Grade 8 Mathematics Curriculum Guide

Grade Level/Course Title: Grade 8	**Semester 1**	**Academic Year:** 2016-2017

Grade Level Mathematics Focus:
In Grade 8, instructional time should focus on three critical areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

Essential Questions for this Unit:
1. What are the types of numbers in the real number system and where are they located on a number line?
2. What is the mathematical definition of an irrational number and how can you approximate them by using rational numbers?
3. How can students understand the properties of exponents as tools to generate equivalent (and simplified) expressions?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 1: (Aug-Sept) **The Number System** **(12 days)**	8.NS.1	***Target A*: Know that there are numbers that are not rational, and approximate them by rational numbers.** 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.	Understanding: • Proper Syntax • Equivalency • Number Line • Estimation • Rounding • Bar Notation • Exponent Properties • Powers of Ten • Inequality • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] Fraction Bars [GMR] Syntax-Expressions, Equations, and Inequalities [GMR] Simplifying Fractions Activity [L] Order of Operations [L] Real Number Line Development & Venn Diagram [CP] **Chapter 1: Real Numbers (12 days)** Lesson 1.1: Rational Numbers (2 days) • Division Algorithms [L] • PT: Repeating or Terminating? [IMT] Lesson 1.2 Powers and Exponents (2 days) • Properties of Exponents [CP] Lesson 1.5 Negative Exponents (2 day) • Zero and Negative Exponents [L] • PT: Extending the Definitions of Exponents [IMT] Lesson 1.3 Multiply and Divide Monomials (1 day) • Quotient of Powers Property [L] • PT: Raising to the zero and negative powers [IMT] Lesson 1.4 Powers of Monomials (2 days) Mid-Chapter Check (1 day) **Review and Assessment (2 days)**
	8.EE.1	***Target B*: Work with radicals and integer exponents.** Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.		
	8.EE.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. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger.*		
	8.EE.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.		

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Essential Questions for this Unit:
1. How can students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 2: **(Sept – Oct)** **Expressions and Equations** **(31 days)**	8.EE.7	***Target D:* Analyze and solve linear equations and pairs of simultaneous linear equations.** **Solve linear equations in one variable**. **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). **b**. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	Solve Equations using multiple methods: • Proper Syntax • Bar Models • Decomposition • Inverse Operations • Algebra Tiles • Number Line • Justifications • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] Bar Models Through The Grades [CP] Solve Equations – Multiple Methods [L] Adding Integers Worksheet [GMR] Adding/Subtracting Integers Worksheet [GMR] **Chapter 2: Equations in One Variable (12 days)** Lesson 2.1: Solve Equations with Rational Coefficient (1 day) • Solving Rational Equations [L] Lesson 2.2: Solve Two-Step Equations (2 days) • Solve Two-Step Equations with Number Lines [L] Lesson 2.3: Write Two-Step Equations (1 day) Inquiry Lab: Algebra Tiles (1 day) *Review: Distributive Property &Combining Like Terms (1 day)* • Distributive Property [CP] Lesson 2.4: Variables on Each Side (2 days) • Solve Equations with Variables on Both Sides [L] Lesson 2.5: Solve Multi-Step Equations (2 day) • Solving Equations with One Solution, No Solutions, and Infinitely Many Solutions [L] • PT: The Sign of Solutions [IMT] **Review and Assessment (2 days)**

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Essential Questions for this Unit:

1. How can students develop understanding of and use linear equations, systems of linear equations, linear functions, and the slope of a line to analyze situations and solve problems?
2. How can students demonstrate their understanding that slope is the graphic representation of a rate of change, and specifically equations for proportions ($y/x = m$ or $y = mx + b$) are special linear equations where the constant of proportionality is the slope, and the line is graphed through the origin?
3. How can students solve systems of two linear equations in two variables and relate the systems to pairs of lines in the plane; these intersect, are parallel, or are the same line?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 2: (Sept – Oct) continued **Expressions & Equations** **(31 days)**	8.EE.5	***Target C*: Understand the connections between proportional relationships, lines, and linear equations.** 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 equation to determine which of two moving objects has greater speed.	Understanding: • Coordinate Plane • Ordered Pairs • Slope • Rate of Change • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] Find the Change [IM] **Chapter 3: Equations in Two Variables (19)** Lesson 3.1: Constant Rate of Change (1 day) • Discovering Slope [L] • Identifying Proportional and Nonproportional Relationships in Tables and Graphs [L] Lesson 3.2: Slope (2 days) Lesson 3.3: Equations in y=mx Form (1 day) Lesson 3.4 Slope-Intercept Form (2 days) • Discovering Slope of a line in Standard Form [L] Inquiry Lab: Slope Triangles (1 day) Graphing Calculator Lesson (1 day) Lesson 3.5: Graph a Line Using Intercept (2 days) Mid-Chapter Check (1 day) Lesson 3.6: Write Linear Equations (2 days) Lesson 3.7: Solve Systems of Equations by Graphing (2days) • Graphing Systems [L] Lesson 3.8 Solve Systems of Equations Algebraically (2days) • Solving a System by Substitution [L] **Review and Assessment (2 days)** **BENCHMARK ASSESSMENT 1 (Nov. 7 – Nov. 18)**
	8.EE.8	***Target D*: Analyze and solve linear equations and pairs of simultaneous linear equations.** Analyze and solve pairs of simultaneous linear equations. 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. **b. Solve** systems of two linear equations in two variables algebraically, 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.* **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.*		

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Essential Questions for this Unit:
1. How can students grasp the concept of a function as a rule that assigns to each input exactly one output?
2. How can students understand that functions describe situations where one quantity determines another?
3. How can students understand and learn to translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and describe how aspects of the function are reflected in the different representations?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 3: **(Oct – Dec)** **Functions** **(21 days)**	8.F.1	***Target E*: Define, evaluate, and compare functions.** 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.	Understanding: • Multiple Representations • Tables • Graphs • Constraints • Input • Output • Change • Function Notation • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] Definition and Representations of a Function [CP] **Chapter 4: Functions (21 days)** Lesson 4.1: Represent Relationships (2 days) • Equations – Multiple Representations and What we Know [L] Lesson 4.2: Relations (1 day) • PT: Introducing Functions [IMT] Inquiry Lab: Relations and Functions (1 day) Lesson 4.3: Functions (2 days) • PT: The Customers [IMT] Lesson 4.4: Linear Functions (2 days) • PT: Modeling with a Linear Function [IMT] Mid-Chapter Check (1 days) Lesson 4.5: Compare Properties of Functions (2 day) • PT: Battery Charging [IMT] continued on next page
	8.F.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.*		
	8.F.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.*		

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Essential Questions for this Unit:
1. How can students grasp the concept of a function as a rule that assigns to each input exactly one output?
2. How can students understand that functions describe situations where one quantity determines another?
3. How can students understand and learn to translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and describe how aspects of the function are reflected in the different representations?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 3: **(Oct – Dec)** **continued** **Functions** **(21 days)**	8.F.4	***Target F*: Use functions to model relationships between quantities.** 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.	Understanding: • Multiple Representations • Tables • Graphs • Constraints • Input • Output • Change • Function Notation • Academic Vocabulary	**Continue Chapter 4: Functions** Lesson 4.6: Construct Functions (2 days) • Interpreting Graphs - Real Life Functions [L] • PT: Modeling with a Linear Function [IMT] Lesson 4.7: Linear and Nonlinear Functions (2 days) • Family of Functions [CP] • Family of Functions Sort [L] • Graphing Family of Functions [L] Lesson 4.8: Quadratic Functions (2 days)(optional) Lesson 4.9: Qualitative Graphs (2 days) • PT: Heart Rate Monitoring [IMT] • PT: Bike Race [IMT] • PT: Distance [IMT] **Review and Assessment (2 days)**
	8.F.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.		

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Essential Questions for this Unit:
1. How can students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 4: **(Dec-Feb)** **Geometry** **Part I** **(28 days)**	8.G.5	***Target G*: <u>Understand congruence and similarity using physical models, transparencies, or geometry software.</u>** 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.*	Understanding: • Congruence • Pythagorean Theorem • Triangles • Plane • Polygons • Parallel Lines • Angles • Patty Paper • geogebra.org • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] **<u>Ch. 5: Triangles & the Pythagorean Theorem (10 days)</u>** Lesson 5.1: Lines (2 day) • Parallel Lines cut by Transversal [L] • PT: Street Intersection [IMT] • PT: Triangle's Interior Angles [IMT] Lesson 5.2: Geometric Proof (1 day) • Simplifying Expressions & Solving Equations With Two Column Proofs [L] Inquiry Lab: Triangles (1 day) • Classifying Triangles [CP] Lesson 5.3: Angles of Triangles (1 day) Lesson 5.4: Polygons and Angles (2 days) • PT: Tile Patterns II: Hexagons [IMT] Mid-Chapter Check (1 day) **Review and Assessment (2 days)**

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Essential Questions for this Unit:
1. What are the types of numbers in the real number system and where are they located on a number line?
2. What is the mathematical definition of an irrational number and how can you approximate them by using rational numbers?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 4: (Dec-Feb) continued **Geometry Part I** **(28 days)**	8.EE.2	***Target B*: Work with radicals and integer exponents.** 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.	Understanding: • Syntax • Equivalency • Number Line • Exponent Properties • Powers of Ten • Estimation • Inequalities • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] **Chapter 1: Real Numbers (9 days)** *First review: Finding Simple Square Roots, Finding Square Roots and Cubed Roots Using Decomposition (1 day)* Lesson 1.8: Roots (2 days) • Square & Square Roots [L] Lesson 1.9: Estimate Roots (2 days) • PT: Estimating Square Roots [IMT] • PT: Placing a Square Root on a Number Line [IMT] Lesson 1.10: Compare Real Numbers (2 days) • Real Number Line Development & Venn Diagram [CP] • PT: Comparing Rational and Irrational Numbers [IMT] **Review and Assessment (2 days)**
	8.NS.2	***Target A:* Know that there are numbers that are not rational, and approximate them by rational numbers.** 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.*		

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Essential Questions for this Unit:
1.How can students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines?
2.How can students understand the statement of the Pythagorean Theorem and its converse, and explain why the Pythagorean Theorem holds, for example, by decomposing a square in two different ways?
3.How can students apply the Pythagorean Theorem to find distances between points on the coordinate plane, find lengths, and analyze polygons?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 4: (Dec-Feb) continued **Geometry Part 1** **(28 days)**	8.G.6	***Target H*: <u>Understand and apply the Pythagorean Theorem.</u>** Explain a proof of the Pythagorean Theorem and its converse.	Understanding: • Congruence • Pythagorean Theorem • Triangles • Distance on a Coordinate Plane • Polygons • Parallel Lines • Angles • Patty Paper • geogebra.org • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] **<u>Chapter 5: Triangles and The Pythagorean Theorem (9 days)</u>** Lesson 5.5: The Pythagorean Theorem (2 days) • Pythagorean Theorem Activity [L] • Pythagorean Theorem Worksheet [GMR] • PT: Converse of the Pythagorean Theorem [IMT] • PT: Sizing up Squares [IMT] Inquiry Lab: Proofs About the Pythagorean Theorem (1 day) • Pythagorean Theorem and Its Converse [L] Lesson 5.6: Use the Pythagorean Theorem (2 days) • PT: Running on the Football Field [IMT] • PT: Spiderbox [IMT] Lesson 5.7: Distance on the Coordinate Plane (2 days) • Distance Formula [CP] • PT: Finding the distance between points [IMT] **Review and Assessment (2 days)** **End of Semester 1**
	8.G.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.		
	8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.		

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Essential Questions for this Unit:
1. How can students use ideas about distance and angles, how they behave under translations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 5: **(Feb-Apr)** **Geometry** **Part II** **(43 days)**	8.G.1	***Target G*: <u>Understand congruence and similarity using physical models, transparencies, or geometry software.</u>** Verify experimentally the properties of rotations, reflections, and translations. **1a.** Lines are taken to lines, and line segments to line segments of the same length. **1b.** Angles are taken to angles of the same measure. **1c**. Parallel Lines are taken to parallel lines	Understanding: • Transformation • Congruence • Similarity • Slope and Similar Triangles • Area • Translations • Rotations • Reflections • Line of Reflection • Patty Paper • geogebra.org • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] **<u>Chapter 6: Transformations (11 days)</u>** • PT: Same Size,Same Shape [IMT] Inquiry Lab: Transformations (1 day) Lesson 6.1: Translations(1 day) Lesson 6.2: Reflections (use mirrors) (1 day) • PT: Reflecting a rectangle over a diagonal [IMT] • PT: Reflecting Reflections [IMT] Mid-Chapter Check (1 day) Inquiry Lab: Rotational Symmetry (1 day) Lesson 6.3: Rotations (1 day) • Congruence Through Transformations [L] • PT: Congruent Rectangles [IMT] • PT: Congruent Segments [IMT] • PT: Congruent Triangles [IMT] • PT: Triangle congruence with coordinates [IMT] Inquiry Lab: Dilations (1 day) Lesson 6.4: Dilations (2 day) • PT: Effects of Dilations on Lengths, Area, and Angles [IMT] • PT: Are They Similar? [IMT] **Review and Assessment (2 days)**
	8.G.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, describing a sequence that exhibits the congruence between them.		
	8.G.3	Describe the effects of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.		
	8.G.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.		

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Essential Questions for this Unit:
1. How can students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 5: (Feb – Apr) continued **Geometry Part II** **(43 days)**	8.G.5	***Target G*: <u>Understand congruence and similarity using physical models, transparencies, or geometry software</u>.** 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, <u>and the angle-angle criterion for similarity of triangles</u>. *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*.	Understanding: • Transformation • Congruence • Similarity • Slope and Similar Triangles • Area • Translations • Rotations • Reflections • Line of Reflection • Dilation • Patty Paper • geogebra.org • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] **<u>Chapter 7: Congruence and Similarity (18 days)</u>** **<u>Chapter 7: Congruence and Similarity</u>** Lesson 7.1 Congruence and Transformations (1 day) Investigate Congruent Triangles (use Patty paper) (1 day) Lesson 7.2 Congruence (2 days) Inquiry Lab: Geometry Software (1 day) Inquiry Lab: Similar Triangles (1 day) Lesson 7.3 Similarity and Transformations (2 day) • Congruent and Similar Polygons [L] Lesson 7.4 Properties of Similar Polygons (2 days) • Dilations Using Right Triangles [L] Lesson 7.5 Similar Triangles and Indirect Measurement (1 day) Lab with Indirect Measurement Using Shadows (1 day) Lesson 7.6 Slope and Similar Triangles (2 days) • PT: Slopes Between Points on a Line [IMT] Lesson 7.7 Area and Perimeter of Similar Figures (2 days) (opt) **Review and Assessment (2 days)** **<u>BENCHMARK ASSESSMENT 2 (Mar. 27 – Apr. 7)</u>**
	8.EE.6	***Target C*: <u>Understand the connections between proportional relationships, lines, and linear equations.</u>** 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.		

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Essential Questions for this Unit:
1. How can students complete their understanding and work on volume by solving problems involving cones, cylinders, and spheres?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 5: (Feb-Apr) continued **Geometry Part II** **(43 days)**	8.G.9	***Target I*: <u>Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.</u>** Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	Understanding: • Volume of Cylinders, Cones, and Spheres • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] **<u>Chapter 8: Volume and Surface Area (14 days)</u>** *Review Area, Perimeter, Especially Circles (1 day)* • Circle Vocabulary [CP] • Area of a Circle [CP] Lesson 8.1 Volume of Cylinders (2 days) Lesson 8.2 Volume of Cones (2 days) • Volume of Prisms, Cylinders, and Cones [CP] Lesson 8.3 Volume of Spheres (1 day) • PT: Flower Vases [IMT] • PT: Glasses [IMT] Mid-Chapter Check and Assessment (1 days) Lesson 8.4 Surface Area of Cylinders (2 days) Optional • Surface Area of Prisms, Cylinders, and Cones [CP] Lesson 8.5 Surface Area of Cones (2 days) Optional Lesson 8.6 Changes in Dimension (1 days) Optional **Review and Assessment (2 days)**
	8.EE.2	**<u>Target B: Work with radicals and integer exponents</u>.** 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.		

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Grade Level/Course Title: Grade 8	**Semester 2**	**Academic Year:** 2016-2017

Grade Level Mathematics Focus:
In Grade 8, instructional time should focus on three critical areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

Essential Questions for this Unit:
1. What is the relationship between powers of ten and scientific notation and why is it useful when working with very large and small numbers?

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 6: (Apr-Jun) **Probability and Statistics** **(14 days)**	8.EE.3	***Target B*: <u>Work with radicals and integer exponents.</u>** 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. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger*.	Understanding: • Syntax • Equivalency • Number Line • Exponent Properties • Powers of Ten • Estimation • Inequality • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] **<u>Chapter 1: Real Numbers (5 days)</u>** Lesson 1.6 Scientific Notation (2 days) • Scientific Notation-Performing Operations Using Multiple Methods [L] • PT: Orders of Magnitude [IMT] Lesson 1.7 Compute with Scientific Notation (1 day) • PT: Choosing appropriate units [IMT] • PT: Giantburgers [IMT] **Review and Assessment (2 days)**
	8.EE.4	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. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger*.		

Grade 8 Mathematics Curriculum Guide

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Essential Questions for this Unit:
1. How can students develop understanding of and use a linear equation to describe the association between two quantities in bivariate data (such as arm span vs. height for students in a classroom)? At this grade, fitting the model, and assessing its fit to the data are done informally. Interpreting the model in the context of the data requires students to express a relationship between the two quantities in question and to interpret components of the relationship (such as slope and y-intercept) in terms of the situation.

Unit (Time)	Standard	Standard Description	Content	Resources
Unit 6: (Apr-June) continued **Probability and Statistics** **(14 days)**	8.SP.1	***Target J*: <u>Investigate patterns of association in bivariate data.</u>** 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.	Understanding: • Tables • Measures of Center • Interquartile Range • Mean Absolute Deviation • Equivalence • Number Line • Bar graphs • Box-n-Whisker • Clusters • Academic Vocabulary	General Resources: Warm-Up Template (Word) [GMR] Multiple Methods Mat [GMR] **<u>Ch. 9 Scatter Plots & Data Analysis (9 days)</u>** Inquiry Lab: Scatter Plots (1day) • PT: Hand Span and Height [IMT] Lesson 9.1: Scatter Plots (1day) • PT: Texting and Grades [IMT] • PT: Animal Brains [IMT] Inquiry Lab: Lines of best fit (1day) Lesson 9.2: Lines of Best Fit (1day) • PT: Birds' Eggs [IMT] • PT: Laptop Battery Charge [IMT] Inquiry Lab: Graphing Technology: Linear and Nonlinear Association (1day) • PT: US Airports [IMT] • Correlation and Line of Best Fit [L] Lesson 9.3: Two-Way Tables (2days) • PT: Music and Sports [IMT] • PT: What's Your Favorite Subject [IMT] **Review and Assessment (2 days)** **End of 2nd Semester**
	8.SP.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.		
	8.SP.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 1.5cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.		
	8.SP.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?		