| **Unit 1** | **Unit 2** | **Unit 3** | | **Unit 4** | **Unit 5** | **Unit 6** | **Unit 7** | **Unit 8** | **Unit 9** | **Unit 10** | **Unit 11** | **Unit 12** |
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| **Introduction to Transformations** | **Congruence Transformations** | **Similarity Transformations** | | **Rational and Irrational Numbers** | **Integer Exponents** | **Rational and Irrational Numbers through Volume** | **Pythagorean Theorem** | **Discovering Slope-Intercept Form through Geometry** | **Linear Functions** | **Solving Linear Equations in One Variable** | **Systems of Equations** | **Bivariate Statistics: Linear** |
| **4 days** | **16 days** | **13 days** | | **9 days** | **15 days** | **10 days** | **16 days** | **14 days** | **18 days** | **14 days** | **18 days** | **13 days** |
| 8.G.A.1 | 8.G.A.2 | 8.G.A.3 | | 8.EE.A.2 | 8.EE.A.1 | 8.EE.A.2 | 8.G.B.6 | 8.EE.B.5 | 8.F.A.1 | 8.EE.C.7 | 8.EE.C.8 | 8.SP.A.1 |
|  | 8.G.A.3 | 8.G.A.4 | | 8.NS.A.1 | 8.EE.A.3 | 8.NS.A.2 | 8.G.B.7 | 8.EE.B.6 | 8.F.A.2 |  |  | 8.SP.A.2 |
|  |  | 8.G.A.5 | | 8.NS.A.2 | 8.EE.A.4 | 8.G.C.9 | 8.G.B.8 |  | 8.F.A.3 |  |  | 8.SP.A.3 |
|  |  |  | |  |  |  | 8.EE.A.2 |  | 8.F.B.4 |  |  | 8.SP.A.4 |
|  |  |  | |  |  |  | 8.NS.A.2 |  | 8.F.B.5 |  |  |  |
|  |  |  | |  |  |  | 8.G.C.9 |  |  |  |  |  |
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| **Major Clusters** | | | **Supporting Clusters** | | | | **Additional Clusters** | | | **Other** | | |
| **EE** – Expressions and Equations  (1, 2, 3, 4, 5, 6, 7, 8)  **F** – Function  (1, 2, 3)  **G** – Geometry  (1, 2, 3, 4, 5, 6, 7, 8) | | | **NS** – The Number System  (1, 2)  **F** – Functions  (4, 5)  **SP** – Statistics and Probability  (1, 2, 3, 4) | | | | **G** – Geometry  (9) | | | **MP** – Standards for Mathematical Practice | | |

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| **Summary of Year for Grade 8 Mathematics** |
| Traditionally 8th grade math has served as a culmination of middle school mathematics. Under the Common Core State Standards (CCSS), 8th grade math will serve more as a foundational course for high school mathematics. The topics taught in this course will directly impact students’ ability to be successful in Algebra I (which is foundational to Algebra II) as well as in Geometry. Students begin 8th grade math with an introduction to transformations of points, lines, line segments, angles and sets of parallel lines. The work with transformations then extends to transforming figures using coordinates. Students will develop a deep conceptual understanding of the effects of transformations and use their understanding to establish the criteria for figure congruence and figure similarity. After completing their work with transformations, students will then start to extend their understanding of the number system. Students leave the 7th grade having mastered operations with the set of rational numbers. In 8th grade students will learn that numbers that are not rational are called irrational and begin to understand informally that every number has a decimal expansion. Students then extend their work with whole number exponents from 6th grade to working with integer exponents in addition to formalizing the properties of integer exponents. Then students will have an opportunity to apply their understanding of the real number system to working with volume and learning the Pythagorean Theorem. The expectation is that students will be able to explain the proof of the Pythagorean Theorem and be able to apply it to solve geometric and real-world problems. The rest of the course is designed around linear equations and linear functions which will form the basis for the beginning of Algebra I. Here students will discover and master slope-intercept form in a very geometric sense by using their knowledge of proportional relationships and similar triangles on the coordinate plane. The concept of a function will be developed through their work with linear equations in two variables and then applied in a modeling context. Students will also increase their procedural skill and fluency in solving linear equations in one variable which will enable them to solve systems of linear equations in two variables. The course ends with an opportunity for the students to apply their work with linear functions to bivariate statistics. |
| **Standards Clarification for Grade 8 Mathematics** |
| Some standards are included in multiple units to provide students with multiple opportunities to engage with the content. In the tables that follow, suggested focus areas and possible benchmarks for repeated standards are identified in the column labeled Standards Clarification. |
| **Mathematical Practices Recommendations for Grade 8 Mathematics** |
| Mathematical practices should be evident *throughout* mathematics instruction and connected to all of the content areas highlighted above, as well as all other content areas addressed at this grade level. Mathematical tasks are an important opportunity to connect content and practices. Examples include:   * When students convert a fraction such as 1/7 to a decimal, they might notice that they are repeating the same calculations and conclude that the decimal repeats. Similarly, by repeatedly checking whether points are on a line through (1, 2) with slope 3, students might abstract the equation of the line in the form (*y* - 2)/(*x* - 1) = 3. In both examples, students look for and express regularity in repeated reasoning (MP.8). * The Pythagorean Theorem can provide opportunities for students to construct viable arguments and critique the reasoning of others (MP.3). * Solving an equation such as 3(*x* – 1/2) = *x* + 2 requires students to see and make use of structure (MP.7). * Much of the mathematics in grade 8 lends itself to modeling (MP.4). For example, standard 8.F.4 involves modeling linear relationships with functions. * Scientific notation (8.EE.4) presents opportunities for strategically using appropriate tools (MP.5). For example, the computation (1.73 x 104) · (1.73 x 105) can be done quickly with a calculator by squaring 1.73 and then using properties of exponents to determine the exponent of the product by inspection. |
| **Fluency Requirements for Grade 8 Mathematics** |
| * **8.EE.7** Students have been working informally with one-variable linear equations since as early as kindergarten. This important line of development culminates in grade 8 with the solution of general one-variable linear equations, including cases with infinitely many solutions or no solutions as well as cases requiring algebraic manipulation using properties of operations. Coefficients and constants in these equations may be any rational numbers. * **8.G.9** When students learn to solve problems involving volumes of cones, cylinders, and spheres — together with their previous grade 7 work in angle measure, area, surface area and volume (7.G.4–6) — they will have acquired a well-developed set of geometric measurement skills. |

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| **Unit 1: Introduction to Transformations** | | **Possible time frame**:  4 days |
| In this unit students will be introduced to translations, reflections, and rotations. This is the first time students have been introduced to transformations. This unit should begin by transforming points to help develop the properties of each transformation. Once students have developed an understanding of each transformation and some of their properties, begin verifying the properties through experiments. Through the experiments students should solidify their understanding of each transformation and fully develop the properties of each. The experiments should be designed with the initial and transformed geometric item along with a particular transformation (or series of transformations) that was performed. Students will then determine if the proposed transformation (or series of transformations) actually works and possibly alter the proposed transformation (or series of transformations) to one that does carry the initial item onto the transformed one. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Understand congruence and similarity using physical models, transparencies, or geometry software.**  **8.G.A.1** Verify experimentally the properties of rotations, reflections, and translations:   1. Lines are taken to lines, and line segments to line segments of the same length. 2. Angles are taken to angles of the same measure. 3. Parallel lines are taken to parallel lines. | | **8.G.A.1** The skill of transforming geometric items as well as the properties of transforming these items will extend to develop and establish the criteria for figure congruence in Unit 2 and figure similarity in Unit 3.  This standard does not include the transformation of figures. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.5** Use appropriate tools strategically. | As students investigate transformations, they attend to precision (MP.6) as they use appropriate terminology to describe and verify the properties of the various transformations. They also select and use tools such as geometry software, coordinate planes, and tracing strategically (MP.5). | |
| **MP.6** Attend to precision. |

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| **Unit 2: Congruence Transformations** | | **Possible time frame**:  16 days |
| Students will bring with them their understanding of transformations and their properties from Unit 1 and apply them to two dimensional figures in this Unit. The criteria for figure congruence will be established through rigid motion and applied to help students create a sequence of transformations that would carry one figure onto another. You may consider beginning transformations of figures on a blank grid and then extend to the coordinate plane. Students should start to formalize the effects of translations, reflections, and rotations in terms of coordinates. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Understand congruence and similarity using physical models, transparencies, or geometry software.**  **8.G.A.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.  **8.G.A.3** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. | | **8.G.A.2** This same skill will be used in Unit 3 (8.G.A.4) with the addition of dilations.  **8.G.A.3** Students will still be responsible for knowing the properties of translations, reflections, and rotations in Unit 3. Dilations will not be included in this Unit. They will be taught in Unit 3. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.3** Construct viable arguments and critique the reasoning of others. | Students construct viable arguments and critique the reasoning of others (MP.3) as they describe the effect of transformations. As students investigate those effects, they attend to structure (MP.7) by recognizing the common attributes and properties generated by the transformations. | |
| **MP.7** Look for and make use of structure. |

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| **Unit 3: Similarity Transformations** | | **Possible time frame**:  13 days |
| This unit will extend students’ understanding of transformations to include dilations. The criteria for figure similarity will be established through the four transformations and applied to help students create a sequence of transformations (including dilations) that would carry one figure onto another. Students will develop an understanding of the connections between similarity and congruence as well as formalize the effects of dilations in terms of coordinates. This will be the culmination of 8.G.A.3 that was introduced in Unit 2. Finally, students will apply their understanding of transformations and their effects to look specifically at angles, triangles, and parallel lines cut by a transversal. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Understand congruence and similarity using physical models, transparencies, or geometry software.**  **8.G.A.3** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.  **8.G.A.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.  **8.G.A.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.* | | The students will continue working with translations, reflections, and rotations and will need to understand the effects of each. (8.G.A.3 from Unit 2)  **8.G.A.3** This standard will be fully mastered at the completion of this Unit. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.1** Make sense of problems and persevere in solving them. | Students attend to precision (MP.6) as they construct viable arguments and critique the reasoning of others (MP.3) while describing the effects of similarity, transformations, and the angle-angle criterion for similarity of triangles. Students will make sense of problems and persevere in solving (MP.1) angle sum of a triangle and discover the value of unknowns. | |
| **MP.3** Construct viable arguments and critique the reasoning of others. |
| **MP.6** Attend to precision. |

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| **Unit 4: Rational and Irrational Numbers** | | **Possible time frame**:  9 days | |
| In this unit students will learn that numbers that are not rational are called irrational as well as develop an informal understanding that all numbers have a decimal expansion. Students should be allowed to discover that the decimal expansion of rational numbers eventually repeats which is the basis for the distinction between rational and irrational numbers. Students will understand that irrational numbers have rational approximations, and they will use rational approximations of irrational numbers for the purpose of comparing the size of irrational numbers, graphing their approximate location on a number line, and estimating the value of expressions. In this unit and ultimately in this course, the understanding of rational and irrational numbers is designed to support the students’ work with radical expressions and equations limited to the second and third roots. Working with radicals is a major topic for this course and will be used in several units throughout the year. There is a distinct shift within the CCSSM away from simplifying radicals to being able to rationally approximate radicals especially in the modeling context. | | | |
| **Major Cluster Standards** | | | **Standards Clarification** |
| **Work with radicals and integer exponents.**  **8.EE.A.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 √2 is irrational. | | | **8.EE.A.2** Students will work with radicals again in Unit 6 when writing and solving equations for an unknown measurement of a three-dimensional figure and again in Unit 7 when working with the Pythagorean Theorem.  **8.EE.A.2** It is not the intent of the standards to teach students how to simplify a radical through factoring the radicand. The emphasis throughout the CCSS beginning in grade 8 and continuing through high school is to be able create a rational approximation for irrational numbers. |
| **Supporting Cluster Standards** | | | **Standards Clarification** |
| **Know that there are numbers that are not rational, and approximate them by rational numbers.**  **8.NS.A.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.  **8.NS.A.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., π2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. | | | **8.NS.A.2** Similar to standard 8.EE.A.2, this standard will be used when modeling and solving real-world problems in Units 6 and 7. |
| **Focus Standards of Mathematical Practice** | | | |
| **MP.1** Make sense of problems and persevere in solving them. | Understand irrational numbers and tier decimal approximations and evaluating square and cube roots requires persistence (MP.1.) with precision and estimation (MP.6). Students look to express regularity with repeated reasoning as the convert fractions to decimal and notice that when they repeat the same calculations, the decimal also repeats (MP.8). | | |
| **MP.6** Attend to precision. |
| **MP.8** Look for and express regularity in repeated reasoning. |

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| **Unit 5: Integer Exponents** | **Possible time frame**:  15 days |
| The focus of this unit is to extend the work with exponents to include integer exponents. In 6th grade students wrote and evaluated numerical expression involving whole-number exponents. Other than working with powers of ten in the 5th grade, this will be the extent of the students’ understanding of and procedural skill with exponents. In this unit students will formalize the properties of integer exponents and apply them to generate equivalent numerical expressions. Students will immediately apply their new understanding of integer exponents to develop a conceptual understanding of scientific notation and its usefulness in modeling real-world quantities. Students will finish this unit by performing operations with numbers expressed in scientific notation including problems where both decimal and scientific notation are used. | |
| **Major Cluster Standards** | **Standards Clarification** |
| **Work with radicals and integer exponents.**  **8.EE.A.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, 32 × 3–5 = 3–3 = 1/33 = 1/27.*  **8.EE.A.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 √2 is irrational.  **8.EE.A.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 × 108 and the population of the world as 7 × 109, and determine that the world population is more than 20 times larger.* | **8.EE.A.1** This will be the first time students are introduced to the properties of exponents. It is important that students be able to formalize and articulate the properties of integer exponents; furthermore, the properties of integer exponents should be discovered by the students through applying the concept of an exponent to generate equivalent numerical expressions. Students should not be taught the properties of integer exponents through direct instruction rather allowed the opportunity to discover them through practice. |

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| **Focus Standards of Mathematical Practice** | |
| **MP.5** Use appropriate tools strategically. | Working with scientific notation presents opportunities for strategically using tools (MP.5) as some situations will have problems that could be more quickly completed with a calculator rather than using the integer rules. |

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| **Unit 6: Rational and Irrational Numbers Through Volume** | | **Possible time frame**:  10 days |
| Volume is the only additional cluster or standard for 8th grade math. In an effort to make it work more seamlessly with the course and not distract from the major work of the course, this unit was designed to allow students the opportunity to practice their procedural skill and fluency with irrational numbers and radicals in a geometric context through volume of cones, cylinders, and spheres. Students will use cones, cylinders, and spheres to model and solve real-world and mathematical problems. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Work with radicals and integer exponents.**  **8.EE.A.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 √2 is irrational. | | Students will use square and cube roots to solve for unknown measures in cylinders, cones, and spheres. (8.EE.A.2 from Unit 4) |
| **Supporting Cluster Standards** | | **Standards Clarification** |
| **Know that there are numbers that are not rational, and approximate them by rational numbers.**  **8.NS.A.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., π2). *For example, by truncating the decimal expansion of* √*2, show that* √*2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.* | | Students will use rational approximations of irrational numbers to model and solve real-world problems involving volume. (8.NS.A.2 from Unit 4) |
| **Additional Cluster Standards** | | **Standards Clarification** |
| **Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.**  **8.G.C.9** Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. | | **8.G.C.9** The students will use cones and other three-dimensional figures constructed with triangles in Unit 7 as an application of the Pythagorean Theorem to find missing lengths as stated in standard 8.G.B.7.  **8.G.C.9** It is the expectation of this standard that students will memorize the formulas for volume of a cone, cylinder, and sphere. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.2** Reason abstractly and quantitatively. | To solve real life situations, students will model geometric relationships with formulas (MP.4) involving three dimensional figures, as they reason both abstractly and quantitatively (MP.2). | |
| **MP.4** Model with mathematics. |

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| **Unit 7: Pythagorean Theorem** | **Possible time frame**:  16 days |
| This is the students’ first exposure to the Pythagorean Theorem as well as its converse. Allowing the students to discover for themselves the Pythagorean Theorem by exploring the proof numerically through perfect squares, geometrically through area, and then with right triangles will promote a deeper conceptual understanding and a greater transfer of knowledge to future courses and applications. Students will use the Pythagorean Theorem to find unknown side lengths in right triangles in two and three dimensions. This will reinforce and allow the students an opportunity to apply their understanding of rational and irrational numbers in a new context. When applying the Pythagorean Theorem to solve real-world and mathematical problems, the students will use rational approximations to create a more meaningful solution within the context of the problem. In addition students will apply the Pythagorean Theorem to find the distance between two points on the coordinate plane. Applying the Pythagorean Theorem to the coordinate plane will help prepare the students for working with triangles on the coordinate plane to discover slope-intercept form in Unit 8. | |
| **Major Cluster Standards** | **Standards Clarification** |
| **Understand and apply the Pythagorean Theorem.**  **8.G.B.6** Explain a proof of the Pythagorean Theorem and its converse.  **8.G.B.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.B.8** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.  **Work with radicals and integer exponents.**  **8.EE.A.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 √2 is irrational. | Students will use square roots to solve for unknown measures in right triangles. (8.EE.A.2 from Unit 4) |
| **Supporting Cluster Standards** | **Standards Clarification** |
| **Know that there are numbers that are not rational, and approximate them by rational numbers.**  **8.NS.A.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., π2). *For example, by truncating the decimal expansion of* √*2, show that* √*2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.* | Students will use rational approximations of irrational numbers to model and solve real-world problems involving right triangles. (8.NS.A.2 from Unit 4) |
| **Additional Cluster Standards** | **Standards Clarification** |
| **Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.**  **8.G.C.9** Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. | Students will solve for unknown measures of right triangles in three dimensions including cones, pyramids, and prisms. (8.G.C.9 from Unit 6)  **8.G.B.6** This standard does not require the students to prove for themselves the Pythagorean Theorem or its converse rather explain a proof of it. To ensure mastery of this standard, multiple proofs of the Pythagorean Theorem and its converse should be used. |

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| **Focus Standards of Mathematical Practice** | |
| **MP.3** Construct viable arguments and critique the reasoning of others. | Understanding, modeling, and applying (MP.4), the Pythagorean Theorem and its converse require that students look for and make use of structure (MP.7) and express repeated reasoning (MP.8). Students also construct and critique arguments as they explain a proof of the Pythagorean Theorem and its converse (MP.3). |
| **MP.4** Model with mathematics. |
| **MP.7** Look for and make use of structure. |
| **MP.8** Look for and express regularity in repeated reasoning. |

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| **Unit 8: Discovering Slope-Intercept Form Through Geometry** | | **Possible time frame**:  14 days |
| This unit is designed to let students discover for themselves the equation of a line that passes through the origin (y=mx) and the equation of a line not passing through the origin (y=mx+b). Students will first look at proportional relationships focusing on direct proportions. Students will also graph the proportional relationships and use their graph to compare the corresponding algebraic and geometric representations of a direct proportion. All of the graphs should be linear; thus, students should discover that the unit rate of the proportional relationship is present in the graph as the slope of the line. After establishing the concept of slope, using similar triangles will allow the students to discover that the slope is the same between any two distinct points on a non-vertical line. This will all lead the students to deriving the equations of a line. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Understand the connections between proportional relationships, lines, and linear equations.**  **8.EE.B.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.*  **8.EE.B.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*. | | **8.EE.B.5** Students should be ready to engage in this standard due to the work they have done with ratios and proportions in the 6th and 7th grades.  **8.EE.B.6** Students who leave this unit with a strong conceptual understanding of the equation of a line should be very successful in Units 9, 11, and 12. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.4** Model with mathematics. | Students model proportional relationships by graphing them on a coordinate plan (MP.4). Deriving an equation for a line requires that students look for and express regularity in repeated reasoning (MP.8). | |
| **MP.8** Look for and express regularity in repeated reasoning. |

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| **Unit 9: Linear Functions** | | **Possible time frame**:  18 days |
| The concept of a function started being developed at during 6th grade when students took their first look at the relationship between two quantities and attempted to describe the way the quantities changed in relation to one another. In the 7th grade, students studied direct proportions algebraically and geometrically including identifying the constant of proportionality. This work culminates in this unit with the concept of a function with a strong emphasis on linear functions. Students should leave this unit with a strong conceptual understanding of functions, the ability to compare functions represented in different forms (algebraically, graphically, numerically in tables, or by verbal descriptions), the understanding that the equation y=mx+b defines a line, the ability to identify functions that are linear and ones that are not, and the ability to construct a function to model a linear relationship between two quantities. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Define, evaluate, and compare functions.**  **8.F.A.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.  **8.F.A.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.A.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 = s2 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.* | | The students must know the equations of a line to be successful in this unit. (8.EE.B.6 from Unit 8)  **8.F.A.1** Function notation should not be introduced nor is it required in the 8th grade.  **8.F.A.3** Students need a strong conceptual understanding of the equation for a linear function and its components when they study bivariate statistics in Unit 12. |
| **Supporting Cluster Standards** | | **Standards Clarification** |
| **Use functions to model relationships between quantities.**  **8.F.B.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.  **8.F.B.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. | |  |
| **Focus Standards of Mathematical Practice** | | |
| **MP.2** Reason abstractly and quantitatively. | Understanding how functions model (MP.4) relationships require that students reason abstractly and quantitatively (MP.2) while looking for and making use of structure (MP.7). | |
| **MP.4** Model with mathematics. |
| **MP.7** Look for and make use of structure. |

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| **Unit 10: Solving Linear Equations in One Variable** | | **Possible time frame**:  14 days |
| Prior to the 8th grade, students were introduced to the concept of a variable and solved one step equations in the 6th grade. In the 7th grade, students extended their procedural skill and fluency to include solving multi-step equations and inequalities. This unit extends students’ work with single-variable equations to include equations where the same variable appears more than one time in the equation. In order for students to be able to solve, they must understand how equations are built from the properties of equality and use those properties of equality to transform the equation into simpler forms until they arrive at the solution. Students should develop an understanding that linear equations in one variable can have one solution, no solution, or infinitely many solutions. The equations in this unit should include all rational numbers as coefficients and/or constants. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Analyze and solve linear equations and pairs of simultaneous linear equations.**  **8.EE.C.7** Solve linear equations in one variable.   1. 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). 2. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. | | **8.EE.C.7** Students’ procedural skill and fluency in solving linear equations in one variable will directly impact their ability to solve a system of linear equations. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.6** Attend to precision. | Writing and solving equations require that students make use of structure (MP.7) and attend to precision (MP.6) as students apply properties of operations to transform equations into simpler forms. | |
| **MP.7** Look for and make use of structure. |

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| **Unit 11: Systems of Equations** | | **Possible time frame**:  18 days |
| In this unit students will combine their conceptual understanding of linear equations in two variables with their procedural skill and fluency in solving linear equations in one variable to solve a system of linear equations in two variables. Students will be expected to solve systems of two linear equations in two variables and understand that the solution to that system is the point of intersection on the coordinate plane. They should understand that the point of intersection is the only point that will satisfy both equations simultaneously. Students will solve systems algebraically, estimate solutions by graphing, and solve simple cases by inspection. Students will also use systems to model and solve real-world problems. | | |
| **Major Cluster Standards** | | **Standards Clarification** |
| **Analyze and solve linear equations and pairs of simultaneous linear equations.**  **8.EE.C.8** Analyze and solve pairs of simultaneous linear equations.   1. 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. 2. 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.* 3. 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.* | | **8.EE.C.8** This is the students’ first exposure to systems of linear equations. This topic will continue to be developed in Algebra I and Algebra II. It is essential that students leave 8th grade with a strong conceptual understanding of systems and their solutions. |
| **Focus Standards of Mathematical Practice** | | |
| **MP.1** Make sense of problems and persevere in solving them. | Students’ perseverance in solving real-world problems with systems of equations requires that they work with various solutions methods and learn to discern each method is most appropriate (MP.1). Writing and solving equations require that students make use of structure (MP.7) and attend to precision (MP.6) as students apply properties of operations to transform equations into simpler forms. | |
| **MP.6** Attend to precision. |
| **MP.7** Look for and make use of structure. |

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| **Unit 12: Bivariate Statistics: Linear** | | **Possible time frame**:  13 days |
| This unit is designed to extend students’ work with statistics from univariate statistics to bivariate statistics. This unit will provide students an opportunity to apply their conceptual understanding of linear functions to model and solve statistics problems in context. Students will interpret slope and y-intercept in the context of bivariate measurement data. This unit will strongly support the major work of linear functions in this course as well as give the students a strong foundation in bivariate statistics that will be necessary for success in high school explorations of statistics. | | |
| **Supporting Cluster Standards** | | **Standards Clarification** |
| **Investigate patterns of association in bivariate data.**  **8.SP.A.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.  **8.SP.A.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.A.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.*  **8.SP.A.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?* | |  |
| **Focus Standards of Mathematical Practice** | | |
| **MP.3** Construct viable arguments and critique the reasoning of others. | Representing and analyzing data requires that students use appropriate tools strategically (MP.5) and construct and critique arguments (MP.3) about the data. | |
| **MP.5** Use appropriate tools strategically. |