ACADEMICS

lobaki™

Mississippi

K-8 Table Of Contents

Catalog Legend

E Accessible within the Engage Library

I Interactive Experience with Built-In Guides & Quizzes (Available with or without Wi-Fi)

MM Accessible via the Math Mania Experience within Engage

IFX Interactable Object Accessible within Engage

LT Interactable Object Accessible within the Lobaki Toolbox

CODE # Code to Launch 360 Experiences in the Virtual Video Viewer

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Mathematics

Science

Social Studies

Interactable Objects

Additional Offerings

2nd Grade

Mathematics

Basic Operations & Reasoning | Adding & Subtracting Within 20

2.OA.1, 2.OA.2 | Adding with Place Value Blocks
Use Place Value Blocks to visualize addition. (2 min) E MM

2.OA.1, 2.OA.2 | Addition with 10 Frames
Use Frames to visualize addition with base 10. (3 min) E MM

2.OA.1, 2.OA.2 | Adding 7+6
Learn how to add 7+6 using the Number Line. (4 min) E MM

2.OA.1, 2.OA.2 | Adding 8+7
Learn how to add 8+7 by making a group of ten. (3 min) E MM

2.OA.1, 2.OA.2 | Subtracting with a Number Line
Use a number line to solve a subtraction problem. (1 min) E MM

2.OA.1, 2.OA.2 | Subtraction Using Place Value Blocks
Use Place Value Blocks to visualize Subtraction. (1 min) E MM

2.OA.1, 2.OA.2, 2.OA.3, 2.OA.4 | Adding with Arrays
Learn to breakdown an array and add with it. (2 min) E MM

2.OA.2, 2.OA.3, 2.OA.4 | Addition Based on Arrays Word Problems
Learn how to use arrays to solve word problems. (2 min) E MM

2.OA.2, 2.OA.3 | Repeated Addition Example: Haircuts
Learn how to solve word problems by adding the same number many times. (2 min) E MM

2.OA.2, 2.OA.3 | Subtraction with 10 Frames
Use Frames to subtract 13-6. (1 min) E MM

2.OA.2, 2.OA.3 | Subtracting 14-6
Learn how to subtract 14-6 by first thinking about subtracting 2 and 4. (4 min) E MM

2.OA.2, 2.OA.3, 2.OA.4 | Addition & Subtraction Word Problems: Gorillas
Use Arrays to solve a word problem about gorillas. (6 min) E MM

2.OA.2, 2.OA.3, 2.OA.4 | Addition & Subtraction Word Problems: Superheroes
Solve a subtraction word problem using deductive reasoning. (4 min) E MM

Basic Operations & Reasoning | Place Value

2.NBT.1 | Intro to Place Values
Learn the Basics of Base 10 Numbers. (3 min) E MM

2.NBT.1 | Identifying Value in Digits
Learn how to identify value in different number digits. (3 min) E MM

2.NBT.1 | Creating the Largest Number
Visual Examples of how to create the largest 3-digit number. (3 min) E MM

2.NBT.1 | Expanded Form of Numbers
Expand numbers to visualize the hundreds, tens, and one's spot of numbers. (3 min) E MM

2.NBT.1 | Number and Word Form of a Number
Expand numbers to visualize the hundreds, tens, and one's spot of numbers. (2 min) E MM

2.NBT.1, 2.NT.3 | Word Form and Expanded Form
Differentiate between expanded word form and expanded number form. (1 min) E MM

2.NBT.2 | Use Place Value Blocks to show Numbers within 1,000
Visualize Place Value to 1,000 by using Place Value Blocks. (4 min) E MM

2.NBT.1, 2. NBT.2 | Counting by 10s
Students learn to count by 10s using visual examples. (2 min) E MM

2.NBT.2 | Place Value Tables within 1,000
Students will use Place Value Tables to visualize place value of 1000. (3 min) E MM

2.NBT.2 | Skip-Counting by 5s
Work on a problem and solve it by skip counting by 5. (2 min) E MM

2.NBT.2 | Skip-Counting by 100s
Learn to count by hundreds in this visual exercise. (3 min) E MM

2.NBT.4 | Greater Than and Less Than Symbols
Learn the greater than symbol and the less than symbol. (5 min) E MM

2.NBT.4 | Comparing Whole Numbers
Learn how to compare whole numbers. (2 min) E MM

2.NBT. 6 | Regrouping Whole Numbers: 675
Visualize how regrouping whole numbers doesn't change the outcome of the number. (4 min) E MM

2.OA.3 | Understanding Even and Odd Numbers Visually
Visually see the difference between even and odd numbers. (4 min) E MM

Basic Operations & Reasoning | Add & Subtract Within 100

2.NBT.5 | Adding 2-Digit Numbers Without Regrouping
Use Place Value to add 2-digit numbers. (2 min) E MM

2.OA.2 | Understanding Place Value when Adding Ones
Learn how to add 37 + 2 by thinking about place value. (2 min) E MM

2.NBT.1 | Understanding Place Value when Adding Tens
Learn how to add 23 + 30 by thinking about place value. (3 min) E MM

2.NBT.7 | Adding with Regrouping
Use Regrouping to Add 35 + 27 in this exercise. (4 min) E MM

2.NBT. 1 | Addition and Subtraction with Number Lines
Learn to see three-digit numbers as hundreds, tens, and ones. (2 min) E MM

2.NBT.5 | Breaking Apart 2-Digit Addition Problems
Visualize different ways to break apart addition problems. (5 min) E MM

2.NBT.5 | Adding 53+17 by Making Groups of 10
Learn addition within a 100 using 53+7. (3 min) E MM

2.NBT.5 | Adding by Making a Group of 10
Using groups of 10 to add. (3 min) E MM

2.NBT.5 | Strategies for Adding 2-Digit Numbers
Visualize different strategies to add 2-digit numbers. (3 min) E MM

2.NBT.5 | Subtracting 1s using Place Value
Learn how to subtract 4 from 46 by thinking about place value. (2 min) E MM

2.NBT.5 | Subtracting 10s using Place Value
Learn how to subtract 40 from 65 by thinking about place value. (2 min) E MM

2.NBT.5 | Subtracting 2-Digit Numbers Without Regrouping
Learn how to subtract 31 from 64 by thinking about tens and ones. (2 min) E MM

2.NBT.5 | Subtracting a 1-Digit Number with Regrouping
Learn how to subtract 35- 8 using regrouping. (3 min) E MM

2.NBT. 7 | Missing Numbers in Addition and Subtraction
Solve a problem with a missing number in the problem. (6 min) E MM

2.NBT.7 | Addition Word Problems: Horses
Solve a word problem about horses using addition. (3 min) E MM

2.NBT.7 | Subtraction Word Problem: Crayons
Solve a subtraction word problem about crayons. (4 min) E MM

2.NBT.7 | Subtraction Word Problem: Basketball
Solve a subtraction problem about basketball. (2 min) E MM

2.NBT.7 | Adding and Subtracting on Number Line Word Problems
Use a number line to solve a word problem. (4 min) E MM

2.NBT.7 | Adding Two Digit Numbers on a Number Line
Use a number line to solve an addition problem with 2-digit numbers. (3 min) E MM

2.NBT.6, 2.NBT.7 | Multi-Step Addition Word Problems
Use addition multiple times to solve a word problem. (4 min) E MM

2.NBT.6, 2.NBT.7 | Multi-Step Subtraction Word Problems
use Subtraction multiple times to solve a word problem. (4 min) E MM

Basic Operations & Reasoning | Add & Subtract within 1,000

2.NBT.7 | Adding 10 or 100
Use place value blocks to add 10s or 100s. (4 min) E MM

2.NBT.1., 2.NBT.5 | Adding 1s, 10s, and 100s
Use place value blocks to add 100s, 10s, and 1s. (4 min) E MM

2.NBT.5 | Adding and Subtracting on Number Line
Learn to add and subtract numbers like 585 and 368 using a number line. (3 min) E MM

2.NBT.5 | Adding 3-Digit Numbers (No Regrouping)
Learn to add 327 + 251 by utilizing place value. (3 min) E MM

2.NBT.5 | Addition using Groups of 10 and 100
Learn to rewrite addition problems to make them easier to solve. (4 min) E MM

2.NBT. 9 | Breaking Apart 3-Digit Addition Problems
Visualize different ways to break up addition problems using place value. (4 min) E MM

2.NBT.1, 2.NBT.5 | Subtracting 1,10, and 100
Learn how to subtract 1s, 10s, and 100s through place value blocks. (4 min) E MM

2.NBT.1, 2.NBT.5 | Subtracting 1s, 10s, and 100s
Learn how to subtract 1s, 10s, and 100s through place value blocks (3 min) E MM

2.NBT.7 | Subtracting 3-Digit Numbers
Learn how to subtract 357-251 with place value blocks. (3 min) E MM

2.NBT.7 | Subtracting with Place Value Blocks (Regrouping)
Learn how to use place value blocks to regroup and subtract 438-272. (3 min) E MM

2.NBT.6 | Adding Four 2-Digit Numbers
Learn how to add 4 2-digit numbers at a time. (3 min) E MM

2.NBT.6 | Adding Multiple 2-Digit Numbers: Word Problems
Solve a word problem by adding multiple 2-digit numbers. (3 min) E MM

Basic Operations & Reasoning | Money & Time

1.MD.5a, 1.MD.5b | Counting American Coins
Learn to differentiate and count American coins. (4 min) E MM

2.MD.8a | Counting Dollars
Learn to differentiate and count American dollars. (3 min) E MM

1.MD.3a, 2.MD.7 | Time on a Number Line
Use a timeline to visualize time. (2 min) E MM

1.MD. 3a, 2.MD.7 | Telling Time (Labeled Clock)
Learn to tell time on an analog clock in this exercise. (3 min) E MM

Geometry | Shapes & Parts of Shapes

2.G.1 | Recognizing Shapes
Learn how to identify circles, triangles, squares, rectangles, rhombuses, and trapezoids. (6 min) E MM

2.G.1 | Cousin Fal's Shape Collection
Learn how to classify shapes based on their number of sides, number of corners, and side-lengths. (4 min) E MM

2.G.1 | Shapes and Angles
Learn about shapes and angles and how to identify them. (3 min) E MM

2.G.3 | Equal Parts of Circles and Rectangles
Learn to identify equal parts of a circle and rectangle. (3 min) E MM

2.G.3 | Partitioning Rectangles Follow along as a rectangle is broken into multiple equal parts up to 2 rows and 5 columns. (3 min) E MM

Measurement & Data | Measurement

2.MD.1 | Getting a Sense of Meters and Centimeters
See how a meter is broken down into centimeters and how they relate to each other. (6 min) E MM

2.MD.1 | Getting a Sense of Inches and Feet
See how a foot is broken down into inches and how they relate to each other. (6 min) E MM

2.MD.1 | Measuring in Inches
Measures a flower in inches. (1 min) E MM

2.MD.1 | Measuring Lengths (cm, m)
Measure various objects with a ruler. (5 min) E MM

2.MD.2 | Measuring lengths in Different Units
Measures the same rectangle in different units and then compares the size of the different units. (3 min) E MM

2.MD.3 | Estimating Lengths
Estimates the length of an object when given the length of another object. (2 min) E MM

2.MD.1, 2.MD.4, 2.OA.1 | Length Word Problem: US Customary
Solve a length word problem example. (4 min) E MM

2.MD.5, 2.OA.1 | Length Word Problem: Chalk Lines
Solve a length word problem with addition and subtraction. (6 min) E MM

Measurement & Data | Data

2.OA.1 | Picture Graphs
A picture graph, or pictograph, is a graph used to display information that uses images or symbols to represent data. (3 min) E MM

2.MD.10 | Making Picture Graphs and Line Plots
To create a line plot, first create a number line that includes all the values in the data set. Next, place an X (or dot) above each data value on the number line. (3 min) E MM

2.MD.10 | Creating a Bar Graph
Create a bar chart using data from a survey. (1 min) E MM

2.MD.10 | Reading Bar Graphs: Bikes
Learn to read and interpret bar graphs. (1 min) E MM

2.MD.10 | Read Line Plots
A line plot is a graph that displays data using a number line. To create a line plot, first create a number line that includes all the values in the data set. Next, place an X (or dot) above each data value on the number line. (4 min) E MM

3rd Grade

Mathematics

Basic Operations & Reasoning | Intro to Multiplication

3.OA.1 | Intro to Multiplication
Follow along as students dive into the concept of multiplication. (3 min) E MM

3.OA.1 | Equal Groups
Find the number of objects in equal groups using skip counting and repeated addition. (3 min) E MM

3.OA.1 | Multiplication as Repeated Addition
Explore the idea of multiplication being the same as repeated addition. (3 min) E MM

3.OA.3 | Multiplication on the Number Line
Uses a number line to represent and solve simple multiplication expressions. (4 min) E MM

3.OA.1 | Multiplication as Equal Groups
Uses arrays and repeated addition to visualize multiplication. (3 min) E MM

3.OA.1 | More Ways to Multiply
Use arrays and repeated addition to multiply. (5 min) E MM

3.OA.1 | Multiplication with Arrays
Explore representing 12 with multiplication. (4 min) E MM

3.OA.1 | Multiplication in Real World Contexts
See how to relate multiplication to real world contexts. (5 min) E MM

3.OA.5 | Commutative Property of Multiplication
Explore what happens when we multiply numbers in different orders. (4 min) E MM

Basic Operations & Reasoning | 1-Digit Multiplication

3.OA.5 | Distributive Property when Multiplying
Use the distributive property to break up 4x7 into smaller numbers. (6 min) E MM

3.OA.5 | Properties and Patterns for Multiplication
Learn to change the order of numbers or decompose numbers to simplify the multiplication problems. (8 min) E MM

Basic Operations & Reasoning | Addition, Subtraction & Estimation

3.NBT.1 | Rounding to the Nearest 10 on the Number Line
Learn to round numbers to the nearest ten using a number line. (9 min) E MM

3.NBT.1 | Rounding to the Nearest 100 on the Number Line
Learn to round numbers to the nearest hundreds using a number line. (7 min) E MM

3.NBT.1 | Rounding to the Nearest 10 and 100
Learn to round up to 4-digit numbers to the nearest ten and hundred. (6 min) E MM

3.NBT.2 | Estimating when Adding Multi-Digit Numbers
Learn about estimating when adding multi-digit numbers. (4 min) E MM

3.NBT.2, 4.NBT.4 | Using Place Value to Add 3-Digit Numbers: Part 1
Explore adding two 3-digit numbers using place value and carrying. (2 min) E MM

3.NBT.2, 4.NBT.4 | Using Place Value to Add 3-Digit Numbers: Part 2
Learn to use regrouping to add 536+398. (2 min) E MM

3.NBT.2, 4.NBT.4 | Adding 3-Digit Numbers
Learn to use regrouping, or carrying to add 709+996, 373+88, and 149+293. (3 min) E MM

3.NBT.2 | Estimating when Subtracting Large Numbers
Use estimation to find reasonable solutions to 2 and 3-digit subtraction problems. (3 min) E MM

3.NBT.2 | Subtraction by Breaking Apart
Solve 2 and 3-digit subtraction problems by breaking apart the numbers by place value. (3 min) E MM

2.NBT.5, 2.NBT.7, 3.NBT.2 | Adding and Subtracting on a Number Line
Add and subtract numbers like 585 and 368 using a number line. (2 min) E MM

3.NBT.2 | Methods for Subtracting 3-Digit Numbers
Subtract 357-156 using place value strategies. (5 min) E MM

3.NBT.2, 4.NBT.4 | Worked Example: Subtracting 3-Digit Numbers
Learn to use regrouping (borrowing) and place value to subtract 971-659. (3 min) E MM

3.NBT.2, 4.NBT.4 | Subtracting 3-Digit Numbers (Regrouping)
Use regrouping (borrowing) and place value to subtract 629-172. (3 min) E MM

3.NBT.2, 4.NBT.4 | Worked Example: Subtracting 3-Digit Numbers (Regrouping Twice)
Use regrouping (borrowing) to subtract 913-286. (4 min) E MM

3.NBT.2, 4.NBT.4 | Worked Example: Subtracting 3-Digit Numbers (Regrouping Twice)
Learn to borrow from a 0 to subtract 301-164. (4 min) E MM

3.NBT.2, 4.NBT.4 | Worked Example: Subtracting 3-Digit Numbers (Regrouping from 0)
Learn to borrow from a 0 to subtract 301-164. (2 min) E MM

3.NBT.2 | Missing Number for 3-Digit Addition within 1,000
Solve for the missing number in problems like ___ + 261 = 630. (4 min) E MM

2.MD.5, 3.NBT.1 | 3-Digit Addition Word Problems
Work through a word problem that involves 3-digit addition. (2 min) E MM

2.MD.5, 3.NBT.1 | 3-Digit Subtraction Word Problems
Work through a word problem that involves 3-digit subtraction. (3 min) E MM

Basic Operations & Reasoning | Intro to Division

3.OA.2 | Division as Equal Groups
Visualize division as equal groups of objects. (4 min) E MM

3.OA.2 | Visualizing Division with Arrays
Use Arrays to represent division expression. (2 min) E MM

3.OA.2 | Division in Context
Learn to relate division expression to real world contexts. (4 min) E MM

3.OA.6 | Relating Division to Multiplication
Learn about the relationship between multiplication and division problems. (3 min) E MM

3.OA.3 | Multiplication Word Problem: Parking Lot
Use a picture and repeated addition to solve a multiplication word problem. (2 min) E MM

3.OA.3, 3.OA.6 | Division Word Problem: School Building
Use a picture and understanding of multiplication to solve a division problem. (4 min) E MM

Basic Operations & Reasoning | More with Mutiplication & Division

3.OA.4 | Unknowns with Multiplication and Division
Find the missing number in multiplication and division equations. (5 min) E MM

3.OA.3 | Multiplication Word Problems: Soda Party
Use a picture and repeated addition to solve a multiplication word problem. (2 min) E MM

3.OA.3 | Division Word Problems: Blueberries
Use a picture and understanding of multiplication to solve a division word problem. (4 min) E MM

3.OA.5 | Associative Property of Multiplication
Explore the associative property of multiplication. (3 min) E MM

3.OA.5 | Properties of Multiplication
Use pictures and practice problems to see commutativity and associativity in multiplication. (5 min) E MM

3.OA.5 | Using Associative Property to Simplify Multiplication
Use the associative property to multiply 2-digit numbers by 1-digit numbers. (4 min) E MM

3.NBT.3 | Multiplying by Multiples of 10
Learn how to decompose multiples of ten to multiply. (3 min) E MM

3.NBT.3 | Multiplying by Tens Word Problems
Learn to multiply by 10s to solve a word problem. (3 min) E MM

Basic Operations & Reasoning | Arithmetic Patterns & Problem Solving

3.OA.8 | Order of Operations (2-Step Expressions)
Learn to evaluate 2-step whole number expressions with different operations. (4 min) E MM

3.OA.8 | 2-Step Estimation Word Problems
Solve 2-step estimation word problems with whole numbers. (3 min) E MM

3. OA.8 | Setting Up 2-Step Word Problems
Learn to represent 2-step word problems with equations. (2 min) E MM

3.OA.8 | 2-Step Word Problems: Truffles
Solve a two-step word problem by drawing a picture and creating an equation. (5 min) E MM

3.OA.8 | 2-Step Word Problems: Running
Solve a two-step word problem by drawing a picture and creating an equation. (3 min) E MM

3.OA.8 | 2-Step Word Problems: Theater
Solve a 2-step word problem by drawing a picture and creating an equation. (3 min) E MM

3.OA.9 | Finding Patterns in Numbers
Learn to identify patterns in number sequences by analyzing three different sequences. (3 min) E MM

3.OA.9 | Recognizing Number Patterns
Explore whole number patterns and their rules, including patterns in tables. (3 min) E MM

3.OA.9 | Intro to Even and Odd Numbers
Learn the difference between even and odd numbers and how they interact when added together. (7 min) E MM

3.OA.9 | Patterns with Multiplying Even and Odd Numbers
Explore the patterns in products when multiplying even and odd numbers. (3 min) E MM

3.OA.9 | Patterns in Hundreds Chart
Explore patterns with the numbers in a hundreds chart. (4 min) E MM

3.OA.9 | Patterns in Multiplication Tables
Explore the multiplication table and work to fill in missing pieces. (5 min) E MM

Basic Operations & Reasoning | Time

3.MD.1 | Telling Time with Number Line
Use a number line to tell time and find the duration of an event. (7 min) E MM

3.MD.1 | Telling Time to the Nearest Minute (Labeled Clock)
Learn to read the time on labeled analog clocks to the nearest minute. (4 min) E MM

3.MD.1 | Telling Time to the Nearest Minute (Unlabeled Clock)
Learn to read the time on unlabeled analog clocks to the nearest minute. (3 min) E MM

3.MD.1, 4.MD.2 | Time Differences Example
Learn to find the difference between the times shown on two different analog clocks. (4 min) E MM

3.MD.1, 4.MD.2 | Time Word Problem: Travel Tme
Learn to work through a word problem involving calculating. (4 min) E MM

3.MD.1, 4.MD.2 | Time Word Problem: Puzzle
Figure out how long it took to solve a puzzle when given the start and finish time. (2 min) E MM

Geometry

3.G.1 | Rhombus Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

3.G.1 | Pentagon Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

3.G.1 | Octagon Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

3.G.1 | Obtuse Isosceles Triangle Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

3.G.1 | Narrow Rhombus Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

3.G.1 | Hexagon Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

3.G.1 | Equilateral Triangle Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

3.G.1 | Acute Isosceles Triangle Tile
Simple geometry manipulatives can be used to teach about shapes and angles or create tessellations. IFX/LT

3.G.1 | Wide Rhombus Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

3.G.1 | Trapezoid Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

3.G.1 | Square Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

Geometry | Area

3.G.1 | Intro to Quadrilaterals
Discover attributes and features of four-sided shapes, including parallelograms, rhombuses, rectangles, and squares. (8 min) E MM

3.MD.5a, 3.MD.5b | Intro to Area and Unit Squares
Explore area by comparing two figures' space on a surface. Using unit square, learn to measure areas, (4 min) E MM

3.MD.5a, 3.MD.6 | Measuring Rectangles with Different Unit Squares
Find areas of a rectangle with different sized units. (3 min) E MM

3.MD.6, 3.MD.7a | Creating Rectangles with a Given Area 1
Learn to create a rectangle with a given area. (3 min) E MM

3.MD.6, 3.MD.7a | Creating Rectangles with a Given Area 2
Learn to create a rectangle that has the same area (but different side lengths) than a given rectangle. (3 min) E MM

3.MD.7a | Counting Unit Squares to Find Area Formula
Learn to use unit squares to see why multiplying side-lengths can also find the area of rectangles. (5 min) E MM

3.MD.7a | Transitioning from Unit Squares to Area Formula
Learn to find the area of a rectangle both by counting unit squares and multiplying side lengths. (3 min) E MM

3.MD.7b | Finding Missing Side when Given Area
Find the missing length on a rectangle when given the area of the rectangle. (3 min) E MM

3.MD.7b | Comparing Areas of Plots of Land
Find the area of two rectangles to solve a word problem. (3 min) E MM

3.MD.7c | Area and the Distributive Property
Use the distributive property to find area of rectangles. (4 min) E MM

3.MD.7d | Decomposing Shapes to Find Area: Grids
Find the area of an irregular shape by decomposing it into 2 rectangles. (3 min) E MM

3.MD.7d | Decomposing Shapes to Find Area: Add
Find the area of an irregular 10-sided shape by breaking it into smaller rectangles. (3 min) E MM

3.MD.7d | Decomposing Shapes to Find Area: Subtract
Find the area of an irregular shape by decomposing it into 2 rectangles and subtracting the area of the rectangles. (3 min) E MM

Geometry | Perimeter

3.MD.8 | Perimeter: Introduction
Perimeter is a math concept that measures the total length around the outside of a shape. (3 min) E MM

3.MD.8 | Perimeter of a Shape
Learn to find the perimeter of a shape. (2 min) E MM

3.MD.8 | Finding Perimeter when a Side Length is Missing
Learn to find perimeter of a shape by using the clues to figure out the length of a side if it isn't labeled. (3 min) E MM

3.MD.8 | Finding Missing Side Length when Given Perimeter
Learn to find the lengths of unknown sides on a shape by using the given perimeter and the lengths of known sides. (5 min) E MM

3.MD.8 | Perimeter Word Problem: Tables
Solves a perimeter word problem that involves combining two perimeters. (4 min) E MM

3.MD.8 | Perimeter Word Problem: Skating Rink
Solve a word problem involving perimeter of a rectangle. (3 min) E MM

3.MD.8 | Comparing Areas and Perimeters of Rectangles
Compare the areas and perimeters of rectangles to a given rectangle. (5 min) E MM

Fractions, Decimals, Percents & Ratios | Understanding Fractions

3.G.2, 3.NF.1 | Intro to Fractions
Visualize how to divide wholes into equal-sized pieces to create unit fractions. (4 min) E MM

3.G.2, 3.NF.1 | Cutting Shapes into Equal Parts
Visualize and explore how cutting shapes into parts equal a fraction of the object. (2 min) E MM

3.G.2, 3.NF.1 | Identifying Unit Fractions Word Problem
Solve a word problem by using a unit fraction. (2 min) E MM

3.NF.1 | Fractions in Contexts
Use fractions to represent real-world contexts. (4 min) E MM

3.NF.1 | Identifying Numerators and Denominators
Identifying numerators and denominators in fractions. (2 min) E MM

3.NF.1 | Recognize Fractions
Use fractions to name parts of a whole. (4 min) E MM

3.NF.1 | Recognizing Fractions Greater than 1
Use fraction models to identify a fraction greater than 1. (1 min) E MM

3.NF.2a, 3.NF.2b | Relating Number Lines to Fraction Bars
Learn to use fraction bars to show fractions on a number line. (3 min) E MM

3.NF.2a, 3.NF.2b | Fractions on a Number Line
Explore how to represent fractions on a number line. (4 min) E MM

3.NF.3c | Finding 1 on the Number Line
Locate 1 on a number line labeled with 0 and a unit fraction. (2 min) E MM

3.NF.3c | Fractions Greater than 1 on the Number Line
Use a number line to plot fractions greater than 1. (3 min) E MM

3.NF.3c | Representing 1 as a Fraction
Explore various ways to represent the number 1 as a fraction, like 1/1, 2/2, and 3/3. (4 min) E MM

3.NF.3c | Relating Fractions to 1
Use 1 as a benchmark for identifying fractions greater than or less than 1. (3 min) E MM

3.NF.3c | Whole Numbers as Fractions
Explore how to represent whole numbers as fractions. (4 min) E MM

3.NF.3c | Writing Whole Numbers as Fractions
Learn how to represent fractions as whole numbers and whole numbers as fractions. (2 min) E MM

Fractions, Decimals, Percents & Ratios | Equivalent Fractions & Comparing Fractions

3.NF.3d | Comparing Fractions with > and < Symbols
Explore and learn how to compare fractions. (5 min) E MM

3.NF.3d | Comparing Fractions Visually
Learn to compare fractions by graphing them a number line and drawing fraction models. (4 min) E MM

3.NF.3d | Comparing Fractions with the Same Denominator
Learn to compare fractions with the same denominator. (3 min) E MM

3.NF.3d | Comparing Unit Fractions
Compare fractions by visualizing them as parts of a whole. (3 min) E MM

3.NF.3d | Comparing Fractions with the Same Numerator
Compare fractions with the same numerator visually. (4 min) E MM

3.NF.3d, 4.NF.2 | Comparing Fractions of Different Wholes: Part 1
Utilize visual fraction models to compare fractions. (5 min) E MM

3.NF.3d, 4.NF.2 | Comparing Fractions of Different Wholes: Part 2
Utilize visual fraction models to compare fractions. (3 min) E MM

3.NF.3a, 3.NF.3b | Equivalent Fractions with Visuals
Learn to use same-sized wholes to show equivalent fractions. (6 min) E MM

3.NF.3a, 3.NF.3b | Equivalent Fraction Models
Use same-sized wholes to show equivalent fractions. (4 min) E MM

3.NF.3a | Equivalent Fractions Visually
Use number lines and fraction models to show equivalent fractions. (4 min) E MM

3.NF.3b | Creating Equivalent Fractions
Learn about equivalent fractions. (4 min) E MM

Measurement & Data | Measuring Mass & Volume

3.MD.2 | Understanding Mass (Grams and Kilograms)
Learn about what mass means and examine the masses of real objects. (7 min) E MM

3.MD.2 | Word Problems with Mass
Solve word problems involving mass. (4 min) E MM

3.MD.2 | Understanding Volume (Liters)
Learn about what volume means and examine the masses of real objects. (5 min) E MM

3.MD.2 | Word Problems with Volume
Solve a word problem using volume. (4 min) E MM

Measurement & Data | Represent & Interpret Data

3.MD.3 | Creating Picture and Bar Graphs
Create and interpret bar and picture graphs. (5 min) E MM

3.MD.3 | Solving Problems with Picture Graphs
Use picture graphs to solve word problems. (4 min) E MM

3.MD.3 | Interpreting Picture Graphs: Paint
Solve a multi-step word problem utilizing a picture graph. (2 min) E MM

3.MD.3 | Interpreting Picture Graphs: Notebook
Solve a multi-step word problem utilizing a picture graph. (4 min) E MM

3.MD.3 | Reading Bar Graphs: Movies
Interpret bar graphs to answer questions about a context. (4 min)

3.MD.3 | Interpreting Bar Graphs: Colors
Solve a multi-step word problem using a bar graph. (4 min) E MM

3.MD.4 | Measuring Lengths to the Nearest 1/4 Unit
Use a ruler to measure lengths to the nearest 1/4 unit. (2 min) E MM

3.MD.3 | Graphing Data on Line Plots
Learn about measurements on line plots, also called dot plots. (5 min) E MM

3.MD.3 | Interpreting Line Plots with Fractions
Interpret data on line plots to the nearest 1/4 unit with some unlabeled tick marks. (4 min) E MM

Science

Earth & Space Science

E.3.7B | Earth Cutaway
A model of Earth with a section cut away to expose its layers. IFX/LT

E.3.7B | Earth Cutaway Info
An Infographic model of Earth with a section cut away to expose its layers. IFX/LT

E.3.7B.3 | Grand Canyon
Explore the Grand Canyon from different observation decks around the natural wonder. (unlimited) E

E.3.9 | Cloud Climb
Explore how clouds, atmosphere, and weather all come together to create different aspects of the Earth's sky. (unlimited) E/I

Life Science

L.3.2 | Glow Worm Caves of New Zealand
Deep below ground, you will learn about strange carnivorous worms. (2 min) 191

L.3.4 | How Animals See the World
Experience how different animals see the world. Includes a human, cat, dog, fly, rat, and snake's point of view. (4 min) 207

L.3.4.5 | Attenborough and the Giant Dinosaur
Learn all about the Titanosaur with David Attenborough. (4 min) 35

L.3.4.5 | Giraffatitan Dinosaur: Back to Life in 360 VR
Encounter the Jurassic giant Giraffatitan, one of the tallest dinosaurs that ever lived, and learn all about how it lived and who its descendants are. (4 min) 188

L.3.4.5 | Rhomaleosaurus Sea Dragon: Back to Life in 360 VR
Encounter the prehistoric sea dragon Rhomaleosaurus, as it roams the gallery over 180 million years after it died. (4 min) 328

L.3.4.5 | VR Jurassic Dinosaur
Explore what life was like during the age of the dinosaur. (3 min) 426

Physical Science

P.3.5 | Gas in Tank
Gas particles that move randomly inside a tank. IFX/LT

P.3.5 | Liquid Particles in Tank
Liquid particles that move randomly inside a tank. IFX/LT

P.3.5 | Solid Particle Arrangement
Rotating cube of crystalline atomic structure. IFX/LT

P.3.5 | Elementary Particle Swarm
Protons, neutrons, and electrons move around randomly. IFX/LT

P.3.6 | Magnet - Like Poles
Animated visualization of two bar magnets with like poles repelling each other. IFX/LT

P.3.6 | Magnet - Opposite Poles
Animated visualization of two bar magnets attracting each other. IFX/LT

P.3.6 | Magnet - Single Bar
Animated visualization of the electromagnetic field surrounding a single bar magnet. IFX/LT

P.3.6 | Magnet - Two Bars
Animated visualization of the electromagnetic field surrounding two bar magnets. IFX/LT

P.3.6 | Magnet - Horseshoe
Animated visualization of the electromagnetic field surrounding a horseshoe magnet. IFX/LT

Social Studies

Civil Rights

CR.3.2 | Civil Rights Museum
Five Civil Rights leaders - Rosa Parks, John Lewis, Martin Luther King Jr., Thurgood Marshall, and Medgar Evers - come to life and teach you their stories on interactive stages. (unlimited) E/I

CR.3.3 | Independence Hall
Join George Washington, John Adams, Thomas Jefferson, Benjamin Franklin, and John Hancock as they come to life to tell you their stories about the founding of the United States. (unlimited) E/I

Economics

E.3.3 | 360 Farm Tour: It Starts with a Seed
Follow a fifth-generation farmer and see the challenges farmers face, solutions that technology offers, and ultimately the fruits of labor that will transform into food, feed, and fuel. Part 1 (6 min) 5

E.3.3 | 360 Farm Tour: As the Corn Grows
Follow a fifth-generation farmer and see the challenges farmers face, solutions that technology offers, and ultimately the fruits of labor that will transform into food, feed, and fuel. Part 2 (4 min) 6

E.3.3 | 360 Farm Tour: Harvesting the Corn
Follow a fifth-generation farmer and see the challenges farmers face, solutions that technology offers, and ultimately the fruits of labor that will transform into food, feed, and fuel. Part 3 (4 min) 7

E.3.3 | 360 Farm Tour: Protecting the Corn

Follow a fifth-generation farmer and see the challenges farmers face, solutions that technology offers, and ultimately the fruits of labor that will transform into food, feed, and fuel. Part 4 (4 min) 8

E.3.3 | Story of Oats

In this 360 video tour, you'll get to see how oats are transformed from a plant in the field to the food on your table. (6 min) 369

E.3.3 | Weaving Around the World

Follow the process of weaving that has been developed across cultures for thousands of years. From Venice to Addis Ababa, and the West Bank to the Navajo Nation Reservation. (4 min) 437

Geography

G.3.1 | Climbing the Redwoods - Fight for the Forests

Climb 200 feet up 'Grandfather,' the highest Redwood in a Northern California Grove while learning about the Redwood Forest and preservation efforts. (2 min) 79

G.3.1 | Protecting Ocean Anchor Species - Racing Extinction

Join marine biologist Luke Tipple as he swims alongside manta rays and whale sharks while sharing why they are vital to the survival of our oceans. (3 min) 315

G.3.1 | Rescuing Rhinos - Racing Extinction

Join a conservation biologist on an interactive mission to learn how animals critical to the world's ecosystem thrive and survive in the wild. (5 min) 323

G.3.1 | The Fight to Save Threatened Species

Get closer than ever before to the most extraordinary creatures on the planet. Whale sharks, rhinos, elephants, manta rays, and lions are all threatened with extinction. (2 min) 388

G.3.2 | Volcano

Experience an erupting volcano. IFX/LT

G.3.2 | After the Floods: Rebuilding Ellicott City

Take an immersive journey through the flooding, aftermath, and reconstruction of Ellicott City, Maryland to give a new perspective on the damage done by flooding. (6 min) 25

G.3.2 | Chennai Floods Aftermath

Take an immersive journey through the impact, rescue, and reason for the floods that occurred in Chennai, India, in December 2015. (6 min) 76

G.3.2 | Kamchatka Volcano Eruption

National Geographic VR takes you to the rim of a spectacular erupting volcano: Klyuchevskoy, one of the tallest and most active volcanoes on the planet. (2 min) 228

G.3.2 | Life in Haiti: After a Devastating Natural Disaster

Join filmmaker Dylan Roberts on a journey to the Haitian city of Jérémie, and the small village of Manish, to witness the aftermath of a colossal storm. (5 min) 258

G.3.2 | Category 3 Hurricane Landfall Simulation

Experience a category 3 hurricane through a simulation with guided popups. (1 min) 74

G.3.2 | Earthquake VR Experience

Be exposed to a virtual earthquake that provides a life-like training experience, without an actual earthquake. (2 min) 115

G.3.2 | Expedition to the Heart of an Active Volcano

Join a group of climbers as they embark on a scientific exploration into an active volcano. (5 min) 129

G.3.2 | Close-Range Tornado

Get up close and personal with a tornado near Wray, CO from May 7th, 2016. (8 min) 80

G.3.2 | Boston Snowstorm from Bunker Hill Monument

Watch a major winter storm move through the city of Boston in this time-lapse from the top of Bunker Hill Monument. (3 min) 56

G.3.2 | Inside Hurricane Maria

Watch Hurricane Maria change from a category 1 to a category 5 in about 24 hours. (5 min) 220

G.3.3 | Nuclear Site

Explore a replica of an underground bunker, a nuclear control room found at Three Mile Island, and a replication of a nuclear power plant with a model of a turbine set. (unlimited) E/I

History

H.3.3 | Civil Rights Museum

Five Civil Rights leaders - Rosa Parks, John Lewis, Martin Luther King Jr., Thurgood Marshall, and Medgar Evers - come to life and teach you their stories on interactive stages. (unlimited) E/I

4th Grade

Mathematics

Basic Operations & Reasoning | Place Value

4.NBT.2 | Place Value Blocks
Identify numbers represented by place value blocks. (6 min) E MM

4.NBT.2 | Place Value Tables
Learn about how to use a place value table to break up a number. (2 min) E MM

4.NBT.2 | Finding Place Value
Find the place value of 3 in 4356. (2 min) E MM

4.NBT.1, 4.NBT.2 | Creating the Largest Number
Learn how to arrange digits to make the largest possible number. (2 min) E MM

4.NBT.2 | Writing a Number in Expanded Form
Learn to write 14,897 in expanded form. (5 min) E MM

4.NBT.2 | Writing Numbers in Words and Standard Form
Write whole numbers in words and write numbers in word form and standard form. (5 min) E MM

4.NBT.2 | Regrouping Whole Number Place Values
Learn to regroup whole numbers by their place values. (6 min) E MM

4.NBT.2 | Regrouping Numbers into Various Place Values
Visualize different ways to regroup 4500. (2 min) E MM

4.NBT.2 | Adding Whole Numbers by Their Place Values
Learn to add numbers like 19 thousands + 7 tens by thinking about their place values. (6 min) E MM

4.NBT.1 | Multiplying Whole Numbers by 10
Visualize a pattern from multiplying whole numbers by 10. (7 min) E MM

4.NBT.1 | Dividing Whole Numbers by 10
Visualize a pattern from dividing whole numbers by 10. (7 min) E MM

4.NBT.1 | Understanding Place
Learn how a digit in one place represents ten times what it represents in the place to its right. (3 min) E MM

4.NBT.1 | Place Value when Multiplying and Dividing by 10
Learn how multiplying and dividing by 10 affects place value. (5 min) E MM

4.NBT.2 | Comparing Multi-Digit Numbers
Learn to compare multi-digit numbers such as 350,000 and 53,000. (6 min) E MM

4.NBT.2 | Comparing Whole Number Place Values
Learn to compare whole numbers written in expanded form, written form, and number form. (2 min) E MM

Basic Operations & Reasoning | Addition, Subtraction, & Estimation

4.NBT.3 | Rounding Whole Numbers to Nearest Hundred
Learn to round 24,259 to the nearest hundred. (4 min) E MM

4.NBT.3 | Rounding Whole Numbers to Nearest Thousand
Learn to round 423,275 to the nearest Thousand. (2 min) E MM

4.NBT.3 | Rounding Whole Numbers: Missing Digit
Find the missing digit in an estimation problem by using a number line. (6 min) E MM

4.NBT.3 | Rounding Whole Numbers Word Problems
Solve word problem by rounding whole numbers to the nearest ten, hundred, or thousand. (3 min) E MM

4.NBT.4 | Relate Place Value to Standard Algorithm for Multi-Digit Addition
Learn to transition from a place value chart to standard algorithm when adding multi-digit numbers. (6 min) E MM

4.NBT.4 | Adding Multi-Digit Numbers: 48,029+233,930
Learn to add 48,029+233,930 using the standard algorithm. (2 min) E MM

4.NBT.4 | Relate Place Value to Standard Algorithm for Multi-Digit Subtraction
Learn to transition from a place value chart to standard algorithm when subtracting multi-digit numbers. (6 min) E MM

4.NBT.4 | Multi-Digit Subtraction: 389,002-76,151
Learn to subtract 389,002-76,151 using the standard algorithm. (3 min) E MM

Basic Operations & Reasoning | Multiply by 1-Digit Numbers

4.OA.1 | Comparing with Multiplication
Learn to represent multiplication equations as comparisons. (3 min) E MM

4.OA.1, 4.OA.3 | Comparing with Multiplication and Addition: Giraffe
Learn to solve two multiplication comparison word problems. (5 min) E MM

4.OA.1 | Comparing with Multiplication and Addition: Money
Learn to solve two multiplication comparison word problems. (7 min) E MM

4.OA.1 | Comparing with Multiplication: Magic
Solve a multiplication comparison word problem with Harry Potter characters. (1 min) E MM

4.NBT.5 | Multiplying 1-Digit Numbers by 10, 100, and 1000
Learn to find a pattern from multiplying 1-digit numbers by 10, 100, and 1000. (6 min) E MM

4.NBT.5 | Multiplying 1-Digit Numbers by Multiples of 10, 100, and 1000
Learn to find a pattern from multiplying 1-digit numbers by multiples of 10, 100, and 1000. (8 min) E MM

4.NBT.5 | Using Area Model and Properties to Multiply
Learn to use place value, the distributive property, associative property, and an area model to show more ways to multiply. (6 min) E MM

4.NBT.5 | Estimating with Multiplication
Learn to use an area model to multiply 6x7981. (3 min) E MM

4.NBT.5 | Multiplying 2-Digits by 1-Digit with Partial Products
Learn to estimate to find reasonable products to 1-digit by 2, 3, and 4-digit multiplication expressions. (4 min) E MM

4.NBT.5 | Multiplying 3-Digit by 1-Digit
Learn to multiply a 3-digit number by a 1-digit number without regrouping. (2 min) E MM

4.NBT.5 | Multiplying 3-Digit by 1-Digit (Regrouping)
Learn to multiply a 3-digit number by a 1-digit number using regrouping. (2 min) E MM

Basic Operations & Reasoning | Multiply by 2-Digit Numbers

4.NBT.5 | Multiplying 10s
Learn to multiply multiples of 10 by other multiples of 10, such as 30x50. (5 min) E MM

4.NBT.5 | Multiplying with Area Model: 16 x 27
Learn to use an area model to multiply 16x27. (9 min) E MM

4.NBT.5 | Multiplying with Area Model: 78 x 65
Learn to use an area model to multiply 78x65. (5 min) E MM

4.NBT.5 | Estimating 2-Digit Multiplication
Learn to estimate to find reasonable products to 2-digit multiplication expressions. (3 min) E MM

4.NBT.5 | Multiplying Two 2-digit Numbers Using Partial Products
Learn to use the distributive property to find each part of the product to get the whole product. (5 min) E MM

4.NBT.5 | Multiplying 2-Digit Numbers
Learn to multiply 2-digit numbers. (4 min) E MM

Basic Operations & Reasoning | Division

4.NBT.6 | Estimating Division that Results in Non-Whole Numbers
Use estimation to find quotients that are non-whole numbers. (4 min) E MM

4.NBT.6 | Introduction to Remainders
Visualize and learn how a remainder is what's left over in a division problem. (5 min) E MM

4.NBT.6 | Quotients that are Multiples of 10
Visulize how to break down division problems using multiples of 10. (6 min) E MM

4.NBT.6 | Division Using Place Value
Learn to use an understanding of place value to divide 5600÷8 and 846÷2. (8 min) E MM

4.NBT.6 | Division with Area Models
Use area models to divide 268÷2 and 856÷8. (8 min) E MM

4.NBT.6 | Estimating Quotients
Solve using estimation to determine if quotients are reasonable or unreasonable. (4 min) E MM

4.NBT.6 | Introduction to Division with Partial Quotients (No Remainder)
Learn to divide multi-digit numbers by a single-digit numbers using partial quotients. (6 min) E MM

4.NBT.6 | Division with Partial Quotients (Remainder)
Learn to divide multi-digit numbers by single-digit numbers using partial quotients. (7 min) E MM

4.NBT.6 | Intro to Long Division (No Remainders)
Visualize how to do long division with the problem 96 ÷4. (3 min) E MM

4.OA.3 | Division Word Problem: Field Goals
Work to solve a division word problem involving field goals. (3 min) E MM

4.OA.3 | Multiplication Word Problem: Pizza
Work to solve a multiplication word problem about pizza. (3 min) E MM

4.OA.3 | 2-Step Estimation Word Problem
Learn to use estimation to solve multi-step word problems involving addition, subtraction, multiplication, and division. (3 min) E MM

Basic Operations & Reasoning | Factors, Multiples, & Patterns

4.OA.4 | Understanding Factor Pairs
Use multiplication and an understanding of area to identify factor pairs for 6 and 16. (4 min) E MM

4.OA.4 | Finding Factors of a Number
Identify the factors of 120. (10 min) E MM

4.OA.4 | Reasoning about Factors and Multiples
Use the equation 3x5=15 to understand the relationship between factors and multiples. (2 min) E MM

4.OA.4 | Finding Factors and Multiples
Use divisibility rules to determine if numbers are factors of 154 and then finds multiples of 14. (4 min) E MM

4.OA.4 | Identifying Multiples
Use skip counting and division to identify multiples of 9. (4 min) E MM

4.OA.4 | Prime Numbers
Identify that prime numbers are numbers that have only 2 factors: 1 and themselves. (8 min) E MM

4.OA.4 | Recognizing Prime and Composite Numbers
Learn to recognize prime numbers in a group of numbers and if it is prime, composite or neither. (5 min) E MM

4.OA.5 | Factors and Multiples: Days of the Week
Learn to use factors and multiples to figure out days of the week. (5 min) E MM

4.OA.5 | Math Patterns: Table
Visualize and identify a pattern with the number of seats at a table. (4 min) E MM

4.OA.5 | Math Patterns: Toothpicks
Visualize and explore a pattern of creating figures with toothpicks. (6 min) E MM

Geometry

4.G.1, 4.G.2, 4.G.3 | Rhombus Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.G.1, 4.G.2, 4.G.3 | Pentagon Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.G.1, 4.G.2, 4.G.3 | Octagon Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.G.1, 4.G.2, 4.G.3 | Obtuse Isosceles Triangle Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.G.1, 4.G.2, 4.G.3 | Narrow Rhombus Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.G.1, 4.G.2, 4.G.3 | Hexagon Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.G.1, 4.G.2, 4.G.3 | Equilateral Triangle Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.G.1, 4.G.2, 4.G.3 | Acute Isosceles Triangle Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.G.1, 4.G.2, 4.G.3, 4.MD.5, 4.MD.6, 4.MD.7 | Wide Rhombus Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.G.1, 4.G.2, 4.G.3 | Trapezoid Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.G.1, 4.G.2, 4.G.3 | Square Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.G.1, 4.G.2, 4.G.3 | Protractor
At-scale measuring tool for measuring angles. Designed to be used with geometric tiles, or as a general teaching/training tool. IFX/LT

Geometry | Plane Figures

4.G.1 | Terms & Labels in Geometry
Explore geometry fundamentals, including points, line segments, rays, and lines. (13 min) E MM

4.G.1 | Lines, Line Segments, & Rays
Learn the difference between lines, line segments, and rays. (3 min) E MM

4.MD.5 | Angles: Introduction
Learn about angles and the parts of an angle, like the vertex. (7 min) E MM

4.MD.5 | Naming Angles
Learn to name angles based on their vertex and endpoints. (2 min) E MM

4.MD.5 | Identifying an Angle
Identify pictures of angles to their degrees. (2 min) E MM

4.G.1 | Acute, Right, & Obtuse Angles
Learn about angle types and see examples of each. (5 min) E MM

4.G.1 | Recognizing Angles
Identify acute, obtuse, and right angles in diagrams and pictures. (2 min) E MM

4.G.1 | Drawing Acute, Right and Obtuse Angles
Learn how to draw acute, right, and obtuse angles with given points. (3 min) E MM

4.G.1 | Parallel & Perpendicular Lines Intro
Learn how to identify parallel and perpendicular lines. (2 min) E MM

4.G.1 | Parallel & Perpendicular Lines
Learn to identify parallel lines and perpendicular lines. (3 min) E MM

4.G.1 | Drawing Parallel Line Segments
Use given points to draw parallel line segments. (2 min) E MM

4.G.2 | Classifying Triangles
Explore how triangles are classified based on their sides and angles. (6 min) E MM

4.G.2 | Classifying Triangles by Angles
Learn how to categorize a triangle by its angles vs. the length of the sides. (6 min) E MM

4.G.2 | Worked Example: Classifying Triangles
Work through sample problems categorizing triangles as scalene, isosceles, equilateral, acute, right, or obtuse. (2 min) E MM

4.G.2 | Classifying Shapes by Line and Angle Types
Learn to categorizes shapes based on their sides and angles. (2 min) E MM

4.G.2, 5.G.4 | Quadrilateral Properties
Learn about the properties of quadrilaterals, parallelograms, trapezoids, rhombuses, rectangles, and squares. (5 min) E MM

4.G.2 | Classifying Shapes by Lines and Angles
Learn to classify a shape based on hints about its sides and angles. (4 min) E MM

4.G.3 | Intro to Reflective Symmetry
Introduction to the concept of an "axis of symmetry". (3 min) E MM

4.G.3 | Identifying Symmetrical Figures
Learn to identify lines of symmetry on three shapes. (6 min) E MM

Geometry | Measuring Angles

4.MD.5z, 4.MD.5b | Angle Measurement & Circle Arcs
Learn to measure angles as part of a circle. (8 min) E MM

4.G.1, 4.MD.5a, 4.MD.5b, 4.MD.6 | Measuring Angles with a Circular Protractor
Use a circular protractor to measure angles. (2 min) E MM

4.MD.5a, 4.MD.5b | Angles in Circles Word Problem
Solve word problems about angles as part of a circle. (3 min) E MM

4.MD.6 | Measuring Angles in Degrees
Learn how to measure an angle with a protractor. (8 min) E MM

4.MD.6 | Measuring Angles Using a Protractor
Learn to use a virtual protractor to measure angles. (3 min) E MM

4.MD.6 | Measuring Angles Using a Protractor 2
Use a protractor to measure several angles. (4 min) E MM

4.MD.5b, 4.MD.6 | Constructing Angles
Use a protractor to create 10° and 155° angles. (3 min) E MM

4.MD.7 | Decomposing an Angle
Find the measure of angles by adding or subtracting. (2 min) E MM

4.MD.7 | Decomposing Angles
Find the measure of angles using addition. (3 min) E MM

Geometry | Area & Perimeter

4.MD.3 | Area & Perimeter Word Problem: Dog Pen
Figure out the width of a dog pen in this word problem. (3 min) E MM

4.MD.3 | Area & Perimeter Word Problem: Table
Solve this word problem and find the dimension of a table. (5 min) E MM

4.MD.3 | Comparing Areas Word Problem
Compare the area of two posters using their side-lengths. (3 min) E MM

Fractions, Decimals, Percents, & Ratios | Equivalent Fractions & Comparing Fractions

4.NF.1 | Equivalent Fractions with Models
Learn to use fraction models and tape diagrams to help identify equivalent fractions. (6 min) E MM

4.NF.1 | Equivalent Fractions on Number Lines
Learn to use a number line to help identify equivalent fractions with different denominators. (5 min) E MM

4.NF.1 | Equivalent Fractions
Learn how equivalent fractions represent the same amount, even with different numerators and denominators. (4 min) E MM

4.NF.1 | More on Equivalent Fractions
Learn to use fraction models and multiplication to find equivalent fractions. (5 min) E MM

3.NF.3d, 4.NF.2 | Equivalent Fractions and Different Wholes
Visualize that two fractions are equivalent only if they refer to the same whole. (6 min) E MM

3.NF.3d, 4.NF.2 | Comparing Fractions of Different Wholes
Learn to compare fractions of different wholes. (5 min) E MM

4.NF.2 | Finding Common Denominators
Learn how to use the least common multiple of the denominators to rewrite fractions, making them easier to compare or add. (5 min) E MM

4.NF.2 | Common Denominators: 1/4 and 5/6
Learn how to find common denominators for fractions with different numerators and denominators by identifying multiples of the original denominators. (8 min) E MM

4.NF.2 | Common Denominators: 3/5 and 7/2
Visualize how to rewrite fractions with different denominators as equivalent fractions with a common denominator. (4 min) E MM

4.NF.2 | Comparing Fractions: Tape Diagram
Learn to compare fractions with unlike denominators by drawing bars. (2 min) E MM

4.NF.2 | Comparing Fractions: Number Line
Learn to compare fractions on a number line. (3 min) E MM

4.NF.2 | Comparing Fractions: Fraction Models
Learn to compare fractions visually with pies. (3 min) E MM

4.NF.2 | Comparing Fractions 1 (Unlike Denominators)
Learn to compare fractions by finding a common denominator. (4 min) E MM

4.NF.2 | Comparing Fractions Word Problems
Work to compare fractions using real-world contexts. (5 min) E MM

Fractions, Decimals, Percents, & Ratios | Add & Subtract Fractions

4.NF.3b | Decomposing a Fraction Visually
Use a tape diagram to decompose 7/9. (5 min) E MM

4.NF.3b | Decomposing a Mixed Number
Use fraction models to decompose 2 1/4. (5 min) E MM

4.NF.3a | Adding Fractions with Like Denominators
Learn to add 3/15 + 7/15. (3 min) E MM

4.NF.3a | Subtracting Fractions with Like Denominators
Learn to subtract 8/18-5/18. (3 min) E MM

4.NF.3d | Fraction Word Problem: Piano
Solve a fraction word problem about practicing piano. (3 min) E MM

4.NF.3d | Fraction Word Problem: Pizza
Solve a fraction model to figure out what fraction of a pizza is left. (5 min) E MM

4.NF.3d | Fraction Word Problem: Spider Eyes
Solve a fraction word problem about spider eyes. (2 min) E MM

4.NF.3d | Writing Mixed Numbers as Improper Fractions
Visualize how to rewrite 5 1/4 as an improper fraction. (7 min) E MM

4.NF.3d | Writing Improper Fractions as Mixed Numbers
Visualize how to rewrite 7/4 as a mixed number. (4 min) E MM

4.NF.3c | Adding Mixed Numbers with Like Denominators
Visualize adding mixed numbers with common (like) denominators. (3 min) E MM

4.NF.3c | Subtracting Mixed Numbers with Like Denominators
Visualize subtracting mixed numbers with common (like) denominators. (2 min) E MM

4.NF.3c | Mixed Number Addition with Regrouping
Learn to use regrouping to add mixed numbers with common (like) denominators. (4 min) E MM

4.NF.3c | Subtracting Mixed Numbers with Regrouping
Learn to use regrouping to subtract mixed numbers with common (like) denominators. (3 min) E MM

4.NF.3d | Fraction Word Problem: Lizard
Solve a fraction word problem about the length of a lizard. (2 min) E MM

4.NF.3c | Subtracting Mixed Numbers with Like Denominators Word Problem
Solve a word problem involving mixed number subtraction by using a visual model. (3 min) E MM

4.NF.5 | Visually Converting Tenths and Hundredths
Learn to rewrite 8/10 with a denominator of 100. (4 min) E MM

4.NF.5 | Decomposing Hundredths
Learn to decompose 47/100 into tenths and hundredths. (4 min) E MM

4.NF.5 | Decomposing Hundredths on Number Line
Visualize how to decompose 26/100 into tenths and hundredths using a number line. (2 min) E MM

4.NF.5 | Adding Fractions (Denominators 10 & 100)
Learn to add 3/10+7/100 by finding a common denominator. (5 min) E MM

4.NF.5 | Adding Fractions: 7/10+13/100
Use visual models to add 7/10 and 13/100. (3 min) E MM

4.MD.4 | Making Line Plots with Fractional Data
Use a line plot to represent data sets. (3 min) E MM

4.MD.4 | Interpreting Line Plots with Fractions
Use a Line plot to visualize the difference between two numbers. (3 min) E MM

4.MD.4 | Reading a Line Plot with Fractions
Explore the concept of interpreting data on line plots, particularly focusing on how to read and understand line plots that display measurements in fractions. (3 min) E MM

Fractions, Decimals, Percents, & Ratios | Multiply Fractions

4.NF.4b, 5.NF.4a, 5.NF.4b | Multiplying Fractions and Whole Numbers Visually
Visually represents this process and practices understanding the relationship between fractions and whole numbers in multiplication. (4 min) E MM

4.NF.4a, 4.NF.4b | Fraction Multiplication on the Number Line
Use number lines to help solve multiplication equations. (3 min) E MM

4.NF.4b | Equivalent Fractions and Whole Number Multiplication Problems
Learn to relate mixed numbers to whole number/fraction multiplication problem. (3 min) E MM

4.NF.4a, 5.NF.4b | Multiplying Unit Fractions and Whole Numbers
Learn how to multiply a whole number by a fraction, using both visual and computational methods. (3 min) E MM

4.NF.4a, 4.NF.4b | Multiplying Mixed Numbers by Whole Numbers
Use repeated addition to help multiply a whole number by a mixed number. (3 min) E MM

4.NF.4c, 5.NF.6 | Multiplying Fractions Word Problem: Milk
Solve a multiplication Fraction Word Problem about Milk. (2 min) E MM

4.NF.4c, 5.NF.6 | Multiplying Fractions Word Problem: Movies
Solve a multiplication fraction word problem about movies. (4 min) E MM

4.NF.4c | Multiplying Fractions by Whole Numbers Word Problem
Solve a word problem that involves multiplying a fraction by a whole number. (3 min) E MM

Fractions, Decimals, Percents, & Ratios | Understanding Decimals

4.NF.6 | Writing a Number as a Fraction and Decimal
Show the connection between decimals and fractions using a grid diagram and number lines. (4 min) E MM

4.NF.6 | Writing Decimals and Fractions Greater than 1 Shown on Grids
Learn to decimal numbers and fractions greater than 1 shown on grids. (3 min) E MM

4.NF.6 | Writing Decimals and Fractions Shown on Number Lines
Learn to write decimal numbers and fractions greater than 1 shown on number lines. (3 min) E MM

4.NF.6 | Rewriting Fractions as Decimals
Learn to rewrite two fractions as decimals. (4 min) E MM

4.NF.6 | Decimals as Words
Visualize how to write 0.17 and 40.03 in words. (6 min) E MM

4.NF.6 | Relating Decimals and Fractions in Words
Learn to relate equivalent decimals and fractions written in word form. (3 min) E MM

4.NF.6 | Decimal Place Value
Learn how decimal numbers and understanding place value to the right of the decimal. (6 min) E MM

4.Nf.6 | Graphing Tenths from 0 to 1
Visualize and learn how to graph 0.6 on a number line. (2 min) E MM

4.NF.6 | Identifying Tenths on a Number Line
See how to identify a point graphed on a number line. (2 min) E MM

4.NF.6 | Graphing Hundredths from 0 to 0.1
Visualize and learn how to graph 0.4 on a number line. (3 min) E MM

4.NF.6 | Identifying Hundredths on a Number Line
Learn to identify decimals graphed on a number line. (3 min) E MM

4.NF.6 | Plotting Decimal Numbers on a Number Line
Find decimals with hundredths on a number line. (4 min) E MM

4.NF.6 | Decimal Place Value with Regrouping
Visualize and discuss decimal numbers that are greater than 1. (6 min) E MM

4.NF.6 | Rewriting Decimals as Fractions: 0.8
Convert 0.8 to a fraction. (1 min) E MM

4.NF.6 | Rewriting Decimals as Fractions: 0.15
Convert the decimals to a fraction and simplify. (2 min) E MM

4.NF.6 | Rewriting Decimals as Fractions: 0.36
Follow this example of how we convert a decimal to a simplified fraction.
(2 min) E MM

4.NF.6 | Rewriting Decimals as Fractions: 2.75
Follow this example of how we convert a decimal to a simplified fraction.
(3 min) E MM

4.NF.6 | Common Fractions and Decimals
Explores the concept of converting common fractions (1/5, 1/4, 1/2) into decimals.
(5 min) E MM

4.NF.7 | Comparing Decimals Visually
Use grid diagrams to compare 0.17 and 0.2.
(4 min) E MM

4.NF.7 | Comparing Decimal Numbers on a Number Line
Use a number line to compare decimals.
(2 min) E MM

4.NF.7 | Comparing Numbers Represented Different Ways
Compare decimals, fractions and number diagrams in these practice problems.
(8 min) E MM

4.NF.7 | Comparing Decimals (Tenths and Hundredths)
Use greater and less than symbols to compare decimals. (4 min) E MM

Measurement & Data

4.MD.1, 4.MD.2 | Fraction Pizzeria
Students can learn about fractions by taking customers' orders, building pizzas, running the register, and experimenting with slopes. (unlimited) E/I

4.MD.5, 4.MD.6, 4.MD.7 | Rhombus Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

4.MD.5, 4.MD.6, 4.MD.7 | Pentagon Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

4.MD.5, 4.MD.6, 4.MD.7 | Octagon Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.MD.5, 4.MD.6, 4.MD.7 | Obtuse Isosceles Triangle Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.MD.5, 4.MD.6, 4.MD.7 | Narrow Rhombus Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.MD.5, 4.MD.6, 4.MD.7 | Hexagon Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.MD.5, 4.MD.6, 4.MD.7 | Equilateral Triangle Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.MD.5, 4.MD.6, 4.MD.7 | Acute Isosceles Triangle Tile
Simple geometry manipulatives that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.MD.5, 4.MD.6, 4.MD.7 | Wide Rhombus Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.MD.5, 4.MD.6, 4.MD.7 | Trapezoid Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.MD.5, 4.MD.6, 4.MD.7 | Square Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or create tessellations. IFX/LT

4.MD.5, 4.MD.6, 4.MD.7 | Protractor
At-scale measuring tool for measuring angles. Designed to be used with geometric tiles, or as a general teaching/training tool. IFX/LT

Measurement & Data | Units of Measurement

4.MD.1 | Metric System: Units of Weight
Identify metric units of mass or weight such as milligram, gram, and kilogram.
(5 min) E MM

4.MD.1 | Choose Pounds or Ounces to Measure Weight
Identify the US customary units of mass or weight such as ounce, pound, and ton.
(2 min) E MM

4.MD.1 | U.S. Customary Units: Weight
Identify the US customary units of mass or weight such as ounce, pound, and ton.
(4 min) E MM

4.MD.1 | Metric System: Units of Volume
Learn about metric units of volume or capacity such as milliliters and liters.
(4 min) E MM

4.MD.1 | U.S. Customary Units: Fluid Volume
Learn about the US customary units of volume or capacity such as teaspoon, fluid ounce, cup, pint, quart, and gallon.
(7 min) E MM

4.MD.1 | Metric System: Units of Distance Discuss metric units of length or distance such as millimeter, centimeter, meter, and kilometer. (7 min) E MM

4.MD.1 | U.S. Customary Units: Distance
Learn about the US customary units of length or distance such as inch, foot, and yard. (5 min) E MM

4.MD.1 | Finding Reasonable Units of Measurement Example
Decide a reasonable unit of time for baking cookies. (4 min) E MM

3.MD.1, 4.MD.2 | Time Differences Example
Learn to find the difference between the times shown on two different analog clocks. (4 min) E MM

3.MD.1, 4.MD.2 | Time Word Problem: Puzzle
Figure out how long it took to solve a puzzle when given the start and finish time. (2 min) E MM

3.MD.1, 4.MD.2 | Time Word Problem: Travel Time
Solve what time you leave if you are traveling 39 minutes and need to be home at 6:15. (4 min) E MM

4.MD.1 | How to Convert kg to mg and t to oz
Convert kilograms to milligrams and tons to ounces. (4 min) E MM

4.MD.1 | Converting Pounds to Ounces
Learn to convert pounds to ounces. (2 min)

4.MD.1 | Metric Units of Mass Review (g and kg)
Learn to convert between liters and milliliters. (2 min) E MM

4.MD.2 | Converting US Customary Units of Volume
Learn to convert between gallons, quarts, pints, cups, and fluid ounces. (2 min) E MM

4.MD.1 | Converting Metric Units of Length
Learn convert kilometers, meters, and centimeters. (2 min) E MM

4.MD.1 | Converting Feet to Inches
Learn to convert feet to inches. (1 min) E MM

4.MD.1 | Converting Yards to Inches
Learn to convert between yards, feet, and inches. (6 min) E MM

4.MD.1 | Converting Units of Time
Learn to convert hours, minutes, and seconds. (4 min) E MM

3.MD.1, 4.MD.2 | Time Word Problem: Susan's Break
Solve what time do you leave if you are traveling 39 minutes and need to be home at 6:15. (4 min) E MM

4.MD.2, 5.MD.1 | Word Problem: Making Change
Understand the importance the relationship between these units and demonstrates how to apply this knowledge to solve real-world problems involving time intervals. (3 min) E MM

4.MD.2 | Currency Conversion Word Problem
Solve how much change is due in this conversion word problem. (1 min) E MM

4.MD.2 | Multi-Step Unit Conversion Examples (Metric)
Learn to convert between American dollars and Chinese yuan in this word problem. (5 min) E MM

4.MD.2 | Multi-Step Unit Conversion Examples (U.S. Customary)
Solve multi-step unit conversion examples with metric units of measure. (5 min) E MM

Number & Operations

4.NF.1, 4.NF.2, 4.NF.5, 4.NF.6, 4.NF.7 | Fraction Pizzeria
Students can learn about fractions by taking customers' orders, building pizzas, running the register, and experimenting with slopes. (unlimited) E/I

Science

Earth & Space Science

E.4.9A, E.4.9B | Cloud Climb
Explore how clouds, atmosphere, and weather all come together to create different aspects of the Earth's sky. (unlimited) E/I

E.4.9C.5 | Category 3 Hurricane Landfall Simulation
Experience a category 3 hurricane through a simulation with guided popups. (1 min) 74

E.4.9C.5 | Close-Range Tornado
Get up close and personal with a tornado near Wray, CO from May 7th, 2016. (8 min) 80

Life Science

L.4.1, L.4.1.3 | Anatomy Lab
Highly interactive anatomy classroom that allows students to assemble the human body piece by piece with over 90 separate body parts to learn about. (unlimited) E/I

L.4.1 | Brain
Realistic model of a human brain. IFX/LT

L.4.1 | Heart
Realistic model of a human heart. IFX/LT

L.4.1 | Liver
Realistic model of a human liver. IFX/LT

L.4.1 | Lungs
Realistic model of human lungs. IFX/LT

L.4.1 | What Happens Inside Your Body?
The human body is an amazing and unique machine that triggers thousands of processes every second, learn about them on this adventure. (8 min) 441

L.4.1.2 | Human Digestive System in VR
Take an amazing journey through the body and find out what happens to your food as it travels through the digestive system. (3 min) 209

L.4.2 | Bears of Kamchatka, Kambalnaya River
Follow along as you experience the Bears of Kamchatka and learn about their habitat, daily life, and mating season. (5 min) 52

L.4.2 | Chengdu Panda Base, China
Get an in-depth look at the pandas that call Chengdu Panda Base their home and learn about their habitat, diet, and daily life. (11 min) 75

L.4.2.2 | Explore the Coral Restoration
Learn about the ecology of coral reefs, natural and human threats to corals, and the science of coral restoration. (4 min) 139

L.4.2.2 | Reef 1
Swim along an active thriving reef. (1 min) 318

L.4.2.2 | Reef 2
Swim along an active thriving reef. (1 min) 319

L.4.2.2 | Reef 3
Swim along an active thriving reef. (1 min) 320

Physical Science

P.4.6B | Light Lab
This highly interactive classroom teaches students about the electromagnetic spectrum including activities like the double slit experiment, shining lights through a prism, building waves, stacking light, and playing with lenses. (unlimited) E/I

P.4.6B | Speed of Light
Visualization of the speed of light showing a glowing orb that revolves around the earth 7 times in one second. IFX/LT

P.4.6C | Music Playground
Be immersed in a concert hall with intractable musical instruments that can be used collaboratively to play, teach, or learn about music and sound waves. (unlimited) E/I

P.4.6C | Music Note - A
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

P.4.6C | Music Note - A Sharp
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

P.4.6C | Music Note - B
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

P.4.6C | Music Note - C
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

P.4.6C | Music Note - C Sharp
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

P.4.6C | Music Note - D
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

P.4.6C | Music Note - D Sharp
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

P.4.6C | Music Note - E
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

P.4.6C | Music Note - F
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

P.4.6C | Music Note - F Sharp
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

P.4.6C | Music Note - G
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

P.4.6C | Music Note - G Sharp
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

Social Studies

Civics

CI.4.3.2 | Supreme Court
Recreation of the front bench of the United States Supreme Court Chamber. IFX/LT

Civil Rights

CR.4.1 | Medgar Evers House
Explore a recreation of the Medgar Evers House and National Monument. Made in collaboration with the Evers family. (unlimited) E/I

CR.4.1 | Civil Rights Museum
Civil Rights leaders: Rosa Parks, John Lewis, Martin Luther King Jr., Thurgood Marshall, and Medgar Evers, come to life to tell you their stories on interactive stages. (unlimited) E/I

Geography

G.4.2 | Weaving Around the World
Follow the process of weaving that has been developed across cultures for thousands of years. From Venice to Addis Ababa, and the West Bank to the Navajo Nation Reservation. (4 min) 437

G.4.2 | Chennai Floods Aftermath
Take an immersive journey through the impact, rescue, and reason for the floods that occurred in Chennai, India, in December 2015. (6 min) 76

G.4.2 | Himalayas: A Trek to School
Follow two girls as they travel up to 6 hours a day to school in a remote Himalayan village. (8 min) 204

G.4.2 | Life in Haiti: After a Devastating Natural Disaster
Join filmmaker Dylan Roberts on a journey to the Haitian city of Jérémie, and the small village of Manish, to witness the aftermath of a colossal storm. (5 min) 258

G.4.2 | Out of Syria - Back to School
Step into the lives of two teenagers from war-torn Syria, Mustafa and Sarah. They both fled the fighting with their families. They left their homelands and their schools behind. (4 min) 301

G.4.2 | Protecting Ocean Anchor Species - Racing Extinction
Join marine biologist Luke Tipple as he swims alongside manta rays and whale sharks while sharing why they are vital to the survival of our oceans. (3 min) 315

5th Grade

Mathematics

Basic Operations & Reasoning | Multi-Digit Multiplication & Division

5.NBT.5 | Strategies for Multiplying Multiples of 10, 100 and 1,000
Learn the strategy of estimating in multi-digit multiplication. (7 min) E MM

5.NBT.5 | Estimating Multi-Digit Multiplication
Learn the skill of estimating the product of multi-digit numbers. (3 min) E MM

5.NBT.5 | Relate Multiplication with Area
Models to the Standard Algorithm
Learn the concept of multi-digit multiplication. (7 min) E MM

5.NBT.5 | Intro to Standard Way of Multiplying Multi-Digit Numbers
Learn the standard algorithm for multiplying a multi digit number by a single digit number. (4 min) E MM

5.NBT.5 | Understanding the Standard Algorithm for Multiplication
Visualize the standard algorithm for multiplication in these three examples: one complete walkthrough, one where the viewer is asked to identify mistakes in incorrect solutions, and one where the viewer is asked to fill in a missing number. (5 min) E MM

5.NBT.5 | Multiplying Multi-Digit Numbers: 6,742x23
Learn to break down the process step by step, demonstrating how to multiply each digit and carry over numbers. (4 min) E MM

5.NBT.6 | Strategies for Dividing Multiples of 10, 100, and 1,000
Visualize and understand how to divide numbers that are multiples of 10, 100, and 1,000. (7 min) E MM

5.NBT.6 | Estimating Multi-Digit Division
Learn the concept of estimating multi-digit division problems. (3 min) E MM

4.NBT.6, 5.NBT.6 | Long Division with Remainders: 2,292÷4
Learn the long division process for multi-digit numbers, including examples with remainders. (10 min) E MM

4.NBT.6, 5.NBT.6 | Long Division with Remainders: 3,771÷8
Visualize and solve a long division problem with a remainder. (3 min) E MM

5.NBT.6 | Introduction to Dividing by 2-Digits
Visualize how to approximate numbers for easier division and practice this skill with examples (5 min) E MM

5.NBT.6, 6.NS.2 | Dividing by 2-Digits: 9,815÷65
Learn the process of dividing large numbers, specifically 9,815 divided by 65. (5 min) E MM

5.NBT.5, 5.NBT.6, 6.NS.2 | Dividing by 2-Digits: 7,182÷42
Learn to break complex division problems into easy step-by-step portions. (3 min) E MM

5.NBT.6 | Dividing by a 2-Digits: 4,781÷32
Learn to break complex division problems into easy step-by-step portions. (4 min) E MM

Basic Operations & Reasoning | Powers of 10

5.NBT.2 | Multiplying and Dividing by 10, 100, 1,000
Learn how multiplying and dividing whole numbers by 10, 100, and 1,000 shifts the digits of the number left or right, respectively. (9 min) E MM

5.NBT.2 | Multiplying and Dividing Decimals by 10
Explore the concept of multiplying and dividing decimals by 10, 100, and 1,000. (4 min) E MM

5.NBT.2 | Multiplying and Dividing Decimals by 10, 100, 1,000
Learn how each digit in a decimal shifts place when multiplied or divided by these powers of 10, providing a visual and intuitive understanding of the process. (5 min) E MM

5.NBT.2 | Introduction to Powers of 10
Learn about exponents and exponential notations in this intro. (4 min) E MM

5.NBT.2 | Using Exponents with Powers of 10
Explore the concept of multiplying by powers of 10. (5 min) E MM

5.NBT.2 | Multiplying and Dividing by Powers of 10
Learn about the patterns when multiplying or dividing numbers by powers of 10. (5 min) E MM

5.NBT.2 | Exponents and Powers of 10 Patterns Visualize and demonstrate how to perform calculations involving powers of ten. (7 min) E MM

5.NBT.2 | Fractions as Division by Power of 10
Explore the concept of multiplying and dividing numbers by powers of 10. (5 min) E MM

5.NBT.1 | Comparing Decimal Place Values
Explore the concept of place value in multi-digit numbers, emphasizing how a digit's value changes based on its position. (6 min) E MM

Geometry | Volume

5.MD.3a, 5.MD.3b | Volume Intro
Learn the difference in finding volume, length, and area and how they involve measuring dimensions to quantify a certain aspect of an object or space. (8 min) E MM

5.MD.3b, 5.MD.4 | Measuring Volume with Unit Cubes
Explore the concept of volume, emphasizing that it's a measure of how much space something takes up. (2 min) E MM

5.MD.5a, 5.MD.5b | Measuring Volume as Area Times Length
Learn to calculate the volume of a rectangular prism, you can multiply the dimensions (width, depth, and height) together in any order (8 min) E MM

5.MD.5b | Volume of a Rectangular Prism
Learn how to calculate the volume of a box using the height, width, and depth. (2 min) E MM

5.MD.5c | Volume in Unit Cubes by Decomposing Shape
Explore the concept of decomposing complex shapes into simpler ones to calculate volume. (3 min) E MM

5.MD.5c | Volume Through Decomposition
Explore the concept of finding the volume of complex shapes by decomposing them into simpler, non-overlapping rectangular prisms. (4 min) E MM

5.MD.5b, 5.MD.5c | Volume Word Problem: Water Tank
Learn the concept of volume, specifically focusing on how to calculate the volume of a complex shape by subtracting the volume of an object within it from the total volume. (5 min) E MM

5.MD.3a, 5.MD.3b, 5.MD.4, 5.MD.5b, 5.MD.5c | Geometry Jam
a full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Geometry | Coordinate Plane

5.G.1 | Introduction to the Coordinate Plane
Learn how coordinates are used to locate a point on a coordinated plane. (7 min) E MM

5.G.1, 5.G.2 | Coordinate Plane: Graphing Points
Visualize and learn the basics of the coordinate plane. (3 min) E MM

5.G.2 | Coordinate Plane Graphing Word Problem
Visualize and learn the concept of using a coordinate plane to solve real-world problems. (2 min) E MM

5.G.2 | Interpreting Plotted Points
Learn the concept of interpreting data points on a coordinate plane. (2 min) E MM

5.G.1, 5.G.2 | Geometry Jam
a full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Geometry | Properties of Shape

4.G.2 | Classifying Triangles
Explore how triangles are classified based on their sides and angles. (6 min) E MM

4.G.2 | Classifying Triangles by Angles
Learn to classify triangles based on the angles. (6 min) E MM

5.G.4 | Intro to Quadrilaterals
Explore and learn the many different types of quadrilaterals. (9 min) E MM

4.G.2, 5.G.4 | Quadrilateral Properties
Learn about the properties of quadrilaterals, parallelograms, trapezoids, rhombuses, rectangles, and squares. (5 min) E MM

5.G.4 | Kites as a Geometric Shape
Explore the world of quadrilaterals, specifically focusing on kites. (6 min) E MM

5.G.4 | Quadrilateral Types
Learn to identify quadrilaterals such as kites, trapezoids, parallelograms, rhombuses, rectangles, and squares by side length, presence of parallel sides, and angle type. (3 min) E MM

5.G.4 | Classifying Quadrilaterals
Learn the many different relationships between the types of quadrilaterals. (3 min) E MM

5.G.4 | Geometry Jam
a full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Algebra | Algebraic Thinking

5.OA.1, 5.OA.2 | Constructing Numerical Expressions
Learn to use the information in each word problem to construct a numerical expression that represents the information. (2 min) E MM

5.OA.1 | Evaluating Expressions with & without Parentheses
Explore the concept of order of operations, emphasizing the importance of parentheses in mathematical expressions. (2 min) E MM

5.OA.2 | Translating Expressions with Parentheses
Understand the importance of parentheses in expressions, and how they can change the meaning of calculations. (9 min) E MM

5.OA.3 | Graphing Patterns on a Coordinate Plane
Learn about understanding numerical patterns. Explore how to generate a second pattern from a given one by applying a rule, in this case, multiplying by 3 and adding 1. (3 min) E MM

5.OA.3 | Interpreting Patterns on a Coordinate Plane
Explore the concept of numerical patterns, focusing on how to generate, identify, and graph them on a coordinate plane. (4 min) E MM

5.G.2, 5.OA.3 | Interpreting Relationships in Ordered Pairs
Explore the concept of numerical patterns, focusing on how to generate, identify, and graph these patterns on a coordinate plane. (4 min) E MM

5.OA.3 | Graphing Sequence Relationships
Explore the concept of numerical patterns. (3 min) E MM

Fractions, Decimals, Percents, & Ratios | Decimal Place Value

5.NBT.1 | Place Value with Decimals
Learn the relationship between place value and decimals. (4 min) E MM

5.NBT.1 | Thousandths on the Number Line
Explore the value of a point on a number line that falls between two known values, in this case 0.03 and 0.04. (2 min) E MM

5.NBT.3a | Write a Decimal in Expanded Form
Learn to break down each digit according to its place value and write it in expanded form. (3 min) E MM

5.NBT.3a | Decimals in Written Form (Hundredths)
Learn to write a decimal in word form by writing out the whole number portion. (4 min) E MM

5.NBT.3a | Decimals in Written Form (Thousandths)
Learn how to read and write decimals in different forms, focusing on thousandths. (3 min) E MM

5.NBT.3a | Expressing Decimals in Multiple Forms
Learn to break down decimals into place values, show how to write them in expanded form, separate each decimal part, and explain how to say them in words. (4 min) E MM

5.NBT.3a, 5.NBT.7 | Visual Understanding of Regrouping Decimals
Explore the concept of place value in decimals, focusing on how to regroup value from one place to another. (5 min) E MM

5.NBT.3a, 5.NBT.7 | Regrouping with Decimals
Explore the concept of expressing decimals in different forms. (4 min) E MM

5.NBT.3a | Regrouping with Decimals: 21.3
Learn about place values, and how regrouping can change the appearance of a number, but not its value. (4 min) E MM

5.NBT.3b | Comparing Decimals: 9.97 and 9.798
Learn to compare two decimals by looking at the largest place value. (4 min) E MM

5.NBT.3b | Comparing Decimals: 156.378 and 156.348
Learn how to determine which decimal is greater by comparing each place value, starting from the left and moving right, until a difference is found. (2 min) E MM

5.NBT.3b | Ordering Decimals
Practice comparing decimals and learning how to order numbers with decimals from least to greatest. (4 min) E MM

5.NBT.3b | Ordering Decimals Through Thousandths
Learn all about comparing decimals (3 min) E MM

5.NBT.3b | Comparing Decimals in Different Representations
Learn how to determine which of two decimals is larger by converting them into a common format. (5 min) E MM

5.NBT.3b | Comparing Decimals Word Problems Explore the concept of comparing decimals. Learn the importance of aligning place values and starting from the largest place value when comparing. (4 min) E MM

5.NBT.4 | Rounding Decimals on the Number Line
Learn how to round decimals using a number line, visually showing which whole number, tenth, hundredth, or thousandth is closest. (4 min) E MM

5.NBT.4 | Worked Example: Rounding Decimals to Nearest Tenth
Visualize how to round decimals and identify the tenth place in each decimal. (2 min) E MM

5. NBT.5 | Rounding Decimals Word Problems
Explore how to adjust decimals to the closest tenth, hundredth, and whole number, all while highlighting the importance of grasping place value. (5 min) E MM

Fractions, Decimals, Percents, & Ratios | Add Decimals

4.NF.6 | Common Fractions and Decimals
Explores the concept of converting common fractions (1/5, 1/4, 1/2) into decimals. (5 min) E MM

5.NBT.7 | Estimating Decimal Addition
Learn all about how to estimate when adding decimals. (4 min) E MM

5.NBT.7 | Introduction to Adding Decimals: Tenths
Learn how to visualize and calculate the addition of tenths using both numerical and visual methods, reinforcing the understanding of decimal addition. (6 min) E MM

5.NBT.7 | Adding Decimals with Ones and Tenths Parts
Learn how to add decimals, specifically to the tenths. (6 min) E MM

5.NBT.7 | Adding Decimals with Ones, Tenths, and Hundredths
Learn about aligning decimal points and adding each place value separately, from hundredths to ones. (7 min) E MM

5.NBT.7 | Adding Decimals with Hundredths
Learn the different ways to add decimals involving hundredths. (7 min) E MM

Fractions, Decimals, Percents, & Ratios | Subtract Decimals

5.NBT.7 | Estimating Decimal Subtraction
Learn to estimate when subtracting decimals. (4 min) E MM

5.NBT.7 | Strategies for Subtracting Basic Decimals
Explore the world of subtracting decimals, focusing on tenths. (6 min) E MM

5.NBT.7 | Strategies for Subtracting more Complex Decimals with Tenths
Learn all about subtraction of decimals, particularly those in the tenths place. (9 min) E MM

5.NBT.7 | Subtracting Decimals: 9.57-8.09
Visualize how to find the least common denominator of two fractions. (1 min) E MM

5.NBT.7 | Subtracting Decimals: 10.1-3.93
Learn how to subtract decimals down to the hundredth place. (2 min) E MM

5.NBT.7 | Subtraction Strategies with Hundredths
Learn about different strategies for subtraction, breaking down the process into manageable steps, and emphasizes the importance of understanding the concept behind the calculations. (6 min) E MM

5.NBT.7 | More Advanced Subtraction Strategies with Hundredths
Explore the concept of subtracting decimals, specifically hundredths. (5 min) E MM

Fractions, Decimals, Percents, & Ratios | Add & Subtract Fractions

5.NF.1 | Visually Adding Fractions: 5/6+1/4
Learn to add two fractions with different denominators, you need to find the least common multiple of the denominators. (6 min) E MM

5.NF.1 | Visually Subtracting Fractions: 3/4-5/8
Learn about understanding how to add and subtract fractions with unlike denominators. (4 min) E MM

5.NF.1 | Estimating Adding Fractions with Unlike Denominators
Learn all about estimating the sum of fractions with unlike denominators. (5 min) E MM

4.NF.2 | Finding Common Denominators
Learn all about finding common denominators in fractions. (5 min) E MM

4.NF.2 | Common Denominators: 1/4 and 5/6
Learn how to find common denominators for fractions with different numerators and denominators by identifying multiples of the original denominators. (8 min) E MM

4.NF.2 | Common Denominators: 3/5 and 7/2
Learn how to rewrite fractions with different denominators as equivalent fractions with a common denominator. (4 min) E MM

5.NF.1 | Adding Fractions with Unlike Denominators Intro
Learn to add fractions with different denominators, such as 1/2 and 1/3, you need to find a common denominator. (4 min) E MM

5.NF.1 | Adding Fractions with Unlike Denominators
Learn how to add two fractions with different denominators. (8 min) E MM

5.NF.1 | Subtracting Fractions with Unlike Denominators Intro
Learn how to subtract fractions with unlike denominators. (4 min) E MM

5.NF.1 | Subtracting Fractions with Unlike Denominators
Learn to identify the least common multiple of the two denominators when subtracting fractions with different denominators. (5 min) E MM

5.NF.1 | Adding and Subtracting 3 Fractions
Learn how to add and subtract fractions with unlike denominators. (5 min) E MM

5.NF.1 | Solving for the Missing Fraction
Learn how to add and subtract fractions with unlike denominators. (6 min) E MM

5.NF.1 | Adding Mixed Numbers: 19 3/18+18 2/3
Visualize how to add mix numbers and simplify the fraction. (2 min) E MM

5.NF.1 | Subtracting Mixed Numbers: 7 6/9-3 2/5
Visualize how to subtract two mixed numbers by converting to improper fractions. (2 min) E MM

5.NF.1 | Adding Mixed Numbers with Regrouping
Learn how to add mixed numbers with unlike denominators. (5 min) E MM

5.NF.1 | Subtracting Mixed Numbers with Regrouping (Unlike Denominators)
Learn how to subtract mixed numbers with unlike denominators. (4 min) E MM

5.NF.2 | Adding Fractions Word Problem: Paint
Learn how to add and subtract fractions with unlike denominators through a real-world problem. (6 min) E MM

5.NF.2 | Subtracting Fractions Word Problem: Tomatoes
Learn how to solve word problems involving the addition and subtraction of fractions with unlike denominators. (4 min) E MM

Fractions, Decimals, Percents, & Ratios | Multiply Fractions

5.NF.5a, 5.NF.5b | Multiplication as Scaling with Fractions
Visualize and understand how multiplying fractions can be seen as scaling, or resizing, the value of a number. (5 min) E MM

5.NF.5a, 5.NF.5b | Fraction Multiplication as Scaling Examples
Visualize examples of how multiplying by a fraction scales a number up or down. (4 min) E MM

5.NF.4a, 5.NF.4b | Multiplying Fractions by Whole Numbers on a Number Line
Learn to multiply fractions by whole numbers on the number line. (2 min) E MM

4.NF.4a, 5.NF.4b | Multiplying Unit Fractions and Whole Numbers
Learn how to multiply a whole number by a fraction, using both visual and computational methods. (3 min) E MM

4.NF.4b, 5.NF.4a, 5.NF.4b | Multiplying Fractions and Whole Numbers Visually
Learn the concept of multiplying fractions and whole numbers. (4 min) E MM

5.NF.4a, 5.NF.4b | Multiplying Fractions and Whole Numbers
Learn and visualize how to multiply fractions and how they combine into parts of a whole. (3 min) E MM

5.NF.4a, 5.NF.4b | Multiplying 2 Fractions: Fraction Model
Visualize multiplying fractions using fraction models. (5 min) E MM

5.NF.4a, 5.NF.4b | Multiplying 2 Fractions: Number Line
Visualize how the process of multiplying fractions by fraction is represented on a number line. (5 min) E MM

5.NF.4a, 5.NF.4b | Multiplying 2 Fractions: 5/6 x 2/3
Work through multiplying 2 fractions with different denominators. (3 min) E MM

5.NF.7 | Multiplying Mixed Numbers
Follow along and visualize how to multiply mixed numbers. (4 min) E MM

5.NF.6 | Finding Area with Fractional Sides 1
Learn how to calculate the area of rectangles with fractional side lengths. (4 min) E MM

5.NF.6 | Finding Area with Fractional Sides 2
Learn how to calculate the area of rectangles with fractional side lengths. (7 min) E MM

5.NF.6 | Multiplying Fractions Word Problem: Muffins
Learn how to solve word problems involving the multiplication of fractions. (4 min) E MM

5.NF.6 | Multiplying Fractions Word Problem: Laundry
Learn how to solve word problems involving multiplication of fractions. (2 min) E MM

5.NF.6 | Multiplying Fractions Word Problem: Bike
Learn how to multiply fractions and mixed numbers. (4 min) E MM

Fractions, Decimals, Percents, & Ratios | Divide Fractions

5.NF.3 | Understanding Fractions as Division
Learn about the relationship between multiplication and division. (7 min) E MM

5.NF.3 | Creating a Fraction Through Division
Learn about the relationship between division and multiplication using fractions. (3 min) E MM

5.NF.3 | Creating Mixed Numbers with Fraction Division
Learn how to interpret fractions as division problems. (5 min) E MM

5.NF.3 | Multiplication and Division Relationship for Fractions
Learn how multiplication and division are related, even when we're dealing with fractions. (4 min) E MM

5.NF.3 | Visually Dividing Unit Fraction by a Whole Number
Learn how to divide fractions by whole numbers. (3 min) E MM

5.NF.5a | Dividing a Unit Fraction by a Whole Number
Learn how to divide fractions by whole numbers. (3 min) E MM

5.NF.7a, 5.NF.7b | Visually Dividing Whole Numbers by Unit Fractions
Learn how to divide whole numbers by fractions. (3 min) E MM

5.NF.7a, 5.NF.7b | Dividing a Whole Number by a Unit Fraction
Learn how to divide a whole number by a fraction. (2 min) E MM

5.NF.7c | Fraction Division in Context
Practice dividing a fraction by a whole number to solve problems. (3 min) E MM

5.NF.7c | Dividing Fractions and Whole Number Word Problems
Use tape diagrams to visually represent division with fractions. (5 min) E MM

Fractions, Decimals, Percents, & Ratios | Multiply Decimals

5.NBT.7 | Estimating with Multiplying Decimals and Whole Numbers
Learn all about the concept of estimating products in multiplication problems involving decimals and whole numbers. (3 min) E MM

5.NBT.7 | Multiplying Decimals and Whole Numbers with Visuals
Demonstrate how to use a number line or model to visualize the process of multiplication and find the product. (4 min) E MM

5.NBT.7 | Strategies for Multiplying Decimals and Whole Numbers
Use different methods for multiplying whole numbers with decimals. (7 min) E MM

5.NBT.7 | Strategies for Multiplying Multi-Digit Decimals by Whole Numbers
Learn how to multiply decimals and whole numbers. (4 min) E MM

5.NBT.7 | Estimating Decimal Multiplication
Use estimation to simplify the process of multiplying decimals. (4 min) E MM

5.NBT.7 | Developing Strategies for Multiplying Decimals
Learn how to multiply decimals, specifically focusing on the strategy of converting decimals to fractions to make the multiplication process easier. (5 min) E MM

5.NBT.7 | Understanding Decimal Multiplication
Learn how to use a hundred grid to represent decimal multiplication. (3 min) E MM

5.NBT.7 | Multiplying Decimals Using Estimation
Learn all about multiplying decimals by using estimation. (4 min) E MM

5.NBT.7 | Developing Strategies for Multiplying 2-Digit Decimals
Learn to multiply decimals by treating them as fractions. (4 min) E MM

Fractions, Decimals, Percents, & Ratios | Divide Decimals

5.NBT.7 | Estimating Decimal Division
Practice rounding decimals to the nearest whole number or a simple fraction, then perform the division. (3 min) E MM

5.NBT.7 | Divide Whole Numbers with Decimal Quotients: 5÷2
Learn how to divide whole numbers to get a decimal quotient. (3 min) E MM

5.NBT.7 | Divide Whole Numbers with Decimal Quotients: 78÷12
Learn how to break down division problems by finding multiples and using remainders. (4 min) E MM

5.NBT.6, 5.NBT.7 | Dividing a Decimal by a Whole Number with Fraction Models
Visualize the concept of dividing decimals by whole numbers using the idea of converting tenths to hundredths to make division more intuitive. (2 min) E MM

5.NBT.7 | Dividing a Decimal by a Whole Number on the Number Line
Visualize the concept of dividing decimals by whole numbers, emphasize understanding division as splitting a quantity into equal parts and use the number line as a visual tool. (2 min) E MM

5.NBT.7 | Dividing a Decimal by a Whole Number Example
Follow this example of how to divide a decimal by a whole number. (3 min) E MM

5.NBT.7 | Visually Dividing a Whole Number by a Decimal
Understand how to divide whole numbers by decimals. (3 min) E MM

5.NBT.7 | Dividing a Whole Number by a Decimal on a Number Line
Explore the concept of dividing whole numbers by decimals on a number line. (2 min) E MM

5.NBT.7 | Division Strategies for Decimal Quotients
Different examples demonstrate how to use fractions, tenths, and reciprocals to multiply instead of divide so we can arrive at the correct answer. (9 min) E MM

5.NBT.7 | Pattern when Dividing by Tenths and Hundredths
Use the strategy of converting whole numbers to tenths or hundredths to make the process clearer when dividing whole numbers by decimals. (5 min) E MM

5.NBT.7 | Dividing Whole Numbers by Decimals Examples
Learn two techniques to dive whole numbers by decimals. (5 min) E MM

Measurement & Data | Converting Units of Measure

5.MD.1 | Converting Units: Minutes to Hours
Learn how to convert minutes to hours by dividing the minutes by 60. (5 min) E MM

5.MD.1 | Converting Units: Metric Distance
Learn all about converting different metric units to a common unit, in this case, meters. (4 min) E MM

5.MD.1 | Converting Units: Centimeters to Meters
Learn how to convert centimeters to meters by understanding the meaning of the "centi" prefix, which represents 1/100. (3 min) E MM

5.MD.1 | U.S. Customary and Metric Units
Learn the world of measurement units, distinguishing between U.S. customary units and metric units. (5 min) E MM

5.MD.1 | Measurement Word Problem: Tea Party
Explore the concept of converting metric units within a real-world context. (4 min) E MM

4.MD.2, 5.MD.1 | Time Word Problem: Susan's Break
Explore the concept of converting units of time, specifically minutes, into hours. (4 min) E MM

5.MD.1 | Converting Units: US Volume
Learn how to convert US Customary units of volume (gallons, quarts, pints, and cups). (5 min) E MM

5.MD.1 | Same Length in Different Units
Explore the concept of converting US customary units, specifically yards to inches. (6 min) E MM

5.MD.1 | Measurement Word Problem: Running Laps
Understand how to convert units within the US customary system to solve word problems. (8 min) E MM

5.MD.1 | Measurement Word Problem: Elevator
Learn the concept of converting units within the U.S. customary system. (7 min) E MM

5.MD.1 | Measurement Word Problem: Blood Drive
Explore the concept of converting units within the US customary system. (4 min) E MM

5.Md.1 | Measurement Word Problem: Distance Home
Explore the concept of converting units within the US customary system, specifically focusing on how to apply this skill to solve multi-step, real-world problems. (4 min) E MM

Measurement & Data | Line Plots

4.MD.4 | Making Line Plots with Fractional Data
Learn about creating line plots to represent data sets. (3 min) E MM

4.MD.4 | Interpreting Line Plots with Fractions
Use a line plot to find the difference between the two heaviest babies. (3 min) E MM

4.MD.4 | Reading a Line Plot with Fractions
Explore the concept of interpreting data on line plots, particularly focusing on how to read and understand line plots that display measurements in fractions. (3 min) E MM

5.MD.2 | Line Plot Distribution: Trail Mix
Explore how to interpret data on line plots, specifically focusing on measurements in fractions of a unit. (3 min) E MM

Number & Operations

5.NF.3, 5.NF.4, 5.NF.5 | Fraction Pizzeria
Students can learn about fractions by taking customers' orders, building pizzas, running the register, and experimenting with slopes. (unlimited) E/I

Science

Earth & Space Science

E.5.8A, E.5.8A.1, E.5.8B | Solar System
Interactive classroom that allows students to visit each planet, watch them orbit, and learn about each one. (unlimited) E/I

E.5.8A, E.5.8A.2, E.5.8B | Sun
Rotating model of the Sun. IFX/LT

E.5.8A, E.5.8A.1, E.5.8B | Solar System Model
Animated model of the solar system where rotation and revolution speeds are scaled accurately. IFX/LT

E.5.8A, E.5.8A.1 | Swirling Galaxy
Rotating spiral-shaped galaxy. IFX/LT

E.5.8A, E.5.8A.3 | The Aurora Borealis Over Alaska's Chatanika River
Explore a timelapse of the Aurora Borealis filmed during a geomagnetic storm by William Briscoe Photography. (5 min) 381

E.5.8A, E.5.8A.3 | 360 Degree Video of the Milky Way
Explore a timelapse of the moving night sky. (1 min) 4

E.5.8A, E.5.8A.1 | Enter the Black Hole
Enter a black hole and explore the area around it. (5 min) 128

E.5.8A, E.5.8A.1 | Explore the Solar System
Take a virtual tour of our Solar System, with the help of Crash Course Astronomy host Phil Plait. (5 min) 142

E.5.8A, E.5.8A.3 | Journey Into the Orion Nebula
Journey into the famous star-forming region of the Orion Nebula based on an image from the Hubble Space Telescope. (2 min) 225

E.5.8A, E.5.8A.4 | Journey to the Edge of Space
Experience what it's like to leave Earth, traveling to over 90,000 feet into the stratosphere. (5 min) 226

E.5.8A, E.5.8A.1 | Mars - The Red Planet VR Documentary
Explore the planet Mars and see its history of exploration. (12 min) 273

E.5.8A, E.5.8A.3, E.5.8B | The Night Sky and Milky Way: Visualize Astronomy
Enjoy a panoramic view of the night sky and the Milky Way. (1 min) 391

E.5.8A, E.5.8A.2, E.5.8B | Solar Eclipse 2017
Watch a total solar eclipse that took place in Casper, Wyoming on August 21st, 2017. (5 min) 358

E.5.8A.1 | VR Solar System Space Video
This amazing 360 video will transport you through our galactic neighborhood, the solar system. (18 min) 429

E.5.8B | Moon Phases
Interactive display of the phases of Earth's Moon. IFX/LT

E.5.10 | Damming the Nile: Episode 1
Africa's largest hydroelectric power project is two thirds finished and the dam can already control the flow of the Blue Nile, which is deeply upsetting downstream Egypt who they didn't consult before building started. (13 min) 94

E.5.10 | Damming the Nile: Episode 2
Journey to the great farming projects of Sudan, fly to a festival on the banks of the Nile and explore the ancient Sudanese pyramid. Then launch in a balloon over Luxor to find out how much this river means to the land of the pharaohs. (16 min) 95

E.5.10 | Climbing the Redwoods - Fight for the Forests
Climb 200 feet up 'Grandfather,' the highest Redwood in a Northern California Grove while learning about the Redwood Forest and preservation efforts. (2 min) 79

Life Science

L.5.3B | Bears of Kamchatka, Kambalnaya River
Follow along as you experience the Bears of Kamchatka and learn about their habitat, daily life, and mating season. (5 min) 52

L.5.3B | Chengdu Panda Base, China
Get an in-depth look at the pandas that call Chengdu Panda Base their home and learn about their habitat, diet, and daily life. (11 min) 75

L.5.3B | Diving Exploration of Kelp Forest Aquarium
Explore the Kelp Forest at Monterey Bay Aquarium. (3 min) 105

L.5.3B | Travel-Dream-Imagine: A VR Journey From the Desert Floor Into the Sea
Travel with us as we step into the Judea Desert, bathe in a waterfall, wet our feet in the red sea, dive among corals, and float in one of the wonders of the world - the Dead Sea. (2 min) 403

L.5.3B.1 | Diving Under Icebergs with a Seal in Antarctica
Take a 360 journey under an iceberg with a crabeater seal and gentoo penguins in Antarctica. (2 min) 106

L.5.3B.1 | Diving with Great White Shark
Experience a great white shark up close and personal while learning about the majestic creature. (2 min) 107

L.5.3B.1 | Great Hammerhead Shark Encounter
Dive into this 360° video and get face-to-face with a curious great hammerhead shark. (2 min) 197

L.5.3B.1 | Protecting Ocean Anchor Species - Racing Extinction
Join marine biologist Luke Tipple as he swims alongside manta rays and whale sharks while sharing why they are vital to the survival of our oceans. (3 min) 315

L.5.3B.1 | Tiger Shark Encounter in the Bahamas: SharkFest
Get face-to-face with massive tiger sharks as you plunge into the crystal-clear waters of the Bahamas. (3 min) 394

L.5.3B.1 | Whale Sharks: Giants of the Deep
Encounter a group of Whale Sharks feeding as they migrate south. (2 min) 440

L.5.3B.1 | Explore an Underwater Mountain from a Submarine
Ride along in a submarine and explore the ocean floor. (4 min) 135

L.5.3B.1 | Explore the Deep Ocean
Follow along in a Submarine and see the ocean from a new view. (2 min) 140

L.5.3B.1 | Kelp
Swim through a kelp forest. (1 min) 229

L.5.3B.1 | Reef 1
Swim along an active thriving reef. (1 min) 318

L.5.3B.1 | Reef 2
Swim along an active thriving reef. (1 min) 319

L.5.3B.1 | Reef 3
Swim along an active thriving reef. (1 min) 320

L.5.3B.1 | Explore the Blue Hawaiian Adventure
Learn about the diversity of life found in the Hawaiian Islands, and explore the ecology of three different species, their importance to Native Hawaiian culture, and the conservation measures in place for their protection. (4 min) 137

L.5.3B.1 | Explore the Coral Restoration
Learn about the ecology of coral reefs, natural and human threats to corals, and the science of coral restoration. (4 min) 139

L.5.3B.2 | Glow Worm Caves of New Zealand
Deep below ground, you will learn about strange carnivorous worms. (2 min) 191

L.5.3B.2 | Lion Whisperer - Racing Extinction
Kevin Richardson, also known as the "lion whisperer", explains the complexities of his relationship to his pride, and summarizes his life's work of protecting these amazing animals from the game hunting trade. (4 min) 259

L.5.3B.2 | Lions 360
Join National Geographic Explorer, Martin Edström, and come face to face with Gibson and his mother, as they struggle with their pride's alpha male. (5 min) 262

L.5.3B.2 | Red Kite Bird Feeding Frenzy
Watch the once endangered Red Kite Bird feed while learning about them. (1 min) 317

L.5.3B.2 | Hyena 1
Watch a hyena feed on a fresh kill. (1 min) 211

L.5.3B.2 | Hyena 2
Watch a hyena approach cautiously for a snack. (1 min) 212

L.5.3B.2 | Leopard
Watch a leopard munch on a meal. (1 min) 238

L.5.3B.2 | Lioness 1
A curious Lioness sniffs at the camera. (1 min) 260

L.5.3B.2 | Lioness 2
Lioness sniffs at food. (1 min) 261

L.5.3B.3 | Fox's Point of View at Night - Planet Earth II: Cities
Through the eyes of an urban fox, can you find food, spot the hazards, and track down a mate in a bustling city at night? (4 min) 181

L.5.3B.3 | Ocean to Plate: A Journey into the Seafood Supply Chain
Learn how populations and appetites grow. Global fisheries are reaching their ecological capacity, yet at least a third of harvested fish and seafood is lost or wasted along the supply chain. (7 min) 293

L.5.3B.3 | Shoaling in the Deep
Dive down deep into the heart of a shoal of fish, follow a manta ray as it skims the ocean floor, and lock eyes with a moray eel lurking in an underwater cave. (3 min) 353

L.5.3B.3 | Whale Sharks at Risks - Racing Extinction
Experience a close encounter with a whale shark- the largest fish on the Planet. (4 min) 439

Physical Science

P.5.5A, E.5.5A.2 | Gas in Tank
Gas particles that move randomly inside a tank. IFX/LT

P.5.5A, E.5.5A.2 | Liquid Particles in Tank
Liquid particles that move randomly inside a tank. IFX/LT

P.5.5A, E.5.5A.2 | Solid Particle Arrangement
Rotating cube of crystalline atomic structure. IFX/LT

P.5.5A, P.5.5A.1 | Elementary Particle Swarm
Protons, neutrons, and electrons move around randomly. IFX/LT

P.5.5A, P.5.5A.4 | Fluid Densities
Three colored liquids of different densities flow out of pipes and stack on top of each other in a tank. IFX/LT

Social Studies

Civics

CI.5.1 | Independence Hall
Join George Washington, John Adams, Thomas Jefferson, Benjamin Franklin, and John Hancock as they come to life to tell you their stories about the founding of the United States. (unlimited) E/I

CI.5.2 | Women's March in Chicago
Witness a Women's Rights march in Chicago that was held on January 21, 2017. (2 min) 450

CI.5.2 | March for Our Lives
Be immersed in Pioneer Valley's March for Our Lives that was held on March 24, 2018. (1 min) 272

CI.5.2 | Syrians "Have to Survive Having No Rights" in Lebanon
Learn about Syrian refugees who are living in makeshift settlements under harsh conditions, with no legal rights in Lebanon's Bekaa Valley. (3 min) 376

Civil Rights

CR.5.1 | Civil Rights Museum
Five Civil Rights leaders - Rosa Parks, John Lewis, Martin Luther King Jr., Thurgood Marshall, and Medgar Evers - come to life and teach you their stories on interactive stages. (unlimited) E/I

CR.5.1 | Historic Jamestown
Interactive experience where students will experience the reason for the English Colonization and the significance of the location regarding resources, defensibility, and economic development. (unlimited) E/I

CR.5.1 | Out of Syria - Back to School
Step into the lives of two teenagers from war-torn Syria, Mustafa and Sarah. They both fled the fighting with their families. They left their homelands and their schools behind. (4 min) 301

CR.5.1 | Seeking Home: Life Inside the Calais Migrant Camp
Become part of a camp in northern France where migrants and refugees hope to make it across the English channel to start a new life in the United Kingdom. (6 min) 350

CR.5.1 | Women's March in Chicago
Witness a Women's Rights march in Chicago that was held on January 21, 2017. (2 min) 450

CR.5.1 | March for Our Lives
Be immersed in Pioneer Valley's March for Our Lives that was held on March 24, 2018. (1 min) 272

CR.5.1 | Syrians "Have to Survive Having No Rights" in Lebanon
Learn about Syrian refugees who are living in makeshift settlements under harsh conditions, with no legal rights in Lebanon's Bekaa Valley. (3 min) 376

CR.5.1 | Traveling While Black
This film offers a revealing view of the Green Book Era as told through Ben's Chili Bowl, a black-owned restaurant in Washington, to remind us of the hardships that African-Americans faced during that time period. (20 min) 404

CR.5.2 | Discover the Taj Mahal, India
Join Asha Leo as she ventures around India and explores the Taj Mahal. (5 min) 104

CR.5.2 | Taj Mahal 360 Degree (VR) Tour in India
Explore one of the 7 Wonders of the World, the Taj Mahal in India. (2 min) 377

CR.5.2 | Hajj - Experience the Journey to Mecca
Walk with Al Jazeera's, Basma Atassi, in Mecca to see the major landmarks that millions of Muslims visit during the period of Hajj, the annual Islamic Pilgrimage. (8 min) 199

CR.5.2 | Japan - Where Tradition Meets the Future
Explore Japanese tradition, modernity, and nature. (3 min) 224

CR.5.2 | Walking Tours of Japan - Kiyomizudera Temple in Kyoto
Experience a walking tour of Kiyomizudera Temple in Kyoto, Japan. (17 min) 431

Economics

E.5.1 | AeroFarms: The Future of Farming
See how AeroFarms in Newark, NJ grows over 2 million pounds of greens a year without sunlight, soil, or pesticides, making it the world's largest indoor vertical farm. (2 min) 23

Geography

G.5.2 | Antarctica - Part II
Sail aboard a ship around Antarctica and see the different wildlife. (6 min) 29

G.5.2 | Back to Nature - Rainforest
Escape to the lush temperate rainforest of Southern Australia. (4 min) 45

G.5.2 | Chennai Floods Aftermath
Take an immersive journey through the impact, rescue, and reason for the floods that occurred in Chennai, India, in December 2015. (6 min) 76

G.5.2 | Iceland
Soar over Iceland and take in the different views that it has to offer. (3 min) 213

G.5.2 | Life in Haiti: After a Devastating Natural Disaster

Join filmmaker Dylan Roberts on a journey to the Haitian city of Jérémie, and the small village of Manish, to witness the aftermath of a colossal storm. (5 min) 258

G.5.2 | Climbing the Redwoods - Fight for the Forests

Climb 200 feet up 'Grandfather,' the highest Redwood in a Northern California Grove while learning about the Redwood Forest and preservation efforts. (2 min) 79

G.5.2 | Category 3 Hurricane Landfall Simulation

Experience a category 3 hurricane through a simulation with guided popups. (1 min) 74

History

H.5.2, H.5.3, H.5.4, H.5.5 | Historic Jamestown

Interactive experience where students will grasp the reason for the English Colonization and the significance of the location regarding resources, defensibility, and economic development. (unlimited) E/I

H.5.4 | Independence Hall

Join George Washington, John Adams, Thomas Jefferson, Benjamin Franklin, and John Hancock as they come to life to tell you their stories about the founding of the United States. (unlimited) E/I

H.5.4, H.5.5 | Battle Road: The American Revolution

Be surrounded by scores of professional reenactors, organizers, onlookers, and photographers as they gather at Lexington, Concord, and Minute Man National Historical Park to honor the memory of this critical turning point in American history. (5 min) 49

H.5.7 | Liberty Bell

Realistic recreation of the Liberty Bell in Philadelphia, PA. Touch the bell to hear it ring, just as it would have sounded before it cracked. IFX/LT

6th Grade

Mathematics

Basic Operations & Reasoning | Exponents & Order of Operations

6.EE.1 | Intro to Exponents
Learn about exponents and how they represent repeated multiplication. (3 min) E MM

6.EE.1 | The Zeroth Power
Consider two different ways to think about why a number raised to the zero power equals one. (4 min) E MM

6.EE.1 | Exponents of Decimals
Explore that exponents of decimals can be calculated by multiplying the decimal number by itself as many times as the exponent indicates. (3 min) E MM

6.EE.1 | Powers of Fractions
Explore how to raise fractions to a power. (2 min) E MM

6.EE.2c | Order of Operations Introduction
Learn to follow PEMDAS (Parentheses, Exponents, Multiplication and Division, and Addition and Subtraction) to accurately evaluate expressions and avoid common mistakes. (5 min) E MM

6.EE.2c | Worked Example: Order of Operations (PEMDAS)
Learn to follow PEMDAS to simplify and accurately solve mathematical expressions, ensuring a correct final answer. (5 min) E MM

6.EE.2c | Order of Operations Examples: Exponents
Understanding the impact of parentheses on calculations helps avoid common mistakes and enhances problem-solving skills (4 min) E MM

6.EE.2c | Comparing Exponent Expressions
Evaluate the expressions: 2 cubed minus 2, 2 squared plus 3 to the power of 0, and 3 squared. (2 min) E MM

6.EE.2c | Order of Operations Example: Fractions and Exponents
Follow the order of operations to simplify expressions and find the correct answer. (4 min) E MM

Basic Operations & Reasoning | Negative Numbers

6.NS.5 | Introduction to Negative Numbers
Explore negative numbers and see them visualized on a number line. (3 min) E MM

6.NS.6a, 6.NS.9a, 6.NS.9b | Negative Symbol as Opposite
Learn about opposites in math and how they relate to negative numbers. (5 min) E MM

6.NS.6a, 6.NS.9a, 6.NS.9b | Number Opposites
Explore how opposite of a positive number is its negative counterpart, while the opposite of a negative number is its positive counterpart. (3 min) E MM

6.NS.6c | Negative Decimals on the Number Line
Learn to locate negative decimals on a number line. (1 min) E MM

6.NS.6b, 6.NS.6c | Decimals & Fractions on the Number Line
Explore how to plot numbers on a number line and visualize numerical values. (2 min) E MM

6.NS.7a | Compare Rational Numbers Using a Number Line
Learn to compare positive and negative numbers, decimals, and fractions using a number line. (6 min) E MM

6.NS.7b | Numerical Inequality Word Problems
Learn to compare quantities using inequalities. (3 min) E MM

6.NS.7a | Ordering Negative Numbers
Visualize ordering negative numbers on a number line helps clarify their positions, with the least number on the left and the greatest on the right. (3 min) E MM

6.NS.7a | Ordering Rational Numbers
Learn how to order numbers from least to greatest using a number line. (4 min) E MM

6.NS.7c | Absolute Value Examples
Visualize how absolute value of a number represents its distance from zero on a number line, always resulting in a positive value. (2 min) E MM

6.NS.7c | Meaning of Absolute Value
Learn how absolute value is a fundamental math concept that measures the distance of a number from zero, regardless of its sign. (4 min) E MM

6.NS.7c | Comparing Absolute Values on the Number Line
Explore absolute values and inequalities using a number line with three numbers: a, b, and c. (4 min) E MM

6.NS.7c | Placing Absolute Values on the Number Line
Learn and practice how to sort values from least to greatest using a number line. (2 min) E MM

6.NS.7c | Comparing Absolute Values
Compare absolute values to determine which number is further from zero, regardless of its positive or negative sign. (4 min) E MM

6.NS.7a | Testing Solutions to Absolute Value Inequalities
Learn how to determine if given values of x satisfy various absolute value inequalities. (6 min) E MM

6.NS.7c, 6.NS.7d | Interpreting Absolute Value
Solve this weight change scenario by plotting the changes on a number line to determine who lost the most weight. (4 min) E MM

Geometry | Plane Figures

6.G.1 | Area of a Parallelogram
Explore how to calculate the area of a parallelogram. (3 min) E MM

6.G.1 | Finding Height of a Parallelogram
Learn that the area of a parallelogram equals the base times the height. (2 min) E MM

6.G.1 | Area of a Triangle
Learn how to find the area of a rectangle and a parallelogram is found by multiplying the base by the height. (6 min) E MM

6.G.1 | Finding Area of Triangles
Learn to find the area of a triangle is found by multiplying one half of the base by the height. (2 min) E MM

6.G.1 | Triangle Missing Side Example
Learn how to find a missing piece of a triangle using just the area and height. (3 min) E MM

6.G.1 | Finding Area by Rearranging Parts
Explore Learn how to find a missing piece using just the area and height. (4 min) E MM

6.G.1 | Area of Composite Shapes
Determine the area of two triangles, a rectangle, and a trapezoid, and then add up the areas of the four shapes to get the total area. (5 min) E MM

6.G.1 | Area of Quadrilateral with 2 Parallel Sides
Learn how to find the area of a quadrilateral by splitting it into two triangles. (4 min) E MM

6.G.1 | Geometry Jam
a full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Geometry | Coordinate Plane

6.NS.6c | Points on the Coordinate Plane Examples
Learn to use the coordinate plane to graph points, lines, and more. (7 min) E MM

6.NS.6c | Plotting a Point (Ordered Pair)
Explore how to plot ordered pairs on a coordinated plane. (2 min) E MM

6.NS.6c | Finding the Point not Graphed
Learn to spot the missing point on a graph by comparing coordinate pairs to points. (1 min) E MM

6.NS.6b, 6.NS.6c | Quadrants of the Coordinate Plane
Explore the coordinate plane and learn how it's divided into four sections, called quadrants, which quadrants are positive, and which are negative. (3 min) E MM

6.NS.6b, 6.NS.6c | Points and Quadrants Example
Explore how plotting points on a graph involves moving along the x and y axes. (2 min) E MM

6.NS.6b, 6.NS.6c, 6.NS.8 | Coordinate Plane Word Problem Examples
Explore how to calculate the distance between two points, using the x and y coordinates. (5 min) E MM

6.G.3 | Drawing a Quadrilateral on the Coordinate Plane Example
Explore how to make a four-sided shape called a quadrilateral using line segments on a coordinated plane. (2 min) E MM

6.G.3 | Area of a Parallelogram on the Coordinate Plane
Find the area of a parallelogram by multiplying the base by the height. (2 min) E MM

6.G.3 | Coordinates of a Missing Vertex
Explore how to find the vertices of a rectangle when you are given three of them. (3 min) E MM

6.G.3 | Example of Shapes on a Coordinate Plane
Visualize drawing a rectangle on a coordinate plane and then finds its height. (2 min) E MM

6.G.3 | Dimensions of a Rectangle from Coordinates
Explore how to determine the length of a side of a rectangle given the coordinates of its vertices. (4 min) E MM

6.G.3 | Coordinates of Rectangle Example
Solve a challenging problem involving a quadrilateral on the coordinate plane. (2 min) E MM

6.G.3 | Parallelogram on the Coordinate Plane
Graph the given coordinates of three of the polygon vertices and find where the 4th vertex is. (5 min) E MM

6.G.3 | Geometry Jam
a full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Geometry | 3D Figures

6.G.4 | Counting Faces and Edges of 3D Shapes
Identify the faces and edges on various 3D shapes. (4 min) E MM

6.G.4 | Recognizing Common 3D Shapes
Identify the following 3D shapes: square pyramid, rectangular prism, triangular prism, cylinder, and cone. (3 min) E MM

6.G.2 | Volume with Fractional Cubes
Explore another way of finding the volume of a rectangular prism involves dividing it into fractional cubes, finding the volume of one, and then multiplying that volume by the number of cubes that fit into our rectangular prism (4 min) E MM

6.G.2 | Volume of a Rectangular Prism: Fractional Dimensions
Learn how to find the volume of a rectangular prism that has fractional side lengths. (4 min) E MM

6.G.2 | How Volume Changes from Changing Dimensions
Explore and discuss changing dimensions on a rectangular prism affects its volume. (4 min) E MM

6.G.2 | Volume of a Rectangular Prism: Word Problem
Explore how to find the volume of a rectangular prism fish tank that has fractional side lengths. (6 min) E MM

6.G.4 | Intro to Nets of Polyhedra
Explore how nets of polyhedra are just 2D objects that wrap around 3D objects, like wrapping paper around presents. (7 min) E MM

6.G.4 | Surface Area Using a Net: Triangular Prism
Learn the steps to compute the surface area of a triangular prism (3 min) E MM

6.G.2 | Surface Area Using a Net: Rectangular Prism
Learn whether a certain net could be folded up into a certain rectangular prism. (4 min) E MM

6.G.4 | Surface Area of a Box (Cuboid)
Learn how to find the surface area of a cuboid which has 6 rectangular faces, add the areas of all 6 faces. (3 min) E MM

6.G.4 | Surface Area of a Box Using Nets
Learn how to find the surface area of cereal box using nets. (5 min) E MM

6.G.4 | Surface Area Word Problem Example
Solve a word problem that involves surface area of a square pyramid. (5 min) E MM

6.G.4 | Geometry Jam
a full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Algebra | Variables & Expressions

6.EE6 | What is a Variable?
Explore and learn how variables are symbols, often letters, that represent different values in various situations. (3 min) E MM

6.EE.2b | Terms, Factors, & Coefficients
Understand how terms are the components added or subtracted, factors are the elements multiplied within each term, and coefficients are the numbers multiplying variables (7 min) E MM

6.EE.2a | Why aren't we Using the Multiplication Sign?
Explore how representing multiplication with variables can be tricky due to the similarity between the variable "x" and the multiplication symbol. (5 min) E MM

6.EE.2c | Evaluating an Expression with One Variable
Explore the expression 5 t plus 3 to calculate the cost of participating in a hospital raffle fundraiser. (2 min) E MM

6.EE.2c | Evaluating Exponent Expressions with Variables
Learn to evaluate expressions with exponents and variables. (3 min) E MM

6.EE.1 | Evaluating Expressions Like $5x^2$ & $\frac{1}{3}(6)^x$
Explore how evaluating expressions with exponents involves substituting a given value for the variable and following the order of operations. (2 min) E MM

6.EE.2c | Evaluating Expressions with Two Variables
Learn how to evaluate expressions with two variables involves substituting the given values for each variable and simplifying the expression. (2 min) E MM

6.EE.2c | Evaluating Expressions with Two Variables: Fractions & Decimals
Explore how to evaluate expressions with two variables involves substituting the given values for each variable and simplifying the expression. (3 min) E MM

6.EE.2c | Expression Value Intuition
Discover how expressions change as variables within them shift. (5 min) E MM

6.EE.2c | Evaluating Expressions with Variables: Temperature
Learn to substitute the variable with a value to solve the problem. (2 min) E MM

6.EE.2c | Evaluating Expressions with Variables: Cubes
Discover how to calculate the total surface area of cube-shaped containers with varying side lengths. (3 min) E MM

6.EE.1, 6.EE.2c | Evaluating Expressions with Variables: Exponents
Learn to evaluate an algebraic expression with exponents by following the order of operations (PEMDAS). (3 min) E MM

6.EE.2a, 6.EE.2b | Writing Basic Expressions with Variables
Discover how to represent various operations like addition, subtraction, multiplication, and division using variables. (3 min) E MM

6.EE.2a | Writing Algebraic Subtraction Expressions
Learn how to turn word statements into algebraic expressions. (2 min) E MM

6.EE.2a, 6.EE.2b | Writing Expressions with Variables
Explore how to write simple algebraic expressions from mathematical statements. (2 min) E MM

6.EE.2a, 6.EE.2b | Writing Expressions with Parentheses
Explore using parentheses and how they help follow the correct order of operations. (2 min) E MM

6.EE.2a, 6.EE.2b | Writing Expressions with Variables & Parentheses
Explore expressions and how to simplify them step by step. (3 min) E MM

6.EE.2a | Writing Basic Expressions Word Problems
Determine and write the basic expressions from this word problem. (3 min) E MM

6.NS.4 | Least Common Multiple
Learn that the least common multiple (LCM) is the smallest number that two or more numbers can divide into evenly. (4 min) E MM

6.NS.4 | Least Common Multiple: Repeating Factors
Determine the least common multiple of two integers. (3 min) E MM

6.NS.4 | Least Common Multiple of Three Numbers
Explore how to find the LCM of 3 different numbers. (6 min) E MM

6.NS.4 | Greatest Common Factor Examples
Explore and learn how the greatest common factor (GCF) of a set of numbers is the largest factor that all the numbers share. (7 min) E MM

6.NS.4 | Greatest Common Factor Explained
Learn how to find the GCD/GCF of two numbers, list their factors, identify the common factors, and choose the largest one. (6 min) E MM

6.EE.3, 6.EE.4 | Factor with the Distributive Property
Learn how the distributive property helps us factor out the greatest common factor (GCF) in math problems. (3 min) E MM

6.EE.3, D.EE.4 | Distributive Property over Addition
Learn how to apply the distributive law of multiplication over addition and why it works. (5 min) E MM

6.EE.3, 6.EE.4 | Distributive Property over Subtraction
Learn how to apply the distributive property of multiplication over subtraction and why it works. (2 min) E MM

6.EE.3, 6.EE.4 | Distributive Property with Variables
Learn to apply the distributive property to an algebraic expression, you multiply each term inside the parentheses by the number or variable outside the parentheses. (7 min) E MM

6.EE.3, 6.EE.4 | Intro to Combining Like Terms
Explore how to add terms with coefficients and variables. (5 min) E MM

6.EE.3, 6.EE.4 | Combining Like Terms
Learn how to add and subtract variables like apples(a) or x's. (3 min) E MM

6.EE.3, 6.EE.4 | Combining Like Terms Example
Learn how to simplify algebraic expressions by combining like terms. (4 min) E MM

6.EE.3, 6.EE.4 | Equivalent Expressions
Learn how to find equivalent expressions by combining terms and factoring. (2 min) E MM

Algebra | Equations & Inequalities

6.EE.2b | Variables, Expressions, & Equations
Learn how to use variables like x, y, and z to represent unknown values. (7 min) E MM

6.EE.5 | Testing Solutions to Equations
Learn how to solve an equation with one variable. (4 min) E MM

6.EE.5, 6.EE.7 | Same Thing to Both Sides of Equations
Visualize how to keep an equation balanced with this scale problem. (3 min) E MM

6.EE.5, 6.EE.7 | Representing a Relationship with an Equation
Learn about balancing scales and solving equations. We discover that to find a mystery mass, we can set up an equation using equal signs and balance both sides. (3 min) E MM

6.EE.5, 6.EE.7 | Dividing Both Sides of an Equation
Learn how to find the mass of a mystery object using a balanced scale. (3 min) E MM

6.EE.7 | One-Step Equations Intuition
Learn how to solve a balance scale problem with unknown mass. (5 min) E MM

6.EE6, 6.EE.7 | One-Step Addition & Subtraction Equations
Learn how to solve simple equations with one unknown variable. (2 min) E MM

6.EE.6. 6.EE.7 | One-Step Addition Equation
Learn how to solve simple equations by isolating the variable by removing other terms on the same side. (2 min) E MM

6.EE.6. 6.EE.7 | One-Step Addition & Subtraction Equations: Fractions & Decimals
Learn how to solve equations by learning how to isolate the variable by adding or subtracting terms from both sides of the equation. (5 min) E MM

6.EE.6, 6.EE.7 | One-Step Division Equations
Learn how to solve simple algebraic equations systematically. (11 min) E MM

6.EE.6, 6.EE.7 | One-Step Multiplication Equations
Learn to solve equations with x divided by a number, like x/3 = 14. (3 min) E MM

6.EE.6, 6.EE.7 | One-Step Multiplication & Division Equations: Fractions & Decimals
Learn to balance equations by applying the same operation on both sides, simplifying fractions, and eliminating decimals. (8 min) E MM

6.EE.6, 6.EE.7 | One-Step Multiplication Equations: Fractional Coefficients
Learn how to solve equations with fractions by using reciprocals. (4 min) E MM

6.EE.6, 6.EE.7 | Finding Mistakes in One-Step Equations
Learn how to spot mistakes in solving algebraic equations. (4 min) E MM

6.EE.6, 6.EE.7 | Modeling with One-Step Equations
Work through this problem to figure out how many pizzas can be bought with the money provided. (4 min) E MM

6.EE.5 | Testing Solutions to Inequalities
Learn to solve inequality puzzles by trying different numbers and seeing which ones make the puzzle true. (5 min) E MM

6.EE.8, 7.EE.4b | Plotting Inequalities
Explore how to plot inequalities on a number line. (2 min) E MM

6.EE.8 | Plotting an Inequality Example
Visualize how to x is less than 4 by using a number line. (2 min) E MM

6.EE.5, 6.EE.6, 6.EE.7, 6.EE.8 | Inequalities Word Problems
Learn to use inequalities to compare values. (2 min) E MM

6.EE.6, 6.EE.9 | Dependent & Independent Variables
Explore independent and dependent variables: how to identify the independent/dependent variables in each setting, and how to write equations with the dependent variable by itself. (2 min) E MM

6.EE.6, 6.EE.9 | Dependent & Independent Variables: Graphing
Visualize how to plot the answer of a problem on a graph. (1 min) E MM

6.EE.6, 6.EE.9 | Writing Equations for Relationships Between Quantities
Learn how to write equations representing real-world scenarios. (6 min) E MM

6.EE.6, 6.EE.9 | Analyzing Relationships Between Variables
Explore and analyze the relationship between variables in a problem. (3 min) E MM

Fractions, Decimals, Percents, & Ratios | Ratios

6.RP.1 | Intro to Ratios
Learn about Ratios and how they are the relationship between two numbers. (4 min) E MM

6.RP.1 | Basic Ratios
Learn how ratios compare two quantities and can be written as "a to b" or "a:b". (3 min) E MM

6.RP.1 | Part: Whole Ratios
Explore ratios in this visual example and learn hw to represent ratios as fractions. (3 min) E MM

6.RP.1, 6.RP.3a | Ratios with Tape Diagrams
Lear to find missing values using given ratios and discover equivalent ratios by multiplying or dividing both parts by the same number. (4 min) E MM

6.RP.1 | Ratios with Tape Diagrams (Part:Whole)
Learn to read a part-to-whole ratio from a tape diagram showing the ratio of the two parts. (3 min) E MM

6.RP.3a | Equivalent Ratio Word Problems
Learn to solve ratio word problems, using examples like Yoda Soda for guests, fish ratios in a tank, ice cream sundae ingredients, and dog color ratios at a park. (6 min) E MM

6.RP.1 | Simplify a Ratio from a Tape Diagram
Use a tape diagram to simplify a ratio in this visual problem. (3 min) E MM

6.RP.1, 6.RP.3a | Ratios and Double Number Lines
Use double number lines to visualize equivalent ratios and describe a ratio relationship between two quantities. (6 min) E MM

6.RP.3a | Solving Ratio Problems with Tables
Learn to solve for missing values in a table. (5 min) E MM

6.RP.1, 6.RP.3a | Equivalent Ratios
Learn to identify equivalent ratios by determining if you can multiply or divide the corresponding parts of the ratio by the same amount. (5 min) E MM

6.RP.1, 6.RP.3a | Equivalent Ratios: Recipe
Identify the correct ratios in this cake recipe problem. (5 min) E MM

6.RP.1 | Understanding Equivalent Ratios
Learn what it means for two ratios to be equivalent. (6 min) E MM

6.RP.2 | Interpreting Unequal Ratios
Use this example to interpret the ratio of pepper to fish in two recipes to decide which tastes spicier. (3 min) E MM

6.RP.3a | Ratios on Coordinate Plane
Understand and visualize that ratios represent the relationship between two quantities and can be visualized on a graph. (5 min) E MM

6.RP.3d | Ratios and Measurement
Learn to complete ratio tables and solve unit conversion problems with examples like hours to weeks, yards to miles, millimeters to feet, and dollars per pound to dollars per ounce. (7 min) E MM

6.RP.3b | Part to Whole Ratio Word Problem: Using Tables
Learn to use ratios to determine the number of indoor and outdoor playtimes in a class with a 2:3 ratio and 30 total playtimes. (3 min) E MM

Fractions, Decimals, Percents, & Ratios | Arithmetic with Rational Numbers

6.NS.3, 6.NS.9d | Adding Decimals: 9.087+15.31
Learn to add decimals by filling in any missing digits to complete this problem. (3 min) E MM

6.NS.3, 6.NS.9d | Adding Decimals: 0.822+5.65
Work to solve this decimal addition problem. (2 min) E MM

6.NS.3, 6.NS.9d | Adding Three Decimals
Work to solve this decimal addition problem. (3 min) E MM

6.NS.3, 6.NS.9d | Subtracting Decimals: 9.005 - 3.6
Learn to subtract decimals by lining up the decimal points. (2 min) E MM

6.NS.3, 6.NS.9 | Subtracting Decimals: 39.1 - 0.794
Learn to subtract decimals by aligning the decimal points and place values. (2 min) E MM

6.NS.3, 6.NS.9 | Adding Decimals Word Problem
Solve this word problem by adding decimals to find the total weight of newborn twins. (2 min) E MM

6.NS.3, 6.NS.9 | Adding & Subtracting Decimals Word Problem
Learn how to manage a bank account balance by adding and subtracting money with decimals. (2 min) E MM

6.NS.1 | Dividing a Fraction by a Whole Number
Visually learn to divide fractions by whole numbers using multiplication. (4 min) E MM

6.NS.1 | Meaning of the Reciprocal
Learn about reciprocals and how they are essential in understanding fractions. (4 min) E MM

6.NS.1 | Dividing a Whole Number by a Fraction
Explore how dividing a whole number by a fraction involves multiplying the whole number by the fraction's reciprocal. (3 min) E MM

6.NS.1 | Dividing a Whole Number by a Fraction with Reciprocal
Understand and visualize that dividing by a fraction involves finding the reciprocal and multiplying. (4 min) E MM

6.NS.1 | Understanding Division of Fractions
Learn to divide mixed numbers by converting the mixed numbers to improper fractions, the simplify the division problem by finding the reciprocal of one of the fractions. (6 min) E MM

6.NS.1 | Dividing Fractions: 2/5 ÷ 7/3
Solve this word problem by dividing 2/5 ÷ 7/3. (2 min) E MM

6.NS.1 | Dividing Fractions: 3/5 ÷ 1/2
Explore how dividing two fractions is the same as multiplying the first fraction by the reciprocal of the second fraction. (4 min) E MM

6.NS.1 | Dividing Mixed Numbers
Learn to divide mixed numbers by converting them to improper fractions. (4 min) E MM

6.NS.1 | Writing Fraction Division Story Problems
Explore how to solve this word problem involving fractions. (4 min) E MM

6.NS.1 | Dividing Whole Numbers & Fractions: T-Shirts
Learn how to calculate the number of baby T-shirts that can be made from 48 yards of fabric. (2 min) E MM

6.NS.1 | Area with Fraction Division Example
Discover the length of a yoga mat with a width of 3/5 meters and an area of 1 and 2/25 square meters. (3 min) E MM

5.NBT.7, 6.NS.3, 6.NS.9d | Intro to Multiplying Decimals
Learn how to multiply decimals. (4 min) E MM

6.NS.3, 6.NS.9d | Decimal Multiplication Place Value
Learn about how to rewrite decimal multiplication using fractions, we can use the commutative and associative properties of multiplication to justify how we place the decimal point in the standard multiplication algorithm. (5 min) E MM

6.NS.3, 6.NS.9d | Multiplying Challenging Decimals
Learn to multiply decimals easily by treating them as whole numbers first. (4 min) E MM

5.NBT.6, 6.NS.2 | Dividing by 2-Digits: 9,815÷65
Learn the process of dividing large numbers, specifically 9,815 divided by 65. (5 min) E MM

5.NBT.5, 5.NBT.6, 6.NS.2 | Dividing by 2-Digits: 7,182÷42
Learn to divide large numbers by two-digit numbers by breaking it in to steps. (3 min) E MM

5.NBT.7, 6.NS.2, 6.NS.3, 6.NS.9d | Dividing Whole Numbers to Get a Decimal
Learn how to divide two numbers and find a decimal answer. (3 min) E MM

6.NS.3, 6.NS.9d | Dividing a Decimal by a Whole Number
Learn how to divide decimals using long division. (2 min) E MM

6.NS.3, 6.NS.9d | Dividing a Whole Number by a Decimal
Learn how dividing a whole number by a decimal can be simplified by multiplying both numbers by 10, shifting the decimal point to the right. (4 min) E MM

6.NS.3, 6.NS.9d | Dividing Decimals with Hundredths
Explore how dividing decimals can be made simple by multiplying both numbers by the same amount to eliminate decimals. (4 min) E MM

6.NS.3, 6.NS.9d | Dividing Decimals Completely Learn to make dividing decimals easier by converting them into whole numbers. (7 min) E MM

6.NS.3, 6.NS.9d | Long Division with Decimals
Learn to divide a decimal by another decimal. (4 min) E MM

6.NS.3, 6.NS.9d | Dividing by a Multi-Digit Decimal
Work through the different steps needed to divide decimals. (5 min) E MM

Fractions, Decimals, Percents, & Ratios | Rates & Percentages

6.RP.2 | Intro to Rates
Learn how rates are closely related to rations and play a significant role in math subjects like algebra and calculus. (5 min) E MM

6.RP.2 | Solving Unit Rate Problem
Visualize and explore how to solve for a unit rate. (2 min) E MM

6.RP.2 | Solving Unit Price Problem
Visualize and explore how to solve for a unit price. (2 min) E MM

6.RP.3b | Rate Problems
Learn to find unit rates and use them to solve problems. (4 min) E MM

6.RP.2, 6.RP.3a | Comparing Rates Example
Visualize how to compare rates in this math problem. (7 min) E MM

6.RP.3c | The Meaning of Percent
Visualize and learn about percentages by shading 20% of a square. (3 min) E MM

6.RP.3c | Meaning of 109%
Visualize how to represent 109% using shading. (3 min) E MM

6.RP.3c | Percents from Fraction Models
Learn how to rewrite the fraction with a denominator of 100, as "percent" means "per 100." (4 min) E MM

6.RP.3c | Finding Percentages with a Double Number Line
Work to determine the percentage of students taking the bus to school in a class of 28. (2 min) E MM

6.RP.3c | Finding the Whole with a Tape Diagram
Use a tape diagram to solve this problem. (3 min) E MM

6.RP.3c | Fraction, Decimal, and Percent from Visual Model
Learn how to convert shaded parts of a square into fractions, decimals, and percentages with ease. (3 min) E MM

6.RP.3c | Converting Percents to Decimals & Fractions Example
Explore how to convert percentages to decimals and fractions. (3 min) E MM

6.RP.3c | Percent of a Whole Number
Discover how to calculate percentages with a simple example: finding 30% of 6. (2 min) E MM

6.RP.3c | Ways to Rewrite a Percentage
Discover how to calculate 2% of 90 using various methods, such as converting percentages to fractions and decimals. (2 min) E MM

6.RP.3c | Finding Common Percentages
Explore how to find the percentage of a number by simply multiplying or dividing by the corresponding fraction e. (3 min) E MM

6.RP.3c | Finding a Percent
Discover how to calculate percentages with this simple method. (3 min) E MM

6.RP.3c | Percent Word Problem: Recycling Cans
Visualize and learn how to calculate the percentage of recycled cans. (3 min) E MM

Measurement & Data | Representing Data Sets

6.SP.2, 6.SP.4 | Representing Data
Explore a few different ways to look at data. (8 min) E MM

6.SP.4 | Frequency Tables & Dot Plots
Learn to organize data into frequency tables and dot plots (sometimes called line plots). (7 min) E MM

6.SP.4 | Creating a Histogram
Explore how a histogram is a graphical display of data using bars of different heights. (7 min) E MM

6.SP.4, 6.SP.5a, 6.SP.5d | Interpreting a Histogram
Learn how to read and interpret histograms, which summarize data by sorting it into buckets. (4 min) E MM

6.SP.2, 6.SP.4, 6.SP.5c | Reading Box Plots
Box and whisker plots seek to explain data by showing a spread of all the data points in a sample. The "whiskers" are the two opposite ends of the data. (3 min) E MM

6.SP.4 | Constructing a Box Plot
Learn how to construct a box and whisker plot to help analyze data. (8 min) E MM

6.SP.4 | Worked Example: Creating a Box Plot (Odd Number of Data Points)
Learn how to create a box plot with 11 data points. (3 min) E MM

6.SP.4 | Worked Example: Creating a Box Plot (Even Number of Data Points)
Learn how to create a box plot using 14 data points. (3 min) E MM

6.SP.4 | Interpreting Box Plots
Learn how to evaluate what we know and what we don't know about a dataset given its box plot. (8 min) E MM

6.SP.4, 6.SP.5c | Comparing Dot Plots, Histograms, and Box Plots
Learn to determine which data displays would be helpful in situations. (5 min) E MM

6.SP.2 | Shapes of Distributions
Explore how some distributions are symmetrical, with data evenly distributed about the mean. Other distributions are "skewed," with data tending to the left or right of the mean. (5 min) E MM

6.SP.2 | Clusters, Gaps, Peaks & Outliers
Explore examples looking at different features of distributions, such as clusters, gaps, peaks, and outliers for distributions. (6 min) E MM

Statistics & Probability | Intro to Statistics & Data Sets

6.SP.1 | Statistical Questions
Explore what makes a question statistical. (9 min) E MM

6.SP.2, 6.SP.4 | Representing Data
Explore a few of the many ways to look at data. (8 min) E MM

6.SP.4 | Frequency Tables & Dot Plots
Learn to organize data into frequency tables and dot plots (sometimes called line plots). (7 min) E MM

6.SP.4 | Creating a Histogram
Discover how a histogram is a graphical display of data using bars of different heights. (7 min) E MM

6.SP.4, 6.SP.5a, 6.SP.5d | Interpreting a Histogram
Learn how to read and interpret histograms, which summarize data by sorting it into buckets. (5 min) E MM

6.SP.3, 6.SP.4, 6.SP.5c | Statistics Intro: Mean, Median, & Mode
Explore what the mean, median and mode is in a data set. (9 min) E MM

6.SP.5c | Mean, Median, & Mode Example
Use a set of numbers to find the mean, median, and mode. (4 min) E MM

6.SP.5c | Missing Value Given the Mean
Learn how to find the value of a missing piece of data if you know the mean of the data set. (5 min) E MM

6.SP.3, 6.SP.5c, 6.SP.5d | Impact on Median & Mean: Removing an Outlier
Explore the effects of removing a low outlier from a data set. (5 min) E MM

6.SP.3, 6.SP.5c, 6.SP.5d | Impact on Median & Mean: Increasing an Outlier
Explore the effects of modifying a value in a data set. (4 min) E MM

6.SP.5c | Median & Range Puzzlers
Solve an interesting median and range challenge problem. (7 min) E MM

6.SP.5c | Interquartile Range (IQR)
Learn to find the interquartile range (IQR) by first find the median (middle value) of the lower and upper half of the data. (6 min) E MM

6.SP.5c | Mean Absolute Deviation (MAD)
Explore how Mean absolute deviation (MAD) of a data set is the average distance between each data value and the mean. (9 min) E MM

6.SP.5c | Mean Absolute Deviation Example
Find the mean absolute deviation of a data set that's given in a bar chart. (6 min) E MM

6.SP.2 | Shapes of Distributions
Explore the difference in symmetrical and "skewed" distributions. (5 min) E MM

6.SP.2 | Clusters, Gaps, Peaks & Outliers
Explore looking at different features of distributions, such as clusters, gaps, peaks, and outliers for distributions. (7 min) E MM

Science

Earth and the Universe

E.6.8 | Solar System
Interactive classroom that allows students to visit each planet, watch them orbit, and learn about each one. (unlimited) E/I

E.6.8 | Sun
Rotating model of the Sun. IFX/LT

E.6.8 | Solar System Model
Animated model of the solar system. Rotation and revolution speeds are scaled accurately. IFX/LT

E.6.8 | Moon Phases
Interactive display of the phases of Earth's Moon. IFX/LT

E.6.8 | 1. Cool VR Walk on the Moon | 2. Yosemite
EXP.1 Walk on the Moon from the Project Apollo Archive.
EXP.2 Experience a guided tour of some of Yosemite's majestic spots.
(2 min/4 min) 1

E.6.8 | The Aurora Borealis Over Alaska's Chatanika River
Explore a timelapse of the Aurora Borealis filmed during a geomagnetic storm by William Briscoe Photography. (5 min) 381

E.6.8 | 360 Degree Video of the Milky Way
Explore a timelapse of the moving night sky. (1 min) 4

E.6.8 | Enter the Black Hole
Enter a black hole and explore the area around it. (5 min) 128

E.6.8 | First-Ever 360 VR Filmed in Space: One Strange Rock
Fly side-by-side with astronauts and experience weightlessness, the speed of traveling at 17 thousand miles per hour, and take in a stunning view of Earth.
(5 min) 177

E.6.8 | Explore the Solar System
Take a virtual tour of our Solar System, with the help of Crash Course Astronomy host Phil Plait. (5 min) 142

E.6.8 | Journey Into the Orion Nebula
Journey into the famous star-forming region of the Orion Nebula based on an image from the Hubble Space Telescope.
(2 min) 225

E.6.8 | Journey to the Edge of Space
Experience what it's like to leave Earth, traveling to over 90,000 feet into the stratosphere. (5 min) 226

E.6.8 | Mars - The Red Planet VR Documentary
Explore the planet Mars and see its history of exploration. (12 min) 273

E.6.8 | NASA's Curiosity Mars Rover at Namib Dune
View the Namib Dune and portions of Mount Sharp through the eyes of the Mars Rover. (2 min) 286

E.6.8 | The Night Sky and Milky Way: Visualize Astronomy
Enjoy a panoramic video of the night sky and Milky Way. (1 min) 391

E.6.8 | Solar Eclipse 2017
Watch a total solar eclipse that took place in Casper, Wyoming on August 21st, 2017.
(5 min) 358

E.6.8 | Space Experience
View Earth from Space below the International Space Station, but beware... meteorites have been forecasted.
(1 min) 366

E.6.8 | Take a VR Tour of 6 Real Exoplanets
Team up with astrophysicists to experience a scientifically accurate, VR tour of 6 exoplanets. (11 min) 379

E.6.8 | VR Solar System Space Video
This amazing 360 virtual reality video will transport you through our galactic neighborhood, the solar system.
(18 min) 429

E.6.8 | Curiosity Mars Rover's
View the Glen Torridon area of Mars from the eyes of the Mars Rover. (2 min) 91

E.6.8 | Sample Asteroid Bennu
Follow along on NASA's first asteroid sample return mission as they make a daring attempt to collect samples from an asteroid. (4 min) 343

Life Science

L.6.1 | Cell Classroom
Animal Cell: Interactive classroom located inside an animal cell. Infographics help students learn about the parts of a cell, alongside animations of the protein synthesis process.
Plant Cell: Interactive classroom located inside a plant cell. Explore the different organelles and components of the cell and explore the photosynthesis process (unlimited) E/I

Physical Science

P.6.6.4 | Electromagnet - Small Solenoid
Animated visualization of an electromagnetic solenoid with 15 coils. IFX/LT

P.6.6.4 | Electromagnet - Large Solenoid
Animated visualization of an electromagnetic solenoid with 26 coils. IFX/LT

P.6.6.4 | Magnet - Like Poles
Animated visualization of two bar magnets with like poles repelling each other. IFX/LT

P.6.6.4 | Magnet - Opposite Poles
Animated visualization of two bar magnets attracting each other. IFX/LT

P.6.6.4 | Magnet - Single Bar
Animated visualization of the electromagnetic field surrounding a single bar magnet. IFX/LT

P.6.6.4 | Magnet - Two Bars
Animated visualization of the electromagnetic field surrounding two bar magnets. IFX/LT

P.6.6.4 | Magnet - Horseshoe
Animated visualization of the electromagnetic field surrounding a horseshoe magnet. IFX/LT

Social Studies

Civics

CI.6.1 | A London City Guided Tour
Take a guided tour to view some of London's most iconic landmarks. (5 min) 15

CI.6.1 | Amazing Morocco
Join Louis as he adventures around Morocco. (8 min) 28

CI.6.1 | Discover the Taj Mahal, India
Join Asha Leo as she ventures around India and explores the Taj Mahal. (5 min) 104

CI.6.1 | Taj Mahal 360 Degree (VR) Tour in India
Explore one of the 7 Wonders of the World, the Taj Mahal in India. (2 min) 377

CI.6.1 | Hajj - Experience the Journey to Mecca
Walk with Al Jazeera's Basma Atassi in Mecca and see the major landmarks that millions of Muslims visit during the period of Hajj, the annual Islamic Pilgrimage. (8 min) 199

CI.6.1 | Himalayas: A Trek to School
Follow two girls as they travel up to 6 hours a day to school in a remote Himalayan village. (8 min) 204

CI.6.1 | Japan - Where Tradition Meets the Future
Explore Japanese tradition, modernity, and nature. (3 min) 224

CI.6.1 | North Korea
Tour throughout the Northeastern parts of North Korea including Rason, Namyang, Hoeryong, Chongjin, Kyongson, and Chilbo. (19 min) 290

CI.6.1 | The Fight for Falluja
Experience firsthand the battles Iraqi forces endured to retake the important strategic city of Fallujah from ISIS. (11 min) 387

CI.6.1, CI.6.2 | Syrians "Have to Survive Having No Rights" in Lebanon
Learn about Syrian refugees who are living in makeshift settlements under harsh conditions, with no legal rights in Lebanon's Bekaa Valley. (3 min) 376

CI.6.2 | Beyond the Map - A Day in a Favela
Step inside this 360 experience of a day in a Favela and meet some truly inspiring people. (3 min) 54

CI.6.2 | Women's March in Chicago
Witness a Women's Rights march in Chicago that was held on January 21, 2017. (2 min) 450

CI.6.2 | March for our Lives
Be immersed in Pioneer Valley's March for Our Lives that was held on March 24, 2018. (1 min) 272

Economics

E.6.1 | Back to Nature - Rainforest
Escape to the lush temperate rainforest of Southern Australia. (4 min) 45

E.6.1 | Damming the Nile: Episode 1
Africa's largest hydroelectric power project is two thirds finished and the dam can already control the flow of the Blue Nile, which is deeply upsetting downstream Egypt who they didn't consult before building started. (13 min) 94

E.6.1 | Damming the Nile: Episode 2
Journey to the great farming projects of Sudan, fly to a festival on the banks of the Nile, and explore the ancient Sudanese pyramid. Then launch in a balloon over Luxor to find out how much this river means to the land of the pharaohs. (16 min) 95

E.6.1 | Climbing the Redwoods - Fight for the Forests
Climb 200 feet up 'Grandfather,' the highest Redwood in a Northern California Grove while learning about the Redwood Forest and preservation efforts. (2 min) 79

E.6.1 | Pond
Explore a freshwater pond and the plants that surround it. (1 min) 313

E.6.1 | Forest
View a tranquil forest and the plant life throughout it. (1 min) 178

E.6.1 | Waterfall 1
View a waterfall and the surrounding plant life. (1 min) 433

E.6.1 | Waterfall 2
View a waterfall and the surrounding plant life. (1 min) 434

E.6.1 | Waterfall 3
View a waterfall and the surrounding plant life. (1 min) 435

Geography

G.6.2 | A London City Guided Tour
Take a guided tour to view some of London's most iconic landmarks. (5 min) 15

G.6.2 | Amazing Morocco
Join Louis as he adventures around Morocco. (8 min) 28

G.6.2 | Athens, Parthenon, Parthenónas, Acropolis - VR Walk
Go on a journey through Athens and see its main attractions from Ancient Greece. (5 min) 34

G.6.2 | Discover the Taj Mahal, India
Join Asha Leo as she ventures around India and explores the Taj Mahal. (5 min) 104

G.6.2 | Taj Mahal 360 Degree (VR) Tour in India
Explore one of the 7 Wonders of the World, the Taj Mahal in India. (2 min) 377

G.6.2 | Hajj - Experience the Journey to Mecca
Walk with Al Jazeera's Basma Atassi in Mecca and see the major landmarks that millions of Muslims visit during the period of Hajj, the annual Islamic Pilgrimage. (8 min) 199

G.6.2 | Walking Tours of Japan - Kiyomizudera Temple in Kyoto
Experience a walking tour of Kiyomizudera Temple in Kyoto, Japan. (17 min) 431

G.6.2 | Immerse Yourself in a Tour Around the Forbidden City of China
With red walls and yellow tiles, the resplendent and magnificent Forbidden City is a treasure of China's ancient palace architecture. (5 min) 214

G.6.2 | Leshan Giant Buddha - Leshan, China
Go on a tour of the Entire Leshan scenic area, including the famous stone Buddha statue. (9 min) 239

G.6.3 | Grand Canyon
Explore the Grand Canyon from different observation decks around the natural wonder. (unlimited) E

G.6.3 | Volcano
Experience an erupting volcano. IFX/LT

G.6.3 | Earth Cutaway
A model of Earth with a section cut away to expose its layers. IFX/LT

G.6.3 | Earth Cutaway info
An Infographic model of Earth with a section cut away to expose its layers. IFX/LT

H.6.1 | The Nutcracker - The Royal Ballet
Immerse yourself in the extraordinary world of The Royal Ballet as you follow young dancer Julia Roscoe as she prepares for her debut as a snowflake in the Nutcracker. (7 min) 392

H.6.1 | Carnegie Hall feat. The Philadelphia Orchestra
The Philadelphia Orchestra performs Grieg's "In the Hall of the Mountain King" from Peer Gynt Suite No. 1 under the direction of Music Director Yannick Nézet-Séguin in Carnegie Hall's Stern Auditorium's Perelman Stage on October 13, 2015. (3 min) 71

H.6.1 | Orchestra VR
Join the Los Angeles Philharmonic as they perform the iconic opening of Beethoven's timeless Fifth Symphony at Walt Disney Concert Hall. (4 min) 298

H.6.1 | Bruegel: A Fall With the Rebel Angels
In partnership with the Royal Museums of Fine Arts of Belgium, the Google Cultural Institute has designed an immersive experience that lets you explore The Fall of the Rebel Angels (1562) like never before. (4 min) 60

H.6.1 | Dreams of Dali
Go inside and beyond Dali's painting Archaeological Reminiscence of Millet's Angelus and explore the world of the surrealist master like never before in this mesmerizing 360° video. (5 min) 108

History

H.6.1 | Weaving Around the World
Follow the process of weaving that has been developed across cultures for thousands of years. From Venice to Addis Ababa, and the West Bank to the Navajo Nation Reservation. (4 min) 437

7th Grade

Mathematics

Basic Operations & Reasoning | Integers: Addition & Subtraction

7.NS.1 | Zero Pairs Worked Example
Explore what makes a zero pair and use integer chips to represent the numbers. (2 min) E MM

7.NS.1 | Subtracting with Integer Chips
Use Integer chip diagrams to model and evaluate sums. (5 min) E MM

7.NS.1b | Adding Negative Numbers on the Number Line
Learn how to model 6 + (-2) using vertical number lines. (5 min) E MM

7.NS.1 | Signs of Sums on a Number Line
Let's build intuition for the sign of sum involving negative and positive numbers. (8 min) E MM

7.NS.1 | Subtracting with Integer Chips
Model subtraction expressions using positive and negative integer chips. (5 min) E MM

7.NS.1b, 7.NS.1c | Number Equations & Number Lines
Use integer equations to describe diagram. (3 min) E MM

7.NS.1b, 7.NS.1c | Graphing Negative Number Addition and Subtraction Expressions
Explore how to graph addition and subtraction expressions involving negative numbers on the number line. (4 min) E MM

7.NS.1b, 7.NS.1c | Interpreting Numeric Expressions Example
Choose the correct interpretation of the integer expression 3 + (-7). (3 min) E MM

7.NS.1b. 7.NS.1c | Adding the Opposite with Integer Chips
Use integer chips to explore the conjecture that subtracting a number gives the same result as adding the opposite of the number. (5 min) E MM

7.NS.1b. 7.NS.1c | Adding the Opposite with Number Lines
Explore the claim that subtracting a number is the same as adding its opposite using number lines. (5 min) E MM

7.NS.1a, 7.NS.1c | Subtracting a Negative = Adding a Positive
Find out why subtracting a negative number is the same as adding the absolute value of that number. (2 min) E MM

7.NS.1a, 7.NS.1c | Adding Integers: Find the Missing Malue
Use number lines to find missing addends in addition equations with integers. (3 min) E MM

7.NS.1a, 7.NS.1c | Subtracting Integers: Find the Missing Value
Use number lines to find missing numbers in subtraction equations with integers. (7 min) E MM

7.NS.1c | Substitution with Negative Numbers
Practice substituting positive and negative values for variables. (8 min) E MM

7.NS.1c, 7.NS.1d | Ordering Expressions
Let's get some practice thinking about adding and subtracting variables representing positive and negative numbers on the number line. (7 min) E MM

Basic Operations & Reasoning | Interpreting Negative Numbers

7.NS.1c | Absolute Value as Distance Between Numbers
Explore what |a-b| really means, and we verify that |a-b| = |b-a| by looking at an example. (5 min) E MM

7.NS.1c | Interpreting Absolute Value as Distance
Work through a bunch of examples that stretch our thinking on absolute value. (11 min) E MM

7.NS.1b, 7.NS.1c, 7.NS.3 | Interpreting Negative Number Statements
Use examples to represent negative numbers in real world situations. (4 min) E MM

7.NS.3 | Negative Number Word Problem: Temperature
Use a number line to solve a word problem that includes a negative number. (4 min) E MM

7.NS.3 | Negative Number Word Problem: Alaska
Figure out the temperature in Fairbanks, Alaska by adding and subtracting negative numbers. (4 min) E MM

7.NS.3 | Associative and Commutative Properties of Addition with Negatives
Explore how the commutative and associative properties apply to addition, but not to subtraction. (4 min) E MM

7.NS.3 | Equivalent Expressions with Negative Numbers
Learn that we can commute and associate terms if we keep the signs with the terms. (5 min) E MM

Basic Operations & Reasoning | Negative Numbers: Multiplication & Division

7.NS.2a | Why a Negative Times a Negative is a Positive
Use the distributive property to understand the products of negative numbers.
(6 min) E MM

7.NS.2a | Why a Negative Times a Negative Makes Sense
Use the repeated addition model of multiplication to give an understanding of multiplying negative numbers.
(5 min) E MM

7.NS.2a | Multiplying Positive & Negative Numbers
Learn some rules of thumb for multiplying positive and negative numbers.
(6 min) E MM

7.NS.2b | Dividing Positive & Negative Numbers
Learn some rules of thumb for multiplying positive and negative numbers.
(5 min) E MM

7.NS.2a, 7.NS.2b | Interpreting Multiplication & Division of Negative Numbers
Let's think about the meaning of negative numbers in different situations.
(4 min) E MM

7.EE.3 | Rational Number Word Problem: Cosmetics
Convert minutes into hours and solve this word problem involving fractions.
(2 min) E MM

7.NS.2a | Exponents with Negative Bases
Learn what we know about negative numbers to determine how negative bases with exponents are affected and what patterns develop. (4 min) E MM

7.NS.2a | 1 and -1 to Different Powers
Explore different exponents affect the value of a number: when raised to the power of zero, any number equals one; when raised to an even power, negative numbers yield positive results; and when raised to an odd power, negative numbers yield negative results. (6 min) E MM

7.NS.2c | Equivalent Expressions with Negative Numbers (Multiplication & Division)
Figure out whether some expressions are equivalent. (8 min) E MM

Basic Operations & Reasoning | Order of Operations

6.EE.2c | Intro to Order of Operations
Show the steps and clarifies the purpose of order of operations: to have ONE way to interpret a mathematical statement.
(10 min) E MM

6.EE.2c | Worked Example: Order of Operations (PEMDAS)
Simplify and accurately solve mathematical expressions, ensuring a correct final answer.
(5 min) E MM

6.EE.1, 6.EE.2c | Order of Operations Example
Simplify this tricky expression using the order of operations. Expression includes negative numbers and exponents.
(5 min) E MM

Geometry

7.G.2 | Geometry Jam
A full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

7.G.2 | Rhombus Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

7.G.2 | Pentagon Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

7.G.2 | Octagon Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

7.G.2 | Obtuse Isosceles Triangle Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

7.G.2 | Narrow Rhombus Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

7.G.2 | Hexagon Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

7.G.2 | Equilateral Triangle Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

7.G.2 | Acute Isosceles Triangle Tile
Simple geometry manipulable that can be used to teach about shapes and angles or build tessellations. IFX/LT

7.G.2 | Wide Rhombus Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

7.G.2 | Trapezoid Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

7.G.2 | Square Tile
Simple geometry manipulable that can be used to teach about shapes and angles, or build tessellations. IFX/LT

7.G.2 | Protractor
At-scale measuring tool for measuring angles. Designed to be used with geometric tiles, or as a general teaching/training tool. IFX/LT

Geometry | Scale Copies

7.G.1 | Exploring Scale Copies
Learn to use virtual manipulatives to identify figures that scale proportionally. (2 min) E MM

7.G.1 | Identifying Corresponding Parts of Scaled Copies
Learn to identify corresponding parts of scaled copies. (2 min) E MM

7.G.1 | Corresponding Points and Sides of Scaled Shapes
Identify corresponding sides and corresponding points in scale copies of figures. (3 min) E MM

7.G.1 | Identifying Scale Copies
Look at side measures on figures to determine if they are scale copies. (4 min) E MM

7.G.1 | Identifying Scale Factor in Drawings
Identify the scale factor used to create a scale copy. (2 min) E MM

7.G.1 | Interpreting Scale Factors in Drawings
Interpret a scale factor to determine if a scale copy will be larger or smaller than the original figure. (2 min) E MM

7.G.1 | Identifying Values in Scale Copies
Identify missing side lengths in scale drawings. (4 min) E MM

7.G.1 | Scale Drawings
Find the missing side length in a scale drawing when given either a set of corresponding side lengths or one side length and the scale factor. (3 min) E MM

7.G.1 | Scale Drawing: Centimeters to Kilometers
Use ratios to figure out how far apart two cities should be on a map. (2 min) E MM

7.G.1 | Interpreting a Scale Drawing
Understand how a scale drawing is converted into real numbers using the scale factor. (5 min) E MM

7.G.1 | Creating Scale Drawings
Use real world contexts to create scale drawings on a grid. (2 min) E MM

7.G.1 | Making a Scale Drawing
Use your knowledge about scale factor, length, and area to assist. (3 min) E MM

7.G.1 | Scale Factors and Area
Explore how scale factors affect the area of a scaled figure. (6 min) E MM

7.G.1 | Solving a Scale Drawing Word Problem
Solve a word problem by using a scale drawing and finding the scale factor. (6 min) E MM

Geometry | Area & Circumference of Circles

7.G.4 | Radius, Diameter, Circumference & π
Learn how the number Pi allows us to relate the radius, diameter, and circumference of a circle. (11 min) E MM

7.G.4 | Labeling Parts of a Circle
Explore the different parts of a circle - radius, diameter, center, and circumference. (2 min) E MM

7.G.4 | Radius & Diameter from Circumference
Find the radius and diameter of a circle given the circumference. (3 min) E MM

7.G.4 | Relating Circumference and Area
Use formulas and a specific example to see how area and circumference relate. (5 min) E MM

7.G.4 | Area of a Circle
Learn how to use this formula, ($A = \pi r^2$) to find the area of a circle when given the diameter. (4 min) E MM

7.G.4 | Partial Circle Area and Arc Length
Find the area of a semicircle and the arc length of a partial circle. (3 min) E MM

7.G.4 | Finding Circumference of a Circle when Given the Area
Learn how to find the circumference, the distance around a circle, when given the area. (2 min) E MM

7.G.4 | Area of a Shaded Region
Find the area of a shaded region where you first determine the area of a square and then the area of a circle. (2 min) E MM

7.G.4 | Impact of Increasing the Radius
Learn how the circumference and area change if the radius of a circle changes. (3 min) E MM

7.G.4 | Geometry Jam
A full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Geometry | Vertical, Complementary, & Supplementary Angles

7.G.5 | Angles: Introduction
Learn about angles and the parts of an angle, like the vertex. (7 min) E MM

7.G.5 | Complementary & Supplementary Angles
Learn about complementary and supplementary angles, as well as the definitions of adjacent and straight angles. (8 min) E MM

7.G.5, 8.G.5 | Vertical Angles
Solve problems involving the intersection of two lines. (7 min) E MM

7.G.5 | Vertical Angles are Congruent Proof
Explore how to prove that vertical angles are equal. (5 min) E MM

7.G.5, 8.G.5 | Find Measure of Vertical Angles
Find the measure of the remaining angles given two intersecting lines and the measure of vertical angles. (3 min) E MM

7.G.5, 8.G.5 | Find Measure of Angles Word Problem
Solve this word problem to find the measure of angles. (4 min) E MM

7.G.5 | Equation Practice with Complementary Angles
Given the algebraic expressions that represent a pair of complementary angles, learn how to form and solve an equation to find an unknown angle. (2 min) E MM

7.G.5, 8.EE.7a, 8.EE.7b, 8.G.5, A-REI.3, G-CO.10 | Equation Practice with Supplementary Angles
Given the algebraic expressions that represent a pair of supplementary angles, form and solve an equation. (2 min) E MM

7.G.5, 8.EE.7a, 8.EE.7b, 8.G.5, A-REI.3, G-CO.10 | Equation Practice with Vertical Angles
Given the algebraic expressions that represent a pair of supplementary angles, form and solve an equation. (2 min) E MM

7.G.5, 8.G.5 | Geometry Jam
a full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Geometry | Constructing Triangles

7.G.2 | Construct a Right Isosceles Triangle
Learn how to build a triangle that is both a right triangle and an isosceles triangle. (2 min) E MM

7.G.2 | Construct a Triangle with Constraints
Learn to construct a triangle given the constraints. (4 min) E MM

7.G.2 | Triangle Inequality Theorem
Explore the intuition behind the triangle inequality theorem. (6 min) E MM

7.G.2 | Geometry Jam
a full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Geometry | Volumes

7.G.3, G-GMD.4 | Slicing a Rectangular Pyramid
Learn what happens when you slice vertically into a rectangular pyramid. (3 min) E MM

7.G.6 | Volume Word Problem: Gold Ring
Find the incremental volume of a ring in cubic inches. (3 min) E MM

7.G.6, 8.G.9, FAC.G.38, G-GMD.3 | Volume of Triangular Prism & Cube
Using the formulas for the volume of triangular prism and cube to solve some solid geometry problems. (4 min) E MM

7.G.6 | Volume of Rectangles Inside Rectangles
Learn to solve for the volume of rectangles inside rectangles. (5 min) E MM

8.G.9, FAC.G.38, G-GMD.3 | Cylinder Volume & Surface Area
Learn how to find the volume of a cylinder using these formulas; $c\ \pi\ r^2\ h$, and its surface area is $2\pi\ r\ h + 2\pi\ r^2$. (8 min) E MM

8.G.9, FAC.G.38, G-GMD.3 | Volume of a Sphere
Use the formula for the volume of a sphere is $V = 4/3\ \pi\ r^3$, where V = volume and r = radius. (3 min) E MM

8.G.9, FAC.G.38, G-GMD.3 | Volume of a Cone
Explore the formula for the volume of a cone is $V=1/3h\pi r^2$. (6 min) E MM

7.G.6, 8.G.9, FAC.G.38, G-GMD.3 | Geometry Jam
a full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Algebra | Proportional Relationships

7.RP.2b | Introduction to Proportional Relationships
Explore proportional relationships are relationships between two variables where their ratios are equivalent. (5 min) E MM

7.RP.2b | Identifying Constant of Proportionality Graphically
Identify the constant of proportionality from a line graphed on a coordinate plane. (4 min) E MM

7.RP.2b | Constant of Proportionality from Graph
Learn how to find constant of proportionality by looking at the graph of a line. (2 min) E MM

7.RP.2b | Identifying the Constant of Proportionality from Equation
Understanding what a constant of proportionality is and how to identify it in an equation. (4 min) E MM

7.RP.2b | Constant of Proportionality from Equation
Identify the constant of proportionality from equations. (2 min) E MM

7.RP.2b | Constant of Proportionality from Tables
Identifying proportionality constants by looking at tables of values. (3 min) E MM

7.RP.2b | Constant of Proportionality from Table (With Equations)
Identify the constant of proportionality from table. (2 min) E MM

7.RP.2b | Comparing Constants of Proportionality
Explore an example comparing constants of proportionality. (4 min) E MM

7.RP.2b | Comparing Proportionality Constants
Compare constants of proportionality in various forms, such as graphs, equations, contexts, diagrams, and tables. (3 min) E MM

7.RP.2b | Interpret Proportionality Constants
Interpret what the constant of proportionality means in a context. (3 min) E MM

7.RP.2a. 7.RP.2b | Intro to Proportional Relationships
Explore if a relationship is proportional, you should look at the ratios between the two variables. (4 min) E MM

7.RP.2a, 7.RP.2b | Proportional Relationships: Movie Tickets
Use this example to determine if the price you pay is proportional to the number of tickets that are bought. (2 min) E MM

7.RP.2a | Proportional Relationships: Bananas
Explore a proportionality problem about eating bananas. (3 min) E MM

7.RP.2a | Proportional Relationships: Spaghetti
Explore a table of ratios and test them for equivalence and determine whether the relationship is proportional. (1 min) E MM

7.RP.2a | Proportional Relationships
Determine which ratios are proportionate to a ratio provided in a context. (4 min) E MM

7.RP.2a | Is Side Length & Area Proportional?
Solve the question by drawing a square and thinking about the relationship between side length and area. (4 min) E MM

7.RP.2a, 7.RP.2b | Is Side Length & Perimeter Proportional?
Solve by drawing a square and thinking about the relationship between side length and perimeter. (3 min) E MM

7.RP.2a, 7.RP.2b | Identifying Proportional Relationships from Graphs
Identify proportional relationships from graphs. (3 min) E MM

7.RP.2a | Proportional Relationships: Graphs
Learn how to tell proportional relationships by drawing graphs. (7 min) E MM

7.RP.2a | Interpreting Graphs of Proportional Relationships
Interpret graphs of proportional relationships. (3 min) E MM

7.RP.2c | Worked Example: Solving Proportions
Learn the reasoning behind solving proportions. (7 min) E MM

7.RP.2c | Writing Proportions Example
Explore examples of writing two ratios and setting them equal to solve proportion word problems. (6 min) E MM

6.RP.2, 6.RP.3b | Proportion Word Problem: Cookies
Explore how to solve this word problem about proportion involving cookies. (6 min) E MM

6.RP.2, 6.RP.3b | Proportion Word Problem: Hot Dogs
Solve this proportion word problem involving hot dogs. (5 min) E MM

7.RP.2c | Equations for Proportional Relationships
Learn how to write a proportional equation y=kx where k is the so-called "constant of proportionality". (5 min) E MM

7.RP.2c | Writing Proportional Equations from Tables
Write an equation to describe the relationship between the number of scoops in an ice cream cone and the price. C (3 min) E MM

7.RP.2c | Writing Proportional Equations
Figure out the constant of proportionality when dealing with a constant rate. (2 min) E MM

Algebra | Expressions

6.EE.3, 6.EE.4 | Intro to Combining Like Terms
Explore adding like terms is a fundamental concept in algebra. (4 min) E MM

7.EE.1 | Combining Like Terms with Negative Coefficients & Distribution
Explore how to layer the distributive property on top of using order of operations and combining like terms. (4 min) E MM

7.EE.1 | Combining Like Terms with Negative Coefficients
Solve this example of combining like terms in an expression. (5 min) E MM

7.EE.1 | Combining Like Terms with Rational Coefficients
Learn how to rewrite algebraic expressions by combining like terms that have decimals and fraction coefficients. (4 min) E MM

7.EE.1 | The Distributive Property with Variables
Learn how to apply the distributive property to factor out the greatest common factor from an algebraic expression like 2+4x. (6 min) E MM

7.EE.1, 7.EE.2, A-SSE.2, FAC.EI.3, FAC.P.33 | Factoring with the Distributive Property
Learn how to factor the expression 4x+18 into the expression 2(2x+9). (4 min) E MM

7.EE.1 | Equivalent Expressions: Negative Numbers & Distribution
Learn how to identify equivalent expressions using your knowledge of the distributive property and negative numbers. (4 min) E MM

7.EE.2 | Interpreting Linear Expressions: Diamonds
Match the expression to their meanings regarding linear expressions. (2 min) E MM

7.EE.2 | Interpreting Linear Expressions: Flowers
Let's practice matching expressions to their meaning in this example of interpreting linear expressions. (2 min) E MM

6.EE.2a, 6.EE.6, 7.EE.2 | Writing Expressions Word Problems
Learn how to write expressions with variables to describe situations described in word problems. (5 min) E MM

Algebra | Equations

6.EE.5, 6.EE.7 | Same Thing to Both Sides of Equations
Solve for the mystery mass's weight by using a balance scale. (2 min) E MM

7.EE.4a, 8.EE.7a, 8.EE.7b | Intro to Two-Step Equations
Solve a two-step equation using the concept of equality: what we do to one side of the equation must be done to the other. (5 min) E MM

7.EE.4a, 8.EE.7a, 8.EE.7b | Two-Step Equations Intuition
Demonstrate how we solve an equation expressed such: ax + b = c. (9 min) E MM

7.EE.7a, 8.EE.7a, 8.EE.7b | Worked Example: Two-Step Equations
Solve the equation -16 = x/4 + 2. (3 min)

7.EE.7a | Two-Step Equations with Decimals and Fractions
Learn how to solve equations that involve decimals and fractions. (8 min) E MM

7.EE.4a, 8.EE.7a, 8.EE.7b | Two-Step Equations with Decimals and Fractions
Let's practice some two step equations, some of which require merging terms and using the distributive property. (14 min) E MM

7.EE.4a, 8.EE.7a, 8.EE.7b | Find the Mistake: Two-Step Equations
Explore how to check our own work (and other people's work) for correctness. (4 min) E MM

6.EE.6, 6.EE.9, 7.EE.4a, 8.EE.7a, 8.EE.7b | Equation Word Problem: Super Yoga (Part 1)
Using information from the super yoga word problem, explore all the possible combinations and create equations which express the possibilities. (7 min) E MM

6.EE.6, 6.EE.9, 7.EE.4a, 8.EE.7a, 8.EE.7b | Equation Word Problem: Super Yoga (Part 2)
Using information from the super yoga word problem, explore all the possible combinations and create equations which express the possibilities. (8 min) E MM

7.EE.4a, 8.EE.7a, 8.EE.7b | Two-Step Equation Word Problem: Computers
Learn how to construct and solve a basic linear equation to solve a word problem. (5 min) E MM

7.EE.4a, 8.EE.7a, 8.EE.7b | Two-Step Equation Word Problem: Garden
Solve this word problem and find the dimensions of a garden given only the perimeter. (2 min) E MM

7.EE.4a, 8.EE.7a, 8.EE.7b | Two-Step Equation Word Problem: Oranges
Learn how to solve a word problem by writing an equation to model the situation. (6 min) E MM

Algebra | Inequalities

6.EE.5 | Testing Solutions to Inequalities
Explore how inequalities are like puzzles where you compare two things. (5 min) E MM

7.EE.4b | One-Step Inequalities Examples
Explore how linear inequalities begin with multiplying and dividing by negative numbers. (10 min) E MM

7.EE.4b | One-Step Inequalities: -5c ⩽ 15
Solve the inequality, we'll graph the solution. (3 min) E MM

7.EE.4b | One-Step Inequality Word Problem
Explore how inequalities are used in real life problems. (2 min) E MM

7.EE.4b | Two-Step Inequalities
Learn how to solve a two-step inequalities problem. (4 min) E MM

7.EE.4b | Two-Step Inequality Word Problem: Apples
Solve this word problem about apples involving two-step inequality. (6 min) E MM

7.EE.4b | Two-Step Inequality Word Problem: R&B
Interpret the information and then construct a linear inequality to solve it. (2 min) E MM

Fractions, Decimals, Percents, & Ratios | Rates & Percentages

7.RP.1 | Rates with Rractions
Solve an example problem with rates with fractions. (5 min) E MM

4.NF.6 | Rewriting Decimals as Fractions: 2.75
Solve an example of how we convert a decimal to a simplified fraction. (3 min) E MM

7.NS.2d, 8.NS.1 | Worked Example: Converting a Fraction (7/8) to a Decimal
Learn how to write the fraction, 7/8 as a decimal. (2 min) E MM

7.NS.2d, 8.NS.1 | Fraction to Decimal: 11/25
Write 11/25 as a decimal (2min) E MM

7.NS.2d, 8.NS.1 | Fraction to Decimal with Rounding
Learn to write 16/21 as a rounded decimal. (3 min) E MM

7.NS.2d, 8.NS.1 | Comparing Rational Numbers
Explore how to compare Rational Numbers. (7 min) E MM

6.RP.3c | Solving Percent Problems
Solve this percent problem using algebra. (6 min) E MM

7.RP.3 | Percent Word Problem: Magic Club
Solve percent word problems including percent comparisons and percent of change. (8 min) E MM

7.RP.3 | Percent Word Problems: Tax and Discount
Solve percent word problems involving tax, tip, and discounts. (6 min) E MM

7.RP.3 | Percent Word Problem: Guavas
Solve this percent word problem to find the full price when you know the discount price. (6 min) E MM

Fractions, Decimals, Percents, & Ratios | Rational Numbers: Addition & Subtraction

7.NS.1b | Adding Fractions with Different Signs
Use a number line to add fractions with different signs. (4 min) E MM

7.NS.1b | Adding and Subtracting Fractions with Negatives
Use the properties of addition to strategically add and subtract fractions with negatives and unlike denominators. (4 min) E MM

7.EE.3, 7.NS.1d | Adding & Subtracting Rational Numbers: 79% - 79.1 - 58 1/10
Evaluate how to add/subtract rational numbers. (5 min) E MM

7.EE.3, 7.NS.1d | Adding & Subtracting Rational Numbers: 0.79 - 4/3 - 1/2 + 150%
Evaluate how to add/subtract rational numbers. (4 min) E MM

Fractions, Decimals, Percents, & Ratios | Rational Numbers: Multiplication & Division

7.EE.3 | Rational Number Word Problem: School Report
Visualize this word problem then use subtraction and multiplication of decimals and fractions to get at the answer. (4 min) E MM

7.EE.3 | Rational Number Word Problem: Ice
Determine the volume of frozen water and express the answer as a fraction. (3 min) E MM

7.EE.3 | Rational Number Word Problem: Computers
Compare the weight of two objects using a ratio of integers. (3 min) E MM

7.EE.3 | Rational Number Word Problem: Stock
Utilize proportions and fractions to determine shareholders profit in this word problem. (4 min) E MM

7.EE.3 | Rational Number Word Problem: Checking Account
Use your knowledge of decimals and adding negative and positive numbers to bring your account back into the black. (3 min) E MM

7.NS.2b | Negative Signs in Fractions
Solve and find equivalent expressions to -g/h. (5 min) E MM

7.NS.2b | Expressions with Rational Numbers
Learn to compare expressions with positive and negative fractions. (6 min) E MM

7.NS.2a | Multiplying Positive and Negative Fractions
Explore examples of multiplying and dividing fractions with negative numbers. (4 min) E MM

7.NS.2b | Dividing Negative Fractions
Explore how dividing by a fraction is the same as multiplying by its reciprocal. (4 min) E MM

6.NS.1 | Dividing Mixed Numbers
Explore how to change mixed numbers into improper fractions, divide, and then change the answer back to a mixed number. (3 min) E MM

Statistics & Probability | Intro to Statistics & Probability

7.SP.7a | Intro to Theoretical Probability
Explore probability through the example of flipping a quarter and rolling a die. (8 min) E MM

7.SP.7a | Simple Probability: Yellow Marble
In order to find the probability of picking a yellow marble from a bag, we must first determine the number of possible outcomes, and then how many of them meet our constraints. (3 min) E MM

7.SP.7a | Simple Probability: Non-Blue Marble
Explore this example we are figuring out the probability of randomly picking a non-blue marble from a bag. (10 min) E MM

7.SP.6 | Experimental Probability
Explore how to make reasonable estimates of the likelihood of future events. (7 min) E MM

7.SP.6 | Intuitive Sense of Probabilities
Explore what probabilities really mean. (9 min) E MM

7.SP.6 | Theoretical and Experimental Probabilities
Compare expected probabilities to what really happens when we run experiments. (7 min) E MM

7.SP.6, 7.SP.7a | Making Predictions with Probability
Explore how theroretical probability helps to predic the number of times a spinner willl land on an elephant. (5 min) E MM

7.SP.6, 7.SP.7b | Probability Models Example: Frozen Yogurt
Model the probability of a frozen yogurt line having 0, 1, or 2 people in it. (8 min) E MM

7.SP.8b | Sample Spaces for Compound Events
Explore the notion of a "sample space". See a sample space represented as a tree diagram, table, and list. (9 min) E MM

7.SP.8a, 7.SP.8b | Die Rolling Probability
Explore the probability of rolling doubles on a pair of dice and create a grid of all possible outcomes. (5 min) E MM

7.SP.8a, 7.SP.8b | Probability of a Compound Event
Learn how to use sample space diagrams to find probabilities. (5 min) E MM

7.SP.8b | Counting Outcomes: Flower Pots
Find the number of ways you can put four types of flowers into three types of pots. (2 min) E MM

7.SP.8b | Count Outcomes Using Tree Diagram
Explore how tree diagrams can be used to find the number of possible outcomes and calculate the probability of possible outcomes. (4 min) E MM

7.SP.1, 7.SP.2 | Reasonable Samples
Explore how to make a valid conclusion, you'll need a representaive, not skewed, sample. (4 min) E MM

7.SP.3, 7.SP.4 | Comparing Distributions with Dot Plots (Example Problem)
Examine two distributions in dot plots to draw conclusions about the times of Olympic swimmers. (4 min) E MM

Science

Earth & Space Science

E.7.9A | Cloud Climb
Explore how clouds, atmosphere, and weather all come together to create different aspects of the Earth's sky. (unlimited) E/I

E.7.9A | Moon Phases
Interactive display of the phases of Earth's Moon. IFX/LT

E.7.9A | Antarctica - Unexpected Snow
See how a Penguin and Seal colony as a winter storm moves in. (2 min) 30

E.7.9A | Category 3 Hurricane Landfall Simulation
Experience a category 3 hurricane through a simulation with guided popups. (1 min) 74

E.7.9A | Close-Range Tornado
Get up close and personal with a tornado near Wray, CO from May 7th, 2016. (8 min) 80

E.7.9A | Boston Snowstorm from Bunker Hill Monument
Watch a major winter storm move through the city of Boston in this time-lapse from the top of Bunker Hill Monument. (3 min) 56

E.7.9A | Inside Hurricane Maria
Watch Hurricane Maria change from a category 1 to a category 5 in about 24 hours. (5 min) 220

E.7.9B | Ace Center @ Hermitage Greenhouse
Join students from Hermitage High School as they explain how a greenhouse works and the different features within it. (3 min) 21

E.7.9B | After the Floods: Rebuilding Ellicott City
Take an immersive journey through the flooding, aftermath, and reconstruction of Ellicott City, Maryland to give a new perspective on the damage done by flooding. (6 min) 25

E.7.9B | Back to Nature - Rainforest
Escape to the lush temperate rainforest of Southern Australia. (4 min) 45

E.7.9B | Chennai Floods Aftermath
Take an immersive journey through the impact, rescue, and reason for the floods that occurred in Chennai, India, in December 2015. (6 min) 76

E.7.9B | Damming the Nile: Episode 1
Africa's largest hydroelectric power project is two thirds finished and the dam can already control the flow of the Blue Nile, which is deeply upsetting downstream Egypt who they didn't consult before building started. (13 min) 94

E.7.9B | Damming the Nile: Episode 2
Journey to the great farming projects of Sudan, fly to a festival on the banks of the Nile and explore the ancient Sudanese pyramid. Then launch in a balloon over Luxor to find out how much this river means to the land of the pharaohs. (16 min) 95

E.7.9B | Life in Haiti: After a Devastating Natural Disaster
Join filmmaker Dylan Roberts on a journey to the Haitian city of Jérémie, and the small village of Manish, to witness the aftermath of a colossal storm. (5 min) 258

E.7.9B | Climbing the Redwoods - Fight for the Forests
Climb 200 feet up 'Grandfather,' the highest Redwood in a Northern California Grove while learning about the Redwood Forest and preservation efforts. (2 min) 79

E.7.9B | Earthquake VR Experience
Be exposed to a virtual earthquake that provides a life-like training experience, without an actual earthquake. (2 min) 115

E.7.9B | Expedition to the Heart of an Active Volcano
Join a group of climbers as they embark on a scientific exploration into an active volcano. (5 min) 129

E.7.9C | Sun
Rotating model of the Sun. IFX/LT

E.7.9C | Solar System
Interactive classroom that allows students to visit each planet, watch them orbit, and learn about each one. (unlimited) E/I

E.7.9C | Solar Eclipse 2017
Watch a total solar eclipse that took place in Casper, Wyoming on August 21st, 2017. (5 min) 358

Life Science

L.7.3.2 | Cell Classroom
Animal Cell: Interactive classroom located inside an animal cell. Infographics help students learn about the parts of a cell, alongside animations of the protein synthesis process.
Plant Cell: Interactive classroom located inside a plant cell. Explore the different organelles and components of the cell and explore the photosynthesis process (unlimited) E/I

Physical Science

P.7.5C | Periodic Table
Interactive classroom that teaches students about the periodic table of elements, their chemical and physical properties, and their atomic structures. E/I

P.7.5D | Cell Classroom
Animal Cell: Interactive classroom located inside an animal cell. Infographics help students learn about the parts of a cell, alongside animations of the protein synthesis process.
Plant Cell: Interactive classroom located inside a plant cell. Explore the different organelles and components of the cell and explore the photosynthesis process (unlimited) E/I

P.7.5B | Bunsen Burner and Beaker
Interactive model of a Bunsen burner, beaker, and ring stand. Toggling the valve turns on the burner flame and starts a chemical reaction in the beaker. IFX/LT

P.7.5C | Hydrogen and Helium Formation
Protons, neutrons, and electrons move around randomly and then collide to form hydrogen and helium atoms. IFX/LT

P.7.5D | Covalent Bonding - H2
Simple visualization of the covalent bond between two hydrogen atoms. IFX/LT

P.7.5D | Covalent Bonding - Glucose Hybridized
Visualization of a covalently bonded glucose molecule with hybridized orbitals. IFX/LT

P.7.5D | Covalent Bonding - O2 Hybridized
Visualization of two covalently bonded oxygen atoms with hybridized orbitals. IFX/LT

P.7.5D | Covalent Bonding - H2O Hybridized
Visualization of a covalently bonded water molecule with hybridized orbitals. IFX/LT

P.7.5D | Ionic Bonding - NaCl
Animated visualization of the ionic bond between a sodium atom and a chlorine atom. IFX/LT

P.7.5D | Ionic Bonding - NaOH
Animated visualization of the ionic bond between a sodium atom and a hydroxide anion. IFX/LT

P.7.5D | Ionic Bonding - NaF
Animated visualization of the ionic bond between a sodium atom and a fluorine atom. IFX/LT

P.7.5D | Ionic Bonding - MgSO4
Animated visualization of the ionic bond between a magnesium atom and a sulfate anion. IFX/LT

Social Studies

Early World History

7.1 | Ancient Egypt - Hall of Pharaohs
Visit the Hall of Pharaohs and interact and learn from 5 of Egypt's most well-known pharaohs of all time: Ramesses the Great, Nefertiti, King Tut, Alexander the Great, and Cleopatra. (unlimited) E/I

7.1 | Crawl Inside a 3,500-Year-Old Egyptian Tomb
Descend 7 meters under the sandy hills of southern Egypt to become one of the first modern humans to explore a newly discovered ancient Egyptian tomb. (3 min) 85

7.1 | The Dream of Egypt's Tuthmosis IV
A tour around the statue of the Sphinx temple and the pyramids of Giza. (4 min) 384

7.2 | Immerse Yourself in a Tour Around the Forbidden City of China
With red walls and yellow tiles, the resplendent and magnificent Forbidden City is a treasure of China's ancient palace architecture. (5 min) 214

7.2 | Leshan Giant Buddha - Leshan, China
Go on a tour of the Entire Leshan scenic area, including the famous stone Buddha statue. (9 min) 239

7.3 | Dholavira
Dholavira is an archaeological site that contains one of the five largest Harappan sites and most prominent archaeological sites in India belonging to the Indus Valley Civilization. (2 min) 102

7.4 | Athens, Parthenon, Parthenónas, Acropolis - VR Walk
Go on a journey through Athens and its main attractions from Ancient Greece. (5 min) 34

7.5 | Pompeii Amazing Tour in VR - Italy
Explore the site of Pompeii, an ancient Roman town-city near modern Naples, that was mostly destroyed and buried under 4 to 6 m (13 to 20 ft) of volcanic ash and pumice in the eruption of Mount Vesuvius in 79 AD. (15 min) 312

7.6 | Witness the Mysterious World of West African Voodoo
Journey to Togo, a tiny nation in West Africa, that contains the region's largest Voodoo market- 'Marche des Fetches' and learn about the rich history that surrounds this religion. (5 min) 448

7.7 | World Religions
See the different major religions of the world and how they are dispersed across the world. (9 min) 452

7.9 | Bruegel: A Fall With the Rebel Angels
In partnership with the Royal Museum of Fine Arts of Belgium, the Google Cultural Institute has designed an immersive experience that lets you explore The Fall of the Rebel Angels (1562) like never before. (4 min) 60

US History

7C.14 | Civil War: A Letter from the Trenches
Get transported back to the 1860s to "experience" what life was like for a young cadet in the Confederate army, trekking through the mud and dodging enemy fire as you journey through the trenches. (5 min) 78

7C.6, 7C.6.5 | Historic Jamestown
Interactive experience where students will experience the reason for the English Colonization and the significance of the location regarding resources, defensibility, and economic development. (unlimited) E/I

7C.7, 7C.8 | Independence Hall
Join George Washington, John Adams, Thomas Jefferson, Benjamin Franklin, and John Hancock as they come to life to tell you their stories about the founding of the United States. (unlimited) E/I

7C.7 | Battle Road: The American Revolution
Be surrounded by scores of professional reenactors, organizers, onlookers, and photographers as they gather at Lexington, Concord, and Minute Man National Historical Park to honor the memory of this critical turning point in American history. (5 min) 49

7C.8 | Liberty Bell
Realistic recreation of the Liberty Bell in Philadelphia, PA. Touch the bell to hear it ring, just as it would have sounded before it cracked. IFX/LT

8th Grade

Mathematics

Basic Operations & Reasoning | Repeating Decimals

8.NS.1 | Converting a Fraction to a Repeating Decimal
Learn to convert a fraction like 19/27 into a decimal, you should divide 27 into 19, and use the remainder to figure out the decimal. (4 min) E MM

8.NS.1 | Converting Repeating Decimals to Fractions (Part 1)
Learn the process of converting a repeating decimal to a fraction can be broken down into a few easy steps. (4 min) E MM

8.NS.1 | Converting Repeating Decimals to Fractions (Part 2)
Learn how repeated decimals can be converted into fractions by shifting the decimal to the right and subtracting the decimals. (9 min) E MM

Basic Operations & Reasoning | Square & Cube Roots

8.EE.2, A-REI.4b | Intro to Square Roots
Learn about the square root symbol (the principal root) and what it means to find a square root. (5 min) E MM

8.EE.2, A-REI.4b | Intro to Cube Roots
Learn the meaning of cube roots and how to find them. Also learn how to find the cube root of a negative number. (8 min) E MM

8.EE.2, A-REI.4b | Worked Example: Cube Root of a Negative Number
Learn how to find the cube root of negative 512 by breaking it down into prime factors. (4 min) E MM

8.EE.2, A-REI.4b | Square Root of a Decimal
Learn how to find the square root of a decimal number. (3 min) E MM

8.EE.2, A-REI.4b | Dimensions of a Cube from its Volume
When we know the volume of a cube, we can use the cube root of the volume to find the length of each side. (3 min) E MM

Basic Operations & Reasoning | Intro to Irrational Numbers

8.NS.1 | Intro to Rational & Irrational Numbers
Learn the difference between rational and irrational numbers, learn how to identify them, and discover why some of the most famous numbers in mathematics, like Pi and e, are actually irrational. (6 min) E MM

8.NS.1 | Classifying Numbers: Rational & Irrational
Learn to write any rational number as the ratio of two integers. (2 min) E MM

8.NS.1 | Classifying Numbers
Learn to classify numbers as one of these four categories: rational numbers, irrational numbers, integers, and whole numbers. (9 min) E MM

8.NS.1 | Worked Example: Classifying Numbers Decide which number set 3.4028 belongs to: integer, rational, or irrational. (7 min) E MM

8.NS.2 | Approximating Square Roots
Learn how to find the approximate values of square roots. (5 min) E MM

8.NS.2 | Comparing Irrational Numbers with Radicals
Learn how to sort a bunch of numbers (4√2 2√3 3√2 √17 3√3 5) from least to greatest without using a calculator. (6 min) E MM

8.NS.2 | Approximating Square Roots to Hundredths
Explore how to find the perfect squares around 45 and use them to make an educated guess. (7 min) E MM

8.NS.2 | Comparing Values with Calculator
Learn how to compare 22.9% to √0.45 using a calculator. (4 min) E MM

Basic Operations & Reasoning | Properties of Exponents

7.NS.2a | Exponents with Negative Bases
Learn to what we know about negative numbers to determine how negative bases with exponents are affected and what patterns develop. (5 min) E MM

6.EE.1, 7.NS.2a | The 0 & 1st Power
Learn different ways of thinking about exponents. (5 min) E MM

7.NS.2a | Even & Odd Numbers of Negatives
Explore whether multiplication and division problems give us a positive or negative result by thinking about how many negative numbers are used in the computation. (7 min) E MM

7.NS.2a | 1 and -1 to Different Powers
Explore the different exponents affect the value of a number: when raised to the power of zero, any number equals one; when raised to an even power, negative numbers yield positive results; and when raised to an odd power, negative numbers yield negative results. (6 min) E MM

6.EE.1 | Powers of Zero
Explore what happens when you have zero to the zero powers. (4 min) E MM

7.NS.2a, 7.NS.2b | Sign of Expressions Challenge Problems
Explore your understanding of what happens when we multiply or divide a bunch of positive or negative numbers. (9 min) E MM

8.EE.1 | Exponent Properties with Products
Learn the different properties that help to simplify expressions with exponents. (14 min) E MM

8.EE1 | Exponent Properties with Parentheses
Learn two exponent properties: (ab)^c = (a^c)*(b^c) and (a^b)^c = a ^ (b*c). (6 min) E MM

8.EE.1 | Exponent Properties with Quotients
Learn how to simplify expressions like (5^6)/(5^2). Also learn how 1/(a^b) is the same as a^-b. (9 min) E MM

8.EE.1 | Negative Exponents
Explore how negative exponents can be rewritten. (7 min) E MM

8.EE1 | Negative Exponent Intuition
Learn how negative exponents work. (5 min) E MM

8.EE1 | Multiplying & Dividing Powers (Integer Exponents)
Learn that any base a and any integer exponents n and m, $a^n \cdot a^m = a^{n+m}$. For any non-zero base, $a^n / a^m = a^{n-m}$. (4 min) E MM

8.EE.1 | Powers of Products & Quotients (Integer Exponents)
For any integers a and b and for any exponents n, $(a \cdot b)^n = a^n \cdot b^n$ and $(a/b)^n = a^n/b^n$. These are worked examples for using these properties with integer exponents. (7 min) E MM

8.EE.4 | Multiplying Multiples of Powers of 10
Learn how to multiply (9 * 10^9) (-2 * 10^-3). (3 min) E MM

8.EE.3, 8.EE.4 | Approximating with Powers of 10
Learn how to approximate how much larger the world population was than the US population in 2014. (4 min) E MM

Basic Operations & Reasoning | Scientific Notation

8.EE.3 | Scientific Notation Example: 0.0000000003457
Explore scientific notation and see examples of it. (4 min) E MM

8.EE.3 | Scientific Notation Examples
Learn about Scientific notation and explore examples. (11 min) E MM

8.EE.4 | Multiplying & Dividing in Scientific Notation
In order to simplify multiplication and division using scientific notation, you should multiply and divide numbers with the same base and add or subtract the exponents. (3 min) E MM

8.EE.4 | Multiplying Three Numbers in Scientific Notation
Explore why multiplying very big or very small numbers is much easier when using scientific notation. (8 min) E MM

8.EE.4 | Subtracting in Scientific Notation Learn how to subtract numbers written in scientific notation. (4 min) E MM

8.EE.4 | Simplifying in Scientific Notation Challenge
Solve a hairy expression and simplify in scientific notation. (6 min) E MM

8.EE.4 | Scientific Notation Word Problem: Red Blood Cells
Use scientific notation to solve how many red blood cells are in the human body. (5 min) E MM

8.EE.3, 8.EE.4 | Scientific Notation Word Problem: U.S. National Debt
Use scientific notation to solve what your part of the national debt is. (6 min) E MM

8.EE.4 | Scientific Notation Word Problem: Speed of Light
Learn to simplify multiplication and division using scientific notation. (5 min) E MM

Geometry | Angles Between Intersecting Lines

8.G.5, G-CO.10, G.CO.9 | Angles, Parallel Lines, & Transversals
When a third line, called a transversal, crosses these parallel lines, it creates angles. Some angles are equal, like vertical angles (opposite angles) and corresponding angles (same position at each intersection). (7 min) E MM

4.G.1 | Parallel & Perpendicular Lines
Parallel lines are lines that never intersect, and they form the same angle when they cross another line. Perpendicular lines intersect at a 90-degree angle, forming a square corner. (4 min) E MM

8.G.5, G-CO.10, G.CO.9 | Missing Angles with a Transversal
When a third line called a transversal crosses two parallel lines, we can find the measures of angles using properties like corresponding angles, vertical angles, and supplementary angles. (2 min) E MM

8.G.5, G.-CO.10, G-CO.9 | Measures of Angles Formed by a Transversal
Solve an equation to find missing angles given two parallel lines and a transversal. (5 min) E MM

8.G.5, G-CO.10, G-CO.9 | Angles in a Triangle Sum to 180° Proof
Explore how the sum of the interior angle measures of a triangle always adds up to 180°. (4 min) E MM

8.G.5, G-CO.9, G-SRT.5 | Isosceles & Equilateral Triangles Problems
Explore the differences between isosceles & equilateral triangles. (6 min) E MM

8.G.5, G-CO.10, G-CO.9 | Triangle Exterior Angle Example
Explore how to find angle measures by using exterior angles. (6 min) E MM

8.G.5, G-CO.10, G.CO.9 | Worked Example: Triangle Angles (Intersecting Lines)
Learn how to find unknown angles in triangles and intersecting lines. (5 min) E MM

8.G.5, G-CO.10, G-CO.9 | Worked Example: Triangle Angles (Diagram)
Find the missing angle measures in the triangles by using this fact and looking at complementary (adding up to 90 degrees) and supplementary (adding up to 180 degrees) angles. (6 min) E MM

8.G.5, G-CO.10, G-CO.9 | Triangle Angle Challenge Problem
Learn about the sum of exterior angles in a polygon, specifically a pentagon. (8 min) E MM

8.G.5, G-CO.10, G-CO.9 | Triangle Angle Challenge Problem 2
Find angle measures in triangles when the given measures are algebraic expressions. (6 min) E MM

8.G.5, G-CO.10, G-CO.9 | Geometry Jam
A full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Geometry | Triangle Angles

8.G.5, G-CO.9, G-CO.10 | Angles in a Triangle Sum to 180° Proof
Explore how the sum of the interior angle measures of a triangle always adds up to 180°. (4 min) E MM

8.G.5, G-CO.9, G-CO.10, G-SRT.5 | Isosceles & Equilateral Triangles Problems
Use the properties of Isosceles triangles to find the missing angles in composite figures. (6 min) E MM

8.G.5, G-CO.9, G-CO.10 | Triangle Exterior Angle Example
Discover how exterior angles are formed outside a triangle by extending a side. (6 min) E MM

8.G.5, G-CO.9, G-CO.10 | Worked Example: Triangle Angles (Intersecting Lines)
Learn how to find unknown angles in triangles and intersecting lines. (5 min) E MM

8.G.5, G-CO.9, G-CO.10 | Worked Example: Triangle Angles (Diagram)
Find the missing angle measures in the triangles by using the knowledge you have of triangle angles. (6 min) E MM

8.G.5, G-CO.9, G-CO.10 | Triangle Angle Challenge Problem 1
Learn about the sum of exterior angles in a polygon, specifically a pentagon. (8 min) E MM

8.G.5, G-CO.9, G-CO.10 | Triangle Angle Challenge Problem 2
Find angle measures in triangles when the given measures are algebraic expressions. (6 min) E MM

8.G.5, G-CO.9, G-CO.10 | Geometry Jam
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Geometry | Pythagorean Theorem

8.G.6, 8.G.7 | Intro to the Pythagorean Theorem
The Pythagorean theorem is a cornerstone of math that helps us find the missing side length of a right triangle. In a right triangle with sides A, B, and hypotenuse C, the theorem states that $A^2 + B^2 = C^2$. The hypotenuse is the longest side, opposite the right angle. (11 min) E MM

8.G.7 | Pythagorean Theorem Example
Apply the Pythagorean theorem to find the missing side length of a right triangle, even when the missing length is one of the shorter sides. (4 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Pythagorean Theorem with Isosceles Triangle
Learn to find the value of a base (x) in an isosceles triangle. (4 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Use Pythagorean Theorem to Find Area of an Isosceles Triangle
Learn to find the area of an isosceles triangle using the Pythagorean theorem. (4 min) E MM

8.G.7 | Pythagorean Theorem Word Problem: Carpet
Use the Pythagorean theorem to solve the missing width of the carpet. (3 min) E MM

8.G.7 | Pythagorean Theorem Word Problem: Fishing Boat
Solve this word problem using Pythagorean theorem. (4 min) E MM

8.G.7, FAC.G.36, FAC.G.37, G-SRT.8 | Pythagorean Theorem in 3D
Discover how to find the length of an edge in a 3D shape using the Pythagorean theorem. (6 min) E MM

8.G.8 | Distance Formula
Learn how to find the distance between two points by using the distance formula, which is an application of the Pythagorean theorem. (10 min) E MM

8.G.7 | Garfield's Proof of the Pythagorean Theorem
Use a trapezoid made of two identical right triangles and half of a square to show that the sum of the squares of the two shorter sides equals the square of the longest side of a right triangle. (9 min) E MM

8.G.6 | Bhaskara's Proof of the Pythagorean Theorem
Explore mathematician Bhaskara's elegant visual proof of the Pythagorean theorem. (9 min) E MM

G-SRT.4 | Pythagorean Theorem Proof Using Similarity
Explore proof of the Pythagorean theorem using similarity. (10 min) E MM

8.G.6 | Another Pythagorean Theorem Proof
Visualize how to prove the Pythagorean theorem. (11 min) E MM

8.G.8 | Geometry Jam
A full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Geometry | Intro to Transformations

8.G.2, 8.G.4, G-CO.2, G-CO.6, G-CO.7 | Rigid Transformations Intro
Explore the three main types: translations (moving the shape), rotations (turning the shape), and reflections (flipping the shape like a mirror image). (7 min) E MM

8.G.3 | Dilations Intro
Explore how dilations are a type of non-rigid transformation. (2 min) E MM

G-CO.5 | Identifying Transformations
Explore the four types of transformations: rotations (spinning a shape around a point), translations (shifting a shape), reflections (flipping a shape over a line), and dilations (shrinking or expanding a shape). (4 min) E MM

Geometry | Types & Properties of Transformations

G-CO.5 | Translating Points
Explore how a translation is a way to move a point or shape by a certain number of units in a certain direction on a coordinate plane. (4 min) E MM

G-CO.5 | Translating Shapes
Explore how to translate shapes. (2 min) E MM

G-CO.5 | Determining Translations
Learn how to find the translation by figuring out how much the x- and y-coordinates need to change to map one triangle onto the other. (2 min) E MM

G-CO.5 | Rotating Points
Explore what it means to rotate angles and how positive and negative rotations affect the angles. (2 min) E MM

G-CO.5 | Determining Rotations
Discover how to see the angle of rotation. (3 min) E MM

G-CO.5 | Reflecting Points
Explore Reflections and how to create mirror images of points, keeping the same distance from the line. (4 min) E MM

G-CO.5 | Reflecting Shapes
Find new points (A', B', C', D') by keeping the same x-coordinates and changing the y-coordinates to their opposite signs. (3 min) E MM

G-CO.5 | Determining Reflections
Explore a line of reflection is an imaginary line that flips one shape onto another. (2 min) E MM

G-CO.2 | Finding Measures Using Rigid Transformations
Explore how to find the measurements after a rigid transformation. (5 min) E MM

G-CO.2 | Rigid Transformations: Preserved Properties
Explore how rigid transformations, like rotations and reflections, change a shape's position but keep its size and shape. (7 min) E MM

G-CO.5 | Mapping Shapes
Find the right sequence of rigid transformations (like rotations, translations, and reflections) to map one triangle onto another. (9 min) E MM

G-CO.5 | Geometry Jam
A full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Geometry | Dilations

8.G.3, 8.G.4, G-CO.2, G-CO.6, G-Co.7, G-SRT.1b, G-SRT.2 | Dilating Points
Discover how dilations are a way to stretch or shrink shapes around a point called the center of dilation. (3 min) E MM

8.G.3, 8.G.4, G-CO.2, G-CO.6, G-Co.7, G-SRT.1b, G-SRT.2 | Dilations: Scale Factor
Explore how to scale dilations.
(5 min) E MM

G-SRT.1b, G-SRT.2 | Dilating Shapes: Expanding Let's dilate a rectangle around a point P using a scale factor 1 2/3. (3 min) E MM

G-SRT.1b, G-SRT.2 | Dilating Shapes: Shrinking by 1/2
Find the new positions of the points after dilation. (3 min) E MM

G-CO.2 | Dilations and Properties
Explore whether the properties of a shape are preserved or not preserved after a dilation. (6 min) E MM

Geometry | Congruence & Similarity

8.G.2, G-CO.6 | Congruent Shapes & Transformations
Explore how congruent shapes and transformations can be congruent.
(2 min) E MM

8.G.2, G-CO.6 | Non-Congruent Shapes & Transformations
Explore how dilations affect congruency.
(2 min) E MM

8.G.4, G-CO.2, G-CO.6, G-CO.7, G-SRT.2 | Similar Shapes & Transformations
Explore how two shapes are similar if we can change one shape into the other using rigid transformations (like moving or rotating) and dilations (making it bigger or smaller). (3 min) E MM

8.G.3, G-CO.2 | Side Lengths After Dilation
Explore how in a dilation, if the scale factor is greater than 1, the shape will stretch away from the center of dilation, getting larger. If the scale factor is between 0 and 1, the shape will shrink towards the center, getting smaller. All the lengths in the figure change by the same scale factor.
(2 min) E MM

Algebra | Solving Equations with One Unknown

8.EE.7b, A-REI.1, A-REI.3 | Intro to Equations with Variables on Both Sides
Learn to solve the equation 2x + 3 = 5x - 2.
(9 min) E MM

8.EE.7b, A-REI.1, A-REI.3 | Equations with Variables on Both Sides: 20-7x=6x-6
Solve the equation 20 - 7x = 6x - 6.
(4 min) E MM

8.EE.7b, A-REI.1, A-REI.3 | Equation with Variables on Both Sides: Fractions
Solve the equation (3/4)x + 2 = (3/8)x - 4.
(5 min) E MM

8.EE.7b, A-REI.1, A-REI.3 | Equation with the Variable in the Denominator
Solve the equation 7 - 10/x = 2 + 15/x.
(4 min) E MM

8.EE.7b, A-REI.1, A-REI.3 | Equations with Parentheses
Solve the equation -9 - (9x - 6) = 3(4x + 6) using the distributive property.
(6 min) E MM

8.EE.7a, A-REI.1 | Number of Solutions to Equations
See how some equations have one solution, others have no solutions, and still others have infinite solutions. (5 min) E MM

8.EE.7a, A-REI.1 | Worked Example: Number of Solutions to Equations
Explore the equation 8(3x + 10) = 28x - 14 - 4x and try to find the solutions.
(2 min) E MM

8.EE.7a, A-REI.1 | Creating an Equation with No Solutions
Show how to complete the equation -11x + 4 = __x + __ so that it has no solutions.
(2 min) E MM

8.EE.7a, A-REI.1 | Creating an Equation with Infinitely Many Solutions
Show how to complete the equation 4(x - 2) + x = 5x + __ so that it has infinitely many solutions. (2 min) E MM

8.EE.7b, A-REI.1, A-REI.3 | Sums of Consecutive Integers
Use algebra to set up an equation to solve for the smallest of the four integers.
(5 min) E MM

8.EE.7b, A-REI.1, A-REI.3 | Sum of Integers Challenge
Solve the following problem: the sum of three consecutive odd integers is 231.
(4 min) E MM

Algebra | Graphing Proportional Relationships

8.EE.5, A-CED.2, F-IF.7a | Rates & Proportional Relationships Example
Explore and compare a rate given in an equation to a rate shown on a graph.
(2 min) E MM

8.EE.5, A-CED.2, F-IF.7a | Rates & Proportional Relationships: Gas Mileage
Choose equations that give a faster rate than the relationship given in a table.
(3 min) E MM

8.EE.5, A-CED.2, F-IF.7a | Graphing Proportional Relationships: Unit Rate
Graph the equation of a line that represents a proportional relationship given a unit rate. (4 min) E MM

8.EE.5, A-CED.2, F-IF.7a | Graphing Proportional Relationships from a Table
Graph the equation of a line that represents a proportional relationship given a table. (2 min) E MM

8.EE.5, A-CED.2, F-IF.7a | Graphing Proportional Relationships from an Equation
Graph the equation of a line that represents a proportional relationship given an equation. (3 min) E MM

Algebra | Solutions to Linear Equations

8.F.1, A-REI.10, F-IF.1 | Intro to the Coordinate Plane
Explore how to create a system of two perpendicular axes (the x and y axes) which could be used to plot points in a plane. (11 min) E MM

8.F.1, A-REI.10, F-IF.1 | Solutions to 2-Variable Equations
Learn about what an ordered pair and how to test solutions to 2-variable equations. (3 min) E MM

8.F.1, A-REI.10, F-IF.1 | Worked Example: Solutions to 2-Variable Equations
Learn how to check if an ordered pair is a solution to a given equation. (3 min) E MM

8.F.1, A-REI.10, F-IF.1 | Completing Solutions to 2-Variable Equations
Given a 2-variable equation and the x or y values of a solution find the value of the other variable in the solution. (7 min) E MM

Algebra | Intercepts

8.F.1, A-REI.10, F-IF.1, F-IF.7a | Intro to Intercepts
Learn what x- and y-intercepts are. (6 min) E MM

8.F.1, F-IF.1, F-IF.7a | X-Intercept of a Line
Determine the x-intercept of a linear equation from a graph. (2 min) E MM

8.EE.7b, 8.F.3, A-REI.10, A-REI.1, A-REI.3, F-IF.7a, F-LE.1b | Intercepts from an Equation
Find the x and y-intercepts of -5x + 4y = 20. (4 min) E MM

8.F.1, F-IF.1, F-IF.7a | Intercepts from a Table
Find the y-intercept of the graph of a linear function given a table of values. (4 min) E MM

8.EE.7b, 8.F.3, A-REI.10, A-REI.1, A-REI.3, F-LE.1b | Worked Example: Intercepts from an Equation
Find the x and y-intercepts of the equation 2y + 1/3x = 12. (4 min) E MM

Algebra | Slope

8.F.4, A-CED.2, A-CED.3, F-FB.1a, F-IF.4, F-IF.6, F-LA.2, F-LE.5, FAC.F.18 | Intro to Slope-Intercept Form
Learn how to calculate the slope of the line in a graph by finding the change in y and the change in x. (7 min) E MM

8.F.4, A-CED.2, A-CED.3, F-FB.1a, F-IF.4, F-IF.6, F-LA.2, F-LE.5 | Slope & Direction of a Line
Find the slope of a line given its graph. (3 min) E MM

8.F.4, A-CED.2, A-CED.3, F-FB.1a, F-IF.4, F-IF.6, F-LA.2, F-LE.5 | Positive & Negative Slope
Find the slope of the line that goes through the ordered pairs (4,2) and (-3, 16). (5 min) E MM

8.F.4, A-CED.2, A-CED.3, F-FB.1a, F-IF.4, F-IF.6, F-LA.2, F-LE.5 | Slope from Graph
Worked examples of finding the slope of a line given its equation, using many forms of equations. (5 min) E MM

8.F.4, A-CED.2, A-CED.3, F-FB.1a, F-IF.4, F-IF.6, F-LA.2, F-LE.5 | Slope of a Line: Negative Slope
Learn to convert equations like 4x + 2y = -8 into slope-intercept form. (4 min) E MM

8.F.4, A-CED.2, A-CED.3, F-FB.1a, F-IF.4, F-IF.6, F-IF.7a, F-LE.5, FAC.F.18 | Slope from Equation
When two points have the same y-value, it means they lie on a horizontal line. The slope of such a line is 0, and you will also find this by using the slope formula. (6 min) E MM

8.F.4, A-CED.2, A-CED.3, F-FB.1a, F-IF.4, F-IF.6, F-LA.2, F-LE.5 | Worked Example: Slope from Two Points
Find the slope of the line that goes through the ordered pairs (4,2) and (-3, 16). (7 min) E MM

8.F.3, 8.F.4, A-CED.2, A-CED.3, F-FB.1a, F-IF.4, F-IF.6, F-LE.1b, F-LE.2, F-LE.5 | Converting to Slope-Intercept Form
Learn to convert equations like 4x + 2y = -8 into slope-intercept form. (5 min) E MM

8.F.4, A-CED.2, A-CED.3, F-FB.1a, F-IF.4, F-IF.6, F-LA.2, F-LE.5, FAC.F.18 | Slope of a Horizontal Line
When two points have the same y-value, it means they lie on a horizontal line. The slope of such a line is 0, and you will also find this by using the slope formula. (5 min) E MM

Algebra | Slope-Intercept Form

8.F.1, 8.F.3, A-REI.10, F-IF.1, F-IF.7a, F-LS.1b, F-LE.2, FAC.F.18 | Intro to Slope-Intercept Form
Slope-intercept form (y=mx+b) of linear equations highlights the slope (m) and the y-intercept (b) of a line. (9 min) E MM

8.F.4, A-CED.2, A-CED.3, F-FB.1a, F-IF.4, F-IF.6, F-LE.2, F-LE.5 | Worked Examples: Slope-Intercept Intro
Explore the relationship between slope, y-intercept, and linear equation in slope-intercept form. (4 min) E MM

8.F.1, 8.F.3, F-IF.1, F-IF.7a, F-LE.1b | Graph from Slope-Intercept Equation
Graph a linear equation in slope-intercept form, (3 min) E MM

8.F.1, 8.F.3, A-CED.2, F-IF.1, F.LE.1b, F-LE.2, FAC.F.18 | Slope-Intercept Equation from Graph
Learn to write equations in slope-intercept form for three different lines.
(11 min) E MM

8.F.1, 8.F.3, A-CED.2, F-IF.1, F.LE.1b, F-LE.2, FAC.F.18 | Slope-Intercept Equation from Slope & Point
Learn how to write an equation in slope-intercept form (y=mx+b) for the line with a slope of -3/4 that goes through the point (0,8). (4 min) E MM

8.EE.7b, 8.F.1, 8.F.3, A-CED.2, A-REI.1, A-REI.3, F-IF.1, F-LE.2, FAC.F.18 | Slope-Intercept Equation from Two Points
Write an equation of the line that passes through the points (-1,6) and (5,-4).
(7 min) E MM

A-CED.2, F-LE.2, FAC.F.18 | Slope-Intercept Form Problems
Learn how to solve problems involving writing an equation in slope-intercept form.
(15 min) E MM

8.F.3, F-LE.1b | Slope-Intercept Form from a Table
Learn how to write an equation of the line that matches up to a table of values.
(4 min) E MM

Algebra | Linear Equations & Functions

8.F.1, F-IF.1, F-IF.2, FAV.F.12, FAC.F.13 | What is a Function?
Visualize examples of various kinds of functions. (8 min) E MM

8.F.1, F-FI.1, F-IF.2, FAC.F.12 | Worked Example: Evaluating Functions from Equation
Learn how to evaluate $f(x)=49-x^2$ at x=5.
(1 min) E MM

8.F.1, F-FI.1, F-IF.2, FAC.F.12 | Function Notation Example
Use function notation to help Frank figure out how much water he can put in his balloon. (2 min) E MM

8.F.1, F-FI.1, F-IF.2, FAC.F.12, FAC.F.13 | Worked Example: Evaluating Functions from Graph
Evaluating a function at x=-1 using the graph of that function. (1 min) E MM

8.F.1, F-FI.1, F-IF.2, FAC.F.12, FAC.F.13 | Equations vs. Functions
Explore the difference between equations and functions. (4 min) E MM

8.F.1, A-CED.4, F-IF.1, FAC.EL.6 | Manipulating Formulas: Temperature
Use the formula for converting from Fahrenheit to Celsius and solve it for F to convert from Celsius to Fahrenheit.
(3 min) E MM

F-IF.1, FAC.F.12, FAC.F.13 | Obtaining a Function from an Equation
Larn to obtain a function from an equation. The function represents the same relationship between the quantities in the equation. (3 min) E MM

F-IF.4 | Linear Graphs Word Problems
Explore how we would go about making sense of the direction of a linear graph that represents a relationship between two real-world quantities. (5 min) E MM

F-IF.4 | Linear Graphs Word Problem: Cats
Find the y-intercept and the slope of a linear relationship representing someone accumulating cats. (3 min) E MM

F-IF.4 | Linear Equations Word Problems: Volcano
Find the y-intercept and the slope of a linear relationship representing someone climbing a volcano. (6 min) E MM

F-IF.4 | Linear Equations Word Problems: Earnings
Find the slope of a linear relationship between the number of work hours and the money earned. (4 min) E MM

F-IF.4, F-IF.5 | Modeling with Linear Equations: Snow
Use a linear equation to model the amount of snow on the ground. (5 min) E MM

F-IF.4, F-IF.5 | Linear Function Example: Spending Money
Solve an interesting application problem using a linear model. (5 min) E MM

F-IF.4, F-IF.5 | Fitting a Line to Data
Learn to create a scatter plot and then fit a line to data on the median California family income. (8 min) E MM

8.F.2, F-IF.9, FAC.F.20 | Comparing Linear Functions: Equation vs. Graph
Solve for a given the formula of a linear function and the graph of another and determine which function increases faster.
(2 min) E MM

8.F.2, F-IF.9, FAC.F.20 | Comparing Linear Functions: Same Rate of Change
Solve when given a table of values of a linear function and four linear graphs and determine which graph has the same rate of change as the function represented in the table. (2 min) E MM

8.F.2, F-IF.9, FAC.F.20 | Comparing Linear Functions: Faster Rate of Change
Solve when given a table of values of a linear function and four linear graphs and determine which graph increases faster than the function represented in the table. (4 min) E MM

F-IF.4, F-IF.9, F-LE.5, FAC.F.20, FAC.F.30 | Comparing Linear Functions Word Problem: Climb
Solve when given the formula and a table of values that represent two people climbing a wall and determine which one started out higher. (5 min) E MM

F-IF.4, F-IF.9, F-LE.5, FAC.F.20 | Comparing Linear Functions Word Problem: Walk
Solve when given a table of values that represents four people walking to school and determine which one started out farther from the school. (4 min) E MM

F-IF.4, F-IF.9, F-LE.5, FAC.F.20 | Comparing Linear Functions Word Problem: Work
Solve when given a table of values that represents a person walking to work and determine which verbal description represents someone starting at the same distance from work. (4 min) E MM

F-IF.7a, FAC.F.17, FAC.F.18 | Linear Functions Word Problem: Fuel
Examine this real-world relationship and draw the graph that represents this relationship best. (5 min) E MM

A-CED.2, F-IF.7a, FAC.F.17, FAC.F.18 | Linear Functions Word Problem: Pool
Examine this real-world relationship and draw the graph that represents this relationship best. (3 min) E MM

A-CED.2, F-IF.7a, FAC.F.17, FAC.F.18 | Modeling with Linear Equations: Gym Membership & Lemonade
Constructing linear equations to solve word problems. (10 min) E MM

A-CED.2, AIII.NQ.2, F-BF.1a, F-LE.2, FAC.F.17, FAC.F.18 | Linear Functions Word Problem: Iceberg
Examine this real-world relationship and find the formula of the function that represents this relationship. (6 min) E MM

A-CED.2, AIII.NQ.2, F-BF.1A, F-LE.2, FAC.F.17, FAC.F.18 | Linear Functions Word Problem: Paint
Examine this real-world relationship and find the formula of the function that represents this relationship. (8 min) E MM

8.F.1, F-IF.1 | Testing if a Relationship is a Function
Learn to determine if points on a graph represent a function. (2 min) E MM

8.F.1, F-IF.1 | Relations and Functions
Learn to determine if a relation given by a set of ordered pairs is a function. (7 min) E MM

8.F.1, F-IF.1, FAC.F.12, FAC.F.13 | Recognizing Functions from Graph
Checking whether a given set of points can represent a function. (4 min) E MM

8.F.1, F-IF.1 | Checking if a Table Represents a Function
Determine if y is a function of x from looking at a table. (1 min) E MM

8.F.1, F-IF.1, FAC.F.12, FAC.F.13 | Recognizing Functions from Table
Checking whether a table of people and their heights can represent a function that assigns a height to a name. (5 min) E MM

8.F.1, F-IF.1 | Checking if an Equation Represents a Function
Determine if y is a function of x from looking at an equation. (4 min) E MM

8.F.1, F-IF.1, FAC.F.12, FAC.F.13 | Does a Vertical Line Represent a Function?
Explaining why a vertical line doesn't represent a function. (2 min) E MM

8.F.1, F-IF.1, FAC.F.12, FAC.F.13 | Recognizing Functions from Verbal Description
Check whether y can be described as a function of x if y is always three more than twice x. (2 min) E MM

8.F.1, F-IF.1, FAC.F.12, FAC.F.13 | Recognizing Functions from Verbal Description Word Problem
Check whether a description of the price of an order can be represented as a function of the shipping cost. (3 min) E MM

8.F.3, F-LE.1b | Recognizing Linear Functions
Learn to recognize if a function is linear. (4 min) E MM

8.F.3, F-LE.1b | Linear & Nonlinear Functions: Table
Learn to determine if a table of values represents a linear function. (2 min) E MM

8.F.3, F-LE.1b | Linear & Nonlinear Functions: Word Problem
Learn to determine if the relationship described in a word problem is a function. (4 min) E MM

8.F.3, F-LE.1b | Linear & Nonlinear Functions: Missing Value
Learn to find the missing value in a table to make sure it represents a linear equation. (2 min) E MM

8.F.5, F-IF.4, F-LE.1b | Interpreting a Graph Example
Learn to interpret the graphs of a linear functions. (2 min) E MM

Algebra | Intro to Systems of Equations

8.EE.8b, A-REI.11, A-REI.6, FAC.F.22 | Systems of Equations: Trolls, Tolls (Part 1)
Explore this troll of a problem and learn about setting up a system of equations. (7 min) E MM

8.EE.8b, A-REI.11, A-REI.6, FAC.F.22 | Systems of Equations: Trolls, Tolls (Part 2)
Explore this troll of a problem and learn about setting up a system of equations. (6 min) E MM

A-REI.11, R-REI.6, FAC.F.22 | Testing a Solution to a System of Equations
Check whether (-1,7) is a solution of the system: x+2y=13 and 3x-y=-11. (2 min) E MM

Algebra | Solving Systems of Equations with Graphing

8.EE.8a, A-REI.11 | Systems of Equations with Graphing
When solving systems of linear equations, one method is to graph both equations on the same coordinate plane. The intersection of the two lines represents a solution that satisfies both equations. (8 min) E MM

8.EE.8a, A-REI.11, A-REI.6, FAC.F.22 | Systems of Equations with Graphing: y=7/5x-5 & y=3/5x-1
Graph the following system of equations and solve it by looking for the intersection point: y=7/5x-5 and y=3/5x-1. (2 min) E MM

8.EE.8a, A-REI.11 | Systems of Equations with Graphing: 5x+3y=7 & 3x-2y=8
Learn how to solve a system of linear equations by graphing each equation separately. (6 min) E MM

8.EE.8a, 8.EE.8c, A-CED.3, A-REI.11 | Systems of Equations with Graphing: Chores
Solve this Graphical Systems Application Problem. (5 min) E MM

A-REI.11, A-REI.6, FAC.F.22 | Systems of Equations with Graphing: Exact & Approximate Solutions
Solve a system of two linear equations in standard form, and then approximate the solution of a system whose solution isn't clearly visible. (6 min) E MM

Algebra | Solving Systems of Equations with Substitution

8.EE.8b, A-REI.6 | Systems of Equations with Substitution: 2y=x+7 & x=y-4
When solving a system of equations using substitution, you can isolate one variable and substitute it with an expression from another equation. (4 min) E MM

8.EE.8b, A-REI.6 | Systems of Equations with Substitution: y=4x-17.5 & y+2x=6.5 Learn to solve the system of equations y = 4x - 17.5 and y + 2x = 6.5 using substitution. (4 min) E MM

8.EE.8b, A-REI.6, FAC.F.22 | Systems of Equations with Substitution: -3x-4y=-2 & y=2x-5
Learn to solve the system of equations -3x - 4y = -2 and y = 2x - 5 using substitution. (4 min) E MM

8.EE.8b, A-REI.6 | Systems of Equations with Substitution: 9x+3y=15 & y-x=5
Learn to solve the system of equations 9x + 3y = 15 and y - x = 5 using substitution. (6 min) E MM

8.EE.8b, A-REI.6 | Systems of Equations with Substitution: y=-5x+8 & 10x+2y=-2 Learn to solve the system of equations y = -5x + 8 and 10x + 2y = -2 using substitution. (4 min) E MM

8.EE.8b, A-REI.6 | Systems of Equations with Substitution: y=-1/4x+100 & y=-1/4x+120
Learn to solve the system of equations y = -1/4x + 100 and y = -1/4x + 120 using substitution. (4 min) E MM

Algebra | Number of Solutions to Systems of Equations

8.EE.8b, A-CED.2, A-REI.10, A-REI.11, A-REI.6, FAC.F.22 | Systems of Equations Number of Solutions: Fruit Prices (Part 1)
Explore an example of a system of equations that has no solutions. (9 min) E MM

8.EE.8b, A-CED.2, A-REI.10, A-REI.11, A-REI.6, FAC.F.22 | Systems of Equations Number of Solutions: Fruit Prices (Part 2) Explore an example of a system of equations that has infinite solutions. (7 min) E MM

A-REI.10, A-REI.11, FAC.F.22 | Solutions to Systems of Equations: Dependent vs. Independent
Explore an example of analyzing a system to see if it's dependent or independent system of equations. (5 min) E MM

8.EE.8a, A-REI.10, A-REi.11, FAC.F.22 | Number of Solutions to a System of Equations
When given three lines on the coordinate plane, identify one system of two lines that has a single solution, and one system that has no solution. (3 min) E MM

8.EE.8a, A-REI.10, A-REI.11, FAC.F.22 | Number of Solutions to a System of Equations Graphically
Determine how many solutions the following system of equations has by considering its graph: 10x-2y=4 and 10x-2y=16. (6 min) E MM

8.EE.8a, 8.EE.8b, A-REI.10, A-REI.11, A-REI.6, FAC.F.22 | Number of Solutions to a System of Equations Algebraically
Solve several examples about the number of solutions of systems of equations using algebraic reasoning. (6 min) E MM

A-REI.10, A-REI.11, FAC.F.22 | How Many Solutions Does a System of Linear Equations Have if There are At Least Two?
Explore the solution to this question. (2 min) E MM

Algebra | Systems of Equations Word Problems

8.EE.8c, A-CED.2, A-CED.3, A-REI.6, FACF.17, FAC.F.18, FAC.F.22 | Age Word Problem: Imran
Solve the following age word problem: In 40 years, Imran will be 11 times as old as he is right now. How old is he right now? (4 min) E MM

8.EE.8c, A-CED.2, A-CED.3, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | Age Word Problem: Ben & William
Solve the following age word problem: William is 4 times as old as Ben. 12 years ago, William was 7 times as old as Ben. How old is Ben now? (6 min) E MM

8.EE.8c, A-CED.2, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | Age Word Problem: Arman & Diya
Solve the following age word problem: Arman is 18. Diya is 2. How many years will it take for Arman to be 3 times as old as Diya? (5 min) E MM

8.EE.8c, A-CED.2, AA-CED.3, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | System of Equations Word Problem: Walk & Ride
Solve a problem about distances walking and riding bus to school. (7 min) E MM

8.EE.8c, A-CED.2, A-CED.3, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | System of Equations Word Problem: No Solution
Solve a problem about a toy factory. (5 min) E MM

8.EE.8c. A-CED.2, A-CED.3, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | System of Equations Word Problem: Infinite Solutions
Solve a problem about a vegetable farmer. (5 min) E MM

8.EE.8c, A-CED.2, A-CED.3, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | Systems of Equations with Substitution: Coins
Solve a word problem about the number of nickels and quarters in a piggy bank by creating a system of equations and solving it. (6 min) E MM

Measurement & Data | Data & Modeling

8.SP.1, S-ID.6a, S-ID.6b | Constructing a Scatter Plot
Explore how to construct a scatter plot from information provided. (2 min) E MM

8.SP.1, S-IS.6a, S-ID.6b | Example of Direction in Scatter Plots
Discover how to compare different graphs in this example. (2 min) E MM

8.SP.1, S-IS.6a, S-IS.6b | Scatter Plot: Smokers
Explore how a negative linear association goes up, as one variable goes up, the other variable goes down at a constant rate. (2 min) E MM

8.SP.2, S-ID.6a, S-ID.6b, S-ID.6c | Estimating the Line of Best Fit Exercise
Explore how to find the line of best fit when looking for a linear trend. (1 min) E MM

8.SP.3, S-ID.6a, S-ID.6c, S-ID.7 | Line of Best Fit: Smoking in 1945
Discover how to guess how many smoked in 1945 by drawing a line that slopes down through the points. (5 min) E MM

8.SP.3, S-ID.6a, S-ID.6c, S-ID.7 | Estimating with Linear Regression (Linear Models)
Explore how line of best fit is a straight line that shows the relationship between two sets of data. (3 min) E MM

8.SP.3, S-ID.6a, S-ID.6c, S-ID.7 | Interpreting a Trend Line
Use the graph to show how studying affects test scores. (3 min) E MM

8.SP.4, S-ID.5 | Two-Way Frequency Tables and Venn Diagrams
Discover how to use Venn Diagrams and two-way tables. (6 min) E MM

8.SP.4, S-ID.5 | Two-Way Relative Frequency Tables
Calculate the relative frequency of accidents for SUVs by dividing the number of SUVs that had accidents by the total number of SUVs. (4 min) E MM

8.SP.4, S-ID.5 | Interpreting Two-Way Tables
Explore how two-way tables help us understand how categories relate. (2 min) E MM

Science

Earth & Space Science

E.8.9A | Earth Cutaway
A model of Earth with a section cut away to expose its layers. IFX/LT

E.8.9A | Earth Magnetic Field
Animated visualization of the electromagnetic field surrounding Planet Earth. IFX/LT

E.8.9A | Earthquake VR Experience
Be exposed to a virtual earthquake that provides a life-like training experience, without an actual earthquake. (2 min) 115

E.8.9A | Expedition to the Heart of an Active Volcano
Join a group of climbers as they embark on a scientific exploration into an active volcano. (5 min) 129

E.8.9A | Volcano
Experience a model of an Erupting Volcano. IFX/LT

E.8.9B | After the Floods: Rebuilding Ellicott City
Take an immersive journey through the flooding, aftermath, and reconstruction of Ellicott City, Maryland to give a new perspective on the damage done by flooding. (6 min) 25

E.8.9B | Chennai Floods Aftermath
Take an immersive journey through the impact, rescue, and reason for the floods that occurred in Chennai, India, in December 2015. (6 min) 76

E.8.9B | Kamchatka Volcano Eruption
National Geographic VR takes you to the rim of a spectacular erupting volcano: Klyuchevskoy, one of the tallest and most active volcanoes on the planet. (2 min) 228

E.8.9B | Life in Haiti: After a Devastating Natural Disaster
Join filmmaker Dylan Roberts on a journey to the Haitian city of Jérémie, and the small village of Manish, to witness the aftermath of a colossal storm. (5 min) 258

E.8.9B | Category 3 Hurricane Landfall Simulation
Experience a category 3 hurricane through a simulation with guided popups. (1 min) 74

E.8.9B | Expedition to the Heart of an Active Volcano
Join a group of climbers as they embark on a scientific exploration into an active volcano. (5 min) 129

E.8.9B | Close-Range Tornado
Get up close and personal with a tornado near Wray, CO from May 7th, 2016. (8 min) 80

E.8.9B | Boston Snowstorm from Bunker Hill Monument
Watch a major winter storm move through the city of Boston in this time-lapse from the top of Bunker Hill Monument. (3 min) 56

E.8.9B | Inside Hurricane Maria
Watch Hurricane Maria change from a category 1 to a category 5 in about 24 hours. (5 min) 220

Life Science

L.8.2B | Glow Worm Caves of New Zealand
Deep below ground, you will learn about strange carnivorous worms. (2 min) 191

L.8.2B | Great Hammerhead Shark Encounter
Dive into this 360° video and go face-to-face with a curious great hammerhead shark. (2 min) 197

L.8.2B | How Animals See the World
Experience how different animals see the world. Includes a human, cat, dog, fly, rat, and snake's point of view. (4 min) 207

L.8.4B | Attenborough and the Giant Dinosaur
Learn all about the Titanosaur with David Attenborough. (4 min) 35

L.8.4B | Giraffatitan Dinosaur: Back to Life in 360 VR
Encounter the Jurassic giant Giraffatitan, one of the tallest dinosaurs that ever lived, and learn all about how it lived and who its descendants are. (4 min) 188

L.8.4B | Rhomaleosaurus Sea Dragon: Back to Life in 360 VR
Encounter the prehistoric sea dragon Rhomaleosaurus, as it roams the gallery over 180 million years after it died. (4 min) 328

Physical Science

P.8.6.8 | Light Lab
This highly interactive classroom teaches students about the electromagnetic spectrum including activities like the Double Slit Experiment, shining lights through a prism, building their own waves, stacking light, and playing with lenses. (unlimited) E/I

Social Studies

Mississippi Studies

MS.8 | Medgar Evers House
Explore a recreation of the Medgar Evers House and National Monument. Made in collaboration with the Evers family. (unlimited) E/I

MS.8 | Civil Rights Museum
Five Civil Rights leaders - Rosa Parks, John Lewis, Martin Luther King Jr., Thurgood Marshall, and Medgar Evers - come to life and teach you their stories on interactive stages. (unlimited) E/I

US History

8.1 | Castillo Cannon Drill
Stand aboard the Castillo's gun deck and see what firing a cannon would be like in the 1740s. (6 min) 72

8.1 | Historic Jamestown
Interactive experience where students will witness the English Colonization and the significance of the location regarding resources, defensibility, and economic development. (unlimited) E/I

8.2 | Independence Hall
Join George Washington, John Adams, Thomas Jefferson, Benjamin Franklin, and John Hancock as they tell you stories about the founding of the United States. (unlimited) E/I

8.2 | Battle Road: The American Revolution
Be surrounded by scores of professional reenactors, organizers, onlookers, and photographers as they gather at Lexington, Concord, and Minute Man National Historical Park to honor the memory of this critical turning point in American history. (5 min) 49

8.8, 8.9 | Civil War: A Letter from the Trenches
Get transported back to the 1860s to "experience" what life was like for a young cadet in the Confederate army, trekking through the mud and dodging enemy fire as you journey through the trenches. (5 min) 78

9th-12th Grade

Mathematics

Algebra I: Geometry | Equations & Geometry

8.EE.7a, 8.EE.7b, 8.G.5, A-REI.1, A-REI.3, G-CO.10 | Equation Practice with Segment Addition
Solve for the value of x by splitting a line segment into two segments. (4 min) E MM

8.EE.7a, 8.EE.7b, 8.G.5, A-REI.1, A-REI.3, G-CO.10 | Equation Practice with Midpoints
Given information about the distance of a segment's midpoint from its endpoints, Sal forms and solves an equation to find the length of the segment. (3 min) E MM

8.EE.7a, 8.EE.7b, 8.G.5, A-REI.1, A-REI.3, G-CO.10 | Equation Practice with Vertical Angles
Given algebraic expressions that represent a pair of vertical angles, form and solve an equation. (2 min) E MM

8.EE.7a, 8.EE.7b, 8.G.5, A-REI.1, A-REI.3, G-CO.10 | Equation Practice with Complementary Angles
Given the algebraic expressions that represent a pair of complementary angles, learn how to form and solve an equation to find an unknown angle. (2 min) E MM

8.EE.7a, 8.EE.7b, 8.G.5, A-REI.1, A-REI.3, G-CO.10 | Equation Practice with Supplementary Angles
Given the algebraic expressions that represent a pair of supplementary angles, form and solve an equation. (2 min) E MM

Algebra I: Geometry | Pythagorean Theorem

8.G.6, 8.G.7 | Intro to the Pythagorean Theorem 1
Discover that the Pythagorean theorem is a cornerstone of math that helps us find the missing side length of a right triangle. (11 min) E MM

8.G.6, 8.G.7 | Intro to the Pythagorean Theorem 2
Explore the Pythagorean Theorem in more depth. (13 min) E MM

8.G.7 | Pythagorean Theorem Example
Learn to apply the theorem to find the missing side length of a right triangle, even when the missing length is one of the shorter sides. (4 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Pythagorean Theorem with Isosceles Triangle
Find the value of a base (x) in an isosceles triangle by spliting the triangle into two congruent right triangles by drawing an altitude. (3 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Use Pythagorean Theorem to Find Area of an Isosceles Triangle
Find the area of an isosceles triangle using the Pythagorean theorem. (4 min) E MM

8.G.7 | Pythagorean Theorem Word Problem: Carpet
Given the length and diagonal measurements, use the Pythagorean theorem to solve for the missing width of the carpet. (3 min) E MM

8.G.7 | Pythagorean Theorem Word Problem: Fishing Boat
Model the length of a rope stretched between the mast and deck as the hypotenuse of a right triangle. (4 min) E MM

8.G.7, FAC.G.36, FAC.G.37, G-SRT.8 | Pythagorean Theorem in 3D
Discover how to find the length of an edge in a 3D shape using the Pythagorean theorem. (6 min) E MM

8.G.8 | Distance Formula
Learn how to find the distance between two points by using the distance formula, which is an application of the Pythagorean theorem. (9 min) E MM

8.G.6 | Garfield's Proof of the Pythagorean Theorem
Explore former U.S. President James Garfield's proof of the Pythagorean theorem. (9 min) E MM

8.G.6 | Bhaskara's Proof of the Pythagorean Theorem
Explore how Bhaskara uses a square and four congruent right triangles, rearranged in two ways, to prove this theorem. (9 min) E MM

G-SRT.4 | Pythagorean Theorem Proof Using Similarity
Proof of the Pythagorean theorem using similarity. (10 min) E MM

8.G.6 | Another Pythagorean Theorem Proof
Visually proving the Pythagorean theorem. (10 min) E MM

Algebra I: Geometry | Similar Triangles

G-SRT.3 | Intro to Triangle Similarity
Explore what it means for triangles to be similar, and how this follows from the definition of similarity. (9 min) E MM

G-SRT.3, G-SRT.5 | Triangle Similarity Postulates & Criteria
Review all the different ways we can determine that two triangles are similar. (12 min) E MM

G-SRT.5 | Determining Similar Triangles
Analyze multiple examples of the similarity of triangles. (9 min) E MM

G-SRT.5 | Solving Similar Triangles
Solve two problems where a missing side length is found by proving that triangles are similar and using this to find the measure. (7 min) E MM

G-SRT.5 | Solving Similar Triangles: Same Side Plays Different Roles
Find a missing side length in a problem where the same side plays different roles in two similar triangles. (7 min) E MM

8.G.5, G-CO.10, G-CO.9 | Angles in a Triangle Sum to 180° Proof
Use transversals, vertical angles, and corresponding angles to rearrange those angle measures into a straight line, proving that they must add up to 180°. (5 min) E MM

Algebra I: Algebra | Overview & History of Algebra

FAC.EI.2 | Origins of Algebra
Explore how algebra began and where its underlying ideas come from. (7 min) E MM

FAC.EI.2 | Abstract-Ness
Explore what abstraction is. (7 min) E MM

FAC.EI.2 | The Beauty of Algebra
Learn why the abstraction of mathematics is so fundamental. (10 min) E MM

FAC.EI.2 | Creativity Break: Why is Creativity Important in Algebra?
Students and professionals share what makes creativity so important in algebra. (2 min) E MM

FAC.EI.2 | Intro to the Coordinate Plane
Learn about how Descartes created a system of two perpendicular axes (the x and y axes) which could be used to plot points in a plane. (11 min) E MM

FAC.EI.2 | Why All the Letters in Algebra?
In algebra, we often want to work with general concepts instead of specific numbers. Using letters allows us to represent quantities that could change or that we don't know the value of yet. Letters can also be used to generalize formulas or equations. (3 min) E MM

Algebra I: Algebra | Intro to Variables

6.EE.6 | What is a Variable?
Variables in math are symbols, often letters, that represent different values in various situations. They help us understand and solve problems with changing values. (3 min) E MM

6.EE.2a | Why Aren't We Using the Multiplication Sign?
In algebra, representing multiplication with variables can be tricky due to the similarity between the variable "x" and the multiplication symbol. (5 min) E MM

FAC.EI.2 | Creativity Break: Why is Creativity Important in STEM Jobs?
Experts share why creativity plays an important role in STEM jobs. (2 min) E MM

6.EE.2c | Evaluating an Expression with One Variable
Explore the expression 5t+3 to calculate the cost of participating in a hospital raffle fundraiser. (2 min) E MM

Algebra I: Algebra | Combining Like Terms

6.EE.3, 6.EE.4 | Intro to Combining Like Terms
Coefficients are the numbers in front of variables, and they can be added when the variables are the same. For example, 2x + 3x equals 5x. When dealing with different variables, such as x and y, add them separately, resulting in expressions like 5x + 9y. (4 min) E MM

7.EE.1 | Combining Like Terms with Negative Coefficients & Distribution
You've learned about order of operations and combining like terms. Let's layer the distributive property on top of this. (4 min) E MM

7.EE1 | Combining Like Terms with Negative Coefficients
This example of combining like terms in an expression gets a little hairy. Pay attention. (5 min) E MM

7.EE.1 | Combining Like Terms with Rational Coefficients
Learn how to rewrite algebraic expressions by combining like terms. (5 min) E MM

6.EE.3, 6.EE.4 | Equivalent Expressions
Larn how to find equivalent expressions by combining like terms and factoring. (2 min) E MM

Algebra I: Algebra | Division by Zero

6.EE.3, 6.EE.4 | Why Dividing by Zero is Undefined
Learn why dividing by zero is undefined. (4 min) E MM

6.EE.3, 6.EE.4 | The Problem with Dividing Zero by Zero
Explore why 0/0 is undetermined. (3 min) E MM

6.EE.3, 6.EE.4 | Undefined & Indeterminate Expressions
Using general mathematical considerations, we see why those are undefined and indeterminate problems. (8 min) E MM

Algebra I: Algebra | Linear Equations with Variables on Both Sides

8.EE.7b, A-REI.1, A-REI.3 | I Why We Do the Same Thing to Both Sides: Variable on Both Sides
Use a scale to try to achieve balance and help explain why we do the same thing to both sides of an equation, even when the variable appears on both sides. (3 min) E MM

8.EE.7b, A-REI.1, A-REI.3 | Intro to Equations with Variables on Both Sides
Learn to solve the equation 2x + 3 = 5x - 2. (9 min) E MM

8.EE.7b, A-REI.1, A-REi.3 | Equations with Variables on Both Sides: 20-7x=6x-6
Solve the equation 20 - 7x = 6x - 6. (4 min) E MM

8.EE.7b, A-REI.1, A-REI.3 | Equation with Variables on Both Sides: Fractions
Solve the equation (3/4)x + 2 = (3/8)x - 4. (5 min) E MM

8.EE.7b, A-REI.1, A-REI.3 | Equation with the Variable in the Denominator
Solve the equation 7 - 10/x = 2 + 15/x. (4 min) E MM

Algebra I: Algebra | Analyzing Linear Equations

8.EE.7b, A-REI.1, A-REI.3 | Equations with Parentheses
Solve the equation -9 - (9x - 6) = 3(4x + 6) using the distributive property. (6 min) E MM

A-REI.1, FAC.EI.11, FAC.EI.7, FAC.EI.8 | Reasoning with Linear Equations
When we perform operations to manipulate equations, some operations produce equivalent equations, while others don't necessarily produce equivalent equations. (8 min) E MM

8.EE.7a, A-REI.1 | Number of Solutions to Equations
Explore how some equations have one solution, others have no solutions, and still others have infinite solutions. (6 min) E MM

8.EE.7a, A-REI.1 | Worked Example: Number of Solutions to Equations
Attempt to solve 8(3x + 10) = 28x - 14 - 4x only to find that the equation has no solution. (2 min) E MM

8.EE.7a, A-REI.1 | Creating an Equation with No Solutions
Explore how to complete the equation -11x + 4 = __x + __ so that it has no solutions. (2 min) E MM

8.EE.7a, A-REI.1 | Creating an Equation with Infinitely Many Solutions
Explore how to complete the equation 4(x - 2) + x = 5x + __ so that it has infinitely many solutions. (2 min) E MM

A-REI.3, FAC.EI.10, FAC.EI.9 | Linear Equations with Unknown Coefficients
Solve the equations ax+3x=bx+5 and a(5-x)=bx-8 for x. (6 min) E MM

Algebra I: Algebra | Multi-Step Inequalities

FAC.EI.10 | Inequalities with Variables on Both Sides
Solve the inequality -3p-7<p+9, draw the solution on a number line, and check a few values to verify the solution. (6 min) E MM

FAC.EI.10 | Inequalities with Variables on Both Sides (With Parentheses)
Solve the inequality 5x+7>3(x+1), draw the solution on a number line, and check a few values to verify the solution. (4 min) E MM

FAC.EI.10 | Multi-Step Inequalities
Solve several multi-step linear inequalities. (8 min) E MM

A-CED.1, FAC.EI.9, FAC.F.25 | Using Inequalities to Solve Problems
Use inequalities to solve problems in each context. (4 min) E MM

Algebra I: Algebra | Compound Inequalities

A-REI.3, FAC.EI.10, FAC.EI.9 | Compound Inequalities: OR
Solve the compound inequality 5z+7<27 OR -3z≤18. (4 min) E MM

A-REI.3, FAC.EI.10, FAC.EI.9 | Compound Inequalities: AND
Solve the compound inequality 3y+7<2y AND 4y+8>-48. (5 min) E MM

A-REI.3, FAC.EI.10, FAC.EI.9 | A Compound Inequality with No Solution
Explore the compound inequality 5x-3<12 AND 4x+1>25 and find why there's no x-value that makes both inequalities true. (3 min) E MM

A-REI.3, FAC.EI.10, FAC.EI.9 | Double Inequalities
Solve the double inequality -16⩽3x+5⩽20, which is the same as the compound inequality -16⩽3x+5 AND 3x+5⩽20. (4 min) E MM

A-REI.3, FAC.EI.10, FAC.EI.9 | Compound Inequalities Examples
Solve several compound linear inequalities. (12 min) E MM

Algebra I: Algebra | Working with Units

N-Q.1 | Intro to Dimensional Analysis
Explore how we can treat units of measurement algebraically and use these tools to convert between different units of the same quantity. (7 min) E MM

N-Q.1 | Same Rate with Different Units
Explore how we can describe the rate 50 km per hour in a variety of different units, using dimensional analysis. (10 min) E MM

N-Q.2 | Defining Appropriate Quantities for Modeling
Explore examples for different ways to define how quantities of interest are calculated in a modeling problem. (6 min) E MM

N-Q.1 | Formulas and Units: Volume of a Pool
Explore how to use formulas to calculate real-world quantitates and make them consistent. (3 min) E MM

N-Q.1 | Formulas and Units: Comparing Rates
Explore how to use formulas to calculate real-world quantitates and make them consistent. (4 min) E MM

N-Q.1 | Reporting Measurements
Discover the appropriate level of precision of different measurements in modeling problems. (6 min) E MM

N-Q.1 | Using Units to Solve Problems: Toy Factory
Find the value of toys produced at a factory using information that involves many different quantities, not all of which are useful for our problem. (3 min) E MM

N-Q.1 | Using Units to Solve Problems: Road Trip
Find the cost of fuel for a road trip, using information that involves many different quantities, not all of which are useful for our problem. (4 min) E MM

A-CED.1, FAC.EI.9, FAC.F.25, N-Q.1 | Using Units to Solve Problems: Drug Dosage
Explore this unit conversion word problem that deals with converting drug dosage units, something that is commonly done in hospitals. (11 min) E MM

Algebra I: Algebra | Intro to 2-Variable Linear Equations

F-FB.1a, F-LE.2, FAC.F.17, FAC.F.18, FAC.F.22 | Two-Variable Linear Equations Intro
Learn about a class of equations in two variables that's called "linear equations." They are called that way because their graph is a line. (8 min) E MM

6.EE.2c | Evaluating Expressions with Two Variables
Explore how to evaluate expressions with multiple variables involves substituting given values for each variable and simplifying the expression. (3 min) E MM

6.EE.2c | Evaluating Expressions with Two Variables: Fractions & Decimals
Explore evaluating expressions with two variables involves substituting the given values for each variable and simplifying the expression. (3 min) E MM

8.F.1, A-REI.10, F-IF.1 | Solutions to 2-Variable Equations
Learn more about ordered pairs and how to test solutions to 2-variable equations. (3 min) E MM

8.F.1, A-REI.10, F-IF.1 | Worked Example: Solutions to 2-Variable Equations
Explore how to check if an ordered pair is a solution to a given equation. (3 min) E MM

8.F.1, A-REI.10, F-IF.1 | Completing Solutions to 2-Variable Equations
Given a 2-variable equation and the x or y values of a solution, find the value of the other variable in the solution. (7 min) E MM

Algebra I: Algebra | Slope

8.F.4, A-CED.2, A-CED.3, F-BF.1A, F-IF.4, F-IF.6, F-IF.7A, F-LE.2, FAC.F.18 | Intro to Slope
Explore how to find the slope of a line. (7 min) E MM

8.F.4, A-CED.2, A-CED.3, F-BF.1a, F-IF.4, F-IF.6, F-IF.7A, F-LE.5, FAC.F.18 | Positive & Negative Slope
Analyze what it means for a slope to be positive or negative. (5 min) E MM

8.F.4, A-CED.2, A-CED.3, F-BF.1a, F-IF.4, F-IF.6, F-LE.2, F-LE.5, FAC.F.18 | Worked Example: Slope from Graph
Learn how to calculate the slope of the line in a graph by finding the change in y and the change in x. (5 min) E MM

8.F.4, A-CED.2, A-CED.3, F-BF.1a, F-IF.4, F-IF.6, F-LE.2, F-LE.5, FAC.F.18 | Graphing a Line Given Point and Slope
Practice graphing a line given its slope and a point the line passes through. (3 min) E MM

FAC.F.15, FAC.F.16 | Calculating Slope from Tables
Practice calculating the slope of a line given some points on the line shown in a table. (3 min) E MM

8.F.4, A-CED.2, A-CED.3, F-FB.1a, F-IF.4, F-IF.6, F-IF.7a, F-LE.2, F-LE.5, FAC.F.18 | Slope of a Horizontal Line
When two points have the same y-value, it means they lie on a horizontal line. The slope of such a line is 0, and you will also find this by using the slope formula. (5 min) E MM

FAC.F.15 | Horizontal & Vertical Lines
Identify the equations and slope of horizontal and vertical lines. (5 min) E MM

Algebra I: Algebra | X-Intercepts & Y-Intercepts

8.F.1, A-REI.10, F-IF.1, F-IF.7a | Intro to Intercepts
Learn what x- and y-intercepts are. (7 min) E MM

8.F.1, F-IF.1, F-IF.7a | X-Intercept of a Line
Determine the x-intercept of a linear equation from a graph. (2 min) E MM

8.EE.7b, 8.F.3, A-REI.10, A-REI.1, A-REI.3, A-REI.10, F-IF.7a, F-LE.1b | Intercepts from an Equation
Find the x and y-intercepts of -5x + 4y = 20. (4 min) E MM

8.F.1, F-IF.1, F-IF.7a | Intercepts from a Table
Find the y-intercept of the graph of a linear function given a table of values. (4 min) E MM

Algebra I: Algebra | Applying Intercepts & Slopes

FAC.F.15 | Slope, X-Intercept, Y-Intercept Meaning in Context
Practice determining what each of the slope, x-intercept, and y-intercept represent in each linear relationship. (4 min) E MM

FAC.F.15 | Slope and Intercept Meaning in Context
Practice determining which feature of a linear model (the slope, the x-intercept, or the y-intercept) is useful for answering a given question in context. (2 min) E MM

FAC.F.15 | Slope and Intercept Meaning from a Table
Given a linear relationship in a table, graph the relationship to explore what the slope and intercepts mean in the given context. (7 min) E MM

FAC.F.15, FAC.F.16 | Finding Slope and Intercepts from Tables
Given a linear relationship in a table, practice finding the slope and intercepts. (6 min) E MM

F-IF.7a, FAC.F.17, FAC.F.18 | Linear Functions Word Problem: Fuel
Draw the graph that represents this relationship when given a verbal description of a real-world relationship involving a truck's fuel consumption. (6 min) E MM

A-CED.1, FAC.EI.9. FAC.F.25 | Comparing Linear Rates Example
Compare the positions of two creatures moving at constant speed and determine when one catches up with the other. (8 min) E MM

Algebra I: Algebra | Forms of Linear Equations

8.F.1, 8.F.3, A-REI.10, F-IF.1, F-IF.7a, F-LE.1b, F-LE.2, FAC.F.18 | Intro to Slope-Intercept Form
Learn about the slope-intercept form (y=mx+b) of linear equations highlighting the slope (m) and the y-intercept (b) of a line. (9 min) E MM

FAC.F.17, FAC.F.18 | Slope and Y-Intercept from Equation
In an equation in slope-intercept form (y=mx+b) the slope is m and the y-intercept is b. We can also rewrite certain equations to look more like slope-intercept form. For example, y=x can be rewritten as y=1x+0, so its slope is 1 and its y-intercept is 0. (4 min) E MM

8.F.4, A-CED.2, A-CED.3, F-BF.1a, F-IF.4, F-IF.6, F-LE.2, F-LE.5 | Worked Examples: Slope-Intercept Intro
Explore and practice the relationship between slope, y-intercept, and linear equation in slope-intercept form. (4 min) E MM

FAC.EI.2 | Linear Equation Word Problems
Solve this linear equation word problem. (4 min) E MM

8.F.1, 8.F.3, F-IF.1, F-IF.7a, F-LE.1b | Graph from Slope-Intercept Equation
Graph a linear equation in slope-intercept form using the information given by that form. (3 min) E MM

8.F.1, 8.F.3, A-CED.2, F-IF.1, F-LE.1b, F-LE.2, FAC.F.18 | Slope-Intercept Equation from Graph
Learn to write equations in slope-intercept form for three different lines. (11 min) E MM

8.F.1, 8.F.3, A-CED.2, F-IF.1, F-LE.1b, F-LE.2, FAC.F.18 | Slope-Intercept Equation from Slope & Point
Learn how to write an equation in slope-intercept form (y=mx+b) for the line with a slope of -3/4 that goes through the point (0,8). (4 min) E MM

8.EE.7b, 8.F.1, 8.F.3, A-CED.2, A-REI.1, A-REI.3, F-IF.1b, F-LE.2, FAC.F.18 | Slope-Intercept Equation from Two Points
Explore how to write an equation of the line that passes through the points (-1,6) and (5,-4). (7 min) E MM

A-CED.2, FAC.F.17, FAC.F.18 | Constructing Linear Equations from Context
Given a written description of a linear relationship in some context, write an equation that represents the linear relationship described. (3 min) E MM

FAC.F.22 | Intro to Point-Slope Form
Learn about how point-slope is the general form $y-y_1=m(x-x_1)$ for linear equations. It emphasizes the slope of the line and a point on the line (that is not the y-intercept). (6 min) E MM

FAC.F.22 | Point-Slope & Slope-Intercept Equations
Learn to rewrite an equation in point-slope form to be in slope-intercept form y=mx+b, to highlight the same line's slope and y-intercept. (7 min) E MM

FAC.F.17, FAC.F.18, FAC.F.22 | Intro to Linear Equation Standard Form
Explore the standard form for linear equations in two variables is Ax+By=C. (8 min) E MM

FAC.F.17, FAC.F.18, FAC.F.22 | Graphing a Linear Equation: 5x+2y=20
Graph graph a linear equation like 5x + 2y = 20 by rewriting it so y is isolated, then plugging in x values to find their corresponding y-values in a table. (5 min) E MM

FAC.F.17, FAC.F.18 | Clarifying Standard Form Rules
Learn and clarify what standard form rules. (5 min) E MM

FAC.F.17, FAC.F.18 | Converting from Slope-Intercept to Standard Form
Rewrite the slope-intercept equation y=2/3x+4/7 in standard form. (5 min) E MM

8.F.4, A-CED.2, A-CED.3, F-BF.1a, F-IF.4, F-IF.6, F-LE.2, F-LE.5 | Slope from Equation
Find the slope of a line given its equation, using many forms of equations. (6 min) E MM

FAC.F.17, FAC.F.18 | Writing Linear Equations in all Forms
Find the equation of a line that passes through (-3,6) and (6,0) in point-slope, slope-intercept, and standard form. (8 min) E MM

Algebra I: Algebra | Intro to Systems of Equations

8.EE.8b, A-REI.11, A-REI.6, FAC.F.22 | Systems of Equations: Trolls, Tolls (Part 1)
Solve this troll of a problem by setting up a system of equations. (7 min) E MM

8.EE.8b, A-REi.11, A-REi.6, FAC.F.22 | Systems of Equations: Trolls, Tolls (Part 2)
Solve this troll of a problem by setting up a system of equations. (6 min) E MM

A-REI.11, A-REI.6, FAC.F.22 | Testing a Solution to a System of Equations
Check whether (-1,7) is a solution of the system: x+2y=13 and 3x-y=-11. (3 min) E MM

8.EE.8a, A-REi.11, A-REi.6, FAC.F.22 | Systems of Equations with Graphing: y=7/5x-5 & y=3/5x-1
Graph the following system of equations and solve it by looking for the intersection point: y=7/5x-5 and y=3/5x-1. (2 min) E MM

A-REi.11, A-REi.6, FAC.F.22 | Systems of Equations with Graphing: Exact & Approximate Solutions
Solve a system of two linear equations in standard form, and then approximate the solution of a system whose solution isn't clearly visible. (6 min) E MM

8.EE.8b, A-REI.11, A-REI.6, FAC.F.22 | Setting up a System of Equations from Context Example (Pet Weights)
Practice writing a system of linear equations that fits the constraints in a word problem. (2 min) E MM

8.EE.8b, A-REI.11, A-REI.6, FAC.F.22 | Setting up a System of Linear Equations Example (Weight and Price)
Practice writing a system of linear equations that fits the constraints in a word problem. (4 min) E MM

FAC.F.22 | Interpreting Points in Context of Graphs of Systems
Given a graph of a system of equations and a context, practice interpreting what various points represent in that system. (6 min) E MM

Algebra I: Algebra | Solving Systems of Equations with Substitution

A-CED.3, A-REI.6, FAC.F.22, FAC.F.25 | Systems of Equations with Substitution: Potato Chips
Learn to solve a system of equations using substitution. (5 min) E MM

8.EE.8b, A-REI.6, FAC.F.22 | Systems of Equations with Substitution: -3x-4y=-2 & y=2x-5
Learn to solve the system of equations -3x - 4y = -2 and y = 2x - 5 using substitution. (4 min) E MM

8.EE.8c, A-CED.2, A-CED.3, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | Systems of Equations with Substitution: Coins
Solve a word problem about the number of nickels and quarters in a piggy bank by creating a system of equations and solving it. (6 min) E MM

Algebra I: Algebra | Solving Systems of Equations with Elimination

A-CED.2, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | Systems of Equations with Elimination: King's Cupcakes
Use simple elimination to figure out how many cupcakes children and adults eat. (9 min) E MM

A-REI.6, FAC.F.22 | Elimination Strategies
Practice identifying strategies for eliminating variables in a system of equations. (7 min) E MM

A-CED.2, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | Systems of Equations with Elimination: x-4y=-18 & -x+3y=11
Solve the following system of equations by eliminating x: x-4y=-18 and -x+3y=11. (6 min) E MM

A-CED.2, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | Systems of Equations with Elimination: Potato Chips
Solve another system of equations using elimination. (9 min) E MM

A-REI.6, FAC.F.22 | Systems of Equations with Elimination and Manipulation
Explore how to slightly manipulate a system of equations before we can solve it using the elimination method. (12 min) E MM

Algebra I: Algebra | Equivalent Systems of Equations

A-REI.5 | Why can We Subtract One Equation from the Other in a System of Equations?
Revisit the example of the scale to help explain why we can subtract one equation from the other in a system of equations. (8 min) E MM

A-REI.5 | Worked Example: Equivalent Systems of Equations
Analyze a couple systems of equations and determine whether they have the same solution as a third given system. (6 min) E MM

A-REI.5 | Worked Example: Non-Equivalent Systems of Equations
Analyze a couple of systems of equations and determine whether they have the same solution as a third given system. (5 min) E MM

A-REI.5 | Reasoning with Systems of Equations
When we perform operations on a system of equations, some operations produce an equivalent system, while others don't necessarily produce an equivalent system. When we're solving a system of equations, we need to use operations that guarantee equivalence. (9 min) E MM

Algebra I: Algebra | Number of Solutions to Systems of Equations

8.EE.8b, A-CED.2, A-REI.10, A-REI.11, A-REI.6, FAC.F.22 | Systems of Equations Number of Solutions: Fruit Prices (Part 1)
Explore an example of a system of equations that has no solution. (9 min) E MM

8.EE.8b, A-CED.2, A-REI.10, A-REI.11, A-REI.6, FAC.F.22 | Systems of Equations Number of Solutions: Fruit Prices (Part 2)
Explore an example of a system of equations that has infinite solutions. (7 min) E MM

A-CED.2, A-REI.10, A-REI.11, FAC.F.22 | Solutions to Systems of Equations: Consistent vs. Inconsistent
Learn about a consistent system of equations that has at least one solution, and an inconsistent system that has no solution. (6 min) E MM

A-REI.10, A-REI.11, FAC.F22 | Solutions to Systems of Equations: Dependent vs. Independent
Explore how a dependent system of equations has infinite solutions, and an independent system has a single solution. (5 min) E MM

8.EE.8a, A-REI.10, A-REI.11, FAC.F.22 | Number of Solutions to a System of Equations
Given three lines on the coordinate plane, identify one system of two lines that has a single solution and one system that has no solution. (3 min) E MM

8.EE.8a, A-REI.10, A-REI.11, FAC.F.22 | Number of Solutions to a System of Equations Graphically
Determine how many solutions the following system of equations has by considering its graph: 10x-2y=4 and 10x-2y=16. (7 min) E MM

8.EE.8b, A-REi.10, A-REI.11, A-REI.6, FAC.F.22 | Number of Solutions to a System of Equations Algebraically
Solve several examples where he reasons about the number of solutions of systems of equations using algebraic reasoning. (6 min) E MM

A-REI.10, A-REI.11, FAC.F.22 | How Many Solutions Does a System of Linear Equations Have if There are At Least Two?
Discover the answer to how many solutions a system of linear equations has. (2 min) E MM

Algebra I: Algebra | Systems of Equations Word Problems

8.EE.8c, A-CED.2, A-CED.3, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | Age Word Problem: Imran
Solve the following age word problem: In 40 years, Imran will be 11 times as old as he is right now. How old is he right now? (4 min) E MM

8.EE.8c, A-CED.2, A-CED.3, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | Age Word Problem: Ben & William
Solve the following age word problem: William is 4 times as old as Ben. 12 years ago, William was 7 times as old as Ben. How old is Ben now? (6 min) E MM

8.EE.8c, A-CED.2, A-CED.3, A-REI.6, FAC.F.17, FAC.F.18. FAC.F.22 | Age Word Problem: Arman & Diya
Solve the following age word problem: Arman is 18. Diya is 2. How many years will it take for Arman to be 3 times as old as Diya? (5 min) E MM

8.EE.8c, A-CED.2, A-CED.3, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | System of Equations Word Problem: Walk & Ride
Solve a problem about walking and bus distances to school. (7 min) E MM

8.EE.8c, A-CED.2, A-CED.3, A-REi.6, FAC.F.17, FAC.F.18, FAC.F.22 | System of Equations Word Problem: No Solution
Solve a problem about a toy factory that has no viable solution, which means the information describes an impossible situation. (5 min) E MM

8.EE.8c, A-CED.2, A-CED.3, A-REI.6, FAC.F.17, FAC.F.18, FAC.F22 | System of Equations Word Problem: Infinite Solutions
Solve a problem about a vegetable farmer that has infinite solutions, which means there's not enough information to find a single solution. (5 min) E MM

A-CED.2, A-REi.6, FAC.F.17, FAC.F.18, FAC.F.22 | Systems of Equations with Elimination: TV & DVD
Solve a word problem about the weights of TVs and DVDs by creating a system of equations and solving it. (6 min) E MM

A-CED.2, A-REI.6, FAC.EI.2, FAC.F.17, FAC.F.18, FAC.F.22 | Systems of Equations with Elimination: Apples and Oranges
Solve a word problem about the price of apples and oranges by creating a system of equations and solving it. (5 min) E MM

8.EE.8c, A-CED.2, A-CED.3, A-REI.6, FAC.F.18, FAC.F.22 | Systems of Equations with Substitution: Coins
Solve a word problem about the number of nickels and quarters in a piggy bank by creating a system of equations and solving it. (6 min) E MM

A-CED.2, A-REI.6, FAC.F.17, FAC.F.18, FAC.F.22 | Systems of Equations with Elimination: Coffee and Croissants
Solve a word problem about the price of coffee and a croissant by creating a system of equations and solving it. (4 min) E MM

Algebra I: Algebra | Testing & Graphing Two-Variable Inequalities

FAC.EI.4 | Testing Solutions to Inequalities
Check if the ordered pairs (3,5) and (1,-7) are solutions of the inequality 5x-3y≥25. (6 min) E MM

FAC.EI.4 | Testing Solutions to Systems of Inequalities
Check whether the ordered pair (2,5) is a solution of the following system: y≥2x+1 and x>1. (1 min) E MM

A-REI.12, FAC.F.23 | Intro to Graphing Two-Variable Inequalities
Learn how to graph two-variable linear inequalities like y≤4x+3. (8 min) E MM

A-REI.12, FAC.F.23 | Graphing Two-Variable Inequalities
Graph the inequality y<3x+5. (3 min) E MM

A-REI.12, FAC.F.23 | Two-Variable Inequalities from Their Graphs
Analyze the given graph to find the two-variable inequality it represents. (3 min) E MM

A-REI.12, FAC.F.23 | Intro to Graphing Systems of Inequalities
Learn how to graph systems of two-variable linear inequalities, like "y>x-8 and y<5-x". (6 min) E MM

A-REI.12, FAC.F.23, FAC.F.24 | Graphing Systems of Inequalities
Graph the solution set of the system "y≥2x+1 and y<2x-5 and x>1". (3 min) E MM

Algebra I: Algebra | Modeling with Linear Inequalities

A-CED.3, FAC.F.24, FAC.F.25 | Writing Two-Variable Inequalities Word Problem
Solve a word problem about scores in a chess tournament by creating a two-variable linear inequality. (2 min) E MM

A-CED.3, FAC.F.24, FAC.F.25 | Solving Two-Variable Inequalities Word Problem
Given a two-variable linear inequality that models a context about watering plants, find how many flowers can be watered. (4 min) E MM

A-CED.3, FAC.F.24, FAC.F.25 | Interpreting Two-Variable Inequalities Word Problem
Analyze a two-variable linear inequality that models a context about YouTube videos. (4 min) E MM

A-CED.3, FAC.F.25 | Modeling with Systems of Inequalities
Model a real-world context into an algebraic system of linear inequalities and graph it. (10 min) E MM

A-CED.3, FAC.F.25 | Writing Systems of Inequalities Word Problem
Model a word problem about baking cupcakes and muffins by creating a system of linear inequalities. (4 min) E MM

A-CED.3, FAC.F.24, FAC.F.25 | Solving Systems of Inequalities Word Problem
Given a system of linear inequalities that models a context about making chairs and tables, find how many can be made. (4 min) E MM

A-CED.3, FAC.F.24, FAC.F.25 | Graphs of Systems of Inequalities Word Problem
Given the graph of a two-variable linear inequality that models a context about chopping vegetables, find if there is time to chop them. (4 min) E MM

A-CED.3, FAC.F.24, FAC.F.25 | Graphs of Two-Variable Inequalities Word Problem
Given the graph of a two-variable linear inequality that models a context about dog biscuits, find if the dog can get enough biscuits. (5 min) E MM

Algebra I: Algebra | Evaluating Functions

8.F.1, F-IF.1, F-IF.2, FAC.F.12, FAC.F.13 | What is a Function?
Explore examples of various kinds of functions. (8 min) E MM

8.F.1, F-IF.1, F-IF.2, FAC.F.12 | Worked Example: Evaluating Functions from Equation
Learn how to evaluate $f(x)=49-x^2$ at x=5. (1 min) E MM

8.F.1, F-IF.1, F-IF.2, FAC.F.12, FAC.F.13 | Worked Example: Evaluating Functions from Graph
Evaluate a function at x=-1 using the graph of that function. (1 min) E MM

F-IF.1, FAC.EI.4, FAC.F.12, FAC.F.13 | Evaluating Discrete Functions
Given the graph of a discrete function, show how to evaluate the function for a few different values. (3 min) E MM

F-IF.1, F-IF.2, FAC.EI.4, FAC.F.12, FAC.F.13 | Worked Example: Evaluating Expressions with Function Notation
Evaluate -2·f(-6)+g(1) given the graphs of f and g. (1 min) E MM

F-IF.1, F-IF.2, FAC.F.12, FAC.F.13 | Worked Example: Matching an Input to a Function's Output (Equation)
Find the input value for which f(t)=13, given that f(t)=-2t+5. (1 min) E MM

F-IF.1, F-IF.2, FAC.F.12, FAC.F.13 | Worked Example: Matching an Input to a Function's Output (Graph)
Find the input value for which g(x)=-2 given the graph of g. (1 min) E MM

F-IF.1, F-IF.2, FAC.F.12, FAC.F.13 | Worked Example: Two Inputs with the Same Output (Graph)
Find the input value other than -5 for which f(x)=f(-5), given the graph of f. (2 min) E MM

8.F.1, F-IF.1, FAC.F.12, FAC.F.13 | Equations vs. Functions
Explore the difference between equations and functions. (4 min) E MM

F-IF.1, FAC.F.12, FAC.F.13 | Obtaining a Function from an Equation
Learn how to obtain a function from an equation. (3 min) E MM

AIII.A.18, FAC.F.12 | Function Notation Word Problem: Bank
Learn how to interpret expressions that contain a function within a real-world context. (3 min) E MM

F-IF.2, FAC.F.12 | Function Notation Word Problem: Beach
Learn how to interpret expressions that contain a function within a real-world context. (2 min) E MM

Algebra I: Algebra | Intro to the Domain & Range of a Function

FAC.EI.10, FAC.F.21 | Intervals and Interval Notation
Learn about intervals, which are bounded sets of numbers and are very useful when describing domain and range. (9 min) E MM

AIII.A.8, F-IF.1, F-IF.3, FAC.F.12, FAC.F.13 | What is the Domain of a Function?
Explore how functions assign outputs to inputs. (7 min) E MM

AIII.A.8, F-IF.1, FAC.F.12, FAC.F.13 | What is the Range of a Function?
Learn the range of a function is the set of all possible outputs the function can produce. (7 min) E MM

AIII.A.8, F-IF.3, F-IF.5, FAC.F.14 | Worked Example: Domain and Range from Graph
Finding the domain and the range of a function that is given graphically.
(4 min) E MM

AIII.A.8, F-IF.1, F-IF.3, FAC.F.12, FAC.F.13, FAC.F.21 | Determining Whether Values are in Domain of Function
Discover how to test whether a value is or isn't in the domain of a function.
(5 min) E MM

AIII.A.8, F-IF.3, F-IF.5, FAC.F.14, FAC.F.21, FAC.F.28 | Examples Finding the Domain of Functions
Discover how to algebraically find the domain of a few different functions.
(4 min) E MM

AIII.A.8, F-IF.3, F-IF.5, FAC.F.14 | Worked Example: Determining Domain Word Problem (Real Numbers)
Determine the domain of a function that models the height of a plant over time.
(3 min) E MM

AIII.A.8, F-IF.3, F-IF.5, FAC.F.14, FAC.F.21 | Worked Example: Determining Domain Word Problem (Positive Integers)
Determine the domain of a function that models the price of candy bars.
(3 min) E MM

AIII.A.8, F-IF.3, F-IF.5, FAC.F.14, FAC.F.21 | Worked Example: Determining Domain Word Problem (All Integers)
Determine the domain of a function that models going up and down a ladder.
(5 min) E MM

Algebra I: Algebra | Recognizing Functions

8.F.1, F-IF.1, FAC.F.12, FAC.F.13 | Recognizing Functions from Graph
Explore whether a given set of points can represent a function. (4 min) E MM

8.F.1, F-IF.1, FAC.F.12, FAC.F.13 | Does a Vertical Line Represent a Function?
Explain why a vertical line doesn't represent a function (2 min) E MM

8.F.1, F-IF.1, FAC.F.12, FAC.F.13 | Recognizing Functions from Table
Check whether a table of people and their heights can represent a function that assigns a height to a name. (5 min) E MM

8.F.1, F-IF.1, FAC.F.12, FAC.F.13 | Recognizing Functions from Verbal Description
Check whether y can be described as a function of x if y is always three more than twice x. (2 min) E MM

8.F.1, F-IF.1, FAC.F.12, FAC.F.13 | Recognizing Functions from Verbal Description Word Problem
Check whether a description of the price of an order can be represented as a function of the shipping cost. (3 min) E MM

Algebra I: Algebra | Interpreting Properties & Features of Functions

F-IF.4 | Introduction to Minimum and Maximum Points
Explain all about minimum and maximum points, both absolute and relative.
(6 min) E MM

F-IF.4 | Worked Example: Absolute and Relative Extrema
How to identify relative and absolute extrema in the graph of a function.
(5 min) E MM

F-IF.4 | Increasing, Decreasing, Positive or Negative Intervals
Function values can be positive or negative, and they can increase or decrease as the input increases. Here we introduce these basic properties of functions. (6 min) E MM

F-IF.4 | Worked Example: Positive & Negative Intervals
Finding the positive or negative intervals of a function from its graph. (1 min) E MM

F-IF.4 | Graph Interpretation Word Problem: Temperature
When a function models a real-world context, we can learn a lot about the content from the function's graph.
(4 min) E MM

F-IF.4, FAC.EI.4 | Graph Interpretation Word Problem: Basketball
Interpret the y-intercept of a graph that models a basketball free throw.
(4 min) E MM

Algebra I: Algebra | Average Rate of Change

F-IF.6 | Intro to Average Rate of Change
Explore the average rate of change of a function over an interval. (6 min) E MM

F-IF.6 | Worked Example: Average Rate of Change from Graph
Finding the interval in a function's graph where the function has an average rate of change of -4. (2 min) E MM

F-IF.6 | Worked Example: Average Rate of Change from Table
Finding the average rate of change of a function over the interval -5<x<-2, given a table of values of the function. (2 min) E MM

F-IF.6 | Average Rate of Change Word Problem: Table
Compare the average rate of change of temperature over different time periods. (4 min) E MM

F-IF.6 | Average Rate of Change Word Problem: Graph
Find the average rate of descent of a skydiver over a specific time interval. (7 min) E MM

Algebra I: Algebra | Intro to Inverse Functions

AII.A.18, AII.F.27, F-BF.4c, FAC.F.12 | Intro to Inverse Functions
Explore how to algebraically find the inverse of a function and look at the graphical relationship between inverse functions. (9 min) E MM

AII.A.18, AII.F.27, F-BF.4a, F-BF.4c, Inputs & Outputs of Inverse Functions
Explore if f(a)=b, then $f^{-1}(b)=a$, or in other words, the inverse function of output a when its input is b. (6 min) E MM

AII.A.18, AII.F.27, F-BF.4a, F-BF.4c, FAC.F.12 | Graphing the Inverse of a Linear Function
Given a line segment on the coordinate plane, and he graphs the inverse of the function represented by that segment. (2 min) E MM

AII.A.18, AII.F.26, F-BF.4a, F-BF.4b, FAC.F.12 | Finding Inverse Functions: Linear
Find the inverses of f(x)=-x+4 and g(x)=-2x-1. (7 min) E MM

Algebra I: Algebra | Arithmetic Sequences

AIII.NQ.1, AIII.NQ.2, F-BF.1a, F-NF.2, F-IF.3 | Sequences Intro
Explore and discover how Sequences are ordered lists of numbers (called "terms"), like 2,5,8. (8 min) E MM

AIII.NQ.1, AIII.NQ.2, F-BF.1a, F-BF.2, F-IF.3 | Intro to Arithmetic Sequences
Discover arithmetic sequences and their main features, the initial term and the common difference. (7 min) E MM

F-IF.3 | Extending Arithmetic Sequences
Discover how to extend the arithmetic sequences -8, -14, -20, -26,... and 2, -1, -4, -7, -10,... to find their next terms. (1 min) E MM

AIII.NQ.1, AIII.NQ.2, f-BF.1a, F-BF.2, F-IF.3 | Using Arithmetic Sequences Formulas
Find the terms of arithmetic sequences using their explicit and recursive formulas. (4 min) E MM

AIII.NQ.1, AIII.NQ.2, f-BF.1a, F-BF.2, F-IF.3 | Worked Example: Using Recursive Formula for Arithmetic Sequence
Practice finding the 4th term in a recursively defined arithmetic sequence. (3 min) E MM

AIII.NQ.1, AIII.NQ.2, f-BF.1a, F-BF.2, F-IF.3 | Recursive Formulas for Arithmetic Sequences
Find the recursive formula of the arithmetic sequence 4, 3⅘, 3⅗, 3⅕,... (3 min) E MM

AIII.NQ.1, AIII.NQ.2, F-BF.1a, F-BF.2, F-IF.3 | Explicit Formulas for Arithmetic Sequences
Find explicit formulas of arithmetic sequences given the first few terms of those sequences. (6 min) E MM

F-IF.3 | Arithmetic Sequence Problem
Find the 100th term in the sequence 15, 9, 3, -3... (6 min) E MM

AIII.NQ.1, AIII.NQ.2, F-BF.1a, F-BF.2, F-IF.3 | Converting Recursive & Explicit Forms of Arithmetic Sequences
Find the solution when given an arithmetic sequence in explicit form and convert it to recursive form. (6 min) E MM

Algebra I: Algebra | Geometric Sequences

F-IF.3 | Intro to Geometric Sequences
Discover geometric sequences and their main features, the initial term and the common ratio. (11 min) E MM

F-IF.3 | Extending Geometric Sequences
Find the next term in the geometric sequence -1/32, 1/8, -1/2, 2,... (2 min) E MM

AIII.NQ.1, AIII.NQ.2, F-BF.1a, F-BF.2, F-IF.3 | Using Explicit Formulas of Geometric Sequences
Find the 5th term in the geometric sequence whose explicit formula is 3(-¼)^(i-1). (2 min) E MM

AIII.NQ.1, AIII.NQ.2, F-BF.1a, F*BF.2, F*IF.3 | Using Recursive Formulas of Geometric Sequences
Find the 4th term in the sequence whose recursive formula is a(1)=-⅛, a(i)=2a(i-1). (4 min) E MM

AIII.NQ.1, AIII.NQ.2, F-BF.1a, F-BF.2, F-IF.3 | Explicit & Recursive Formulas for Geometric Sequences
Find an explicit formula of a geometric sequence given the first few terms of the sequences. (6 min) E MM

AIII.NQ.1, IIII.Nq.2, F-BF.1a, F-BF.2, F-IF.3 | Converting Recursive & Explicit Forms of Geometric Sequences
Solve the following problem: The explicit formula of a geometric sequence is g(x)=9*8^(x-1). (6 min) E MM

Algebra I: Algebra | More with Sequences

F-IF.3, FAC.EI.2, FAC.EI.8 |Sequences Word Problems
Solve two-word problems about modeling real-world situations with arithmetic and geometric sequences. (6 min) E MM

AIII.NQ.1, AIII.NQ.2, F-BF.1a, F-BF.2, F-IF.2, FAC.F.12 | Evaluating Sequences in Recursive Form
Show how to evaluate a sequence that is defined with a recursive formula. (9 min) E MM

AIII.NQ.1, AIII.NQ.2, F-BF.1a, F-BF.2, F-IF.3 | Sequences and Domain
Learn how to generate the same sequence with different functions and different domains. (6 min) E MM

Algebra I: Algebra | Absolute Value Functions

AIII.G.39, F-BF.3, FAC.F.27 | Shifting Absolute Value Graphs
Explore how the graph of y=|x-h|+k is the graph of y=|x| shifted h units to the right and k units up. (6 min) E MM

AIII.G.39, F-BF.3, FAC.F.27 | Scaling & Reflecting Absolute Value Functions: Equation
Find the equation of an absolute value function from a description of the transformation performed on y=|x|. (4 min) E MM

AIII.G.39, F-BF.3, FAC.F.27 | Scaling & Reflecting Absolute Value Functions: Graph
Find the equation of an absolute value function from its graph. (3 min) E MM

AIII.F.23, AIII.G.38, F-IF.7b | Graphing Absolute Value Functions
Explore how to graph any absolute value equation of the form y=k|x-a|+h by thinking about function transformations (horizontal shifts, vertical shifts, reflections, and scalings). (6 min) E MM

Algebra I: Algebra | Piecewise Functions

AIII.F.23, AIII.G.37, AIII.G.40, F-IF.7b | Introduction to Piecewise Functions
Learn about how a piecewise function is a function built from pieces of different functions over different intervals. (4 min) E MM

AIII.F.23, AIII.G.37, AIII.G.40, F-IF.7b, FAC.EI.4 | I Worked Example: Evaluating Piecewise Functions
Learn to evaluate piecewise functions (find the value of the function) by using their formulas or their graphs. (4 min) E MM

AIII.F.23, AIII.G.37, AIII.G.40, F-IF.7b | Worked Example: Graphing Piecewise Functions
Learn to graph a piecewise function by graphing each individual piece. (4 min) E MM

AIII.F.23, AIII.G.37, AIII.G.38, AIII.G.40, F-IF.1, FAC.F.12, FAC.F.13 | Worked Example: Domain & Range of Step Function
Learn to find the domain and range of a piecewise function that is constant in each segment. Such functions are called "step functions". (3 min) E MM

AIII.F.23, AIII.G.37, AIII.G.38, AIII.G.40, F-IF.1, F-LE.5, FAC.F.12, FAC.F.13, FAC.F.30 | Worked Example: Domain & Range of Piecewise Linear Functions
Finding the domain and range of a piecewise function where each segment is linear. (7 min) E MM

Algebra I: Algebra | Exponents & Radicals

8.EE.1 | Multiplying & Dividing Powers (Integer Exponents)
Explore how any base and any integer exponents n and m, $a^n \cdot a^m = a^{n+m}$. For any nonzero base, $a^n / a^m = a^{n-m}$. (5 min) E MM

8.EE.1 | Powers of Products & Quotients (Integer Exponents)
Explore for any integers a and b and for any exponents n, $(a \cdot b)^n = a^n \cdot b^n$ and $(a/b)^n = a^n / b^n$. (7 min) E MM

8.EE.2, A-REI.4b | Intro to Square Roots
Learn about the square root symbol (the principal root) and what it means to find a square root. (6 min) E MM

8.EE.2 | Understanding Square Roots
Learn how square root means what number multiplied by itself will result in the given number. (1 min) E MM

8.EE.2, A-REI.4b | Square Root of Decimal
Learn how to find the square root of a decimal number. (3 min) E MM

8.EE.2, A-REI.4b | Intro to Cube Roots
Learn the meaning of cube roots and how to find them. Also learn how to find the cube root of a negative number. (8 min) E MM

A-REI.4b | 5th Roots
Learn about 5th roots and how to find them. (4 min) E MM

Algebra I: Algebra | Exponential Growth & Decay

AIII.F.23, AIII.G.38, AIII.G.40, F-IF.7e, FAC.EI.2 | Intro to Exponential Functions
An exponential function represents the relationship between an input and output, where we use repeated multiplication on an initial value to get the output for any given input. (8 min) E MM

F-LE.1b, F-LE.3 | Exponential vs. Linear Growth
For constant increments in x, a linear growth would increase by a constant difference, and an exponential growth would increase by a constant ratio. (3 min) E MM

F-LE.1c, FAC.EI.2 | Exponential vs. Linear Models: Verbal
Explore how to look at the type of change over time to see if the given example represents linear or exponential growth. (3 min) E MM

F-LE.1b, F-LE.3, FAC.S.42, S-ID.6a | Exponential vs. Linear Models: Table
Determine whether real world model is linear or exponential, where the model is given as a table. (3 min) E MM

F-LE.1c, FAC.EI.2 | Exponential Expressions Word Problems (Numerical)
Given the description of a real-world context, learn to write a calculation of a certain measure. (5 min) E MM

F-IF.6, F-LE.1c, FAC.EI.2 | | Initial Value & Common Ratio of Exponential Functions
Explore how an exponential function of the form f(x) = a*b^x, the initial value is usually taken to be the value of f(0), or "a". (5 min) E MM

F-LE.1c, FAC.EI.2 | Exponential Expressions Word Problems (Algebraic)
Given a real-world context that involves repeated multiplication, model it with an exponential function. (3 min) E MM

F-LE.1c, FAC.EI.2 | Interpreting Exponential Expression Word Problem
Given an exponential function that models a real-world context, interpret it to see what each part of the function represents in the real world. (3 min) E MM

AII.F.23, AIII.G.38, AIII.G.40, F-IF.7e | Exponential Function Graph
Learn to graph an exponential function, like $y=5^x$, by picking a few inputs (x-values) and finding their corresponding outputs (y-values). (5 min) E MM

AIII.F.23, AIII.G.38, AIII.G.40, F-IF.7e, F-LE.1c | Graphs of Exponential Growth
Identifying which graph represents a given exponential function. (4 min) E MM

F-LE.1b | Exponential vs. Linear Growth Over Time
Compare linear and exponential growth and see that over time, *any* exponential growth will surpass *any* linear growth, no matter how steep it is. (5 min) E MM

F-LE.1c | Exponential Decay Intro
Explore how in an exponential growth function, the factor is greater than 1, so the output will increase (or "grow") over time. - In an exponential decay function, the factor is between 0 and 1, so the output will decrease (or "decay") over time. (8 min) E MM

AIII.F.23, AIII.G.38, AIII.G.40, F-IF.7e, F-Le.1c | Graphing Exponential Growth & Decay
Explore graphing the exponential functions $y=27 \cdot (\frac{1}{3})^x$ and $y=-30 \cdot 2^x$. (4 min) E MM

AIII.F.23, AIII.G.38, AIII.G.40, F-IF.7e, F-LE.1c | Writing Functions with Exponential Decay
Explore how to write a function to model exponential decay in a context. (4 min) E MM

F-LE.1c, F-LE.5 | Writing Exponential Functions
Learn to write the exponential function whose initial value is -2 and common ratio is 1/7. (2 min) E MM

F-LE.1c, F-LE.5 | Writing Exponential Functions from Tables
Explore the difference of a linear equation can be thought of as representing repeated addition on an initial value, while an exponential equation can be thought of as representing repeated multiplication on an initial value. (5 min) E MM

F-LE.1c, F-LE.5 | Writing Exponential Functions from Graphs
Given a graph of an exponential curve, we can write an exponential function in the form y=ab^x by identifying the common ratio (b) and y-intercept (a) in the graph. (7 min) E MM

F-IF.4 | Analyzing Tables of Exponential Functions
Learn how to write an equation for an exponential function from a table of values: 1. (7 min) E MM

F-IF.4 | Analyzing Graphs of Exponential Functions
Given the graph of an exponential function, find the formula of the function and a value that is outside the graph. (4 min) E MM

F-IF.4 | Analyzing graphs of Exponential Functions: Negative Initial Value
Given the graph of an exponential function with a negative initial value, find the formula of the function and solve an equation. (6 min) E MM

A-CED.2, F-LE.1c, FACEI.2, FAC.F.17, FAC.F.18 | Modeling with Basic Exponential Functions Word Problem
Solve a word problem where he models the growth of a speeding ticket fine over time as an exponential function, and then interprets this model. (6 min) E MM

F-LE.1c, FAC.EI.2 | Linear vs. Exponential Growth: From Data (Example 1)
Construct functions that model the growth of trees over time and decide whether the function is linear or exponential. (6 min) E MM

F-LE.1c, FAC.EI.2 | Linear vs. Exponential Growth: From Data (Example 2)
Construct a function that models cooling water and decides whether the function is linear or exponential. (7 min) E MM

Algebra I: Algebra | Intro to Polynomials

A-SSE.1a, FAC.EI.1 | Polynomials Intro
Polynomials are sums of terms of the form $k \cdot x^n$, where k is any number and n is a positive integer. For example, 3x+2x-5 is a polynomial. (11 min) E MM

A-APR.1 | Multiply Monomials by Polynomials: Area Model
Use an area model to multiply a polynomial by a single term. (4 min) E MM

Algebra I: Algebra | Multiplying Binomials

A-APR.1 | Multiplying Binomials: Area Model
Express the area of a rectangle whose height is x+2 and width is x+3. (4 min) E MM

A-APR.1 | Multiplying Binomials Intro
Express (x-4)(x+7) as the standard trinomial $x^2+3x-28$ and discusses how the general product (x+a)(x+b) can be written as $x^2+(a+b)x+a*b$. (5 min) E MM

A-APR.1, FA.EI.4 | Multiplying Binomials
Express the product (3x+2)(5x-7) as $15x^2-11x-14$. (6 min) E MM

A-APR.1 | Special Products of the Form (x+a)(x-a)
Explore the difference of square expressions. For example, (x+3)(x-3) is expanded as x^2-9. (5 min) E MM

A-APR.1 | Squaring Binomials of the Form $(x+a)^2$
Explore the perfect square expressions. For example, $(x+7)^2$ is expanded as $x^2+14x+49$. (6 min) E MM

A-APR.1 | Special Products of the Form (ax+b)(ax-b)
Explore the difference of squares (2x+8)(2x-8) as $4x^2-64$. (4 min) E MM

A-APR.1 | Squaring Binomials of the Form $(ax+b)^2$
Explore the perfect square $(7x+10)^2$ as 49x^2+140x+100. (3 min) E MM

Algebra I: Algebra | Factoring Quadratics

A-SSE.1a, FAC.EI.1 | Intro to Factors & Divisibility
Discover what it means for a polynomial to be a factor of another polynomial, and what it means for a polynomial to be divisible by another polynomial. (5 min) E MM

A-SSE.2, FAC.EI.3, FAC.P.33 | Factoring with the Distributive Property
Explore how to factor the expression 4x+18 into the expression 2(2x+9). (3 min) E MM

A-SSE.2, AIII.NQ.7, FAC.EI.3 | Factoring Quadratics as (x+a)(x+b) (Example 1)
Factor x^2-3x-10 as (x+2)(x-5) using the sum-product form: (x+a)(x+b)=x^2+(a+b)x+a*b. (6 min) E MM

AIII.NQ.7 | Factoring Quadratics as (x+a)(x+b) (Example 2)
Factor x^2-14x+40 as (x-4)(x-10) and x^2-x-12 as (x+3)(x-4). (4 min) E MM

AIII.NQ.7 | More Examples of Factoring Quadratics as (x+a)(x+b)
Explore these different examples of factoring. (16 min) E MM

FAC.P.33 | Factoring Quadratics with a Common Factor
Learn to factor quadratics by first pulling out a common factor so the result looks like a(x+b)(x+c). (3 min) E MM

FAC.P.33 | Factoring Completely with a Common Factor
Learn to factor quadratics by first pulling out a common factor so the result looks like a(x+b)(x+c). (4 min) E MM

A-SSE.2, AIII.NQ.7, FAC.EI.3 | Intro to Grouping
Explore the method of grouping, which is very useful in factoring quadratics who's leading coefficient is not 1. (14 min) E MM

AIII.NQ.7 | Factoring Quadratics by Grouping
Factor 4y^2+4y-15 as (2y-3)(2y+5) by grouping. (4 min) E MM

A-SSE.2, AIIII.NQ.7, FAC.EI.3 | Factoring Quadratics: Common Factor + Grouping
Factor 35k^2+100k-15 as 5(k+3)(7k-1). (5 min) E MM

A-SSE.2, AIIINQ.7, FAC.EI.3 | Factoring Quadratics: Negative Common Factor + Grouping
Factor -12f^2-38f+22 as -2(2f-1)(3f+11). (5 min) E MM

A-SSE.2, FAC.Ei.3 | Difference of Squares Intro
Learn that when an expression can be viewed as the difference of two perfect squares, i.e. a^2-b^2, then we can factor it as (a+b)(a-b). (5 min) E MM

A-SSE.2, AIII.NQ.7, FAC.EI.3 | Factoring Difference of Squares: Leading Coefficient ≠ 1
Factor 45x^2-125 as 5(3x+5)(3x-5). (2 min) E MM

A-SSE.2, FAC.EI.3, FAC.P.33 | Factoring Difference of Squares: Analyzing Factorization Analyze the two different factorizations of 16x^2-64 and determine whether they are correct. (3 min) E MM

A-SSE.2, FAC.EI.3 | Factoring Difference of Squares: Shared Factors
Find the binomial factor shared by m^2-4m-45 and 6m^2-150. (4 min) E MM

A-SSE.2, FAC.EI.3 | Perfect Square Factorization Intro
Learn when an expression has the general form a^2+2ab+b^2, then we can factor it as $(a+b)^2$. (5 min) E MM

A-SSE.2, AIII.NQ.7, FACEI.3 | Factoring Perfect Squares
Factor 25x^2-30x+9 as (5x-3)^2 or as (-5x+3)^2. (5 min) E MM

A-SSE.2, FAC.EI.3 | Identifying Perfect Square Form
Explore how we can identify that a trinomial has the "perfect square" form. (4 min) E MM

A-SSE.2, AIII.NQ.7, FAC.EI.3 | Factoring Perfect Squares: Negative Common Factor
Learn to factor -4t^2-12t-9 as -1(2t+3)^2. (4 min) E MM

A-SSE.2, FAC.EI.3 | Factoring Perfect Squares: Missing Values
Analyze the factorization of x^2+5x+c as (x+d)^2 to find the values of the missing coefficients c and d. (3 min) E MM

A-SSE.2, FAC.EI.3 | Factoring Perfect Squares: Shared Factors
Find the binomial factor shared by 4x^2+12x+9 and 4x^2-9. (5 min) E MM

A-SSE.2, FAC.EI.3, FAC.P.33 | Strategy in Factoring Quadratics (Part 1)
Explore how to think strategically about which method is useful for a given quadratic expression we want to factor. (7 min) E MM

A-SSE.2, FAC.EI.3, FAC.P.33 | Strategy in Factoring Quadratics (Part 2)
Explore how to think strategically about which method is useful for a given quadratic expression we want to factor. (8 min) E MM

Algebra I: Algebra | Intro to Parabolas

F-IF.7a | Parabolas Intro
Learn and explore all about parabolas and their shared characteristics. (8 min) E MM

F-IF.7a | Interpreting a Parabola in Context
Given a parabola that models a context, learn to relate key features of the parabola, like the y-intercept, vertex, and x-intercepts. (3 min) E MM

F-IF.4, F-IF.7a | Interpret a Quadratic Graph
Interpret what the features of a graph of a quadratic model mean in terms of a given context. (3 min) E MM

Algebra I: Algebra | Quadratics in Factored Form & Vertex Form

A-REi.4a, A-REI.4b, FAF.29 | Zero Product Property
Learn that the zero product property states that if a·b=0 then either a or b equal zero. (7 min) E MM

F-IF.7a | Graphing Quadratics in Factored Form Analyze the quadratic function in factored form to find the x-intercepts of the graph as well as the vertex. (6 min) E MM

F-IF.4, FAC.F.28 | Quadratic Word Problems (Factored Form)
Solve a problem where a quadratic function (given in factored form) models the height of a launched rocket. (6 min) E MM

F-IF.7a, FAC.P.35 | Vertex Form Introduction
Discover one of the common forms for quadratic functions is called vertex form, because it highlights the coordinates of the vertex of the function's graph. (6 min) E MM

F-IF.7a, FAC.P.35 | Graphing Quadratics: Vertex Form
Learn how to graph any quadratic function that is given in vertex form. (4 min) E MM

F-IF.4, FAC.F.28 | Quadratic Word Problems (Vertex Form)
Given a quadratic function that models the height of an object being launched from a platform, analyze the function to answer questions like "what is the height of the platform?" or "when does the object reach its maximum height?". (7 min) E MM

Algebra I: Algebra | Solving Quadratics by Taking the Square Root

A-REI.4a, A-REI.4b, FAC.F.29 | Solving Quadratics by Taking Square Roots
Solve the equation 2x^2+3=75 by isolating x^2 and taking the square root of both sides. (3 min) E MM

A-REI.4a, A-REI.4b, FAC.F.29 | Solving Quadratics by Taking Square Roots Examples
Solve the equation $(x+3)^2-4=0$ and finds the x-intercepts of $f(x)=(x-2)^2-9$. (5 min) E MM

A-REI.4a, A-REI.4b | Quadratics by Taking Square Roots: Strategy
Analyze a given solution of a quadratic equation and find where and what was the error in that process. (2 min) E MM

A-REI.4a, A-REI.4b, FAC.F.29 | Solving Quadratics by Taking Square Roots: With Steps
Explore the exact order of steps in the process of solving the equation 3(x+6)^2=75. (4 min) E MM

Algebra I: Algebra | Solving Quadratics by Factoring

A-REI.4a, A-REI.4b, A-SSE.3a, F-IF.8a, FAC.F.29 | Solving Quadratics by Factoring
Solve the equation s^2-2s-35=0 by factoring the expression on the left as (s+5)(s-7) and finding the s-values that make each factor equal to zero. (6 min) E MM

A-REI.4a, A-REI.4b, A-SSE.3a, F-IF.8a, FAC.F.29 | Solving Quadratics by Factoring: Leading Coefficient ≠ 1
Solve $6x^2-120x+600=0$ by first dividing by 6 and then factoring. (4 min) E MM

A-REI.4a, A-REI.4b, A-SSE.3a, F-IF.8a, FAC.F.29, FAC.P.33 | Solving Quadratics Using Structure
Solve (2x-3)^2=4x-6 by substituting p for 2x-3 and obtaining the simpler equation p^2=2p. (4 min) E MM

A-CED.1, A-REI.4a, A-SSE.3a, F-BF.1a, FAC.F.28, FAC.P.33 | Quadratic Equations Word Problem: Triangle Dimensions
Solve a geometry problem using a quadratic equation. (8 min) E MM

A-CED.1, A-REI.4a, A-SSE.3a, F-BF.1a, FAC.F.28, FAC.P.33 | Quadratic Equations Word Problem: Box Dimensions
Solve a volume problem using a quadratic equation. (6 min) E MM

Algebra I: Algebra | The Quadratic Formula

A-REI.4a, A-REI.4b, FAC.F.29 | The Quadratic Formula
Learn about the quadratic formula and how it helps us solve any quadratic equation. (17 min) E MM

A-Rel.4a, A-REI.4b, FAC.F.29 | Worked Example: Quadratic Formula
Solve the equation -x^2+8x=1 by first bringing it to standard form and then using the quadratic formula. (7 min) E MM

A-REI.4a, A-REI.4b, FAC.F.29 | Worked Example: Quadratic Formula (Negative Coefficients)
Solve -3x^2+10x-3=0 by plugging a=-3, b=10, c=-3 in the quadratic formula. (5 min) E MM

A-REI.4a, A-REI.4b, FAC.F.29, FAC.F.30 | Using the Quadratic Formula: Number of Solutions
Determine how many solutions the equation $x^2+14x+49=0$ has by considering its quadratic formula, and more specifically, its discriminant. (5 min) E MM

A-REI.4b, FAC.F.29 | Strategy in Solving Quadratic Equations
Based on the initial form of a quadratic equation, determine which solution methods are and aren't appropriate. (6 min) E MM

Algebra I: Algebra | Completing the Square

A-REI.4a, A-REI.4b, A-SSE.3b, F-IF.8a, FAC.F.29 | Completing the Square
Learn how to "complete the square" by adding a constant number to a quadratic expression. (14 min) E MM

A-SSE.3b, FAC.F.29 | Worked Example: Completing the Square (Intro)
Discover how to complete x^2-44x into a perfect square. (3 min) E MM

A-REI.4a, A-REI.4b, A-SSE.3b, F-IF.8a, FAC.EI.3 | Worked Example: Rewriting Expressions by Completing the Square
Learn to rewrite $x^2+16x+9$ as $(x+8)^2-55$ by completing the square. (3 min) E MM

A-REI.4a, A-REI.4b, A-SSE.3b, F-IF.8a, FAC.F.29 | Worked Example: Rewriting & Solving
Equations by Completing the Square
Solve $x^2-2x-8=0$ by rewriting the equation as $(x-1)^2-9=0$ by completing the square. (6 min) E MM

A-REI.4b, FAC.F.29 | Solve by Completing the Square: Integer Solutions
Use the strategy of completing the square to solve quadratic equations (6 min) E MM

A-REI.4b, FAC.F.29 | Solve by Completing the Square: Non-Integer Solutions
Use the strategy of completing the square to solve quadratic equations even when the solutions aren't integers. (4 min) E MM

A-REI.4a, A-REI.4b, A-SSE.3b, F-IF.8a, FAC.F.29 | Worked Example: Completing the Square (Leading Coefficient ≠ 1)
Solve the equation 4x^2+40x-300=0 by completing the square. (5 min) E MM

A-REI.4a, A-REI.4b, A-SSE.3b, F-IF.8a, FAC.F.29 | Solving Quadratics by Completing the Square: No Solution
Try to solve the equation 4x^2+40x+280=0 by completing the square, only to find there's no solution for this equation. (5 min) E MM

A-REI.4a | Proof of the Quadratic Formula
Prove the quadratic formula using the method of completing the square. (8 min) E MM

Algebra I: Algebra | Features & Forms of Quadratic Functions

A-SSE.3a, A-SSE.3b, F-IF.7a, F-IF.8a, FAC.F.29, FAC.F.29, FAC.P.33 | Finding the Vertex of a Parabola in Standard Form
Rewrite the equation y=-5x^2-20x+15 in vertex form (by completing the square) to identify the vertex of the corresponding parabola. (8 min) E MM

A-SSE.3a, A-SSE.3b, F-IF.7a, FAC.P.33 | Graphing Quadratics: Standard Form
Learn how to graph any quadratic function that is given in standard form. (6 min) E MM

A-REI.4a, A-REI.4b, F-IF.4, FAC.EI.2, FAC.F.28, FAC.F.29 | Quadratic Word Problem: Ball
Solve a word problem about a ball being shot in the air. (6 min) E MM

A-SSE.3a, FAC.P.33 | Forms & Features of Quadratic Functions
Rewrite $f(x)=x^2-5x+6$ in factored form to reveal its zeros and in vertex form to reveal its vertex. (6 min) E MM

A-SSE.3a, A-SSE.3b, F-LE.5, FAC.F.30, FAC.P.33 | Worked Examples: Forms & Features of Quadratic Functions
Learn to choose whether factored form, vertex form or standard form of a quadratic is best in different situations. (7 min) E MM

A-SSE.3b | Vertex & Axis of Symmetry of a Parabola
Rewrite a quadratic equation in vertex form and shows how it reveals the vertex of the corresponding parabola. (7 min) E MM

A-SSE.3a, F-IF.7a, FAC.P.33 | Finding Features of Quadratic Functions
Find the zeros, the vertex, & the line of symmetry of quadratic functions given in vertex form, factored form, & standard form. (8 min) E MM

A-SSE.3a, F-LE.5, FAC.F.29, FAC.F.30, FAC.P.33 | Interpret Quadratic Models: Factored Form
Given a quadratic function that models a relationship, rewrite the function to reveal certain properties of the relationship. (4 min) E MM

A-SSE.3b, F-LE.5, FAC.F.30 | Interpret Quadratic Models: Vertex Form
Given a quadratic function that models a relationship, rewrite the function to reveal certain properties of the relationship. (6 min) E MM

Algebra I: Algebra | Comparing & Transforming Quadratic Functions

A-SSE.3a, F-IF.9, F-LE.5, FAC.F.20, FAC.F.30, FAC.P.33 | Comparing Features of Quadratic Functions
Compare the y-intercepts, the zeros, and the concavity of quadratic functions given graphically and algebraically. (4 min) E MM

A-SSE.3a, F-IF.9, F-LE.5, FAC.F.20, FAC.F.30 | Comparing Maximum Points of Quadratic Functions
Given several quadratic functions represented in different forms, find the one with the lowest maximum value. (4 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.27 | Intro to Parabola Transformations
Discuss how we can shift and scale the graph of a parabola to obtain any other parabola, and how this affects the equation of the parabola. (8 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.27 | Shifting Parabolas
Explore how the graph of $y=(x-k)^2+h$ is the resulting of shifting (or translating) the graph of $y=x^2$, k units to the right and h units up. (5 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.27 | Scaling & Reflecting Parabolas
Find the equation of a parabola from its graph. (5 min) E MM

Algebra I: Algebra | Irrational Numbers

8.NS.1 | Intro to Rational & Irrational Numbers
Learn the difference between rational and irrational numbers, learn how to identify them, and discover why some of the most famous numbers in mathematics, like Pi and e, are actually irrational. (6 min) E MM

8.NS.1 | Classifying Numbers: Rational & Irrational
Learn to write any rational number as the ratio of two integers, and learn that irrational numbers, such as the square root of 8 and pi, cannot be written this way. (3 min) E MM

N-RN.3 | Proof: Sum & Product of Two Rationals is Rational
Prove that the sum, or the product, of any two rational numbers will always be a rational number. (3 min) E MM

N-RN.3 | Proof: Product of Rational & Irrational is Irrational
Learn that the product of any rational number and any irrational number will always be an irrational number. (3 min) E MM

N-RN.3 | Proof: Sum of Rational & Irrational is Irrational
Learn that the sum of any rational number and any irrational number will always be an irrational number. (3 min) E MM

N-RN.3 | Sums and Products of Irrational Numbers
Explore how the sum of two irrational numbers can be rational and it can be irrational. (6 min) E MM

N-RN.3 | Worked Example: Rational vs. Irrational Expressions
Show how to determine whether the following expressions are rational or irrational: $9 + \sqrt{45}$, $\sqrt{45}/ (3*\sqrt{5})$, and $3*\sqrt{9}$. (3 min) E MM

N-RN.3 | Worked Example: Rational vs. Irrational Expressions (Unknowns)
Determine whether expressions with unknown rational/irrational numbers are rational or irrational. (6 min) E MM

N-RN.3 | Proof: $\sqrt{2}$ is Irrational
Prove that the square root of 2 is an irrational number, i.e. it cannot be given as the ratio of two integers. (8 min) E MM

N-RN.3 | Proof: Square Roots of Prime Numbers are Irrational
Prove that the square root of any prime number must be an irrational number. (8 min) E MM

N-RN.3 | Proof: There's an Irrational Number Between Any Two Rational Numbers
Prove that when given any two rational numbers, no matter how close, we can find an irrational number that lies between them. (6 min) E MM

Geometry | Intro to Euclidean Geometry

G-CO.1 | Euclid as the Father of Geometry
Euclid, often called the father of geometry, changed the way we learn about shapes with his 13-book series, Euclid's Elements. He used basic ideas called axioms or postulates to create solid proofs and figure out new ideas called theorems and propositions. (8 min) E MM

G-CO.1 | Terms & Labels in Geometry
Learn key geometric terms like colinear points, midpoints, and vertices, and enhance your knowledge of geometry. I (13 min) E MM

G-CO.1 | Geometric Definitions Example
Explore using precise language is important in geometry, as it allows for clear communication and understanding of geometric concepts. (9 min) E MM

Geometry | Intro to Rigid Transformations

G-CO.2, G-CO.6, G-CO.7 | Rigid Transformations Intro
Transformations in math involve changing a shape's position or which way the shape points. There are three main types: translations (moving the shape), rotations (turning the shape), and reflections (flipping the shape like a mirror image). Rigid transformations keep the shape's size and angles the same. (7 min) E MM

G-CO.2, G-CO.6, G-CO.7 | Dilations Intro
Dilations are a type of non-rigid transformation. They change the size of a shape by scaling it up or down, making it bigger or smaller. Unlike rigid transformations, dilations do not keep the shape's size the same. (2 min) E MM

G-CO.5 | Identifying Transformations
Explore the four types of transformations: rotations (spinning a shape around a point), translations (shifting a shape), reflections (flipping a shape over a line), and dilations (shrinking or expanding a shape).
(4 min) E MM

Geometry | Translations

G-CO.5 | Translating Points
Explore how a translation is a way to move a point or shape by a certain number of units in a certain direction. (4 min) E MM

G-CO.5 | Determining Translations
Learn to find the translation by figuring out how much the x- and y-coordinates need to change to map one triangle onto the other.
(2 min) E MM

G-CO.5 | Translating Shapes
Explore how in translations we move every point of the shape a certain distance left or right, and up or down, to create a new shape that's the same size and shape as the original. (2 min) E MM

G-CO.5 | Challenge Problem: Translation
Explore the translation acting on the coordinate plane takes the point (-169,434) to point (-203, -68). (3 min) E MM

G-CO.5 | Geometry Jam
A full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Geometry | Rotations

G-CO.5 | Rotating Points
Explore the different rotation angles and how positive angles rotate counterclockwise and negative angles rotate clockwise. (2 min) E MM

G-CO.5 | Determining Rotations
Learn to see the angle of rotation, we draw lines from the center to the same point in the shape before and after the rotation.
(3 min) E MM

G-CO.5 | Rotating Shapes
Given a triangle on the coordinate plane and the definition of a rotation about the origin, manually draws the image of that rotation. (8 min) E MM

Geometry | Reflections

G-CO.5 | Reflecting Points
Reflections create mirror images of points, keeping the same distance from the line. When we reflect across the y-axis, the image point is the same height, but has the opposite position from left to right.
(4 min) E MM

G-CO.5 | Determining Reflections
Learn about how a line of reflection is an imaginary line that flips one shape onto another. (2 min) E MM

G-CO.5 | Determining Reflections (Advanced)
Given two line segments on the coordinate plane, determine the reflection that maps one of them into the other. (6 min) E MM

G-CO.5 | Reflecting Shapes
Explore how to reflect a quadrilateral across the x-axis. (3 min) E MM

G-CO.5 | Reflecting Shapes: Diagonal Line of Reflection
Given two line segments on the coordinate plane and the definition of a reflection, draw the image of the segments under that reflection. (7 min) E MM

Geometry | Dilations

G-CO.2, G-CO.6, G-CO.7, G-SRT.1b, G-SRT.2 | Dilating Points
Dilations are a way to stretch or shrink shapes around a point called the center of dilation. The amount we stretch or shrink is called the scale factor. If the scale factor is greater than 1, the shape stretches. If it's between 0 and 1, the shape shrinks.
(3 min) E MM

8.G.3, 8.G.4, G-CO.2, G-CO.6, G-CO.7, G-SRT.1.b, G-SRT.2 | Dilations: Scale Factor
A scale factor tells us how much to multiply by the side lengths to change the size. The scale factor is the ratio of the side length in the new shape (image) to the side length in the corresponding side in the original shape (pre-image). (5 min) E MM

G-CO.5 | Dilations: Center
Determining the center of dilation, given a figure and its image under a dilation.
(3 min) E MM

G-SRT.1b, G-SRT.2| Dilating Shapes: Expanding
Let's dilate a rectangle around a point P using a scale factor 1 2/3. This changes the size of the rectangle while keeping its shape. Because 1 2/3 is bigger than 1, most of the points get farther from P. Point P stays in place, because a distance of 0 times any scale factor is still 0. (3 min) E MM

G-CO.5 | Dilating Shapes: Shrinking
Draw the image of the triangle under a dilation with scale factor 1/4 about the center of dilation on the coordinate plane.
(3 min) E MM

G-CO.5 | Dilating Triangles: Find the Error
Explore that dilating doesn't just shrink or grow a figure. The scale factor also changes the distance from each point to the center of dilation. (3 min) E MM

Geometry | Properties of Transformations

G-CO.2 | Finding Measures Using Rigid Transformations
Learn how to find the measures after a rigid transformation. (5 min) E MM

G-CO.2 | Rigid Transformations: Preserved Properties
Rigid transformations preserve side lengths, angle measures, perimeter, and area, but they might not keep the same coordinates or relationships to lines outside the figure.
(7 min) E MM

G-CO.5 | Mapping Shapes
Find the right sequence of rigid transformations (like rotations, translations, and reflections) to map one triangle onto another. (9 min) E MM

G-CO.2 | Dilations and Properties
Learn what properties of a shape are preserved or not preserved after a dilation.
(6 min) E MM

G-CO.2 | Sequences of Transformations
Determine whether segment lengths and angle measures are preserved under a given sequence of transformations.
(4 min) E MM

G-CO.2 | Defining Transformations
Given a description of the effect of a certain transformation, determine whether that transformation is a translation, a rotation, or a reflection. (6 min) E MM

G-CO.2 | Identifying Type of Transformation
Determine what kind of transformation when given information in terms of a few pairs of points and their corresponding images. (5 min) E MM

G-CO.9 | Proofs with Transformations
Explore this exercise about line and angle proofs. (9 min) E MM

Geometry | Symmetry

4.G.3 | Intro to Reflective Symmetry
Discover the concept of an "axis of symmetry". (3 min) E MM

G-CO.3 | Intro to Rotational Symmetry
Explore whether various figures are symmetrical under a 180 degrees rotation.
(4 min) E MM

G-CO.3 | Finding a Quadrilateral from its Symmetries (Example 1)
Draw and classify the quadrilateral.
(3 min) E MM

G-CO.3 | Finding a Quadrilateral from its Symmetries (Example 2)
Two of the points that define a certain quadrilateral are (-4,-2) and (0,5). The quadrilateral has a reflective symmetry over the lines y=x/2 and y=-2x+5. Draw and classify the quadrilateral. (7 min) E MM

Geometry | Intro to Congruence

8.G.2, G-CO.6 | Congruent Shapes & Transformations
Explore the differences between congruent shapes and transformations. (2 min) E MM

8.G.2, G-CO.6 | Non-Congruent Shapes & Transformations
Learn what makes a shape non-congruent and how transformations affect congruency.
(2 min) E MM

G.CO.7 | Segment Congruence Equivalent to Having Same Length
Discover how two-line segments are congruent if and only if they have equal lengths. (7 min) E MM

G-CO.7 | Angle Congruence Equivalent to Having Same Measure
Discover how two angles are congruent if and only if they have the same measure.
(6 min) E MM

Geometry | Congruent Triangles

G-CO.7 | Corresponding Parts of Congruent Triangles are Congruent
Discover that when two triangles are congruent, that all their corresponding sides and angles are congruent too. (6 min) E MM

G-CO.8, G-SRT.5 | Proving the SSS Triangle Congruence Criterion Using Transformations
Prove the side-side-side (SSS) triangle congruence criterion using the rigid transformation definition of congruence. (6 min) E MM

G-CO.8, G-SRT.5 | Proving the SAS Triangle Congruence Criterion Using Transformations
Prove the side-angle-side (SAS) triangle congruence criterion using the rigid transformation definition of congruence. (4 min) E MM

G-CO.8, G-SRT.5 | Proving the ASA and AAS Triangle Congruence Criteria Using Transformations
Prove the angle-side-angle (ASA) and angle-angle-side (AAS) triangle congruence criteria using the rigid transformation definition of congruence. (7 min) E MM

G-CO.7 | Why SSA isn't a Congruence Postulate/Criterion
There are some cases when SSA can imply triangle congruence, but not always. This is why it's not like the other triangle congruence postulates/criteria. (7 min) E MM

G-CO.7 | Triangle Congruence Postulates/Criteria
Explore and justify the SSS, SAS, ASA and AAS postulates for congruent triangles. (14 min) E MM

G-SRT.5 | Determining Congruent Triangles
Use the SSS, ASA, SAS, and AAS postulates to find congruent triangles. (7 min) E MM

G-SRT.5 | Calculating Angle Measures to Verify Congruence
Calculate missing angle measures to determine which triangles must be congruent. (4 min) E MM

G-SRT.5 | Proving Triangle Congruence
Given a figure composed of 2 triangles, prove that the triangles are congruent or determine that there's not enough information to tell. (4 min) E MM

Geometry | Proofs & Properties of Triangles

8.G.5, G-CO.9, G-CO.10 | Angles in a Triangle Sum to 180° Proof
Learn to use transversals, vertical angles, and corresponding angles to rearrange those angle measures into a straight line, proving that they must add up to 180. (4 min) E MM

G-CO.10 | Proofs Concerning Isosceles Triangles
Prove that the base angles in isosceles triangles are congruent, and conversely, that triangles with congruent base angles are isosceles. (9 min) E MM

G-CO.10 | Proofs Concerning Equilateral Triangles
Prove that the angles of an equilateral triangle are all congruent (and therefore they all measure 60°), and conversely, that triangles with all congruent angles are equilateral. (7 min) E MM

8.G.5, G-CO.9, G-CO.10 | Triangle Exterior Angle Example
Explore that an exterior angle is formed outside a triangle by extending a side. Its measure is equal to the sum of the two non-adjacent interior angle measures, thanks to the fact that all angle measures in a triangle add up to 180 degrees. (6 min) E MM

G-SRT.5 | Corresponding Angles in Congruent Triangles
Use the Letters of congruent triangles to solve some angles. (4 min) E MM

8.G.5, G-CO.9, G*CO.10, G-SRT.5 | Isosceles & Equilateral Triangles Problems
Isosceles triangles have two congruent sides and two congruent base angles. Equilateral triangles have all side lengths equal and all angle measures equal. We use these properties to find missing angles in composite figures. (6 min) E MM

G-SRT.5 | Finding Angles in Isosceles Triangles (Example 1)
The measures of two angles of an isosceles triangle are 3x+5 and x+16. Find all possible values of x. (6 min) E MM

G-SRT.5 | Finding Angles in Isosceles Triangles (Example 2)
Explore how isosceles triangles and parallel lines with the power of algebra to solve the angles of an isosceles triangle. (4 min) E MM

Geometry | Proofs & Properties of Quadrilaterals

G-CO.11 | Proof: Opposite Sides of a Parallelogram
Prove that a figure is a parallelogram if and only if opposite sides are congruent. (8 min) E MM

G-CO.11 | Proof: Diagonals of a Parallelogram
Discover that a quadrilateral is a parallelogram if and only if its diagonals bisect each other. (9 min) E MM

G-Co.11 | Proof: Opposite Angles of a Parallelogram
Discover that opposite angles of a parallelogram are congruent. (4 min) E MM

G-CO.11 | Proof: The Diagonals of a Kite are Perpendicular
Discover that the diagonals of a kite are perpendicular, by using the SSS and SAS triangle congruence criteria. (11 min) E MM

G-CO.11 | Proof: Rhombus Diagonals are Perpendicular Bisectors
Discover that the diagonals of a rhombus are perpendicular, and that they intersect at the midpoints of both. (4 min) E MM

G-CO.11 | Proof: Rhombus Area
Discover that we can find the area of a rhombus by taking half the product of the lengths of the diagonals. (5 min) E MM

Geometry | Proofs of General Theorems

G-SRT.5 | Geometry Proof Problem: Midpoint
Discover that a point is the midpoint of a segment using triangle congruence. (6 min) E MM

G-SRT.5 | Geometry Proof Problem: Congruent Segments
Prove that two pairs of segments are congruent using the ASA and AAS congruence criteria. (12 min) E MM

G-SRT.5 | Geometry Proof Problem: Squared Circle
Find a missing angle using triangle congruence in a diagram that contains sector of a circle inscribed within a square. (8 min) E MM

Geometry | Constructing Lines & Angles

G-CO.12 | Geometric Constructions: Congruent Angles
Explore how to construct congruent angles with a compass and straight edge. They're congruent corresponding angles of congruent triangles. (4 min) E MM

G-CO.12 | Geometric Constructions: Parallel Line
Explore how to construct parallel lines with compass and straightedge by creating a pair of congruent corresponding angles on a transversal. (2 min) E MM

G-CO.12 | Geometric Constructions: Perpendicular Bisector
Explore how to construct a perpendicular bisector to a given line segment using compass and straightedge. (2 min) E MM

G-CO.12 | Geometric Constructions: Perpendicular Line Through a Point on the Line
Explore how to construct a line perpendicular to a given line through a point on the line using compass and straightedge. (1 min) E MM

G-CO.12 | Geometric Constructions: Perpendicular Line Through a Point Not on the Line
Learn to construct a perpendicular line through a point off the line. The lines must be perpendicular because a rhombus's diagonals are perpendicular. (3 min) E MM

G-CO.12 | Geometric Constructions: Angle Bisector
Learn to construct a line that bisects a given angle using compass and straightedge. (2 min) E MM

Geometry | Similar Triangles

8.G.4, G-CO.2, G-CO.6, G-CO.7, G-SRT.2 | Similar Shapes & Transformations
Explore how two shapes are similar after they have gone through transformation and what makes shapes not similar. (2 min) E MM

G-SRT.3 | Intro to Triangle Similarity
Discover what it means for triangles to be similar, and how this follows from the definition of similarity (9 min) E MM

G-SRT.3, G-SRT.5 | Triangle Similarity Postulates/Criteria
Explore all the different ways we can determine that two triangles are similar. (12 min) E MM

G-SRT.5 | Determining Similar Triangles
Analyze multiple examples of the similarity of triangles. (9 min) E MM

G-SRT.5 | Solving Similar Triangles
Solve two problems where a missing side length is found by proving that triangles are similar and using this to find the measure. (7 min) E MM

G-SRT.5 | Solving Similar Triangles: Same Side Plays Different Roles
Find a missing side length in a problem where the same side plays different roles in two similar triangles. (6 min) E MM

G-SRT.4 | Intro to Angle Bisector Theorem
The angle bisector theorem states that when an angle in a triangle is split into two equal angles, it divides the opposite side into two parts. The ratio of these parts will be the same as the ratio of the sides next to the angle. (8 min) E MM

G-SRT.5 | Using the Angle Bisector Theorem
Use the angle bisector theorem to solve for the sides of a triangle. (3 min) E MM

G-SRT.5 | Using Similar & Congruent Triangles
Use the similarity of triangles and the congruence of others in this multi-step problem to find the area of a polygon. (10 min) E MM

G-SRT.5 | Challenge Problem: Triangle Similarity
Learn to solve a similarity problem where we don't have a lot of information to work with. (10 min) E MM

Geometry | Proofs & Problem-Solving with Similar Trangles

G-SRT.4 | Pythagorean Theorem Proof Using Similarity
Explore the Pythagorean theorem using similarity. (10 min) E MM

G-CO.10 | Exploring Medial Triangles
The three midsegments (segments joining the midpoints of the sides) of a triangle form a medial triangle. Find out the properties of the midsegments, the medial triangle and the other 3 triangles formed in this way. (12 min) E MM

G-SRT.4 | Proof: Parallel Lines Divide Triangle Sides Proportionally
Discover that a line parallel to one triangle side divides other sides proportionately. (7 min) E MM

8.EE.6 | Proving Slope is Constant Using Similarity
Use a clever proof involving similar triangles to show that slope is constant for a line. (8 min) E MM

FAC.F.15, G-GPE.5 | Proof: Parallel Lines have the Same Slope
Discover that parallel lines have the same slope using triangle similarity. (6 min) E MM

FAC.F.15, G-GPE.5 | Proof: Perpendicular Lines have Opposite Reciprocal Slopes
Learn to prove that perpendicular lines have opposite reciprocal slopes, draw the two lines and label key points. (9 min) E MM

G-SRT.5 | Geometry Word Problem: The Golden Ratio
Solve this word problem about triangle similarity, the golden ratio, and art. (9 min) E MM

G-SRT.5 | Geometry Word Problem: Earth & Moon Radii
Solve this word problem about triangle similarity, the golden ratio, and the Earth. (7 min) E MM

G-SRT.5 | Geometry Word Problem: A Perfect Pool Shot
Use triangle similarity to plan the perfect shot in a pool game. (7 min) E MM

Geometry | Pythagorean Theorem & Its Proofs

8.G.7, FAC.G.36, FAC.G.37, G-SRT.8 | Pythagorean Theorem in 3D
Discover how to find the length of an edge in a 3D shape using the Pythagorean theorem. (6 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Pythagorean Theorem with Isosceles Triangle
Find the value of a base (x) in an isosceles triangle by using the Pythagorean theorem to create an equation involving x. (4 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Multi-Step Word Problem with Pythagorean Theorem
Use the Pythagorean theorem and proportional reasoning in context. (5 min) E MM

G-SRT.4 | Pythagorean Theorem Proof Using Similarity
Explore this proof of the Pythagorean theorem using similarity. (10 min) E MM

Geometry | Special Right Triangles & Ratios

FAC.G.36, FAC.G.37, G-SRT.8 | Special Right Triangles: 30-60-90
Learn how to prove the ratios between the sides of a 30-60-90 triangle. (7 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Special Right Triangles: 45-45-90
Showing the ratios of the sides of a 45-45-90 triangle are 1:1:sqrt(2). (6 min) E MM

FAC.G.36, FAC.G.37, G-SRT.5, G-SRT.8 | 30-60-90 Triangle Example Problem
Use 30-60-90 triangles to solve what at first seems to be a challenging problem. (7 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Area of a Regular Hexagon
Find the area of a regular hexagon. (8 min) E MM

FAC.G.36, G-SRT.6 | Using Similarity to Estimate Ratio Between Side Lengths
When two right triangles share an acute angle measure, the ratios of the corresponding side lengths within the triangles are equal. (5 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Using Right Triangle Ratios to Approximate Angle Measure
Because of similarity, all right triangles with a given acute angle measure have equal ratios between their side lengths. (3 min) E MM

Geometry | Intro to Trigonometric Ratios

FAC.G.36, G-SRT.6 | Triangle Similarity & the Trigonometric Ratios
Explore how the trigonometric ratios are derived from triangle similarity considerations. (9 min) E MM

FAC.G.36, FAC.G.37, G-SRT.6, G-SRT.8 | Trigonometric Ratios in Right Triangles
Use the two legs of a right triange to find the tirg ratios of one of the acute angles. (12 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Solving for a Side in Right Triangles with Trigonometry
Given a right triangle with an acute angle of 65° and a leg of 5 units, uses trigonometry to find the two missing sides (7 min) E MM

G-SRT.7 | Sine & Cosine of Complementary Angles
Show that the sine of any angle is equal to the cosine of its complementary angle. (4 min) E MM

G-SRT.7 | Using Complementary Angles
Solve the following problem: Given that cos(58°)=0.53, find sin(32°). (4 min) E MM

G-SRT.7 | Trig Word Problem: Complementary Angles
Solve a problem about a submerged pyramid using the fact that the sine of an angle is equal to the cosine of its complementary angle. (6 min) E MM

G-SRT.7 | Trig Challenge Problem: Trig Values & Side Ratios
Match different expressions with different trig values. (10 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Right Triangle Word Problem
Solve a modeling problem where he finds the necessary angle to shoot at a vicious alien. (4 min) E MM

Geometry | Analyzing Line Segments

8.G.8 | Distance Formula
Learn how to find the distance between two points by using the distance formula, which is an application of the Pythagorean theorem. (9 min) E MM

G-GPE.6 | Midpoint Formula
Learn how to use the midpoint formula to find the midpoint of a line segment on the coordinate plane, or find the endpoint of a line segment given one point and the midpoint. (7 min) E MM

G-GPE.6 | Dividing Line Segments: Graphical
Figure out the coordinates of a point between two other points that give a certain ratio. (5 min) E MM

G-GPE.6 | Dividing Line Segments
Figure out the coordinates of a point between two other points that give a certain ratio. (4 min) E MM

G-CO.10 | Proving Triangle Medians Intersect at a Point
Prove that for any triangle, the medians intersect at a point 2/3 of the way from each vertex to the midpoint of the opposite side. (7 min) E MM

Geometry | Problem-Solving on the Coordinate Plane

G-GPE.7 | Area of Trapezoid on the Coordinate Plane
Find the area of a trapezoid using the distance formula and the trapezoid area formula. (7 min) E MM

G-GPE.4 | Points Inside/Outside/On a Circle
USe the distance formula to determine whether the point (-6,-6) is inside, outside, or on the circle centered at (-1,-3) with radius 6. (4 min) E MM

G-GPE.4 | Challenge Problem: Points on Two Circles
Solve a challenging problem where he must determine if points are on both, one, or neither of two circles. (10 min) E MM

G-GPE.7 | Coordinate Plane Word Problem
Solve an example where must determine which of the Minions a wizard can reach using the coordinate plane. (6 min) E MM

4.G.1 | Parallel & Perpendicular Lines Intro
Learn how to identify parallel and perpendicular lines. (2 min) E MM

FAC.F.15, G-GPE.5 | Parallel & Perpendicular Lines from Graph
Determine whether given lines are parallel or perpendicular. (7 min) E MM

G-GPE.4 | Classifying Quadrilaterals on the Coordinate Plane
Classify a quadrilateral as a square, rhombus, rectangle, parallelogram, or trapezoid given its four vertices. (5 min) E MM

G-GPE.4 | Classifying Figures with Coordinates
Use coordinates to determine the slopes of sides of a figure to classify it. (7 min) E MM

Geometry | Equations of Parallel & Perpendicular Lines

FAC.F.15, G-GPE.5 | Parallel Lines from Equation (Example 1)
Determine which pairs out of a few given linear equations are parallel. (4 min) E MM

FAC.F.15, G-GPE.5 | Parallel Lines from Equation (Example 2)
Determine which pairs out of a few given linear equations are parallel. (3 min) E MM

FAC.F.15, G-GPE.5 | Parallel Lines from Equation (Example 3)
Determine which pairs out of a few given linear equations are parallel. (3 min) E MM

FAC.F.15, G-GPE.5 | Perpendicular Lines from Equation
Determine which pairs out of a few given linear equations are perpendicular. (3 min) E MM

FAC.F.15, G-GP5E. | Writing Equations of Perpendicular Lines (Example 1)
Given line A and point P, find the equation of the line perpendicular to A that passes through P. (3 min) E MM

FAC.F.15, G-GPE.5 | Writing Equations of Perpendicular Lines (Example 2)
Find the equation of a line perpendicular to a line given in slope-intercept form that passes through a specific point. (2 min) E MM

FAC.F.15, G-GPE.5 | Proof: Parallel Lines have the Same Slope
Prove that parallel lines have the same slope using triangle similarity. (6 min) E MM

FAC.F.15, G-GPE.5 | Proof: Perpendicular Lines have Opposite Reciprocal Slopes
Explore how to show that two slopes are indeed opposite reciprocals of each other. (9 min) E MM

Geometry | Conic Sections

G-CO.1, G-GPE.1, G-GPE.2, G-GPE.3 | Intro to Conic Sections
Discover the four conic sections and show how they are derived by intersecting planes with cones in certain ways. (11 min) E MM

G-GPE.1 | Graphing Circles from Features
Learn to graph a circle given the center and either the radius or another point on the circle. (2 min) E MM

G-GPE.1 | Features of a Circle from its Graph
Given a circle on the coordinate plane, find its center and its radius. (4 min) E MM

G-GPE.1 | Features of a Circle from its Standard Equation
Find the center and the radius of the circle whose equation is (x+3)^2+(y-4)^2=49. (4 min) E MM

G-GPE.1 | Graphing a Circle from its Standard Equation
Graph the circle whose equation is $(x+5)^2+(y-5)^2=4$. (6 min) E MM

G-GPE.1 | Writing Standard Equation of a Circle
Given a circle on the coordinate plane, find its standard equation, which is an equation in the form $(x-a)^2+(y-b)^2=r^2$. (6 min) E MM

G-GPE.1 | Features of a Circle from its Expanded Equation
Find the center and the radius of a circle whose equation is x^2+y^2+4x-4y-17=0, and then graph the circle. (4 min) E MM

G-GPE.2 | Intro to Focus & Directrix
Learn how a parabola is the set of all points equidistant from a point (called the "focus") and a line (called the "directrix"). (4 min) E MM

G-GPE.2 | Equation of a Parabola from Focus & Directrix
The equation of a parabola is derived from the focus and directrix, and then the general formula is used to solve an example. (10 min) E MM

Geometry | Circle Basics

G-C.2 | Circles Glossary
Discover the formal definition of a circle, Tangent and secant lines, Diameters and radii, major and minor arcs. (11 min) E MM

FAC.G.38, G-GMD.1 | Area of a Circle Intuition
Use triangles to create an informal argument for the area of a circle formula. (9 min) E MM

G-C.1 | Proof: All Circles are Similar
Explore that all circles are similar by showing how we can translate then dilate any circle onto another. (2 min) E MM

Geometry | Arc Measure, Arc Length, & Sectors

G-C.5 | Intro to Arc Measures
Learn about arc measures including that they must sum to 360, conventions of minor and major arcs, and a comparison to arc length. (6 min) E MM

G-C.5 | Finding Arc Measures
Solve a few problems where he finds a missing arc measure. (6 min) E MM

G-C.5 | Finding Arc Measures with Equations
Solve a few items where arc measures are given in equations, we must find a variable, then use it to find an arc measure. (7 min) E MM

G-C.5 | Arc Length from Subtended Angle
Find the length of an arc using the degree of the angle subtended by the arc and the perimeter of the circle. (5 min) E MM

G-C.5 | Subtended Angle from Arc Length
Solve an example where he finds the central angle given arc length. (2 min) E MM

G-C.5 | Area of a Sector
Find the area of a circle's sector using the area of the circle and the central angle of the sector. (2 min) E MM

G-C.5 | Radians as Ratio of Arc Length to Radius
Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius and define the radian measure of the angle as the constant of proportionality. (7 min) E MM

Geometry | Intro to Radians

G-C.5 | Intro to Radians
Explore the definition and motivation for radians and the relationship between radians and degrees. (11 min) E MM

G-C.5 | Radians & Degrees
Discover the general approach to converting between radians and degrees and vice versa. (7 min) E MM

G-C.5 | Degrees to Radians
Learn how to convert from degrees to radians by multiplying the number of degrees by π/180. (7 min) E MM

G-C.5 | Radians to Degrees
Learn to change from radians to degrees by multiplying the number of radians by 180/π. (3 min) E MM

G-C.5 | Arc Length as Fraction of Circumference
Find the fraction of an arc length out of the entire circumference using the radian measure of the central angle subtended by the arc. (3 min) E MM

G-C.5 | Arc Length from Subtended Angle: Radians
Find the length of an arc using the radius and the radian measure of the angle subtended by the arc. (3 min) E MM

Geometry | Inscribed Angles & Shapes

G-C.2 | Inscribed Angles
Find a missing inscribed angle using the inscribed angle theorem. (1 min) E MM

G-C.2 | Inscribed Angle Theorem Proof
Prove that an inscribed angle is half of a central angle that subtends the same arc. (14 min) E MM

G-C.2 | Inscribed Shapes: Find Diameter
Find the diameter of a circle using an inscribed right triangle. (2 min) E MM

G-C.2 | Inscribed Shapes: Angle Subtended by Diameter
Explore one method using an inscribed angle intercepting a diameter of a circle. (6 min) E MM

G-C.2 | Inscribed Shapes: Find Inscribed Angle
Explore using either the inscribed angle theorem or the fact that two inscribed angles that intercept the same arc must be congruent. (2 min) E MM

G-C.3 | Solving Inscribed Quadrilaterals
Explore supplementary opposite angles in inscribed quadrilateral. (5 min) E MM

G-C.2 | Proof: Right Triangles Inscribed in Circles
Explore this proof showing that a triangle inscribed in a circle having a diameter as one side is a right triangle. (5 min) E MM

G-C.3 | Inscribed Quadrilaterals Proof
Use the inscribed angle theorem and some algebra to prove that opposite angles of an inscribed quadrilateral are supplementary. (4 min) E MM

Geometry | Properties of Tangents

G-C.2 | Proof: Radius is Perpendicular to a Chord it Bisects
Prove that if a radius in a circle is drawn so it bisects a chord, then the radius is also perpendicular to that chord. The proof uses SSS congruence. (8 min) E MM

G-C.2 | Proof: Perpendicular Radius Bisects Chord
Explore this simple proof using right triangle-side-hypotenuse (RSH) congruence criterion to show that a radius perpendicular to a chord bisects it. (4 min) E MM

G-C.2 | Proof: Radius is Perpendicular to Tangent Line
Prove that the radius that connects the intersection point of a tangent line with the circle is perpendicular to the tangent line. (9 min) E MM

G-C.2 | Proof: Segments Tangent to Circle from Outside Point are Congruent
Prove that two tangent segments to a circle that are drawn from the same outside point are congruent. (4 min) E MM

G-C.2 | Tangents of Circles Problem (Example 1)
Find missing angles using the property that tangents are perpendicular to the radius. (4 min) E MM

G-C.2 | Tangents of Circles Problem (Example 2)
Find a missing angle using the property that tangents are perpendicular to the radius. (4 min) E MM

G-C.2 | Tangents of Circles Problem (Example 3)
Find a missing length using the property that tangents are perpendicular to the radius. (3 min) E MM

G-C.4 | Geometric Constructions: Circle Tangent (Example 1)
Construct a line tangent to a circle using compass and straightedge. (6 min) E MM

G-C.4 | Geometric Constructions: Circle Tangent (Example 2)
Construct a line tangent to a circle using compass and straightedge. (5 min) E MM

Geometry | Constructing Inscribed & Circumscribed Shapes

G-C.3, G-CO.13 | Geometric Constructions: Circle-Inscribed Square
Construct a square that is inscribed inside a given circle using compass and straightedge. (3 min) E MM

G-C.3, G-CO.13 | Geometric Constructions: Circle-Inscribed Equilateral Triangle
Construct an equilateral triangle that is inscribed inside a given circle using compass and straightedge. (4 min) E MM

G-CO.3, G-CO.13 | Geometric Constructions: Circle-Inscribed Regular Hexagon
Construct a regular hexagon that is inscribed inside a given circle using compass and straightedge. (4 min) E MM

G-C.3 | Geometric Constructions: Triangle-Inscribing Circle
Construct a circle that inscribes a given triangle using compass and straightedge. (3 min) E MM

G-C.3 | Geometric Constructions: Triangle-Circumscribing Circle
Construct a circle that circumscribes a given triangle using compass and straightedge. (2 min) E MM

Geometry | 2D vs. 3D Objects

G-GMD.4 | Dilating in 3D
The cross sections of 3D shapes are dilations of the original shape, centered at a specific point. The scale factor of the dilation depends on the height of the cross-section or the distance from the point on the base. (4 min) E MM

G-GMD.4 | Slicing a Rectangular Pyramid
Explore what happens when you slice vertically into a rectangular pyramid. (4 min) E MM

G-GMD.4 | Ways to Cross-Section a Cube
Learn about all the different ways we can obtain cross-sections of a cube. (7 min) E MM

G-GMD.4 | Rotating 2D Shapes in 3D
Explore rotating various 2D shapes and see what 3D objects you get. (4 min) E MM

Geometry | Cavalieri's Principal & Dissection Methods

FAC.G.38, G-GMD.1 | Cavalieri's Principle in 3D
Cavalieri's principle tells us that if 2 figures have the same height and the same cross-sectional area at every point along that height, they have the same volume. (5 min) E MM

FAC.G.38, G-GMD.1, G.GMD.3 | Volume of Pyramids Intuition
Find out what that fraction is by cutting a prism into several pyramids. (8 min) E MM

FAC.G.38, G-GMD.1, G-GMD.3 | Volumes of Cones Intuition
Use Cavalieri's principle to establish that the formula for the volume of a cone is the same as the formula for the volume of a pyramid (1/3 * base area * height). (6 min) E MM

FAC.G.38, G-GMD.3 | Using Related Volumes
Use related volumes (using the volume of one figure to determine the volume of another). (6 min) E MM

Geometry | Volume & Surface Area

FAC.G.38, G-GMD.3 | Volume of Triangular Prism & Cube
Use the formulas for the volume of triangular prism and cube to solve some solid geometry problems. (4 min) E MM

FAC.G.38, G-GMD.3 | Volume of a Cone
Learn the formula for the volume of a cone is $V=1/3h\pi r^2$. (6 min) E MM

FAC.G.38, G-GMD.3 | Cylinder Volume & Surface Area
Learn the cylinder's volume is $\pi r^2 h$, and its surface area is $2\pi r h + 2\pi r^2$. (8 min) E MM

FAC.G.38, G-GMD.3 | Volume of a Sphere
The formula for the volume of a sphere is $V = 4/3 \pi r^3$, where V = volume and r = radius. The radius of a sphere is half its diameter. So, to calculate the surface area of a sphere given the diameter of the sphere, you can first calculate the radius, then the volume. (2 min) E MM

FAC.G.38, G-GMD.3, G-MG.1 | Applying Volume of Solids
Calculate the volume of a grain hopper and then use the given rate to solve an applied problem. (7 min) E MM

FAC.G.38, G-GMD.3 | Area Density
Learn that area or surface density is the amount of a quantity (often mass) per unit of area. Density=Quantity/Area. (4 min) E MM

FAC.G.38, G-GMD.3, G-MG.1 | Volume Density
Learn that volume density is the amount of a quantity (often mass) per unit of volume. Density=Quantity/Volume. (4 min) E MM

FAC.G.38, G-GMD.3 | Geometry Jam
A full suite of interactive math-based tools to help students build their understanding of basic geometric and algebraic topics. I

Algebra II | Polynomial Arithmetic

A-SSE.1a, FAC.EI.1 | Polynomials Intro
This introduction to polynomials covers common terminology like terms, degree, standard form, monomial, binomial and trinomial. Polynomials are sums of terms of the form $k \cdot x^n$, where k is any number and n is a positive integer. (11 min) E MM

A-SSE.1a, FAC.EI.1 | The Parts of Polynomial Expressions
Learn to identify terms, coefficients, and exponents in a polynomial. (3 min) E MM

F-IF.6 | Finding Average Rate of Change of Polynomials
Learn how to calculate the average rate of change of a function over a specific interval. (4 min) E MM

F-IF.6 | Sign of Average Rate of Change of Polynomials
Discover how to find the average rate of change in polynomials. (5 min) E MM

A-APR.1, FAC.P.32 | Adding Polynomials
Learn how to simplify polynomials by combining like terms (2 min) E MM

A-APR.1, FAC.P.32 | Subtracting Polynomials
Learn how to distribute negative signs across terms, combine like terms, and simplify expressions. (2 min) E MM

A-APR.1, FAC.P.32 | Polynomial Subtraction
Discover how distributing a negative sign changes the signs of all terms in a polynomial. (3 min) E MM

A-APR.1, FAC.P.32 | Multiplying Monomials
Discover how to multiply numbers and variables separately, then combine them for the final answer. (3 min) E MM

A-APR.1, FAC.P.32 | Multiplying Monomials by Polynomials: Area Model
By breaking down a rectangle into smaller parts, we can find the total area by multiplying the height and width of each part. This method introduces us to the concept of multiplying monomials by polynomials. (2 min) E MM

A-APR.1, FAC.P.32 | Area Model for Multiplying Polynomials with Negative Terms
Discover how to multiply monomials by polynomials using area models. (5 min) E MM

A-APR.1, FAC.P.32 | Multiplying Monomials by Polynomials
Discover how to multiply monomials by polynomials using the distributive property. (3 min) E MM

A-APR.1, FAC.P.32 | Binomials by Polynomials: Area Model
By breaking down the big rectangle into smaller ones, we can find the area and thus the product of the polynomials. (7 min) E MM

A-APR.1, FAC.P.32 | Multiplying Binomials by Polynomials
earn how to multiply binomials by polynomials by using the distributive property to multiply each term. (3 min) E MM

A-APR.1, A-SSE.2, FAC.EI.3, FAC.P.32 | Polynomial Special Products: Difference of Squares
Dive into the exciting world of special products of polynomials, focusing on the difference of squares. (4 min) E MM

A-APR.1, A-SSE.2, FAC.EI.3, FAC.P.32 | Polynomial Special Products: Perfect Square
Explore how to use the perfect square pattern to square more complex binomials (5 min) E MM

Algebra II | Complex Numbers

N-CN.1 | Intro to the Imaginary Numbers
Learn about the imaginary unit, "i", a unique number defined as the square root of -1. (5 min) E MM

N-CN.1 | Simplifying Roots of Negative Numbers
Explore how to simplifying the square root of negative numbers using 'i', the principal square root of -1. (4 min) E MM

N-CN.1, N-CN.2 | Powers of the Imaginary Unit Discover how the powers of 'i' cycle through values, making it possible to calculate high exponents of 'i' easily. (7 min) E MM

N-CN.1 | i as the Principal Root of -1
Explore the concept of 'i' is equal to the square root of -1, and every complex number can be expressed as a + bi, where a and b are real numbers. (7 min) E MM

N-CN.1 | Intro to Complex Numbers
Explain how we obtain complex numbers by adding real numbers and imaginary numbers. (5 min) E MM

N-CN.1 | Classifying Complex Numbers
Learn how real and imaginary numbers are subsets of complex numbers and study how to classify numbers as real, pure imaginary, or complex. (5 min) E MM

N-CN.4 | Plotting Numbers on the Complex Plane
Learn how to plot complex numbers on a unique two-dimensional grid known as the complex plane. (2 min) E MM

N-CN.2 | Adding Complex Numbers
Learn how to break down the process of adding complex numbers into simple steps. (2 min) E MM

N-CN.2 | Subtracting Complex Numbers
Learn how to break down the process of subtracting complex numbers into simple steps. (2 min) E MM

N-CN.2 | Multiplying Complex Numbers
Discover how to multiply complex numbers using the distributive property or FOIL method. (5 min) E MM

A-REI.4b, N-CN.7 | Solving Quadratic Equations: Complex Roots
Learn to break down the process of solving quadratic equations using the quadratic formula and standard form. (10 min) E MM

Algebra II | Polynomial Factorization

A-SSE.2, FAC.EI.3 | Introduction to Factoring Higher Degree Polynomials
Learn to simplify third-degree polynomials and tackle fourth-degree monomials. (6 min) E MM

A-SSE.2, FAC.EI.3 | Introduction to Factoring Higher Degree Monomials
Learn to factor monomials like $6x^7$ as $2x^3 \cdot 3x^4$ or as $x^6 \cdot 6x$. (5 min) E MM

A-SSE.2, FAC.EI.3 | Which Monomial Factorization is Correct?
Learn that factoring monomials involves breaking down an expression into two parts. (2 min) E MM

A-SSE.2, FAC.EI.3 | Worked Example: Finding the Missing Monomial Factor
Learn how to use exponent properties to rewrite complex expressions and get a firm grasp on the crucial role that coefficients and exponents play in this process. (3. min) E MM

A-SSE.2, FAC.EI.3 | Worked Example: Finding Missing Monomial Side in Area Model
Find the length of a rectangle whose area is 42xy^3 and whose height is 14xy. (2 min) E MM

A-SSE.2, FAC.EI.3 | Greatest Common Factor of Monomials
Explore prime factorization and variable parts and learn how to break down monomials into their simplest forms. (3 min) E MM

A-SSE.2, FAC.EI.3 | Taking Common Factor from Binomial
Explore the process of factoring polynomials using the greatest common monomial factor. (5 min) E MM

A-SSE.2, FAC.EI.3 | Taking Common Factor from Trinomial
Learn how to identify the greatest common factor of a trinomial expression and use it to simplify the expression. (6 min) E MM

A-SSE.1a, A-SSE.2, FAC.EI.1, FAC.EI.3 | Taking Common Factor: Area Model
Learn how to find the greatest common monomial factor of terms and uses the area of a rectangle as a visual aid. (5 min) E MM

A-SSE.2, FAC.EI.3 | Factoring Higher-Degree Polynomials: Common Factor
Discover the art of factoring higher degree polynomials. (4 min) E MM

A-SSE.2, FAC.EI.3 | Identifying Quadratic Patterns
Determine whether the polynomial $9x^8+6x^4y+y^2$ can be factored using the perfect square pattern or the difference of squares pattern (or neither). (6 min) E MM

A-SSE.2, FAC.EI.3 | Factorization with Substitution
Explore how to simplify complex expressions by identifying patterns and substituting variables. (5 min) E MM

A-SSE.2, FAC.EI.3 | Factoring Using the Perfect Square Pattern
Factor 25x^4-30x^2+9 as (5x^2-3)^2. (3 min) E MM

A-SSE.2, FAC.EI.3 | Factoring Using the Difference of Squares Pattern
If we expand (a+b)(a-b) we will get a^2-b^2. Factorization goes the other way: suppose we have an expression that is the difference of two squares, like x^2-25 or $49x^2-y^2$, then we can factor is using the roots of those squares. (2 min) E MM

A-APR.4, AIII.A.10 | Polynomial Identities Introduction
Discover that polynomial identities are equations that are true for all possible values of the variable. (5 min) E MM

A-APR.4, AIII.A.10 | Analyzing Polynomial Identities
Explore two cases of polynomial identities and their proofs. (8 min) E MM

A-APR.4, AIII.A.10 | Describing Numerical Relationships with Polynomial Identities
Explore how to use identities to prove that the differences between consecutive square numbers (1,4,9,...) are consecutive odd numbers (1,3,5,...). (5 min) E MM

Algebra II | Geometric Series

A-SSE.4 | Geometric Series Introduction
Explore how a geometric series is the sum of the first few terms of a geometric sequence. (6 min) E MM

A-SSE.4 | Finite Geometric Series Formula
Explore the finite geometric series formula is $a(1-r^n)/(1-r)$. (7 min) E MM

A-SSE.4 | Worked Examples: Finite Geometric Series
Evaluate three geometric series (defined in various ways) using the finite geometric series formula $a(1-r^n)/(1-r)$. (7 min) E MM

A-SSE.4 | Geometric Series Word Problems: Swing
Find an expression for the total length and calculate it for a specific number of swings. (6 min) E MM

A-SSE.4 | Geometric Series Word Problems: Hike
Modeling the length of a hike with a geometric series. (7 min) E MM

Algebra II | Polynomial Division

A-APR.6, AIII.A .13 | Polynomial Division Introduction
Explore how some quotients end up as a polynomial, while other times we have a remainder and cannot express the quotient as a polynomial. (5 min) E MM

A-APR.6, AIII.A.13 | Dividing Polynomials by X (No Remainders)
Finding the quotient $(x^4-2x^3+5x)/x$ is the same as asking "what should we multiply by x to get x^4-2x^3+5x?". (5 min) E MM

A-APR.6, AIII.A.13 | Divide Polynomials by X (With Remainders)
Learn how to divide (18x^4-3x^2+6x-4) by 6x. (5 min) E MM

A-APR.6, AIII.A.13 | Intro to Long Division of Polynomials
Any quotient of polynomials a(x)/b(x) can be written as q(x)+r(x)/b(x), where the degree of r(x) is less than the degree of b(x). (12 min) E MM

A-APR.6, AIII.A.13 | Dividing Quadratics by Linear Expressions (No Remainders)
Explore how you can divide polynomials similarly to how we divide integers. (4 min) E MM

A-APR.6, AIII.A.13 | Dividing Quadratics by Linear Expressions with Remainders
Learn about dividing quadratics by linear expressions with remainders. (5 min) E MM

A-APR.6, AIII.A.13 | Dividing Quadratics by Linear Expressions with Remainders: Missing X-Term
An interesting case in polynomial division is when one of the terms is missing. For example (x^2+1) divided by (x+2). Learn how to avoid any mistakes in such cases. (5 min) E MM

A-APR.6, AIII.A.13 | Dividing Polynomials by Linear Expressions
Dividing $(3x^3+4x^2-3x+7)$ by (x+2) using long division. (4 min) E MM

A-APR.6, AIII.A.13 | Dividing Polynomials by Linear Expressions: Missing Term
Dividing $(2x^3-47x-15)$ by (x-5) using long division. (5 min) E MM

A-APR.6, AIII.A.13 | Factoring Using Polynomial Division
Use the fact that (x+2) is a factor of $(4x^3+19x^2+19x-6)$ to completely factor the polynomial. (6 min) E MM

A-APR.6, AIII.A.13 | Factoring Using Polynomial Division: Missing Term
Using the fact that (x+6) is a factor of (x^3+9x^2-108) to completely factor the polynomial. (4 min) E MM

Algebra II | Polynomial Remainder Theorem

A-APR.2, AIII.A.21 | Intro to the Polynomial Remainder Theorem
The polynomial remainder theorem allows us to determine whether a linear expression is a factor of a polynomial expression easily. (7 min) E MM

A-APR.2, AIII.A.21 | Remainder Theorem: Finding Remainder from Equation
Find the remainder of (-3x^3-4x^2+10x-7) divided by (x-2) using the PRT (Polynomial Remainder Theorem). (4 min) E MM

A-APR.2, AIII.A.21 | Remainder Theorem Examples
Explore that the polynomial remainder theorem says that for a polynomial p(x) and a number a, the remainder on division by (x-a) is p(a). (6 min) E MM

A-APR.2, AIII.A.21 | Remainder Theorem: Checking Factors
Check whether (x-3) is a factor of (2x^4-11x^3+15x^2+4x-12) using the factor theorem. (4 min) E MM

A-APR.2, AIII.A.21 | Remainder Theorem: Finding Coefficients
Determine the value of coefficient c in p(x)=x^3+2x^2+cx+10, for (x-5) to be a factor of p. (4 min) E MM

A-APR.2, AIII.A.21 | Proof of the Polynomial Remainder Theorem
Learn to use the PRT (Polynomial Remainder Theorem) to prove problems. (6 min) E MM

Algebra II | Polynomial Graphs

A-APR.3, FAC.P.35 | Zeros of Polynomials Introduction
Explore that the of a polynomial p(x) are all the x-values that make the polynomial equal to zero. (5 min) E MM

A-APR.3, FAC.P.35 | Zeros of Polynomials: Plotting Zeros
When given a polynomial in factored form, find the polynomial's zeros, and represent them as the x-intercepts of the polynomial's graph. (3 min) E MM

A-APR.3, FAC.P.35 | Zeros of Polynomials: Matching Equation to Zeros
When given a list of the zeros of a polynomial, we can conclude the polynomial must have certain factors, which gives us information about the equation of the polynomial. (4 min) E MM

A-APR.3, FAC.P.35 | Zeros of Polynomials: Matching Equation to Graph
When we are given the graph of a polynomial, we can deduce what its zeros are, which helps us determine a few factors the polynomial's equation must include. (3 min) E MM

A-APR.3, FAC.P.35 | Zeros of Polynomials (With Factoring): Grouping
Follow along with this example of a 3rd degree polynomial we can factor using the method of grouping. (5 min) E MM

A-APR.3, FAC.P.35 | Zeros of Polynomials (With Factoring): Common Factor
Follow along with this example of a 3rd degree polynomial we can factor by first taking a common factor and then using the sum-product pattern. (4 min) E MM

A-APR.3, FAC.P.35 | Positive and Negative Intervals of Polynomials
Given the graph of a polynomial and looking at its x-intercepts, we can determine the factors the polynomial must have. (9 min) E MM

A-APR.3, FAC.P.35 | Multiplicity of Zeros of Polynomials
Multiplicity is a fascinating concept, and it is directly related to graphical behavior of the polynomial around the zero. (7 min) E MM

A-APR.3, FAC.P.35 | Zeros of Polynomials (Multiplicity)
Given the graph of a polynomial and looking at its x-intercepts, we can determine the factors the polynomial must have. (5 min) E MM

AIII.F.23, F-IF.7c | Intro to End Behavior of Polynomials
Explain what "end behavior" is and what affects the end behavior of polynomial functions. (8 min) E MM

Algebra II | Rational Exponents & Radicals

N-RN.1, N-RN.2 | Intro to Rational Exponents
Explore what it means to take a number by a power which is a unit fraction. (5 min) E MM

N-RN.1, N-RN.2 | Rewriting Roots as Rational Exponents
Solve several problems about the equivalence of expressions with roots and rational exponents. (4 min) E MM

N-RN.1, N-RN.2 | Exponential Equation with Rational Answer
Solve for the unknown in $3^a = \sqrt[5]{(3^2)}$. (4 min) E MM

N-RN.2 | Rewriting Quotient of Powers (Rational Exponents)
Rewrite the expression m^(7/9) / m^(1/3) as a single exponential term m^(4/9). (3 min) E MM

N-RN.2 | Rewriting Mixed Radical and Exponential Expressions
Rewrite (r^(2/3)s^3)^2*√(20r^4s^5), once as an exponential expression and once as a radical expression. (7 min) E MM

N-RN.2 | Evaluating Fractional Exponents
Show how to evaluate 64^(2/3) and (8/27)^(-2/3). (6 min) E MM

N-RN.2 | Evaluating Fractional Exponents: Negative Unit-Fraction
Learn to evaluate powers that are negative unit fractions, like 9 raised to -1/2 and 27 raised to -1/3. (3 min) E MM

N-RN.2 | Evaluating Fractional Exponents: Fractional Base
Show how to evaluate (25/9)^(1/2) and (81/256)^(-1/4). (4 min) E MM

N-RN.2 | Evaluating quotient of Fractional Exponents
Simplify the complicated expression 256^(4/7) / 2^(4/7) until the expression is equal to 16. (4 min) E MM

N-RN.2 | Evaluating Mixed Radicals and Exponents
Explore this example of calculating an expression that has both a radical and an exponent. (3 min) E MM

A-SSE.3c, F-IF.8b, F-LE.1a, N-RN.2 | Rewriting Exponential Expressions as $A \cdot B^t$
Simplify the expression 10*9^(0.5t+2)*5^(3t) as 810*375^t. (5 min) E MM

A-SSE.3c, F-IF.8b, F-LE.1a, N-RN.2 | Equivalent Forms of Exponential Expressions
Explore how to rewrite (1/32)*2^t as 32*1024^(t/10-1). (9 min) E MM

N-RN.2 | Solving Exponential Equations Using Exponent Properties
Solve equations like 26^(9x+5) = 1 and 2^(3x+5) = 64^(x-7). (5 min) E MM
N-RN.2 | Solving Exponential Equations Using Exponent Properties (Advanced)
Solve equations like 26^(9x+5) = 1 and 2^(3x+5) = 64^(x-7). (7 min) E MM

Algebra II | Exponential Models

A-SSE.3c, AIII.A.8, AIII.F.23, AIII.G.38, F-IF.8b, F-LE.1a, F-LE.5, FAC.F.21 | Interpreting Change in Exponential Models
Find the factor by which a quantity changes over a single time unit in various exponential models. (7 min) E MM
A-SSE.3c, AIII.A.8, AIII.F.23, AIII.G.38, F-IF.8b, F-LE.1a, F-LE.5, FAC.F.21 | Interpreting Time in Exponential Models
Find the time interval over which a quantity changes by a given factor in various exponential models. (7 min) E MM
A-CED.2, F-BF.1a, F-LE.2, FAC.F.17, FAC.F.18 | Constructing Exponential Models
Model the distribution of a chain letter using an exponential function. (4 min) E MM
A-CED.2, F-BF.1a, F-LE.2, FAC.F.17, FAC.F.18 | Constructing Exponential Models: Half Life
Model the decay of a Carbon-14 samples using an exponential function. (4 min) E MM
A-CED.2, F-BF.1a, F-LE.2, FAC.F.17, FAC.F.18 | Constructing Exponential Models: Percent Change
Model a population of narwhals using an exponential function. (5 min) E MM
A-SSE.3c, AII.A.8, AIII.F.23, AIII.G.38, F-IF.8b, F-LE.1a, F-LE.5, FAC.F21 | Interpreting Change in Exponential Models: With Manipulation
Analyze the rate of change of various exponential models, where the function that models the situation needs some manipulation. (5 min) E MM
A-SSE.3c, AIII.A.8, AIII.F.23, AIII.G.38, F-IF.8b, F-LE.1a, F-LE.5, FAC.F.21 | Interpreting Change in Exponential Models: Changing Units
Analyze the rate of change of various exponential models for different time units by manipulating the functions that model the situations. (4 min) E MM

Algebra II | Intro to Logarithms

AIII.F.29, F-BF.5, F-LE.4 | Intro to Logarithms
Explain what logarithms are and gives a few examples of finding logarithms. (7 min) E MM
AIIIF.29, F-BF.5, F-LE.4 | Evaluating Logarithms (Advanced)
Evaluate $\log_2(8)$, $\log_8(2)$, $\log_2(1/8)$, and $\log_8(1/2)$. (4 min) E MM
AIII.F.29, F-BF.5, F-LE.4 | Exponentials & Logarithms: Graphs
Given a few points on the graph of an exponential function, Sal plots the corresponding points on the graph of the corresponding logarithmic function. (4 min) E MM

Algebra II | The Constant E & the Natural Logarithm

F-LE.2, F-LE.4 | *e* and Compound Interest
Discover a very special number in the world of math: the constant *e*. (12 min) E MM
F-LE.2, F-LE.4 |*e* as a Limit
Dig deeper into the mathematical definition of *e*. (6 min) E MM
F-LE.2, F-LE.4 | Evaluating Natural Logarithm with Calculator
Evaluate log_e(67) (which is more commonly written as ln(67)) using a calculator. (4 min) E MM

Algebra II | Properties of Logarithms & Change of Base

AIII.F.29, F-BF.5, F-LE.4 | Intro to Logarithm Properties (Part 1)
Introduce the logarithm identities for addition and subtraction of logarithms. (9 min) E MM
AIII.F.29, F-BF.5, F-E.4 | Intro to Logarithm Properties (Part 2)
Explore the logarithm identities for multiplication of logarithm by a constant, and the change of base rule. (10 min) E MM
AIII.F.29, F-BF.5, F-LE.4 | Using the Logarithmic Product Rule
Learn to rewrite $\log_3(27x)$ as $\log_3(27)+\log\_3(x)$, which is simplified as $3+\log_3(x)$. (5 min) E MM
AIII.F.29, F-BF.5, F-LE.4 | Using the Logarithmic Power Rule
Learn to rewrite $\log_5(x^3)$ as $3\log_5(x)$. (5 min) E MM

AIII.F.29, F-BF.5, F-LE.4 | Using the Properties of Logarithms: Multiple Steps
Learn to rewrite log_5([25^x]/y) as 2x-log_5(y) by using both the log subtraction property and the log multiplied by a constant property. (2 min) E MM

AIII.F.29, F-BF.5, F-LE.4 | Proof of the Logarithm Product Rule
Explore how to prove the logarithm addition property, log(a) + log(b) = log(ab). (7 min) E MM

AIIIF.29, F-BF.5, F-LE.4 | Roof of the Logarithm Quotient and Power Rules
Explore how to prove garithm addition property, log(a) + log(b) = log(ab). (8 min) E MM

F-LE.2, F-LE.4 | Evaluating Logarithms: Change of Base Rule
Approcimate $\log_5(100)$ by rewriting it as log(100)/log(5) using the change of base rule, then evaluates with a calculator. (8 min) E MM

F-LE.2, F-LE.4 | Using the Logarithm Change of Base Rule
Explore how to rewrite logarithmic expressions like $1/(\log_a 4)$ or $\log_a(16)*\log_2(a)$ using the change of base rule. (7 min) E MM

F-LE.2, F-LE.4 | Proof of the Logarithm Change of Base Rule
Explore how to prove the logarithmic change of base rule, $\log_a(b)=\log_x(b)/\log_x(a)$. (5 min) E MM

Algebra II | Solving Exponential Equations with Lagorithms

F-LE.2, F-LE.4 | Solving Exponential Equations Using Logarithms: Base-10
Solve the equation 10^(2t-3)=7. (3 min) E MM

F-LE.2, F-LE.4 | Solving Exponential Equations Using Logarithms: Base-2
Learn to use logarithms to solve *any* exponential equation of the form $a\cdot b^{cx}=d$. (5 min) E MM

F-LE.2, F-LE.4 | Exponential Model Word Problem: Medication Dissolve
Solve an exponential equation to answer a question about an exponential model. (4 min) E MM

F-LE.2, F-LE.4 | Exponential Model Word Problem: Bacteria Growth
Evaluate an exponential function at a specific value to answer a question about an exponential model. (2 min) E MM

Algebra II | Transformations of Functions

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Shifting Functions Introduction
Explore how the graph of y=f(x)+k (where k is a real number) is the same as the graph of y=f(x) only it's shifted up (when k>0) or down (when k<0). (6 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Shifting Functions Examples
Analyze two cases where functions f and g are given graphically, and g is a result of shifting f. (8 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Graphing Shifted Functions
Given the graph of $f(x)=x^2$, graphs $g(x)=(x-2)^2-4$, which is the graph of f shifted 2 units to the right and 4 units down. (3 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Reflecting Functions Introduction
Learn to reflect the graph of y=f(x) over the x-axis by graphing y=-f(x) and over the y-axis by graphing y=f(-x). (7 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Reflecting Functions: Examples
We can reflect the graph of any function f about the x-axis by graphing y=-f(x) and we can reflect it about the y-axis by graphing y=f(-x). (6 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Function Symmetry Introduction
Learn about the two types of symmetry we call even and odd functions. (6 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Even and Odd Functions: Graphs
Pick the function that is odd among three functions given by their graphs. (4 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Even and Odd Functions: Tables
Even functions are symmetrical about the y-axis: f(x)=f(-x). Odd functions are symmetrical about the x- and y-axis: f(x)=-f(-x). Let's use these definitions to determine if a function given as a table is even, odd, or neither. (4 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Even and Odd Functions: Equations
When given the equation of a function f(x), check whether the function is even, odd, or neither by evaluating f(-x). (4 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Even and Odd Functions: Find the Mistake
See another student's work when trying to determine whether a function is even, odd, or either, and decide whether they made a mistake, and if so, where. (4 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Scaling Functions Introduction
Explore how operatiosn are classified as scaling. (6 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Scaling Functions Vertically: Examples
See multiple examples of how we relate the two functions and their graphs, and determine the value of k. (5 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Scaling Functions Horizontally: Examples
Explore the function f(k·x) is a horizontal scaling of f. (8 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Identifying Horizontal Squash from Graph
Given the graphs of functions f and g, where g is the result of compressing f by a factor of 2, find g(x) in terms of f(x). (4 min) E MM

AIII.G.39, F-BF.3, FAC.F.19, FAC.F.26, FAC.F.27 | Identifying Function Transformations
Explore several examples of how to write g(x) implicitly in terms of f(x) when g(x) is a shift or a reflection of f(x). (7 min) E MM

Algebra II | Graphing Radical, Exponential, & Logarithmic Functions

AIII.F.23, AIII.G.38, F-IF.7b | Graphing Square and Cube Root Functions
Graph various square root and cube root functions by thinking of them as transformations of the parent graphs $y=\sqrt{x}$ and $y=\sqrt[3]{x}$. (7 min) E MM

AIII.G.39, F-BF.3, F-IF.7e, FAC.F.19, FAC.F.26, FAC.F.27 | Transforming Exponential Graphs (Example 1)
Given the graph of $y=2^x$, graph $y=2^{-x}-5$, which is a horizontal reflection and shift of $y=2^x$. (3 min) E MM

AIII.G.39, F-BF.3, F-IF.7e, FAC.F.19, FAC.F.26, FAC.F.27 | Transforming Exponential Graphs (Example 2)
Given the graph of $y=2^x$, graph $y=(-1)2^{x+3}+4$, which is a vertical reflection and a shift of $y=2^x$. (5 min) E MM

AIII.G.39, F-BF.3, F-IF.7e, FAC.F.19, FAC.F.26, FAC.F.27 | Graphing Exponential Functions
Graph $y=-2*3^x+5$ using our interactive graphing widget. (4 min) E MM

AIII.F.29, F-BF.5, F-IF.7e, F-LE.4 | Graphical Relationship Between 2^x and $\log_2(x)$
Graph $y=2^x$ and $y=\log_2(x)$ on the same coordinate plane, showing how they relate as graphs of inverse functions. (6 min) E MM

AIII.G.39, F-BF.3, F-IF.7e, FAC.F.19, FAC.F.26, FAC.F.27 | Graphing Logarithmic Functions (Example 1)
Graph $y=2\log_2(-x-3)$ by viewing it as a transformation of $y=\log_2(x)$. (6 min) E MM

AIII.G.39, F-BF.3, F-IF.7e, FAC.F.19, FAC.F.26, FAC.F.27 | Graphing Logarithmic Functions (Example 2)
Graph $y=4\log_2(x+6)-7$ by viewing it as a transformation of $y=\log_2(x)$. (5 min) E MM

Algebra II | More Types of Equations & Solutions

A-REI.2 | Rational Equations Intro
Learn about rational equation which is when an equation where the variable is in the denominator of a quotient. (3 min) E MM

A-REI.2 | Equations with Rational Expressions (Example 1)
Solve $(x^2-10x+21)/(3x-12)=(x-5)/(x-4)$, which has one real solution and one extraneous solution. (5 min) E MM

A-REI.2 | Equations with Rational Expressions (Example 2)
Solve $(-2x+4)/(x-1)=3/(x+1)-1$. (7 min) E MM

A-REI.2, AIII.A.18, F-BF.4a | Finding Inverses of Rational Functions
Find an expression for the inverse of f by solving the equation $x=f(y)$ for the variable y. (4 min) E MM

A-REI.2 | Intro to Square-Root Equations & Extraneous Solutions
Explore what square-root equations are and show an example of solving such an equation while checking for extraneous solutions. (11 min) E MM

A-REI.2 | Square-Root Equations Intro
Explore an example of how an extraneous solution arises when solving $2x-1=\sqrt{(8-x)}$. (5 min) E MM

A-REI.2 | Solving Square-Root Equations: One Solution
Solve the equation $3+\sqrt{(5x+6)}=12$. (3 min) E MM

A-REI.2 | Solving Square-Root Equations: Two Solutions
Solve the equation $6+3w=\sqrt{(2w+12)}+2w$ which has two solutions. (5 min) E MM

A-REI.2 | Solving Square-Root Equations: No Solution
Solve the equation $\sqrt{(3x-7)}+\sqrt{(2x-1)}=0$, only to find out that the single solution is extraneous, which means the equation has no solution. (4 min) E MM

A-REI.2 | Extraneous Solutions
Explore how and why we get extraneous solutions, by understanding the logic behind the process of solving equations. (8 min) E MM

A-REI.2 | Equation that has a Specific Extraneous Solution
Find the value of d for which √(3x+25)=d+2x has an extraneous solution at x=-3. (5 min) E MM

A-REI.2 | Solving Cube-Root Equations
Solve the equation $-\sqrt[3]{y}=4\sqrt[3]{y}+5$. (4 min) E MM

A-REI.7 | Quadratic Systems: A Line and a Parabola
Explore how a system of equations that contains one linear equation, and one quadratic equation can be solved both graphically and algebraically. (6 min) E MM

A-REI.7 | Quadratic Systems: A Line and a Circle
Solve the system y=x+1 and x^2+y^2=25. (4 min) E MM

A-REI.7 | Quadratic System with No Solutions
Solve a system of two quadratic equations algebraically and finds the system has no solutions. (7 min) E MM

A-REI.11, FAC.F.22 | Solving Equations by Graphing
Explore how to solve a system of equations by graphing the equations and looking for intersection points. (4 min) E MM

A-REI.11, FAC.F.22 | Solving Equations by Graphing: Intro
Learn that you can always solve an equation by graphing it, although the solution might not be exact. (5 min) E MM

A-REI.11, FAC.F.22 | Solving Equations by Graphing: Graphing Calculator
Learn to approximate the solutions to any equation by graphing both sides of the equation and looking for intersection points. (4 min) E MM

A-REI.11, FAC.F.22 | Solving Equations by Graphing: Word Problems
Learn to approximate the solutions of any equation by graphing both sides of the equation and looking for intersection point. (9 min) E MM

Algebra II | The Unit Circle, Radians, & Trig Identities

F-TF.2 | Unit Circle
Learn how to use the unit circle to define sine, cosine, and tangent for all real numbers. (9 min) E MM

F-TF.2 | The Trig Functions & Right Triangle Trig Ratios
Learn how, for acute angles, the two different definitions of the trigonometric values (SOH CAH TOA and the unit circle definition) result in the same values. (7 min) E MM

G-C.5 | Intro to Radians
Explain the definition and motivation for radians and the relationship between radians and degrees. (11 min) E MM

G-C.5 | Radians & Degrees
Discuss the general approach to converting between radians and degrees and vice versa. (7 min) E MM

G-C.5 | Degrees to Radians
Learn to convert from degrees to radians, multiply the number of degrees by π/180. (7 min) E MM

G-C.5 | Radians to Degrees
Learn to change from radians to degrees, you need to multiply the number of radians by 180/π. (3 min) E MM

F-TF.2 | Radian Angles & Quadrants
Determine the quadrant at which a ray falls after a rotation by a certain measure of radians. (4 min) E MM

AIII.F.30, F-TF.3 | Trig Values of π/4
Find the trigonometric values of π/4 using the unit-circle definition. (8 min) E MM

AIII.F.36, F-TF.8 | Proof of the Pythagorean Trig Identity
Prove this identity using the Pythagorean theorem in the unit circle with $x^2+y^2=1$. (6 min) E MM

AIIIF.36, F-TF.8 | Using the Pythagorean Trig Identity
Explore the Pythagorean identity tells us that no matter what the value of θ is, $\sin^2\theta+\cos^2\theta$ is equal to 1. (6 min) E MM

Algebra II | Features & Graphs of Trigonometric Functions

F-IF.7e | Graph of y=sin(x)
Explore how the graph of y=sin(x) is like a wave that forever oscillates between -1 and 1, in a shape that repeats itself every 2π units. (9 min) E MM

F-IF.7e | Intersection Points of y=sin(x) and y=cos(x)
Draw the graphs of the sine and the cosine functions and analyze their intersection points. (12 min) E MM

F-IF.7e | Graph of y=tan(x)
Draw the graph of the tangent function based on the unit circle definition of the function. (10 min) E MM

F-IF.7e | Features of Sinusoidal Functions Explore the main features of sinusoidal functions: midline, amplitude, & period. (5 min) E MM

AIII.G.39, F-BF.3, F-IF.7e, FAC.F.19, FAC.F.26, FAC.F.27 | Amplitude & Period of Sinusoidal Functions from Equation
Find the amplitude and the period of y=-0.5cos(3x). (8 min) E MM

AIII.G.39, F-BF.3, F-IF.7e, FAC.F.19, FAC.F.26, FAC.F.27 | Transforming Sinusoidal Graphs: Vertical Stretch & Horizontal Reflection
Graph y=2*sin(-x) by considering it as a vertical stretch and a horizontal reflection of y=sin(x). (13 min) E MM

AIIIG.39, F-BF.3, F-IF.7e, FAC.F.19, FAC.F.26, FAC.F.27 | Transforming Sinusoidal Graphs: Vertical & Horizontal Stretches
Graph y=-2.5*cos(1/3*x) by considering it as a vertical stretch and reflection, and a horizontal stretch, of y=cos(x). (11 min) E MM

F-IF.7e | Example: Graphing y=3·sin(½·x)-2
Graph y=3·sin(½·x)-2 by thinking about the graph of y=sin(x) and analyzing how the graph (including the midline, amplitude, and period) changes as we perform function transformations to get from y=sin(x) to y=3·sin(½·x)-2. (4 min) E MM

F-IF.7e | Example: Graphing y=-cos(π·x)+1.5
Graph y=-cos(π·x)+1.5 by thinking about the graph of y=cos(x) and analyzing how the graph (including the midline, amplitude, and period) changes as we perform function transformations to get from y=cos(x) to y=-cos(π·x)+1.5. (3 min) E MM

AIII.F.32, AIII.G.39, F-BF.3, F-TF.5, FAC.F.19, FAC.F.26, FAC.F.27 | Sinusoidal Function from Graph
Find the equation of a sinusoidal function from its graph where the minimum point (-2,-5) and the maximum point (2,1) are highlighted. (5 min) E MM

A-CED.2, AIII.F.32, F-BF.1a, F-TF.5, FAC.F.17, FAC.F.18 | Interpreting Trigonometric Graphs in Context
When a trigonometric function models a real-world relationship, we can assign meaning to its midline, amplitude and period. (6 min) E MM

A-CED.2, AIII.F.32, F-BF.1a, F-TF.5, FAC.F.17, FAC.F.18 | Trig Word Problem: Modeling Daily Temperature
Solve a word problem about the daily change in temperature by modeling it with a sinusoidal function. (11 min) E MM

A-CED.2, AIII.F.32, F-BF.1a, F-TF.5, FAC.F.17, FAC.F.18 | Trig Word Problem: Modeling Annual Temperature
Solve a word problem about the annual change in temperature by modeling it with a sinusoidal function. (7 min) E MM

A-CED.2, AIII.F.32, F-BF.1a, F-TF.5, FAC.F.17, FAC.F.18 | Trig Word Problem: Length of Day (Phase Shift)
Solve a word problem about the annual change in the length of day by modeling it with a sinusoidal function that has a phase shift. (8 min) E MM

Algebra II | Modeling & Analysis Using Functions

F-BF.1b | Modeling with Function Combination Model the height of a tree on top of a tower, by adding the functions that model the growth of the tree and the tower separately. (3 min) E MM

AIII.A.8, F-IF.4, FAC.F.21 | Periodicity of Algebraic Models
Analyze the periodicity of graphs that model real world situations. (3 min) E MM

AIII.A.8, F-IF.4, FAC.F.21 | End Behavior of Algebraic Models
Analyze the end behavior of graphs that model real world situations. (3 min) E MM

AIII.A.8, F-IF.4, FAC.F.21 | Symmetry of Algebraic Models
Interpret the significance of modeling function being even. (3 min) E MM

A-CED.4, FAC.EI.6 | Manipulating Formulas: Perimeter
Rewrite the formula for the perimeter of a rectangle so it is solved for width. (7 min) E MM

A-CED.4, FAC.EI.6 | Manipulating Formulas: Area
Rewrite the formula for the area of a triangle so it is solved for height. (3 min) E MM

A-CED.4, F-IF.1, FAC.EI.6 | Manipulating Formulas: Temperature
Take the formula for converting from Fahrenheit temperature to Celsius and solve it for F so it serves to convert from Celsius to Fahrenheit. (3 min) E MM

A-CED.1 | Graph Labels and Scales
When graphing a real-world relationship, we need to pick labels and axis scales that are appropriate for the purpose of our model. (4 min) E MM

A-CED.1 | Rational Equation Word Problem
Model a context that concerns the number and price of pizza slices. (9 min) E MM

A-CED.1 | Quadratic Inequality Word Problem
Model a context that concerns a candy vending machine. (10 min) E MM

A-CED.1 | Exponential Equation Word Problem
Model a context that concerns a bank savings account. (9 min) E MM

A-CED.2, FAC.F.17, FAC.F.18 | Modeling with Multiple Variables: Pancakes
Explore this example of a model that relates different quantities in the context of making pancakes. (3 min) E MM

A-CED.2, FAC.F.17, FAC.F.18 | Modeling with Multiple Variables: Roller Coaster
Explore this example of a model that relates different quantities in the context of roller coaster rides. (3 min) E MM

A-CED.2, FAC.F.17, FAC.F.18 | Modeling with Multiple Variables: Taco Stand
Explore this example of a model that relates different quantities related to the daily profits of a taco stand. (3 min) E MM

A-CED.2, FAC.F.17, FAC.F.18 | Modeling with Multiple Variables: Ice Cream
Explore this example of a model that relates different quantities related to two people walking to the same ice cream shop (3 min) E MM

A-SSE.1b | Interpreting Expressions with Multiple Variables: Resistors
Given the expression for the total resistance in an electric circuit with two resistors, analyze the expression to tell what happens to the total resistance when the resistance of one resistor increases and the resistance of the other resistor stays the same. (3 min) E MM

A-SSE.1b | Interpreting Expressions with Multiple Variables: Cylinder
Given the value and the expression for the radius of a cylinder, find the radius of a cylinder with the same volume and 100 times the height. (4 min) E MM

Trigonometry | Right Triangles & Trigonometry

FAC.G.36, G-SRT.6 | Using Similarity to Estimate Ratio Between Side Lengths
When two right triangles share an acute angle measure, the ratios of the corresponding side lengths within the triangles are equal. (4 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Using Right Triangle Ratios to Approximate Angle Measure
Explore how all right triangles with a given acute angle measure have equal ratios between their side lengths. (3 min) E MM

FAC.G.36, G-SRT.6 | Triangle Similarity & the Trigonometric Ratios
Explain how the trigonometric ratios are derived from triangle similarity considerations. (9 min) E MM

FAC.G.36, FAC.G.37, G-SRT.6, G-SRT.8 | Trigonometric Ratios in Right Triangles Explore a few examples where that start with the two legs of a right triangle, and then find the trig ratios of one of the acute angles. (12 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Solving for a Side in Right Triangles with Trigonometry
Given a right triangle with an acute angle of 65° and a leg of 5 units, use trigonometry to find the two missing sides. (7 min) E MM

G-SRT.7 | Intro to the Pythagorean Trig Identity
Explore the identity (sinθ)^2+(cosθ)^2=1, which arises from the Pythagorean theorem. (4 min) E MM

G-SRT.7 | Sine & Cosine of Complementary Angles
Explore that the sine of any angle is equal to the cosine of its complementary angle. (4 min) E MM

G-SRT.7 | Using Complementary Angles Solve the following problem: Given that cos(58°)=0.53, find sin(32°). (4 min) E MM

G-SRT.7 | Trig Word Problem: Complementary Angles
Solve a problem about a submerged pyramid using the fact that the sine of an angle is equal to the cosine of its complementary angle. (5 min) E MM

G-SRT.7 | Challenge Problem: Trig Values & Side Ratios
Given a diagram with multiple right triangles and is asked to match different expressions with different trig values. (10 min) E MM

FAC.G.36, FAC.G.37, G-SRT.8 | Right Triangle Word Problem
Solve a modeling problem where he finds the necessary angle to shoot at a vicious alien. (4 min) E MM

FAC.G.36, G-SRT.6 | Finding Reciprocal Trig Ratios
Find all six trigonometric ratios (sine, cosine, tangent, secant, cosecant, and cotangent) of an angle in each right triangle. (5 min) E MM

FAC.G.36, G-SRT.6 | Using Reciprocal Trig Ratios
Given two sides in a right triangle and the cotangent of one of the angles and use this information to find the missing side. (6 min) E MM

Trigonometry | The Unit Circle, Radians, & Trig Identities

F-TF.2 | Unit Circle
Learn how to use the unit circle to define sine, cosine, and tangent for all real numbers. (9 min) E MM

F-TF.2 | The Trig Functions & Right Triangle Trig Ratios
Show how, for acute angles, the two different definitions of the trigonometric values (SOH, CAH, TOA, and the unit circle definition) result in the same values. (7 min) E MM

G-C.5 | Intro to Radians
Explain the definition and motivation for radians and the relationship between radians and degrees. (11 min) E MM

G-C.5 | Radians & Degrees
Discuss the general approach to converting between radians and degrees and vice versa. (7 min) E MM

G-C.5 | Degrees to Radians
Learn to convert from degrees to radians, multiply the number of degrees by π/180. (7 min) E MM

G-C.5 | Radians to Degrees
Learn to change from radians to degrees, you need to multiply the number of radians by 180/π. (3 min) E MM

F-TF.2 | Radian Angles & Quadrants
Determine the quadrant at which a ray falls after a rotation by a certain measure of radians. (4 min) E MM

AIII.F.30, F-TF.3 | Trig Values of π/4
Find the trigonometric values of π/4 using the unit-circle definition. (8 min) E MM

AIII.F.36, F-TF.8 | Proof of the Pythagorean Trig Identity
Prove this identity using the Pythagorean theorem in the unit circle with $x^2+y^2=1$. (6 min) E MM

AIIIF.36, F-TF.8 | Using the Pythagorean Trig Identity
Explore the Pythagorean identity tells us that no matter what the value of θ is, $\sin^2\theta+\cos^2\theta$ is equal to 1. (6 min) E MM

AIII.F.30, F-TF.3 | Cosine, Sine and Tangent of π/6 and π/3
With the unit circle and the Pythagorean theorem, we can find the exact sine, cosine, and tangent of the angles π/6 and π/3. (9 min) E MM

AIII.F.31, F-TF.4 | Sine & Cosine Identities: Symmetry
Find several trigonometric identities for sine and cosine by considering horizontal and vertical symmetries of the unit circle. (8 min) E MM

AIII.F.31, F-TF.4 | Tangent Identities: Symmetry
Find several trigonometric identities for tangent by considering horizontal and vertical symmetries of the unit circle. (7 min) E MM

AIII.F.31, F-TF.4 | Sine & Cosine Identities: Periodicity
Find trigonometric identities for sine and cosine by considering angle rotations on the unit circle. (6 min) E MM

AIII.F.31, F-TF.4 | Tangent Identities: Periodicity
Solve a problem by considering the periodicity of the tangent function. (4 min) E MM

Trigonometry | Features & Graphs of Trigonometric Functions

F-IF.7e | Graph of y=sin(x)
Find the graph of y=sin(x) using the unit-circle definition of sin(x). (9 min) E MM

F-IF.7e | Intersection Points of y=sin(x) and y=cos(x)
Draw the graphs of the sine and the cosine functions and analyze their intersection points. (11 min) E MM

F-IF.7e | Graph of y=tan(x
Draw the graph of the tangent function based on the unit circle definition of the function. (10 min) E MM

F-IF.7e | Features of Sinusoidal Functions Explore the main features of sinusoidal functions: midline, amplitude, & period. (5 min) E MM

AIII.G.39, F-BF.3, F-IF.7e, FA.F.19, FAC.F.26, FAC.F.27 | Amplitude & Period of Sinusoidal Functions from Equation
Find the amplitude and the period of y=-0.5cos(3x). (8 min) E MM

AIII.G.39, F-BF.3, F-IF.7e, FA.F.19, FAC.F.26, FAC.F.27 | Transforming Sinusoidal Graphs: Vertical Stretch & Horizontal Reflection
Graph y=2*sin(-x) by considering it as a vertical stretch and a horizontal reflection of y=sin(x). (13 min) E MM

AIII.G.39, F-BF.3, F-IF.7e, FA.F.19, FAC.F.26, FAC.F.27 | Transforming Sinusoidal Graphs: Vertical & Horizontal Stretches
Graph y=-2.5*cos(1/3*x) by considering it as a vertical stretch and reflection, and a horizontal stretch, of y=cos(x). (11 min) E MM

F-IF.7e | Example: Graphing y=3·sin(½·x)-2
Graph y=3·sin(½·x)-2 by thinking about the graph of y=sin(x) and analyzing how the graph (including the midline, amplitude, and period) changes as we perform function transformations to get from y=sin(x) to y=3·sin(½·x)-2. (4 min) E MM

F-IF.7e | Example: Graphing y=-cos(π·x)+1.5
Graph y=-cos(π·x)+1.5 by thinking about the graph of y=cos(x) and analyzing how the graph (including the midline, amplitude, and period) changes as we perform function transformations to get from y=cos(x) to y=-cos(π·x)+1.5. (3 min) E MM

AIII.F.32, AIII.G.39, F-BF.3, F-TF.5, FAC.F.19, FAC.F.27 | Sinusoidal Function from Graph
Find the equation of a sinusoidal function from its graph where the minimum point (-2,-5) and the maximum point (2,1) are highlighted. (5 min) E MM

A-CED.2, AIII.F.32, F-BF.1a, F-TF.5, FAC.F.17, FAC.F.18 | Interpreting Trigonometric Graphs in Context
When a trigonometric function models a real-world relationship, we can assign meaning to its midline, amplitude and period. (5 min) E MM

A-CED.2, AIII.F.32, F-BF.1a, F-TF.5, FAC.F.17, FAC.F.18 | Trig Word Problem: Modeling Daily Temperature
Solve a word problem about the daily change in temperature by modeling it with a sinusoidal function. (11 min) E MM

A-CED.2, AIII.F.32, F-BF.1a, F-TF.5, FAC.F.17, FAC.F.18 | Trig Word Problem: Modeling Annual Temperature
Solve a word problem about the annual change in temperature by modeling it with a sinusoidal function. (7 min) E MM

A-CED.2, AIII.F.32, F-TF.5, FAC.F.17, FAC.F.18 | Trig Word Problem: Length of Day (Phase Shift)
Solve a word problem about the annual change in the length of day by modeling it with a sinusoidal function that has a phase shift. (8 min) E MM

Trigonometry | Law of Sines & Law of Cosines

AIII.G.43, AIII.G.44, G-SRT.10, G-SRT.11 | Solving for a Side with the Law of Sines
Given a triangle with two angle measures and one side length, find all the missing side lengths and angle measures using the law of sines. (6 min) E MM

AIII.G.43, AIII.G.44, G-SRT.10, G-SRT.11 | Solving for an Angle with the Law of Sines
Given a triangle with two side lengths and one angle measure, find all the missing angle measures using the law of sines. (5 min) E MM

AIII.G.43, G-SRT.10 | Proof of the Law of Sines
Give a simple proof of the law of sines. (6 min) E MM

AIII.G.43, AIII.G.44, G-SRT.10, G-SRT.11 | Solving for a Side with the Law of Cosines
Learn how to use the law of cosines to find the missing side length of a triangle when given two side lengths and the contained angle measure. (5 min) E MM

AIII.G.43, AIII.G.44, G-SRT.10, G-SRT.11 | Solving for an Angle with the Law of Cosines
Given a triangle with all side lengths but no angle measure, find one of the angle measures using the law of cosines. (7 min) E MM

AIII.G.43, G-SRT.10 | Proof of the Law of Cosines
Explore a simple proof of the law of cosines. (9 min) E MM

AIII.G.43, AIII.G.44, G-SRT.10, G-SRT.11 | Trig Word Problem: Stars
Solve a word problem about the distance between stars using the law of cosines. (6 min) E MM

Trigonometry | Inverse Trigonometric Functions

AIII.A.18, AIII.F.28, F-BF.4d | Intro to Arcsine
Explore arcsine, which is the inverse function of sine, and discusses its principal range. (11 min) E MM

AIII.A.18, AIII.F.28, F-BF.4d | Intro to Arctangent
Explore arctangent, which is the inverse function of tangent, and discusses its principal range. (10 min) E MM

AIII.A.18, AIII.F.28, F-BF.4d | Intro to Arccosine
Explore arccosine, which is the inverse function of cosine, and discusses its principal range. (14 min) E MM

AIII.A.18, AIII.F.28, F-BF.4d | Restricting Domains of Functions to Make them Invertible
Given the graph of a trigonometric function and discuss ways in which he can change the function to make it invertible. (6 min) E MM

AIII.A.18, AIII.F.28, F-BF.4d | Domain & Range of Inverse Tangent Function
Find the formula for the inverse function of $g(x)=\tan(x-3\pi/2)+6$, and then determine the domain of that inverse function. (10 min) E MM

AIII.A.18, AIII.F.28, F-BF.4d | Using Inverse Trig Functions with a Calculator
Discuss the appropriate way to use the calculator to find an angle when its tangent value is given. (4 min) E MM

Trigonometry | Sinusoidal Equations

AIII.F.34, F-TF.7 | Solving Sinusoidal Equations of the Form sin(x)=d
Find the expressions that together represent all possible solutions to the equation $\sin(x)=1/3$. (6 min) E MM

AIII.F.34, F-TF.7 | Cosine Equation Algebraic Solution Set
Solve a cosine equation with an infinite number of solutions. (6 min) E MM

AIII.F.34, F-TF.7 | Cosine Equation Solution Set in an Interval
Given the algebraic solution set for a cosine equation, find which solutions fall within an interval. (6 min) E MM

AIII.F.34, F-TF.7 | Sine Equation Algebraic Solution Set
Solve a sine equation with an infinite number of solutions. Use trig identities to represent the whole solution set. (5 min) E MM

AIII.F.34, F-TF.7 | Solving cos(θ)=1 and cos(θ)=-1
Solve the equations cos(θ)=1 and cos(θ)=-1 using the graph of y=cos(θ). (5 min) E MM

Trigonometry | Sinusoidal Models

AIII.F.34, F-TF.7 | Interpreting Solutions of Trigonometric Equations
Starting from a context represented by a trigonometric function, interpret equations based on the function. (4 min) E MM

A-CED.2, AIII.F.32, F-TF.5, FAC.F.17, FAC.F.18 | Trig Word Problem: Modeling Daily Temperature
Solve a word problem about the annual change in temperature by solving a sinusoidal equation. (11 min) E MM

A-CED.2, AIII.F.32, F-TF.5, FAC.F.17, FAC.F.18 | Trig Word Problem: Modeling Annual Temperature
Solve a word problem about the annual change in temperature by solving a sinusoidal equation. (7 min) E MM

A-CED.2, AIII.F.32, F-TF.5, FAC.F.17, FAC.F.18 | Trig Word Problem: Solving for Temperature
Solve a word problem about the annual change in temperature by solving a sinusoidal equation. (8 min) E MM

A-CED.2, AIII.F.32, F-TF.5, FAC.F.17, FAC.F.18 | Trig Word Problem: Length of Day (Phase Shift)
Solve a word problem about the annual change in the length of day by modeling it with a sinusoidal function that has a phase shift. (8 min) E MM

Trigonometry | Angle Addition Identities

AIII.F.35 | Trig Angle Addition Identities
Review 6 related trigonometric angle addition identities: sin(a+b), sin(a-c), cos(a+b), cos(a-b), cos(2a), and sin(2a). (11 min) E MM

AIII.F.35, F-TF.9 | Using the Cosine Angle Addition Identity
Evaluate the cosine of the sum of 60° and another angle whose right triangle is given. (5 min) E MM

AIII.F.35, F-TF.9 | Using the Cosine Double-Angle Identity
The cosine double angle formula tells us that $\cos(2\theta)$ is always equal to $\cos^2\theta-\sin^2\theta$. (4 min) E MM

AIII.F.35, F-TF.9 | Proof of the Sine Angle Addition Identity
Prove the identity sin(x+y) = sin(x)*cos(y) + cos(x)*sin(y). (8 min) E MM

AIII.F.35, F-TF.9 | Proof of the Cosine Angle Addition Identity
Prove the identity cos(x+y) = cos(x)*cos(y) - sin(x)*sin(y). (6 min) E MM

AIII.F.35, F-TF.9 | Proof of the Tangent Angle Sum and Difference Identities
Using the sine and cosine of the sum or difference of two angles, we can prove: tan(x+y)=(tan(x)+tan(y))/(1-tan(x)tan(y)). (7 min) E MM

Trigonometry | Using Trigonometric Identities

AIII.F.35, F-TF.9 | Finding Trig Values Using Angle Addition Identities
Find the value of $\sin(7\pi/12)$ by rewriting it as $\sin(\pi/3+\pi/4)$ and then using the sine angle addition formula. (9 min) E MM

AIII.F.35, F-TF.9 | Using the Tangent Angle Addition Identity
Find the tangent of 13pi/12 without a calculator using the tangent angle addition identity. (7 min) E MM

AIII.F.35, F-TF.9 | Using Trig Angle Addition Identities: Finding Side Lengths
Given a drawing with two triangles and some side lengths, use the sine angle addition identity in order to find a missing side length. (5 min) E MM

AIII.F.35, F-TF.9 | Using Trig Angle Addition Identities: Manipulating Expressions
Given that $\cos(2\theta)=C$, use the cosine double-angle identity to find an expression for $\sin(\theta)$. (6 min) E MM

AIII.F.35, F-TF.9 | Using Trigonometric Identities
Trigonometric identities like $\sin^2\theta+\cos^2\theta=1$ can be used to rewrite expressions in a different, more convenient way. (3 min) E MM

Trigonometry | Challenging Trigonometry Problems

AIII.F.35, F-TF.9 | Trig Challenge Problem: Area of a Triangle
Solve a very complicated geometrical trig problem that appeared as problem 11 in the 2003 AIME II exam. (16 min) E MM

AIII.F.35, F-TF.9 | Trig Challenge Problem: Area of a Hexagon
Solve a very complicated geometrical trig problem that appeared as problem 14 in the 2003 AIME II exam. (18 min) E MM

AIII.F.35, F-TF.9 | Trig Challenge Problem: Cosine of Angle-Sum
Given cos(θ) and cos(φ) and find cos(θ+φ). (7 min) E MM

AIII.F.35, F-TF.9 | Trig Challenge Problem: Arithmetic Progression
Solve a very complicated algebraic trig problem that appeared as problem 29 in the 2010 IIT JEE Paper I exam.
(15 min) E MM

AIII.F.35, F-TF.9 | Trig Challenge Problem: Maximum Value
Solve a very complicated algebraic trig problem that appeared as problem 48 in the 2010 IIT JEE Paper I exam.
(10 min) E MM

AIII.F.35, F-TF.9 | Trig Challenge Problem: Multiple Constraints
Solve a very complicated algebraic trig problem that appeared as problem 47 in the 2010 IIT JEE Paper I exam.
(13 min) E MM

AIII.F.35, F-TF.9 | Trig Challenge Problem: System of Equations
Solve a very complicated algebraic trig problem that appeared as problem 55 in the 2010 IIT JEE Paper I exam.
(11 min) E MM

Statistics & Probability | Mean, Median, & Mode

6.SP.3, 6.SP.4, 6.SP.5c | Statistics Intro: Mean, Median, & Mode
The mean (average) of a data set is found by adding all numbers in the data set and then dividing by the number of values in the set. The median is the middle value when a data set is ordered from least to greatest. The mode is the number that occurs most often in a data set.
(9 min) E MM

6.SP.5c | Mean, Median, & Mode Example
Find the mean, median, and mode in this example. (4 min) E MM

6.SP.4, 6.Sp.5c | Comparing Means of Distributions
Compare the means of two different distributions given as dot plots.
(8 min) E MM

6.SP.4, 6.Sp.5c | Means and Medians of Different Distributions
Compare the mean and median based on a few different distributions. (7 min) E MM

6.SP.3, 6.Sp.5c, 6.SP.5d | Impact on Median & Mean: Removing an Outlier
Explore the mean and median based on a few different distributions. (6 min) E MM

6.SP.3, 6.Sp.5c, 6.SP.5d | Impact on Median & Mean: Increasing an Outlier
Explore the effects of modifying a value in a data set. (4 min) E MM

6.Sp.5c | Missing Value Given the Mean Learn how to find the value of a missing piece of data if you know the mean of the data set. (5 min) E MM

6.SP.5c | Median & Range Puzzlers
Solve an interesting median and range challenge problem. (7 min) E MM

Statistics & Probability | Variance & Standard Deviation of Populations & Samples

S-ID.4 | Measures of Spread: Range, Variance & Standard Deviation
Range, variance, and standard deviation all measure the spread or variability of a data set in different ways. The range is easy to calculate—it's the difference between the largest and smallest data points in a set. Standard deviation is the square root of the variance. Standard deviation is a measure of how spread out the data is from its mean.
(13 min) E MM

S-ID.4 | Variance of a Population
Population variance is a measure of how spread out a group of data points is.
(8 min) E MM

S-ID.4 | Population Standard Deviation
Explore that the population standard deviation is a measure of how much variation there is among individual data points in a population. (8 min) E MM

S-ID.2 | Mean and Standard Deviation Versus Median and IQR
Learn to choose the "preferred" measures of center and spread when outliers are present in a set of data. (8 min) E MM

S-ID.2 | Statistics: Alternate Variance Formulas
Explore how this variance is calculated as $\sigma^2 = (\Sigma (x-\mu)^2) / N$. Another equivalent formula is $\sigma^2 = ((\Sigma x^2) / N) - \mu^2$.
(12 min) E MM

S-ID.2 | Sample Variance
Estimate the variance of a population by looking at the data in a sample.
(11 min) E MM

S-ID.2 | Sample Standard Deviation and Bias
Explore an example of calculating standard deviation and bias. (9 min) E MM

S-ID.2 | Why We Divide by n - 1 in Variance
Explore this visualization providing evidence that dividing by n-1 truly gives an unbiased estimate of population variance.
(5 min) E MM

S-ID.2 | Simulation Showing Bias in Sample Variance
Discover a better understanding of why we divide by (n-1) when calculating the unbiased sample variance. (6 min) E MM

S-ID.2 | Simulation Providing Evidence that (n-1) Gives Us Unbiased Estimate
Explore that dividing by (n-1) gives us an unbiased estimate of population variance.
(5 min) E MM

S-ID.2 | Review and Intuition: Why We Divide by n-1 for the Unbiased Sample Variance
Review the population mean, sample mean, population variance, sample variance and building an intuition for why we divide by n-1 for the unbiased sample variance. (10 min) E MM

Statistics & Probability | Box & Whisker Plots

6.SP.4 | Worked Example: Creating a Box Plot (Odd Number of Data Points)
Learn how to create a box plot. (3 min) E MM

6.SP.4 | Worked Example: Creating a Box Plot (Even Number of Data Points)
Learn how to create a box plot. (3 min) E MM

6.SP.4 | Constructing a Box Plot
Explore this word problem that's perfectly suited for a box and whiskers plot to help analyze data. (8 min) E MM

6.Sp.2, 6.SP.4, 6.SP.5c | Reading Box Plots Discover how box and whisker plots seek to explain data by showing a spread of all the data points in a sample. (3 min) E MM

6.Sp.2, 6.SP.4, 6.SP.5c | Interpreting Box Plots
Learn how to evaluate what we know and what we don't know about a dataset given its box plot. (8 min) E MM

S-ID.1, S-ID.3 | Judging Outliers in a Dataset
Using the inter-quartile range (IQR) to judge outliers in a dataset. (8 min) E MM

Statistics & Probability | Other Measures of Spread

S-ID.2 | Interquartile Range (IQR)
Discover that the IQR describes the middle 50% of values when ordered from lowest to highest. (6 min) E MM

S-ID.2 | Range and Mid-Range
Discover how the midrange is the average of the largest and smallest data points. (2 min) E MM

S-ID.2 | Mean Absolute Deviation (MAD)
Discover mean absolute deviation (MAD) of a data set is the average distance between each data value and the mean. (9 min) E MM

S-ID.2 | Mean Absolute Deviation Example
Find he mean absolute deviation of a data set that's given in a bar chart. (6 min) E MM

Statistics & Probability | Modeling Data Distributions

S-ID.4 | Calculating Percentile
Learn how to calculate the percentile rank for a given data point. (4 min) E MM

S-ID.4 | Analyzing a Cumulative Relative Frequency Graph
Learn how to calculate the percentile rank for a given data point. (6 min) E MM

S-ID.4 | Normal Distribution Problem: Z-Scores
Explore Z-score practice. (8 min) E MM

S-ID.4 | Comparing with Z-Scores
Use standardized scores—also called z-scores— to compare data points from different distributions. (4 min) E MM

S-ID.4 | How Parameters Change as Data is Shifted and Scaled
See how transforming a data set by adding, subtracting, multiplying, or dividing a constant affects measures of center and spread. (7 min) E MM

S-ID.4 | Density Curves
Explore this introduction to density curves for visualizing distributions. (10 min) E MM

S-ID.4 | Median, Mean and Skew from Density Curves
Analyze how median, mean, left skew, and right skew effects density curves. (6 min) E MM

S-ID.4 | Density Curve Worked Example
Analyze skew, median, mean and height of a density curve. (4 min) E MM

S-ID.4 | Worked Example Finding Area Under Density Curves
Explore this example finding area under density curves. (5 min) E MM

S-ID.4 | Qualitative Sense of Normal Distributions
Explore how "normal" a distribution might be. (11 min) E MM

S-ID.4 | Normal Distribution Problems: Empirical Rule
Explore the empirical rule (also called the "68-95-99.7 rule") is a guideline for how data is distributed in a normal distribution. (11 min) E MM

S-ID.4 | Standard Normal Distribution and the Empirical Rule
Use the empirical rule with a standard normal distribution. (8 min) E MM

S-ID.4 | More Empirical Rule and Z-Score Practice
Explore the empirical rule and z-score practice. (6 min) E MM

S-ID.4 | Standard Normal Table for Proportion Below
Finding the proportion of a normal distribution that is below a value by calculating a z-score and using a z-table. (4 min) E MM

S-ID.4 | Standard Normal Table for Proportion Above
Finding the proportion of a normal distribution that is above a value by calculating a z-score and using a z-table. (5 min) E MM

S-ID.4 | Standard Normal Table for Proportion Between Values
Finding the proportion of a normal distribution that is between two values by calculating z-scores and using a z-table. (7 min) E MM

S-ID.4 | Finding Z-Score for a Percentile
Given a particular normal distribution with some mean and standard deviation, use that z-score to find the actual cutoff for that percentile. (4 min) E MM

S-ID.4 | Threshold for Low Percentile
Find the cutoff for a given lower percentile in a normal distribution. (6 min) E MM

S-ID.4 | Deep Definition of the Normal Distribution
Explore how normal distribution to explore the parent function that generates normal distributions, and how to modify parameters in the function to produce a normal distribution with any given mean and standard deviation. (26 min) E MM

S-ID.4 | Normal Distribution Excel Exercise
Show that the normal distribution approximates the binomial distribution for many. (26 min) E MM

Statistics & Probability | Study Design

6.SP.1 | Statistical Questions
Explore what makes a question a "statistical question." (9 min) E MM

6.SP.1 | Statistical and Non-Statistical Questions
Learn that a statistical question is one that can be answered by collecting data and where there will be variability in that data. (8 min) E MM

7.SP.1, 7.SP.2 | Reasonable Samples
To make a valid conclusion, you'll need a representative, not skewed, sample. (4 min) E MM

S-IC.1 FAC.S.45, S-IC.6, S-ID.9 | Identifying a Sample and Population
Learn to identify a sample and population. (2 min) E MM

S-IC.1 FAC.S.45, S-IC.6, S-ID.9 | Examples of Bias in Surveys
Explore examples of bias in surveys. (6 min) E MM

S-IC.1 FAC.S.45, S-IC.6, S-ID.9 | Example of Undercoverage Introducing Bias
Given the description of a study, we can think about potential sources of bias, and how they may have impacted the results of the study. (4 min) E MM

FAC.S.45, S-IC.6, S-ID.9 | Correlation and Causality
Understand why correlation does not imply causality (even though many in the press and some researchers often imply otherwise). (11 min) E MM

S-IC.3 | Picking Fairly
Determine if a few different methods of a magician choosing a volunteer are fair. (7 min) E MM

S-IC.3 | Techniques for Generating a Simple Random Sample
Explore techniques for generating a simple random sample. (6 min) E MM

S-IC.3 | Techniques for Random Sampling and Avoiding Bias
Explore techniques for random sampling and avoiding bias. (9 min) E MM

S-IC.3 | Types of Statistical Studies
Explore these different types of statistical studies. (11 min) E MM

S-IC.3 | Worked Example Identifying Experiment
Explore this example identifying experiment. (5 min) E MM

S-IC.3 | Worked Example Identifying Observational Study
Explore this example identifying observational study. (7 min) E MM

S-IC.3 | Worked Example Identifying Sample Study
Explore this example identifying sample study. (3 min) E MM

S-IC.3 | Appropriate Statistical Study Example
Determine if a statistical study was a sample study, an experiment, or an observational study. (6 min) E MM

S-IC.3 | Introduction to Experiment Design
Explore experiment design, explanatory and response variables, control and treatment groups. (11 min) E MM

S-IC.3 | Matched Pairs Experiment Design
Explore matched pairs experiment design. (6 min) E MM

Statistics & Probability | Basic Theoretical Probability

7.SP.7a | Intro to Theoretical Probability
Explore probability through the example of flipping a quarter and rolling a die. (8 min) E MM

7.SP.7a | Simple Probability: Yellow Marble
Determine the number of possible outcomes, and then how many of them meet our constraints. (3 min) E MM

7.SP.7a | Simple Probability: Non-Blue Marble
Figure out the probability of randomly picking a non-blue marble from a bag. (10 min) E MM

7.SP.6 | Intuitive Sense of Probabilities
Explore what probabilities really mean. (9 min) E MM

7.SP.6 | The Monty Hall Problem
Analyze the famous thought experiment: the "Monty Hall" problem. (8 min) E MM

Statistics & Probability | Probability Using Sample Spaces

7.SP.8a, 7.SP.8b | Probability with Counting Outcomes
Explore the probability of getting exactly 2 heads when flipping three coins. (2 min) E MM

7.SP.8a, 7.SP.8b | Example: All the Ways You Can Flip a Coin
Explore manually going through the combinatorics to determine the probability of an event occurring. (2 min) E MM

7.SP.8a, 7.SP.8b | Die Rolling Probability Explore the probability of rolling doubles on a pair of dice and grid out the possible outcomes. (5 min) E MM

7.SP.8a, 7.SP.8b | Subsets of Sample Spaces
Solve an example about subsets. (6 min) E MM

Statistics & Probability | Basic Set Operations

7.SP.6, 7.SP.7a | Intersection and Union of Sets
Learn to find the intersection and union of sets. (8 min) E MM

7.SP.6, 7.SP.7a | Relative Complement or Difference Between Sets
Show an example finding the relative complement or difference of two sets A and B. (6 min) E MM

7.SP.6, 7.SP.7a | Universal Set and Absolute Complement
Explore the universal set and absolute complement. (6 min) E MM

7.SP.6, 7.SP.7a | Subset, Strict Subset, and Superset
A subset of a set A is any set B such that every element of B is also an element of A. A strict subset is a subset that isn't equal to the original set (i.e. B must have at least one fewer element than A). A superset of A is any set C such that A is a subset of C. (4 min) E MM

7.SP.6, 7.SP.7a | Bringing the Set Operations Together
Summarize the set operations that he has discussed in the previous videos. (7 min) E MM

Statistics & Probability | Probability, Randomness, & Simulation

7.SP.6 | Experimental Probability
Explore reasonable estimates of the likelihood of future events. (7 min) E MM

7.SP.6, 7.SP.7a | Theoretical and Experimental Probabilities
Compare expected probabilities to what really happens when we run experiments. (7 min) E MM

7.SP.6, 7.SP.7a | Making Predictions with Probability
Predict the number of times a spinner will land on an elephant. (5 min) E MM

S-IC.2 | Experimental Versus Theoretical Probability Simulation
Explore experimental versus theoretical probability simulation. (5 min) E MM

S-IC.4 | Random Number List to Run Experiment
Use a list of random numbers to simulate multiple trials of an experiment. (8 min) E MM

S-IC.5 | Random Numbers for Experimental Probability
Use a list of random number to calculate an experimental probability. (8 min) E MM

S-IC.5 | Statistical Significance of Experiment
Determine if the results of an experiment about advertising are statistically significant. (8 min) E MM

Statistics & Probability | Addition Rule for Probability

S-CP.1, S-CP.7 | Probability with Venn Diagrams
Use a Venn diagram to illustrate the concept of overlapping events and how to calculate the combined probability. (10 min) E MM

S-CP.1, S-CP.7 | Addition Rule for Probability Explore Venn diagrams and the addition rule for probability. (11 min) E MM

7.SP.8b | Addition and Multiplication Rule for Probability
Explore the notion of a "sample space". See a sample space represented as a tree diagram, table, and list. (10 min) E MM

Statistics & Probability | Multiplication Rule for Independent Events

S-CP.1, S-CP.2 | Sample Spaces for Compound Events
Learn how to calculate probabilities of coin flips using two methods: listing all possible outcomes or multiplying independent events. (9 min) E MM

S-CP.1, S-CP.2 | Compound Probability of Independent Events
Learn how to calculate probabilities of coin flips using two methods: listing all possible outcomes or multiplying independent events. (6 min) E MM

7.SP.8a, 7.SP.8b | Probability of a Compound Event
Learn how to use sample space diagrams to find probabilities. (5 min) E MM

S-CP.1, S-CP.2 | "At Least One" Probability with Coin Flipping
Explore the probability of getting at least one head in multiple flips of a fair coin. (9 min) E MM

S-CP.1, S-CP.2 | Free-Throw Probability
Determine the probability of making 10 free throws in a row. (7 min) E MM

S-CP.1, S-CP.2 | Three-Pointer vs. Free-Throw Probability
Determine if there's a high probability of making three free throws in a row or one three-pointer. (6 min) E MM

S-CP.1, S-CP.2 | Probability without Equally Likely Events
Explore probabilities surrounding only equally likely events. (9 min) E MM

S-CP.1, S-CP.2 | Independent Events Example: Test Taking
Consider the probability of two independent events occurring. (5 min) E MM

S-CP.1, S-CP.2 | Die Rolling Probability with Independent Events
Figure out the probability in this problem. (3 min) E MM

Statistics & Probability | Multiplication Rule for Dependent Events

S-CP.8 | Dependent Probability Introduction
Explore dependent probability using a scenario involving a casino game. (7 min) E MM

S-CP.8 | Dependent Probability: Coins
How the probability of an event can be dependent on another event occurring in this example problem. (9 min) E MM

S-CP.8 | Dependent Probability Example
Practice these probability problems as they get more complex eventually. (7 min) E MM

S-CP.8 | Independent & Dependent Probability
Identify whether the problem is independent or dependent. (3 min) E MM

S-CP.8 | Dependent Probability
Find dependent probabilities like P(A | B) using an example rolling dice. (10 min) E MM

Statistics & Probability | Conditional Probability & Independence

S-CP.4, S-CP.6 | Calculating Conditional Probability
Explore how Conditional probabilities are written like P(A|B), which can be read to mean, "the probability that A happens GIVEN b has happened." (7 min) E MM

S-CP.4, S-CP.6 | Conditional Probability Explained Visually
Visualize how to do conditional probability. (5 min) E MM

S-CP.4, S-CP.6 | Conditional Probability Tree Diagram Example
Use a tree diagram to work out a conditional probability question. (11 min) E MM

S-CP.4, S-CP.6 | Conditional Probability and Independence
Use conditional probability to see if events are independent or not. (4 min) E MM

S-CP.4, S-CP.6 | Analyzing Event Probability for Independence
Use an example about shirts, scarves, hats, and pants to explain how to use probabilities to figure out if two events are independent. (7 min) E MM

Statistics & Probability | Counting Principal, Factorial, & Permutations

7.SP.8b | Count Outcomes Using Tree Diagram
Use tree diagrams to find the number of possible outcomes and calculate the probability of possible outcomes. (5 min) E MM

7.SP.8b | Counting Outcomes: Flower Pots
Find the number of ways you can put four types of flowers into three types of pots. (3 min) E MM

S-CP.9 | Permutation Formula
Learn about the permutation formula by solving seating arrangement problems with factorial notation and a general formula. (8 min) E MM

S-CP.9 | Zero Factorial or 0!
Learn how Factorials are a quick way to represent multiplying a number by all the smaller positive integers down to one. (5 min) E MM

S-CP.9 | Factorial and Counting Seat Arrangements
Learn how to use permutations to solve problems involving ways to arrange things. (6 min) E MM

S-CP.9 | Possible Three Letter Words
Explain how to find all the possible three letter words when we can use each letter as many times as we want, and when each letter can only be used once. (6 min) E MM

S-CP.9 | Ways to Arrange Colors
Explore about how many ways you can pick four colors from a group of 6. (4 min) E MM

S-CP.9 | Ways to Pick Officers
Explore how many ways you can pick an officer. (2 min) E MM

Statistics & Probability | Combinations & Probability

S-CP.9 | Intro to Combinations
Learn the difference between permutations and combinations, using the example of seating six people in three chairs. (7 min) E MM

S-CP.9 | Combination Formula
Learn the difference between permutations and combinations, and how to calculate them using factorials. (11 min) E MM

S-CP.9 | Handshaking Combinations
Figure out how different combinations of people can shake hands. (7 min) E MM

S-CP.9 | Combination Example: 9 Card Hands
Explore how many ways we can construct a hand of 9 cards. (8 min) E MM

S-CP.9 | Probability using Combinations (Part 1)
Explore the Probability of getting exactly 3 heads in 8 flips of a fair coin. (9 min) E MM

S-CP.9 | Probability using Combinations (Part 2)
Explore the Probability of getting exactly 3 heads in 8 flips of a fair coin. (11 min) E MM

S-CP.9 | Example: Different Ways to Pick Officers
Explore the different ways we can pick officers in order to find the probability of one situation in particular. (3 min) E MM

S-CP.9 | Example: Combinatorics and Probability
Explore the Probability of getting a set of cards. (12 min) E MM

S-CP.9 | Getting Exactly Two Heads (Combinatorics)
Explore a different way to think about the probability of getting 2 heads in 4 flips. (10 min) E MM

S-CP.9 | Exactly Three Heads in Five Flips
Discover the Probability of exactly 3 heads in 5 flips using combinations. (7 min) E MM

S-CP.9 | Generalizing with Binomial Coefficients (Advanced)
Conceptual understanding of where the formula for binomial coefficients come from. (12 min) E MM

S-CP.9 | Example: Lottery Probability
Explore the the probability of winning a 4-number lottery. (5 min) E MM

S-CP.9 | Conditional Probability and Combinations
Find the probability that a coin is flipped 4 heads out of 6 tosses. (17 min) E MM

S-CP.9 | Mega Millions Jackpot Probability
Explore the probability of winning the Mega Millions jackpot. (6 min) E MM

S-CP.9 | Birthday Probability Problem
Explore the probability that at least 2 people in a room of 30 share the same birthday. (13 min) E MM

Statistics & Probability | Random Variables: Discrete vs. Continuous

S-MD.1 | Random Variables
Discover the Basic idea and definitions of random variables. (6 min) E MM

S-MD.1 | Discrete and Continuous Random Variables
Discrete random variables can only take on a finite number of values. Continuous random variables, on the other hand, can take on any value in each interval. (12 min) E MM

S-MD.1 | Constructing a Probability
Distribution for Random Variable
Learn how to create the probability distribution of the number of "heads" after 3 flips of a fair coin. (7 min) E MM

S-MD.1 | Probability Models Example: Frozen Yogurt
Model the probability of a frozen yogurt line having 0, 1, or 2 people in it. (8 min) E MM

S-MD.1 | Valid Discrete Probability Distribution Examples
Explore examples on identifying valid discrete probability distributions. (4 min) E MM

S-MD.1 | Probability with Discrete Random Variable Example
Explore example analyzing discrete probability distribution. (4 min) E MM

S-MD.2 | Mean (Expected Value) of a Discrete Random Variable
Learn to calculate the mean (or expected value) of a discrete random variable as the weighted average of all the outcomes of that random variable based on their probabilities. (4 min) E MM

S-MD.2 | Variance and Standard Deviation of a Discrete Random Variable
Find the variance and standard deviation of a discrete random variable. (6 min) E MM

S-MD.2 | Probability Density Functions
Explore Probability density functions for continuous random variables. (10 min) E MM

S-MD.2 | Probabilities from Density Curves
Explore Examples finding probabilities from probability distributions for continuous random variables. (5 min) E MM

Statistics & Probability | Transforming & Combining Random Variables

S-MD.3, S-MD.4 | Impact of Transforming (Scaling and Shifting) Random Variables
Linear transformations (addition and multiplication of a constant) and their impacts on center (mean) and spread (standard deviation) of a distribution. (7 min) E MM

S-MD.3, S-MD.4 | Example: Transforming a Discrete Random Variable
Explore an example of transforming a discrete random variable. (4 min) E MM

S-MD.3, S-MD.4 | Mean of Sum and Difference of Random Variables
Discover the Mean of sum and difference of random variables. (4 min) E MM

S-MD.3, S-MD.4 | Variance of Sum and Difference of Random Variables
Intuition for why the variance of both the sum and difference of two independent random variables is equal to the sum of their variances. (8 min) E MM

S-MD.3, S-MD.4 | Intuition for Why Independence Matters for Variance of Sum
Intuition for why independence matters for variance of sum. (5 min) E MM

S-MD.3, S-MD.4 | Deriving the Variance of the Difference of Random Variables
Derive the variance of the difference of random variables. (11 min) E MM

S-MD.3, S-MD.4 | Example: Analyzing Distribution of Sum of Two Normally Distributed Random Variables
Find the probability that the total of some random variables exceeds an amount by understanding the distribution of the sum of normally distributed variables. (6 min) E MM

S-MD.3, S-MD.4 | Example: Analyzing the Difference in Distributions
Find the probability that a randomly selected woman is taller than a randomly selected man by understanding the distribution of the difference of normally distributed variables. (10 min) E MM

Statistics & Probability | Binomial Random Variables

S-MD.5, S-MD.7 | Binomial Variables
Explore a special class of random variables called binomial random variables. (8 min) E MM

S-MD.5, S-MD.7 | Recognizing Binomial Variables
Explore examples and counterexamples of binomial variables. (7 min) E MM

S-MD.5, S-MD.7 | 10% Rule of Assuming "Independence" Between Trials
Discover the 10% rule of assuming "independence" between trials. (7 min) E MM

S-MD.5, S-MD.7 | Binomial Distribution
Learn about binomial distribution with an example. (12 min) E MM

S-MD.5, S-MD.7 | Visualizing a Binomial Distribution
Graph a binomial distribution and connects it back to how to calculate binomial probabilities. (10 min) E MM

S-MD.5, S-MD.7 | Binomial Probability Example
Use the binomial distribution to find the probability of getting a certain number of successes, like successful basketball shots, out of a fixed number of trials. (10 min) E MM

S-MD.5, S-MD.7 | Generalizing K Scores in N Attempts
Generalize 2 scores in 6 attempts to k scores in n attempts. (4 min) E MM

S-MD.5, S-MD.7 | Free Throw Binomial Probability Distribution
Use the binomial distribution to calculate the probability of making different number of free throws. (9 min) E MM

S-MD.5, S-MD.7 | Graphing Basketball Binomial Distribution
Graph the results of using the binomial distribution to find the probabilities of making different numbers of free throws. (5 min) E MM

S-MD.5, S-MD.7 | Binompdf and Binomcdf Functions
Explore how to use a TI-84 (very similar for TI-85 or TI-89) calculator for making calculations regarding binomial random variables. (6 min) E MM

S-MD.5, S-MD.7 | Mean and Variance of Bernoulli Distribution Example
Calculate the mean and variance of a Bernoulli distribution (in this example the responses are either favorable or unfavorable). (9 min) E MM

S-MD.5, S-MD.7 | Bernoulli Distribution Mean and Variance Formulas
Learn to derive the mean and variance formulas for the Bernoulli distribution. (7 min) E MM

S-MD.5, S-MD.7 | Expected Value of a Binomial Variable
Explore how to derive and use the expected value (mean) formula for binomial random variables. (7 min) E MM

S-MD.5, S-MD.7 | Variance of a Binomial Variable
Derive the variance of a binomial variable to be p(1-p), and the standard deviation is the square root of the variance. (7 min) E MM

S-MD.5, S-MD.7 | Finding the Mean and Standard Deviation of a Binomial Random Variable
For a binomial random variable, the mean is n times p (np), where n is the sample size and p is the probability of success. The standard deviation is the square root of np(1-p). We can use them to make predictions in a binomial setting. (5 min) E MM

Statistics & Probability | Geometric Random Variables & Expected Value

G-GMD.2, G-GPE.3 | Geometric Random Variables Introduction
Distinguishing between geometric and binomial random variables. (7 min) E MM

G-GMD.2, G-GPE.3 | Probability for a Geometric Random Variable
Find the probability for a single outcome of a geometric random variable. (3 min) E MM

G-GMD.2, G-GPE.3 | Cumulative Geometric Probability (Greater than a Value)
Find the probability for a geometric random variable being greater than a certain value. (6 min) E MM

G-GMD.2, G-GPE.3 | Cumulative Geometric Probability (Less than a Value)
Find the probability for a geometric random variable being less than a certain value. (4 min) E MM

G-GMD.2, G-GPE.3 | Calculator Functions: Geometpdf and Geometcdf
Use a TI-84 (very similar for TI-85 or TI-89) calculator for making calculations regarding geometric random variables. (6 min) E MM

G-GMD.2, G-GPE.3 | Proof of Expected Value of Geometric Random Variable
Explore the Proof of expected value of geometric random variable. (4 min) E MM

G-GMD.2, G-GPE.3 | | Getting Data from Expected Value
Explore how expected value refers to the average outcome you would expect from repeating an experiment over and over. (10 min) E MM

G-GMD.2, G-GPE.3 | Expected Profit from Lottery Ticket
Multiply the outcomes by probabilities to find the expected value of a lottery ticket. (9 min) E MM

G-GMD.2, G-GPE.3 | Expected Value while Fishing
Explore example where he multiplies probability by values and sums to find expected value. (9 min) E MM

G-GMD.2, G-GPE.3 | Comparing Insurance with Expected Value
Use expected value to compare a couple of different insurance policies. (9 min) E MM

G-GMD.2, G-GPE.3 | Law of Large Numbers
Explore the magic behind the law of large numbers. (9 min) E MM

Statistics & Probability | (Advanced) Poisson Distribution

S-MD.1 | Introduction to Poisson Distribution
Explore the Poisson Processes and the Poisson Distribution. (16 min) E MM

S-MD.1 | Poisson Process (Part 1)
Explore the Poisson Processes and the Poisson Distribution more in-depth. (11 min) E MM

S-MD.1 | Poisson Process (Part 2)
Explore the Poisson Processes and the Poisson Distribution more in-depth. (13 min) E MM

Statistics & Probability | Sampling Distributions

S-MD.2 | Introduction to Sampling Distributions
Learn about sampling distributions. (7 min) E MM

S-MD.2 | Sample Statistic Bias Worked Example
Determine bias of sample statistics based on approximate sampling distributions example. (3 min) E MM

S-MD.2 | Sampling Distribution of Sample Proportion (Part 1)
Explore the formulas for the mean and standard deviation of a sampling distribution of sample proportions. (10 min) E MM

S-MD.2 | Sampling Distribution of Sample Proportion (Part 2)
Learn to build intuition for the sampling distribution of sample proportions using a simulation. (5 min) E MM

S-MD.2 | Normal Conditions for Sampling
Distributions of Sample Proportions
Explore conditions for roughly normal sampling distribution of sample proportions. (6 min) E MM

S-MD.2 | Probability of Sample Proportions Example
Explore this probability of sample proportions example. (7 min) E MM

S-MD.2 | Inferring Population Mean from Sample Mean
Discover how to infer things about the greater population mean from a sample mean. (10 min) E MM

S-MD.2, S-MD.3 | Central Limit Theorem
Explore the central limit theorem and the sampling distribution of the mean. (10 min) E MM

S-MD.2, S-MD.3 | Sampling Distribution of the Sample Mean (Part 1)
Explore the main idea of the central limit theorem — the sampling distribution of the sample mean is approximately normal for "large" samples. (11 min) E MM

S-MD.2, S-MD.3 | Sampling Distribution of the Sample Mean (Part 2)
Examine the central limit theorem and the sampling distribution of the sample mean. (13 min) E MM

S-MD.2, S-MD.3 | Standard Error of the Mean
Explore what the standard error of the mean measures. (15 min) E MM

S-MD.2, S-MD.3 | Example: Probability of Sample Mean Exceeding a Value
Estimate the probability that the sample mean exceeds a given value in the sampling distribution of the sample mean. (15 min) E MM

Statistics & Probability | Confidence Intervals: Population Proportion

S-IC.4 | Confidence Intervals and Margin of Error
Use what we know about sampling distributions and margin of error to build a confidence interval to estimate the true value of the percentage in the population. (12 min) E MM

S-IC.4 | Confidence Interval Simulation
Explore confidence interval simulation. (5 min) E MM

S-IC.4 | Interpreting Confidence Level Example
Explore how to Interpret confidence level example. (5 min) E MM

S-IC.4 | Confidence Interval Example
Calculate a 99% confidence interval for the proportion of teachers who felt computers are an essential tool. (19 min) E MM

S-IC.4 | Margin of Error (Part 1)
Find the 95% confidence interval for the proportion of a population voting for a candidate. (16 min) E MM

S-IC.4 | Margin of Error (Part 2)
Find the 95% confidence interval for the proportion of a population voting for a candidate. (10 min) E MM

S-CP.5 | Conditions for Valid Confidence Intervals for a Proportion
Discover the conditions to satisfy the random, normal, and independent conditions for these confidence intervals to be valid. (7 min) E MM

S-CP.5 | Conditions for Confidence Interval for a Proportion Worked Examples
Discover the conditions for confidence intervals for a population proportion worked examples--random condition, independence condition and normal condition. (5 min) E MM

S-CP.5 | Critical Value (z*) for a Given Confidence Level
Learn to calculate a critical value z* for any given confidence level using normal distribution calculations. (6 min) E MM

S-CP.5 | Example Constructing and Interpreting a Confidence Interval for P
Learn to check conditions, calculate, and interpret a confidence interval to estimate a population proportion. (7 min) E MM

S-CP.5 | Determining Sample Size Based on Confidence and Margin of Error
Determine sample size based on confidence level and margin of error. (8 min) E MM

Statistics & Probability | Confidence Intervals: Population Mean

S-IC.4 | Introduction to T Statistics
Discover why we use t statistics. (5 min) E MM

S-IC.4 | Simulation Showing Value of T Statistic
Explore why we use t statistics when building confidence intervals for a mean using the sample standard deviation in place of the population standard deviation. (3 min) E MM

S-IC.5 | Conditions for Valid T Intervals
Explore example showing how to determine if the conditions have been met for making a t interval to estimate a mean. (5 min) E MM

S-IC.5 | Example Finding Critical T Value
Given a confidence level, we can calculate a critical value (t*) in a t-distribution with n-1 degrees of freedom. (4 min) E MM

S-IC.5 | Example Constructing a T Interval for a Mean
Explore example showing how to calculate a one-sample t interval for a mean. (6 min) E MM

S-IC.5 | Confidence Interval for a Mean with Paired Data
Explore Confidence interval for a mean difference with paired data. (10 min) E MM

S-IC.5 | Sample Size for a Given Margin of Error for a Mean
Calculate the approximate sample size required to obtain a desired margin of error in a confidence interval for a mean. (8 min) E MM

S-IC.5 | T-Statistic Confidence Interval
Compute a confidence interval for the emission from an engine with a new design. (12 min) E MM

S-IC.5 | Small Sample Size Confidence Intervals
Construct small sample size confidence intervals using t-distributions. (11 min) E MM

Statistics & Probability | The Idea of Significance Tests

Simple Hypothesis Testing
Explore an example about who should do the dishes that gets at the idea behind hypothesis testing. (6 min) E MM

Idea Behind Hypothesis Testing
Discover the idea behind hypothesis testing. (8 min) E MM

VAR-6.D, VAR-7.C | Examples of Null and Alternative Hypotheses
Explore examples of how the null hypothesis and alternative hypothesis are used. (6 min) E MM

DAT-3.E, DAT-3.F, VAR-7.C | P-Values and Significance Tests
Compare a P-value to a significance level to make a conclusion in a significance test. (8 min) E MM

DAT-3.A, DAT-3.B | Comparing P-Values to Different Significance Levels
Explore examples comparing P-values to different significance levels, and why it's important to set the significance level before a test. (5 min) E MM

DAT-3.A, DAT-3.B | Estimating a P-Value from a Simulation
Solve this example of estimating a P-value based on a simulation to approximate a sampling distribution assuming the null hypothesis is true. (5 min) E MM

Statistics & Probability | Error Probabilities & Power

UNC-5.A | Introduction to Type I and Type II Errors
Learn how both type 1 and type 2 errors are mistakes made when testing a hypothesis. (5 min) E MM

UNC-5.A | Type 1 Errors
Discover that a Type 1 error occurs when the null hypothesis is true, but we reject it because of a usual sample result. (3 min) E MM

UNC-5.A | Examples Identifying Type I and Type II Errors
Explore these examples identifying Type I and Type II errors. (6 min) E MM

UNC-5.B | Introduction to Power in Significance Tests
Explore the power in significance tests. (10 min) E MM

UNC-5.C | Examples Thinking About Power in Significance Tests
Explore these examples thinking about power in significance tests. (4 min) E MM

Statistics & Probability | Tests About a Population Proportion

VAR-6.D | Constructing Hypotheses for a Significance Test About a Proportion
Explore how to construct a hypothesis for a significance test about a proportion. (4 min) E MM

VAR-6.F | Conditions for a Z Test About a Proportion
Explore how to check whether the conditions have been met for doing a z test about a proportion. (5 min) E MM

VAR-6.G | Calculating a Z Statistic in a Test About a Proportion
Explore how to calculate a z statistic in a one-sample z test about a proportion. (5 min) E MM

DAT-3.A, VAR-6.G | Calculating a P-Value Given a Z Statistic
Calculate a test statistic based on our sample results. (5 min) E MM

DAT-3.B | Making Conclusions in a Test About a Proportion
Explore this example of how to make a conclusion in a test about a proportion. (5 min) E MM

Statistics & Probability | Tests About a Population Mean

VAR-7.C | Writing Hypotheses for a Significance Test About a Mean
Explore this example of constructing hypotheses for a test about a mean. (3 min) E MM

VAR-7.D | Conditions for a T Test About a Mean
Explore examples showing how to check which conditions have been met for a t test about a mean. (6 min) E MM

VAR-7.E | When to Use Z or T Statistics in Significance Tests
Discover when to use z or t statistics in significance tests. (5 min) E MM

VAR-7.E | Example Calculating T Statistic for a Test About a Mean
Explore an example of how to calculate t statistic for test about a mean. (5 min) E MM

VAR-7.E | Using TI Calculator for P-Value from T Statistic
Calculate a test statistic based on our sample results. (3 min) E MM

VAR-7.E | Using a Table to Estimate P-Value from T Statistic
Use a table to estimate the p-value based on that test statistic using a t distribution with n-1 degrees of freedom. (4 min) E MM

DAT-3.E, DAT-3.F | Comparing P-Value from T Statistic to Significance Level
Explore this example showing how to compare the P-value to a significance level to make a conclusion in a t test. (4 min) E MM

Statistics & Probability | More on Significance Testing

Hypothesis Testing and P-Values
Explore an example about a neurologist testing the effect of a drug to discuss hypothesis testing and p-value. (11 min) E MM

One-Tailed and Two-Tailed Tests
Discover the effect of a drug to one-tailed and two-tailed hypothesis tests. (7 min) E MM

Z-Statistics vs. T-Statistics
Discover the difference between Z-statistics and T-statistics. (7 min) E MM

Small Sample Hypothesis Test
Explore an example of a hypothesis test where we determine if there is sufficient evidence to conclude that a new type of engine meets emission requirements. (9 min) E MM

Large Sample Proportion Hypothesis Testing
Use a large sample to test if more than 30% of US households have internet access. (15 min) E MM

Statistics & Probability | Two-Sample Inference for the Difference Between Groups

Comparing Population Proportions (Part 1)
Use an election example to compare population proportions. (11 min) E MM

Comparing Population Proportions (Part 2)
Use an election example to compare population proportions. (10 min) E MM

Hypothesis Test Comparing Population Proportions
Use election results to run a hypothesis test comparing population proportions. (17 min) E MM

S-IC.5 | Statistical Significance of Experiment
Determine if the results of an experiment about advertising are statistically significant. (9 min) E MM

S-IC.5 | Statistical Significance on Bus Speeds
Determine if the results of an experiment about bus speeds are statistically significant. (11 min) E MM

Difference of Sample Means Distribution
Explore the difference of sample means distribution. (12 min) E MM

Confidence Interval of Difference of Means
Use a confidence interval to help figure out if a low-fat diet helps obese people lose weight. (16 min) E MM

Clarification of Confidence Interval of Difference of Means
Discover what clarification of confidence interval of difference of means covers. (3 min) E MM

Hypothesis Test for Difference of Means
Explore what the Hypothesis Test for Difference of Means is. (10 min) E MM

Statistics & Probability | Inference for Categorical Data (Chi-Square Tests)

Chi-Square Distribution Introduction
Explore what chi-square distribution is. (11 min) E MM

DAT-3.J, VAR-1.J, VAR-8.B, VAR-8.C, VAR-8.D, VAR-8.E, VAR-8.F, VAR-8.G | Pearson's Chi Square Test (Goodness of Fit)
Use the chi square test to the hypothesis that the owner's distribution is correct. (12 min) E MM

DAT-3.I, DAT-3.J, VAR-1.J, VAR-8.A, VAR-8.B, VAR-8.C, VAR-8.D, VAR-8.F, VAR-8.G | Chi-Square Statistic for Hypothesis Testing
Explore the chi-square statistic for hypothesis testing (chi-square goodness-of-fit test). (9 min) E MM

DAT-3.J, VAR-1.J, VAR-8.B, VAR-8.C, VAR-8.D, VAR-8.E, VAR-8.F, VAR-8.G | Chi-Square Goodness-of-Fit Example
Solve this chi-square goodness-of-fit example. (7 min) E MM

Filling out Frequency Table for Independent Events
Given the row and column totals, fill in the cells of a frequency table so that the events are independent. (5 min) E MM

Contingency Table Chi-Square Test
Use the contingency table chi-square test to see if a couple of different herbs prevent people from getting sick. (17 min) E MM

DAT-3.L, VAR-8.H, VAR-8.I, VAR-8.J, VAR-8.K, VAR-8.L | Introduction to the Chi-Square Test for Homogeneity
Discover the chi-square test for homogeneity. (8 min) E MM

DAT-3.K, DAT-3.L, VAR-8.H, VAR-8.I, VAR-8.J, VAR-8.K, VAR-8.L, VAR-8.M | Chi-Square Test for Association (Independence)
Explore the Chi-square test for association/independence. (11 min) E MM

Statistics & Probability | Advanced Regression (Inference & Transforming)

UNC-4.AC, UNC-4.AC.3, UNC-4.AF, UNC-4.AF.1, UNC-4.AF.2, VAR-1.K | Introduction to Inference About Slope in Linear Regression
Explore sample slopes and use them to make confidence intervals or do a test about the population slope in least-squares regression. (7 min) E MM

UNC-4.AD, UNC-4.AD.1, VAR-7.L | Conditions for Inference on Slope
Discover the conditions for making a confidence interval or doing a test about slope in least-squares regression. (5 min) E MM

UNC-4.AF, UNC-4.AF.1 | Confidence Interval for the Slope of a Regression Line
Learn about confidence interval for the slope of a regression line. (7 min) E MM

VAR-7.J, VAR-7.K, VAR-7.M | Calculating T Statistic for Slope of Regression Line
Calculate the test statistic in a test about the slope of a regression line. (7 min) E MM

DAT-3.M, DAT-3.N | Using a P-Value to Make Conclusions in a Test About Slope
Make conclusions in a hypothesis test about the slope of a least-squares regression line. (6 min) E MM

UNC-4.AH, UNC-4.AH.1 | Using a Confidence Interval to Test Slope
Use confidence interval for hypothesis test on regression slope. (4 min) E MM

Comparing Models to Fit Data Example
Determine if a quadratic or exponential model fits the data better, then uses the model to make a prediction. (4 min) E MM

DAT-1.J | Transforming Nonlinear Data
Use logarithms to transform nonlinear data into a linear relationship so we can use least-squares regression methods. (3 min) E MM

DAT-1.J | Worked Example of Linear Regression Using Transformed Data
Solve this example of linear regression using transformed data (8 min) E MM

Statistics & Probability | Analysis of Variance (ANOVA)

ANOVA 1: Calculating SST (Total Sum of Squares)
Analysis of variance 1 - calculating SST (total sum of squares). (8 min) E MM

ANOVA 2: Calculating SSW and SSB (Total Sum of Squares Within and Between)
Analysis of variance 2 - calculating SSW and SSB (total sum of squares within and between). (14 min) E MM

ANOVA 3: Hypothesis Test with F-Statistic
Analysis of variance 3 - hypothesis test with f-statistic. (10 min) E MM

Statistics & Probability: Measurement & Data | Charts & Graphs: Analyzing One Categorical Variable

S-ID.1 | Identifying Individuals, Variables and Categorical Variables in a Data Set
Identifying individuals, variables and categorical variables in a data set. (3 min) E MM

S-ID.1 | Reading Pictographs
Explore how pictograph is basically a way to represent data with pictures that relate to the data. (3 min) E MM

S-ID.1 | Reading Bar Graphs
Explore how to read a bar graph. (3 min) E MM

S-ID.1 | Reading Bar Graphs: Harry Potter
Interpret a bar graph. (1 min) E MM

S-ID.1 | Creating a Bar Graph
Create a bar chart using data from a survey. (1 min) E MM

S-ID.1 | Reading Bar Charts: Comparing Two Sets of Data
Explore how a bar chart is especially useful with comparing two sets of data. (2 min) E MM

S-ID.1 | Reading Bar Charts: Putting it Together with Central Tendency
Look at bar charts and using the information to determine the measures of central tendency. (5 min) E MM

S-ID.1 | Reading Pie Graphs (Circle Graphs)
Explore how to read pie graphs (circle graphs). (3 min) E MM

Statistics & Probability: Measurement & Data | Two-Way Tables

S-ID.5 | Two-Way Frequency Tables and Venn Diagrams
Explore how to use Venn diagrams and two-way tables to categorize data. (6 min) E MM

S-ID.5 | Two-Way Relative Frequency Tables
Explore how relative frequencies show how often something happens compared to the total number of times it could happen. (5 min) E MM

S-ID.5 | Interpreting Two-Way Tables
Explore how two-way tables help us understand how categories relate. (2 min) E MM

S-ID.5 | Categorical Data Example
Explore the relationship between two categorical variables with two-way tables to see if there is an association between the variables. (3 min) E MM

S-ID.5 | Analyzing Trends in Categorical Data
Solve an example where he is asked to calculate relative frequencies and analyze trends in categorical data. (9 min) E MM

S-ID.5 | Marginal and Conditional Distributions
Marginal distributions are totals for each row or column in a two-way table (or joint distribution table), showing the distribution of one variable. (5 min) E MM

Statistics & Probability: Measurement & Data | Displaying Quantitative Data with Graphs

UNC-1.G | Representing Data
Explore a few of the many ways to look at data. (8 min) E MM

UNC-1.G | Frequency Tables & Dot Plots
Learn to organize data into frequency tables and dot plots (sometimes called line plots). (7 min) E MM

UNC-1.G | Histograms
Explore how a histogram is a graphical display of data using bars of different heights. (6 min) E MM

UNC-1.G | Creating a Histogram
Explore how to create a histogram. (7 min) E MM

UNC-1.G | Interpreting a Histogram
Learn how to read and interpret histograms, which summarize data by sorting it into buckets. (5 min) E MM

UNC-1.G | Stem-and-Leaf Plots
A stem and leaf is a table used to display data. The 'stem' is on the left and displays the first digit or digits. The 'leaf' is on the right and displays the last digit. (6 min) E MM

UNC-1.G | Reading Stem and Leaf Plots
A stem and leaf plot display data by breaking each data point into two parts: the "stem" and the "leaf." (3 min) E MM

Statistics & Probability: Measurement & Data | Describing & Comparing Distributions

6.SP.2 | Shapes of Distributions
Some distributions are symmetrical, with data evenly distributed about the mean. Other distributions are "skewed," with data tending to the left or right of the mean. We sometimes say that skewed distributions have "tails". (5 min) E MM

UNC-1.H | Clusters, Gaps, Peaks & Outliers
Examples looking at different features of distributions, such as clusters, gaps, peaks, and outliers for distributions. (7 min) E MM

7.SP.3, 7.SP.4 | Comparing Distributions with Dot Plots (Example Problem)
Examine two distributions in dot plots to draw conclusions about the times of Olympic swimmers. (4 min) E MM

6.SP.4, 6.SP.5c | Comparing Dot Plots, Histograms, and Box Plots
Solve practice problems where he thinks about which data displays would be helpful in which situations. (5 min) E MM

UNC-1.N, UNC-1.O | Example: Comparing Distributions
Compare distributions using the features of shape, center, spread, and outliers. (7 min) E MM

6.SP.2, 6.SP.4 | Reading Line Graphs
Explore how a line graph is a way to visually represent data, especially data that changes over time. (3 min) E MM

6.SP.2, 6.SP.4 | Misleading Line Graphs
Explore misleading line graphs. (5 min) E MM

Statistics & Probability: Measurement & Data | Intro to Scatterplots

S-ID.6a, S-ID.6b | Constructing a Scatter Plot
Explore how to construct a scatter plot from this model. (3 min) E MM

S-ID.6a, S-ID.6b | Example of Direction in Scatter Plots
Explore this example of scatter plots. (3 min) E MM

S-ID.6a, S-ID.6b | Scatter Plot: Smokers
In a negative linear association, as one variable goes up, the other variable goes down at a constant rate. (3 min) E MM

S-ID.6b | Bivariate Relationship Linearity, Strength and Direction
Describe a bivariate relationship's linearity, strength, and direction. (9 min) E MM

Statistics & Probability: Measurement & Data | Correlation & Trend Lines

FAC.S.44, S-ID.6b, S-ID.8 | Example: Correlation Coefficient Intuition
Explain the intuition behind correlation coefficients and does a problem where he matches correlation coefficients to scatter plots. (7 min) E MM

FAC.S.44, S-ID.6b, S-ID.8 | Calculating Correlation Coefficient
The most common way to calculate the correlation coefficient (r) is by using technology, but using the formula can help us understand how r measures the direction and strength of the linear association between two quantitative variables. (13 min) E MM

S-ID.6a, S-ID.6b, S-ID.6c | Fitting a Line to Data
Create a scatter plot and then fit a line to data on the median California family income. (8 min) E MM

S-ID.6a, S-ID.6b, S-ID.6c | Estimating the Line of Best Fit Exercise
The "line of best fit" is a line that shows the pattern of data points. If we can find a good line, it means there is a linear trend. If not, it means there is no linear trend. (1 min) E MM

S-ID.6a, S-ID.6b, S-ID.6c | Estimating with Linear Regression (Linear Models)
A line of best fit is a straight line that shows the relationship between two sets of data. We can use the line to make predictions. (3 min) E MM

S-ID.6a, S-ID.6c, S-ID.7 | Line of Best Fit: Smoking in 1945
Explore this scatter plot that shows how many adults in America smoked from year to year. (5 min) E MM

Statistics & Probability: Measurement & Data | Least-Squares Regression & Fit

FAC.S.43 | Introduction to Residuals and Least Squares Regression
Explore this introduction to residuals and least squares regression. (8 min) E MM

FAC.S.43 | Calculating Residual Example
Explore how to calculate residual example. (5 min) E MM

FAC.S.43 | Calculating the Equation of a Regression Line
Calculate the equation of a least-squares regression line. Intuition for why this equation makes sense. (8 min) E MM

FAC.S.43, S-ID.7 | Interpreting Slope of Regression Line
Interpret the slope of regression line. (3 min) E MM

FAC.S.43, S-ID.7 | Interpreting Y-Intercept in Regression Model
Interpret the y-intercept in regression model. (3 min) E MM

8.SP.3, S-ID.6a, S-ID.6c, S-ID.7 | Interpreting a Trend Line
Explore this graph shows how studying affects test scores. (4 min) E MM

FAC.S.43, S-ID.7 | Residual Plots
Create and analyze residual plots based on regression lines. (6 min) E MM

FAC.S.43, S-ID.7 | R-Squared or Coefficient of Determination
In linear regression, r-squared (also called the coefficient of determination) is the proportion of variation in the response variable that is explained by the explanatory variable in the model. (13 min) E MM

FAC.S.43, S-ID.7 | Standard Deviation of Residuals or Root-Mean-Square Error (RMSD)
Standard deviation of the residuals are a measure of how well a regression line fits the data. It is also known as root mean square deviation or root mean square error. (7 min) E MM

FAC.S.43, S-ID.7 | Interpreting Computer Regression Data
Explore how to interpret computer generated regression data to find the equation of a least-squares regression line. (5 min) E MM

FAC.S.43, S-ID.7 | Impact of Removing Outliers on Regression Lines
Explore the impact of removing outliers on slope, y-intercept and r of least-squares regression lines. (6 min) E MM

Statistics & Probability: Measurement & Data | More on Regression

FAC.S.43, S-ID.7 | Squared Error of Regression Line
Explore the idea that one can find a line that minimizes the squared distances to the points. (7 min) E MM

FAC.S.43, S-ID.7 | Proof (Part 1) Minimizing Squared Error to Regression Line
Explore this proof minimizing squared error to regression line. (11 min) E MM

FAC.S.43, S-ID.7 | Proof (Part 2) Minimizing Squared Error to Regression Line
Explore this proof minimizing squared error to regression line. (10 min) E MM

FAC.S.43, S-ID.7 | Proof (Part 3) Minimizing Squared Error to Regression Line
Explore this proof minimizing squared error to regression line. (11 min) E MM

FAC.S.43, S-ID.7 | Proof (Part 4) Minimizing Squared Error to Regression Line
Explore this proof minimizing squared error to regression line. (4 min) E MM

FAC.S.43, S-ID.7 | Regression Line Example
Explore this regression line example. (10 min) E MM

FAC.S.43, S-ID.7 | Second Regression Example
Explore this second regression example. (9 min) E MM

FAC.S.43, S-ID.7 | Calculating R-Squared
Learn to calculate r-squared to see how well a regression line fits data. (10 min) E MM

FAC.S.43, S-ID.7 | Covariance and the Regression Line
Explore covariance, variance and the slope of the regression line. (15 min) E MM

Pre-Calculus: Geometry | Special Trig Values & Identities

AIII.F.30, F-TF.3 | Trig Values of π/4
Find the trigonometric values of π/4 using the unit-circle definition. (8 min) E MM

AIII.F.30, F-TF.3 | Cosine, Sine and Tangent of π/6 and π/3
Use the unit circle and the Pythagorean theorem, and find the exact sine, cosine, and tangent of the angles π/6 and π/3. (9 min) E MM

AIII.F.36, F-TF.8 | Proof of the Pythagorean Trig Identity
The Pythagorean identity tells us that no matter what the value of θ is, $\sin^2\theta+\cos^2\theta$ is equal to 1. We can prove this identity using the Pythagorean theorem in the unit circle with $x^2+y^2=1$. (6 min) E MM

AIII.F.36, F-TF.8 | Using the Pythagorean Trig Identity
The Pythagorean identity tells us that no matter what the value of θ is, $\sin^2\theta+\cos^2\theta$ is equal to 1. This follows from the Pythagorean theorem, which is why it's called the Pythagorean identity! We can use this identity to solve various problems. (6 min) E MM

AIII.F.31, F-TF.4 | Sine & Cosine Identities: Symmetry
Find several trigonometric identities for sine and cosine by considering horizontal and vertical symmetries of the unit circle. (8 min) E MM

AIII.F.31, F-TF.4 | Tangent Identities: Symmetry
Find several trigonometric identities for tangent by considering horizontal and vertical symmetries of the unit circle. (7 min) E MM

AIII.F.31, F-TF.4 | Sine & Cosine Identities: Periodicity
Find trigonometric identities for sine and cosine by considering angle rotations on the unit circle. (6 min) E MM

AIII.F.31, F-TF.4 | Tangent Identities: Periodicity
Solve a problem by considering the periodicity of the tangent function. (4 min) E MM

Pre-Calculus: Geometry | Inverse Trigonometric Functions

Intro to Arcsine
Explore arcsine, which is the inverse function of sine, and discusses its principal range. (10 min) E MM

Intro to Arctangent
Explore arctangent, which is the inverse function of tangent, and discusses its principal range. (10 min) E MM

Intro to Arccosine
Explore arccosine, which is the inverse function of cosine, and discusses its principal range. (14 min) E MM

AIII.A.18, AIII.F.28, F-BF.4d | Restricting Domains of Functions to Make Them Invertible
Given the graph of a trigonometric function, we discuss ways to change the function to make it invertible. (6 min) E MM

AIII.A.18, AIII.F.28, F-BF.4d | Domain & Range of Inverse Tangent Function
Find the formula for the inverse function of g(x)=tan(x-3π/2)+6 and determine the domain of that inverse function. (10 min) E MM

AIII.A.18, AIII.F.28, F-BF.4d | Using Inverse Trig Functions with a Calculator
Explore the appropriate way to use the calculator to find an angle when its tangent value is given. (4 min) E MM

Pre-Calculus: Geometry | Law of Sines & Law of Cosines

AIII.G.43, AIII.G.44, G-SRT.10, G-SRT.11 | Solving for a Side with the Law of Sines
Given a triangle with two angle measures and one side length, find all the missing side lengths and angle measures using the law of sines. (6 min) E MM

AIII.G.43, AIII.G.44, G-SRT.10, G-SRT.11 | Solving for an Angle with the Law of Sines
Given a triangle with two side lengths and one angle measure, find all the missing angle measures using the law of sine (6 min) E MM

AIII.G.43, G-SRT.10 | Proof of the Law of Sines
Explore a simple proof of the Law of Sines. (7 min) E MM

AIII.G.43, AIII.G.44, G-SRT.10, G-SRT.11 | Solving for a Side with the Law of Cosines
Learn how to use the law of cosines to find the missing side length of a triangle when given two side lengths and the contained angle measure. (4 min) E MM

AIII.G.43, AIII.G.44, G-SRT.10, G-SRT.11 | Solving for an Angle with the Law of Cosines
Given a triangle with all side lengths but no angle measure, find one of the angle measures using the law of cosines. (7 min) E MM

AIII.G.43, G-SRT.10 | Proof of the Law of Cosines
Explore a simple proof of the Law of Cosines. (9 min) E MM

AIII.G.43, AIII.G.44, G-SRT.10, G-SRT.11 | Trig Word Problem: Stars
Solve a word problem about the distance between stars using the law of cosines. (6 min) E MM

Pre-Calculus: Geometry | Sinusoidal Equations & Models

AIII.F.34, F-TF.7 | Solving Sinusoidal Equations of the Form sin(x)=d
Find the expressions that together represent all possible solutions to the equation sin(x)=1/3. (6 min) E MM

AIII.F.34, F-TF.7 | Cosine Equation Algebraic Solution Set
Solve a cosine equation with an infinite number of solutions. Use trig identities to represent the whole solution set. (6 min) E MM

AIII.F.34, F-TF.7 | Cosine Equation Solution Set in an Interval
Given the algebraic solution set for a cosine equation, find which solutions fall within an interval. (6 min) E MM

AIII.F.34, F-TF.7 | Sine Equation Algebraic Solution Set
Solve a sine equation with an infinite number of solutions. Use trig identities to represent the whole solution set. (5 min) E MM

AIII.F.34, F-TF.7 | Solving cos(θ)=1 and cos(θ)=-1
Solve the equations cos(θ)=1 and cos(θ)=-1 using the graph of y=cos(θ). (5 min) E MM

AIII.F.34, F-TF.7 | Interpreting Solutions of Trigonometric Equations
Starting from a context represented by a trigonometric function, interpret equations based on the function. (4 min) E MM

AIII.F.34, F-TF.7 | Trig Word Problem: Modeling Daily Temperature
Solve a word problem about the annual change in temperature by solving a sinusoidal equation. (11 min) E MM

Pre-Calculus: Geometry | Angle Addition Identities

AIII.F.35, F-TF.9 | Trig Angle Addition Identities Review 6 related trigonometric angle addition identities: sin(a+b), sin(a-c), cos(a+b), cos(a-b), cos(2a), and sin(2a). (11 min) E MM

AIII.F.35, F-TF.9 | Using the Cosine Angle Addition Identity
Evaluate the cosine of the sum of 60° and another angle whose right triangle is given. (5 min) E MM

AIII.F.35, F-TF.9 | Using the Cosine Double-Angle Identity
Explore how to use cosine double angle formula tells us that cos(2θ) is always equal to $\cos^2\theta-\sin^2\theta$. (4 min) E MM

AIII.F.35, F-TF.9 | Proof of the Sine Angle Addition Identity
Prove the identity sin(x+y) = sin(x)*cos(y) + cos(x)*sin(y). (8 min) E MM

AIII.F.35, F-TF.9 | Proof of the Cosine Angle Addition Identity
Prove the identity cos(x+y) = cos(x)*cos(y) - sin(x)*sin(y). (6 min) E MM

AIII.F.35, F-TF.9 | Proof of the Tangent Angle Sum and Difference Identities
Using the sine and cosine of the sum or difference of two angles, prove: tan(x+y)=(tan(x)+tan(y))/(1-tan(x)tan(y)). (7 min) E MM

Pre-Calculus: Geometry | Using Trigonometric Identities

AIII.F.35, F-TF.9 | Finding Trig Values Using Angle Addition Identities
Find the value of sin(7π/12) by rewriting it as sin(π/3+π/4) and then using the sine angle addition formula. (9 min) E MM

AIII.F.35, F-TF.9 | Using the Tangent Angle Addition Identity
Find the tangent of 13pi/12 without a calculator using the tangent angle addition identity. (6 min) E MM

AIII.F.35, F-TF.9 | Using Trig Angle Addition Identities: Finding Side Lengths
Given a drawing with two triangles and some side lengths, uses the sine angle addition identity in order to find a missing side length. (5 min) E MM

AIII.F.35, F-TF.9 | Using Trig Angle Addition Identities: Manipulating Expressions
Given that cos(2θ)=C and he uses the cosine double-angle identity to find an expression for sin(θ). (6 min) E MM

AIII.F.35, F-TF.9 | Using Trigonometric Identities
Learn how trigonometric identities like $\sin^2\theta+\cos^2\theta=1$ can be used to rewrite expressions in a different, more convenient way. (3 min) E MM

Pre-Calculus: Geometry | Conic Sections

G-CO.1, G-GPE.1, G-GPE.2, G-GPE.3 | Intro to Conic Sections
Explore the four conic sections and shows how they are derived by intersecting planes with cones in certain ways. (11 min) E MM

G-GPE.3 | Intro to Ellipses
Learn all about ellipses. (14 min) E MM

G-GPE.3 | Ellipse Standard Equation from Graph
Given an ellipse on the coordinate plane, find its standard equation, which is an equation in the form $(x-h)^2/a^2+(y-k)^2/b^2=1$. (4 min) E MM

G-GPE.3 | Ellipse Graph from Standard Equation
Explore how to graph an ellipse when given its equation in standard form. (2 min) E MM

G-GPE.3 | Foci of an Ellipse from Equation
Explore how the radii and the foci of an ellipse relate to each other, and how we can use this relationship to find the foci from the equation of an ellipse. (14 min) E MM

G-GPE.3 | Intro to Hyperbolas
Explore the standard equation for hyperbolas, and how it can be used to determine the direction of the hyperbola and its vertices. (14 min) E MM

G-GPE.3 | Vertices & Direction of a Hyperbola (Example 1)
Pick the graph of $y^2/9-x^2/4=1$ based on the hyperbola's center, direction, & vertices. (5 min) E MM

G-GPE.3 | Vertices & Direction of a Hyperbola (Example 2)
Match an equation to a given graph of a hyperbola, based on the hyperbola's direction & vertices. (3 min) E MM

G-GPE.3 | Graphing Hyperbolas
Given the hyperbola equation y^2/4-x^2/9=1, determine the direction to which it opens and its vertices to draw its graph. (8 min) E MM

G-GPE.3 | Foci of a Hyperbola from Equation
Explore the foci of hyperbolas and show how they relate to hyperbola equations. (16 min) E MM

G-GPE.3 | Proof of the Hyperbola Foci Formula
Explore how to prove why, for the general hyperbola equation x^2/a^2-y^2/b^2=1, the focal length f forms the equation f^2=a^2+b^2 with the parameters a and b. (15 min) E MM

G-GPE.3 | Equation of a Hyperbola not Centered at the Origin
Analyze the hyperbola whose equation is (x-1)^2/16-(y+1)^2/4=1, and graphs. (11 min) E MM

Pre-Calculus: Algebra | Composite Functions

AIII.A.18, AIII.F.25, F-BF.1c | Intro to Composing Functions
Learn how to evaluate the composition of functions step by step, using examples with three different function definitions: f (x), g(t), and h(x). (6 min) E MM

AIII.A.18, AIII.F.25, F-BF.1c | Evaluating Composite Functions
Evaluate (h∘g)(-6) for $g(x)=x^2+5x-3$ and $h(y)=3(y-1)^2-5$. (4 min) E MM

AIII.A.18, AIII.F.25, F-BF.1c | Evaluating Composite Functions: Using Tables
Given tables of values of the functions f and g, evaluate f(g(0)) and g(f(0)). (4 min) E MM

AIII.A.18, AIII.F.25, F-BF.1c | Evaluating Composite Functions: Using Graphs
Given the graphs of the functions f and g, evaluate g(f(-5)). (3 min) E MM

AIII.A.18, AIII.F.25, F-BF.1c | Finding Composite Functions
Through a worked example involving $f(x)=\sqrt{(x^2-1)}$ and $g(x)=x/(1+x)$, learn about function composition: the process of combining two functions to create a new function. (3 min) E MM

AIII.A.18, AIII.F.25, F-BF.1c | Evaluating Composite Functions (Advanced)
Given that $h(x)=\sqrt{3}x$ and $g(t)=-2t-2-h(t)$, find h(g(8)). (4 min) E MM

AIII.A.18, AIII.F.25, F-BF.1c | Modeling with Composite Functions
Determine the correct functions to compose (and the correct order) to model a given relationship, and vice versa. (7 min) E MM

AIII.A.18, AIII.F.25, F-BF.1c | Modeling with Composite Functions: Skydiving
Model the maximum speed of a skydiver, by using composing given formulas for the maximum speed as a function of parachute area and parachute area as a function of width. (4 min) E MM

AIII.A.18, AIII.F.25, F-BF.1c | Meaningfully Composing Functions
Decide which composed functions make sense by checking that the value that one function passes to the other is the right kind of input. (4 min) E MM

Pre-Calculus: Algebra | Inverse Functions

AIII.A.18, AIII.F.28, F-BF.4d | Determining if a Function is Invertible
Learn how to build a mapping diagram for a finite function, and how to use this diagram to determine if the function is invertible. (4 min) E MM

AIII.A.18, AIII.F.28, F-BF.4d | Restricting Domains of Functions to Make Them Invertible Given the graph of a trigonometric function, determine ways to change the function to make it invertible. (6 min) E MM

AIII.F.27, F-BF.4c | Reading Inverse Values from a Graph
Learn how to find the inverse of a function and how to graph it. (4 min) E MM

AIII.F.27, F-BF.4c | Reading Inverse Values from a Table
Given a table of inputs and outputs for a function, evaluate the inverse function for a certain input. (2 min) E MM

AIII.A.18, AIII.F.26, F-BF.4b | Verifying Inverse Functions from Tables
Explore Functions s and t are inverses if and only if s(t(x))=x and t(s(x))=x for every x-value in the domains. (5 min) E MM

AIII.A.18, AIII.F.26, F-BF.4b | Using Specific Values to Test for Inverses
Learn how to determine if two functions are inverses. (4 min) E MM

AIII.A.18, AIII.F.26, F-BF.4b | Verifying Inverse Functions by Composition
Compose $f(x)=(x+7)^3-1$ and $g(x)=\sqrt[3]{(x+1)}-7$, and determine if f(g(x))=g(f(x))=x are inverses. (7 min) E MM

AIII.A.18, AIII.F.26, F-BF.4b | Verifying Inverse Functions by Composition: Not Inverse
Compose f(x)=2x-3 and g(x)=½x+3 and discover that f(g(x)) ≠ g(f(x)) ≠ x, which means the functions are not inverses. (4 min) E MM

Pre-Calculus: Algebra | Complex Numbers

N-CN.4 | Plotting Numbers on the Complex Plane
Discover the real and imaginary parts of complex numbers and see how they correspond to the horizontal and vertical axes. (2 min) E MM

N-CN.6 | Distance & Midpoint of Complex Numbers
Find the distance between (2+3i) and (-5-i) and then he finds their midpoint on the complex plane. (6 min) E MM

N-CN.3, N-CN.5 | Intro to Complex Number Conjugates
Learn about the conjugate of complex numbers, how to add and divide using conjugates, and the key property that multiplying a complex number by its conjugate produces a real number. (8 min) E MM

N-CN.3 | Complex Number Conjugates
Explore how to find the conjugate of a complex number, which is simply changing the sign of the imaginary part. (4 min) E MM

N-CN.3, N-CN.5 | Dividing Complex Numbers
Divide (6+3i) by (7-5i). (5 min) E MM

N-CN.8 | Complex Numbers & Sum of Squares Factorization
Learn how expressions of the form x^2+y^2 can be factored into linear factors. (5 min) E MM

N-CN.8 | Factoring Sum of Squares
Factor 36a^8+2b^6 as (6a^4-i*√2b^3)(6a^4+i*√2b^3). (3 min) E MM

N-CN.8 | Factoring Polynomials Using Complex Numbers
Show how to factor a fourth degree polynomial into linear factors using the sum-product rule and the sum of squares identity. (3 min) E MM

N-CN.3 | Absolute Value of Complex Numbers
Find the absolute value of (3-4i). (3 min) E MM

N-CN.3 | Complex Numbers with the Same Modulus (Absolute Value)
Show how to determine which members in a set of complex numbers have the same modulus (or absolute value). (3 min) E MM

N-CN.4 | Absolute Value & Angle of Complex Numbers
Find the modulus (which is the absolute value) and the argument (which is the angle) of √3/2+1/2*i. (13 min) E MM

N-CN.4 | Polar & Rectangular Forms of Complex Numbers
Learn how to convert a complex number from rectangular form to polar form. (12 min) E MM

N-CN.4 | Converting a Complex Number from Polar to Rectangular Form
Given a complex number in polar form, we can convert that number to rectangular form and plot it on the complex plane. (3 min) E MM

N-CN.5 | Multiplying Complex Numbers Graphically Example: -3i
Learn to multiply complex numbers graphically on the complex plane by rotating and scaling. Multiplying a complex number z by -3i rotates and scales z. (2 min) E MM

N-CN.5 | Multiplying Complex Numbers Graphically Example: -1-I
Learn to multiply complex numbers graphically on the complex plane. (4 min) E MM

N-CN.5 | Multiplying Complex Numbers in Polar Form
Learn to multiply two complex numbers in polar form by multiplying their moduli and adding their arguments. (3 min) E MM

N-CN.5 | Dividing Complex Numbers in Polar Form
Learn to divide two complex numbers in polar form by dividing their moduli and subtracting their arguments. (3 min) E MM

N-CN.5 | Taking and Visualizing Powers of a Complex Number
Given a complex number in rectangular form, we can convert it to polar form to show how to visualize powers of the complex number by scaling and rotating it by its own modulus and argument. (7 min) E MM

N-CN.5 | Complex Number Equations: $x^3=1$
Find all complex solutions to the equation x^3=1. (12 min) E MM

Pre-Calculus: Algebra | The Fundamental Theorem of Algebra

N-CN.9 | The Fundamental Theorem of Algebra
Explore the fundamental theorem of algebra, which, as is reflected in its name, is a very important theorem about polynomials. (6 min) E MM

N-CN.9 | Quadratics & the Fundamental Theorem of Algebra
Explore the proof of the fundamental theorem of algebra for any degree of polynomial. (7 min) E MM

N-CN.9 | Number of Possible Real Roots of a Polynomial
Expore how the fundamental theorem of algebra can be used to determine how many real roots a given polynomial has. (4 min) E MM

Pre-Calculus: Algebra | Properties of Rational Functions

A-APR.6, AIII.A.13 | Reducing Rational Expressions to Lowest Terms
Learn how to simplify rational expressions, which are fractions with variable expressions in the numerator and denominator. (8 min) E MM

AIII.F.23, AIII.F.24, AIII.G.38, AIII.G.40, F-IF.7d | End Behavior of Rational Functions
Analyze the end behavior of several rational functions, that together cover all case types of end behavior. (10 min) E MM

AIII.F.23, AIII.F.24, AIII.G.38, AIII.G.40, F-IF.7d | Discontinuities of Rational Functions
Analyze two rational functions to find their vertical asymptotes & removable discontinuities. He distinguishes those from the zeros of the functions. (7 min) E MM

Pre-Calculus: Algebra | Graphs of Rational Functions

AIII.F.23, AIII.F.24, AIII.G.38, AIII.G.40 | Graphing Rational Functions According to Asymptotes
Learn how to find removable discontinuities, horizontal asymptotes, and vertical asymptotes of rational functions. (11 min) E MM

AIII.F.23, AIII.F.24, AIII.G.38, AIII.G.40, F-IF.7d | Graphs of Rational Functions: Y-Intercept
Pick the graph that matches f(x)=(ax^m+bx+12)/(cx^m+dx+12) based on its y-intercept. (3 min) E MM

AIII.F.23, AIII.F.24, AIII.G.38, AIII.G.40, F-IF.7d | Graphs of Rational Functions: Horizontal Asymptote
Pick the graph that matches $f(x)=(-x^2+ax+b)/(x^2+cx+d)$ based on its horizontal asymptote. (3 min) E MM

AIII.F.23, AIII.F.24, AIII.G.38, AIII.G.40, F-IF.7d | Graphs of Rational Functions: Vertical Asymptotes
Pick the graph that matches $f(x)=g(x)/(x^2-x-6)$ (where g(x) is a polynomial) based on its discontinuities. (6 min) E MM

AIII.F.23, AIII.F.24, AIII.G.38, AIII.G.40, F-IF.7d | Graphs of Rational Functions: Zeros
Pick the graph that matches $f(x)=(2x^2-18)/g(x)$ (where g(x) is a polynomial) based on its zeros. (8 min) E MM

Pre-Calculus: Algebra | Modeling with Rational Functions

A-SSE.1a, A-SSE.1b, FAC.EI.1 | Analyzing Structure Word Problem: Pet Store (Part 1)
Solve a word problem about the unknown number of bears, cats, and dogs in a pet store using visual reasoning. (6 min) E MM

A-SSE.1a, A-SSE.1b, FAC.EI.1 | Analyzing Structure Word Problem: Pet Store (Part 2)
Solve a word problem about the unknown number of bears, cats, and dogs in a pet store using algebraic reasoning. (3 min) E MM

A-CED.1 | Combining Mixtures Example
Figure out how much of two gasoline mixtures to combine to get gasoline with a certain concentration of ethanol. (6 min) E MM

A-CED.1, A-CED.2, A-REI.2, FAC.F.17, FAC.F.18 | Rational Equations Word Problem: Combined Rates (Example 1)
Solve a word problem about the combined leaf-bagging rates of Ian and Kyandre, by creating a rational equation that models the situation. (6 min) E MM

A-CED.2, A-REI.2, FAC.F.17, FAC.F.18 | Rational Equations Word Problem: Combined Rates (Example 2)
Solve a word problem about the combined deck-staining rates of Anya and Bill, by creating a rational equation that models the situation. (6 min) E MM

A-CED.1, A-CED.2, A-REI.2, FAC.F.17, FAC.F.18 | Rational Equations Word Problem: Eliminating Solutions
Solve a word problem about the combined pool-filling rates of two water hoses by creating a rational equation that models the situation. (8 min) E MM

A-SSE.1a, A-SSE.1b, A-SSE.2, FAC.EI.1, FAC.EI.3 | Reasoning About Unknown Variables
Given that $a>0$, $b<0$, and $a/b>a*b$, explore what we can determine from the variables. (6 min) E MM

A-SSE.1a, A-SSE.1b, A-SSE.2, FAC.EI.1, FAC.EI.3 | Reasoning About Unknown Variables: Divisibility
Given the positive integers a, b, and c, where a is a multiple of c and (a+b)/c is an integer. Is b necessarily a multiple of c? (4 min) E MM

A-SSE.1a, A-SSE.1b, FAC.EI.1 | Structure in Rational Expression
Analyze this expression to determine what's bigger: the value of that expression at some unknown c, or the number of times the expression is equal to 0. (5 min) E MM

Pre-Calculus: Algebra | Operations with Rational Expressions

A-APR.7, AIII.A.16 | Multiplying & Dividing Rational Expressions: Monomials
Multiply $(6x^3/5)$ X $(2/3x)$ and divides $(2x^4/7)$ ÷ $(5x^4/4)$. (6 min) E MM

A-APR.7, AIII.A.16 | Multiplying Rational Expressions
Multiply rational expressions, we multiply both numerators and multiply both denominators. (6 min) E MM

A-APR.7, AIII.A.16 | Dividing Rational Expressions
Learn the steps to divide rational expressions. (7 min) E MM

A-APR.7, AIII.A.16 | Adding & Subtracting Rational Expressions: Like Denominators
Add $6/(2x^2-7) + (-3x-8)/(2x^2-7)$ and subtracts $(9x^2+3)/(14x^2-9) - (-3x^2+5)/(14x^2-9)$. (4 min) E MM

A-APR.7, AIII.A.16 | Intro to Adding Rational Expressions with Unlike Denominators
Rewrite a/b+c/d as a single rational expression. (3 min) E MM

A-APR.7, AIII.A.16 | Adding Rational Expression: Unlike Denominators
Learn how to add rational expressions with different denominators by finding a common denominator, multiplying the numerators and denominators by the same factors, and simplifying the result. (5 min) E MM

A-APR.7, AIII.A.16 | Subtracting Rational Expressions: Unlike Denominators
Rewrite $(-5x)/(8x+7)-(6x^3)/(3x+1)$ as $(-48x^4-42x^3-15x^2-5x)/(8x+7)(3x+1)$. (5 min) E MM

A-APR.7, AIII.A.16 | Least Common Multiple of Polynomials
Find the least common multiple (LCM) of $3z^3-6z^2-9z$ and $7z^4+21z^3+14z^2$. (7 min) E MM

A-APR.7, AIII.A.16 | Subtracting Rational Expressions: Factored Denominators
Subtract two rational expressions whose denominators are factored. (5 min) E MM

A-APR.7, AIII.A.16 | Subtracting Rational Expressions
Subtract and simplifies $(a-2)/(a+2) - (a-3)/(a^2+4a+4)$. (5 min) E MM

Pre-Calculus: Algebra | Intro to Vectors

N-VM.1, N-VM.2, N-VM.3 | Intro to Vectors and Scalars
Explore some examples of scalars and vectors, including distance, displacement, speed, and velocity. (9 min) E MM

N-VM.1, N-VM.2, N-VM.3 | Representing Quantities with Vectors
Vectors can represent real-world quantities where it's important to have both a magnitude and a direction. (3 min) E MM

N-VM.1, N-VM.2, N-VM.3 | Interpreting Statements about Vectors
Interpret a mathematical statement about two vector quantities in terms of the real-world quantities they represent. (3 min) E MM

N-VM.1, N-VM.2, N-VM.3 | Introduction to Vector Components
In the two-dimensional plane, we can describe them in an equivalent way, by thinking about the changes in x and y from the vector's tail to its head. (5 min) E MM

N-VM.1, N-VM.2, N-VM.3 | Finding the Components of a Vector
Find the x and y-components of a vector given its graph. (3 min) E MM

N-VM.1, N-VM.2, N-VM.3 | Comparing the Components of Vectors
Figure out which vectors have the same x-component given the graphs of 4 different vectors. (3 min) E MM

N-VM.1, N-VM.2, N-VM.3 | Vector Magnitude from Graph
Find the magnitude of a vector given its graph. (4 min) E MM

N-VM.1, N-VM.2, N-VM.3 | Vector Magnitude from Components
Find the magnitude of a vector given its components of (5, -3). (3 min) E MM

N-VM.1, N-VM.2, N-VM.3 | Vector Magnitude from Initial & Terminal Points
Explore the magnitude of a vector when what we're given about the vector is where it starts and where it ends. (6 min) E MM

Pre-Calculus: Algebra | Operations with Vectors

N-VM.4, N-VM.5 | Scalar Multiplication: Component Form
Explore what happens graphically and to the components of a vector when we multiply it by a scalar. (6 min) E MM

N-VM.4, N-VM.5 | Scalar Multiplication: Magnitude and Direction
Analyze the magnitude and direction of vectors that are a result of scalar multiplication of a vector whose magnitude is given. (5 min) E MM

N-VM.4, N-VM.5 | Adding & Subtracting Vectors
Explore how to add vectors by adding their components, then explain the intuition behind adding vectors using a graph. (8 min) E MM

N-VM.4, N-VM.5 | Adding & Subtracting Vectors End-to-End
Build intuition behind adding and subtracting vectors visually and the "end-to-end" method. (7 min) E MM

N-VM.8, N-VM.9 | Parallelogram Rule for Vector Addition
The parallelogram rule says that if we place two vectors, so they have the same initial point, and then complete the vectors into a parallelogram, then the sum of the vectors is the directed diagonal that starts at the same point as the vectors. (3 min) E MM

N-VM.8, N-VM.9 | Subtracting Vectors End-to-End
Determine which diagram represents vector subtraction graphically. (2 min) E MM

N-VM.8, N-VM.9 | Subtracting Vectors with Parallelogram Rule
Learn to subtract two vectors, we simply add the first vector and the opposite of the second vector, i.e., a+b=a+(-b). (3 min) E MM

N-VM.8, N-VM.9 | Vector Addition & Magnitude Explain some interesting properties of the magnitude of vector sums. (6 min) E MM

Pre-Calculus: Algebra | Vector Direction & Magnitude

N-VM.11, N-VM.12 | Direction of Vectors from Components: 1st & 2nd Quadrants
Find the direction angle of a vector in the first quadrant, then moves onto a trickier one in the second quadrant. (9 min) E MM

N-VM.11, N-VM.12 | Direction of Vectors from Components: 3rd & 4th Quadrants
Find the direction angle of a vector in the third quadrant and a vector in the fourth quadrant. (7 min) E MM

N-VM.11, N-VM.12 | Vector Components from Magnitude & Direction
Find the components of a couple of vectors given in magnitude and direction form. (10 min) E MM

N-VM.11, N-VM.12 | Vector Components from Magnitude & Direction: Word Problem
Given the magnitudes and directions of the forces two people are applying to a box, find the overall force that is applied in the direction of the target. (9 min) E MM

N-VM.11, N-VM.12 | Adding Vectors in Magnitude and Direction Form
Take two vectors given by magnitude and direction and finds the magnitude and direction of their sum. (8 min) E MM

Pre-Calculus: Algebra | Vector Word Problems

N-VM.8 | Vector Word Problem: Resultant Velocity
Find the resultant velocity vector of a boat. (11 min) E MM

N-VM.8 | Vector Word Problem: Hiking
Solve a word problem with vectors where he finds the total straight-line distance traveled over a few days. (7 min) E MM

N-VM.8 | Vector Word Problem: Resultant Force
Find a resultant force vector using geometry, specifically the laws of sines and the laws of cosines. (8 min) E MM

Pre-Calculus: Algebra | Intro to Matrices

N-VM.6 | Intro to Matrices
Discover what matrices are and what they do. (5 min) E MM

N-VM.6 | Using Matrices to Represent Data: Networks
Explore how Matrices are basically tables of numeric values. (6 min) E MM

N-VM.6 | Using Matrices to Represent Data: Payoffs
Represent a game's payoffs: we represent the points each player gets in an elaborate version of rock, paper, scissors. (7 min) E MM

N-VM.7 | Multiplying Matrices by Scalars Define what it means to multiply a matrix by a scalar (in the world of matrices, a scalar is simply a regular number). (3 min) E MM

N-VM.7 | Adding & Subtracting Matrices
Define what it means to add or subtract matrices. (6 min) E MM

N-VM.10 | Using Matrices to Manipulate Data: Pet Store
Explore how we can use matrices. (4 min) E MM

N-VM.10 | Using Matrices to Manipulate Data: Game Show
Learn how to manipulate matrices that represent the possible prizes in a game show. (4 min) E MM

Pre-Calculus: Algebra | Using Matrices for Transformation

N-VM.10, N-VM.11 | Matrices as Transformations of the Plane
By telling us where the vectors [1,0] and [0,1] are mapped to, we can figure out where any other vector is mapped to. (8 min) E MM

N-VM.10, N-VM.11 | Working with Matrices as Transformations of the Plane
Learn how to connect geometric transformations like rotations, reflections, and dilations to specific matrices. (4 min) E MM

N-VM.10, N-VM.12 | Intro to Determinant Notation and Computation
Learn to define matrix determinant and learn about related notation. (4 min) E MM

N-VM.10, N-VM.12 | Interpreting Determinants in Terms of Area
The determinant of a 2X2 matrix tells us what the area of the image of a unit square would be under the matrix transformation. This, in turn, allows us to tell what the area of the image of any figure would be under the transformation. (4 min) E MM

N-VM.10, N-VM.12 | Finding Area of Figure After Transformation Using Determinant
Find the area of the image of a rectangle after a transformation defined by a given matrix. (2 min) E MM

N-VM.10, N-VM.12 | Proof: Matrix Determinant Gives Area of Image of Unit Square Under Mapping
Proof that the determinant of a 2X2 matrix gives the area of the image of the unit square under the mapping defined by the matrix. (4 min) E MM

N-VM.10, N-VM.12 | Using Matrices to Transform the Plane: Mapping a Vector
Explore how to find the image of a given vector under the transformation defined by a given matrix. (4 min) E MM

N-VM.10, N-VM.12 | Using Matrices to Transform the Plane: Composing Matrices
Explore how to find a single matrix that defines the same transformation as the composition of two other matrices. (5 min) E MM

N-VM.10, N-VM.12 | Using Matrices to Transform a 4D Vector
Explore how to find the image of a given 4D vector under the transformation defined by a given matrix. (6 min) E MM

N-VM.10, N-VM.12 | Composing 3x3 Matrices
Explore how to find the matrix transformation that is the composition of two other matrices. (4 min) E MM

Pre-Calculus: Algebra | Matrix Multiplication

N-VM.9 | Intro to Matrix Multiplication
Explain what it means to multiply two matrices and give an example. (6 min) E MM

N-VM.9 | Multiplying Matrices
Explore an example of a multiplication of two matrices that don't have the same dimensions. (6 min) E MM

N-VM.9 | Defined Matrix Operations
Discuss the conditions of matrix dimensions for which addition or multiplication are defined. (4 min) E MM

N-VM.10 | Intro to Identity Matrix
Learn as any number remains the same when multiplied by 1, any matrix remains the same when multiplied by the identity matrix. (8 min) E MM

N-VM.10 | Dimensions of Identity Matrix
Explain why the identity matrix is always a square matrix, even though it works with non-square matrices. (4 min) E MM

N-VM.10 | Is Matrix Multiplication Commutative?
Explore whether the commutative property applies for matrix multiplication. In other words, he checks whether for any two matrices A and B, A*B=B*A (the answer is NO, by the way). (8 min) E MM

Pre-Calculus: Algebra | Matrix Inverses

A-REI.9 | Inverse Matrix Introduction
Explore how the inverse of a square matrix is another matrix (of the same dimensions), where the multiplication (or composition) of the two matrices results in the identity matrix (7 min) E MM

A-REI.9, N-VM.10 | Invertible Matrices and Determinants
Investigate the relationship between a matrix's determinant, and whether that matrix is invertible. (5 min) E MM

A-REI.9, N-VM.10 | Invertible Matrices and Transformations
Compare the effect of two transformations, one defined by an invertible matrix and one by a non-invertible matrix. (6 min) E MM

A-REI.9 | Inverse Matrices and Matrix Equations
Explore how we can solve systems of equations with matrices. (8 min) E MM

A-REI.9 | Finding Inverses of 2x2 Matrices
Give an example of how to find the inverse of a given 2x2 matrix. (3 min) E MM

Pre-Calculus: Algebra | Matrices & System of Equations

A-REI.8 | Representing Systems of Equations with Matrices
Given a system of 3 linear equations with 3 variables, we can represent it with the equation Ax=b, where A is a 3x3 matrix, x is a 3D vector with the variables, and b is a constant 3D vector. (7 min) E MM

A-REI.8 | Representing Systems of Any Number of Equations with Matrices
Explore how to represent a system of n equations and variables. The resulting equation will be Ax=b, where A is an nXn matrix, x is an nX1 unknown vector, and b is the nX1 constant vector. (5 min) E MM

A-REI.9 | Inverse Matrices and Matrix Equations
Explore how we can solve systems of equations with matrices. (8 min) E MM

A-REI.9 | Solving Linear Systems with Matrices
Solve that matrix equation using the inverse of the coefficient matrix. (7 min) E MM

Pre-Calculus: Algebra | Geometric Series

A-SSE.4 | Geometric Series Introduction
Learn about geometric series and explore and example where a geometric series helps us describe a savings account balance. (6 min) E MM

A-SSE.4 | Geometric Sequence vs. Series
Explore how a geometric series is the sum of the terms of a geometric sequence (3 min) E MM

A-SSE.4 | Finite Geometric Series Formula
Explore what the finite geometric series formula is $a(1-r^n)/(1-r)$ and learn why it works. (7 min) E MM

A-SSE.4 | Worked Examples: Finite Geometric Series
Evaluate three geometric series (defined in various ways) using the finite geometric series formula $a(1-r^n)/(1-r)$. (7 min) E MM

A-SSE.4 | Geometric Series Word Problems: Swing
Find an expression for the total length and calculate it for a specific number of swings. (6 min) E MM

A-SSE.4 | Geometric Series Word Problems: Hike
Explore how to model the length of a hike with a geometric series. (7 min) E MM

Pre-Calculus: Algebra | Geometric Series with Summation Notation

A-SSE.4 | Summation Notation
Learn how Sigma, Σ, is the standard notation for writing long sums. (4 min) E MM

A-SSE.4 | Geometric Series with Sigma Notation
Learn about geometric series and how they can be written in general terms and using sigma notation. (4 min) E MM

A-SSE.4 | Worked Example: Finite Geometric Series (Sigma Notation)
Evaluate the geometric series $\Sigma 2(3^k)$ for k=0 to 99 using the finite geometric series formula $a(1-r^n)/(1-r)$. (3 min) E MM

A-SSE.4 | Finite Geometric Series Word Problem: Social Media
Solve an example of using a geometric series to answer a fun word problem. (8 min) E MM

A-SSE.4 | Finite Geometric Series Word Problem: Mortgage
Figure out the formula for fixed mortgage payments using the sum of a geometric series. (18 min) E MM

Pre-Calculus: Algebra | The Binomial Theorem

A-APR.5, AII.A.11, AIII.A.12 | Intro to the Binomial Theorem
The binomial theorem tells us how to expand expressions of the form $(a+b)^n$, for example, $(x+y)^7$. (13 min) E MM

A-APR.5, AII.A.11, AIII.A.12 | Pascal's Triangle and Binomial Expansion
Learn about Pascal's triangle and how we use it to figure out the coefficients in binomial expansions. (8 min) E MM

A-APR.5, AII.A.11, AIII.A.12 | Expanding Binomials
Expand (3y^2+6x^3)^5 using the binomial theorem and Pascal's triangle. (9 min) E MM

A-APR.5, AII.A.11, AIII.A.12 | Expanding Binomials without Pascal's Triangle
Discover this "trick" for expanding large powers of binomials, without using Pascal's triangle. (5 min) E MM

A-APR.5, AII.A.11, AIII.A.12 | Binomial Expansion & Combinatorics
Explore why we use the combinatorial formula for (n choose k) to expand binomial expressions. (5 min) E MM

A-APR.5, AII.A.11, AIII.A.12 | Pascal's Triangle & Combinatorics
Discover how generating the values in Pascal's triangle is related to the combinatorial formula (n choose k). (4 min) E MM

Pre-Calculus: Algebra | Arithmetic Series

Arithmetic Series Intro
Explore the formula for the sum of a finite arithmetic series. (4 min) E MM

Arithmetic Series Formula
Learn how to write an arithmetic sequence in general terms, using a common difference d and a first term a. (8 min) E MM

Worked Example: Arithmetic Series (Sigma Notation)
Evaluate the arithmetic series $\Sigma(2k+50)$ for k=1 to 550. (7 min) E MM

Worked Example: Arithmetic Series (Sum Expression)
Evaluate the arithmetic sum (-50)+(-44)+(-38)+...+2044. (7 min) E MM

Worked Example: Arithmetic Series (Recursive Formula)
Evaluate the sum of the first 650 terms in the sequence defined recursively as $\{a_i=a_{i-1}+11, a_1=4\}$. (6 min) E MM

Proof of Finite Arithmetic Series Formula
Prove the expression for the sum of all positive integers up to and including n. (4 min) E MM

Pre-Calculus: Algebra | Intro to Limits

LIM-1.A, LIM-1.B | Limits Intro
Learn about limits, a fundamental concept in calculus. (12 min) E MM

LIM-1.C | Estimating Limit Values from Graphs
Learn to estimate limit values from graphs by observing the function's behavior as x approaches a value from both left and right sides. (6 min) E MM

LIM-1.C | Unbounded Limits
Explore estimating limit values from graphs, focusing on two functions: $y = 1/x^2$ and $y = 1/x$. (3 min) E MM

LIM-1.C | One-Sided Limits from Graphs
Discover a one-sided limit is the value the function approaches as the x-values approach the limit from *one side only*. (10 min) E MM

LIM-1.C | One-Sided Limits from Graphs: Asymptote
Explore estimating one-sided limit values from graphs. (3 min) E MM

LIM-1.C | Connecting Limits and Graphical Behavior
Explore how a description of a limit can apply to multiple different functions. (6 min) E MM

LIM-1.C | Approximating Limits Using Tables
Learn about estimating limit values from tables. (5 min) E MM

LIM-1.C | Estimating Limits from Tables
Given a table of values for a function, estimate the limit at a certain point by observing the values the function approaches from both sides. (4 min) E MM

LIM-1.C | One-Sided Limits from Tables
Explore one-sided limits using tables, focusing on estimating the value a function approaches from either the left or right. (7 min) E MM

Pre-Calculus: Algebra | Methods for Finding Limits

LIM-1.D | Limit Properties
Discover limit properties, which are intuitive rules that help simplify limit problems. (5 min) E MM

LIM-1.D | Limits of Combined Functions
Learn how to find the limit of combined functions using algebraic properties of limits. (4 min) E MM

LIM-1.D | Limits of Combined Functions: Piecewise Functions
Analyze left and right-hand limits, determine if the limit of the combined functions exists and find its value. (4 min) E MM

LIM-1.D | Theorem for Limits of Composite Functions
Find the limit of composite functions, specifically the limit as 'x' approaches 'a' of f(g(x)). (3 min) E MM

LIM-1.D | Theorem for Limits of Composite Functions: When Conditions Aren't Met
Learn to find limit of the composite function f(g(x)) at x=a. (4 min) E MM

LIM-1.D | Limits of Composite Functions: Internal Limit Doesn't Exist
Find the limit of g(h(x)) at x=-1 when the limit of h(x) at x=-1 doesn't exist. (4 min) E MM

LIM-1.D | Limits of Composite Functions: External Limit Doesn't Exist
Find the limit of g(h(x)) at x=1 when the limit of h(x) at x=1 is 2 and the limit of g(x) at x=2 doesn't exist. (4 min) E MM

LIM-1.D | Limits by Direct Substitution
Learn to find the limits of functions at points where the functions are continuous: simply plug in the x-value into the function. (2 min) E MM

LIM-1.D | Undefined Limits by Direct Substitution
Explore an example of a limit where direct substitution ends in a quotient with 0 in the denominator and non-0 in the numerator. (2 min) E MM

LIM-1.D | Limits of Trigonometric Functions
Explore limits of trigonometric functions, focusing on sine, cosine, and tangent. (6 min) E MM

LIM-1.D | Limits of Piecewise Functions
Explore limits of piecewise functions using algebraic properties of limits and direct substitution. (4 min) E MM

LIM-1.D | Limits of Piecewise Functions: Absolute Value
Find the limit of $|x-3|/(x-3)$ at $x=3$ by rewriting it and examining it as a piecewise function. (6 min) E MM

LIM-1.E | Limits by Factoring
Explore the limit of $(x^2+x-6)/(x-2)$ as x approaches 2. (6 min) E MM

LIM-1.E | Limits by Rationalizing
Explore how to find the limit of a function as x approaches -1. (10 min) E MM

LIM-1.E | Trig Limit Using Pythagorean Identity
Explore finding the limit as θ approaches 0 for the expression $(1-\cos\theta)/(2\sin^2\theta)$. (7 min) E MM

LIM-1.E | Trig Limit Using Double Angle Identity
Find the limit at $\theta=-\pi/4$ of $(1+\sqrt{2}\sin\theta)/(\cos 2\theta)$ by employing trigonometric identities. (11 min) E MM

LIM-1.E | Strategy in Finding Limits
Explore strategies for determining which technique to use when finding limits. (13 min) E MM

LIM-1.E | Squeeze Theorem (Sandwich Theorem) Intro
Discover that the squeeze (or sandwich) theorem states that if $f(x)\leq g(x)\leq h(x)$ for all numbers, and at some point $x=k$ we have $f(k)=h(k)$, then $g(k)$ must also be equal to them. (7 min) E MM

LIM-1.E | Limit of sin(x)/x as x Approaches 0
Prove that the limit of $\sin(\theta)/\theta$ as θ approaches 0 is equal to 1. (9 min) E MM

LIM-1.E | Limit of (1-cos(x))/x as x Approaches 0
Explore the limit of (1-cos(x))/x as x approaches 0 and show that it equals 0. (4 min) E MM

Pre-Calculus: Algebra | Limits & Continuity

LIM-2.A | Types of Discontinuities
Explore how a function being continuous at a point means that the two-sided limit at that point exists and is equal to the function's value. (7 min) E MM

LIM-2.A | Continuity at a Point
Discover how saying a function f is continuous when x=c is the same as saying that the function's two-side limit at x=c exists and is equal to f(c). (8 min) E MM

LIM-2.A | Worked Example: Continuity at a Point (Graphical)
Explore the necessary conditions for continuity at a point using graphical representations of functions. (7 min) E MM

LIM-2.A | Worked Example: Point Where a Function is Continuous
Find the limit of a piecewise function at the point between two different cases of the function. (4 min) E MM

LIM-2.A | Worked Example: Point Where a Function Isn't Continuous
Find the limit of a piecewise function at the point between two different cases of the function. (4 min) E MM

LIM-2.B | Continuity Over an Interval
Explore how function f is continuous over the open interval (a,b) if and only if it's continuous on every point in (a,b). (9 min) E MM

LIM-2.B | Functions Continuous on All Real Numbers
Discover how to determine if a function is continuous on all real numbers by examining two examples: e^x and $\sqrt{x}$. Generally, common functions exhibit continuity within their domain. (3 min) E MM

LIM-2.B | Functions Continuous at Specific X-Values
Determine the continuity of two functions, ln(x-3) and e^(x-3), at x=3. Explore the concept of continuity, highlighting that common functions are continuous within their domain. (4 min) E MM

LIM-2.C | Removing Discontinuities (Factoring)
Find the value the function $f(x)=(6x^2+18x+12)/(x^2-4)$ should have at x=-2 so it's continuous at that point. (4 min) E MM

LIM-2.C | Removing Discontinuities (Rationalization)
Find the value the function $f(x)=(\sqrt{(x+4)}-3)/(x-5)$ should have at x=5 so it's continuous at that point. (5 min) E MM

Pre-Calculus: Algebra | Infinite Limits & Asymptotes

LIM-2.D | Introduction to Infinite Limits
Explore the notation of infinite limits. (4 min) E MM

LIM-2.D | Infinite Limits and Asymptotes
Discover that Unbounded limits are represented graphically by vertical asymptotes and limits at infinity are represented graphically by horizontal asymptotes. (4 min) E MM

LIM-2.D | Analyzing Unbounded Limits: Rational Function
Analyze the behavior of $f(x)=-1/(x-1)^2$ around its asymptote at x=1. (5 min) E MM

LIM-2.D | Analyzing Unbounded Limits: Mixed Function
Analyze the behavior of f(x)=x/[1-cos(x-2)] around its asymptote at x=2. (6 min) E MM

LIM-2.D | Introduction to Limits at Infinity
Explore the idea and notion of limits at infinity (and negative infinity). (3 min) E MM

LIM-2.D | Functions with Same Limit at Infinity
Explore how a limit at infinity (like any other limit) describes the behavior of a function but it isn't unique to that function. (4 min) E MM

LIM-2.D | Limits at Infinity of Quotients (Part 1)
Find the limits at positive and negative infinity of $(4x^5-3x^2+3)/(6x^5-100x^2-10)$. (4 min) E MM

LIM-2.D | Limits at Infinity of Quotients (Part 2)
Analyze the limits at infinity of three different rational functions. (4 min) E MM

LIM-2.D | Limits at Infinity of Quotients with Square Roots (Odd Power)
Find the limits at positive and negative infinity of $x/\sqrt{(x^2+1)}$. (5 min) E MM

LIM-2.D | Limits at Infinity of Quotients with Square Roots (Even Power)
Discover the Limit at infinity of rational expression with radical. (4 min) E MM

Pre-Calculus: Algebra | Intermediate Value Theorem

FUN-1.A | Intermediate Value Theorem
Discover the intermediate value theorem, a fundamental concept in calculus that states if a function is continuous over a closed interval [a, b], it encompasses every value between f(a) and f(b) within that range. (8 min) E MM

FUN-1.A | Worked Example: Using the Intermediate Value Theorem
Discover how the intermediate value theorem guarantees specific outcomes for continuous functions. (7 min) E MM

FUN-1.A | Justification with the Intermediate Value Theorem: Table
Explore this example justifying the use of the intermediate value theorem (where the function is defined with a le). (6 min) E MM

FUN-1.A | Justification with the Intermediate Value Theorem: Equation
Explore this example justifying use of intermediate value theorem (where function is defined with an equation). (4 min) E MM

Pre-Calculus: Statistics & Probability | Addition & Multiplication Rules for Probability

S-CP.1, S-CP.7 | Probability with Venn Diagrams
Explore the probability of drawing a Jack or a Heart from a deck of 52 cards. It uses a Venn diagram to illustrate the concept of overlapping events and how to calculate the combined probability. (10 min) E MM

S-CP.1, S-CP.7 | Addition Rule for Probability
Explore Venn diagrams and the addition rule for probability. (11 min) E MM

S-CP.1, S-CP.2 | Compound Probability of Independent Events
Learn how to calculate probabilities of coin flips using two methods: listing all possible outcomes or multiplying independent events. (6 min) E MM

S-CP.1, S-CP.2 | Independent Events Example: Test Taking
Discover the probability of two independent events occurring. (5 min) E MM

S-CP.3, S-CP.8 | General Multiplication Rule Example: Independent Events
Use the general multiplication rule to find the probability that two events both occur when the events are independent. (3 min) E MM

S-CP.8 | Dependent Probability Introduction Explore dependent probability using a scenario involving a casino game. (7 min) E MM

S-CP.8 | General Multiplication Rule Example: Dependent Events
Use the general multiplication rule to find the probability that two events both occur when the events are not independent. (3 min) E MM

S-CP.8 | Interpreting General Multiplication Rule
Express the probability that two events both occur symbolically using the general multiplication rule,and we can interpret probability statements that are expressed symbolically. (5 min) E MM

S-MD.6 | Using Probabilities to Make Fair Decisions Example
Determine whether probabilities are being used to make a fair decision. (4 min) E MM

Pre-Calculus: Statistics & Probability | Permutations

S-CP.9 | Factorial and Counting Seat Arrangements
Learn how to use permutations to solve problems involving ways to arrange things. (6 min) E MM

S-CP.9 | Permutation Formula
Explore this useful technique by solving seating arrangement problems with factorial notation and a general formula. (8 min) E MM

S-CP.9 | Possible Three Letter Words
Explain how to find all the possible three letter words when we can use each letter as many times as we want, and when each letter can only be used once. (6 min) E MM

S-CP.9 | Zero Factorial or 0!
Learn that factorials are a quick way to represent multiplying a number by all the smaller positive integers down to one. This video also shows why mathematicians have defined zero factorial as one, instead of zero, to make the formula for permutations work in all cases. (5 min) E MM

S-CP.9 | Ways to Arrange Colors
Explore how many ways you can pick four colors from a group of 6. (4 min)

S-CP.9 | Ways to Pick Officers
Explore how many ways we can pick officers for our organization in this problem. (3 min) E MM

Pre-Calculus: Statistics & Probability | Combinations

S-CP.9 | Intro to Combinations
Learn the difference between permutations and combinations, using the example of seating six people in three chairs. (7 min) E MM

S-CP.9 | Combination Formula
Learn the difference between permutations and combinations, and how to calculate them using factorials. (12 min) E MM

S-CP.9 | Handshaking Combinations
Explore how different combinations of people can shake hands. (8 min) E MM

S-CP.9 | Combination Example: 9 Card Hands
Explore how many ways we can construct a hand of 9 cards. (8 min) E MM

Pre-Calculus: Statistics & Probability | Probability Using Combinatorics

S-CP.9 | Probability Using Combinations Explore the probability of getting exactly 3 heads in 8 flips of a fair coin. (9 min) E MM

S-CP.9 | Example: Lottery Probability
Discover what the probability of winning a 4-number lottery is. (5 min) E MM

S-CP.9 | Example: Different Ways to Pick Officers
Explore the different ways we can pick officers to find the probability of one situation in particular. (2 min) E MM

S-CP.9 | Probability with Permutations & Combinations Example: Taste Testing
Learn to use combinations (when order does not matter) and permutations (when order does matter) to find probabilities. (4 min) E MM

S-CP.9 | Probability with Combinations Example: Choosing Groups
Use two combinations (when order does not matter) to find the probability of someone being included in the group that's chosen at random from a larger group created. (4 min) E MM

S-CP.9 | Probability with Combinations Example: Choosing Cards
Use combinations (when order does not matter) to find the probability of drawing two aces and two kings in a draw of four cards. (3 min) E MM

S-CP.9 | Mega Millions Jackpot Probability
Explore the probability of winning the mega millions jackpot. (6 min) E MM

Pre-Calculus: Statistics & Probability | Probability Distributions

S-MD.1 | Constructing a Probability Distribution for Random Variable
Learn how to create the probability distribution of the number of "heads" after 3 flips of a fair coin. (7 min) E MM

S-MD.1 | Valid Discrete Probability Distribution Examples
Explore examples on identifying valid discrete probability distributions. (4 min) E MM

S-MD.1 | Probability with Discrete Random Variable Example
Analyze discrete probability distribution. (4 min) E MM

S-MD.1 | Theoretical Probability Distribution Example: Tables
Learn to create the probability distribution for rolling two dice by creating a table to represent the events that make up the sample space. (3 min) E MM

S-MD.1 | Theoretical Probability Distribution Example: Multiplication
Learn to create a probability distribution for the number of times someone wins a prize using the multiplication rule. (3 min) E MM

S-MD.1 | Probability Distributions from Empirical Data
Learn to approximate a probability distribution by using empirical or observed data. (3 min) E MM

Pre-Calculus: Statistics & Probability | Expected Value

S-MD.2 | Mean (Expected Value) of a Discrete Random Variable
Learn to calculate the mean (or expected value) of a discrete random variable as the weighted average of all the outcomes of that random variable based on their probabilities. (5 min) E MM

S-MD.2 | Interpreting Expected Value
Explore how to interpret expected value as a long-term average outcome. (3 min) E MM

S-MD.5a | Expected Payoff Example: Lottery Ticket
Find the expected payoff (or the expected net gain) of a certain lottery ticket by taking the weighted average the outcomes. (4 min) E MM

S-MD.5a | Expected Payoff Example: Protection Plan
Find the expected payoff (or the expected net gain) of a protection plan offered by a store by taking the weighted average of the outcomes. (3 min) E MM

Calculus

CAL 1-4, CAL 6-11, CAL 13-18, CAL 21-30 | CalcVR
Interactive app that allows students to explore the geometric meaning of three-dimensional objects, concepts and notions. (unlimited)

Calculus: Limits | Intro to Limits

LIM-1.A | Limits Intro
Learn about limits, a fundamental concept in calculus. (12 min) E MM

LIM-1.C | Estimating Limit Values from Graphs Learn to estimate limit values from graphs by observing the function's behavior as x approaches a value from both left and right sides. (7 min) E MM

LIM-1.C | Unbounded Limits
Explore estimating limit values from graphs, focusing on two functions: $y = 1/x^2$ and $y = 1/x$. For $y = 1/x^2$, the limit is unbounded as x approaches 0, since the function increases without bound. (3 min) E MM

LIM-1.C.1 | One-Sided Limits from Graphs
Explore how a one-sided limit is the value the function approaches as the x-values approach the limit from *one side only*. (9 min) E MM

LIM-1.C.3 | One-Sided Limits from Graphs: Asymptote
Explore estimating one-sided limit values from graphs. (3 min) E MM

LIM-1.C.3 | Connecting Limits and Graphical Behavior
Analyze a function's limits from its graph, we are looking at the more "interesting" points. (5 min) E MM

LIM-1.C.4 | Approximating Limits Using Tables Analyze various 1- and 2-sided limits of a function given graphically. (5 min) E MM

LIM-1.C.5 | Estimating Limits from Tables Given a table of values for a function, estimate the limit at a certain point by observing the values the function approaches from both sides. (4 min) E MM

LIM-1.C.5 | One-Sided Limits from Tables
Explore one-sided limits using tables, focusing on estimating the value a function approaches from either the left or right. (6 min) E MM

Calculus: Limits | Methods for Finding Limits

LIM-1.D.2 | Limit Properties
Discover limit properties, which are intuitive rules that help simplify limit problems. (5 min) E MM

LIM-1.D.2 | Limits of Combined Functions Learn how to find the limit of combined functions using algebraic properties of limits. (4 min) E MM

LIM-1.D.2 | Limits of Combined Functions: Piecewise Functions
Discover that even when individual limits of functions f(x) and g(x) don't exist, the limit of their sum or product might still exist. (4 min) E MM

LIM-1.D.2 | Theorem for Limits of Composite Functions
Find the limit of composite functions, specifically the limit as 'x' approaches 'a' of f(g(x)). (3 min) E MM

LIM-1.D.2 | Theorem for Limits of Composite Functions: When Conditions Aren't Met
Find the limit of the composite function f(g(x)) at x=a. (3 min) E MM

LIM-1.D.2 | Limits of Composite Functions: Internal Limit Doesn't Exist
Find the limit of g(h(x)) at x=-1 when the limit of h(x) at x=-1 doesn't exist. (4 min) E MM

LIM-1.D.2 | Limits of Composite Functions: External Limit Doesn't Exist
Find the limit of g(h(x)) at x=1 when the limit of h(x) at x=1 is 2 and the limit of g(x) at x=2 doesn't exist. (3 min) E MM

LIM-1.D.2 | Limits by Direct Substitution
Discover how to find limits of functions at points where the functions are continuous: simply plug in the x-value into the function. (2 min) E MM

LIM-1.D.2 | Undefined Limits by Direct Substitution
Explore an example of a limit where direct substitution ends in a quotient with 0 in the denominator and non-0 in the numerator. (2 min) E MM

LIM-1.E.2 | Limits of Trigonometric Functions
Discover limits of trigonometric functions, focusing on sine, cosine, and tangent. (6 min) E MM

LIM-1.E.2 | Limits of Piecewise Functions Explore limits of piecewise functions using algebraic properties of limits and direct substitution. (4 min) E MM

LIM-1.E.2 | Limits of Piecewise Functions: Absolute Value
Find the limit of $|x-3|/(x-3)$ at x=3 by rewriting it and examining it as a piecewise function. (6 min) E MM

LIM-1.D.2 | Limits by Factoring
Explore the limit of $(x^2+x-6)/(x-2)$ as x approaches 2. (6 min) E MM

LIM-1.D.2 | Limits by Rationalizing
Explore how to find the limit of a function as x approaches -1. (10 min) E MM

LIM-1.E.2 | Trig Limit Using Pythagorean Identity
Explore finding the limit as θ approaches 0 for the expression $(1-\cos\theta)/(2\sin^2\theta)$. (7 min) E MM

LIM-1.E.2 | Trig Limit Using Double Angle Identity
Find the limit at $\theta=-\pi/4$ of $(1+\sqrt{2}\sin\theta)/(\cos 2\theta)$ by employing trigonometric identities. (11 min) E MM

LIM-1.E.2 | Strategy in Finding Limits
Explore strategies for determining which technique to use when finding limits. (13 min) E MM

LIM-1.E.2 | Squeeze Theorem (Sandwich Theorem) Intro
Discover that the squeeze (or sandwich) theorem states that if $f(x)\leq g(x)\leq h(x)$ for all numbers, and at some point, $x=k$ we have $f(k)=h(k)$, then $g(k)$ must also be equal to them. (7 min) E MM

LIM-1.E.2 | Limit of sin(x)/x as x Approaches 0
Prove that the limit of $\sin(\theta)/\theta$ as θ approaches 0 is equal to 1. (9 min) E MM

LIM-1.E.2 | Limit of (1-cos(x))/x as x Approaches 0
Explore the limit of $(1-\cos(x))/x$ as x approaches 0 and show that it equals 0. (4 min) E MM

Calculus: Limits | Limits & Continuity

LIM-2.A | Types of Discontinuities
Explore the different types of discontinuities. (7 min) E MM

LIM-2.A | Continuity at a Point
Discover how saying a function f is continuous when x=c is the same as saying that the function's two-side limit at x=c exists and is equal to f(c). (8 min) E MM

LIM-2.A | Worked Example: Continuity at a Point (Graphical)
Explore the necessary conditions for continuity at a point using graphical representations of functions. (7 min) E MM

LIM-2.A | Worked Example: Point Where a Function is Continuous
Find the limit of a piecewise function at the point between two different cases of the function. (4 min) E MM

LIM-2.A | Worked Example: Point Where a Function Isn't Continuous
Find the limit of a piecewise function at the point between two different cases of the function. (4 min) E MM

LIM-2.B Continuity Over an Interval
Discover that A function f is continuous over the open interval (a,b) if and only if it's continuous on every point in (a,b). (9 min) E MM

LIM-2.B | Functions Continuous on All Real Numbers
Discover how to determine if a function is continuous on all real numbers by examining two examples: e^x and $\sqrt{x}$. (3 min) E MM

LIM-2.B | Functions Continuous at Specific X-Values
Explore the concept of continuity, highlighting that common functions are continuous within their domain. (4 min) E MM

LIM-2.C | Removing Discontinuities (Factoring)
Find the value the function $f(x)=(6x^2+18x+12)/(x^2-4)$ should have at $x=-2$ so it's continuous at that point. (5 min) E MM

LIM-2.C | Removing Discontinuities (Rationalization)
Find the value the function $f(x)=(\sqrt{(x+4)}-3)/(x-5)$ should have at $x=5$ so it's continuous at that point. (5 min) E MM

Calculus: Limits | Infinite Limits & Asymptotes

LIM-2.D | Introduction to Infinite Limits
Discover the notation of infinite limits. (4 min) E MM

LIM-2.D | Infinite Limits and Asymptotes
Explore unbounded limits are represented graphically by vertical asymptotes and limits at infinity are represented graphically by horizontal asymptotes. (4 min) E MM

LIM-2.D | Analyzing Unbounded Limits: Rational Function
Analyze the behavior of $f(x)=-1/(x-1)^2$ around its asymptote at $x=1$. (5 min) E MM

LIM-2.D | Analyzing Unbounded Limits: Mixed Function
Analyze the behavior of $f(x)=x/[1-\cos(x-2)]$ around its asymptote at $x=2$. (6 min) E MM

LIM-2.D | Introduction to Limits at Infinity
Explore the idea and notion of limits at infinity (and negative infinity). (3 min) E MM

LIM-2.D | Functions with Same Limit at Infinity
Discover that a limit at infinity (like any other limit) describes the behavior of a function but it isn't unique to that function. (4 min) E MM

LIM-2.D | Limits at Infinity of Quotients (Part 1)
Find the limits at positive and negative infinity of $(4x^5-3x^2+3)/(6x^5-100x^2-10)$. (4 min) E MM

LIM-2.D | Limits at Infinity of Quotients (Part 2)
Analyze the limits at infinity of three different rational functions. (5 min) E MM

LIM-2.D | Limits at Infinity of Quotients with Square Roots (Odd Power)
Find the limits at positive and negative infinity of $x/\sqrt{(x^2+1)}$. (5 min) E MM

LIM-2.D | Limits at Infinity of Quotients with Square Roots (Even Power)
Discover the Limit at infinity of rational expression with radical. (4 min) E MM

Calculus: Limits | Intermediate Value Theorem

FUN-1.A | Intermediate Value Theorem
Discover the intermediate value theorem, a fundamental concept in calculus that states if a function is continuous over a closed interval [a, b], it encompasses every value between f(a) and f(b) within that range. (8 min) E MM

FUN-1.A | Worked Example: Using the Intermediate Value Theorem
Discover how the intermediate value theorem guarantees specific outcomes for continuous functions. (7 min) E MM

FUN-1.A | Justification with the Intermediate Value Theorem: Table
Explore this example justifying the use of the intermediate value theorem (where the function is defined with a le). (6 min) E MM

FUN-1.A | Justification with the Intermediate Value Theorem: Equation
Explore this example justifying use of intermediate value theorem (where function is defined with an equation). (4 min) E MM

Calculus: Limits | Formal Definition of Limits

LIM-1.D | Formal Definition of Limits Part 1: Intuition Review
Enhance your understanding of this fundamental concept by reviewing how function values approach a specific limit as the input variable gets closer to a certain point. (4 min) E MM

LIM-1.D | Formal Definition of Limits Part 2: Building the Idea
Explore the rigorous mathematical definition of a limit as x approaches c, and understand how to get f(x) as close to L as desired by finding a range around c. (6 min) E MM

LIM-1.D | Formal Definition of Limits Part 3: The Definition
Explore the epsilon-delta definition of limits, which states that the limit of f(x) at x=c equals L if, for any $\varepsilon>0$, there's a $\delta>0$ ensuring that when the distance between x and c is less than δ, the distance between f(x) and L is less than ε. (7 min) E MM

LIM-1.D | Formal Definition of Limits Part 4: Using the Definition
Explore the epsilon-delta definition of limits in calculus, as we rigorously prove a limit exists for a piecewise function. (9 min) E MM

Calculus: Differentiation | Defining Average & Instantaneous Rates of Change at a Point

CHA-2.A, CHA-2.B | Newton, Leibniz, and Usain Bolt
Uncover the connection between Newton and Leibniz's pioneering work and Usain Bolt's impressive sprinting speeds, while grasping the significance of determining instantaneous velocity in diverse situations (9 min) E MM

CHA-2.A, CHA-2.B | Derivative as a Concept
Learn about derivatives as the instantaneous rate of change and the slope of the tangent line. (7 min) E MM

CHA-2.A | Secant Lines & Average Rate of Change
Learn how to calculate the average rate of change for a function and its connection to the slope of a secant line. (5 min) E MM

CHA-2.B, CHA-2.C | Derivative as Slope of Curve
Explore how to interpret the derivative of a function at a specific point as the curve's slope or the tangent line's slope at that point. (6 min) E MM

CHA-2.B, CHA-2.C | The Derivative & Tangent Line Equations
Discover how the derivative of a function reveals the slope of the tangent line at any point on the graph. (8 min) E MM

Calculus: Differentiation | Defining the Derivative of a Function & Using Derivative Notation

CHA-2.B | Formal Definition of the Derivative as a Limit
Discover how to define the derivative of a function at a specific point using the limit of the slope of the secant line. (16 min) E MM

CHA-2.B | Formal and Alternate Form of the Derivative
Discover the two methods for defining the derivative of a function at a specific point using limit expressions. (5 min) E MM

CHA-2.B | Worked Example: Derivative as a Limit
Discover how to apply the formal and alternate forms of the derivative in real-world scenarios. (6 min) E MM

CHA-2.B | Worked Example: Derivative from Limit Expression
Explore a limit expression and discover that it represents the derivative of the function $f(x) = x^3$ at the point $x = 5$. (5 min) E MM

CHA-2.B | The Derivative of x^2 at x=3 Using the Formal Definition
Learn to calculate the slope of the tangent line at a specific point on the curve $y=x^2$ by applying the limit as the change in x approaches zero. (9 min) E MM

CHA-2.B | The Derivative of x^2 at Any Point Using the Formal Definition
Learn to apply the limit as h approaches 0 to determine the slope of the tangent line at a given point on the curve $y = x^2$. (11 min) E MM

CHA-2.D | Estimating Derivatives
Estimate the derivative at a point using the slope of a secant line connecting points around that point. (6 min) E MM

Calculus: Differentiation | Differentiability & Continuity

FUN-2.A | Differentiability and Continuity
Explore differentiability and get an intuition for the relationship between differentiability and continuity. (10 min) E MM

FUN-2.A | Differentiability at a Point: Graphical
Explore examples of functions and their graphs, focusing on finding points where the function isn't differentiable. (6 min) E MM

FUN-2.A | Differentiability at a Point: Algebraic (Function is Differentiable)
Examine a piecewise function to determine its continuity and differentiability at an edge point. (5 min) E MM

FUN-2.A | Differentiability at a Point: Algebraic (Function Isn't Differentiable)
Examine a piecewise function to determine its differentiability and continuity at an edge point. (6 min) E MM

Calculus: Differentiation | Basic Derivative Rules

FUN-3.A | Power Rule
Discover the power rule, a handy tool for finding the derivative of x^n. (4 min) E MM

FUN-3.A | Power Rule (With Rewriting the Expression)
Discover how the power rule helps us find derivatives of functions like $1/x$, $\sqrt[3]{x}$, or $\sqrt[3]{x^2}$. (5 min) E MM

FUN-3.A | Basic Derivative Rules
Explore how to find the derivative of any polynomial using the power rule and additional properties. (10 min) E MM

FUN-3.A | Basic Derivative Rules: Find the Error
Analyze two students' attempts to differentiate linear functions using basic rules. (5 min) E MM

FUN-3.A | Basic Derivative Rules: Table
Explore a problem involving two functions, f and g, and their derivatives at specific points. (9 min) E MM

FUN-3.A | Differentiating Polynomials
Explore how to differentiate polynomials using the power rule and derivative properties. (7 min) E MM

FUN-3.A | Differentiating Integer Powers (Mixed Positive and Negative)
Explore how to differentiate the function $g(x) = 2/(x^3) - 1/(x^2)$ and evaluate the derivative at $x = 2$. (5 min) E MM

FUN-3.A | Tangents of Polynomials
Find the equation of the line tangent to the graph of $f(x)=x^3-6x^2+x-5$ at $x=1$. (5 min) E MM

Calculus: Differentiation | Derivatives of cos(x), sin(x), e^x, & ln(x)

FUN-3.A | Derivatives of sin(x) and cos(x)
Explore the intuition behind the derivatives of trigonometric functions, discovering that the derivative of sin(x) is cos(x) and the derivative of cos(x) is -sin(x). (4 min) E MM

FUN-3.A | Worked Example: Derivatives of sin(x) and cos(x)
Discover the derivative of the function $g(x) = 7\sin(x) - 3\cos(x) - (\pi/\sqrt[3]{x})^2$. (5 min) E MM

FUN-3.A | Derivative of e^x
Explore the properties of the derivative of e^x. (3 min) E MM

FUN-3.A | Derivative of ln(x)
Discover the derivative of ln(x) is 1/x. (2 min) E MM

Calculus: Differentiation | Product Rule & Quotient Rule

FUN-3.B | Product Rule
Discover the product rule, a fundamental technique for finding the derivative of a function expressed as a product of two functions. (3 min) E MM

FUN-3.B | Differentiating Products
Explore the product rule by finding the derivative of $e^x\cos(x)$. (4 min) E MM

FUN-3.B | Worked Example: Product Rule with Table
Explore how to evaluate the derivative of the product of two functions, f(x) and h(x), at x=3, using given values for f, h, and their derivatives. (3 min) E MM

FUN-3.B | Worked Example: Product Rule with Mixed Implicit & Explicit
Explore how to calculate the derivative of F(x) = f(x)·g(x) at x = -1, given the values of f and f' at x = -1 and g(x) = 1/x.
(3 min) E MM

FUN-3.B | Quotient Rule
Discover the quotient rule, a powerful technique for finding the derivative of a function expressed as a quotient.
(4 min) E MM

FUN-3.B | Worked Example: Quotient Rule with Table
Explore how to find the derivative of F(x) = f(x)/g(x) at x = -1, given the values of f and f' at x = -1 and $g(x) = 2x^3$. (6 min) E MM

FUN-3.B | Differentiating Rational Functions
Discover the differentiation of the rational function $(5-3x)/(x^2+3x)$ using the Quotient Rule. (7 min) E MM

FUN-3.B | Derivatives of tan(x) and cot(x)
Find the derivatives of tan(x) and cot(x) by rewriting them as quotients of sin(x) and cos(x). (5 min) E MM

FUN-3.B | Derivatives of sec(x) and csc(x)
Explore the derivatives of sec(x) and csc(x) by expressing them as 1/cos(x) and 1/sin(x), respectively, and applying the quotient rule.
(4 min) E MM

Calculus: Differentiation | Intro to the Chain Rule

FUN-3.C | Chain Rule
Discover that the chain rule states that the derivative of f(g(x)) is f'(g(x))·g'(x).
(5 min) E MM

FUN-3.C | Common Chain Rule Misunderstandings
Explore these three common student misconceptions when applying the chain rule. (7 min) E MM

FUN-3.C | Identifying Composite Functions
Review of composite functions and how to recognize them. (8 min) E MM

FUN-3.C | Worked Example: Derivative of $\cos^3(x)$ Using the Chain Rule
Examine this example of composite functions, using the example $f(x) = \cos^3(x)$.
(9 min) E MM

FUN-3.C | Worked Example: Derivative of $\sqrt{(3x^2-x)}$ Using the Chain Rule
Discover the process of differentiating a composite function, specifically f(x)=sqrt(3x^2-x), using the chain rule.
(6 min) E MM

FUN-3.C | Worked Example: Derivative of ln(√x) Using the Chain Rule
Examine and dissect the composite function f(x)=ln(√x) into its parts, ln(x) and √x.
(7 min) E MM

Calculus: Differentiation | The Chain Rule: More Practice

FUN-3.C | Worked Example: Chain Rule with Table
Explore the Chain rule with a table.
(3 min) E MM

FUN-3.C | Derivative of a^x (For Any Positive Base a)
Explore the derivative of a^x for any positive base a. (6 min) E MM

FUN-3.C | Derivative of $\log_a x$ (For Any Positive Base $a\neq1$)
Find the derivative of $\log_a x$ for any positive base $a\neq1$. (5 min) E MM

FUN-3.C | Worked Example: Derivative of $7^{(x^2-x)}$ Using the Chain Rule
Explore the process of differentiating the exponential function $7^{(x^2-x)}$. (4 min) E MM

FUN-3.C | Worked Example: Derivative of $\log_4(x^2+x)$ Using the Chain Rule
Explore a worked example of differentiating the logarithmic function $\log_4(x^2+x)$ using the chain rule.
(4 min) E MM

FUN-3.C | Worked Example: Derivative of sec(3π/2-x) Using the Chain Rule
Explore the process of differentiating the function sec(3π/2-x) in this worked example. (7 min) E MM

FUN-3.C | Worked example: Derivative of $\sqrt[4]{(x^3+4x^2+7)}$ Using the Chain Rule
Explore the challenge of differentiating the fourth root of a polynomial expression in this worked example. (6 min) E MM

Calculus: Differentiation | Implicit Differentiation

FUN-3.D | Implicit Differentiation
Explore how Implicit differentiation helps us find dy/dx even for relationships like that. (8 min) E MM

FUN-3.D | Worked Example: Implicit Differentiation
Use implicit differentiation to solve the equation $(x-y)^2 = x + y - 1$ in this worked example. (5 min) E MM

FUN-3.D | Worked Example: Evaluating
Derivative with Implicit Differentiation Calculate the slope of a tangent line at a specific point on a curve using implicit differentiation. (5 min) E MM

FUN-3.D | Showing Explicit and Implicit Differentiation Gives Same Result
Discover the connection between implicit and explicit differentiation. (8 min) E MM

Calculus: Differentiation | Differentiating Inverse Functions

FUN-3.E | Derivatives of Inverse Functions
Learn that Functions f and g are inverses if f(g(x))=x=g(f(x)) and see how it applies to e^x and ln(x). (5 min) E MM

FUN-3.E | Derivatives of Inverse Functions: From Equation
Explore the relationship between a function and its inverse, focusing on the function $f(x)=\frac{1}{2}x^3+3x-4$. (5 min) E MM

FUN-3.E | Derivatives of Inverse Functions: From Table
Discover inverse functions, exploring how to evaluate the derivative of an inverse function, h', at a specific x-value. (5 min) E MM

FUN-3.E | Derivative of Inverse Sine
Learn to find the derivative of inverse sine. (5 min) E MM

FUN-3.E | Derivative of Inverse Cosine
Learn to find the inverse cosine function. (4 min) E MM

FUN-3.E | Derivative of Inverse Tangent
Learn to find the derivative of the inverse tangent function. (6 min) E MM

Calculus: Differentiation | Strategies for Calculating Derivatives

Differentiating Functions: Find the Error
Examine the work of students differentiating various functions to see if they made a mistake, and if so, what mistake. (11 min) E MM

Manipulating Functions Before Differentiation
Explore how to rewrite a function before differentiating it so the process of differentiation is faster and easier. (11 min) E MM

Differentiating Using Multiple Rules: Strategy
Analyze the structure of an elaborate expression to determine which derivative rules to use, and (not less important) in what order. (6 min) E MM

Applying the Chain Rule and Product Rule
Explore this example showing multiple strategies for taking a derivative that involves both the product rule and the chain rule. (6 min) E MM

Applying the Chain Rule Twice
Solve this example applying the chain rule twice. (3 min) E MM

Derivative of $e^{\cos x} \cdot \cos(e^x)$
Differentiate $e^{\cos x} \cdot \cos(e^x)$ by applying both the product rule and the chain rule. (6 min) E MM

Derivative of $\sin(\ln(x^2))$
Differentiate $\sin(\ln(x^2))$ by applying the chain rule twice. (5 min) E MM

LIM-3.A | Disguised Derivatives
Differentiates the product of three different functions and generalizes for the derivative of the product of any number of functions. (5 min) E MM

Calculus: Differentiation | Higher-Order Derivatives

FUN-3.F | Second Derivatives
Find the second derivative of $y=6/x^2$. Second derivative is the derivative of the derivative of y. (3 min) E MM

FUN-3.F | Second Derivatives (Implicit Equations): Find Expression
Given an implicit equation in x and y, find the expression for the second derivative of y with respect to x. (5 min) E MM

FUN-3.F | Second Derivatives (Implicit Equations): Evaluate Derivative
Given the first derivative of an implicit equation in x and y, evaluate the second derivative at a certain point. (5 min) E MM

Calculus: Differentiation | Proofs of Derivative Rules

Proof: Differentiability Implies Continuity
Discover that if a function is differentiable at a point, it is also continuous at that point. (12 min) E MM

Justifying the Power Rule
Explore the power rule's validity by examining the derivatives of x^1 and x^2. (7 min) E MM

Proof of Power Rule for Positive Integer Powers
Explore the formula for the derivative of x^n by skillfully applying the binomial theorem. (7 min) E MM

Proof of Power Rule for Square Root Function
Explore a proof of the power rule for the special case when n=½, focusing on the derivative of √x. (5 min) E MM

LIM-1.E | Limit of sin(x)/x as x Approaches 0
Prove that the limit of sin(θ)/θ as θ approaches 0 is equal to 1. (9 min) E MM

LIM-1.E | Limit of (1-cos(x))/x as x Approaches 0
Explore e the limit of (1-cos(x))/x as x approaches 0 and show that it equals 0. (4 min) E MM

Proof of the Derivative of sin(x)
Discover the proof that the derivative of sin(x) equals cos(x). (6 min)

Proof of the Derivative of cos(x)
Examine that the derivative of sin(x) equals cos(x) to visually demonstrate that the derivative of cos(x) equals -sin(x). (4 min) E MM

Product Rule Proof
Explore the proof of the product rule, a key concept in calculus. (9 min) E MM

If Function u is Continuous at x, Then Δu→0 as Δx→0
Discover that if a function is continuous, the difference in the function's values approaches 0 as the difference in the x-values approaches 0. (7 min) E MM

Chain Rule Proof
Use the formal properties of continuity and differentiability to see why the chain rule is true. (6 min) E MM

Quotient Rule from Product & Chain Rules
Explore how you can derive the quotient rule using the product rule and the chain rule. (5 min) E MM

Calculus: Differentiation | Straight-Line Motion: Connecting Position, Velocity, & Acceleration

CHA-3.B | Introduction to One-Dimensional Motion with Calculus
Discover that straight-line motion can be modeled by giving position as a function of time. (7 min) E MM

CHA-3.B | Interpreting Direction of Motion from Position-Time Graph
Given the position-time graph of a linear motion, interpret whether the moving object moves forward or backward. (3 min) E MM

CHA-3.B | Interpreting Direction of Motion from Velocity-Time Graph
Given the velocity-time graph of a linear motion, interpreting whether the moving object moves forward or backward. (2 min) E MM

CHA-3.B | Interpreting Change in Speed from Velocity-Time Graph
Explore this example thinking about speed from velocity-time graph. (4 min) E MM

CHA-3.B | Worked Example: Motion Problems with Derivatives
Find and interpret the velocity and acceleration given position as a function of time. (5 min) E MM

Calculus: Differentiation | Rates of Change in Other Applied Contexts

CHA-3.A | Interpreting the Meaning of the Derivative in Context
Discover how to make sense of derivatives when they are used to describe real-world situations. (5 min) E MM

CHA-3.C | Applied Rate of Change: Forgetfulness
Explore applied rate of change in this problem about forgetfulness. (5 min) E MM

Marginal Cost & Differential Calculus
In economics, the idea of marginal cost can be nicely captured with the derivative. (5 min) E MM

Calculus: Differentiation | Related Rates

CHA-3.D | Related Rates Intro
Examine the relationship between how fast a circle's radius changes, and how fast its area changes. (8 min) E MM

CHA-3.D | Analyzing Related Rates Problems: Expressions
Explore and understand all the involved quantities in a related rates problem. (8 min) E MM

CHA-3.D | Analyzing Related Rates Problems: Equations (Pythagoras)
Discover that a crucial part of solving related rates problems is picking an equation that correctly relates the quantities. (4 min) E MM

CHA-3.D | Analyzing Related Rates Problems: Equations (Trig)
Find the rate of change of an angle that a falling ladder forms with the ground. (8 min) E MM

CHA-3.D | Differentiating Related Functions Intro
Use the chain rule, find the derivatives of those functions with respect to that variable. (4 min) E MM

CHA-3.D | Worked Example: Differentiating Related Functions
Learn how to use implicit differentiation to find the derivatives of the functions with respect to that variable. (8 min) E MM

CHA-3.E | Related Rates: Approaching Cars
Explore how the rate of change of the distance between them changes as two cars approach the same intersection from different roads. (7 min) E MM

CHA-3.E | Related Rates: Falling Ladder
Discover the rate of change in this problem. (6 min) E MM

CHA-3.E | Related Rates: Water Pouring into a Cone
As you pour water into a cone, discover how the rate of change of the depth of the water relate to the rate of change in volume. (12 min) E MM

CHA-3.E | Related Rates: Shadow
Solve a related rates problem about the shadow an owl casts as it's hunting a mouse. (11 min) E MM

CHA-3.E | Related Rates: Balloon
Analyze the rate of change of a balloon's altitude based on the angle you must crane your neck to look at it. (8 min) E MM

Calculus: Differentiation | Local Linearity

CHA-3.F | Local Linearity
Explore the idea of approximating curves using their tangent line equations. (10 min) E MM

CHA-3.F | Local Linearity and Differentiability
Learn how local linearity relates to differentiability using the Desmos graphing calculator. (7 min) E MM

CHA-3.F | Worked Example: Approximation with Local Linearity
Find the equation of a tangent line at a point of a curve by knowing the derivative at that point. (4 min) E MM

CHA-3.F | Linear Approximation of a Rational Function
Find a linear expression that approximates $y=1/(x-1)$ around $x=-1$. (7 min) E MM

Calculus: Differentiation | L'Hôpital's Rule: Limits of Indeterminate Forms

LIM-4.A | L'Hôpital's Rule Introduction
When you are solving a limit, and get 0/0 or ∞/∞, L'Hôpital's rule is the tool you need. (9 min) E MM

LIM-4.A | L'Hôpital's Rule: Limit at 0 Example
Use L'Hôpital's rule to find the limit at 0 of $(2\sin(x)-\sin(2x))/(x-\sin(x))$. (8 min) E MM

LIM-4.A | L'Hôpital's Rule: Limit at Infinity Example
Use L'Hôpital's rule to find the limit at infinity of $(4x^2-5x)/(1-3x^2)$. (5 min) E MM

Calculus: Differentiation | Using the Mean Value Theorem

FUN-1.B | Mean Value Theorem
The Mean Value Theorem states that if a function f is continuous on the closed interval [a,b] and differentiable on the open interval (a,b), then there exists a point c in the interval (a,b) such that f'(c) is equal to the function's average rate of change over [a,b]. (7 min) E MM

FUN-1.B | Mean Value Theorem Example: Polynomial
Find the number that satisfies the Mean value theorem for $f(x)=x^2-6x+8$ over the interval [2,5]. (5 min) E MM

FUN-1.B | Mean Value Theorem Example: Square Root Function
Find the number that satisfies the Mean value theorem for $f(x)=\sqrt{(4x-3)}$ over the interval [1,3]. (7 min) E MM

FUN-1.B | Justification with the Mean Value Theorem: Table
Explore this example justifying use of mean value theorem (where function is defined with a table). (4 min) E MM

FUN-1.B | Justification with the Mean Value Theorem: Equation
Explore this example justifying use of mean value theorem (where function is defined with an equation). (3 min) E MM

FUN-1.B | Mean Value Theorem Application
Explore how to apply the mean value theorem in this speeding problem. (7 min) E MM

Calculus: Differentiation | Extrema, Critical Points, & Intervals

FUN-1.C | Extreme Value Theorem
The extreme value theorem states that if a function is continuous on a closed interval [a,b], then the function must have a maximum and a minimum on the interval. (8 min) E MM

FUN-1.C | Critical Points Introduction
Discover the "critical points" of a function and discuss their relationship with the extremum points of the function. (8 min) E MM

FUN-1.C | Finding Critical Points
Find the critical points of $f(x)=xe^{(-2x^2)}$. (6 min) E MM

FUN-4.A | Finding Decreasing Interval Given the Function
Find the intervals where the function $f(x)=x^6-3x^5$ is decreasing by analyzing the intervals where f' is positive or negative. (5 min) E MM

FUN-4.A | Finding Increasing Interval Given the Derivative
Given that the derivative of function g, is $g'(x)=x^2/(x-2)^3$, find the intervals where g is increasing, by looking for the intervals where g' is positive. (6 min) E MM

FUN-4.A | Introduction to Minimum and Maximum Points
Discover all about minimum and maximum points, both absolute and relative. (6 min) E MM

FUN-4.A | Finding Relative Extrema (First Derivative Test)
Discover how to find a critical point and tell if it is a minimum, maximum or neither. (5 min) E MM

FUN-4.A | Worked Example: Finding Relative Extrema
Find the relative maximum point of $g(x)=x^4-x^5$ by analyzing the intervals where its derivative, g', is negative or positive. (8 min) E MM

FUN-4.A | Analyzing Mistakes when Finding Extrema (Example 1)
Examine the work of someone who tried to find extrema of a function, to see whether they made mistakes. (5 min) E MM

FUN-4.A | Analyzing Mistakes when Finding Extrema (Example 2)
Examine the work of someone who tried to find extrema of a function, to see whether they made mistakes. (5 min) E MM

FUN-4.A | Finding Absolute Extrema on a Closed Interval
Find the absolute maximum value of $f(x)=8\ln(x)-x^2$ over the interval [1,4]. (7 min) E MM

FUN-4.A | Absolute Minima & Maxima (Entire Domain)
Discover the absolute minimum and maximum points of $g(x)=x^2\ln(x)$ over its entire domain. (10 min) E MM

FUN-4.A | Second Derivative Test
Explore an example of the second derivative test, which is a way of determining relative minima & maxima. (6 min) E MM

Calculus: Differentiation | Concavity & Points of Inflection

FUN-4.A | Concavity Introduction
Explore the concept of concavity, what it means for a graph to be "concave up" or "concave down," and how this relates to the second derivative of a function. (10 min) E MM

FUN-4.A | Analyzing Concavity (Graphical)
Solve an exercise where you are asked to recognize the concavity of a function in certain regions. (3 min) E MM

FUN-4.A | Inflection Points Introduction
Discover that Inflection points are points where the function changes concavity, i.e. from being "concave up" to being "concave down" or vice versa. (3 min) E MM

FUN-4.A | Inflection Points (Graphical)
Analyze the graph of a function g to find all the inflection points of g. (4 min) E MM

FUN-4.A | Analyzing Concavity (Algebraic)
Find the intervals where $g(x)=-x^4+6x^2-2x-3$ is concave down/up by finding where its second derivative, g'', is positive/negative. (9 min) E MM

FUN-4.A | Inflection Points (Algebraic)
Analyze the points of inflection of $g(x)=¼x^4-4x^3+24x^2$ by looking for values where the second derivative g'' changes signs. (6 min) E MM

FUN-4.A | Mistakes When Finding Inflection Points: Second Derivative Undefined
Candidates for inflection points are points where the second derivative is zero *and* points where the second derivative is undefined. (6 min) E MM

FUN-4.A | Mistakes When Finding Inflection Points: Not Checking Candidates
Explore how to test x-values and see if they really are inflection points. (4 min) E MM

FUN-4.D | Horizontal Tangent to Implicit Curve
Find the equation of a horizontal tangent to a curve that is defined implicitly as an equation in x and y. (3 min) E MM

Calculus: Differentiation | Sketching Curves of Functions & Their Derivatives

FUN-4.A | Curve Sketching with Calculus: Polynomial
Visualize a graph of $f(x)=3x^4-4x^3+2$ including extremum and inflection points. (20 min) E MM

FUN-4.A | Curve Sketching with Calculus: Logarithm
Visualize a graph of $f(x)=\ln(x^4+27)$ including extremum and inflection points. (25 min) E MM

FUN-4.A | Analyzing a Function with its Derivative
Taking the derivative of $f(x)=x^3-12x+2$ and graphing the derivative, find when f is increasing or decreasing, and where is its relative extremum points. (10 min) E MM

Calculus: Differentiation | Connecting a Function, Its First Derivative, & Its Second Derivative

FUN-4.A | Calculus-Based Justification for Function Increasing
Discover that a calculus-based justification is when we explain a property of a function f based on its derivative f'. (4 min) E MM

FUN-4.A | Justification Using First Derivative
Explore why a function is increasing, decreasing, or having a relative maximum using information about its first derivative. This is called calculus-based justification. (6 min) E MM

FUN-4.A | Inflection Points from Graphs of Function & Derivatives
Identify inflection points from graphs of function, first derivative and second derivative. (5 min) E MM

FUN-4.A | Justification Using Second Derivative: Inflection Point
Justify whether a function has an inflection point by looking at where the second derivative changes its sign. (4 min) E MM

FUN-4.A | Justification Using Second Derivative: Maximum Point
Given that the derivative of a function is zero, justify whether the function has a relative maximum point by looking at the second derivative. (4 min) E MM

FUN-4.A | Connecting f, f', and f'' Graphically (Example 1)
Examine three graphs to see which describes the derivative of which another graph. (6 min) E MM

FUN-4.A | Connecting f, f', and f'' Graphically (Example 2)
Examine three graphs to see which describes the derivative of which another graph. (4 min) E MM

Calculus: Differentiation | Solving Optimization Problems

FUN-4.B, FUN-4.C | Optimization: Sum of Squares
Discover what the minimum possible value of x^2+y^2 is given that their product must be fixed at xy = -16. (8 min) E MM

FUN-4.B, FUN-4.C | Optimization: Box Volume (Part 1)
Explore how to maximize the volume in this box problem. (10 min) E MM

FUN-4.B, FUN-4.C | Optimization: Box Volume (Part 2)
Examine the formulas needed to solve this box problem. (9 min) E MM

FUN-4.B, FUN-4.C | Optimization: Profit
Explore how to maximize profits in this optimization problem about a shoe factory. (12 min) E MM

FUN-4.B, FUN-4.C | Optimization: Cost of Materials
Explore optimization as you figure out how to minimize the cost of storage. (13 min) E MM

FUN-4.B, FUN-4.C | Optimization: Area of Triangle & Square (Part 1)
Construct an equilateral triangle & a square whose bases are 100m (about 328.08 ft) together, such that their area is the smallest possible. (6 min) E MM

FUN-4.B, FUN-4.C | Optimization: Area of Triangle & Square (Part 2)
Construct an equilateral triangle & a square whose bases are 100m (about 328.08 ft) together, such that their area is the smallest possible. (5 min) E MM

FUN-4.B, FUN-4.C | Motion Problems: Finding the Maximum Acceleration
The speed of a particle moving along the x-axis is given by $v(t)=-t^3+6t^2+2t$, find the time when the particle's acceleration attains its maximum value. (4 min) E MM

Calculus: Integration | Intro to Integrals: Accumulation of Change

CHA-4.A | Introduction to Integral Calculus
Discover that the basic idea of Integral calculus is finding the area under a curve. (4 min) E MM

CHA-4.A | Definite Integrals Intro
Explore that Definite integrals represent the area under the curve of a function and above the x-axis. (8 min) E MM

CHA-4.A | Worked Example: Accumulation of Change
Examine this example relating rates of change with a leaky bathtub. (7 min) E MM

Calculus: Integration | Riemann Sums

LIM-5.A | Riemann Approximation Introduction
Discover how Riemann sum approximates the area under a curve using some rectangles. (7 min) E MM

LIM-5.A | Over- and Under-Estimation of Riemann Sums
Explore the difference between overestimation and underestimation when using Riemann sums. (4 min) E MM

LIM-5.A | Worked Example: Finding a Riemann Sum Using a Table
Given a table of values of a function, use it to find a Riemann sum approximation of that function. (7 min) E MM

LIM-5.A | Worked Example: Over- and Under-Estimation of Riemann Sums
Examine how to order different areas from least to greatest. (5 min) E MM

LIM-5.A | Midpoint Sums
Explore approximating area under a curve using rectangle where the heights are the value of the function at the midpoint of each interval. (6 min) E MM

LIM-5.A | Trapezoidal Sums
Discover that the area under a curve is commonly approximated using rectangles (e.g. left, right, and midpoint Riemann sums), but it can also be approximated by trapezoids. (9 min) E MM

LIM-5.A | Summation Notation Learn how to use Sigma, Σ, which is the standard notation for writing long sums.
(5 min) E MM

LIM-5.A | Worked Examples: Summation Notation
Explore examples of how we read expressions in summation notation.
(6 min) E MM

LIM-5.B | Riemann Sums in Summation Notation
Generalize the technique of approximating area under a curve with rectangles.
(9 min) E MM

LIM-5.B | Worked example: Riemann Sums in Summation Notation
Express the approximation of the area under a curve in sigma notation.
(7 min) E MM

LIM-5.B | Definite Integral as the Limit of a Riemann Sum
Learn to use Riemann sums with infinite rectangles of infinitely small width (using limits), we get the exact area, i.e. the definite integral. (5 min) E MM

LIM-5.B, LIM-5.C | Worked Example: Rewriting Definite Integral as Limit of Riemann Sum
Given a definite integral expression, write the corresponding limit of a Riemann sum with infinite rectangles. (6 min) E MM

LIM-5.B, LIM-5.C | Worked Example: Rewriting Limit of Riemann Sum as Definite Integral
Given a limit of Riemann sum with infinite rectangles, analyze the expression to find the corresponding definite integral.
(7 min) E MM

Calculus: Integration | The Fundamental Theorem of Calculus: Accumulation Functions

FUN-5.A | The Fundamental Theorem of Calculus and Accumulation Functions
Explore how the fundamental theorem of calculus shows how, in some sense, integration is the opposite of differentiation. (8 min) E MM

FUN-5.A | Functions Defined by Definite Integrals (Accumulation Functions)
Discover that a function can be defined using a definite integral. (4 min) E MM

FUN-5.A | Finding Derivative with Fundamental Theorem of Calculus: Chain Rule
Explore how to incorporate the chain rule into the fundamental theorem of calculus.
(3 min) E MM

FUN-5.A | Interpreting the Behavior of Accumulation Functions
Given the graph of function f, reason about the graph of its antiderivative g (so $g'=f$).
(9 min) E MM

FUN-5.A | Proof of Fundamental Theorem of Calculus
Explore the fundamental theorem of calculus and learn that if we define $F(x)$ to be the definite integral of function f from some constant a to x, then F is an antiderivative of f. (14 min) E MM

FUN-5.A | Intuition for Second Part of Fundamental Theorem of Calculus
Explore that the second part of the fundamental theorem of calculus tells us that to find the definite integral of a function f from a to b, we need to take an antiderivative of f, call it F, and calculate $F(b)-F(a)$. (13 min) E MM

Calculus: Integration | Applying Properties of Definite Integrals

FUN-6.A | Negative Definite Integrals
Learn that definite integrals give us the area under the curve and above the x-axis. (5 min) E MM

FUN-6.A | Finding Definite Integrals Using Area Formulas
Discover that definite integrals are the net area between a curve and the x-axis, we can sometimes use geometric area formulas to find definite integrals. (4 min) E MM

FUN-6.A | Definite Integral Over a Single Point
Discover what happens when the bounds of your integral are the same. (3 min) E MM

FUN-6.A | Integrating Scaled Version of Function
Use a graph to explain why we can take a constant out of a definite integral. (5 min) E MM

FUN-6.A | Switching Bounds of Definite Integral
Discover what happens when you swap the bounds on an integral. (5 min) E MM

FUN-6.A | Integrating Sums of Functions
Given the integrals of two functions, find the integral of their sum. (7 min) E MM

FUN-6.A | Worked Examples: Finding Definite Integrals Using Algebraic Properties
Evalute definite integrals of functions given their graphs. (3 min) E MM

FUN-6.A | Definite Integrals on Adjacent Intervals
Learn how to break up an integral by subdividing the stretch of numbers where you are integrating. (3 min) E MM

FUN-6.A | Worked Example: Breaking up the Integral's Interval
Find a definite integral by breaking it down to smaller intervals that are adjacent to each other. (7 min) E MM

FUN-6.A | Worked Example: Merging Definite Integrals Over Adjacent Intervals
Discover how to evaluate the sum of definite integrals over adjacent intervals. (4 min) E MM

FUN-6.A | Functions Defined by Integrals: Switched Interval
Evaluate a function defined by the integral of a graphed function. (3 min) E MM

FUN-6.A | Finding Derivative with Fundamental Theorem of Calculus: X is on Lower Bound
Discover how to swap the bounds of integration before applying the fundamental theorem of calculus. (3 min) E MM

FUN-6.A | Finding Derivative with Fundamental Theorem of Calculus: X is on Both Bounds
Explore how to apply the fundamental theorem of calculus when both integral bounds are a function of x. (5 min) E MM

FUN-6.B | The Fundamental Theorem of Calculus and Definite Integrals
Explore the two versions of the fundamental theorem of calculus, and the connection between them. (5 min) E MM

FUN-6.B | Antiderivatives and Indefinite Integrals
Explore what the "indefinite integral" is and how it is the opposite of a derivative. (4 min) E MM

Calculus: Integration | Indefinite Integrals: Basic Rules & Notation

FUN-6.C | Reverse Power Rule
Find a function whose derivative is x^n. (6 min) E MM

FUN-6.C | Indefinite Integrals: Sums & Multiples
Discover that an indefinite integral of a sum is the same as the sum of the integrals of the component parts. (5 min) E MM

FUN-6.C | Rewriting Before Integrating
Explore how some indefinite integrals are much simpler to integrate by algebraically rewriting the integrand first. (5 min) E MM

FUN-6.C | Indefinite Integral of 1/x
Explore how Integration goes the other way: the integral (or antiderivative) of 1/x should be a function whose derivative is 1/x. As we just saw, this is ln(x). However, if x is negative then ln(x) is undefined. (8 min) E MM

FUN-6.C | Indefinite Integrals of sin(x), cos(x), and e^x
Learn why $\int \sin(x)dx=-\cos(x)+C$, $\int \cos(x)dx=\sin(x)+C$, and $\int e^x dx=e^x+C$. (4 min) E MM

Calculus: Integration | Definite Integrals: Basic Rules & Notation

FUN-6.B, FUN-6.C | Definite Integrals: Reverse Power Rule
Explore examples of calculating definite integrals of polynomials using the fundamental theorem of calculus and the reverse power rule. (4 min) E MM

FUN-6.B, FUN-6.C | Definite Integral of Rational Function
Find the definite integral of $(16-x^3)/x^3$ between -1 and -2 using the reverse power rule. (5 min) E MM

FUN-6.B, FUN-6.C | Definite Integral of Radical Function
Find the definite integral of $12\sqrt[3]{x}$ between -1 and 8 using the reverse power rule. (4 min) E MM

FUN-6.B, FUN-6.C | Definite Integral of Trig Function
Find the definite integral of 9sin(x) between $11\pi/2$ and 6π. (5 min) E MM

FUN-6.B, FUN-6.C | Definite Integral Involving Natural Log
Find the definite integral of $(6+x^2)/x^3$ between 2 and 4. (8 min) E MM

FUN-6.B, FUN-6.C | Definite Integral of Piecewise Function
Evaluate definite integral of a piecewise function over an interval that goes through the two cases of the function. (7 min) E MM

FUN-6.B, FUN-6.C | Definite Integral of Absolute Value Function
Evaluate the definite integral of f(x)=|x+2| between -4 and 0. (7 min) E MM

Calculus: Integration | Integrating Using Substitution

FUN-6.D | u-Substitution Intro
Discover how to use u-substitution to find the anti-derivative of a function. (5 min) E MM

FUN-6.D | u-Substitution: Multiplying by a Constant
Learn how to manipulate the expression to make u-substitution a little more obvious. (6 min) E MM

FUN-6.D | u-Substitution: Defining u
Examine a common challenge when performing u-substitution is to realize which part should be our u. (4 min) E MM

FUN-6.D | u-Substitution: Defining u (More Examples)
Examine a common challenge when performing u-substitution is to realize which part should be our u. (5 min) E MM

FUN-6.D | u-Substitution: Rational Function
Work through another example of using u-substitution. (4 min) E MM

FUN-6.D | u-Substitution: Logarithmic Function
Explore doing u-substitution with ln(x). (4 min) E MM

FUN-6.D | u-Substitution: Definite Integrals
Discover that when using u-substitution in definite integrals, we must make sure we take care of the boundaries of integration. (6 min) E MM

FUN-6.D | u-Substitution: Definite Integral of Exponential Function
Find the definite integral from 0 to 1 of $x^2 \cdot 2^{(x^3)}$. (8 min) E MM

Calculus: Integration | Other Methods of Integration

A-APR.6, AIII.A.13 | Revisiting Polynomial Long Division
Learn how to divide polynomials, also known as algebraic long division. (12 min) E MM

FUN-6.D | Integration Using Long Division
Explore how to do polynomial long division to make an integral more computable. (5 min) E MM

FUN-6.D | Integration Using Completing the Square and the Derivative of Arctan(x)
Discover how to integrate rational functions by using the method of completing the square in the denominator and then integrating using u-substitution and our knowledge about the derivative of arctan(x). (6 min) E MM

Calculus: Integration | Average Value of a Function on an Interval

CHA-4.B | Average Value Over a Closed Interval
Discover the average value of a function over a closed interval. (5 min) E MM

CHA-4.B | Calculating Average Value of Function Over Interval
Find the average value of x^2+1 on the interval between 0 and 3. (5 min) E MM

CHA-4.B | Mean Value Theorem for Integrals
Discover the connection between the mean value theorem and integration. (9 min) E MM

Calculus: Integration | Connecting Position, Velocity, & Acceleration Using Integrals

CHA-4.C | Motion Problems with Integrals: Displacement vs. Distance
Discover how the definite integral of a velocity function gives us the displacement. (8 min) E MM

CHA-4.C | Analyzing Motion Problems: Position
Find the appropriate expression to use when looking for the position at a certain time. (3 min) E MM

CHA-4.C | Analyzing Motion Problems: Total Distance Traveled
Find the appropriate expression to use when looking for the total distance traveled over a certain time interval. (3 min) E MM

CHA-4.C | Worked Example: Motion Problems (With Definite Integrals)
Discover the velocity and position of a particle given its acceleration. (9 min) E MM

CHA-4.C | Average Acceleration Over Interval
Explore an example of finding a mean value, we find an average acceleration. (5 min) E MM

Calculus: Integration | Accumulation Functions & Definite Integrals in Context

CHA-4.D, CHA-4.E | Area Under Rate Function Gives the Net Change
When given a function representing rate, explore what the area under its curve represents. (8 min) E MM

CHA-4.D, CHA-4.E | Interpreting Definite Integrals as Net Change
Explore how to interpret definite integrals in a real-world context. (5 min) E MM

CHA-4.D, CHA-4.E | Worked Examples: Interpreting Definite Integrals in Context
Explore how to interpret expressions involving definite integrals in a real-world context. (4 min) E MM

CHA-4.D, CHA-4.E | Analyzing Problems Involving Definite Integrals
Explore example of how to find the appropriate expression to use to solve word problems using definite integrals. (6 min) E MM

CHA-4.D, CHA-4.E | Worked Example: Problem Involving Definite Integral (Algebraic)
Use definite integral to solve a word problem about the growth in the population of a town. (8 min) E MM

Calculus: Integration | Finding the Area Between Curves

CHA-5.A | Area Between a Curve and the X-Axis
Based on the fundamental theorem of calculus, use antiderivatives to compute integrals. (6 min) E MM

CHA-5.A | Area Between a Curve and the X-Axis: Negative Area
Explore the idea of introducing the notion of "negative area" with integrals. (8 min) E MM

CHA-5.A | Area Between Curves
Explore how to integrate the difference of two functions to find the area between them. (7 min) E MM

CHA-5.A | Composite Area Between Curves
Discover how to break the area into multiple different areas because the enclosing functions change. (7 min) E MM

CHA-5.A | Area Between a Curve and the Y-Axis
Use a definite integral in terms of y to find the area between a curve and the y-axis. (4 min) E MM

CHA-5.A | Horizontal Area Between Curves
Use a definite integral in terms of y to find the horizontal area between curves of two functions of y. (8 min) E MM

Calculus: Integration | Volume with Cross Sections

CHA-5.B | Volume with Cross Sections: Intro
Use definite integration to find volume of a solid whose base is given as a region between function and whose cross sections are squares. (6 min) E MM

CHA-5.B | Volume with Cross Sections: Squares and Rectangles (No Graph)
Learn to express the volume of a 3-D figure as a definite integral (where the area of cross sections are functions of x). (6 min) E MM

CHA-5.B | Volume with Cross Sections Perpendicular to Y-Axis
Explore this example expressing the volume of a figure based on cross sections perpendicular to the y-axis as a definite integral (integrating with respect to y). (5 min) E MM

CHA-5.B | Volume with Cross Sections: Semicircle
Discover the volume of a solid with semi-circular cross sections and a triangular base. (9 min) E MM

CHA-5.B | Volume with Cross Sections: Triangle
Explore the cross section of our solid is given as the area between two curves. (9 min) E MM

Calculus: Integration | Volume with the Disc Method

CHA-5.C | Disc Method Around X-Axis
Find the solid of revolution (constructed by revolving around the x-axis) using the disc method. (9 min) E MM

CHA-5.C | Generalizing Disc Method Around X-Axis
Generalize f(x) to get the "formula" for using the disc method around the x-axis. (3 min) E MM

CHA-5.C | Disc Method Around Y-Axis
Find the volume of a figure that is rotated around the y-axis using the disc method. (8 min) E MM

CHA-5.C | Disc Method Rotation Around Horizontal Line
Explore volume of the solid of revolution constructed by rotating around a line that is not an axis. (10 min) E MM

CHA-5.C | Disc Method Rotating Around Vertical Line
Discover the Volume of solid created by rotating around vertical line that is not the y-axis using the disc method. (5 min) E MM

CHA-5.C | Calculating Integral Disc Around Vertical Line
Calculate the integral from around the vertical line. (6 min) E MM

Calculus: Integration | Volume with the Washer Method

CHA-5.C | Solid of Revolution Between Two Functions (Leading Up to the Washer Method)
Find the volume of a solid of revolution that is defined between two functions. (9 min) E MM

CHA-5.C | Generalizing the Washer Method
Explore this example of generalizing the washer method. (9 min) E MM

CHA-5.C | Washer Method Rotating Around Horizontal Line (Not X-Axis), Part 1
Discover the Washer method when rotating around a horizontal line that is not the x-axis. (7 min) E MM

CHA-5.C | Washer Method Rotating Around Horizontal Line (Not X-Axis), Part 2
Evaluate the definite integral from the of the washer method. (8 min) E MM

CHA-5.C | Washer Method Rotating Around Vertical Line (Not Y-Axis), Part 1
Set up the definite integral for the volume of a solid of revolution around a vertical line using the "washer" or "ring" method. (8 min) E MM

CHA-5.C | Washer Method Rotating Around Vertical Line (Not Y-Axis), Part 2
Evaluate the integral set up in the last video using washer method. (6 min) E MM

Calculus: Differential Equations | Intro to Differential Equations

FUN-7.A | Differential Equations Introduction
Discover that Differential equations are equations that relate a function with one or more of its derivative. (8 min) E MM

FUN-7.A | Writing a Differential Equation
Explore how differential equations describe relationships that involve quantities and their rates of change. (3 min) E MM

FUN-7.B | Verifying Solutions to Differential Equations
Explore how to check whether a potential solution to a differential equation is indeed a solution. (6 min) E MM

Calculus: Differential Equations | Intro to Slope Fields

FUN-7.C | Slope Fields Introduction
Learn how to draw and use slope fields, which allows us to analyze differential equations graphically. (6 min) E MM

FUN-7.C | Worked Example: Equation from Slope Field
Given a slope field and a few differential equations, determine which equation corresponds to the slope field by considering specific slopes. (6 min) E MM

FUN-7.C | Worked Example: Slope Field from Equation
Given a differential equation in x and y, draw a segment with dy/dx as slope at any point (x,y). (4 min) E MM

FUN-7.C | Worked Example: Forming a Slope Field
Given a differential equation in x and y, draw a segment with dy/dx as slope at any point (x,y). (4 min) E MM

FUN-7.C | Approximating Solution Curves in Slope Fields
Given the slope field of a differential equation, sketch various solutions to the equation. (7 min) E MM

FUN-7.C | Worked Example: Range of Solution Curve from Slope Field
Given the slope field of a differential equation, sketch various solutions to the equation. (3 min) E MM

Calculus: Differential Equations | Separation of Variables

FUN-7.D | Separable Equations Introduction
Explore how "separation of variables" allows us to rewrite differential equations so we obtain an equality between two integrals we can evaluate. (9 min) E MM

FUN-7.D | Addressing Treating Differentials Algebraically
Explore how to address treating differentials algebraically. (5 min) E MM

FUN-7.D | Worked Example: Separable Differential Equations
Explore these two worked examples of finding general solutions to separable differential equations. (4 min) E MM

FUN-7.D | Worked Example: Identifying Separable Equations
Analyze various differential equations to see if they are separable. (5 min) E MM

FUN-7.E | Particular Solutions to Differential Equations: Rational Function
Find f(-1) given that $f'(x)=24/x^3$ and f(2)=12. (5 min) E MM

FUN-7.E | Particular Solutions to Differential Equations: Exponential Function
Find f(0) given that $f'(x)=5e^x$ and $f(7)=40+5e^7$. (4 min) E MM

FUN-7.E | Worked Example: Finding a Specific Solution to a Separable Equation
Solve a separable differential equation given initial conditions. (6 min) E MM

FUN-7.E | Worked Example: Separable Equation with an Implicit Solution
Discover that sometimes the solution of a separable differential equation can't be written as an explicit function. (4 min) E MM

Calculus: Differential Equations | Exponential Models with Differential Equations

FUN-7.F, FUN-7.G | Exponential Models & Differential Equations (Part 1)
Assuming a quantity grows proportionally to its size results in the general equation dy/dx=ky, solve it with separation of variables results in the general exponential function $y=Ce^{kx}$. (8 min) E MM

FUN-7.F, FUN-7.G | Exponential Models & Differential Equations (Part 2)
Given the general solution $P=Ce^{kt}$ and the conditions P(0)=100 and P(50)=200, find the solution to an exponential modeling problem. (5 min) E MM

FUN-7.F, FUN-7.G | Worked Example: Exponential Solution to Differential Equation
Examine the solution of the general differential equation dy/dx=ky (for some k) is $C\cdot e^{kx}$ (for some C). (4 min) E MM

Science

Biology

BIO.1A.3 | Anatomy Lab
Highly interactive anatomy classroom that allows Students assemble the human body piece by piece with over 90 separate body parts to learn about. (unlimited) E/I

BIO.1A.3 | Brain
Realistic model of the Human Brain. IFX/LT

BIO.1A.3 | Heart
Realistic model of a Human Heart. IFX/LT

BIO.1A.3 | Liver
Realistic model of a Human Liver. IFX/LT

BIO.1A.3 | Lungs
Realistic model of the Human Lungs. IFX/LT

BIO.1B.1, BIO.1C, BIO.1D | Cell Classroom
Animal Cell: Interactive classroom located inside an animal cell. Infographics help students learn about the parts of a cell, alongside animations of the protein synthesis process.
Plant Cell: Interactive classroom located inside a plant cell. Explore the different organelles and components of the cell and explore the photosynthesis process (unlimited) E/I

BIO.4 | Back to Nature - Rainforest
Escape to the lush temperate rainforest of Southern Australia. (4 min) 45

BIO.4 | Diving Exploration of Kelp Forest Aquarium
Explore the Kelp Forest at Monterey Bay Aquarium. (3 min) 105

BIO.4 | Diving Under Icebergs with a Seal in Antarctica
Take a 360 journey under an iceberg with a crabeater seal and Gentoo Penguins in Antarctica. (2 min) 106

BIO.4 | Elephant Seals and King Penguin Chicks
These King Penguin chicks get our (elephant) seal of approval. (2 min) 122

BIO.4 | In the Presence of Animals
Experience a dangerous world with some of the planet's most at-risk species: an endangered jaguar, a rainforest sloth, a massive bison, fluttering monarchs, and a mother olive ridley turtle. (5 min) 216

BIO.4, BIO.5 | Protecting Ocean Anchor Species - Racing Extinction
Join marine biologist Luke Tipple as he swims alongside manta rays and whale sharks while sharing why they are vital to the survival of our oceans. (3 min) 315

BIO.4 | Underwater National Park
Plunge into a Caribbean gem with National Geographic photographer Brian Skerry to explore the Buck Island Reef – America's first protected marine monument. (6 min) 410

BIO.5 | Bears of Kamchatka, Kambalnaya River
Follow along as you experience the Bears of Kamchatka and learn about their habitat, daily life, and mating season. (5 min) 52

BIO.5 | Chengdu Panda Base, China
Get an in-depth look at the pandas that call Chengdu Panda Base their home and learn about their habitat, diet, and daily life. (11 min) 75

BIO.5 | Gorillas in the Congo: A Jump VR Video
Experience gorillas in their natural habitat of the Congo Jungle. (2 min) 195

BIO.5 | Great Hammerhead Shark Encounter
Dive into this 360° video and go face to face with a curious great hammerhead shark. (2 min) 197

BIO.5 | Red Kite Bird Feeding Frenzy
Watch the once endangered Red Kite Bird feeding while learning about them. (1 min) 317

Botany

BOT.1, BOT.4 | 360 Farm Tour: It Starts with a Seed
Follow a fifth-generation farmer and see the challenges farmers face, solutions that technology offers, and ultimately the fruits of labor that will transform into food, feed, and fuel. Part 1 (6 min) 5

BOT.1, BOT.4 | 360 Farm Tour: As the Corn Grows
Follow a fifth-generation farmer and see the challenges farmers face, solutions that technology offers, and ultimately the fruits of labor that will transform into food, feed, and fuel. Part 2 (4 min) 6

BOT.1, BOT.4 | 360 Farm Tour: Harvesting the Corn
Follow a fifth-generation farmer and see the challenges farmers face, solutions that technology offers, and ultimately the fruits of labor that will transform into food, feed, and fuel. Part 3 (4 min) 7

BOT.1, BOT.4 | 360 Farm Tour: Protecting the Corn
Follow a fifth-generation farmer and see the challenges farmers face, solutions that technology offers, and ultimately the fruits of labor that will transform into food, feed, and fuel. Part 4 (4 min) 8

BOT1., BOT.4 | Back to Nature - Rainforest
Escape to the lush temperate rainforest of Southern Australia. (4 min) 45

BOT.1, BOT.4 | Climbing the Redwoods - Fight for the Forests
Climb 200 feet up 'Grandfather,' the highest Redwood in a Northern California Grove while learning about the Redwood Forest and preservation efforts. (2 min) 79

BOT.1 | Diving Exploration of Kelp Forest Aquarium
Explore the Kelp Forest at Monterey Bay Aquarium. (3 min) 105

BOT.1 | Forest
View a tranquil forest and the plant life throughout it. (1 min) 178

BOT.1 | Kelp
Swim through a kelp forest. (1 min) 229

Chemistry

CHE.3 | Periodic Table
Interactive classroom that teaches students about the periodic table of elements, their chemical and physical properties, and their atomic structures. (unlimited) E/I

CHE.4 | Covalent Bonding - H2
Simple visualization of the covalent bond between two hydrogen atoms. IFX/LT

CHE.4 | Covalent Bonding - Glucose Hybridized
Visualization of a covalently bonded glucose molecule with hybridized orbitals. IFX/LT

CHE.4 | Covalent Bonding - O2 Hybridized
Visualization of two covalently bonded oxygen atoms with hybridized orbitals. IFX/LT

CHE.4 | Covalent Bonding - H2O Hybridized
Visualization of a covalently bonded water molecule with hybridized orbitals. IFX/LT

CHE.4 | Ionic Bonding - NaCl
Animated visualization of the ionic bond between a sodium atom and a chlorine atom. IFX/LT

CHE.4 | Ionic Bonding - NaOH
Animated visualization of the ionic bond between a sodium atom and a hydroxide anion. IFX/LT

CHE.4 | Ionic Bonding - NaF
Animated visualization of the ionic bond between a sodium atom and a fluorine atom. IFX/LT

CHE.4 | Ionic Bonding - MgSO4
Animated visualization of the ionic bond between a magnesium atom and a sulfate anion. IFX/LT

Earth & Space Science

ESS.1.A | Big Bang Explosion
Explosion particle effect with fire, smoke, and plasma. IFX/LT

ESS.1.A | Big Bang Sound
Sound effect of what scientists estimate the big bang would have sounded like. IFX/LT

ESS.1.A, ESS.1.B | 360 Degree Video of the Milky Way
Interactive time-lapse of the moving night sky. (1 min) 4

ESS.1.A, ESS.1.B | Enter the Black Hole
Enter a black hole and explore the area around it. (5 min) 128

ESS.1.A, ESS.1.B | Explore the Solar System
Take a virtual tour of our Solar System, with the help of Crash Course Astronomy host Phil Plait. (5 min) 142

ESS.1.A | First-Ever 360 VR Filmed in Space: One Strange Rock
Fly side-by-side with astronauts and experience weightlessness, the speed of traveling at 17 thousand miles per hour, and take in a stunning view of Earth. (5 min) 177

ESS.1.A | Journey Into the Orion Nebula
Journey into the famous star-forming region of the Orion Nebula based on an image from the Hubble Space Telescope. (2 min) 225

ESS.1.A | Journey to the Edge of Space
Experience what it's like to leave Earth, traveling to over 90,000 feet into the stratosphere. (5 min) 226

ESS.1.A | Mars - The Red Planet VR Documentary
Explore the planet Mars and see its history of exploration. (12 min) 273

ESS.1.A | NASA's Curiosity Mars Rover at Namib Dune
View the Namib Dune and portions of Mount Sharp through the eyes of the Mars Rover. (2 min) 91

ESS.1.A, ESS.1.B | The Night Sky and Milky Way: Visualize Astronomy
Enjoy a panoramic video of the night sky and Milky Way. (1 min) 391

ESS.1.A, ESS.1.B | Solar System 360 Degree Tour
Take a 360-degree virtual tour of our Solar system with Crash Course host Phil Plait. (5 min) 359

ESS.1.A, ESS.1.B | Space Experience
View Earth from Space below the International Space Station, but beware... meteorites have been forecasted. (1 min) 366

ESS.1.A | Take a VR Tour of 6 Real Exoplanets
Team up with astrophysicists to experience a scientifically accurate, VR tour of 6 exoplanets. (11 min) 379

ESS.1.A, ESS.1.B | VR Solar System Space Video
This amazing 360 video will transport you through our galactic neighborhood, the solar system. (18 min) 429

ESS.1.A, ESS.1.B | Sample Asteroid Bennu
Follow along on NASA's first asteroid sample return mission as they make a daring attempt to collect samples from an asteroid. (4 min) 343

ESS.1.B | Solar System
Interactive classroom that allows students to visit each planet, watch them orbit, and learn about each one. (unlimited) E/I

ESS.1.B | Solar System Model
Animated model of the solar system where rotation and revolution speeds are scaled accurately. IFX/LT

ESS.1.B | Star Visualization - Exponential
Visualization of the number of stars in the universe using color-coded exponential groups. IFX/LT

ESS.1.B | 1. Cool VR Walk on the Moon | 2. Yosemite
EXP.1 Walk on the Moon from the Project Apollo Archive.
EXP.2 Experience a guided tour of some of Yosemite's majestic spots.
(2 min/4 min) 1

ESS.1.B | The Aurora Borealis Over Alaska's Chatanika River
Explore a timelapse of the Aurora Borealis filmed during a geomagnetic storm by William Briscoe Photography. (5 min) 381

ESS.1.B | Solar Eclipse 2017
Watch a total solar eclipse that took place in Casper, Wyoming on August 21st, 2017. (5 min) 358

ESS.2.A | Earth Cutaway
A model of Earth with a section cut away to expose its layers. IFX/LT

ESS.2.A | Earth Cutaway info
An Infographic model of Earth with a section cut away to expose its layers. IFX/LT

ESS.3 | Earth Magnetic Field
Animated visualization of the electromagnetic field surrounding Planet Earth. IFX/LT

ESS.3 | Cloud Climb
Explore how clouds, atmosphere, and weather all come together to create different aspects of the Earth's sky. (unlimited) E/I

ESS.4 | Damming the Nile: Episode 1
Africa's largest hydroelectric power project is two thirds finished and the dam can already control the flow of the Blue Nile, which is deeply upsetting downstream Egypt who they didn't consult before building started. (13 min) 94

ESS.4 | Damming the Nile: Episode 2
Journey to the great farming projects of Sudan, fly to a festival on the banks of the Nile, and explore the ancient Sudanese pyramid. Then launch in a balloon over Luxor to find out how much this river means to the land of the pharaohs. (16 min) 95

ESS.4 | Climbing the Redwoods - Fight for the Forests
Climb 200 feet up 'Grandfather,' the highest Redwood in a Northern California Grove while learning about the Redwood Forest and preservation efforts. (2 min) 79

ESS.4 | Lion Whisperer - Racing Extinction
Kevin Richardson, also known as the "lion whisperer", explains the complexities of his relationship to his pride, and summarizes his life's work of protecting these amazing animals from the game hunting trade. (4 min) 259

ESS.4 | Protecting Ocean Anchor Species - Racing Extinction
Join marine biologist Luke Tipple as he swims alongside manta rays and whale sharks while sharing why they are vital to the survival of our oceans. (3 min) 315

ESS.4 | Rescuing Rhinos - Racing Extinction
Join a conservation biologist on an interactive mission to learn how animals critical to the world's ecosystem thrive and survive in the wild. (5 min) 323

Environmental Science

ENV.1, ENV.3 | Antarctica - Part II
Sail aboard a ship around Antarctica and see the different wildlife. (6 min) 29

ENV.1 | The Hidden Worlds of National Parks
Follow rangers on a journey to places most people never go. Experience the sights, sounds, and adventures of Kenai Fjords, Hawai'i Volcanoes, Carlsbad Caverns, Bryce Canyon, and Dry Tortugas. (5 min) 389

ENV.1 | Diving Exploration of Kelp Forest Aquarium
Explore the Kelp Forest at Monterey Bay Aquarium. (3 min) 105

ENV.1 | Diving Under Icebergs with a Seal in Antarctica
Take a 360 journey under an iceberg with a crabeater seal and Gentoo Penguins in Antarctica. (2 min) 106

ENV.1 | Elephant Seals and King Penguin Chicks
These king penguin chicks get our (elephant) seal of approval. (2 min) 122

ENV.1 | Fox's Point of View at Night - Planet Earth II: Cities
Through the eyes of an urban fox, can you find food, spot the hazards, and track down a mate in a bustling city at night? (4 min) 181

ENV.1 | Travel-Dream-Imagine: A VR Journey From the Desert Floor Into the Sea
Travel with us as we step into the Judea desert, bathe in a waterfall in a hidden oasis, wet our feet in the red sea, dive among corals, and finally float in one of the wonders of the world - the Dead Sea. (2 min) 403

ENV.2 | Lion Whisperer - Racing Extinction
Kevin Richardson, also known as the "lion whisperer", explains the complexities of his relationship to his pride, and summarizes his life's work of protecting these amazing animals from the game hunting trade. (4 min) 259

ENV.2 | Lions 360
Join National Geographic Explorer Martin Edström, you will come face to face with Gibson and his mother, as they struggle with their pride's alpha male. (5 min) 262

ENV.2 | Manatee: Crystal River National Wildlife Refuge
Underwater cinematographer and VR filmmaker Adam Ravetch takes us on an adventure on Florida's Crystal River as he captures the river's wild manatees in their natural habitat at the Crystal River National Wildlife Refuge. (3 min) 268

ENV.2 | Protecting Ocean Anchor Species - Racing Extinction
Join marine biologist Luke Tipple as he swims alongside manta rays and whale sharks while sharing why they are vital to the survival of our oceans. (3 min) 315

ENV.2 | Rescuing Rhinos - Racing Extinction
Join a conservation biologist on an interactive mission to learn how animals critical to the world's ecosystem thrive and survive in the wild. (5 min) 323

ENV.2 | Surrounded by Lemurs - Perth Zoo - Australia
Take a private tour of Lemur Island and encounter these critically endangered species. (4 min) 371

ENV.2 | The Fight to Save Threatened Species
Get closer than ever before to the most extraordinary creatures on the planet. Whale sharks, rhinos, elephants, manta rays, and lions are all threatened with extinction. (2 min) 388

ENV.2 | Whale Sharks at Risks - Racing Extinction
Experience a close encounter with a Whale Shark, the largest fish on the Planet. (4 min) 439

ENV.3 | Back to Nature - Rainforest
Escape to the lush temperate rainforest of Southern Australia. (4 min) 45

ENV.3 | Climbing the Redwoods - Fight for the Forests
Climb 200 feet up 'Grandfather,' the highest Redwood in a Northern California Grove while learning about the Redwood Forest and preservation efforts. (2 min) 79

Foundation of Biology

FB.1.2 | Microscope
Highly interactive science lab microscope with 4 different, insertable slides that they can view at 3 different zoom levels. IFX/LT

FB.4 | Glow Worm Caves of New Zealand
Deep below ground, you will learn about strange carnivorous worms. (2 min) 191

FB.4 | Giraffe 1
See a giraffe interacting with its natural habitat. (1 min) 189

FB.4 | Giraffe 2
See a giraffe interacting with its natural habitat. (1 min) 190

FB.5.2 | Attenborough and the Giant Dinosaur
Learn all about the Titanosaur with David Attenborough. (4 min) 35

FB.5.2 | Giraffatitan Dinosaur: Back to Life in 360 VR
Encounter the Jurassic giant Giraffatitan, one of the tallest dinosaurs that ever lived, and learn all about how it lived and who its descendants are. (4 min) 188

FB.5.2 | Rhomaleosaurus Sea Dragon: Back to Life in 360 VR
Encounter the prehistoric sea dragon Rhomaleosaurus, as it roams the gallery over 180 million years after it died. (4 min) 328

FB.5.2 | VR Jurassic Dinosaur
Explore what life was like during the age of the dinosaur. (3 min) 426

Foundations of Science Literacy

FSL.1 | Explore the Blue Shipwreck Alley
Tied to the virtual dive on the wreck of D.M Wilson, students research the historical, ecological, and economic importance of Thunder Bay National Marine Sanctuary. Students create a digital infographic that communicates the importance of preserving a shipwreck. (3 min) 138

FSL.1, FSL.2 | NASA Astronaut Training: Space Walk
The stunning NASA VR/360 video, produced by Harmonic, offers a variety of perspectives - in the pool and out - as astronauts complete space-walk training for future missions to the International Space Station. (3 min) 285

FSL.1, FSL.2 | Wind Tunnel Test of NASA's Most Powerful Rocket
Follow NASA as they test their most powerful rocket in a wind tunnel test. (3 min) 447

FSL.1, FSL.2 | NASA's Curiosity Mars Rover at Namib Dune
View the Namib Dune and portions of Mount Sharp through the eyes of the Mars Rover. (2 min) 286

FSL.1, FSL.2 | Curiosity Mars Rover
View the Glen Torridon area of Mars from the eyes of the Mars Rover. (2 min) 91

FSL.1, FSL.2 | Space Engine in Immersive 360 Video
Experience a Space engine as it flies and looks at different interesting locations in Space. (5 min) 365

FSL.1, FSL.2 | Rocket Launch: DeltaIV NROL-45
Experience one of the most powerful activities in spaceflight - Launch. (4 min) 333

FSL.1 | 1. Cool VR Walk on the Moon | 2. Yosemite
EXP.1 Walk on the Moon from the Project Apollo Archive.
EXP.2 Experience a guided tour of some of Yosemite's majestic spots.
(2 min/4 min) 1

FSL.1.2 | Microscope
Highly interactive science lab microscope with 4 different, insertable slides that they can view at 3 different zoom levels. IFX/LT

FSL.2 | Category 3 Hurricane Landfall Simulation
Experience a category 3 hurricane through a simulation with guided popups. (1 min) 74

FSL.2 | Mars - The Red Planet VR Documentary
Explore the planet Mars and see its history of exploration. (12 min) 273

FSL.2 | Explore an Underwater Mountain from a Submarine
Ride along as you dive in a submarine and explore the ocean floor. (4 min) 135

FSL.2 | Explore the Deep Ocean
Follow along in a Submarine and see the ocean from a new view. (2 min) 140

FSL.2 | Explore Lake Ontario Schooner: St. Peter
Explore the wreck of the Schooner St. Peter, which lies in Lake Ontario National Marine Sanctuary. Students research the technologies used by maritime archaeologists to locate and image shipwrecks and participate in simulations of the use of two of these technologies, sonar, and photogrammetry. (4 min) 231

Genetics

GEN.2B | Giraffe 1
See a giraffe interacting with its natural habitat. (1 min) 189

GEN.2B | Giraffe 2
See a giraffe interacting with its natural habitat. (1 min) 190

GEN.2B | Glow Worm Caves of New Zealand
Deep below ground, you will learn about strange carnivorous worms. (2 min) 191

GEN.2B | Great Hammerhead Shark Encounter
Dive into this 360° video and go face to face with a curious great hammerhead shark. (2 min) 197

Human Anatomy & Physiology

HAP.1, HAP.13 | Human Digestive System in VR
Take an amazing journey through the body and find out what happens to your food as it travels through the digestive system. (3 min) 209

HAP.1 | What Happens Inside Your Body?
The human body is an amazing and unique machine that triggers thousands of processes every second, learn about them on this adventure. (8 min) 441

HAP.4, HAP. 5, HAP.6, HAP.10, HAP.12, HAP.13, HAP.14 | Anatomy Lab
Highly interactive anatomy classroom that allows students to assemble the human body piece by piece with over 90 separate body parts to learn about. (unlimited) E/I

HAP.4 | VR Bone Resorption
Watch bone resorption at the cellular level in action. (1 min) 424

HAP.6 | Brain
Realistic model of the Human Brain. IFX/LT

HAP.6 | A Walk-Through Dementia: At Home
A unique experience designed to put you in the shoes of someone living with dementia. (3 min) 19

HAP.6 | A Walk-Through Dementia: Walking Home
A unique experience designed to put you in the shoes of someone living with dementia. (4 min) 20

HAP.6 | Autism Virtual Reality
Become a student with autism in the daily fight for survival. (7 min) 37

HAP.6 | VR Surgery - Brain Aneurysm
Immerse the general public, patients, medical students, and allied healthcare professionals into what a real brain operation is like. (6 min) 430

HAP.6 | Inside Anxiety
Anxiety can make you feel on edge, unable to concentrate, fearful, irritable, and like you have lost control. Step inside the mind of someone who experiences anxiety and see the world from their point of view. (9 min) 217

HAP.6.1, HAP 6.7 | Anatomy of Hearing
Take a deep dive into the different parts that make up the Human Ear, and see how we use our sense of hearing. (unlimited) E/I

HAP.8 | Miracle of Life
Experience the epic moment we are all conceived in. Our DNA is passed on from our parents, our first cells grow and we begin the miraculous journey of life. (5 min) 279

HAP.10 | Heart
Realistic model of the Human Heart. IFX/LT

HAP.10 | 360 Video of a Heart Valve Operation in the Heart Center Leipzig
Experience exclusive insights into surgery in full 360 degree video. Head of Cardiac Surgery Prof. Michael Borger explains what happens during a mitral valve Operation. (4 min) 10

HAP.10 | Experience a Heart Transplant in 360
Filmed recently at William P. Clements Jr. University Hospital, the video details the process of a heart transplant and all its intricacies, with narration from our transplant team, including Drs. Matthias Peltz, Pietro Bajona, and John Murala. (5 min) 130

HAP.10 | Advanced Life Support / Code Blue
How to lead a cardiac arrest /code blue using the advanced cardiac life support (ALS/ACLS) algorithms. (8 min) 22

HAP.10 | Cardiac Arrest (Code Blue) Advanced Life Support
This 360-degree training video demonstrates how to manage a cardiac arrest (code blue) using an automated defibrillator. (7 min) 69

HAP.10 | Patient Point of View in Advanced Life Support (Code Blue)
This 360-degree video is filmed from a patient's point of view and demonstrates what happens if you have a cardiac arrest in the hospital. (7 min) 303

HAP.10, HAP.12 | Choking and Cardiac Arrest (Code Blue) Advanced Life Support
This 360-degree training video demonstrates how to manage a cardiac arrest (code blue) due to choking. (3 min) 77

HAP.12 | Lungs
Realistic model of the Human Lungs. IFX/LT

HAP.12 | Resuscitation of a Covid-19 Patient w/ Respiratory Failure Best Practices Demonstration
This immersive 360-degree video takes you inside a hospital emergency department and shows the best practices learned by medical staff in New York City and Philadelphia for treating critically ill COVID-19 patients with respiratory failure. (11 min) 324

HAP.13 | Liver
Realistic model of the Human Liver. IFX/LT

HAP.13 | Oesophageal Cancer Operation Filmed
The operation to remove a tumor from Janet Jenkins, 65, at Southampton General Hospital was carried out by Professor Tim Underwood who is currently undertaking the research. The surgery lasted eight hours. (2 min) 295

Marine & Aquatic Science

MAQ.2, MAQ.4 | Pond
Explore a freshwater pond and the plants that surround it. (1 min) 313

MAQ.2, MAQ.4 | Reef 1
Swim along an active thriving reef. (1 min) 318

MAQ.2, MAQ.4 | Reef 2
Swim along an active thriving reef. (1 min) 319

MAQ.2, MAQ.4 | Reef 3
Swim along an active thriving reef. (1 min) 320

MAQ.2 | Waterfall 1
View a waterfall and the surrounding plant life. (1 min) 433

MAQ.2 | Waterfall 2
View a waterfall and the surrounding plant life. (1 min) 434

MAQ.2 | Waterfall 3
View a waterfall and the surrounding plant life. (1 min) 435

MAQ.2, MAQ.4 | Explore the Blue Hawaiian Adventure
Learn about the diversity of life found in the Hawaiian Islands, and explore the ecology of three different species, their importance to Native Hawaiian culture, and the conservation measures in place for their protection. (4 min) 137

MAQ.2 | Explore the Mallows Bay Ghost Fleet
Learn about the Mallows Bay-Potomac River National Marine Sanctuary and the "Ghost Fleet." and explore how human actions affect the environment by interpreting data and evidence about the impact of turbidity on submerged aquatic vegetation. (4 min) 141

MAQ.3, MAQ.5 | Explore an Underwater Mountain in a Submarine
Ride along as you dive in a submarine and explore the ocean floor. (4 min) 135

MAQ.3 | Explore the Deep Ocean
Follow along in a Submarine and see the ocean from a new view. (2 min) 140

MAQ.4, MAQ.5 | Underwater National Park
Plunge into a Caribbean gem with National Geographic photographer Brian Skerry to explore the Buck Island Reef – America's first protected marine monument. (6 min) 410

MAQ.4 | Explore the Coral Restoration
Learn about the ecology of coral reefs, natural and human threats to corals, and the science of coral restoration. (4 min) 139

MAQ.5 | Diving Exploration of Kelp Forest Aquarium
Explore the Kelp Forest at Monterey Bay Aquarium. (3 min) 105

MAQ.5, MAQ.7 | Diving Under Icebergs with a Seal in Antarctica
Take a 360 journey under an iceberg with a crabeater seal and Gentoo Penguins in Antarctica. (2 min) 106

MAQ.5 | Elephant Seals and King Penguin Chicks
These King Penguin chicks get our (elephant) seal of approval. (2 min) 122

MAQ.5, MAQ.7 | Great White Sharks
Get up close with Great White Sharks on an actual dive while learning more about them. (2 min) 198

MAQ.5, MAQ.7 | Isle of Jaws
Suit up and join the team on the search for the mysterious "Isle of Jaws" in Discovery's first-ever full virtual reality act. (7 min) 223

MAQ.5, MAQ.7 | Manatee: Crystal River National Wildlife Refuge
Underwater cinematographer and VR filmmaker Adam Ravetch takes us on an adventure on Florida's Crystal River as he captures the river's wild manatees in their natural habitat at the Crystal River National Wildlife Refuge. (3 min) 268

MAQ.5 | Ocean to Plate: A Journey into the Seafood Supply Chain
As populations and appetites grow, global fisheries are reaching their ecological capacity, yet at least a third of harvested fish and seafood is lost or wasted along the supply chain. (7 min) 293

MAQ.5, MAQ.7 | Protecting Ocean Anchor Species - Racing Extinction
Join marine biologist Luke Tipple as he swims alongside manta rays and whale sharks while sharing why they are vital to the survival of our oceans. (3 min) 315

MAQ.5, MAQ.7 | Shoaling in the Deep
Dive down deep into the heart of a shoal of fish, follow a manta ray as it skims the ocean floor, and lock eyes with a moray eel lurking in an underwater cave. (3 min) 353

MAQ.5, MAQ.7 | Swimming with Giants 360
Earth's oceans have been home to giant animals for hundreds of millions of years. Have you ever wondered what it would be like to swim with some of these giants? (5 min) 374

MAQ.5 | Kelp
Swim through a kelp forest. (1 min) 229

MAQ.5 | Scuba in the Maldives
Dive into the waters o Maldives and experience the aquatic life and environment. (2 min) 346

MAQ.7 | Arctic Orca
Orca Foraging in a school fish with free divers. (1 min) 31

MAQ.7 | Diving with Great White Shark
Experience a Great white shark up close and personal while learning about the majestic creatures. (2 min) 107

MAQ.7 | Great Hammerhead Shark Encounter
Dive into this 360° video and go face to face with a curious great hammerhead shark. (2 min) 197

MAQ.7 | MythBusters: Shark Shipwreck
Explore the sunken wreckage of the Ray of Hope with the MythBusters. (4 min) 283

MAQ.7 | MythBusters: Sharks Everywhere!
MythBuster Adam Savage takes you underwater and face-to-face with a shiver of sharks. (5 min) 284

MAQ.7 | The Blu: Whale Encounter
Go deep under the ocean, onto the deck of a sunken ship, and face to face with the largest species on Earth. (2 min) 382

MAQ.7 | Tiger Shark Encounter in the Bahamas: SharkFest
Come face to face with massive tiger sharks as you plunge into the crystal clear waters of the Bahamas. (3 min) 394

MAQ.7 | Whale Sharks at Risk - Racing Extinction
Experience a close encounter with a Whale Shark- the largest fish on the Planet. (4 min) 439

MAQ.7 | Whale Sharks: Giants of the Deep
Encounter a group of Whale Sharks feeding as they migrate south. (2 min) 440

MAQ.7 | Wild Dolphins VR
Over 6 years ago, our production team filmed unique footage of wild dolphins in the Sataya Reef in Egypt's Red Sea. (2 min) 444

MAQ.7 | Sharks
Explore an aquarium of sharks. (1 min) 352

Physical Science

PHS.1 | Gas in Tank
Three colored liquids of different densities flow out of pipes and stack on top of each other in a tank. IFX/LT

PHS.1 | Liquid Particles in Tank
Liquid particles that move randomly inside a tank. IFX/LT

PHS.1 | Solid Particle Arrangement
Rotating cube of crystalline atomic structure. IFX/LT

PHS.3 | Periodic Table
Interactive classroom that teaches students about the periodic table of elements, their chemical and physical properties, and their atomic structures. E/I

PHS.3 | Hydrogen and Helium Formation
Protons, neutrons, and electrons move around randomly and then collide to form hydrogen and helium atoms. IFX/LT

PHS.5, PHS.9 | Electromagnet - Small Solenoid
Animated visualization of an electromagnetic solenoid with 15 coils. IFX/LT

PHS.5, PHS.9 | Electromagnet - Large Solenoid
Animated visualization of an electromagnetic solenoid with 26 coils. IFX/LT

PHS.5, PHS.9 | Magnet - Like Poles
Animated visualization of two bar magnets with like poles repelling each other. IFX/LT

PHS.5, PHS.9 | Magnet - Opposite Poles
Animated visualization of two bar magnets attracting each other. IFX/LT

PHS.5, PHS.9 | Magnet - Single Bar
Animated visualization of the electromagnetic field surrounding a single bar magnet. IFX/LT

PHS.5, PHS.9 | Magnet - Two Bars
Animated visualization of the electromagnetic field surrounding two bar magnets. IFX/LT

PHS.5, PHS.9 | Magnet - Horseshoe
Animated visualization of the electromagnetic field surrounding a horseshoe magnet. IFX/LT

PHS.6, PHS.6.5 | Music Playground
Concert hall with interactive musical instruments that can be used to collaboratively play, teach, or learn about music and soundwaves. (unlimited) E/I

PHS.6, PHS.6.6 | Light Lab
This highly interactive classroom teaches students about the electromagnetic spectrum including activities like the Double Slit Experiment, shining lights through a prism, building their own waves, stacking light, and playing with lenses. (unlimited) E/I

PHS.6 | Music Note - A
Interactive music note spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6 | Music Note - A Sharp
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6 | Music Note - B
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6 | Music Note - C
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6 | Music Note - C Sharp
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6 | Music Note - D
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6 | Music Note - D Sharp
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6 | Music Note - E
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6 | Music Note - F
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6 | Music Note - F Sharp
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6 | Music Note - G
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6 | Music Note - G Sharp
Interactive music notes spanning 4 octaves and using 10 different instrument sounds. IFX/LT

PHS.6.5 | Anatomy of Hearing
Take a deep dive into the different parts that make up the Human Ear, and see how we use our sense of hearing. (unlimited) E/I

PHS.7 | Bunsen Burner and Beaker
Interactive model of a Bunsen burner, beaker, and ring stand. Toggling the valve turns on the burner flame and starts a chemical reaction in the beaker. IFX/LT

Physics

PHY.1, PHY.2 | Bridge Builder
An interactive module that allows for the building of bridges to scale using architectural applications. (unlimited) E

Zoology

ZOO.1, ZOO.9 | Attenborough and the Giant Dinosaur
Learn all about the Titanosaur with David Attenborough. (4 min) 35

ZOO.1 | Rhomaleosaurus Sea Dragon: Back to Life in 360 VR
Encounter the prehistoric sea dragon Rhomaleosaurus, as it roams the gallery over 180 million years after it died. (4 min) 328

ZOO.7 | Diving with Great White Shark
Experience a Great white shark up close and personal while learning about the majestic creatures. (2 min) 107

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These King Penguin chicks get our (elephant) seal of approval. (2 min) 122

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ZOO.7 | Swimming with Giants 360
Earth's oceans have been home to giant animals for hundreds of millions of years. Have you ever wondered what it would be like to swim with some of these giants? (5 min) 374

ZOO.7 | The Blu: Whale Encounter
Go deep under the ocean, onto the deck of a sunken ship, and face to face with the largest species on Earth. (2 min) 382

ZOO.7 | Tiger Shark Encounter in the Bahamas: SharkFest
Come face to face with massive tiger sharks as you plunge into the crystal clear waters of the Bahamas. (3 min) 394

ZOO.7 | Whale Sharks at Risks - Racing Extinction
Experience a close encounter with a Whale Shark- the largest fish on the Planet. (4 min) 439

ZOO.7 | Whale Sharks: Giants of the Deep
Encounter a group of Whale Sharks feeding as they migrate south. (2 min) 440

ZOO.7 | Sharks
Explore an aquarium of sharks. (1 min) 352

ZOO.8 | Reptile Room - Discovery Nature & Animal
Take a virtual tour inside a reptile room at a zoo. (1 min) 322

ZOO.9 | Red Kite Bird Feeding Frenzy
Watch the once endangered Red Kite Bird feeding while learning about them. (1 min) 317

ZOO.9 | VR Jurassic Dinosaur
Explore what life was like during the age of the dinosaur. (3 min) 426

ZOO.10 | 360 Orangutan School
Go inside the International Animal Rescue Sanctuary in the forests of Borneo to see what it takes to teach a baby orangutan... to be an orangutan. (9 min) 9

ZOO.10 | Arctic Orca
Orca Foraging in a school fish with free divers. (1 min) 31

ZOO.10 | Bears of Kamchatka, Kambalnaya River
Follow along as you experience the Bears of Kamchatka and learn about their habitat, daily life, and mating season. (5 min) 52

ZOO.10 | Caring for Rhinos
A herd of nine rhinos graze in the South African bush while we hear Chris Sussons, game reserve manager, give some cool facts about rhinos and why they need to protect them from poachers. (2 min) 70

ZOO.10 | Chengdu Panda Base, China
Get an in-depth look at the pandas that call Chengdu Panda Base their home and learn about their habitat, diet, and daily life. (11 min) 75

ZOO.10 | Diving Under Icebergs with a Seal in Antarctica
Take a 360 journey under an iceberg with a crabeater seal and Gentoo Penguins in Antarctica. (2 min) 106

ZOO.10 | Elephants on the Brink
A herd of African elephants curiously investigates its surroundings in South Africa and happens to notice cameras filming their behavior. (3 min) 123

ZOO.10 | Getting Licked by a Cow in Ireland
Get up close and personal with cows. Now you'll know what it's like to be licked and sniffed by them. (1 min) 187

ZOO.10 | Gorillas in the Congo: A Jump VR Video
Experience gorillas in their natural habitat of the Congo Jungle. (2 min) 195

ZOO.10 | Lion Whisperer - Racing Extinction
Kevin Richardson, also known as the "lion whisperer", explains the complexities of his relationship to his pride, and summarizes his life's work of protecting these amazing animals from the game hunting trade. (4 min) 259

ZOO.10 | Lions 360
Join National Geographic Explorer Martin Edström, you will come face to face with Gibson and his mother, as they struggle with their pride's alpha male. (5 min) 262

ZOO.10 | Play with Meerkats: Animals with Cameras
Get up close and personal with Meerkats as they investigate the camera. (1 min) 308

ZOO.10 | Playful Elephants Swim
A family of elephants decide to take a break from the hot South Africa sun and swim in the local watering hole as Vicky Brooker, elephant curator, tells about the animals. (2 min) 309

ZOO.10 | Rescuing Rhinos - Racing Extinction
Join a conservation biologist on an interactive mission to learn how animals critical to the world's ecosystem thrive and survive in the wild. (5 min) 323

ZOO.10 | Surrounded by Lemurs - Perth Zoo - Australia
Take a private tour of Lemur Island and encounter these critically endangered species. (10 min) 371

ZOO.10 | Surrounded by White Lions
Experience White lions at a preserve. (10 min) 372

ZOO.10 | Surrounded by Wild Elephants
Come face to face with the largest land animal on the planet, the African elephant. Follow along as this herd of giants take a detour to investigate a stranger in their midst. (3 min) 373

ZOO.10 | The Eye of the Tiger
Look at the day in the life of a tiger at the Dierenpark Amersfoort Zoo. (2 min) 386

ZOO.10 | What It's Like to be Surrounded by Wild Dogs
See how Wild dogs differ from domesticated ones and how they interact within a herd. (1 min) 442

ZOO.10 | Wild Dolphins VR
Over 6 years ago, our production team filmed unique footage of wild dolphins in the Sataya Reef in Egypt's Red Sea. (2 min) 444

ZOO.10 | Baboons 1
See how a group of Baboons interact. Part. 1. (1 min) 43

ZOO.10 | Baboons 2
See how a group of Baboons interact. Part. 2. (1 min) 44

ZOO.10 | Baboons 3
See how a group of Baboons interact. Part. 3. (1 min) 42

ZOO.10 | Cows
See a group of African Cows roam in search of food. (1 min) 84

ZOO.10 | Deer
See Antelope deer feeding on a plain. (1 min) 97

ZOO.10 | Elephant 1
See a herd of elephants graze about. Part 1 (1 min) 118

ZOO.10 | Elephant 2
See a herd of elephants graze about. Part 2 (1 min) 119
ZOO.10 | Elephant 3
See a herd of elephants graze about. Part 3 (1 min) 120
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See a herd of elephants graze about. Part 4 (1 min) 121
ZOO.10 | Giraffe 1
Get up close with a giraffe as it feeds. Part 1. (1 min) 189
ZOO.10 | Giraffe 2
Get close to a giraffe as it feeds. Part 1. (1 min) 190
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ZOO.10 | Lemur 1
Watch lemurs climb and play in a zoo. Part 1. (1 min) 235
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Watch lemurs climb and play in a zoo. Part 2. (1 min) 236
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ZOO.10 | Monkey 1
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ZOO.10 | Monkey 2
Watch a monkey enjoy a fun treat. (1 min) 281
ZOO.10 | Monkey Cage
See two playful monkeys in a zoo. (1 min) 282
ZOO.10 | Rhino 1
Watch a Rhino wallow in a mud hole. (1 min) 325
ZOO.10 | Rhino 2
Watch a baby rhino enjoy a bottle. (1 min) 326
ZOO.10 | Rhino 3
Watch a baby rhino frolic around. (1 min) 327
ZOO.10 | Zebra 1
Watch a herd of zebras grazing. (1 min) 456
ZOO.10 | Zebra 2
Watch how zebras move as a herd. (1 min) 457

Social Studies

African American Studies

AAS.5 | Traveling While Black
This film offers a revealing view of the Green Book Era as told through Ben's Chili Bowl, a black-owned restaurant in Washington, to remind us of the hardships that African-Americans faced during that time period. (20 min) 404
AAS.8, AAS.9 | Civil Rights Museum
Five Civil Rights leaders - Rosa Parks, John Lewis, Martin Luther King Jr., Thurgood Marshall, and Medgar Evers - come to life and teach you their stories on interactive stages. (unlimited) E/I

History of the Ancient Middle East

HAME.1 | Ancient Egypt - Hall of Pharaohs
Visit the Hall of Pharaohs and interact and learn from 5 of Egypt's most well-known pharaohs of all time: Ramesses the Great, Nefertiti, King Tut, Alexander the Great, and Cleopatra. (unlimited) E/I
HAME.1 | Crawl Inside a 3,500-Year-Old Egyptian Tomb
Descend 7 meters under the sandy hills of southern Egypt to become one of the first modern humans to explore a newly discovered ancient Egyptian tomb. (3 min) 85
HAME.1 | The Dream of Egypt's Tuthmosis IV
A tour around the statue of the Sphinx temple and the pyramids of Giza. (4 min) 384
HAME.1.2 | Athens, Parthenon, Parthenónas, Acropolis - VR Walk
Go on a journey through Athens and its main attractions from Ancient Greece. (5 min) 34

Humanities

HUM.1 | Immerse Yourself in a Tour Around the Forbidden City of China
With red walls and yellow tiles, the resplendent and magnificent Forbidden City is a treasure of China's ancient palace architecture. (5 min) 214
HUM.1 | Leshan Giant Buddha - Leshan, China
Go on a tour of the Entire Leshan scenic area, including the famous stone Buddha statue. (9 min) 239

HUM.1 | Dholavira
Dholavira is an archaeological site that contains one of the five largest Harappan sites and most prominent archaeological sites in India belonging to the Indus Valley Civilization. (2 min) 102

HUM.1 | Ancient Egypt - Hall of Pharaohs
Visit the Hall of Pharaohs and interact and learn from 5 of Egypt's most well-known pharaohs of all time: Ramesses the Great, Nefertiti, King Tut, Alexander the Great, and Cleopatra. (unlimited) E/I

HUM.1 | Crawl Inside a 3,500-Year-Old Egyptian Tomb
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HUM.1 | The Dream of Egypt's Tuthmosis IV
A tour around the statue of the Sphinx temple and the pyramids of Giza.
(4 min) 384

HUM.2 | Athens, Parthenon, Parthenónas, Acropolis - VR Walk
Go on a journey through Athens and its main attractions from Ancient Greece.
(5 min) 34

HUM.5 | Bruegel: A Fall With the Rebel Angels
In partnership with the Royal Museums of Fine Arts of Belgium, the Google Cultural Institute has designed an immersive experience that lets you explore The Fall of the Rebel Angels (1562) like never before.
(4 min) 60

Introduction to Geography

ITG.2 | Grand Canyon
Explore the Grand Canyon from different observation decks around the natural wonder. (unlimited) E

ITG.2 | 1. VR Pearl Harbor Attack | 2. Explore South Dakota's Badlands
EXP.1: The Japanese midget submarine, manned by Ensign Kazuo Sakamaki, failed in its mission to attack and destroy American warships.
EXP.2: The Badlands is home to the largest mixed-grass prairie where bison and other wildlife graze freely. (6 min/2 min) 428

ITG.2 | 1. Cool VR Walk on the Moon | 2. Yosemite
EXP.1 Walk on the Moon from the Project Apollo Archive.
EXP.2 Experience a guided tour of some of Yosemite's majestic spots.
(2 min/4 min) 1

ITG.2 | A London City Guided Tour
Take a guided tour to view some of London's most iconic landmarks. (5 min) 15

ITG.2, ITG.6 | Athens, Parthenon, Parthenónas, Acropolis - VR Walk
Go on a journey through Athens and its main attractions from Ancient Greece.
(5 min) 34

ITG.2, ITG.6 | Discover the Taj Mahal, India
Join Asha Leo as she ventures around India and explores the Taj Mahal. (5 min) 104

ITG.2, ITG.6 | Taj Mahal 360 Degree (VR) Tour in India
Explore one of the 7 Wonders of the World, the Taj Mahal in India. (2 min) 377

ITG.2, ITG.6 | Hajj - Experience the Journey to Mecca
Walk with Al Jazeera's Basma Atassi in Mecca and see the major landmarks that millions of Muslims visit during the period of Hajj, the annual Islamic Pilgrimage.
(8 min) 199

ITG.2 | Japan - Where Tradition Meets the Future
Explore Japanese tradition, modernity, and nature. (3 min) 224

ITG.2 | The Aurora Borealis Over Alaska's Chatanika River
Explore a timelapse of the Aurora Borealis filmed during a geomagnetic storm by William Briscoe Photography. (5 min) 381

ITG.2, ITG.6 | Walking Tours of Japan - Kiyomizudera Temple in Kyoto
Experience a walking tour of Kiyomizudera Temple in Kyoto, Japan. (17 min) 431

ITG.2, ITG.6 | Immerse Yourself in a Tour Around the Forbidden City of China
With red walls and yellow tiles, the resplendent and magnificent Forbidden City is a treasure of China's ancient palace architecture. (5 min) 214

ITG.2 | Leshan Giant Buddha - Leshan, China
Go on a tour of the Entire Leshan scenic area, including the famous stone Buddha statue. (9 min) 239

ITG.2, ITG.5 | World Religions
See the different major religions of the world and how they are dispersed across the world. (9 min) 452

ITG.2 | Canyon
Peer down into a canyon from the top.
(1 min) 67

ITG.4 | Earth Cutaway
A model of Earth with a section cut away to expose its layers. IFX/LT

ITG.4 | Earth Cutaway info
An Infographic model of Earth with a section cut away to expose its layers.
IFX/LT

ITG.5 | Syrians "Have to Survive Having No Rights" in Lebanon
Learn about Syrian refugees who are living in makeshift settlements under harsh conditions, with no legal rights in Lebanon's Bekaa Valley. (3 min) 376

ITG.6 | Amazing Morocco
Join Louis as he adventures around Morocco. (8 min) 28

ITG.6 | Let's Go Rickshaw Ride Around Japan 1
Learn about traditional Japanese cuisine and take in sites. (3 min) 240

ITG.6 | Let's Go Rickshaw Ride Around Japan 2
See the bridge, Togetsu-Kyo which means "The moon crossing bridge," over the Katsura River which flows through the center of Arashiyama. (2 min) 241

ITG.6 | Let's Go Rickshaw Ride Around Japan 3
The path leading to Okochi Sanso garden from Nonomiya Shrine is about 400m long. (2 min) 242

ITG.6 | Witness the Mysterious World of West African Voodoo
Journey to Togo, a tiny nation in West Africa, that contains the region's largest Voodoo market- 'Marche des Fetches' and learn about the rich history that surrounds this religion. (5 min) 448

ITG.6 | The Fight for Falluja
Experience firsthand the battles Iraqi forces endured to retake the important strategic city of Fallujah from ISIS. (11 min) 387

ITG.8 | Beyond the Map - A Day in a Favela
In Rio, one out of every five residents lives in a favela, that's more than one and a half million people. (3 min) 54

ITG.9 | Damming the Nile: Episode 1
Africa's largest hydroelectric power project is two thirds finished and the dam can already control the flow of the Blue Nile, which is deeply upsetting downstream Egypt who they didn't consult before building started. (13 min) 94

ITG.9 | Damming the Nile: Episode 2
Journey to the great farming projects of Sudan, fly to a festival on the banks of the Nile and explore the ancient Sudanese pyramid. Then launch in a balloon over Luxor to find out how much this river means to the land of the pharaohs. (16 min) 95

ITG.9 | The Hidden Worlds of National Parks
Follow rangers on a journey to places most people never go. Experience the sights, sounds, and adventures of Kenai Fjords, Hawai'i Volcanoes, Carlsbad Caverns, Bryce Canyon, and Dry Tortugas. (5 min) 389

ITG.9 | Climbing the Redwoods - Fight for the Forests
Climb 200 feet up 'Grandfather,' the highest Redwood in a Northern California Grove while learning about the Redwood Forest and preservation efforts. (2 min) 79

ITG.9 | Ocean to Plate: A Journey into the Seafood Supply Chain
As populations and appetites grow, global fisheries are reaching their ecological capacity, yet at least a third of harvested fish and seafood is lost or wasted along the supply chain. (7 min) 293

ITG.9 | Protecting Ocean Anchor Species - Racing Extinction
Join marine biologist Luke Tipple as he swims alongside manta rays and whale sharks while sharing why they are vital to the survival of our oceans. (3 min) 315

Minority Studies

MIN.1 | Seeking Home: Life Inside the Calais Migrant Camp
Become part of a camp in northern France where migrants and refugees hope to make it across the English channel to start a new life in the United Kingdom. (6 min) 350

MIN.1 | Witness the Mysterious World of West African Voodoo
Journey to Togo, a tiny nation in West Africa, that contains the region's largest Voodoo market- 'Marche des Fetches' and learn about the rich history that surrounds this religion. (5 min) 448

MIN.1 | Traveling While Black
This film offers a revealing view of the Green Book Era as told through Ben's Chili Bowl, a black-owned restaurant in Washington, to remind us of the hardships that African-Americans faced during that time period. (20 min) 404

MIN.7 | Chennai Floods Aftermath
Take an immersive journey through the impact, rescue, and reason for the floods that occurred in Chennai, India, in December 2015. (6 min) 76

MIN.7 | Himalayas: A Trek to School
Follow two girls as they travel up to 6 hours a day to school in a remote Himalayan village. (8 min) 204

MIN.7 | Life in Haiti: After a Devastating Natural Disaster
Join filmmaker Dylan Roberts on a journey to the Haitian city of Jérémie, and the small village of Manish, to witness the aftermath of a colossal storm. (5 min) 258

MIN.7 | Out of Syria - Back to School
Step into the lives of two teenagers from war-torn Syria, Mustafa and Sarah. They both fled the fighting with their families. They left their homelands and their schools behind. (4 min) 301

MIN.7 | The Fight for Falluja
Experience firsthand the battles Iraqi forces endured to retake the important strategic city of Fallujah from ISIS. (11 min) 387

Mississippi Studies

MS.8 | Traveling While Black
This film offers a revealing view of the Green Book Era as told through Ben's Chili Bowl, a black-owned restaurant in Washington, to remind us of the hardships that African-Americans faced during that time period. (20 min) 404

MS.8 | Medgar Evers House
Explore a recreation of the Medgar Evers House and National Monument. Made in collaboration with the Evers family. (unlimited) E/I

MS.8 | Civil Rights Museum
Five Civil Rights leaders -Rosa Parks, John Lewis, Martin Luther King Jr., Thurgood Marshall, and Medgar Evers - come to life and teach you their stories on interactive stages. (unlimited) E/I

Problems in American Democracy

PAD.1 | Independence Hall
Join George Washington, John Adams, Thomas Jefferson, Benjamin Franklin, and John Hancock as they come to life to tell you their stories about the founding of the United States. (unlimited) E/I

PAD.8 | Civil Rights Museum
Five Civil Rights leaders - Rosa Parks, John Lewis, Martin Luther King Jr., Thurgood Marshall, and Medgar Evers - come to life and teach you their stories on interactive stages. (unlimited) E/I

Psychology

PSY.4, PSY.14 | Autism Virtual Reality
Become a student with autism in the daily fight for survival. (7 min) 37

PSY.4, PSY.8, PSY.14 | Inside Anxiety
Anxiety can make you feel on edge, unable to concentrate, fearful, irritable, and like you have lost control. Step inside the mind of someone who experiences anxiety and see the world from their point of view. (9 min) 217

PSY.7, PSY.14 | A Walk-Through Dementia: At Home
A unique experience designed to put you in the shoes of someone living with dementia. (3 min) 19

PSY.7, PSY.14 | A Walk-Through Dementia: Walking Home
A unique experience designed to put you in the shoes of someone living with dementia. (4 min) 20

US History

US.3, US.11 | Civil Rights Museum
Five Civil Rights leaders - Rosa Parks, John Lewis, Martin Luther King Jr., Thurgood Marshall, and Medgar Evers - come to life and teach you their stories on interactive stages. (unlimited) E/I

US.4 | Explore a WWI Trench in VR
Explore and discover how WWI soldiers lived in the trenches, view across No Man's Land, explore an officer's quarters, step inside the first aid field hospital and navigate the wet and muddy trench system. (2 min) 134

US.7 | 1. VR Pearl Harbor Attack | 2. Explore South Dakota's Badlands
EXP.1: The Japanese midget submarine, manned by Ensign Kazuo Sakamaki, failed in its mission to attack and destroy American warships.
EXP.2: The Badlands is home to the largest mixed-grass prairie where bison and other wildlife graze freely. (6 min/2 min) 428

US.7 | 1941 Battle Reenactment
Watch the reenactment of this World War II battle from 1941. in this video, you'll see operating German vehicles, such as the Pz.Kpfw. III medium tank as well as the StuG III self-propelled gun. The tanks on the Soviet side are the T-34-76 and the BT-7. (3 min) 2

US.7 | Honor Everywhere
See the World War II Memorial, Arlington National Cemetery, US Marines Corps War Memorial, US Air Force Memorial, and the Korean Memorial. (9 min) 206

US.7 | Remembering Pearl Harbor VR: Experience History
Follow Lt. James Downing, who at 103 is the second-oldest living American veteran to have witnessed that day, who recounts his time as postmaster of the USS West Virginia. (2 min) 321

US.8 | Nuclear Site
Explore a replica of an underground bunker, a nuclear control room found at Three Mile Island, and a replication of a nuclear power plant with a model of a turbine set. (unlimited) E/I

US.9 | The JFK Assassination
Follow along as you get an in-depth look into the assassination of JFK. (4 min) 390

US.11 | Medgar Evers House
Explore a recreation of the Medgar Evers House and National Monument. Made in collaboration with the Evers family. (unlimited) E/I

US.11 | Traveling While Black
This film offers a revealing view of the Green Book Era as told through Ben's Chili Bowl, a black-owned restaurant in Washington, to remind us of the hardships that African-Americans faced during that time period. (20 min) 404

US.12 | The Fight for Falluja
Experience firsthand the battles Iraqi forces endured to retake the important strategic city of Fallujah from ISIS. (11 min) 387

US.12 | Women's March in Chicago
Experience a women's rights march in Chicago on Jan 21, 2017. (2 min) 450

US.12 | March for our Lives
Pioneer Valley's March for our Lives on March 24, 2018. (1 min) 272

US.12 | Protest Alt Left & Right at Berkley
Experience a political division march from August 29, 2017. (1 min) 316

US Government

USG.5 | Traveling While Black
This film offers a revealing view of the Green Book Era as told through Ben's Chili Bowl, a black-owned restaurant in Washington, to remind us of the hardships that African-Americans faced during that time period. (20 min) 404

USG.5, USG.6 | Women's March in Chicago
Experience a women's rights march in Chicago on Jan 21, 2017. (2 min) 450

USG.6 | March for our Lives
Pioneer Valley's March for our Lives on March 24, 2018. (1 min) 272

World History

WH.8 | Explore a WWI Trench in VR
Explore and discover how WWI soldiers lived in the trenches, view across No Man's Land, explore an officer's quarters, step inside the first aid field hospital and navigate the wet and muddy trench system. (2 min) 134

WH.10 | 1941 Battle Reenactment
Watch the reenactment of this World War II battle from 1941. in this video, you'll see operating German vehicles, such as the Pz.Kpfw. III medium tank as well as the StuG III self-propelled gun. The tanks on the Soviet side are the T-34-76 and the BT-7. (3 min) 2

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See the World War II Memorial, Arlington National Cemetery, US Marines Corps War Memorial, US Air Force Memorial, and the Korean Memorial. (9 min) 206

WH.10 | Remembering Pearl Harbor VR: Experience History
Follow Lt. James Downing, who at 103 is the second-oldest living American veteran to have witnessed that day, who recounts his time as postmaster of the USS West Virginia. (2 min) 321

WH.10 | Virtually Inside the First Tank
Join Richard "The Challenger" Cutland and Nicholas "Chieftain" Moran as they explore the oldest members of the collection at The Tank Museum at Bovington, UK, including the world's last surviving Mark I tank: the oldest surviving combat tank in the world. (7 min) 420

WH.11 | Nuclear Site
Explore a replica of an underground bunker, a nuclear control room found at Three Mile Island, and a replication of a nuclear power plant with a model of a turbine set. (unlimited) E/I

IFX/LT - Interactable Objects

Mathematics

US Money - 1 Dollar Bill | 2 Dollar Bill | 5 Dollar Bill | 10 Dollar Bill | 20 Dollar Bill | 50 Dollar Bill | 100 Dollar Bill

Realistic representations of US paper money that can be used to teach about currency, decimals, and making change. IFX/LT

10 × 10 Array

This interactive math tool can be used to help students understand fractions, decimals, percents, and ratios by toggling 100 individual cubes on or off. IFX/LT

Abacus

This interactive math tool lets students toggle individual beads back and forth, which they can use to learn about place value, perform basic calculations, or represent large numbers. IFX/LT

Cone - Scalable

Dynamically scale the base and height of this cone, and learn to calculate its volume. IFX/LT

Cube - Scalable

Dynamically scale the edge length of this cube, and learn to calculate its volume. IFX/LT

Cylinder - Scalable

Dynamically scale the base and height of this cylinder, and learn to calculate its volume. IFX/LT

Rectangular Prism - Scalable

Dynamically scale the length, width, and height of this rectangular prism, and learn to calculate its volume. IFX/LT

Rectangular Pyramid - Scalable

Dynamically scale the base and height of this rectangular pyramid, and learn to calculate its volume. IFX/LT

Sphere - Scalable

Dynamically scale the radius of this sphere, and learn to calculate its volume. IFX/LT

Triangular Prism - Scalable

Dynamically scale the base and height of this triangular prism, and learn to calculate its volume. IFX/LT

Triangular Pyramid - Scalable

Dynamically scale the base and height of this triangular pyramid, and learn to calculate its volume. IFX/LT

Exponents Visualizer

A visualization of how exponents work using colorful cubes for numbers 1-10.

Ferris Wheel - Sine & Cosine Demo

Learn about the sine and cosine functions by plotting your position as you ride on a Ferris Wheel. IFX/LT

Math Words (37 separate IFX/LT)

3D representation of words for math and numbers. IFX/LT

Metric Volumes - 1000 mL Beaker | 1-Kiloliter Tank | 1-Liter Bottle | 2-Liter Bottle

Visualize and compare volumes with these 3D models. IFX/LT

US/Imperial Volumes - Cup | Gallon | Pint | Quart | Tablespoon | Teaspoon

Visualize and compare volumes with these 3D models. IFX/LT

Money Pallet - One Billion Dollars

A visualization of a billion dollars when counted using US hundred dollar bills. IFX/LT

Multiplication Table

An interactive 10x10 multiplication table that visualizes multiplication in rows and columns. Individual numbers can be toggled on or off to allow for quizzing. IFX/LT

Number Builder

This interactive math tool lets students explore place value up to the trillions place, and down to the trillionths place. The value of each place can be set, allowing users to create any number big or small. Teachers can also use this as a quizzing tool by hiding the place value labels. IFX/LT

Number Line - Whole Numbers (Positive)

This interactive math tool shows whole numbers 1-100, grouped in sections of 10 at a time. Students can use this tool to practice counting up or down by 1, 2, 3, 4, 5, or 10. IFX/LT

Place Value Blocks - 1 | 10 | 100 | 1000

Students can learn about place value with these 3D blocks representing 1, 10, 100, and 1000. IFX/LT

Place Value Whiteboard

This interactive whiteboard is labeled with boxes for representing the place value of numbers. Students can use this as a tool to learn about place value, then compare the values of two different numbers. IFX/LT

Point Plotter

Plot up to 12 line segments on a grid by defining each point's position and rotation. IFX/LT

Protractor - 360° (Interactive)

This interactive measuring tool can be used to measure angles of any object in any scene. The measuring arm can be moved in 1°, 5°, 10°, 15°, 20°, 30°, or 45° increments, allowing students to dynamically measure angles of any value. IFX/LT

Pythagorean Theorem Visualizer

Interactive visualization of the Pythagorean Theorem. Select values for sides A and B to generate a triangle, then apply the theorem for side C. IFX/LT

Revolved Cone

Visualization of how a 2D right triangle can be revolved into a 3D cone. IFX/LT

Mathematics (cont.)

Revolved Cylinder
Visualization of how a 2D rectangle can be revolved into a 3D cylinder. IFX/LT

Revolved Sphere
Visualization of how a 2D semicircle can be revolved into a 3D sphere. IFX/LT

Tens Frame
Students can use the interactive Tens Frame to explore the concepts of basic addition, subtraction, and representation of numbers 1-10. IFX/LT

Science

Sun Formation
See lots of Particles colliding to form the Sun. IFX/LT

Star Visualization- Sand Pile 1
Visualization of the number of stars in the universe as grains of sand on a map of the US. IFX/LT

Star Visualization- Sand Pile 2
Visualization of the number of stars in the universe as grains of sand on a partial map of the US. IFX/LT

Particle collision with Sparks
Two swarms of particles colliding with each other and forming sparks. IFX/LT

Bunsen Burner
Interactive model of a Bunsen burner with toggleable flame. IFX/LT

Erlenmeyer Flask
Flask/beaker with a chemical reaction taking place inside. IFX/LT

Hazardous Waste Disposal
Interactive model of a fire extinguisher. IFX/LT

Fire Extinguisher
Interactive model of a fire extinguisher. IFX/LT

Lab Safety Manual
Interactive at-scale measuring tool. IFX/LT

Emergency Eye Wash
Interactive model of an emergency eyewash and shower station as found in a science lab. IFX/LT

Tape Measure
Interactive at-scale measuring tool. Users can extend the tape in 1-ft segments up to 10 feet. IFX/LT

Face Mask
Photorealistic model of a blue disposable face mask. IFX/LT

Fume Hood
Interactive science lab fume hood. IFX/LT

International Space Station
Model of the exterior of the International Space Station. IFX/LT

Fire Extinguisher- Network
Interactive model of a fire extinguisher that allows for the user to pull the pin, aim the handle, and squeeze the trigger to produce the foam. IFX/LT

Accelerant Turbine
Model of a steam turbine set in a warehouse location. IFX/LT

X- Ray Machine
Interactive model of an x-ray machine. IFX/LT

Social Studies

Amphora Jar - Greek Artifact
A collection of artifacts from Ancient Greece. IFX/LT

Aphrodite Statue - Greek Artifact
A collection of artifacts from Ancient Greece. IFX/LT

Discobolus Statue - Greek Artifact
A collection of artifacts from Ancient Greece. IFX/LT

Hercules and Calliope Statue - Greek Artifact
A collection of artifacts from Ancient Greece. IFX/LT

Lebes Gamikos Vassel - Greek Artifact
A collection of artifacts from Ancient Greece. IFX/LT

Pelike Jar - Greek Artifact
A collection of artifacts from Ancient Greece. IFX/LT

Ancient Greek Amphitheater Section
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Decorated Wall - Corner
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Decorated Wall - Inside Corner
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Decorated Wall - Top Corner
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Decorated Wall - Top Side
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Doorway
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Doric Column
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Doric Column - Fluted
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Tiled Floor Plane
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Roof - Corner 1
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Roof - Corner 2
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Roof - Pediment
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Roof - Center
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Semicircle Wall
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Steps - Short
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Steps - Side Detail
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Wall - Medium
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Wall - Short
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Ancient Greek Wall - Short Painted
Modular building pieces designed to have students design/recreate Ancient Greek amphitheaters. These can be used to build scenes for reenacting plays, studying Ancient Greek culture, or learning about architecture and design principles. IFX/LT

Miscellaneous

Trolley Barn
Mockup of a proposed design for a trolley bar in Belmont, NC. IFX/LT

Painting Tool
Select the color you want to paint the other objects, then touch one painting tool to the other to change its color. IFX/LT

ADDITIONAL OFFERINGS

Other Content

Museum of Science Fiction
A VR Sci-Fiction Museum. (unlimited) E

Picto Puzzle
Multiplayer game where one participant designs a maze, one level at a time, and the other participants must race to solve it before the next level is created. (unlimited) I

EMU Multicultural Center
Multi-use space featuring a community center, art gallery, and a café. (unlimited) E

Google Data Center Tour
Take a Google data center tour and learn about the massive scale, the incredible attention to security and privacy, and the amazing efforts to make the data center extremely efficient and green. (9 min) 193

Letter A - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter A. (2 min) 243

Letter B - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter B. (2 min) 244

Letter C - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter C. (2 min) 245

Letter D - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter D. (2 min) 246

Letter E - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter E. (2 min) 247

Letter F - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter F. (2 min) 248

Letter G - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter G. (2 min) 249

Letter H - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter H. (2 min) 250

Letter I - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter I. (3 min) 251

Letter J - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter J. (5 min) 252

Letter K - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter K. (5 min) 253

Letter L - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter L. (7 min) 254

Letter M - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter M. (6 min) 255

Letter N - 360 3D Animated VR Kids Video
Try out our 360 degree video where you can turn all around to find the objects that begin with the Letter N. (4 min) 256

Backstage with an Elite Ballerina
Go behind the scenes with Sarah Lane, a soloist at the American Ballet Theatre, as she prepares to dance the title role in "The Sleeping Beauty" at Lincoln Center. (5 min) 46

Explore the World in 4k
Venture around the world and see different aspects of the natural world and various cities and wildlife. (3 min) 143

GoPro VR: New York City Jump
There's no better way to see New York City in 360 then through the eyes of a born and bred NY photographer. (3 min) 194

Okinawa 360 - VR Sea Tour
Explore the diverse aquatic life surrounding Okinawa. (5 min) 296

Visit Hamilton Island with Qantas
Fly over Hamilton Island and explore the resort from a Qantas Jet. (8 min) 442

How Babies See The World
Follow along as you see through the eyes of a baby how their eyesight changes over the first year of life. (2 min) 208

Wreck Diving Time Lapse
Scuba dive one of the Caribbean's most iconic shipwrecks. (1 min) 453

Ducks and Swans in London Park
Beautiful view of London Park. (1 min) 110

London Tower Bridge
Beautiful view off the London Tower Bridge. (1 min) 265

A Skateboard Ride to STEM Learning | 360° VR video
University of Washington Professor Kristen Missall discusses her research partnership with Iowa Children's Museum and leads a tour of its "Notion of Motion" exhibit. (3 min) 16

NYC 360 Time Warp
Time lapse of a day in New York City. (1 min) 292

All Skippers Invited
Join a short selling trip on a sunny day. (1 min) 26

Panoramic Experiences

The Alamo E
Alamo 1
Alamo 2
Alamo 3
Alamo 4
Alamo 5
Alamo 6
Alamo Cenotaph Monument

The Forbidden City E
Forbidden City 1
Forbidden City 2
Forbidden City 3
Forbidden City 4
Forbidden City 5
Forbidden City 6
Forbidden City 7
Forbidden City 8

The Louvre E
Jardin de l'Oratoire
Louvre 1
Louvre 2
Louvre 3
Louvre 4
Louvre 5
Louvre 6
Louvre 7
Louvre 8
Louvre 9
Louvre 10
Louvre 11
Louvre 229
Louvre 307-309
Louvre Front
Louvre Outside 2
Louvre Outside
Louvre Pyramid
Louvre Rivoli

The Vatican E
Altar of the Fatherland
Basilica di San Giovanni in Laterano
Basilica di San Giovanni in Laterano 2
Basilica Papale di Santa Maria Maggiore
Basilica Papale di Santa Maria Maggiore 2
Baths of Caracalla
Baths of Diocletian
Borghese Gallery and Museum
Borghese Gallery and Museum 2
Borghese Gallery and Museum 3
Borghese Gallery and Museum Entrance
Campidoglio
Capitoline Museums 1
Capitoline Museums 2
Capitoline Museums 3
Capitoline Museums 4
Capitoline Museums Exterior
Castel Sant'Angelo
Castel Sant'Angelo 2
Castel Sant'Angelo 3
Circus Maximus
Colosseum
Colosseum 2
Doria Pamphilj Gallery
Fiumi Fountain
Fontana di Trevi
Hadrian's Villa
Largo di Torre Argentina
Largo Romolo e Remo
Ludus Magnus
National Roman Museum
Palatine Hill
Pantheon
Pantheon Entrance
Piazza del Popolo
Piazza Navona
Pyramid of Caius Cestius
Roman Forum
Roman Forum 2
Spanish Steps
St. Clemens Basilica
Temple of Asclepius
Trajan's Column
Trajan's Market
Villa d'Este 1
Villa d'Este 2

Jerusalem E
Ben Yehuda St 1
Ben Yehuda St 2
Chords Bridge
Church of All Nations
Church of the Holy Sepulchre 1
Church of the Holy Sepulchre 2
Church of the Holy Sepulchre 3
City of David
Damascus Gate
Davidka Square
Dome of the Rock 1
Dome of the Rock 2
Dome of the Rock Exterior
Dormition Abbey
Gethsemane
Hall of Names, Yad Vashem
Lions' Gate
Mahane Yehuda Market
Model of Jerusalem in 2nd Temple Period 1
Model of Jerusalem in 2nd Temple Period 2
Montefiore Windmill
Mount of Olives
Museum on the Seam
National Hall for Israel's Fallen
Pool of Siloam
Rockefeller Archaeological Museum
Sacher Park
The Garden Tomb Jerusalem 1
The Garden Tomb Jerusalem 2
The Israel Museum
The Israel Museum Exterior
The Jaffa Gate
Tomb of the Prophets
Tomb of the Virgin
Tower of David
Warsaw Ghetto Monument
Western Wall
Wohl Rose Garden
Zedekiah's Cave
Zion Gate

Mount Rushmore E
Lincoln Borglum Visitor Center 1
Lincoln Borglum Visitor Center 2
Lincoln Borglum Visitor Center 3
Lincoln Borglum Visitor Center 4
Mount Rushmore 1
Mount Rushmore 2
Mount Rushmore 3
Mount Rushmore 4
Presidential Trail 1
Presidential Trail 2
Presidential Trail 3
Sculptor's Studio
SD 244 1
SD 244 2
SD 244 3

Yosemite National Park E
Bridalveil Falls View
Cathedral Beach
El Capitan Picnic Area
Glacier Point Trail

Yosemite National Park (cont.) E
Glacier Point
Lost Arrow Spire
Lower Yosemite Falls Bridge
Lower Yosemite Falls Trailhead
Merced River 1
Merced River 2
Merced River 3
North Dome
Sentinel Beach
Tunnel View
Upper Yosemite Falls Trail
Upper Yosemite Falls
Washburn Point
Yosemite Falls
Yosemite Mountaintop
Yosemite Valley View

London, England E
Barbican Centre
Big Ben
Borough Market 1
Borough Market 2
Buckingham Palace
Canary Wharf
Churchill War Rooms
Cutty Sark
Hyde Park
Kensington Palace
Kyoto Garden Holland Park
London Bridge 1
London Bridge 2
London Bridge 3
London Eye
London Eye Waterloo Pier
London Wall
Memorial Garden
Millenium Bridge
Monument of the Great Fire of London
National Gallery 1
National Gallery 2
National Gallery 3
National Gallery 4
National Gallery Exterior
Palace of Westminster 1
Palace of Westminster 2
Palace of Westminster 3
Palace of Westminster Exterior
Piccadilly Circus
Princess Diana Memorial Garden
Royal Albert Hall
Shaftesbury Memorial Fountain
St. James's Palace
St. Mary's Axe
St. Paul's Cathedral
Tate Modern
Tate Modern Viewing Level
The British Museum 1
The British Museum 2
The British Museum 3
The British Museum 4
The British Museum 5
The British Museum 6
The British Museum Exterior
Tower Bridge
Tower of London
Trafalgar Square

Virtual Museums & Field Trips

Smithsonian National Museum of Natural History
Explore and learn from the many exhibits in the Smithsonian. (unlimited) E

The Vatican Museum
Raphael's Rooms, Pio Clementino Museum, Niccoline Chapel, Room of Chiaroscuro. (unlimited) E

George Washington's Mount Vernon
Explore George Washington's historic home. (unlimited) E

The Met 360 Project
Great Hall (2 min), The Met Cloisters (2 min), The Temple of Dendur (2 min), The Met Breuer (2 min), The Charles Engelhard Court (3 min), Arms and Armor Galleries (3 min), Collection (6min) E

Kennicott Glacier
Explore the Kennicott Glacier in the Wrangell-St. Elias National Park and Preserve in Alaska. (unlimited) E

Access Mars
Explore the Planet of Mars from the Mars Rover. (unlimited) E

National Museum of the US Air Force
Explore the Museum of the US Air Force and learn about its history. (unlimited) E

Antietam National Battlefield
Explore this historic battlefield from the Civil War. (unlimited) E

Gettysburg National Battlefield
Explore this historic Battlefield from the Civil War. (unlimited) E

Fredericksburg National Battlefield
Explore this historic battlefield from the Civil War. (unlimited) E

Charleston and Fort Sumter
Explore this historic battlefield from the American Revolution. (unlimited) E

Shiloh National Battlefield
Explore this historic Battlefield from the Civil War. (unlimited) E

Chattanooga National Military Park
Explore this historic Battlefield from the Civil War. (unlimited) E

Yorktown Battlefield
Explore this historic Battlefield from the Revolutionary War. (unlimited) E

Vicksburg National Military Park
Explore this historic Battlefield from the Civil War. (unlimited) E

Appomattox Courthouse
Explore this historic Courthouse where the end of the Civil War happened. (unlimited) E

Chancellorsville Battlefield
Explore this historic Battlefield from the Civil War. (unlimited) E

Guilford Courthouse
Explore this historic site from the Revolutionary War. (unlimited) E

Eutaw Springs Battlefield
Explore this historic Battlefield from the Revolutionary War. (unlimited) E

Mount Everest
Explore the impressive heights of Mount Everest. (unlimited) E