

Planned Course of Study

Standards Based Mathematics

Grade 9

Mathematics Department

Salisbury Township School District

1140 Salisbury Road

Allentown, PA 18103

Subject: Mathematics
Course: Standards Based Mathematics
Grade Level: 9

Learning Objective	PA Mathematics Standard	Teaching/Learning Activities	Evaluation Criteria
<p>OBJECTIVE 1</p> <p>The student will be able to represent numbers in equivalent forms.</p>	<p>2.1.8.A, 2.1.8.B</p>	<p>Using information gathered from in-class data collection, students will convert fractions, decimals, and/or percents to equivalent forms.</p> <p>Students will use the internet to research distance, time, and temperature in space. They will then convert these very large or very small numbers into scientific notation and vice versa.</p> <p>Students will estimate the square or cube of any whole number then verify their estimate by using a calculator. Students will also find the square or cube root of a perfect square or cube without the use of a calculator.</p> <p>Students will explain verbally and/or in written form how to convert numbers to equivalent forms (fractions, decimals, percents, scientific notation, and square and cube roots).</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 2</p> <p>The student will be able to compare quantities and magnitudes of real numbers.</p>	<p>2.1.8.C; 2.1.8.F; 2.11.8.A</p>	<p>Students will plot integers, fractions, mixed numbers, and decimals on a classroom number line. Students will be asked to support and/or verify their solution by comparing their number to surrounding numbers on the number line.</p> <p>Given a mixed set of integers, fractions, mixed numbers, and decimals, the student will order them from least to greatest.</p> <p>Students will explain verbally and/or in written form how to compare quantities and magnitudes of real numbers.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 3</p> <p>The student will be able to apply number theory concepts to divisibility, greatest common factors, and least common multiples.</p>	<p>2.1.5.G</p>	<p>Students will solve problems, draw conclusions, and make predictions about numbers using the divisibility rules for 2, 3, 5, and 10.</p> <p>Given two or three numbers, the student will find their Greatest Common Factor (GCF) and Least Common Multiple (LCM). Students will also use the GCF and/or LCM of two or three numbers to solve problems.</p> <p>Students will explain verbally and/or in written form the divisibility rules for 2, 3, 5, and 10.</p> <p>Students will explain verbally and/or in written form how to find the GCF and LCM of two or three numbers.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 4</p> <p>The student will be able to use order of operations to simplify expressions and solve equations.</p>	<p>2.1.8.G; 2.2.8.A</p>	<p>Students will simplify expressions using the order of operations. Operations will include addition, subtraction, multiplication, division, exponents, and all grouping symbols.</p> <p>Students will explain verbally and/or in written form how to use the order of operations to simplify expressions and solve equations.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 5</p> <p>The student will be able to set up ratios and proportions to solve rate and percent problems.</p>	<p>2.1.8.D; 2.2.8.B; 2.2.8.C:2.2.8.E; 2.3.8.B; 2.4.8.B; 2.5.8.A; 2.11.8.B</p>	<p>Given real world examples, students will solve for the unknown data by selecting and using a ratio, a proportion, or a percent.</p> <p>Given real word examples, students will solve rate problems involving unit rate, distance, simple interest, etc. Using the provided formula sheet, students will solve the given rate formula for any missing term.</p> <p>Students will explain verbally and/or in written form how to set up and solve ratio, proportion, and percent problems.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 6</p> <p>The student will be able to determine whether an exact answer to a problem is required or whether an estimation technique is sufficient.</p>	<p>2.2.8.F; 2.2.8.G; 2.4.8.D</p>	<p>Students will explain verbally and/or in written form when it is appropriate to round up or round down in estimation.</p> <p>Given an initial example, students will brainstorm real world situations in which an exact answer is required and in which an estimate would be more appropriate. Generated ideas will be displayed for discussion.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 7</p> <p>The student will be able to solve problems using estimation strategies.</p>	<p>2.2.8.D; 2.2.8.G; 2.2.8.H; 2.5.8.A; 2.5.8.C</p>	<p>Using sale flyers, bank and credit card statements, and news magazine graphs and/or charts, students will estimate to solve simple percent problems for the base, percentage, or rate. Estimated percents will be limited to 1%, 10%, 15%, 20%, 25%, 50% and 75%.</p> <p>Students create simple percent word problems that require estimation to solve. Students share their word problems with other students who will estimate and solve.</p> <p>Students will explain verbally and/or in written form how to use estimation strategies in problem solving situations.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 8</p> <p>The student will be able to compute and explain the four basic operations using integers, fractions and/or decimals.</p>	<p>2.2.8.B; 2.4.8.D; 2.5.8.D</p>	<p>Students will add, subtract, multiply, and divide fractions and decimals both with and without the use of a calculator.</p> <p>Given a word problem involving fractions and/or decimals, students will determine what operation (addition, subtraction, multiplication, or division) is appropriate to solve.</p> <p>Students will explain verbally and/or in written form how to add, subtract, multiply, and divide fractions and decimals.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 9</p> <p>The student will be able to convert measurements within the metric and customary systems of measure.</p>	<p>2.3.5.D2.4.8.B; 2.5.8.A</p>	<p>Students will measure height, weight, and liquid capacity using the proper tools and record these measurements in meters, grams, and liters, respectively. Using the provided reference sheet, students will then convert these to equivalent metric measurements (milli, centi, deci, deka, hecto, and kilo).</p> <p>Students will measure height, weight, and liquid capacity using the proper tools and record these measurements in inches, ounces, and cups, respectively. Using the provided reference sheet, students will then convert these to equivalent customary measurements 2 units above or below the original.</p> <p>Students will record the time it takes to complete certain tasks and then convert the time 2 units above or below what is given. For example, students will convert hours to minutes, seconds, days, and months.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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		<p>Students will use reference books and/or the Internet to find the boiling point of water, the freezing point of water, and normal body temperature in both Fahrenheit and Celsius. Students will then use the given formulas to convert back and forth between the two measures.</p> <p>Students will explain verbally and/or in written form how to convert between given metric and customary units of measurement.</p>	

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<p>OBJECTIVE 10</p> <p>The student will be able to determine the measurement of a missing side(s) or angle(s) of a polygon.</p>	<p>2.3.8.C; 2.5.8.D; 2.10.8.B</p>	<p>By means of an exploratory activity students will discover angle measure (given number of sides) or number of sides (given angle measure) of 3 through 8 sided figures.</p> <p>Given two angle measures in a triangle, students will calculate the missing angle without the use of a calculator or reference sheet.</p> <p>Given a drawing of two similar figures, students will use a proportion to solve for the missing length given 2 lengths of one object and one length of the other.</p> <p>Students will explain verbally and/or in written form how to find the missing angles or sides of a given polygon.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 11</p> <p>The student will be able to label, measure and list properties of angles.</p>	<p>2.3.8.C; 2.4.8.B; 2.9.8.B; 2.9.8.E</p>	<p>Students will use a protractor to measure angles up to 180 degrees.</p> <p>Given the definitions, students will identify and construct complementary, supplementary, adjacent, and vertical angles.</p> <p>Given a drawing, students will find the measures of complementary, supplementary, adjacent, and vertical angles.</p> <p>Given the definitions, students will identify and construct corresponding, alternate interior, and alternate exterior angles. Given a drawing, students will find the measures of corresponding, alternate interior, and alternate exterior angles.</p> <p>Students will explain verbally and/or in written form how to measure a given angle using a protractor.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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		Students will explain verbally and/or in written form what it means to be a complementary, supplementary, adjacent, vertical, corresponding, alternate interior, and alternate exterior angle.	

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<p>OBJECTIVE 12</p> <p>The student will be able to determine the perimeter, circumference, area, surface area and/or volume of geometric shapes.</p>	<p>2.3.8.A; 2.3.8.D; 2.4.8.B; 2.5.8.C; 2.9.8.G</p>	<p>Students will develop and use formulas and procedures to find the perimeter, circumference, and area of simple and complex figures present in the classroom. Simple figures will include circles, parallelograms, triangles, and trapezoids. Attention will be paid to appropriate units.</p> <p>Students will identify examples of cubes and rectangular prisms in everyday life. Students will use approximate measures of sides to find the surface area and volume of these figures. A reference sheet will be provided. Attention will be paid to appropriate units.</p> <p>Students will determine whether circumference, perimeter, area, surface area, or volume is the measurement needed to solve for real life situations. Situations will include the amount of water needed to fill an aquarium, the</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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		<p>amount of turf needed to cover a football field, the amount of leather covering a baseball, etc.</p> <p>Students will explain verbally and/or in written form how to find the perimeter, circumference, area, surface area, and volume of a given geometric shape.</p>	

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<p>OBJECTIVE 13</p> <p>The student will be able to construct, interpret, and/or use scale drawings to solve real-world problems.</p>	<p>2.3.8.F; 2.3.8.G; 2.4.8.D; 2.5.8.B</p>	<p>Given a blueprint, map, and/or model sketch, students will find a given length and/or distance by using the scale shown.</p> <p>Given a drawing on the coordinate system, students will enlarge or reduce the drawing by multiplying or dividing the given coordinates by an appropriate factor.</p> <p>Students will explain verbally and/or in written form how to use scale drawings to solve real-world problems.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 14</p> <p>The student will be able to determine how a change in the linear dimension of a figure affects its perimeter, area, and volume.</p>	<p>2.3.8.E; 2.4.8.B; 2.4.8.C</p>	<p>Students will sketch a triangle, a parallelogram, a trapezoid, a circle, a cube, and a rectangular prism using a straight edge and a compass. Students will then assign positive integer values to the dimensions of each figure and calculate perimeter, area or volume. For each drawing, students will create two more drawings: one in which the dimensions are doubled and one in which the dimensions are cut in half. Perimeter, area, and/or volume will be found for each of the new figures, and students will determine how the change in dimension changed these measurements.</p> <p>Students will explain verbally and/or in written form how a change in the length of a side of a figure changes its perimeter, area, and volume.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 15</p> <p>The student will be able to identify, name, and describe properties of triangles, quadrilaterals, circles, pyramids, prisms, spheres, cones, and cylinders.</p>	<p>2.4.8.C; 2.9.8.C; 2.9.8.D; 2.9.8.F; 2.9.8.J; 2.9.8.K</p>	<p>Through an exploratory activity, students will discover the properties of parallelograms, squares, rectangles, trapezoids, and rhombi.</p> <p>Through an exploratory activity, students will discover the properties of right, acute, obtuse, scalene, isosceles, and equilateral triangles.</p> <p>Through an exploratory activity, students will discover the properties of cubes, pyramids, spheres, prisms, cones, and cylinders.</p> <p>Students will explain verbally and/or in written form the properties of triangles, quadrilaterals. Circles, pyramids, and cylinders.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 16</p> <p>The student will be able to use the Pythagorean Theorem to determine the measures of the sides of right triangles.</p>	<p>2.5.8.C; 2.10.8.A</p>	<p>Students will use an Internet activity to explore the proof of the Pythagorean Theorem.</p> <p>Students will use the Pythagorean Theorem to find the missing length of a right triangle and an unknown distance on a coordinate grid.</p> <p>Students will explain verbally and/or in written form how to use the Pythagorean Theorem to find the missing side of a right triangle.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 17</p> <p>The student will be able to describe, analyze and draw translations, reflections, and rotations (90°, 180°, 360°).</p>	<p>2.4.8.B; 2.9.8.H</p>	<p>Students will define in their own words the concepts of reflection, rotation, and translation in reference to 2-dimensional shapes.</p> <p>Students will use graph paper and/or computer software to create rotations, translations, and reflections across the axes of 2-dimensional shapes.</p> <p>Students will identify and label the coordinates of the vertices of a 2-dimensional shape after a rotation, reflection, or translation.</p> <p>Students will explain verbally and/or in written form how to create a rotation, reflection, and/or translation of a two-dimensional shape.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 18</p> <p>The student will be able to plot and identify ordered pairs on a coordinate plane.</p>	<p>2.5.8.C; 2.8.5.H</p>	<p>Students will plot and/or identify a set of ordered pairs on a coordinate plane.</p> <p>Given a figure, students will find the ordered pair of the unlabeled vertex.</p> <p>Students will explain verbally and/or in written form how to plot ordered pairs on a coordinate plane.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 19</p> <p>The student will be able to analyze, extend, and describe patterns or functions.</p>	<p>2.4.8.B; 2.5.8.A; 2.5.8.C; 2.8.8.A; 2.8.8.B; 2.8.8.D; 2.8.8.G; 2.11.8.C</p>	<p>Students will carry out a numeric or algebraic pattern to at least three places. The patterns can include up to two operations, squares, and square roots.</p> <p>Given a table and/or a rule, students will find up to three missing elements in a numeric, geometric, or graphic pattern, or a function.</p> <p>Given a list, a chart, or an input-output table, students will state the rule of the expressed function, either in words or equation form.</p> <p>Students will explain verbally and/or in written form how to solve a pattern or a function for a missing value.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 20</p> <p>The student will select and use a strategy to simplify expressions, solve equations or inequalities, and check the solution for accuracy.</p>	<p>2.1.8.E; 2.4.8.C; 2.5.8.C; 2.8.8.C; 2.8.8.E; 2.8.8.F; 2.8.8.J</p>	<p>Students will solve one or two step equations and/or inequalities for the missing variable. Expressions will not include absolute value.</p> <p>Students will substitute their solution into the given equation or inequality and simplify in order to verify the accuracy of their results.</p> <p>Students will replace a variable with a number value to determine the value of a given equation or inequality.</p> <p>Students will explain verbally and/or in written form how to solve a one or two step equation and/or inequality for the missing variable.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 21</p> <p>The student will be able to create and interpret expressions, equations, or inequalities that model problem situations.</p>	<p>2.4.8.B; 2.5.8.A; 2.5.8.C; 2.8.8.C 2.8.8.E</p>	<p>Given a real life situation involving cost, profit, weight, etc., students will translate the written words into a numeric/algebraic expression. Situations requiring an equation will include up to two variables while those requiring an inequality will have only one.</p> <p>Given a real life situation involving cost, profit, weight, etc., students will translate the situation into an equation or inequality, solve or substitute for the variable, and substitute the solution to verify accuracy of results.</p> <p>Students will explain verbally and/or in written form three real-world situations that can be translated into an equation or inequality.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 22</p> <p>The student will be able to represent relationships with tables or graphs on the coordinate plane.</p>	<p>2.4.8.B; 2.5.8.C; 2.8.8.C; 2.8.8.H; 2.8.8.I</p>	<p>Given an x/y table of integers, students will graph the represented function on the coordinate plane.</p> <p>Given the graph of a function on the coordinate plane, students will match it to its corresponding x/y table of integers.</p> <p>Given a linear equation in slope-intercept form, students will match it to its corresponding x/y table of integers.</p> <p>Given an inequality, students will match it to its corresponding graph on an integer number line.</p> <p>Students will explain verbally and/or in written form how to graph a function on the coordinate plane when given an x/y table of values.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 23</p> <p>The student will be able to display and interpret data in tables, charts, graphs, etc.</p>	<p>2.5.8.B; 2.6.5.A; 2.6.8.D; 2.6.8.E; 2.7.8.D; 2.6.8.F; 2.6.8.G</p>	<p>Given data, students will determine the correct graphical representation (bar graph, histogram, circle graph, scatter plot, line graph, etc.).</p> <p>Given data, students will display it graphically (bar graph, histogram, circle graph, scatter plot, lien graph, etc.) Completed graph will include a title, labels, a scale, and a key, if appropriate.</p> <p>Students will use graphs to interpret data and draw conclusions.</p> <p>Students will use stem-and-leaf plots and box-and-whisker plots to interpret data and draw conclusions.</p> <p>Students will explain verbally and/or in written form the properties of a bar graph, histogram, circle graph, scatter plot, and lien graph.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 24</p> <p>The student will be able to describe, compare, and contrast different plots of data using measures of central tendency.</p>	<p>2.4.8.B; 2.5.8.B; 2.5.8.C; 2.6.8.A</p>	<p>Student will compute the mean, median, mode, range, and quartiles of a given set of data.</p> <p>Student will determine which measure of central tendency best represents the given data.</p> <p>Students will perform a hands-on experiment within the classroom, record the results, use the results to calculate measures of central tendency, and use these measures to draw conclusions about the experiment.</p> <p>Students will explain verbally and/or in written form the meaning of the terms mean, median, mode, range, and quartile.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 25</p> <p>The student will be able to calculate the probability of an event.</p>	<p>2.4.8.B; 2.5.8.A; 2.5.8.C; 2.7.8.E</p>	<p>Students will survey their peers within the classroom and use these results to determine the probability of mutually exclusive and independent events. Probabilities will be expressed as simplified fractions.</p> <p>Students will explain verbally and/or in written form how to calculate the probability of an event.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 26</p> <p>The student will be able to determine the number of combinations and permutations for an event.</p>	<p>2.4.8.B; 2.7.8.A</p>	<p>Students will use an organized list to compute the permutations and/or combinations of a given event that includes no more than four choices.</p> <p>Students will use a calculator to compute the permutations and/or combinations of a given event that includes more than four choices.</p> <p>Students will explain verbally and/or in written form how to find permutations and/or combinations of a specific event.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 27</p> <p>The student will be able draw conclusions, make inferences and evaluate hypotheses based on statistical and data displays.</p>	<p>2.4.8.B; 2.5.8.A; 2.5.8.C; 2.6.8.C; 2.7.8.B; 2.7.8.C; 2.7.8.E</p>	<p>Student will create a scatter plot from collected data. Students will then draw a line of best fit and describe the relationship displayed between the two variables as positive, negative, weak, strong, etc.</p> <p>Given a survey or graph, students will make conclusions and predictions based upon the displayed data.</p> <p>Students will explain verbally and/or in written form how surveys and graphs can help a person to make conclusions and predictions about an event.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 28</p> <p>The student will be able to utilize appropriate test taking strategies on tests such as the PSSA.</p>	<p>2.5.8.A; 2.5.8.D</p>	<p>Through out the course, test taking strategies will be taught and practiced. These strategies include 1) how to take a multiple choice test, 2) how to solve word problems using the t-chart strategy, 3) how to identify extraneous information in a problem, 4) how to read and break apart a word problem, 5) how to read and break apart graphs, charts, etc., 6) how to read and dissect questions and directions.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>

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<p>OBJECTIVE 29</p> <p>Students will be able to use writing as a tool to solve mathematical problems.</p>	<p>2.5.8.B; 2.5.8.C</p>	<p>Students will use logs to communicate mathematically with the instructor.</p> <p>Students will use the t-chart strategy to explain steps in answering a question.</p>	<p>Classroom discussions, computer based activities, classroom projects, benchmark tests.</p>