Middle School Big Rocks

	6th	7th
Ratio and Proportional Relationships	• Use reasoning about multiplication and division to solve ratio and rate problems about quantities. • Connect understanding of multiplication and division with ratios and rates by viewing equivalent ratios and rates as deriving from and extending, pairs of rows (or columns) in the multiplication table and by analyzing simple drawings that indicate the relative size of quantities. • Expand the scope of problems for which they can use multiplication and division to solve problems and they connect ratios and rates.	• Extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. • Use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips and percent increase or decrease. • Solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. • Graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope, • Distinguish proportional relationships from other relationships.
Number System	• Use the meaning of fractions and relationships between multiplication and division to understand and explain why the procedures for dividing fractions make sense. • Extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, particularly negative integers. • Reason about the order and absolute value of rational numbers and about the location of points on a coordinate plane.	• Develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation) and percents as different representations of rational numbers. • Extend addition, subtraction, multiplication and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction and multiplication and division--by applying these properties and by viewing negative numbers in terms of everyday contexts. • Explain and interpret the rules for adding, subtracting, multiplying and dividing with negative numbers. • Use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.
Expressions and Equations	• Write expressions and equations that correspond to give situations, using variables to represent an unknown and describe relationships between quantities. • Understand that expressions in different forms can be equivalent and use the properties of operations to rewrite and evaluate expressions in equivalent forms. • Use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations.	

Geometry	• Reason about relationships among shapes to determine area, surface area and volume. They find areas of right triangles, other triangles and special quadrilaterals by decomposing these shapes, rearranging or removing pieces and relating the shapes to rectangles. • Discuss, develop and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths.	• Continue their work with area from grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. • Reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions and they gain familiarity with the relationships between angles formed by intersecting lines. • Work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. • Solve real world and mathematical problems involving area, surface area and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.
Statistics and Probability	• Develop their ability to think statistically. • Recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally and also in the sense that it is a balance point. • Recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability. • Learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps and symmetry, considering the context in which the data were collected.	• Build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. • Begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

	8th
Number System Expressions and Equations Statistics and Probability	• Recognize equations for proportions (y/x = m or y= mx) as special linear equations (y = mx + b), understanding that the constant of proportionality (m) is the slope and the graphs are lines throughout the origin. • Understand that the slope (m) of a line is a constant rate of change, as well as how the input and output changes as a result of the constant rate of change. • Interpret a model in the context of the data by expressing a linear relationship between the two quantities in question and interpret components of the relationship (such as slope and y-intercept) in terms of the situation. • 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. • Use linear equations, systems of linear equations, linear functions and their understanding of slope of a line to represent, analyze and solve a variety of problems.
Functions	• Grasp the concept of a function as a rule that assigns to each input exactly one output. • Understand that functions describe situations where one quantity determines another. • Translate among representations and partial representations of functions (nothing that tabular and graphical representations may be partial representations of the function) and describe how aspects of the function are reflected in the different representations.
Geometry	• 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. • 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. • Understand the statement of the Pythagorean theorem and its converse, and why the Pythagorean theorem holds. • Apply the Pythagorean theorem to find distances between points on the coordinate plane, to find lengths and to analyze polygons.