A Correlation of

Connected Mathematics Project 3

(CMP3) ©2018

to the

Massachusetts Mathematics Curriculum Framework 2017 Grades 6 - 8

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to the Massachusetts Mathematics Curriculum Framework 2017

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Standards for Mathematical Practice	
1. Make sense of problems and persevere in solving them.	The goal for students to make sense of, and persevere in solving, problems is fundamental to the curriculum set forth in *Connected Mathematics Project 3*. In addition to providing practice in critical thinking and problem-solving strategies, the problems are geared to engage students with student centered problem situations. Student-student and student-teacher dialogues encourage students to persevere in solving problems. Applications, Connections, and Extensions (ACE) homework problems provide students with opportunities to apply what they have learned to make sense of and persevere in solving new problems. The introductions to the problems in each investigation include an initial analysis of the problem situation and the formation of a plan for solving the problem. In *Variables and Patterns*, students apply algebra to represent problems using variables, expressions, equations, tables, graphs, and patterns. Suggested questions in the Teacher Guide provide metacognitive scaffolding to help students monitor and refine their problem solving strategies; the ACE homework problems enable students to practice and synthesize problem-solving skills. See, for example: **Prime Time:** 1.4: Rectangles and Factor Pairs; 2.3: Bagging Snacks; 3.4: Unraveling the Locker Problem; 4.1: Reasoning With Even and Odd Numbers **Comparing Bits and Pieces:** 2: Connecting Ratios and Rates (ACE 31-33) **Let's Be Rational:** 4.3: Becoming an Operations Sleuth **Covering and Surrounding:** 1.1: Designing Bumper-Car Rides; 1.2: Building Storm Shelters; 1.3 Fencing in Spaces; 4.3 Designing Gift Boxes

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2. Reason abstractly and quantitatively.	*Connected Mathematics Project 3* helps students develop abstract and quantitative reasoning skills by focusing on student acquisition of mathematical language and various forms of mathematical reasoning (e.g., visual, spatial, logical, graphical, and algebraic reasoning and number sense). Students employ abstract and quantitative reasoning to analyze, represent, and solve problems. They decontextualize problem situations by using variables, expressions, and equations to represent various aspects of the problem. They contextualize abstract representations to justify and verify their solution strategies, explain their reasoning, and state their solution in terms of the original problem situation. See, for example: **Prime Time:** 1.3: The Product Game; 1.4: Rectangles and Factor Pairs; 1: Building on Factors and Multiples (ACE 42, Common Core Mathematical Practices); 2: Common Multiples and Common Factors (ACE 46-53); 3: Factorizations: Searching for Factor Strings (ACE 47) **Let's Be Rational:** 4.3: Becoming an Operations Sleuth; 4: Wrapping Up the Operations (Common Core Mathematical Practices) **Covering and Surrounding:** 4: Measuring Surface Area and Volume (Common Core Mathematical Practices) **Decimal Ops:** 1.3: Take a Hike **Variables and Patterns:** 4.1: Taking the Plunge

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3. Construct viable arguments and critique the reasoning of others.	In the *Connected Mathematics Project 3* classroom, students routinely participate in student-student and student-teacher discourse as they explain their thinking about a problem situation and their reasoning for a solution pathway. Additionally, the problems in each investigation and in the ACE problem sets provide opportunities for students to construct mathematical arguments and to critique other students' solutions and strategies. Teachers Guides include suggested questions to support the development of a classroom culture that includes argument and critique as fundamental components of mathematical problem-solving process. Students make conjectures and construct logical arguments using previously established results, assumptions, and definitions. They reason deductively and inductively and communicate their reasoning to others, providing opportunities for mutual critique of arguments. See, for example: **Prime Time:** 1.2: Playing to Win; 1: Building on Factors and Multiples (ACE 1a, 49d); 2: Common Multiples and Common Factors (ACE 60); 3: Factorizations: Searching for Factor Strings (Common Core Mathematical Practices) **Comparing Bits and Pieces:** 3: Extending the Number Line (Common Core Mathematical Practices) **Let's Be Rational:** 3: Dividing With Fractions (ACE 54); 4: Wrapping up the Operations (ACE 47-55) **Covering and Surrounding:** 1.2: Building Storm Shelters; 1.3: Fencing in Spaces; 2.4: Designing Triangles Under Constraints

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4. Model with mathematics.	Students construct, make inferences from, and interpret concrete, symbolic, graphic, verbal, and algorithmic models of mathematical relationships in problem situations. They translate information from model to another, and modify their models as needed. Students develop fluency with different types of models, and learn to apply them appropriately to different problem situations arising in everyday life, society, and the workplace. See, for example: **Prime Time:** 4.1: Reasoning with Even and Odd Numbers; 4.2: Using the Distributive Property **Comparing Bits and Pieces:** 1.3: Equivalent Fractions on the Line; 2.3: Making Comparisons with Rate Models; 3.1: Extending the Number Line **Let's Be Rational:** 1.3: Land Sections; 2.1: How Much of the Pan Have We Sold?; 2.2: Modeling Multiplication Situations; 3.2: Into Pieces **Covering and Surrounding:** 1.1: Designing Bumper-Car Rides

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5. Use appropriate tools strategically.	Students use tools to explore problem situations, deciding which tools are appropriate for solving a particular problem. Students are able to describe various uses for different tools, including the calculator, graphing tools, poly strips, and plastic two-dimensional shapes. For example, students recognize that calculators can be used to compute, to verify reasoning, to explore possibilities, and to see whether an approach or a solution makes sense; they use polystrips and two-dimensional plastic models to explore properties of geometry and measurement. See, for example: **Comparing Bits and Pieces:** 1.3: Equivalent Fractions on the Line; 4: Working With Percents (Common Core Mathematical Practices) **Covering and Surrounding:** 2.1: Triangles on Grids; 3.4: Polygons on Coordinate Grids; 3: Measuring Parallelograms (Common Core Mathematical Practices) **Decimal Ops:** 4.1: What's the Tax on This Item?; 4.2: Computing Tips; 4.3: Percent Discounts; 4.4: Putting Operations Together **Data About Us:** 3.3: Is It Worth the Wait?

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6. Attend to precision.	*Connected Mathematics Project 3* emphasizes the use of precise terms and definitions with the philosophy that the clarity of a student's reasoning and processing is reflected in the student's use of precise mathematical language. The student textbook includes definitions that are mathematically accurate and student-friendly. Students are expected to attend to precision in mathematical language and also in argument presentation. The Mathematical Reflections pages include questions to help students synthesize and organize their understandings of important concepts and strategies. Additionally, students are expected to perform accurate calculations, expressing numerical answers with an appropriate degree of precision, depending on the context of the problem. See, for example: **Prime Time:** 1.2: Playing to Win; 1.3: The Product Game; 1: Building on Factors and Multiples (ACE 43-44); 3: Factorizations Searching for Factor Strings (ACE 51b); 4: Linking Multiplication and Addition: The Distributive Property (Common Core Mathematical Practices) **Let's Be Rational:** 1.1: Getting Close; 1.2: Estimating Sums and Differences; 1: Extending Addition and Subtraction of Fractions (Common Core Mathematical Practices) **Covering and Surrounding:** 1: Designing Bumper Cars: Extending and Building on Area and Perimeter (ACE 75-77) **Decimal Ops:** 1.2: Getting Close

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7. Look for and make use of structure.	The *Connected Mathematics Project 3* materials are designed to help students build mathematical understandings while illuminating and applying mathematical structure. For example, in Grade 6, students discover patterns in data tables and analyze numbers to determine their prime structure. In all grades, students experience structure in algebraic expressions and properties, functional relationships, measurement formulas, computation algorithms, and number systems. See, for example: **Prime Time:** 1.1: Playing the Factor Game; 1.2: Playing to Win; 1.4: Rectangles and Factor Pairs; 1: Building on Factors and Multiples (ACE 37-38, 48); 3.3: Using Prime Factorizations **Comparing Bits and Pieces:** 2: Connecting Ratios and Rates (Common Core Mathematical Practices) **Let's Be Rational:** 4.1: Just the Facts **Covering and Surrounding:** 1: Designing Bumper Cars: Extending and Building on Area and Perimeter (Common Core Mathematical Practices) **Decimal Ops:** 3.1: Multiplying Decimals I; 3.4: Going the Long Way

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8. Look for and express regularity in repeated reasoning.	As students investigate problems in *Connected Mathematics Project 3*, they are encouraged to look for connections to previously solved problems and employed solution strategies. The titles of the units and investigations are intended to promote the connectedness of mathematical concepts and processes with references to "building," "linking," "connecting," and "extending." For example, in the Prime Time unit, students investigate Building on Factors and Multiples and Linking Multiplication and Addition. They extend the number line to include rational and negative numbers, and they extend computation algorithms to add and subtract fractions. See, for example: **Prime Time:** 1.3: The Product Game; 2: Common Multiples and Common Factors (Common Core Mathematical Practices); 4.3: Ordering Operations **Let's Be Rational:** 3: Dividing With Fractions (ACE 6, Common Core Mathematical Practices); 4.1: Just the Facts; 4.2: Multiplication and Division Fact Families **Covering and Surrounding:** 2.3: Making Families of Triangles; 3.2: Making Families of Parallelograms **Decimal Ops:** 1.3: Take a Hike; 2.3: Connecting Operations

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Content Standards	
Ratios and Proportional Relationships	**6.RP**
A. Understand ratio and rate concepts and use ratio and rate reasoning to solve problems.	
1. Understand the concept of a ratio including the distinctions between part: part and part: whole and the value of a ratio; part/part and part/whole. Use ratio language to describe a ratio relationship between two quantities. For example: The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every two wings there was one beak; For every vote candidate A received, candidate C received nearly three votes, meaning that candidate C received three out of every four votes or ¾ of all votes.	**Comparing Bits and Pieces:** 1.1: Fundraising; 1.2: Fundraising Thermometers; 1.3: Equivalent Fractions on the Line; 1.4: Making Progress; 1.5: Comparing Fundraising Goals **Decimal Ops:** 1.3: Take a Hike
2. Understand the concept of a unit rate *a*/*b* associated with a ratio *a*:*b* with $b \neq 0$, and use rate language in the context of a ratio relationship, *including the use of units*. For example: This recipe has a ratio of three cups of flour to four cups of sugar, so there is ¾ cup of flour for each cup of sugar; We paid $75 for 15 hamburgers, which is a rate of five dollars per hamburger.	**Comparing Bits and Pieces:** 2.1: Equal Shares; 2.2: Unequal Shares; 2.3: Making Comparisons with Rate Tables **Decimal Ops:** 1.3: Take a Hike
3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.	**Comparing Bits and Pieces:** 1.1: Fundraising; 1.2: Fundraising Thermometers; 1.3: Equivalent Fractions on the Line; 1.4: Making Progress; 1.5: Comparing Fundraising Goals; 2.1: Equal Shares; 2.2: Unequal Shares; 2.3: Making Comparisons with Rate Tables **Decimal Ops:** 1.3: Take a Hike **Variables and Patterns:** 1.1: Getting Ready to Ride; 1.2: From Atlantic City to Lewes; 1.3: From Lewes to Chincoteague Island; 1.4: From Chincoteague to Colonial Williamsburg; 2.1: Renting Bicycles; 3.1: Visit to Wild World; 3.2: Moving, Texting, and Measuring

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a. Make tables of equivalent ratios relating quantities with whole-number measurements. Find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.	**Comparing Bits and Pieces:** 2.3: Making Comparisons with Rate Tables **Variables and Patterns:** 1.1: Getting Ready to Ride; 2.1: Renting Bicycles; 3.2: Moving, Texting, and Measuring
b. Solve unit rate problems, including those involving unit pricing, and constant speed. For example, if it took seven hours to mow four lawns, then, at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?	**Comparing Bits and Pieces:** 2.1: Equal Shares **Decimal Ops:** 1.3: Take a Hike **Variables and Patterns:** 3.1: Visit to Wild World; 3.2: Moving, Texting, and Measuring
c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means $30/100$ times the quantity); solve problems involving finding the whole, given a part and the percent.	**Comparing Bits and Pieces:** 4.1: Who Is the Best? Making Sense of Percents; 4.2: Genetic Traits; 4.3: The Art of Comparison **Decimal Ops:** 4.1: What's the Tax on This Item? 4.2: Computing Tips; 4.3: Percent Discounts; 4.4: Putting Operations Together
d. Use ratio reasoning to convert measurement units within and between measurement systems; manipulate and transform units appropriately when multiplying or dividing quantities. For example, Malik is making a recipe, but he cannot find his measuring cups! He has, however, found a tablespoon. His cookbook says that 1 cup = 16 tablespoons. Explain how he could use the tablespoon to measure out the following ingredients: two cups of flour, ½ cup sunflower seed, and 1¼ cup of oatmeal.	**Covering and Surrounding:** 1.2: Building Storm Shelters; 1.3: Fencing in Spaces, 4.2: Filling the Boxes; 4.3: Designing Gift Boxes **Decimal Ops:** 4.4: Putting Operations Together
e. Solve problems that relate the mass of an object to its volume.	This standard is outside the scope of Connected Mathematics Project 3.

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The Number System 6.NS	
A. Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	
1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for ($\frac{2}{3}$) ÷ ($\frac{3}{4}$) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that ($\frac{2}{3}$) ÷ ($\frac{3}{4}$) = $\frac{8}{9}$ because $\frac{3}{4}$ of $\frac{8}{9}$ is $\frac{2}{3}$. In general, ($\frac{a}{b}$) ÷ ($\frac{c}{d}$) = $\frac{ad}{bc}$. How much chocolate will each person get if three people share ½ lb. of chocolate equally? How many ¾-cup servings are in ⅔ of a cup of yogurt? How wide is a rectangular strip of land with length ¾ mile and area ½ square mile?	**Let's Be Rational:** 3.1: Preparing Food; 3.2: Into Pieces; 3.3: Sharing a Prize; 3.4: Examining Algorithms for Dividing Fractions
B. Compute fluently with multi-digit numbers and find common factors and multiples.	
2. Fluently divide multi-digit numbers using the standard algorithm.	**Prime Time:** 1.1: Playing the Factor Game; 1.4: Rectangles and Factor Pairs; 3.2: Finding the Longest Factor String; 3.3: Using Prime Factorizations **Let's Be Rational:** 3.1: Preparing Food; 3.2: Into Pieces; 3.3: Sharing a Prize; 3.4: Examining Algorithms for Dividing Fractions **Decimal Ops:** 3.3: How Many Times?; 3.4: Going the Long Way; 3.5: Challenging Cases
3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	**Decimal Ops:** 2.1: Getting Things in the Right Place; 2.2: What's the Difference; 2.3: Connecting Operations; 3.1: It's Decimal Time(s); 3.2: It Works Every Time; 3.3: How Many Times?; 3.4: Going the Long Way; 3.5: Challenging Cases

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4. Use prime factorization to find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two relatively prime numbers. For example, express 36 + 8 as 4(9 + 2).	**Prime Time:** 2.1: Riding Ferris Wheels; 2.2: Looking at Cicada Cycles; 2.3: Bagging Snacks; 3.2: Finding the Longest Factor String; 3.3: Using Prime Factorizations; 3.4: Unraveling the Locker Problem; 4.2: Using the Distributive Property; 4.3: Ordering Operations **Let's Be Rational:** 1.3: Land Sections; 1.4: Visiting the Spice Shop
C. Apply and extend previous understandings of numbers to the system of rational numbers.	
5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, and positive/negative electric charge). Use positive and negative numbers (whole numbers, fractions, and decimals) to represent quantities in real-world contexts, explaining the meaning of zero in each situation.	**Comparing Bits and Pieces:** 3.1: Extending the Number Line; 3.2: Estimating and Ordering Rational Numbers **Variables and Patterns:** 2.3: Predicting Profits; 2.4: Interpreting Graphs
6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.	**Comparing Bits and Pieces:** 3.1: Extending the Number Line; 3.2: Estimating and Ordering Rational Numbers; 3.4 Decimals on the Number Line **Variables and Patterns:** 2.3: Predicting Profits; 2.4: Interpreting Graphs
a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that zero is its own opposite.	**Comparing Bits and Pieces:** 3.1: Extending the Number Line; 3.2: Estimating and Ordering Rational Numbers; 3.4 Decimals on the Number Line

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b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.	**Comparing Bits and Pieces:** 3.1: Extending the Number Line; 3.2: Estimating and Ordering Rational Numbers **Variables and Patterns:** 2.3: Predicting Profits
c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	**Comparing Bits and Pieces:** 3.1: Extending the Number Line; 3.2: Estimating and Ordering Rational Numbers; 3.4 Decimals on the Number Line **Variables and Patterns:** 2.3: Predicting Profits
7. Understand ordering and absolute value of rational numbers.	**Comparing Bits and Pieces:** 3.1: Extending the Number Line; 3.2: Estimating and Ordering Rational Numbers; 3.4 Decimals on the Number Line
a. Interpret statements of inequality as statements about the relative positions of two numbers on a number line diagram. For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.	**Comparing Bits and Pieces:** 3.1: Extending the Number Line; 3.2: Estimating and Ordering Rational Numbers; 3.4 Decimals on the Number Line
b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write –3°C > –7°C to express the fact that –3°C is warmer than –7°C.	**Comparing Bits and Pieces:** 3.1: Extending the Number Line; 3.2: Estimating and Ordering Rational Numbers **Variables and Patterns:** 2.3: Predicting Profits

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c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.	**Comparing Bits and Pieces:** 3.1: Extending the Number Line; 3.2: Estimating and Ordering Rational Numbers
d. Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars**.**	**Comparing Bits and Pieces:** 3.1: Extending the Number Line; 3.2: Estimating and Ordering Rational Numbers **Variables and Patterns:** 2.3: Predicting Profits
8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	**Covering and Surrounding:** 2.1: Triangles on Grids; 3.4: Polygons on Coordinate Grids **Variables and Patterns:** 1.1: Getting Ready to Ride; 1.2: From Atlantic City to Lewes; 1.3: From Lewes to Chincoteague Island; 1.4: From Chincoteague to Colonial Williamsburg
Expressions and Equations	**6.EE**
A. Apply and extend previous understandings of arithmetic to algebraic expressions.	
1. Write and evaluate numerical expressions involving whole-number exponents.	**Prime Time: Factors and Multiples:** 3.2: Finding the Longest Factor String; 3.3: Using Prime Factorizations; 3.4: Unraveling the Locker Problem
2. Write, read, and evaluate expressions in which letters stand for numbers.	**Covering and Surrounding:** 4.2: Filling the Boxes; 4.3: Designing Gift Boxes **Variables and Patterns:** 3.1: Visit to Wild World; 3.2: Moving, Texting, and Measuring; 3.3: Group Discounts and a Bonus Card; 3.4: Getting the Calculation Right; 4.1: Taking the Plunge; 4.2: More Than One Way to Say It; 4.3: Putting It All Together; 4.4: Finding the Unknown Value; 4.5: It's Not Always Equal

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a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 – y.	**Variables and Patterns:** 3.1: Visit to Wild World; 3.2: Moving, Texting, and Measuring; 3.3: Group Discounts and a Bonus Card; 3.4: Getting the Calculation Right; 4.1: Taking the Plunge; 4.2: More Than One Way to Say It; 4.3: Putting It All Together; 4.4: Finding the Unknown Value; 4.5: It's Not Always Equal
b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, and coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2(8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.	**Prime Time:** 1.3: The Product Game; 1.4: Rectangles and Factor Pairs; 3.1: The Product Puzzle; 3.2: Finding the Longest Factor String; 3.3: Using Prime Factorizations; 3.4: Unraveling the Locker Problem; 4.2: Using the Distributive Property; 4.3: Ordering Operations
c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length s = ½ .	**Covering and Surrounding:** 4.2: Filling the Boxes; 4.3: Designing Gift Boxes **Variables and Patterns:** 3.1: Visit to Wild World; 3.2: Moving, Texting, and Measuring; 3.3: Group Discounts and a Bonus Card; 3.4: Getting the Calculation Right; 4.1: Taking the Plunge; 4.2: More Than One Way to Say It; 4.3: Putting It All Together; 4.4: Finding the Unknown Value; 4.5: It's Not Always Equal
3. Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3(2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6(4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.	**Prime Time:** Factors and Multiples: 4.2: Using the Distributive Property; 4.3: Ordering Operations; 4.4: Choosing an Operation **Variables and Patterns:** 4.1: Taking the Plunge; 4.2: More Than One Way to Say It; 4.3: Putting It All Together

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4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.	**Prime Time:** Factors and Multiples: 4.2: Using the Distributive Property; 4.3: Ordering Operations; 4.4: Choosing an Operation **Variables and Patterns:** 4.1: Taking the Plunge; 4.2: More Than One Way to Say It; 4.3: Putting It All Together
B. Reason about and solve one-variable equations and inequalities.	
5. Understand solving an equation or inequality as a process of answering a question: Which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	**Variables and Patterns:** 4.4: Finding the Unknown Value; 4.5: It's Not Always Equal
6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	**Variables and Patterns:** 3.1: Visit to Wild World; 3.2: Moving, Texting, and Measuring; 3.3: Group Discounts and a Bonus Card; 3.4: Getting the Calculation Right; 4.1: Taking the Plunge; 4.2: More Than One Way to Say It; 4.3: Putting It All Together; 4.4: Finding the Unknown Value; 4.5: It's Not Always Equal
7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q, and x are all nonnegative rational numbers.	**Variables and Patterns:** 4.1: Taking the Plunge; 4.2: More Than One Way to Say It; 4.3: Putting It All Together; 4.4: Finding the Unknown Value
8. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	**Variables and Patterns:** 4.5: It's Not Always Equal

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C. Represent and analyze quantitative relationships between dependent and independent variables.	
9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.	**Variables and Patterns:** 1.1: Getting Ready to Ride; 1.2: From Atlantic City to Lewes; 1.3: From Lewes to Chincoteague Island; 1.4: From Chincoteague to Colonial Williamsburg; 2.1: Renting Bicycles; 2.2: Finding Customers; 2.3: Predicting Profits; 2.4: What's the Story?; 3.1: Visit to Wild World; 3.2: Moving, Texting, and Measuring; 3.3: Group Discounts and a Bonus Card; 3.4: Getting the Calculation Right

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Geometry	**6.G**
A. Solve real-world and mathematical problems involving area, surface area, and volume.	
1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems	**Covering and Surrounding:** 1.1: Designing Bumper-Car Rides; 1.2: Building Storm Shelters; 1.3: Fencing in Spaces; 2.1: Triangles on Grids; 2.2: More Triangles; 2.3: Making Families of Triangles; 2.4: Designing Triangles Under Constraints; 3.1: Parallelograms and Triangles; 3.2: Making Families of Parallelograms; 3.3: Designing Parallelograms; 3.4: Polygons on Coordinate Grids; 4.1: Making Rectangular Boxes; 4.2: Filling the Boxes; 4.3: Designing Gift Boxes
2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	**Covering and Surrounding:** 4.2: Filling the Boxes; 4.3: Designing Gift Boxes
3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	**Covering and Surrounding:** 2.1: Triangles on Grids; 3.4: Polygons on Coordinate Grids
4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface areas of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	**Covering and Surrounding:** 4.1: Making Rectangular Boxes; 4.3: Designing Gift Boxes

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Statistics and Probability	**6.SP**
A. Develop understanding of statistical variability.	
1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.	**Data About Us:** 1.1: How Many Letters Are in a Name?; 1.2: Describing Name Lengths; 1.3: Describing Name Lengths; 2.1: What's a Mean Household Size?; 2.2: Comparing Distributions With the Same Mean; 2.3: Making Choices; 2.4: Who Else Is in Your Household; 3.1: Estimating Cereal Serving Sizes; 3.2: Connecting Cereal Shelf Location and Sugar; 3.3: Is It Worth the Wait?; 4.1: Traveling to School; 4.2: Jumping Rope; 4.3: How Much Taller is a 6th Grader Than A Second Grader?
2. Understand that a set of data collected to answer a statistical question has a distribution, which can be described by its center (median, mean, and/or mode), spread (range, interquartile range), and overall shape.	**Data About Us:** 1.1: How Many Letters Are in a Name?; 1.2: Describing Name Lengths; 1.3: Describing Name Lengths; 2.1: What's a Mean Household Size?; 2.2: Comparing Distributions With the Same Mean; 2.3: Making Choices; 2.4: Who Else Is in Your Household; 3.1: Estimating Cereal Serving Sizes; 3.2: Connecting Cereal Shelf Location and Sugar; 3.3: Is It Worth the Wait?; 4.1: Traveling to School; 4.2: Jumping Rope; 4.3: How Much Taller is a 6th Grader Than A Second Grader?
3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	**Data About Us:** 2.1: What's a Mean Household Size?; 2.2: Comparing Distributions With the Same Mean; 2.3: Making Choices; 2.4: Who Else Is in Your Household; 3.1: Estimating Cereal Serving Sizes; 3.2: Connecting Cereal Shelf Location and Sugar; 3.3: Is It Worth the Wait?

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B. Summarize and describe distributions.	
4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	**Data About Us:** 1.1: How Many Letters Are in a Name?; 1.2: Describing Name Lengths; 1.3: Describing Name Lengths; 2.1: What's a Mean Household Size?; 2.2: Comparing Distributions With the Same Mean; 2.3: Making Choices; 2.4: Who Else Is in Your Household; 3.1: Estimating Cereal Serving Sizes; 3.2: Connecting Cereal Shelf Location and Sugar; 3.3: Is It Worth the Wait?; 4.1: Traveling to School; 4.2: Jumping Rope; 4.3: How Much Taller is a 6th Grader Than A Second Grader?
a. Read and interpret circle graphs.	This standard is outside the scope of Connected Mathematics Project 3.
5. Summarize numerical data sets in relation to their context, such as by:	**Data About Us:** 1.1: How Many Letters Are in a Name?; 1.2: Describing Name Lengths; 1.3: Describing Name Lengths; 2.1: What's a Mean Household Size?; 2.2: Comparing Distributions With the Same Mean; 2.3: Making Choices; 2.4: Who Else Is in Your Household; 3.1: Estimating Cereal Serving Sizes; 3.2: Connecting Cereal Shelf Location and Sugar; 3.3: Is It Worth the Wait?; 4.1: Traveling to School; 4.2: Jumping Rope; 4.3: How Much Taller is a 6th Grader Than A Second Grader?
a. Reporting the number of observations.	**Data About Us:** 1.1: How Many Letters Are in a Name?; 1.2: Describing Name Lengths; 1.3: Describing Name Lengths; 2.1: What's a Mean Household Size?; 2.2: Comparing Distributions With the Same Mean; 2.3: Making Choices; 2.4: Who Else Is in Your Household; 3.1: Estimating Cereal Serving Sizes; 3.2: Connecting Cereal Shelf Location and Sugar; 3.3: Is It Worth the Wait?; 4.1: Traveling to School; 4.2: Jumping Rope; 4.3: How Much Taller is a 6th Grader Than A Second Grader?

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b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.	**Data About Us:** 1.1: How Many Letters Are in a Name?; 1.2: Describing Name Lengths; 1.3: Describing Name Lengths; 2.1: What's a Mean Household Size?; 2.2: Comparing Distributions With the Same Mean; 2.3: Making Choices; 2.4: Who Else Is in Your Household; 3.1: Estimating Cereal Serving Sizes; 3.2: Connecting Cereal Shelf Location and Sugar; 3.3: Is It Worth the Wait?; 4.1: Traveling to School; 4.2: Jumping Rope; 4.3: How Much Taller is a 6th Grader Than A Second Grader?
c. Giving quantitative measures of center (median, and/or mean) and variability (range and/or interquartile range), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.	**Data About Us:** 2.1: What's a Mean Household Size?; 2.2: Comparing Distributions With the Same Mean; 2.3: Making Choices; 2.4: Who Else Is in Your Household; 3.1: Estimating Cereal Serving Sizes; 3.2: Connecting Cereal Shelf Location and Sugar; 3.3: Is It Worth the Wait?
d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	**Data About Us:** 2.1: What's a Mean Household Size?; 2.2: Comparing Distributions With the Same Mean; 2.3: Making Choices; 2.4: Who Else Is in Your Household; 3.1: Estimating Cereal Serving Sizes; 3.2: Connecting Cereal Shelf Location and Sugar; 3.3: Is It Worth the Wait?

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Standards for Mathematical Practice	
1. Make sense of problems and persevere in solving them.	The goal for students to make sense of, and persevere in solving, problems is fundamental to the curriculum set forth in *Connected Mathematics Project 3*. In addition to providing practice in critical thinking and problem-solving strategies, the problems are geared to engage students with student-centered problem situations. Student-student and student teacher dialogues encourage students to persevere in solving problems. Unit Projects require students to analyze and solve multifaceted problems, and report on their conclusions. Applications, Connections, and Extensions (ACE) homework problems provide students with opportunities to apply what they have learned to make sense of and persevere in solving new problems. The introductions to the problems in each investigation include an initial analysis of the problem situation and the formation of a plan for solving the problem. In *Moving Straight Ahead*, students apply algebra and linear relationships to represent problems using variables, expressions, equations, tables, graphs, and patterns. Suggested questions in the Teacher Guide provide metacognitive scaffolding to help students monitor and refine their problem-solving strategies; the ACE homework problems enable students to practice and synthesize problem-solving skills. See, for example: **Shapes and Designs:** 3.2: Design Challenge II: Drawing Triangles **Accentuate the Negative:** 4.3: What Operations are Needed? **Stretching and Shrinking:** Unit Project: Shrinking and Enlarging Pictures **Comparing and Scaling:** Unit Project: Paper Pool; 2.1: Sharing Pizza: Comparison Strategies; 3.3: Mixing It Up: Connecting Ratios, Rates, Percents, and Proportions **Moving Straight Ahead:** Unit Project: Conducting an Experiment; 3.2: Mystery Pouches in the Kingdom of Montarek: Exploring Equality

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2. Reason abstractly and quantitatively.	*Connected Mathematics Project 3* helps students develop abstract and quantitative reasoning skills by focusing on student acquisition of mathematical language and various forms of mathematical reasoning (e.g., visual, spatial, logical, graphical, and algebraic reasoning and number sense). Students employ abstract and quantitative reasoning to analyze, represent, and solve problems. They decontextualize problem situations by using variables, expressions, and equations to represent various aspects of the problem. They contextualize abstract representations to justify and verify their solution strategies, explain their reasoning, and state their solution in terms of the original problem situation. See, for example: **Shapes and Designs:** 2.2: Angle Sums of Any Polygon; 2.4: The Ins and Outs of Polygons **Accentuate the Negative:** 3.1: Multiplication Patterns With Integers; 4.2: The Distributive Property **Stretching and Shrinking:** 4.3: Finding Missing Parts: Using Similarity to Find Measurements **Comparing and Scaling:** 1.4: Keeping Things in Proportion: Scaling to Solve Proportions **Moving Straight Ahead:** 3.4: Solving Linear Equations **What Do You Expect?:** 4.4: Finding Expected Value **Filling and Wrapping:** 1.2: Optimal Containers II: Finding the Least Surface Area **Samples and Populations:** 3.2: Comparing Heights of Basketball Players: Using Means and MADs.

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3. Construct viable arguments and critique the reasoning of others.	In the *Connected Mathematics Project 3* classroom, students routinely participate in student-student and student-teacher discourse as they explain their thinking about a problem situation and their reasoning for a solution pathway. Additionally, the problems in each investigation and in the ACE problem sets provide opportunities for students to construct mathematical arguments and to critique other students' solutions and strategies. Teachers Guides include suggested questions to support the development of a classroom culture that includes argument and critique as fundamental components of mathematical problem-solving process. Students make conjectures and construct logical arguments using previously established results, assumptions, and definitions. They reason deductively and inductively and communicate their reasoning to others, providing opportunities for mutual critique of arguments. See, for example: **Shapes and Designs:** 2: Designing Polygons: The Angle Connection (ACE 21) **Accentuate the Negative:** Unit Project: Dealing Down **Stretching and Shrinking:** 1: Enlarging and Reducing Shapes (ACE 23-24); 3: Scaling Perimeter and Area (ACE 22-24); 4: Similarity and Ratios (ACE 18, 50) **Comparing and Scaling:** 1.4: Keeping Things in Proportion: Scaling to Solve Proportions; 2.1: Sharing Pizza: Comparison Strategies **Moving Straight Ahead:** 3.2: Mystery Pouches in the Kingdom of Montarek: Exploring Equality **Filling and Wrapping:** 1.2: Optimal Containers I: Finding Surface Area **Samples and Populations:** 1.2: Which Team Is Most Successful?: Using the MAD to compare samples

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4. Model with mathematics.	Students construct, make inferences from, and interpret concrete, symbolic, graphic, verbal, and algorithmic models of mathematical relationships in problem situations. They translate information from model to another, and modify their models as needed. Students develop fluency with different types of models, and learn to apply them appropriately to different problem situations arising in everyday life, society, and the workplace. See, for example: **Shapes and Designs:** 3.4: Parallel Lines and Transversals **Accentuate the Negative:** 1.3: From Sauna to Snowbank: Using a Number Line; 1.4: In the Chips: Using a Chip Model **Stretching and Shrinking:** 2: Similar Figures (ACE 19) **Moving Straight Ahead:** 3.2: Mystery Pouches in the Kingdom of Montarek: Exploring Equality; 3.3: From Pouches to Variables: Writing Equations **What Do You Expect?:** 3.1: Designing a Spinner to Find Probabilities; 4.1: Drawing Area Models to Find the Sample Space **Filling and Wrapping:** 4.1: Networking: Surface Area of Cylinders **Samples and Populations:** 3.3: Five Chocolate Chips in Every Cookie: Using Sampling in a Simulation

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5. Use appropriate tools strategically.	Students use tools to explore problem situations, deciding which tools are appropriate for solving a particular problem. Students are able to describe various uses for different tools, including the calculator, graphing tools, polystrips, and plastic two-dimensional shapes. For example, students recognize that calculators can be used to compute, to verify reasoning, to explore possibilities, and to see whether an approach or a solution makes sense; they use polystrips and two-dimensional plastic models to explore properties of geometry and measurement. See, for example: **Shapes and Designs:** 1.5: Design Challenge I: Drawing With Tools—Ruler and Protractor; 3.1: Building Triangles; 3.2: Design Challenge II: 3.3: Building Quadrilaterals; 3.5: Design Challenge III: The Quadrilateral Game **Stretching and Shrinking:** Unit Project: Shrinking or Enlarging Pictures; 3.1: Rep-Tile Quadrilaterals: Forming Rep-Tiles With Similar Quadrilaterals; 3.2: Rep-Tile Triangles: Forming Rep-Tiles With Similar Triangles **Moving Straight Ahead:** Unit Project: Conducting an Experiment **Filling and Wrapping:** 4.4: Filling Cones and Spheres

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6. Attend to precision.	*Connected Mathematics Project 3* emphasizes the use of precise terms and definitions with the philosophy that the clarity of a student's reasoning and processing is reflected in the student's use of precise mathematical language. The student textbook includes definitions that are mathematically accurate and student-friendly. Students are expected to attend to precision in mathematical language and also in argument presentation. The Mathematical Reflections pages include questions to help students synthesize and organize their understandings of important concepts and strategies. Additionally, students are expected to perform accurate calculations, expressing numerical answers with an appropriate degree of precision, depending on the context of the problem. See, for example: **Shapes and Designs:** 1.3: Estimating Measures of Rotations and Angles **Accentuate the Negative:** 4.2: The Distributive Property **Stretching and Shrinking:** 4.4: Using Shadows to Find Heights: Using Similar Triangles **Comparing and Scaling:** 2.3: Finding Costs: Unit Rate and Constant of Proportionality; 3.1: Commissions, Markups, and Discounts: Proportions with Percents; 3.2: Measuring to the Unit: Measurement Conversions; 3.3: Mixing It Up: Connecting Ratios, Rates, Percents, and Proportions **What Do You Expect?:** 4.4: Finding Expected Value **Filling and Wrapping:** 3.3: Squaring a Circle to Find Its Area: Did You Know?; 3.4: Connecting Circumference and Area

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7. Look for and make use of structure.	The *Connected Mathematics Project 3* materials are designed to help students build mathematical understandings while illuminating and applying mathematical structure. For example, in Grade 6, students discover patterns in data tables and analyze numbers to determine their prime structure. In all grades, students experience structure in algebraic expressions and properties, functional relationships, measurement formulas, computation algorithms, and number systems. See, for example: **Shapes and Designs:** 2.2: Angle Sums of Any Polygon; 2.4: The Ins and Outs of Polygons **Accentuate the Negative:** 1.2: Extending the Number Line; 2.3: The "+/-" Connection; 4.1: Order of Operations **Stretching and Shrinking:** 1.2: Scaling up and Down: Corresponding Sides and Angles **Comparing and Scaling:** 2.3: Finding Costs: Unit Rate and Constant of Proportionality; 3.3: Mixing It Up: Connecting Ratios, Rates, Percents, and Proportions **Moving Straight Ahead:** 4.4: Pulling It All Together: Writing Equations for Linear Relationships **Filling and Wrapping:** 3.3: Squaring a Circle to Find Its Area: Did You Know?

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8. Look for and express regularity in repeated reasoning.	As students investigate problems in *Connected Mathematics Project 3*, they are encouraged to look for connections to previously solved problems and employed solution strategies. The titles of the units and investigations are intended to promote the connectedness of mathematical concepts and processes with references to "building," "linking," "connecting," and "extending." For example, in the Prime Time unit, students investigate Building on Factors and Multiples and Linking Multiplication and Addition. They extend the number line to include rational and negative numbers, and they extend computation algorithms to add and subtract fractions. See, for example: **Shapes and Designs:** 2.2: Angle Sums of Any Polygon; 2.3: The Bees Do It: Polygons in Nature; 2.4: The Ins and Outs of Polygons **Accentuate the Negative:** 1.2: Extending the Number Line; 2.1: Extending Addition to Rational Numbers; 2.2: Extending Subtraction to Rational Numbers; 2.4: Fact Families; 3.1: Multiplication Patterns With Integers **Stretching and Shrinking:** 3.1: Rep-Tile Quadrilaterals: Forming Rep-Tiles With Similar Quadrilaterals; 3.2: Rep-Tile Triangles: Forming Rep-Tiles With Similar Triangles

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Grade 7 Content Standards	
Ratios and Proportional Relationships	**7.RP**
A. Analyze proportional relationships and use them to solve real-world and mathematical problems.	
1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. *For example, if a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½/¼ miles per hour, equivalently 2 miles per hour.*	**Comparing and Scaling:** 1.1: Surveying Opinions; 1.2: Mixing Juice; 1.3: Time to Concentrate; 2.2: Comparing Pizza Prices; 2.3: Finding Costs; 3.2: Measuring to the Unit **Moving Straight Ahead:** 1.1: Walking Marathons; 1.2: Walking Rates and Linear Relationships; 1.3: Raising Money; 2.1: Henri and Emile's Race; 2.2: Crossing the Line; 2.3: Comparing Costs; 2.4: Connecting Tables; Graphs, and Equations; 2.3: Comparing Costs
2. Recognize and represent proportional relationships between quantities.	**Stretching and Shrinking:** 1.2: Scaling Up and Down; 2.3: Mouthing Off and Nosing Around; 3.1: Rep-Tile Quadrilaterals; 3.3: Designing Under Constraints; 3.4: Out of Reach; 4.1: Ratios Within Similar Parallelograms; 4.2: Ratios Within Similar Triangles; 4.3: Finding Missing Parts; 4.4: Using Shadows to Find Heights **Comparing and Scaling:** 1.4: Keeping Things in Proportion; 2.1: Sharing Pizza; 2.2: Comparing Pizza Prices; 2.3: Finding Costs; 3.1: Commissions, Markups, and Discounts; 3.2: Measuring to the Unit; 3.3: Mixing it Up **Moving Straight Ahead:** 1.1: Walking Marathons; 1.2: Walking Rates and Linear Relationships
a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table, or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	**Stretching and Shrinking:** 2.3: Mouthing Off and Nosing Around; 3.1: Rep-Tile Quadrilaterals; 3.3: Designing Under Constraints; 4.1: Ratios Within Similar Parallelograms; 4.2: Ratios Within Similar Triangles **Comparing and Scaling:** 1.4: Keeping Things in Proportion; 2.1: Sharing Pizza

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b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	**Comparing and Scaling:** 2.2: Comparing Pizza Prices; 2.3: Finding Costs; 3.2: Measuring to the Unit **Moving Straight Ahead:** 1.1: Walking Marathons; 1.2: Walking Rates and Linear Relationships
c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.*	**Stretching and Shrinking:** 4.3: Finding Missing Parts; 4.4: Using Shadows to Find Heights **Comparing and Scaling:** 1.4: Keeping Things in Proportion; 2.2: Comparing Pizza Prices; 2.3: Finding Costs; 3.2: Measuring to the Unit; 3.3: Mixing it Up
d. Explain what a point (*x, y*) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r*) where *r* is the unit rate.	**Moving Straight Ahead:** 2.1: Henri and Emile's Race; 2.2: Crossing the Line
3. Use proportional relationships to solve multi-step ratio, rate, and percent problems. For example: simple interest, tax, price increases and discounts, gratuities and commissions, fees, percent increase and decrease, percent error.	**Stretching and Shrinking:** 1.2: Scaling Up and Down; 3.1: Rep-Tile Quadrilaterals; 3.4: Out of Reach; 4.1: Ratios Within Similar Parallelograms; 4.2: Ratios Within Similar Triangles; 4.3: Finding Missing Parts; 4.4: Using Shadows to Find Heights **Comparing and Scaling:** 1.1: Surveying Opinions; 1.4: Keeping Things in Proportion; 2.1: Sharing Pizza; 2.2: Comparing Pizza Prices; 2.3: Finding Costs; 3.1: Commissions, Markups, and Discounts; 3.2: Measuring to the Unit; 3.3: Mixing it Up

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The Number System **7.NS**	
A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	
1. Apply and extend previous understandings of addition and subtraction to add and subtract integers and other rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.	**Accentuate the Negative:** 1.1: Playing Math Fever; 1.2: Extending the Number Line; 1.3 From Sauna to Snowbank; 1.4: In the Chips; 2.1: Extending Addition to Rational Numbers; 2.2 Extending Subtraction to Rational Numbers; 2.3: The “+/-“ Connection; 2.4: Fact Families; 4.1: Order of Operations
a. Describe situations in which opposite quantities combine to make zero. For example: A hydrogen atom has zero charge because its two constituents are oppositely charged; If you open a new bank account with a deposit of $30 and then withdraw $30, you are left with a $0 balance.	**Accentuate the Negative:** 1.2: Extending the Number Line; 1.4: In the Chips; 2.2 Extending Subtraction to Rational Numbers; 2.3: The “+/-“ Connection; 2.4: Fact Families; 4.1: Order of Operations
b. Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.	**Accentuate the Negative:** 1.2: Extending the Number Line; 1.3 From Sauna to Snowbank; 1.4: In the Chips; 2.1: Extending Addition to Rational Numbers; 2.2 Extending Subtraction to Rational Numbers; 2.3: The "+/-" Connection; 2.4: Fact Families; 4.1: Order of Operations
c. Understand subtraction of rational numbers as adding the additive inverse, $p – q = p + (–q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.	**Accentuate the Negative:** 1.2: Extending the Number Line; 1.3 From Sauna to Snowbank; 1.4: In the Chips; 2.2 Extending Subtraction to Rational Numbers; 2.3: The "+/-" Connection; 2.4: Fact Families; 4.1: Order of Operations

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d. Apply properties of operations as strategies to add and subtract rational numbers.	**Accentuate the Negative:** 1.1: Playing Math Fever; 1.2: Extending the Number Line; 1.3 From Sauna to Snowbank; 1.4: In the Chips; 2.1: Extending Addition to Rational Numbers; 2.2 Extending Subtraction to Rational Numbers; 2.3: The "+/-" Connection; 2.4: Fact Families; 4.1: Order of Operations
2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide integers and other rational numbers.	**Accentuate the Negative:** 3.1: Multiplication Patterns; 3.2: Multiplication of Rational Numbers; 3.3 Division of Rational Numbers; 3.4: Playing the Integer Product Game; 4.1: Order of Operations; 4.2: The Distributive Property; 4.3: What Operations Are Needed? **Comparing and Scaling:** 3.1: Commissions, Markups, and Discounts; 3.2: Measuring to the Unit: Measurement Conversions
a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.	**Accentuate the Negative:** 3.1: Multiplication Patterns; 3.2: Multiplication of Rational Numbers; 3.4: Playing the Integer Product Game; 4.1: Order of Operations; 4.2: The Distributive Property; 4.3: What Operations Are Needed? **Comparing and Scaling:** 3.1: Commissions, Markups, and Discounts; 3.2: Measuring to the Unit: Measurement Conversions
b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.	**Accentuate the Negative:** 3.3 Division of Rational Numbers; 3.4: Playing the Integer Product Game; 4.1: Order of Operations; 4.2: The Distributive Property; 4.3: What Operations Are Needed? **Comparing and Scaling:** 3.1: Commissions, Markups, and Discounts; 3.2: Measuring to the Unit: Measurement Conversions

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c. Apply properties of operations as strategies to multiply and divide rational numbers.	**Accentuate the Negative:** 3.1: Multiplication Patterns; 3.2: Multiplication of Rational Numbers; 3.3 Division of Rational Numbers; 3.4: Playing the Integer Product Game; 4.1: Order of Operations; 4.2: The Distributive Property; 4.3: What Operations Are Needed? **Comparing and Scaling:** 3.1: Commissions, Markups, and Discounts; 3.2: Measuring to the Unit: Measurement Conversions
d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	**Accentuate the Negative:** 3.3 Division of Rational Numbers; 4.2: The Distributive Property **Comparing and Scaling:** 3.1: Commissions, Markups, and Discounts
3. Solve real-world and mathematical problems involving the four operations with integers and other rational numbers.	**Accentuate the Negative:** 1.1: Playing Math Fever; 1.2: Extending the Number Line; 1.3 From Sauna to Snowbank; 1.4: In the Chips; 2.1: Extending Addition to Rational Numbers; 2.2 Extending Subtraction to Rational Numbers; 2.3: The "+/-" Connection; 2.4: Fact Families; 3.1: Multiplication Patterns; 3.2: Multiplication of Rational Numbers; 3.3 Division of Rational Numbers; 3.4: Playing the Integer Product Game; 4.1: Order of Operations; 4.2: The Distributive Property; 4.3: What Operations Are Needed? **Comparing and Scaling:** 3.1: Commissions, Markups, and Discounts; 3.2: Measuring to the Unit: Measurement Conversions
Expressions and Equations	**7.EE**
A. Use properties of operations to generate equivalent expressions.	
1. Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. For example, $4x + 2 = 2(2x + 1)$ and $-3(x - \frac{5}{3}) = -3x + 5$.	**Moving Straight Ahead:** 3.3: From Pouches to Variables: Writing Equations; 3.4: Solving Linear Equations **Filling and Wrapping:** 3.4: Connecting Circumference and Area

ACE = Applications Connections – Extensions
INV = Investigations
MR = Mathematical Reflections

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2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05." A shirt at a clothing store is on sale for 20% off the regular price, "p". The discount can be expressed as 0.2p. The new price for the shirt can be expressed as p – 0.2p or 0.8p.	**Shapes and Designs:** 2.1: Angle Sums of Regular Polygons; 2.2: Angle Sums of Any Polygon; 2.4: The Ins and Outs of Polygons **Moving Straight Ahead:** 3.3: From Pouches to Variables: Writing Equations; 3.4: Solving Linear Equations **Filling and Wrapping:** 3.4: Connecting Circumference and Area
B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	
3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example, if a woman making $25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9¾ inches long in the center of a door that is 27½ inches wide, you will need to place the bar about 9 inches from each edge; This estimate can be used as a check on the exact computation.	**Accentuate the Negative:** 2.1: Extending Addition to Rational Numbers; 2.2 Extending Subtraction to Rational Numbers; 2.3: The "+/- " Connection; 2.4: Fact Families; 3.1: Multiplication Patterns; 3.2: Multiplication of Rational Numbers; 3.3 Division of Rational Numbers; 3.4: Playing the Integer Product Game; 4.1: Order of Operations; 4.2: The Distributive Property; 4.3: What Operations Are Needed? **Stretching and Shrinking:** 4.3: Finding Missing Parts: Using Similarity to Find Measurements; 4.4: Using Shadows to Find Heights: Using Similar Triangles **Comparing and Scaling:** 3.1: Commissions, Markups, and Discounts; 3.2: Measuring to the Unit: Measurement Conversions **Moving Straight Ahead:** 1.1: Walking Marathons; 1.2: Walking Rates and Linear Relationships; 1.3: Raising Money; 1.4: Using the Walkathon Money; 2.1: Henri and Emile's Race; 2.2: Crossing the Line; 2.3: Comparing Costs; 2.4: Connecting Tables; Graphs, and Equations; 3.1: Solving Equations Using Tables and Graphs; 3.2: Mystery Pouches in the Kingdom of Montarek; 3.3: From Pouches to Variables; 3.4: Solving Linear Equations; 3.5: Finding the Points of Intersection; 4.1: Climbing Stairs; 4.2: Finding the Slope of a Line; 4.3: Exploring Patterns With Lines; 4.4: Pulling it All Together

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4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.	**Accentuate the Negative:** 1.2: Extending the Number Line; 1.3 From Sauna to Snowbank **Shapes and Designs:** 2.1: Angle Sums of Regular Polygons; 2.2: Angle Sums of Any Polygon; 2.4: The Ins and Outs of Polygons **Stretching and Shrinking:** 4.3: Finding Missing Parts: Using Similarity to Find Measurements; 4.4: Using Shadows to Find Heights: Using Similar Triangles **Comparing and Scaling:** 1.3: Time to Concentrate: Scaling Ratios; 1.4: Keeping Things in Proportion: Scaling to Solve Proportions; 2.3: Finding Costs: Unit Rate and Constant of Proportionality; 3.1: Commissions, Markups, and Discounts; 3.2: Measuring to the Unit: Measurement Conversions; 3.3: Mixing It Up: Connecting Ratios, Rates, Percents, and Proportions **Moving Straight Ahead:** 1.1: Walking Marathons; 1.2: Walking Rates and Linear Relationships; 1.3: Raising Money; 1.4: Using the Walkathon Money; 2.1: Henri and Emile's Race; 2.2: Crossing the Line; 2.3: Comparing Costs; 2.4: Connecting Tables; Graphs, and Equations; 3.1: Solving Equations Using Tables and Graphs; 3.2: Mystery Pouches in the Kingdom of Montarek; 3.3: From Pouches to Variables; 3.4: Solving Linear Equations; 3.5: Finding the Points of Intersection; 4.1: Climbing Stairs; 4.2: Finding the Slope of a Line; 4.3: Exploring Patterns With Lines; 4.4: Pulling it All Together

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a. Solve word problems leading to equations of the form $px + q = r$ and $p(x \div q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?	**Comparing and Scaling:** 2.3: Finding Costs: Unit Rate and Constant of Proportionality; 3.1: Commissions, Markups, and Discounts; 3.2: Measuring to the Unit: Measurement Conversions; 3.3: Mixing It Up: Connecting Ratios, Rates, Percents, and Proportions **Moving Straight Ahead:** 3.1: Solving Equations Using Tables and Graphs; 3.2: Mystery Pouches in the Kingdom of Montarek; 3.3: From Pouches to Variables; 3.4: Solving Linear Equations
b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example, as a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.	**Accentuate the Negative:** 1.2: Extending the Number Line **Moving Straight Ahead:** 3.5: Finding the Point of Intersection: Equations and Inequalities
c. Extend analysis of patterns to include analyzing, extending, and determining an expression for simple arithmetic and geometric sequences (e.g., compounding, increasing area), using tables, graphs, words, and expressions.	This standard is outside the scope of Connected Mathematics Project 3.

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Geometry	**7.G**
A. Draw, construct, and describe geometrical figures and describe the relationships between them.	
1. Solve problems involving scale drawings of geometric figures, such as computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	**Stretching and Shrinking:** 1.1: Solving a Mystery; 1.2: Scaling Up and Down; 2.1: Drawing Wumps; 2.2: Hats Off to the Wumps; 2.3: Mouthing Off and Nosing Around; 3.1: Rep-Tile Quadrilaterals; 3.2: Rep-Tile Triangles; 3.3: Designing Under Constraints; 3.4: Out of Reach; 4.1: Ratios Within Similar Parallelograms; 4.2: Ratios Within Similar Triangles; 4.3: Finding Missing Parts; 4.4: Using Shadows to Find Heights **Filling and Wrapping:** 1.4: Compost Containers: Scaling Up Prisms
2. Draw (freehand, with ruler and protractor, and with technology) two-dimensional geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	**Shapes and Designs:** 1.1: Sorting and Sketching Polygons; 1.2: In a Spin: Angles and Rotations; 1.3: Estimating Measures of Rotations and Angles; 1.4: Measuring Angles; 1.5: Design Challenge I: Drawing with Tools—Ruler and Protractor; 2.2: Angle Sums of Any Polygon; 2.3: The Bees Do It: Polygons in Nature; 2.4: The Ins and Outs of Polygons; 3.1: Building Triangles; 3.2: Design Challenge II: Drawing Triangles; 3.3: Building Quadrilaterals **Stretching and Shrinking:** 1.1: Solving a Mystery; 2.1: Drawing Wumps; 2.2: Hats Off to the Wumps; 2.3: Mouthing Off and Nosing Around; 3.1: Rep-Tile Quadrilaterals; 3.2: Rep-Tile Triangles; 3.3: Designing Under Constraints; 4.4: Using Shadows to Find Heights
3. Describe the shape of the two-dimensional face of the figure that results from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	**Filling and Wrapping:** 2.3: Slicing Prisms and Pyramids

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B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	
4. Circles and measurement:	**Filling and Wrapping:** 3.1: Going Around in Circles; 3.2: Pricing Pizza; 3.3: Squaring a Circle to Find Its Area; 3.4: Connecting Circumference and Area
a. Know that a circle is a two-dimensional shape created by connecting all of the points equidistant from a fixed point called the center of the circle.	**Filling and Wrapping:** 3.1: Going Around in Circles; 3.2: Pricing Pizza; 3.3: Squaring a Circle to Find Its Area; 3.4: Connecting Circumference and Area
b. Understand and describe the relationships among the radius, diameter, circumference and circumference of a circle.	**Filling and Wrapping:** 3.1: Going Around in Circles; 3.2: Pricing Pizza; 3.3: Squaring a Circle to Find Its Area; 3.4: Connecting Circumference and Area
c. Understand and describe the relationship among the radius, diameter, and area of a circle.	**Filling and Wrapping:** 3.1: Going Around in Circles; 3.2: Pricing Pizza; 3.3: Squaring a Circle to Find Its Area; 3.4: Connecting Circumference and Area
d. Know the formulas for the area and circumference of a circle and use them to solve problems.	**Filling and Wrapping:** 3.1: Going Around in Circles; 3.2: Pricing Pizza; 3.3: Squaring a Circle to Find Its Area; 3.4: Connecting Circumference and Area
e. Give an informal derivation of the relationship between the circumference and area of a circle.	**Filling and Wrapping:** 3.1: Going Around in Circles; 3.2: Pricing Pizza; 3.3: Squaring a Circle to Find Its Area; 3.4: Connecting Circumference and Area
5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write simple equations and use them to solve for an unknown angle in a figure.	**Shapes and Designs:** 1.4: Measuring Angles; 2.4: The Ins and Outs of Polygons; 3.4: Parallel Lines and Transversals

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6. Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	**Stretching and Shrinking:** 1.2: Scaling Up and Down; 3.1: Rep-Tile Quadrilaterals; 3.2: Rep-Tile Triangles; 3.3: Designing Under Constraints **Filling and Wrapping:** 1.1: How Big Are Those Boxes?; 1.2: Optimal Containers I; 1.3: Optimal Containers II; 1.4: Compost Containers; 2.1: Folding Paper; 2.2: Packing A Prism; 2.3: Slicing Prisms and Pyramids; 3.1: Going Around in Circles; 3.2: Pricing Pizza; 3.3: Squaring a Circle to Find Its Area; 3.4: Connecting Circumference and Area; 4.1: Networking; 4.2: Wrapping Paper; 4.3: Comparing Juice Containers; 4.4: Filling Cones and Spheres; 4.5: Comparing Volumes of Spheres, Cylinders, and Cones
Statistics and Probability	**7.SP**
A. Use random sampling to draw inferences about a population.	
1. Understand that statistics can be used to gain information about a population by examining a sample of the population; Generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.	**Samples and Populations:** 2.1: Asking About Honesty; 2.2: Selecting a Sample; 2.3: Choosing Random Samples; 2.4: Growing Samples; 3.1: Solving an Archeological Mystery; 3.2: Comparing Heights of Basketball Players; 3.3: Five Chocolate Chips in Every Cookie; 3.4: Estimating a Deer Population
2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.	**Samples and Populations:** 2.1: Asking About Honesty; 2.2: Selecting a Sample; 2.3: Choosing Random Samples; 2.4: Growing Samples; 3.1: Solving an Archeological Mystery; 3.2: Comparing Heights of Basketball Players; 3.3: Five Chocolate Chips in Every Cookie; 3.4: Estimating a Deer Population

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B. Draw informal comparative inferences about two populations.	
3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team and both distributions have similar variability (mean absolute deviation) of about 5 cm. The difference between the mean heights of the two teams (10 cm) is about twice the variability (5 cm) on either team. On a dot plot, the separation between the two distributions of heights is noticeable.	**Samples and Populations:** 1.1: Comparing Performances; 1.2: Which Team Is Most Successful?; 1.4: Are Steel-Frame Coasters Faster Than Wood-Frame Coasters?; 3.1: Solving an Archeological Mystery; 3.2: Comparing Heights of Basketball Players; 3.3: Five Chocolate Chips in Every Cookie; 3.4: Estimating a Deer Population
4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.	**Samples and Populations:** 1.1: Comparing Performances; 1.2: Which Team Is Most Successful?; 1.4: Are Steel-Frame Coasters Faster Than Wood-Frame Coasters?; 3.1: Solving an Archeological Mystery; 3.2: Comparing Heights of Basketball Players; 3.3: Five Chocolate Chips in Every Cookie; 3.4: Estimating a Deer Population
C. Investigate chance processes and develop, use, and evaluate probability models.	
5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	**What Do You Expect?:** 1.1: Choosing Cereal; 1.2: Tossing Paper Cups; 1.3 One More Try; 1.4 Analyzing Events; 2.1 Predicting to Win; 2.2 Choosing Marbles; 2.3: Designing a Fair Game; 2.4: Winning the Bonus Prize; 3.1: Designing a Spinner to Find Probabilities; 3.2: Making Decisions; 3.3: Roller Derby; 3.4: Scratching Spots

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6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.	**What Do You Expect?:** 1.1: Choosing Cereal; 1.2: Tossing Paper Cups; 1.3 One More Try; 1.4 Analyzing Events; 2.1 Predicting to Win; 2.2 Choosing Marbles; 2.3: Designing a Fair Game; 2.4: Winning the Bonus Prize; 3.1: Designing a Spinner to Find Probabilities; 3.2: Making Decisions; 3.3: Roller Derby; 3.4: Scratching Spots
7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.	**What Do You Expect?:** 2.1 Predicting to Win; 2.2 Choosing Marbles; 2.3: Designing a Fair Game; 2.4: Winning the Bonus Prize; 3.1: Designing a Spinner to Find Probabilities; 3.2: Making Decisions; 3.3: Roller Derby; 3.4: Scratching Spots; 4.1: Drawing Area Models to Find the Sample Space; 4.2: Making Purple; 4.3: One-and-One Free Throws: Simulating a Probability Situation; 4.4: Finding Expected Value; 5.1: Guessing Answers: Finding More Expected Values; 5.2: Ortonville: Binomial Probability; 5.3: A Baseball Series: Expanding Binomial Probability
a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.	**What Do You Expect?:** 4.1: Drawing Area Models to Find the Sample Space; 4.2: Making Purple; 4.3: One-and-One Free Throws: Simulating a Probability Situation; 4.4: Finding Expected Value; 5.1: Guessing Answers: Finding More Expected Values; 5.2: Ortonville: Binomial Probability; 5.3: A Baseball Series: Expanding Binomial Probability

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b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?	**What Do You Expect?:** 1.1: Choosing Cereal; 1.2: Tossing Paper Cups; 1.3 One More Try; 1.4 Analyzing Events; 2.1 Predicting to Win; 2.2 Choosing Marbles; 2.3: Designing a Fair Game; 2.4: Winning the Bonus Prize; 3.1: Designing a Spinner to Find Probabilities; 3.2: Making Decisions; 3.3: Roller Derby; 3.4: Scratching Spots
8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.	**What Do You Expect?:** 2.3: Designing a Fair Game; 3.4: Scratching Spots: Designing and Using a Simulation; 4.1: Drawing Area Models to Find the Sample Space; 4.4: Finding Expected Value; 5.2: Ortonville: Binomial Probability
a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.	**What Do You Expect?:** 3.2: Making Decisions; 3.3: Roller Derby; 3.4: Scratching Spots; 4.1: Drawing Area Models to Find the Sample Space; 4.2: Making Purple; 4.3: One-and-One Free Throws: Simulating a Probability Situation; 4.4: Finding Expected Value; 5.1: Guessing Answers: Finding More Expected Values
b. Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.	**What Do You Expect?:** 2.3: Designing a Fair Game; 3.4: Scratching Spots: Designing and Using a Simulation; 4.1: Drawing Area Models to Find the Sample Space; 4.4: Finding Expected Value; 5.2: Ortonville: Binomial Probability
c. Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least four donors to find one with type A blood?	**What Do You Expect?:** 2.3: Designing a Fair Game; 3.4: Scratching Spots: Designing and Using a Simulation; 4.1: Drawing Area Models to Find the Sample Space

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Standards for Mathematical Practice	
1. Make sense of problems and persevere in solving them.	The goal for students to make sense of, and persevere in solving, problems is fundamental to the curriculum set forth in *Connected Mathematics Project 3*. In addition to providing practice in critical thinking and problem-solving strategies, the problems are geared to engage students with student-centered problem situations. Student-student and student teacher dialogues encourage students to persevere in solving problems. Applications, Connections, and Extensions (ACE) homework problems provide students with opportunities to apply what they have learned to make sense of and persevere in solving new problems. The introductions to the problems in each investigation include an initial analysis of the problem situation and the formation of a plan for solving the problem. Suggested questions in the Teacher Guide provide metacognitive scaffolding to help students monitor and refine their problem-solving strategies; the ACE homework problems enable students to practice and synthesize problem-solving skills. See, for example: **Thinking With Mathematical Models:** 3.2: Distance, Speed and Time; 3.3: Planning a Field Trip; 3.4: Modeling Data Patterns **Growing, Growing, Growing:** 1.3: Making a New Offer; 2.1: Killer Plant Strikes Lake Victoria; 2.3: Studying Snake Populations; 3.3: Making a Difference **Butterflies, Pinwheels, and Wallpaper:** 2.1: Connecting Congruent Polygons; 2.2: Supporting the World; 2.3: Minimum Measurement **Say It with Symbols:** 3.3: Factoring Quadratic Equations **It's In The System:** 1.1: Shirts and Caps; 1.2: Connecting Ax + By = C and y = mx + b; 1.3: Booster Club Members; 2.2: Taco Truck Lunch; 2.3: Solving Systems by Combining Equations II; 4.4: Miles of Emissions

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2. Reason abstractly and quantitatively.	*Connected Mathematics Project 3* helps students develop abstract and quantitative reasoning skills by focusing on student acquisition of mathematical language and various forms of mathematical reasoning (e.g., visual, spatial, logical, graphical, and algebraic reasoning and number sense). Students employ abstract and quantitative reasoning to analyze, represent, and solve problems. They decontextualize problem situations by using variables, expressions, and equations to represent various aspects of the problem. They contextualize abstract representations to justify and verify their solution strategies, explain their reasoning, and state their solution in terms of the original problem situation. See, for example: **Thinking with Mathematical Models:** 1.3: Custom Construction Parts; 2.1: Modeling Linear Data Patterns; 2.2: Up and Down the Staircase; 2.3: Tree Top Fun; 2.4: Boat Rental Business; 2.5: Amusement Park or Movies **Growing, Growing, Growing:** 3.1: Reproducing Rabbits; 3.2: Investing for the Future; 3.3: Making a Difference **Butterflies, Pinwheels, and Wallpaper:** 4.1: Focus on Dilations; 4.2: Return of Super Sleuth; 4.3: Checking Similarity; 4.4: Using Similar Triangles **Say It with Symbols:** 3.1: Selling Greeting Cards; 3.2: Comparing Costs; 3.3: Factoring Quadratic Equations; 3.4: Solving Quadratic Equations **It's in The System:** 2.1: Shirts and Caps Again; 2.2: Taco Truck Lunch; 2.3: Solving Systems by Combining Equations II

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3. Construct viable arguments and critique the reasoning of others.	In the *Connected Mathematics Project 3* classroom, students routinely participate in student-student and student-teacher discourse as they explain their thinking about a problem situation and their reasoning for a solution pathway. Additionally, the problems in each investigation and in the ACE problem sets provide opportunities for students to construct mathematical arguments and to critique other students' solutions and strategies. Teachers Guides include suggested questions to support the development of a classroom culture that includes argument and critique as fundamental components of mathematical problem-solving process. Students make conjectures and construct logical arguments using previously established results, assumptions, and definitions. They reason deductively and inductively and communicate their reasoning to others, providing opportunities for mutual critique of arguments. See, for example: **Thinking with Mathematical Models:** 2.1: Modeling Linear Data Patterns; 2.2: Up and Down the Staircase; 2.3: Tree Top Fun; 2.4: Boat Rental Business; 2.5: Amusement Park or Movies; 4.1: Vitruvian Man; 4.2: Older and Faster; 4.3: Correlation Coefficients and Outliers; 4.4: Measuring Variability **Looking for Pythagoras:** 1.2: Planning Parks **Growing, Growing, Growing:** 1.1: Making Ballots; 1.2: Requesting a Reward; 1.3: Making a New Offer **Say It with Symbols:** 5.1: Using Algebra to Solve a Puzzle **It's in The System: 1**.1: Shirts and Caps; 1.2: Connecting Ax + By = C and y = mx + b; 1.3: Booster Club Members

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4. Model with mathematics.	Students construct, make inferences from, and interpret concrete, symbolic, graphic, verbal, and algorithmic models of mathematical relationships in problem situations. They translate information from model to another, and modify their models as needed. Students develop fluency with different types of models, and learn to apply them appropriately to different problem situations arising in everyday life, society, and the workplace. See, for example: **Growing, Growing, Growing:** 1.1: Making Ballots; 1.2: Requesting a Reward; 1.3: Making a New Offer; 2.1: Killer Plant Strikes Lake Victoria; 2.2: Growing Mold; 2.3: Studying Snake Populations; 3.1: Reproducing Rabbits; 3.2: Investing for the Future; 3.3: Making a Difference; 4.1: Making Smaller Ballots; 4.2: Fighting Fleas; 4.3: Cooling Water; 5.1: Looking For Patterns Among Exponents; 5.2: Rules of Exponents; 5.3: Extending the Rules of Exponents; 5.4: Operations With Scientific Notation; 5.5: Revisiting Exponential Functions **Butterflies, Pinwheels, and Wallpaper:** 4.1: Focus on Dilations; 4.2: Return of Super Sleuth; 4.3: Checking Similarity; 4.4: Using Similar Triangles **Say It With Symbols:** 2.3: Making Candles; 2.4: Selling Ice Cream **It's In The System: 2**.1: Shirts and Caps Again; 2.2: Taco Truck Lunch; 2.3: Solving Systems by Combining Equations II

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5. Use appropriate tools strategically.	Students use tools to explore problem situations, deciding which tools are appropriate for solving a particular problem. Students are able to describe various uses for different tools, including the calculator, graphing tools, polystrips, and plastic two-dimensional shapes. For example, students recognize that calculators can be used to compute, to verify reasoning, to explore possibilities, and to see whether an approach or a solution makes sense; they use polystrips and two-dimensional plastic models to explore properties of geometry and measurement. See, for example: **Thinking With Mathematical Models:** 2.1: Modeling Linear Data Patterns; 2.2: Up and Down the Staircase; 2.3: Tree Top Fun; 2.4: Boat Rental Business; 2.5: Amusement Park or Movies **Looking for Pythagoras:** 5.1: Stopping Sneaky Sally; 5.2: Analyzing Triangles; 5.3: Analyzing Circles **Growing, Growing, Growing:** 1.1: Making Ballots; 1.2: Requesting a Reward; 1.3: Making a New Offer; 5.1: Looking For Patterns Among Exponents; 5.2: Rules of Exponents; 5.3: Extending the Rules of Exponents; 5.4: Operations With Scientific Notation; 5.5: Revisiting Exponential Functions **Butterflies, Pinwheels, and Wallpaper:** 1.1: Butterfly Symmetry; 1.2: In a Spin; 1.3: Sliding Around; 1.4: Properties of Transformations; 2.3: Minimum Measurement; 3.1: Flipping on a Grid; 3.2: Sliding on a Grid; 3.3: Spinning on a Grid; 3.4: A Special Property of Translations and Half-Turns; 3.5: Parallel Lines, Transversals, and Angle Sums; 4.1: Focus on Dilations; 4.3: Checking Similarity; 4.4: Using Similar Triangles **Say It With Symbols:** 2.3: Making Candles; 2.4: Selling Ice Cream **It's In The System:** 2.1: Shirts and Caps Again; 2.2: Taco Truck Lunch; 2.3: Solving Systems by Combining Equations II

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6. Attend to precision.	*Connected Mathematics Project 3* emphasizes the use of precise terms and definitions with the philosophy that the clarity of a student's reasoning and processing is reflected in the student's use of precise mathematical language. The student textbook includes definitions that are mathematically accurate and student-friendly. Students are expected to attend to precision in mathematical language and also in argument presentation. The Mathematical Reflections pages include questions to help students synthesize and organize their understandings of important concepts and strategies. Additionally, students are expected to perform accurate calculations, expressing numerical answers with an appropriate degree of precision, depending on the context of the problem. See, for example: **Looking for Pythagoras:** 4.1: Analyzing the Wheel of Theodorus; 4.4: Getting Real **Growing, Growing, Growing:** 1.1: Making Ballots; 1.2: Requesting a Reward; 1.3: Making a New Offer; 5.1: Looking For Patterns Among Exponents; 5.2: Rules of Exponents; 5.3: Extending the Rules of Exponents; 5.4: Operations With Scientific Notation; 5.5: Revisiting Exponential Functions **Butterflies, Pinwheels, and Wallpaper:** 2.1: Connecting Congruent Polygons; 2.2: Supporting the World; 2.3: Minimum Measurement **Say It With Symbols:** 4.3: Generating Patterns; 4.4: What’s the Function?; 5.1: Using Algebra to Solve a Puzzle **It’s In The System:** 4.3: Feasible Points; 4.4: Miles of Emissions

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7. Look for and make use of structure.	The *Connected Mathematics Project 3* materials are designed to help students build mathematical understandings while illuminating and applying mathematical structure. For example, in Grade 8, students extend their experience with the real number system to include irrational numbers. In all grades, students experience structure in algebraic expressions and properties, functional relationships, measurement formulas, computation algorithms, and number systems. See, for example: **Thinking With Mathematical Models:** 1.3: Custom Construction Parts; 3.2: Distance, Speed and Time; 3.3: Planning a Field Trip; 3.4: Modeling Data Patterns **Looking for Pythagoras:** 4.1: Analyzing the Wheel of Theodorus; 4.4: Getting Real **Growing, Growing, Growing:** 1.1: Making Ballots; 1.2: Requesting a Reward; 1.3: Making a New Offer; 2.1: Killer Plant Strikes Lake Victoria; 2.2: Growing Mold; 2.3: Studying Snake Populations; 3.1: Reproducing Rabbits; 3.2: Investing for the Future; 3.3: Making a Difference; 4.1: Making Smaller Ballots; 4.2: Fighting Fleas; 5.3: Extending the Rules of Exponents; 5.4: Operations With Scientific Notation; 5.5: Revisiting Exponential Functions **Butterflies, Pinwheels, and Wallpaper:** 1.1: Butterfly Symmetry; 1.2: In a Spin; 1.3: Sliding Around; 1.4: Properties of Transformations; 2.1: Connecting Congruent Polygons; 2.2: Supporting the World; 2.3: Minimum Measurement; 3.3: Spinning on a Grid; 3.4: A Special Property of Translations and Half-Turns; 3.5: Parallel Lines, Transversals, and Angle Sums **Say It With Symbols:** 3.1: Selling Greeting Cards; 3.2: Comparing Costs; 3.3: Factoring Quadratic Equations; 3.4: Solving Quadratic Equations **It's In The System:** 1.1: Shirts and Caps; 1.2: Connecting $Ax + By = C$ and $y = mx + b$; 1.3: Booster Club Members

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8. Look for and express regularity in repeated reasoning.	As students investigate problems in *Connected Mathematics Project 3*, they are encouraged to look for connections to previously solved problems and employed solution strategies. The titles of the units and investigations are intended to promote the connectedness of mathematical concepts and processes with references to "building," "linking," "connecting," and "extending." For example, in the Growing, Growing, Growing unit, 8th grade students learn that there are different patterns of change and different rates and types of growth than they have heretofore experienced, as they extend their knowledge of linear functions to exponential and quadratic functions. See, for example: **Thinking With Mathematical Models:** 3.2: Distance, Speed and Time; 3.3: Planning a Field Trip; 3.4: Modeling Data Patterns **Growing, Growing, Growing:** 1.1: Making Ballots; 1.2: Requesting a Reward; 1.3: Making a New Offer; 2.1: Killer Plant Strikes Lake Victoria; 2.2: Growing Mold; 2.3: Studying Snake Populations; 3.1: Reproducing Rabbits; 3.2: Investing for the Future; 3.3: Making a Difference; 4.1: Making Smaller Ballots; 4.2: Fighting Fleas; 4.3: Cooling Water **Butterflies, Pinwheels, and Wallpaper:** 2.1: Connecting Congruent Polygons; 2.2: Supporting the World; 2.3: Minimum Measurement **Say It With Symbols:** 3.1: Selling Greeting Cards; 3.2: Comparing Costs; 3.3: Factoring Quadratic Equations; 3.4: Solving Quadratic Equations **It's In The System:** 4.3: Feasible Points; 4.4: Miles of Emissions

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Content Standards	
The Number System	**8.NS**
A. Know that there are numbers that are not rational, and approximate them by rational numbers.	
1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion. For rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	**Looking for Pythagoras:** 4.1: Analyzing the Wheel of Theodorus; 4.4: Getting Real
2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). For example, by truncating the decimal expansion of $\sqrt{2}$ show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.	**Looking for Pythagoras:** 4.1: Analyzing the Wheel of Theodorus; 4.4: Getting Real; 5.1: Stopping Sneaky Sally
Expressions and Equations	**8.EE**
A. Work with radicals and integer exponents.	
1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.	**Growing, Growing, Growing:** 5.1: Looking For Patterns Among Exponents; 5.2: Rules of Exponents; 5.3: Extending the Rules of Exponents; 5.4: Operations with Scientific Notation
2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.	**Looking for Pythagoras:** 2.2: Square Roots; 2.3: Using Squares; 2.4: Cube Roots; 5.1: Stopping Sneaky Sally

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3. Use numbers expressed in the form of a single digit multiplied by an integer power of 10 to estimate very large or very small quantities, and express how many times as much one is than the other. For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.	**Growing, Growing, Growing:** 1.2: Requesting a Reward: Representing Exponential Functions; 5.4: Operations With Scientific Notation
4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	**Growing, Growing, Growing:** 5.4: Operations With Scientific Notation
B. Understand the connections between proportional relationships, lines, and linear equations.	
5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.	**Thinking with Mathematical Models:** 2.2: Up and Down the Staircase; 3.2: Distance, Speed, and Time
6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane. Derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.	**Thinking With Mathematical Models:** 2.2: Up and Down the Staircase

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C. Analyze and solve linear equations and pairs of simultaneous linear equations.	
7. Solve linear equations in one variable.	**Thinking With Mathematical Models:** 2.4: Boat Rental Business; 2.5: Amusement Park or Movies **Say It With Symbols:** 3.1: Selling Greeting Cards; 3.2: Comparing Costs; 5.1: Using Algebra to Solve a Puzzle
a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).	**Thinking With Mathematical Models:** 2.4: Boat Rental Business **Say It With Symbols:** 3.1: Selling Greeting Cards; 3.2: Comparing Costs; 5.1: Using Algebra to Solve a Puzzle
b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	**Thinking With Mathematical Models:** 2.4: Boat Rental Business **Say It With Symbols:** 3.1: Selling Greeting Cards; 3.2: Comparing Costs; 5.1: Using Algebra to Solve a Puzzle
8. Analyze and solve pairs of simultaneous linear equations.	**Thinking With Mathematical Models:** 2.5: Amusement Park or Movies **It's In The System:** 1.1: Shirts and Caps; 1.2: Connecting Ax + By = C and y = mx + b; 1.3: Booster Club Members; 2.1: Shirts and Caps Again; 2.2: Taco Truck Lunch; 2.1: Shirts and Caps Again; 2.2: Taco Truck Lunch; 2.3: Solving Systems by Combining Equations II; 4.4: Miles of Emissions

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a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	**Thinking With Mathematical Models:** 2.5: Amusement Park or Movies **It's In The System:** 2.1: Shirts and Caps Again; 2.2: Taco Truck Lunch; 2.3: Solving Systems by Combining Equations II; 4.4: Miles of Emissions
b. Solve systems of two linear equations in two variables algebraically (using substitution and elimination strategies), and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.	**Thinking With Mathematical Models:** 2.5: Amusement Park or Movies **It's In The System:** 1.1: Shirts and Caps; 1.2: Connecting Ax + By = C and y = mx + b; 1.3: Booster Club Members; 2.1: Shirts and Caps Again; 2.2: Taco Truck Lunch; 2.3: Solving Systems by Combining Equations II; 4.4: Miles of Emissions
c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.	**Thinking With Mathematical Models:** 2.5: Amusement Park or Movies **It's In The System:** 1.1: Shirts and Caps; 1.2: Connecting Ax + By = C and y = mx + b; 1.3: Booster Club Members; 2.1: Shirts and Caps Again; 2.2: Taco Truck Lunch; 2.3: Solving Systems by Combining Equations II; 4.4: Miles of Emissions

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Functions	**8.F**
A. Define, evaluate, and compare functions.	
1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	**Thinking With Mathematical Models:** 2.1: Modeling Linear Data Patterns; 2.2: Up and Down the Staircase; 2.3: Tree Top Fun; 2.4: Boat Rental Business; 2.5: Amusement Park or Movies; 3.2: Distance, Speed and Time; 3.3: Planning a Field Trip; 3.4: Modeling Data Patterns **Growing, Growing, Growing:** 1.1: Making Ballots; 1.2: Requesting a Reward; 1.3: Making a New Offer; 2.1: Killer Plant Strikes Lake Victoria; 2.2: Growing Mold; 2.3: Studying Snake Populations; 3.1: Reproducing Rabbits; 3.2: Investing for the Future; 3.3: Making a Difference; 4.1: Making Smaller Ballots; 4.2: Fighting Fleas; 4.3: Cooling Water; 5.5: Revisiting Exponential Functions **Say It With Symbols:** 2.1: Walking Together; 2.2: Predicting Profit; 3.1: Selling Greeting Cards; 3.2: Comparing Costs; 3.3: Factoring Quadratic Equations; 3.4: Solving Quadratic Equations; 4.3: Generating Patterns; 4.4: What's the Function?
2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.	**Say It With Symbols:** 2.1: Walking Together; 2.2: Predicting Profit; 4.3: Generating Patterns; 4.4: What's the Function? **It's In The System:** 4.3: Feasible Points

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3. Interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1, 1), (2, 4) and (3, 9), which are not on a straight line.	**Thinking With Mathematical Models:** 2.1: Modeling Linear Data Patterns; 2.2: Up and Down the Staircase; 2.3: Tree Top Fun; 2.4: Boat Rental Business; 2.5: Amusement Park or Movies
B. Use functions to model relationships between quantities.	
4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (*x, y*) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	**Thinking With Mathematical Models:** 1.3: Custom Construction Parts; 2.1: Modeling Linear Data Patterns; 2.2: Up and Down the Staircase; 2.3: Tree Top Fun; 2.4: Boat Rental Business; 2.5: Amusement Park or Movies **Say It With Symbols:** 3.1: Selling Greeting Cards; 3.2: Comparing Costs
5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	**Thinking With Mathematical Models:** 1.3: Custom Construction Parts; 2.2: Up and Down the Staircase; 2.3: Tree Top Fun; 2.4: Boat Rental Business; 2.5: Amusement Park or Movies; 3.2: Distance, Speed and Time; 3.3: Planning a Field Trip; 3.4: Modeling Data Patterns **Growing, Growing, Growing:** 1.3: Making a New Offer; 2.1: Killer Plant Strikes Lake Victoria; 2.3: Studying Snake Populations; 3.3: Making a Difference; 4.2: Fighting Fleas; 5.5: Revisiting Exponential Functions **Say It With Symbols:** 3.3: Factoring Quadratic Equations

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Geometry **8.G**	
A. Understand congruence and similarity using physical models, transparencies, or geometry software.	
1. Verify experimentally the properties of rotations, reflections, and translations:	**Butterflies, Pinwheels, and Wallpaper:** 1.1: Butterfly Symmetry; 1.2: In a Spin; 1.3: Sliding Around; 1.4: Properties of Transformations; 2.1: Connecting Congruent Polygons; 2.2: Supporting the World; 2.3: Minimum Measurement; 3.1: Flipping on a Grid; 3.2: Sliding on a Grid; 3.3: Spinning on a Grid; 3.4: A Special Property of Translations and Half-Turns; 3.5: Parallel Lines, Transversals, and Angle Sums
a. Lines are transformed to lines, and line segments to line segments of the same length.	**Butterflies, Pinwheels, and Wallpaper:** 1.1: Butterfly Symmetry; 1.2: In a Spin; 1.3: Sliding Around; 1.4: Properties of Transformations; 3.1: Flipping on a Grid; 3.2: Sliding on a Grid; 3.3: Spinning on a Grid; 3.4: A Special Property of Translations and Half-Turns; 3.5: Parallel Lines, Transversals, and Angle Sums
b. Angles are transformed to angles of the same measure.	**Looking for Pythagoras:** 5.2: Analyzing Triangles **Butterflies, Pinwheels, and Wallpaper:** 1.1: Butterfly Symmetry; 1.2: In a Spin; 1.3: Sliding Around; 1.4: Properties of Transformations; 3.1: Flipping on a Grid; 3.2: Sliding on a Grid; 3.3: Spinning on a Grid; 3.4: A Special Property of Translations and Half-Turns; 4.1: Focus on Dilations; 4.2: Return of Super Sleuth; 4.3: Checking Similarity Without Transformations; 4.4: Using Similar Triangles
c. Parallel lines are transformed to parallel lines.	**Butterflies, Pinwheels, and Wallpaper:** 1.1: Butterfly Symmetry; 1.3: Sliding Around; 1.4: Properties of Transformations; 3.1: Flipping on a Grid; 3.2: Sliding on a Grid

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2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations. Given two congruent figures, describe a sequence that exhibits the congruence between them.	**Looking for Pythagoras:** 5.2: Analyzing Triangles **Butterflies, Pinwheels, and Wallpaper:** 1.1: Butterfly Symmetry; 1.2: In a Spin; 1.3: Sliding Around; 1.4: Properties of Transformations; 2.1: Connecting Congruent Polygons; 2.2: Supporting the World; 3.1: Flipping on a Grid; 3.2: Sliding on a Grid; 3.3: Spinning on a Grid; 3.4: A Special Property of Translations and Half-Turns
3. Describe the effects of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	**Butterflies, Pinwheels, and Wallpaper:** 4.1: Focus on Dilations; 4.2: Return of Super Sleuth; 4.3: Checking Similarity Without Transformations; 4.4: Using Similar Triangles
4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations. Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	**Looking for Pythagoras:** 5.2: Analyzing Triangles **Butterflies, Pinwheels, and Wallpaper:** 4.2: Return of Super Sleuth; 4.3: Checking Similarity Without Transformations; 4.4: Using Similar Triangles
5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.	**Looking for Pythagoras:** 5.2: Analyzing Triangles **Butterflies, Pinwheels, and Wallpaper:** 3.5: Parallel Lines, Transversals, and Angle Sums; 4.3: Checking Similarity Without Transformations; 4.4: Using Similar Triangles
B. Understand and apply the Pythagorean Theorem.	
6. **a.** Understand the relationship among the sides of a right triangle.	**Looking for Pythagoras:** 1.2: Planning Parks; 3.1: Discovering the Pythagorean Theorem; 3.2: A Proof of the Pythagorean Theorem; 3.3: Finding Distances; 3.4: Measuring the Egyptian Way; 4.1: Analyzing the Wheel of Theodorus; 5.1: Stopping Sneaky Sally; 5.3: Analyzing Circles

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b. Analyze and justify the Pythagorean Theorem and its converse using pictures, diagrams, narratives, or models.	**Looking for Pythagoras:** 1.2: Planning Parks; 3.1: Discovering the Pythagorean Theorem; 3.2: A Proof of the Pythagorean Theorem; 3.3: Finding Distances; 3.4: Measuring the Egyptian Way; 4.1: Analyzing the Wheel of Theodorus; 5.1: Stopping Sneaky Sally; 5.3: Analyzing Circles
7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	**Looking for Pythagoras:** 1.2: Planning Parks; 3.1: Discovering the Pythagorean Theorem; 3.2: A Proof of the Pythagorean Theorem; 3.3: Finding Distances; 3.4: Measuring the Egyptian Way; 4.1: Analyzing the Wheel of Theodorus; 5.1: Stopping Sneaky Sally; 5.3: Analyzing Circles
8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	**Looking for Pythagoras:** 3.1: Discovering the Pythagorean Theorem; 3.2: A Proof of the Pythagorean Theorem; 3.3: Finding Distances; 3.4: Measuring the Egyptian Way; 4.1: Analyzing the Wheel of Theodorus; 5.1: Stopping Sneaky Sally; 5.3: Analyzing Circles
C. Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	
9. Know the formulas for the volumes of cones, cylinders, and spheres, and use them to solve real-world and mathematical problems.	**Say It With Symbols:** 2.3: Making Candles; 2.4: Selling Ice Cream
A. Investigate patterns of association in bivariate data.	
1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	**Thinking With Mathematical Models:** 1.3: Custom Construction Parts; 2.1: Modeling Linear Data Patterns; 3.4: Modeling Data Patterns; 4.1: Vitruvian Man; 4.2: Older and Faster; 4.3: Correlation Coefficients and Outliers

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2. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line and informally assess the model fit by judging the closeness of the data points to the line.	**Thinking With Mathematical Models:** 1.3: Custom Construction Parts; 2.1: Modeling Linear Data Patterns; 3.4: Modeling Data Patterns; 4.1: Vitruvian Man; 4.2: Older and Faster; 4.3: Correlation Coefficients and Outliers
3. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.	**Thinking With Mathematical Models:** 1.3: Custom Construction Parts; 2.1: Modeling Linear Data Patterns; 3.4: Modeling Data Patterns; 4.1: Vitruvian Man; 4.2: Older and Faster; 4.3: Correlation Coefficients and Outliers
4. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?	**Thinking With Mathematical Models:** 5.1: Wood or Steel? That's the Question; 5.2: Politics of Girls and Boys; 5.3: After-School Jobs and Homework