Southington Public Schools
Curriculum Map

Subject: Math **Grade: 8**

UNIT TITLE	#1 Variables, Expressions and Linear Equations	#2 Linear Relationships / Rate of Change	#3 Geometry and Spatial Relationships – Part I
CONTENT	• Model situations with symbolic statements • Write equivalent expressions • Determine if different symbolic expressions are mathematically equivalent • Solve linear equations involving parentheses	• Recognize problem situations in which two or more variables have a linear relationship to each other. • Construct tables, graphs, and symbolic equations that express linear relationships. • Understand the connections between linear equations and patterns in the tables and graphs of those relations – rate of change, slope, and *y*-intercept. • Solve linear equations	• Understand important properties of symmetry • Use tools to examine symmetries and transformations • Identify basic design elements that can be used to replicate a given design
STATE STANDARDS	7.1.1.a Analyze physical phenomena, functions and patterns to identify relationships and make generalizations. (1) Generalize mathematical situations and patterns with algebraic expressions, equations and inequalities. (2) Identify the independent and dependent variables in a given situation. Recognize and explain when a graph should be continuous or a discrete set of points. 8.1.1.a Analyze physical phenomena, functions and patterns to identify relationships and make generalizations. (1) Write recursive and explicit functions to generalize patterns. Identify relationships that are linear and nonlinear and compare and contrast their properties using tables, graphs, equations and verbal descriptions. 8.1.2.a Describe the effects of characteristics of linear relationships on the way the relationship is represented verbally and in tables, graphs, and equations. (1) Determine the constant rate of change in a linear relationship and recognize this as the slope of a line.	7.1.1. a. Analyze physical phenomena and patterns to identify relationships and make generalizations. (1)Generalize mathematical situations and patterns with algebraic expressions, equations, and inequalities. (2)Identify the independent and dependent variables in a given situation (3)Recognize and explain when a graph should be continuous or a discrete set of points 7.1.2. a. Describe the affects of characteristics of mathematical relationships on the way the relationship is represented. (1)Use graphs, tables, equations, and verbal descriptions to represent and analyze changes in linear and nonlinear relationships. (2)Recognize that a linear relationship has a constant rate of change. 7.1.3. a. Solve problems using a variety of algebraic methods. (1)Solve problems using concrete, verbal, symbolic, graphical and tabular representations.	7.3.1.a Describe and classify polygons according to their transformational properties. (1)Identify which classes of polygons have line and/or rotational symmetry. (2)Use rectangular grids to represent polygons and perform transformations (translations, rotations, reflections, and dilations) on those polygons. (3)Describe the effect of transformations on polygons with line and/or rotational symmetry. 8.3.2.a Model geometric relationships in a variety of ways. (1)Use coordinate geometry to explore and test geometric relationships of parallel and perpendicular lines and polygons and their transformations.

	(2) Compare and contrast the graphs of lines with the same slope verses those with different slopes. (3) Interpret slope and y-intercepts from contextual situations, graphs, and linear equations. Given two linear relationships in context, recognize that they may have a common solution. 8.1.3.a Solve problems using various algebraic methods and properties. (1) Solve multi-step equations using algebraic properties. Use tables, graphs and equations to represent mathematical relationships and solve real-world problems.		
ASSESSMENT	**PERFORMANCE TASK** **Goal:** To select the best lead band and backup band combination for various sized venues to maximize your profit. **Role:** You are a concert promoter. **Audience:** Your financial partners. **Scenario:** You will be given three lead bands and three backup bands and their different financial arrangements. You will be setting up concerts at three different locations. Each location tends to generate a different quantity of tickets sold. You need to select the best combination of lead and backup bands for each venue. **Product:** You must present the schedule to your business partners showing graphically and algebraically why each combination is the best financially for its venue. Your final presentation must include equations and graphs of the financial arrangements for the individual bands (one graph for lead bands and one for backup bands). In addition you must create a third graph showing the three combinations you select. **Extension:** From each graph give the range of tickets sold for which you would pick each of the bands or combinations. **Standards:** Your presentation will be	**PERFORMANCE TASK** **Goal:** Finding the golf ball that will travel the farthest. **Role:** You are on a committee to select the golf ball to be used in the longest drive contest **Audience:** The golf tournament committee **Scenario:** Your team must predict how high a golf ball will bounce if dropped from the roof of the school – approximately 25 meters. **Product:** You will conduct an experiment to gather data on the rebound height of a golf ball. The data will be presented in tabular and graphical form. You will then create an equation to model the line of best fit and use this equation to answer the original question **Standards:** The assessment (performance task) must include a correct table, a correct graph, a correct equation and a reasonable estimate of the rebound height when dropped from 25 meters	**PERFORMANCE TASK** **Goal:** To create a tessellation using at least two transformations. **Role:** You are an art students entering a contest held by the M.C. Escher Organization. They are looking for original work that uses tessellations that show transformation. **Audience:** The M.C. Escher Organization Broad of Trustees. **Scenario:** The M.C. Escher Organization is celebrating the 100th year of Escher's works. They are looking for young art students whose artwork uses Escher's transformations and creativity. **Product:** A tessellation that uses at least two transformations **Standards:** Students will be evaluated on their understanding of tessellating a pattern; transformations and use of material **Differentiated Version of Task:** Students could use 1, 2 or 3 different types of translations, rotations or reflections to create their tessellation.

	judged based upon correct equations, accurate graphs, and logical selection of band combination for the three venues. **Differentiated Version of Task:** The extension is designed as a differentiated version for advanced students. Low ability students will be given less bands of each type with easier financial arrangements. If necessary, certain set up of the graphs will be done for the students. **OTHER EVIDENCE** • Supplemental materials • Periodic quizzes and verbal assessments • Journal entries/written explanations with algebraic examples and graphs • Ability to utilize graphing calculator to graph equations and find specific solutions. • Appropriate CMT questions (CBAs)	**OTHER EVIDENCE** • Supplemental materials • Periodic quizzes, exit questions, and verbal assessments • Journal entries / written explanations with numerical and pictorial representations • Student self-assessments • Notebook checks	**OTHER EVIDENCE** • Classwork and homework assignments • Periodic written and verbal assessments • Journal entries/written explanations with pictorial representations.
SKILLS	• Model a situation with an algebraic expression • Simplify and solve equations • Graph a linear equation • Use the table and graphing functions on a graphing calculator • Evaluate expressions • Choose the best manner to solve problems • Judge the reasonableness of an answer	• Connect points of a graph of data that were collected or predicted • Determine whether a set of data is linear • Find a solution common to two linear equations by graphing or creating tables • Communicate with and interpret information from a variety of representations • Identify variables and determine an appropriate range of values for independent and dependent variables	• Recognize and describe symmetries of figures • Determine the initial design before transformations are applied • Creating designs using transformations • Describe the transformations orally and in writing using coordinate rules • Create a tessellation

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UNIT TITLE	#4 Pythagorean Theorem and Irrational Numbers	#5 Statistics	#6 Modeling with Algebra
CONTENT	• Relate the area of a square to the length of a side of the square • Estimate square roots • Understand and apply the Pythagorean	• Revisit and use the process of statistical investigation to explore problems • Distinguish between samples and populations and use information drawn from samples to draw conclusions about populations • Explore the influences of sample size and of random or nonrandom sample selection	• Recognize linear and non-linear patterns in contexts, tables and graphs and describe those patterns using words and symbolic expressions. • Write equations to express linear patterns appearing in tables, graphs, and verbal contexts. • Solve linear equations. • Interpret inequalities
STATE STANDARDS	8.3.1.a Explore the relationships among sides, angles, perimeters, areas, surface areas and volumes of congruent and similar polygons and solids. (2) Make and test conjectures about the relationships among angles, sides, perimeters and areas of congruent and similar polygons including the Pythagorean Theorem. 8.3.2.a Model geometric relationships in a variety of ways. (1) Use coordinate geometry to explore and test geometric relationships of parallel and perpendicular lines and polygons and their transformations. 8.3.3.b Solve problems involving measurement through the use of appropriate tools, techniques and strategies. (1) Use the Pythagorean theorem to solve indirect measurement problems. (2) Describe the accuracy of estimates and measures and the precision of measurement tools.	8.4.1.a Construct appropriate representations of data based on the size and kind of data set and the purpose for its use. (1) Collect, organize, display, compare, and analyze large data sets. (2) Construct a variety of data displays, including box-and-whisker plots, and identify where measures of central tendency are found in graphical displays. 8.4.2.a Make and evaluate statistical claims and justify conclusions with evidence. (1) Make predictions from scatter plots using or estimating a line of best fit. (2) Make inferences and evaluate reasonable hypotheses based on experimental data. (3) Analyze and interpret data using descriptive statistics including range, mode, median, quartiles, outliers, and mean. (4) Determine the accuracy of statistical claims. (5) Describe the role of random sampling, random number generation, and the effects of sample size in statistical claims.	8.1.1.a Analyze physical phenomena, functions and patterns to identify relationships and make generalizations. (2) Identify relationships that are linear and nonlinear and compare and contrast their properties using tables, graphs, equations and verbal descriptions. (3) Recognize and solve problems of direct variation. 8.1.2.a Describe the effects of characteristics of linear relationships on the way the relationship is represented verbally and in tables, graphs and equations. (1) Determine the constant rate of change in a linear relationship and recognize this as the slope of a line. (2) Compare and contrast the graphs of lines with the same slope verses those with different slopes. (3) Interpret slope and y-intercepts from contextual situations, graphs, and linear equations. 8.1.3.a Solve problems using various algebraic methods and properties. (1) Solve multi-step equations using algebraic properties. (2) Use tables, graphs and equations to

			represent mathematical relationships and solve real-world problems.
ASSESSMENT	**PERFORMANCE TASK** **Goal:** To calculate exact measurements for the production of tangram pieces. **Role:** You are a design engineer for a manufacturer of math manipulatives **Audience:** The manufacturing engineers **Scenario:** Your company is introducing a new product, multi-colored tangram puzzles. You have a sketch of the completed tangram puzzle and must provide this information for each piece. **Product:** You must create a report for the manufacturing division that communicates this information in the most effective way. The engineers must also understand how you made your calculations. **Standards:** You will be judged on • the accuracy of your calculations • the clarity and completeness of your report **Differentiated Version of Task:** The task can be differentiated by giving different tangram puzzles. This performance task was created using the problem 1 of the Looking Back and Looking Ahead activities at the end of *Looking for Pythagoras*. It can also be differentiated by reducing the requirements, such as the need to identify similarity and calculate the scaling factors.	**PERFORMANCE TASK** **Unit Project for Samples and Populations** **Goal:** To report on the deer population in a Michigan State Park. **Role:** You work for the Department of Natural Resources. **Audience:** The director of the Department of Natural Resources **Scenario:** You are to use the capture-tag-recapture method to estimate the number of deer in a large forest in Michigan. Some factors that you must consider are tagging deer from several places in the area of concern, taking sufficient samples for tagging, allowing the tagged deer time to mix back with the herd and taking the final samples from several places in the area. **Product:** You will write a report about your findings and method of carrying out the experiment **Standards:** Your report will be assessed based on the accuracy and clarity of your graphs, and on the thoroughness of your analysis and conclusion. **Differentiated Version of Task:** Volume of data could be adjusted for students. Graphs could be recommended and/or started for students. Number of graphs required could be adjusted up or down. Written expectation could be modified for students.	**PERFORMANCE TASK** **Goal:** Develop a model to predict the number of rubber bands required to drop an action figure from any given height. **Role:** You are a research and development engineer for the Daredevil Entertainment Company. **Audience:** The board of directors of Daredevil Entertainment Company **Scenario:** Daredevil Company currently offers rock climbing, sky diving, and extreme snowboarding to its customers, but they are considering offering bungee jumping to their clients. Your job is to use action figures to model a bungee jumping situation, and determine the length of "bungee chord" (number of elastic bands) required to allow the figure to come as close to the ground as possible without splitting her head open (maximize thrills/eliminate risk), from any given test height. This involves testing jumps with several different numbers of elastics (1-6 is good), and writing an algebraic equation to model the experiment. All test jumps should be done at least 3 times, and the average distance used. The equation should then be used to predict the length of chord for several test jumps. **Product:** You must write a report explaining your experiment and the results as well as your predictions. Report should include: experimental data from trials in table form, graph of data including a line of best fit, the equation of the line for any given height, predictions for number of elastics for given test heights, and an explanation of your work

	OTHER EVIDENCE • Class work and homework assignments • Quizzes and Tests • Periodic written and verbal assessments • Journal entries/written explanations with pictorial representations.	**OTHER EVIDENCE** • Class work and homework assignments • Periodic written and verbal assessments • Journal entries/written explanations with graphical representations.	and any actual or possible problems with the experiment. **Standards:** Predictions will be tested from actual predicted heights. Reports will be judged based on accuracy of data tables, graphs, algebraic calculations, and reasonableness of predictions. **Note:** Students could be required to use the graphing calculators for this task or not. Actual test sites and heights can be determined by individual teachers. **Differentiated Version of Task:** • Degree of graphing calculator use could be adjusted based on ability. • Written requirements could be adjusted. • Number of predictions required could be adjusted. **OTHER EVIDENCE** • Class work and homework assignments • Periodic written and verbal assessments • Journal entries/written explanations with pictorial representations.
SKILLS	• Calculate the distance between two points in the plane • Find areas of figures drawn on a coordinate grid with whole-number vertices • Use the Pythagorean Theorem to solve problems • Write rational numbers as decimals	• Use statistical investigation to explore problems • Create various displays of a set of data • Analyze data using various methods • Describe and interpret the shape of the data in a graph including elements like clusters, outliers, symmetry, or skew • Find or estimate a line of best fit for related data in a scatter plot, and interpret its meaning • Make inferences about a situation based upon data	• Calculate slope given two points on a line • Identify whether slope is positive, negative, zero or no slope given a graph • Determine the slope and y-intercept of a graph or equation in slope-intercept form • Graph an equation using an x/y table or the y-intercept and slope • Write the equation for a line given slope and y-intercept, two points on a line, or data in context.

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UNIT TITLE	**#7 Numerical Reasoning**		
CONTENT	• Recognize situations where one variable is an exponential function of another variable • Recognize the connections between exponential equations and growth patterns in tables and graphs of those relations		
STATE STANDARDS	2.1.a Compare and order integers, powers and roots using number lines and grids. (1) Compare, locate and order rational numbers on number lines, scales, coordinate grids and measurement tools. (2) Identify another rational number between any two rational numbers. 2.1.b Extend the understanding of scientific notation to very small numbers. (1)Use powers of ten and negative exponents to write decimal fractions (2) Use powers of ten and positive and negative exponents to express and compare magnitude of very large and very small numbers. (3) Find the results of multiplication and division with powers of ten using patterns in operating with exponents. 2.2.a Solve problems involving fractions, decimals, ratios and percents. (1) Estimate and solve problems involving percent of increase and decrease. 2.2.c Connect the exponential growth and decay models to represent multiplication by the same factor. (1) Solve problems that involve repetitive patterns and iterations, such as compound interest, using tables, spreadsheets and calculators.		

ASSESSMENT	**PERFORMANCE TASK** Unit Project **Goal:** Conduct and experiment to understand half-life and radioactive decay. **Role:** You are a scientist studying the effects of Half-Life and radioactive decay. **Audience:** The Federal Commission on Nuclear power plants. **Scenario:** You are a scientist who is conducting an experiment for a Federal Commission on the radioactive substance known as iodine – 124. You job is to determine how long it will take before all traces of this substance is in an acceptable range. **Product:** Write a report, including graphs and charts that summarizes your findings on the radioactive decay of iodine 124. **Standards:** • solutions to the problems are correct. • explanations of the work is clear and organized. **OTHER EVIDENCE** • Tests • Quizzes • Hands-on-activities • Journal writing	**PERFORMANCE TASK** **OTHER EVIDENCE**	**PERFORMANCE TASK** **OTHER EVIDENCE**
SKILLS	• Build and analyze an exponential model. • Explore the significance of shapes of graphs and patterns in tables using exponential relationships • Explore rates of growth • Recognize and describe situation that can be modeled by an exponential function • Use exponents		