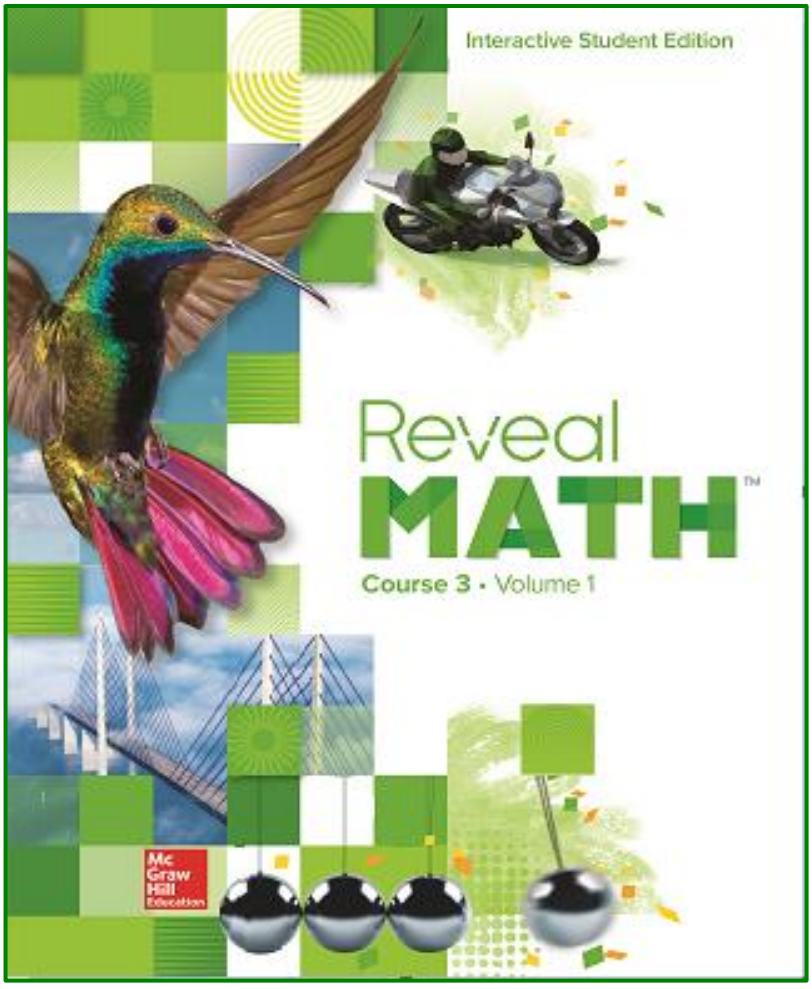

Course 3 © 2020

Next Generation Mathematics Learning Standards
Grade 8

Primary references are bold. *Supporting references are italicized.*

STANDARDS	LESSON(S)
Mathematical Practices	
1. Make sense of problems and persevere in solving them.	A strong problem-solving strand is present throughout the program with an emphasis on having students explain to themselves and others the meanings of problems and plan their solution strategies. Look for the **Apply** problems and exercises labeled as **Persevere with Problems**. In the Teacher Edition, look for the **Teaching the Mathematical Practices** tips labeled as this mathematical practice. *Throughout the program, for example:* *Interactive Student Edition and Teacher Edition:* • Lesson 4-5, Apply • Lesson 5-4, Apply • Lesson 7-3, Practice Exercise 7 • Lesson 8-1, Practice Exercises 7-8 • Lesson 10-1, Apply
2. Reason abstractly and quantitatively.	Students are routinely asked to make sense of quantities and their relationships, and attend to the meaning of quantities as opposed to just computing with them. Look for the exercises labeled as **Reason Abstractly**. Many ***Talk About It!*** question prompts ask students to reason about relationships between quantities. In the Teacher Edition, look for the **Teaching the Mathematical Practices** tips labeled as this mathematical practice. *Throughout the program, for example:* *Interactive Student Edition and Teacher Edition:* • Lesson 1-2, Learn *Quotient of Powers*, *Talk About It!* • Lesson 2-4, Example 4 *Talk About It!* • Lesson 5-2, Example 3 • Lesson 6-3, Example 4 • Lesson 9-1, Explore activity *Congruence and Transformations*

STANDARDS	LESSON(S)
3. Construct viable arguments and critique the reasoning of others.	Students are required to justify their reasoning and to find the errors in another student's reasoning or work. Look for the **Apply** problems (Step 4) and the exercises labeled as **Make a Conjecture**, **Find the Error**, **Use a Counterexample**, **Make an Argument**, or **Justify Conclusions.** Many ***Talk About It!*** question prompts ask students to justify conclusions and/or critique another student's reasoning. In the Teacher Edition, look for the **Teaching the Mathematical Practices** tips labeled as this mathematical practice. *Throughout the program, for example:* *Interactive Student Edition and Teacher Edition:* • Lesson 1-4, Explore activity *Exponents of Zero* • Lesson 2-1, Practice Exercise 16 • Lesson 2-4, Practice Exercises 14 and 17 • Lesson 4-3, Learn *Similar Triangles and Slope, Talk About It!* • Lesson 7-2, Explore activity *Angles of Triangles* • Lesson 8-2, Practice Exercise 9
4. Model with mathematics.	Students apply the mathematics they know to solve real-world problems by using mathematical modeling. For example, students write equations to model real-world situations. Look for the exercises labeled as **Model with Mathematics.** In the Teacher Edition, look for the **Teaching the Mathematical Practices** tips labeled as this mathematical practice. *Throughout the program, for example:* *Interactive Student Edition and Teacher Edition:* • Lesson 3-2, Example 2 • Lesson 4-4, Example 1 • Lesson 5-3, Example 1 • Lesson 6-1, Explore activity *Systems of Equations* • Lesson 6-5, Example 2

STANDARDS	LESSON(S)
5. Use appropriate tools strategically.	In addition to traditional tools such as estimation, mental math, or measurement tools, students are encouraged to use digital tools, such as Web Sketchpad, eTools, etc. to help solve problems. Look for the exercises labeled as **Use Math Tools.** Many **Explore** activities ask students to select and use appropriate tools as they progress through the activities. In the Teacher Edition, look for the **Teaching the Mathematical Practices** tips labeled as this mathematical practice. *Throughout the program, for example:* *Interactive Student Edition and Teacher Edition:* • Lesson 2-3, Practice Exercise 15 • Lesson 4-2, Explore activity *Develop Concepts of Slope* • Lesson 6-1, Explore activity *Systems of Equations* • Lesson 7-3, Explore activity *Right Triangle Relationships* • Lesson 8-3, Example 2 *Talk About It!*
6. Attend to precision.	Students are routinely required to communicate precisely to partners, the teacher, or the entire class by using precise definitions and mathematical vocabulary. Look for the exercises labeled as **Be Precise.** Many ***Talk About It!*** question prompts ask students to clearly and precisely explain their reasoning. In the Teacher Edition, look for the **Teaching the Mathematical Practices** tips labeled as this mathematical practice. *Throughout the program, for example:* *Interactive Student Edition and Teacher Edition:* • Lesson 1-5, Practice Exercise 14 • Lesson 2-1, Example 1 • Lesson 2-2, Example 4, *Talk About It!* • Lesson 3-5, Example 3, *Talk About It!* • Lesson 4-1, Learn *Unit Rate and Slope*, *Talk About It!*

STANDARDS	LESSON(S)
7. Look for and make use of structure.	Students are routinely encouraged to look for patterns or structure present in problem situations. Look for the exercises labeled as **Identify Structure.** Many ***Talk About It!*** question prompts ask students to study the structure of expressions and figures. In the Teacher Edition, look for the **Teaching the Mathematical Practices** tips labeled as this mathematical practice. *Throughout the program, for example:* *Interactive Student Edition and Teacher Edition:* • Lesson 1-1, Practice Exercise 12 • Lesson 3-5, Learn *Number of Solutions*, *Talk About It!* • Lesson 6-1, Example 3 • Lesson 6-2, Practice Exercise 13 • Lesson 6-3, Example 4 and *Talk About It!* • Lesson 7-5, Example 1, *Talk About It!*
8. Look for and express regularity in repeated reasoning.	Students are encouraged to look for repeated calculations that lead them to sound mathematical conclusions. Look for the exercises labeled as **Identify Repeated Reasoning.** Several ***Talk About It!*** question prompts ask students to look for repeated calculations. In the Teacher Edition, look for the **Teaching the Mathematical Practices** tips labeled as this mathematical practice. *Throughout the program, for example:* *Interactive Student Edition and Teacher Edition:* • Lesson 1-2, Practice Exercise 14 • Lesson 2-1, Examples 1 and 2 • Lesson 2-2, Explore activity *Find Square Roots Using a Square Model* • Lesson 2-2, Practice Exercise 16 • Lesson 4-2, Explore activity *Slope of Horizontal and Vertical Lines*

STANDARDS	LESSON(S)
NY-8.NS Number System	
Know that there are numbers that are not rational, and approximate them by rational numbers.	
1. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion eventually repeats. Know that other numbers that are not rational are called irrational.	**Lesson(s) 2-1, 2-3, 2-5**
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.	**Lesson(s) 2-4, 2-5**
NY-8.EE Expressions, Equations, and Inequalities	
Work with radicals and integer exponents.	
1. Know and apply the properties of integer exponents to generate equivalent numerical expressions.	**Lesson(s) 1-2, 1-3, 1-4,** *1-6*
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. Know square roots of perfect squares up to 225 and cube roots of perfect cubes up to 125. Know that the square root of a non-perfect square is irrational.	**Lesson(s) 2-2, 2-3,** *2-4, 7-3, 10-4*
3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.	**Lesson(s) 1-5, 1-6**
4. Perform multiplication and division with numbers expressed in scientific notation, including problems where both standard decimal form and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.	**Lesson(s) 1-5, 1-6**
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.	**Lesson(s) 4-1,** *4-4*
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.	**Lesson(s) 4-3, 4-4, 4-5**

STANDARDS	LESSON(S)
Analyze and solve linear equations and pairs of simultaneous linear equations.	
7. Solve linear equations in one variable.	**Lesson(s) 3-1, 3-2, 3-3, 3-4, 3-5**
a. Recognize when linear equations in one variable have one solution, infinitely many solutions, or no solutions. Give examples and show which of these possibilities is the case by successively transforming the given equation into simpler forms.	**Lesson(s)** *3-2, 3-4,* **3-5**
b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms.	**Lesson(s) 3-1, 3-2, 3-3, 3-4**
8. Analyze and solve pairs of simultaneous linear equations.	**Lesson(s) 6-1, 6-2, 6-3, 6-4, 6-5**
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. Recognize when the system has one solution, no solution, or infinitely many solutions.	**Lesson(s) 6-1, 6-2,** *6-5*
b. Solve systems of two linear equations in two variables with integer coefficients: graphically, numerically using a table, and algebraically. Solve simple cases by inspection.	**Lesson(s) 6-1, 6-3, 6-4, 6-5**
c. Solve real-world and mathematical problems involving systems of two linear equations in two variables with integer coefficients.	**Lesson(s) 6-1, 6-3, 6-4, 6-5**
NY-8.F **Functions**	
Define, evaluate, and compare functions. Note: Function notation is not required in Grade 8.	
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.	**Lesson(s) 5-1, 5-2**
2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	**Lesson(s) 5-4**
3. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line. Recognize examples of functions that are not linear and non-linear.	**Lesson(s) 5-5**

STANDARDS	LESSON(S)
Use functions to model relationships between quantities. Note: Function notation is not required in Grade 8.	
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.	**Lesson(s) 5-3,** *11-3*
5. Describe qualitatively the functional relationship between two quantities by analyzing a graph. Sketch a graph that exhibits the qualitative features of a function that has been described in a real-world context.	**Lesson(s) 5-6**
NY-8.G **Geometry**	
Understand congruence and similarity using physical models, transparencies, or geometry software.	
1. Verify experimentally the properties of rotations, reflections, and translations.	**Lesson(s) 8-1, 8-2, 8-3, 9-1, 9-2**
a. Verify experimentally lines are mapped to lines, and line segments to line segments of the same length.	**Lesson(s) 8-1, 8-2, 8-3, 9-1, 9-2**
b. Verify experimentally angles are mapped to angles of the same measure.	**Lesson(s) 9-1, 9-2**
c. Verify experimentally parallel lines are mapped to parallel lines.	**Lesson(s) 9-1**
2. Know that a two-dimensional figure is congruent to another if the corresponding angles are congruent and the corresponding sides are congruent. Equivalently, two two-dimensional figures are congruent if one is the image of the other after a sequence of rotations, reflections, and translations. Given two congruent figures, describe a sequence that maps the congruence between them on the coordinate plane.	**Lesson(s) 9-1, 9-2**
3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	**Lesson(s) 8-1, 8-2, 8-3, 8-4**
4. Know that a two-dimensional figure is similar to another if the corresponding angles are congruent and the corresponding sides are in proportion. Equivalently, two two-dimensional figures are similar if one is the image of the other after a sequence of rotations, reflections, translations, and dilations. Given two similar two-dimensional figures, describe a sequence that maps the similarity between them on the coordinate plane.	**Lesson(s) 9-3, 9-4**

STANDARDS	LESSON(S)
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.	**Lesson(s) 7-1, 7-2, 9-4, 9-5**
Understand and apply the Pythagorean Theorem.	
6. Understand a proof of the Pythagorean Theorem and its converse.	**Lesson(s) 7-3, 7-4**
7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	**Lesson(s) 7-3**
8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	**Lesson(s) 7-5**
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	
9. Given the formulas for the volume of cones, cylinders, and spheres, solve mathematical and real-world problems.	**Lesson(s) 10-1, 10-2, 10-3, 10-4, 10-5**
NY-8.SP Statistics and Probability	
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.	**Lesson(s) 11-1**
2. Understand 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.	**Lesson(s) 11-2**
3. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.	**Lesson(s) 11-3**