8th Grade Math

The purpose of this document is to clarify what students should know and be able to do each quarter (Q).

Competencies	Q 1	Q 2	Q 3	Q 4
C1-Number and Operation The student represents and uses real numbers in a variety of forms.	X			
C2-Expressions and Equations The student uses one-variable equations and inequalities in problem situations.		X	X	X
C3-Proportionality The student models proportional and non-proportional linear relationships.		X		X
C4-Geometry The student explains the effect of transformations applied to two-dimensional shapes on a coordinate plane.	X	X		
C5-Measurement The student solves problems involving surface area, volume, and Pythagorean theorem.	X	X	X	X
C6-Data Analysis The student describes bivariate sets of data using scatterplots.			X	
C7-Personal Financial Literacy The student solves problems involving investment and credit.				X

Learning Progression for Competency 1: Number and Operations

The student represents and uses real numbers in a variety of forms.

Developing	Progressing	Proficient	Advanced
Describes relationships between sets of real numbers using a visual representation Locates, compares, and orders integers and rational numbers using a number line	*Meets all developing criteria and …* Approximates the value of an irrational number, including Pi and square roots of numbers less than 225 Converts between standard decimal notation and scientific notation	*Meets all progressing criteria and …* Demonstrates the approximate value of an irrational number using a number line Orders a set of real numbers	*Meets all proficient criteria and …* Justifies reasonableness of solutions

Success Criteria for Proficient in Number and Operations:

The student can:
- describe relationships between sets and subsets using graphic organizers, including Venn diagrams.
- locate, compare, and order integers and rational numbers using a number line.
- approximate the value of an irrational number.
    - Pi
    - square roots
        - understand the relationship between a square and its root
        - using a number line
        - identify the perfect squares less than and greater than
- convert between standard decimal notation and scientific notation.
    - understand that the value of the coefficient of a number in scientific notation will be greater than or equal to 1 and less than 10
    - understand the change in the place value is determined by the exponent
    - understand that a positive exponent in scientific notation produces multiplication expression and a negative exponent produces division expression
    - convert real numbers, including squares and square roots, to a common form
- order a set of real numbers from mathematical and real-world problem situations.

Learning Progression for Competency 4: Geometry

The student explains the effect of transformations applied to two-dimensional shapes on a coordinate plane.

Developing	Progressing	Proficient	Advanced
Determines if shapes are similar	*Meets all developing criteria and …*	*Meets all progressing criteria and …*	*Meets all proficient criteria and …*
Compares and contrasts the attributes of a shape and its dilation(s) on a coordinate plane	Applies the scale factor to the points of a figure on the coordinate plane and determines the scale factor when provided with two images	Explains the effect of a scale factor applied to a two-dimensional figure on a coordinate plane using an algebraic representation	Applies knowledge of dilations to two-dimensional figures to analyze their effect on perimeter and area of a figure
Identifies the transformation being applied to a two-dimensional figure given pre-image and image	Graphs a transformation using patty paper; labeling both pre-image and transformed image coordinates	Explains the effect of transformations applied to two-dimensional shapes on a coordinate plane using an algebraic representation	Creates a pre-image and image and uses an algebraic representation to explain the transformation
Identifies whether or not a transformation preserves orientation and congruence			

Success Criteria for Proficient in Geometry:

The student can:
- determine if two shapes are similar using a proportion.
- explain the relationship between the corresponding side lengths of a pre-image and an image.
- explain the relationship between the corresponding angle measures in a pre-image and image.
- identify and define translations, rotations, dilations, and reflections.
- compare and contrast movement on the coordinate plane by translation, rotation, and reflection.
- identify and define which transformations change congruence and orientation.
- apply the given scale factor to each coordinate point of the pre-image in order to:
    - determine new coordinates of dilated image.
    - graph/model the image.
- compare the coordinate points of the image to the pre-image in order to identify the scale factor being applied to each coordinate point of the pre-image.
- model translations, rotations, and reflections on a coordinate plane (using patty paper) and label both pre-image and image coordinates.
- define the coordinates of the image (transformed image) using a model.
- explain the movement of a transformation (slide, flip, turn, up, down, right, left, etc.).
- connect to an algebraic description. (I.e. "up four units" is $y + 4$) using a verbal description.
- represent a transformed image using an algebraic representation.
- represent a transformation algebraically Using a transformed image.

- create an algebraic representation to represent a dilation.
- dilate an image using an algebraic representation.

Learning Progression for Competency 5: Measurement

The student solves problems involving surface area, volume, and Pythagorean theorem.

Developing	Progressing	Proficient	Advanced
Identifies attributes of right angles and understand the relationship between the length of the legs of a triangle Identifies the side lengths as leg a, leg b, and hypotenuse	*Meets all Developing criteria and …* Explains the Pythagorean Theorem using models and diagrams Describes volume in terms of the area of the base and the height of the prism Determines lateral area and total surface area of rectangular prisms, triangular prisms, and cylinders using area of two-dimensional figures Distinguishes between lateral and total surface area	*Meets all Progressing criteria and …* Solves problems where the Pythagorean Theorem concept is applied to real-world situations Determines the distance between two points on a coordinate grid using the Pythagorean Theorem Solves problems involving volume of cylinders, cones, and spheres by applying appropriate formula Solves problems involving lateral area and total surface area of rectangular prisms, triangular prisms, and cylinders by applying appropriate formula	*Meets all Proficient criteria and …* Applies the Pythagorean Theorem to multi-step real-world problems and justifies reasonableness of solutions Solves problems involving volume of composite three-dimensional figures and justifies reasonableness of solutions Solves problems involving lateral area and total surface area of composite three-dimensional figures and justifies reasonableness of solutions

Success Criteria for Proficient in Measurement:

The student can:
- identify and define the parts of a right triangle.
    - right angle
    - legs a and b
    - hypotenuse
- explain the Pythagorean Theorem using models and diagrams.
- solve problems involving the Pythagorean Theorem.
    - find the hypotenuse when given the lengths of the legs using the Pythagorean Theorem
    - find the length of a leg when given the length of one leg and the hypotenuse using the Pythagorean Theorem
    - find the distance between two points using the Pythagorean Theorem
    - solve multi-step real-world problems using the Pythagorean Theorem
    - justify the reasonableness of solutions to problems involving the Pythagorean Theorem

- o calculate the missing measurements of right triangles using the Pythagorean theorem in models and diagrams in real-world context
- solve problems involving lateral area and total surface area of rectangular prisms, triangular prisms, and cylinders.
  - o explain the connections between the area of a net and the total and lateral surface area formulas of a prism/cylinder
  - o differentiate between the similarities and differences between lateral and total surface area in mathematical and real-world applications
  - o solve for lateral and total surface area in real world contexts
- solve problems involving volume cylinders, cones, and spheres.
  - o describes volume in terms of the area of the base and the height of the prism
  - o solve for volume of cones, cylinders, and spheres in a real-world situation
- solve for a measurement of a dimension given the volume