**Term 1**

**Topic: Equations**

**Essential Questions:**
- How can you use inductive reasoning to discover rules in mathematics? How can you test a rule?
- How can you solve a multi-step equation? How can you check the reasonableness of your solution?
- How can you solve an equation that has variables on both sides?
- How can you use a formula for one measurement to write a formula for a different measurement?

**Topic: Exponents and Scientific Notation**

**Essential Questions:**
- How can you use exponents to write numbers?
- How can you use inductive reasoning to observe patterns and write general rules involving properties of exponents?
- How can you multiply two powers that have the same base?
- How can you divide two powers that have the same base?
- How can you evaluate a nonzero number with an exponent of zero or a negative integer exponents?
- How can you read and write numbers that are written in scientific notation?
- How can you perform operations with numbers written in scientific notation?

**Extension Topic: Angles and Triangles**

**Essential Questions:**
- How can you describe angles formed by parallel lines and transversals?
- How can you describe the relationships among the angles of a triangle?
- How can you find the sum of the interior angle measures and the sum of the exterior angle measures of a polygon?
- How can you use angles to tell whether triangles are similar?

**Term 2**

**Topic: Graphing and Writing Linear Equations**

**Essential Questions:**
- How can you recognize a linear equation? How can you draw its graph?
- How can you use the slope of a line to describe the line?
- How can you describe the graph of the equation \( y = mx \)?
- How can you describe the graph of the equation \( y = mx + b \)?
• How can you describe the graph of the equation $ax + by = c$?
• How can you write an equation of a line when you are given the slope and the y-intercept of the line?
• How can you write an equation of a line when you are given the slope and a point on the line?

Extension Topic: Volume and Similar Solids

Essential Questions:
• How can you find the volume of a cylinder?
• How can you find the volume of a cone?
• How can you find the volume of a sphere?
• When the dimensions of a solid increase by a factor of $k$, how does the surface area change? How does the volume change?

Term 3

Topic: Transformations

Essential Questions:
• How can you identify congruent triangles?
• How can you arrange tiles to make a tessellation?
• How can you use reflections to classify a frieze pattern?
• What are the three basic ways to move an object in a plane?
• How can you use proportions to help make decisions in art, design, and magazine layouts?
• How do changes in dimensions of similar geometric figures affect the perimeter and the area of the figures?
• How can you enlarge or reduce a figure drawn in the coordinate plane?

Topic: Systems of Linear Equations

Essential Questions:
• How can you solve a system of linear equations?
• How can you use substitution to solve a system of linear equations?
• How can you use elimination to solve a system of linear equations?
• Can a system of linear equations have no solution?
• Can a system of linear equations have many solutions?

Extension Topic: Real Numbers and the Pythagorean Theorem

Essential Questions:
• How can you find the dimensions of a square or a circle when you are given its area?
• How is the cube root of a number different from the square root of a number?
• How are the lengths of the sides of a right triangle related?
• How can you find decimal approximations of square roots that are not rational?
• In what other ways can you use the Pythagorean Theorem?
### Term 4

#### Topic: Functions

**Essential Questions:**
- How can you use a mapping diagram to show the relationship between two data sets?
- How can you represent a function in different ways?
- How can you use a function to describe a linear pattern?
- How can you recognize when a pattern in real life is linear or nonlinear?
- How can you use a graph to represent relationships between quantities without using numbers?

#### Extension Topic: Data Analysis and Displays

**Essential Questions:**
- How can you construct and interpret a scatter plot?
- How can you use data to predict an event?
- How can you read and make a two-way table?
- How can you display data in a way that helps you make decisions?