Milford EVSD Math 8 Mathematics Curriculum

Unit A: The Number System (2 weeks)

Essential Questions	**Standards** Define what students should understand and be able to do.	**Vocabulary**	**Strategies & Resources (Will update when resource is chosen)**	**Assessments and Instructional Strategies for Diverse Learners *(Updating throughout 2018-19)***
1. What are the types of real numbers? 2. What is the difference between a rational and an irrational number, when looking at decimal form? 3. How can quotients of two integers be used to represent a rational number? 4. How do you classify numbers by their simplest form? 5. How do I approximate an irrational number using rational numbers? 6. How can the square root of a number and its opposite be written in simplified form? 7. How do you classify the roots of perfect squares and perfect cubes? 8. How do both rational and irrational numbers fit between two consecutive integers?	8.NS.1. Know that numbers that are not rational are called irrational. Know that real numbers are either rational or irrational. Understand informally that every number has a decimal expansion which is repeating, terminating, or is non-repeating and non-terminating. 8.NS.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., 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	Rational Irrational Repeating decimal Non-repeating decimal Terminating decimal Non-terminating decimal Integer Whole number Natural number Real number system Approximate	Real Number Webquest Venn Diagram Graphic Organizer Venn Diagram Activity Ordering Real Number Cards Schoology Games	7th Grade: 8th Grade:

Unit B & C: Expressions and Equations (18 weeks)

Essential Questions	**Standards** Define what students should understand and be able to do.	**Vocabulary**	**Strategies & Resources**	**Assessments & Instructional Strategies for Diverse Learners** ***(Updating throughout 2018-19)***
1. How can I simplify an expression using the zero and negative properties of exponents? 2. What is the expanded form of a variable with an exponent and how is that different than a coefficient? 3. How can I find the solution to a simple quadratic or cubic equation using square and cube roots? 4. How many solutions does $x^2 = p$ have? 5. How many solutions does $\sqrt{p}$ have? 6. How many solutions does $x^3 = p$ have? 7. Is the square root of 2 rational or irrational? 8. How does a decimal convert to scientific notation? 9. What is the meaning of the positive or negative exponent in	8.EE.1. Understand, explain, 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.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 the square root of 2 is irrational. 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 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.	Integer Exponent Square root Cube root Perfect square Perfect cube Irrational Coefficient Scientific notation Proportion Slope Unit rate D=rt Similar triangles y = mx + b vertical	Poof Book Mystery Color Sheet Scavenger Hunt for Add/Sub Sci Notation Color Sheet Sci Notation Muti/Div Scientific Notopoly Clue Scavenger Hunt Marketing Analyst	7th Grade: 8th Grade:

a number written in scientific notation form and how does it compare to one? _____ 1. What is slope and how is it written as a ratio? 2. How can a proportional relationship be represented as an equation and how does it appear on a coordinate grid? 3. How can right triangles be used to describe and show slope? 4. What does the value of b in the equation y = mx +b mean and where does that appear on the graph of the line? 5. How can the relationship between two variables be represented as graphs, tables, equations or in verbal form?	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 8.EE.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.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*.	horizontal origin coordinate plane	Slope Foldable Real World Slope Cards Slope Intercept Form Task Cards	
1. How can I solve multi step linear equations using inverse operations?	8.EE.7. Solve linear equations in one variable.	Solution Infinite	Word Problem and 2 Step Match 2 Step Word Problem Stations	

2. What is the difference between a linear equation that has one solution, no solution or infinitely many solutions? 3. How can an ordered pair show a solution to a pair of linear equations? 4. How many solutions can a pair of linear equations have? 5. How do linear pairs of equations and their solutions appear on a coordinate grid?	8.EE.7.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). 8.EE.7.b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. 8.EE.8. Analyze and solve pairs of simultaneous linear equations. **a.** Understand that the solution to a pair of linear equations in two variables corresponds to the point(s) of intersection of their graphs, because the point(s) of intersection satisfy both equations simultaneously. **b.** Use graphs to find or estimate the solution to a pair of two simultaneous linear equations in two variables. Equations should include all three solution types: one solution, no solution, and infinitely many solutions. 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.*	Coefficient Distributive property Like terms Systems Point of intersection Solution Linear equation	Combining Like Terms with Distributive Property Scavenger Hunt Multi Step (variables both sides/distribute) 2 Step and Multi Step Word Problems One, None, Inf Many Cloud Stained Glass Activity Zombie Review Games Schoology	

	c. Solve real-world and mathematical problems leading to pairs of 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.* (Limit solutions to those that can be addressed by graphing.)			

Unit D: Functions (4 weeks)

Essential Questions	**Standards** Define what students should understand and be able to do.	**Vocabulary**	**Strategies & Resources**	**Assessments & Instructional Strategies for Diverse Learners** ***(Updating throughout 2018-19)***
1. What is a function?	8.F.1. Understand that a function is a rule that assigns to each		Real World Application of	7th Grade:

2. What is the difference between a linear and a nonlinear function? 3. What makes a graph a function? 4. What are the 4 ways a function can be represented? 5. What do the properties of linear functions include? 6. What makes an undefined slope? 7. What is true about a linear function's input and output table values and rate of change? 8. Are all functions continuous?	input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. Function notation is not required in Grade 8. 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 = 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.	Function Input Output Ordered pairs Rate-of-change y = mx + b Linear Non-linear Algebraic expression Initial value / y-intercept	Functions Google Doc	8th Grade:
1. What is the slope of a line? 2. What makes an undefined slope? 3. What makes a line have a slope of zero?	8.F.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	Rate-of-change Increase Decrease Horizontal		

4. How do you describe a line with a positive slope? What about negative slope? 5. How do you determine the steepness of a graph of a line.	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.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.	Vertical Linear Non-linear		

Unit E: Geometry (6 weeks)

Essential Questions	**Standards** Define what students should understand and be able to do.	**Vocabulary**	**Strategies & Resources**	**Assessments & Instructional Strategies for Diverse Learners** ***(Updating throughout 2018-19)***
1. What type of relationships are formed when parallel lines are cut by a transversal? 2. What is the sum of the interior angles in a triangle? 3. How do you find the measure of an exterior angle in a triangle? 4. What is the relationship between 2 triangles who have a pair of congruent interior angles? 5. Can you identify corresponding angles and sides in transformed figures? 6. Do transformations change the angle measures or sides lengths in figures? 7. If a figure is transformed, is its image congruent to the pre-image? 8. What are the characteristics of translations, rotations, reflections, and dilations? 9. What is required to complete a dilation? 10. What is the relationship between figures that are dilated?	8.G.1. Verify experimentally the properties of rotations, reflections, and translations (include examples both with and without coordinates) 8.G.1.a. Lines are taken to lines, and line segments to line segments of the same length. 8.G.1.b. Angles are taken to angles of the same measure. 8.G.1.c. Parallel lines are taken to parallel lines. 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, describe a sequence that exhibits the congruence between them. (include examples both with and without coordinates)	Transformations Translation Reflection Rotation Dilation Similar figures Polygon Interior angle Exterior angle Transversal Parallel lines AA for similar triangles	City Design Project Transformation Golf Game (Schoology) Transformation Game Transformation ¨U¨ Activity	7th Grade: 8th Grade:

	8.G.3. Describe the effect 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. (include examples both with and without coordinates). 8.G.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.			
1. What are ways to represent the side length of a triangle that is not a rational number. 2. What is the definition of the	8.G.6. Analyze and justify an informal proof of the Pythagorean Theorem and its converse.	Pythagorean theorem Hypotenuse	Pythagorean Theorem Intro Activity Star Activity	

Pythagorean Theorem? 3. What is the formula that is represented by the Pythagorean Theorem? 4. The Pythagorean Theorem is applied to what figure? 5. What is the longest side of a right triangle called? What about the two shorter sides? 6. How can the Pythagorean Theorem be used to find the distance between two points on a coordinate plane? 7. What is the converse of the Pythagorean Theorem? 8. How can you use the Pythagorean Theorem to determine whether or not a triangle is a right triangle?	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. (distance formula).	Legs Square Square root Perfect square Distance formula Coordinate plane		
1. What is base figure of a cone and cylinder? 2. What makes up the net of a cylinder? 3. How many base(s) does a cone and pyramid have? 4. What is point in a cone and pyramid called? 5. How do you define the height of a cone or pyramid? 6. What is the slant height of a cone or pyramid?	8.G.9. Solve real-world and mathematical problems involving volumes of cones, cylinders, and spheres	Volume Height Slant height Vertex point Base Radius Cone Cylinder Sphere	Surface and Volume Graphic Organizer SA and V Glue Activity (Need to Link)	

7. The volume of a pyramid/cone is what fraction to the volume of a prism/cylinder?				

Unit F: Statistics and Probability (5 weeks)

Essential Questions	**Standards** Define what students should understand and be able to do.	**Vocabulary**	**Strategies & Resources**	**Assessments & Instructional Strategies for Diverse Learners** ***(Updating throughout 2018-19)***
1. Scatterplots are used for what type of data? 2. What type of trends exist in a scatterplot? 3. What is an outlier? 4. How can you represent a scatter plot using a linear function? 5. How can you use a line of best fit to make a prediction? 6. What type of association exists between the slope and y-intercept of a trend line? 7. How can linear functions be used to solve problems from a scatter plot? 8. On what kind of data are two-way frequency tables used? 9. What do two-way frequency tables display? 10. What can relative frequencies be used to describe? 11. How can you tell a frequency table has no correlation? 12. How can you tell a frequency table has a positive/negative	8.SP.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. (GAISE Model, steps 3 and 4) 8.SP.2. Understand 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. (GAISE Model, steps 3 and 4) 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 1.5 cm/hr as meaning that an additional hour of*	Scatter plots Bivariate data Clustering Outlier Linear Non-linear Line graph Line of best fit Trend line Slope Intercept Frequency table	GAISE Report Pages 11-22 Level C & D Pages 61-88 Data Analysis Project LOCUS	7th Grade: 8th Grade:

correlation?	*sunlight each day is associated with an additional 1.5 cm in mature plant height.* (GAISE Model, steps 3 and 4) 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?*			

Updated 1-25-18 *Waiting on Resources

Updated 4-6-18 Revised Essential Questions (based on Model Curriculum)