**HAZLETON AREA SCHOOL DISTRICT**



Math Curriculum

Grade 7 Pre-Algebra Algebra Concepts (updated 2023)

|  |  |
| --- | --- |
| **Topic 1:** | Operations of Rational Numbers; Properties of Operations; The Real Number System |
| **Weeks:** | 7 Weeks |
| **PA Standards:** | CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers.  CC.2.1.8.E.1 Distinguish between rational and irrational numbers using their properties.  CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers. |
| **Math Practice**  **Standards:** | (1) Make sense of problems and persevere in solving them; (2) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (4.) Model with mathematics; (5) Use appropriate tools strategically; (6) Attend to precision; (7) Look for and make use of structure; (8) Look for and make sense of regularity in repeated reasoning. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weeks** | **Topic** | **Eligible Content** | **Concepts and Competencies**  **The learner will:** | **Tier 2 & 3 Vocabulary** |
| 3 Weeks | ***Operations of Rational Numbers***   * Model and Compute Using a Number Line * Opposites and the Additive Inverse Property * Apply Properties to Add and Subtract Rational Numbers * Apply Properties to Multiply and Divide Rational Numbers * Apply the Four Operations to Real-World Situations * Decimal Form of Rational Numbers | **M07.A-N.1.1.1** Apply properties of operations to add and subtract rational numbers, including real-world context.  **M07.A-N.1.1.2** Represent addition and subtraction on a horizontal or vertical number line.  **M07.A-N.1.1.3** Apply properties of operations to multiply and divide rational numbers, including real-world contexts; demonstrate that the decimal form of a rational number terminates or eventually repeats. | * Adding and subtracting on a number line to explain the similarities and differences between the operations. * Use the property of opposites to determine the additive inverse. * Calculate addition and subtraction of rational numbers. * Calculate multiplication and division of rational numbers. * Apply the correct operation to solve real world problems with decimal solutions. * Solve problems and differentiate between terminal and repeating decimal solutions. | Rational Numbers  Sum  Difference  Terminating Decimal  Repeating Decimal  Additive Inverse  Absolute Value  Commutative Property  Associative Property  Non-Zero Divisor  Restriction  Domain  Of  Quantity  Irrational Numbers  Terminating Decimals  Symbols of Inclusion |
| 2 weeks | ***Properties of Operations***   * Add, Subtract, Multiply, and Divide Signed Rational Numbers * Evaluating Expressions Involving Fractions, Decimals, and Whole Numbers | **M07.A-N.1.1.1** Apply properties of operations to add and subtract rational numbers, including real-world context.  **M07.A-N.1.1.2** Represent addition and subtraction on a horizontal or vertical number line.  **M07.A-N.1.1.3** Apply properties of operations to multiply and divide rational numbers, including real-world contexts; demonstrate that the decimal form of a rational number terminates or eventually repeats. | * Apply and extend the properties of operations involving fractions and rational numbers. * Interpret and analyze real world problems involving fractions, decimals, and percent. |  |
| 2 weeks | ***The Real Number System***   * Real Numbers * Rational Numbers * Irrational Numbers | **M08.A-N.1.1.1** Determine whether a number is rational or irrational. For rational numbers, show that the decimal expansion terminates or repeats (limit repeating decimals to thousandths).  **M08.A-N.1.1.2** Convert a terminating or repeating decimal to a rational number (limit repeating decimals to thousandths).  **M08.A-N.1.1.3** Estimate the value of irrational numbers without a calculator (limit whole number radicand to less than 144). Example: √5 is between 2 and 3 but closer to 2.  **M08.A-N.1.1.4** Use rational approximations of irrational numbers to compare and order irrational numbers.  **M08.A-N.1.1.5** Locate/identify rational and irrational numbers at their approximate locations on a number line.  **A1.1.1.1.1** Compare and/or order any real numbers (rational and irrational may be mixed).  **A1.1.1.1.2** Simplify square roots (e.g., √24 = 2√6). | * Develop a logical argument to explain the difference between a rational and irrational number. Cite evidence as to whether a rational number terminates or repeats by showing the decimal expansion. * Classify a number as either rational or irrational and illustrate whether the decimal is terminating or repeating. * Compare estimates of irrational numbers to rational numbers. | Fraction  Complex Fraction  Identity Property of Zero  Integer  Whole Number |

|  |  |
| --- | --- |
| **Topic 2:** | Probability |
| **Weeks:** | 2 Weeks |
| **PA Standards:** | CC.2.4.7.B.3 Investigate chance processes and develop, use, and evaluate probability models. |
| **Math Practice Standards:** | (1) Make sense of problems and persevere in solving them; (2.) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (4.) Model with mathematics; (5) Use appropriate tools strategically.; (6) Attend to precision; (7) Look for and make use of structure; (8) Look for and make sense of regularity in repeated reasoning. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weeks** | **Topic** | **Eligible Content** | **Concepts and Competencies**  **The learner will:** | **Tier 2 & 3 Vocabulary** |
| 2 Weeks | ***Probability***   * Explain Probability as a Number Between 0 and 1 * Calculate Theoretical Probability of Uniform Events * Calculate Theoretical Probability of Non-Uniform Events * Calculate the Experimental Probability of an Event * Represent Sample Spaces in a Variety of Formats * Communicate Visually or Verbally How the Outcomes from 2 Individual Events can be Combined to Represent a Compound Event * Design a Simulation/ Conduct an Experiment to Generate Frequencies for Compound Events | **M07.D-S.3.1.1** Predict or determine whether some outcomes are certain, more likely, less likely, equally likely, or impossible (ie. a probability near 0 indicates an unlikely event, a probability around ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event).  **M07.D-S.3.2.1** Determine the probability of a chance event given relative frequency, Predict the approximate relative frequency given the probability. (Example: When rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times but probably not exactly 200 times.)  **M07.D-S.3.2.2** Find the probability of a simple event, including the probability of a simple event not occurring. (Example: What is the probability of not rolling a 1 on a number cube?)  **M07.D-S.3.2.3** Find probabilities of independent compound events using organized lists, tables, tree diagrams, and simulation. | * Recognize how the fractional probability indicates the likeliness that an event will or will not occur. * Calculate the theoretical probability of uniform events and draw conclusions about relative frequency related to those probabilities. * Calculate the theoretical probability of non-uniform events and draw conclusions about relative frequency related to those probabilities. * Calculate the probability of an event based on the results of an experiment and compare the results to the theoretical probability of the same event. * Display outcomes of compound events using tables, lists, graphs, or tree diagrams. * Display the outcomes from 2 individual events using diagrams, tables, or lists and interpret them to find the probability. * Design a simulation/experiment and analyze the results. | Complement  Probability Model  Uniform  Permutation  Independently  Combined Frequency |

|  |  |
| --- | --- |
| **Topic 3:** | Populations and Inferences |
| **Weeks:** | 2 Weeks |
| **PA Standards:** | CC.2.4.7.B.1 Draw inferences about populations based on random sampling concepts.  CC.2.4.7.B.2 Draw informal comparative inferences about two populations.  CC.2.4.7.B.3 Investigate chance processes and develop, use, and evaluate probability models. |
| **Math Practice Standards:** | (1) Make sense of problems and persevere in solving them; (2) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (4) Model with mathematics; (5) Use appropriate tools strategically; (6) Attend to precision; (7) Look for and make use of structure; (8) Look for and make sense of regularity in repeated reasoning. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weeks** | **Topic** | **Eligible Content** | **Concepts and Competencies**  **The learner will:** | **Tier 2 & 3 Vocabulary** |
| 2 Weeks | ***Populations and Inferences***   * Determine if a Sample is Random * Use Data from Random Samples to Make Conclusions About Populations * Use Proportions and the Random Sample to Represent the Entire Population * Compare Measures of Central Tendency | **M07.D-S.1.1.1** Determine whether a sample is a random sample given a real-world situation.  **M07.D-S.1.1.2** Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. (Example 1: Estimate the mean word length in a book by randomly sampling words from the book. Example 2: Predict the winner of a school election based on randomly sampled survey data.)  **M07.D-S.2.1.1** Compare two numerical data distributions using measures of center of visibility. (Example 1: The mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team. This difference is equal to approximately twice the variability (mean absolute deviation) on either team. On a line plot, note the difference between the two distributions of heights.) (Example 2: Decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.) | * Classify samples as random or non-random given a real-world situation. * Draw conclusions about populations from random samples. * Make predictions and inferences about an unknown characteristic of an entire population given data from a sample. * Analyze data from measures of central tendency, including absolute deviation to make generalizations and comparisons about two populations. | Population  Sample  Fallacy  Valid  Invalid  Random Sampling  Mean  Median  Mode  Range  Quartiles  Interquartile Range  Distribution |

|  |  |
| --- | --- |
| **Topic 4:** | Unit Rates and Scale |
| **Weeks:** | 4 weeks |
| **PA Standards:** | CC.2.1.7. D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems. |
| **Math Practice Standards:** | (1) Make sense of problems and persevere in solving them; (2.) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (4.) Model with mathematics; (5) Use appropriate tools strategically.; (6) Attend to precision; (7) Look for and make use of structure; (8) Look for and make sense of regularity in repeated reasoning. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weeks** | **Topics** | **Eligible Content** | **Content and Competences**  **The learner will:** | **Tier 2 and 3 Vocabulary** |
| 2 Weeks | ***Unit Rates***   * Identify Unit Rate * Calculate Unit Rate * Convert numbers between all forms * Determine Equivalency Between Ratios * Write and Solve Proportional Relationships * Proportional Relationships on Tables, Graphs, etc. * Identify Constant of Proportionality on Tables, Graphs, etc. * Apply to Real-World Situations | **M07.A-R.1.1.1** Compute unit rates associated with rations of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. (Example: If a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½ / ¼ miles per hour, equivalently 2 miles per hours.)  **M07.A-R.1.1.2** Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a table, graphing on a coordinate plane and observing whether the graph is a straight line through the origin).  **M07.A-R.1.1.3** Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.  **M07.A-R.1.1.4** Represent proportional relationships by equations. Example: If total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.  **M07.A-R.1.1.5** Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r), where r is the unit rate. | * Interpret graphs, tables, equations, and diagrams to identify patterns that represent slope and unit rate. * Calculate unit rates associated with like and unlike units. * Draw conclusions about proportionality by testing for a constant rate of change in a table or generating a linear graph. * Construct and solve a proportion from scale factors. * Connect concepts of proportionality to real world situations. * Investigate verbal and written descriptions of proportional relationships in order to construct equations and solve multi-step ratio problems. * Analyze points on a graph of a proportional relationship to explain the relationship between x and y. |  |
|  | ***Scale Factor***   * Identify and/or Create a Scale * Solve Problems Involving Scale Factors | **M07.C-G.1.1.1** Solve problems involving scale drawings of geometric figures, including finding length and area. | * Identify the scale of enlargement or reduction between similar figures. |  |
|  | ***Percentages***   * Apply to Real-World Situations * Percent | **M07.B-E.2.1.1** Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. (Example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50 an hour (or 1.1 × $25 = $27.50). | * Use proportional relationships to solve multi-step ratio and percent problems. |  |

|  |  |
| --- | --- |
| **Topic 5:** | Algebraic Expressions and Equations; Solving Linear Equations |
| **Weeks:** | 9 Weeks |
| **PA Standards:** | CC.2.2.7.B.1 Apply properties of operations to generate equivalent expressions.  CC.2.2.7.B.3 Model and solve real world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.  CC.2.2.8.B.3 Analyze and solve linear equations and pairs of simultaneous linear equations. |
| **Math Practice Standards:** | (1) Make sense of problems and persevere in solving them; (2.) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (4.) Model with mathematics; (5) Use appropriate tools strategically.; (6) Attend to precision; (7) Look for and make use of structure; (8) Look for and make sense of regularity in repeated reasoning. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weeks** | **Topic** | **Eligible Content** | **Concepts and Competencies**  **The learner will:** | **Tier 2 & 3 Vocabulary** |
| 2 Weeks | ***Algebraic Expressions***   * Rewrite Expressions in Equivalent Forms * Recognize and Identify Multiple Representations for an Expression and Equation | **M07.B-E.1.1.1** Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. (Example 1: The expression 1/2 • (x + 6) is equivalent to 1/2 • x + 3.) (Example 2: The expression 5.3 – y + 4.2 is equivalent to 9.5 – y (or –y + 9.5).) (Example 3: The expression 4w – 10 is equivalent to 2(2w – 5).) | * Analyze expressions using the properties of operations and create an equivalent expression. * Evaluate and match multiple representations of expressions and equations applying the properties of operations. |  |
| 5 Weeks | ***Equations***   * Write and Solve Multi-Step Equations for Real-World Situations Using all Forms of Signed Numbers   ***Solving Linear Equations***   * Write and Solve Linear Equations * Solving Multi-Step Linear Equations * Apply Estimation Strategies to Verify the Answers to Word Problems * Interpret the Meaning of a Solution Based on the Context of the Problem | **M07.B-E.2.1.1** Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. (Example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50 an hour (or 1.1 × $25 = $27.50).)  **M07.B-E.2.2.1** Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. (Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?)  **M08.B-E.3.1.1** Write and identify 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).  **M08.B-E.3.1.2** Solve linear equations that have rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.  **M07.B-E.2.3.1** Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem. (Example: If you want to place a towel bar that is 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.)  **A.1.1.1.4.1** Use estimation to solve problems. | * Create and calculate equations for real world situations using all forms of rational numbers. * Create, solve, and classify linear equations including combining like terms or the distributive property by number of solution (1, infinite, or none). * Create, solve, and classify linear equations or inequalities including combining like terms and the distributive property by number of solutions (1, infinite, or none). * Calculate real world problems following the order of operations using expressions, equations and inequalities and connect the results to equivalent forms. * Estimate solutions of real-world problems and check for accuracy. * Make inferences about reasonableness of solutions based upon the context of the problem. | Variable  Constant  Coefficient  Multiplicative  Inverses  Properties of Equality |
| 2 weeks | ***Inequalities***   * Write and Solve Inequalities for Real-World Situations with Special Attention Given to the Order of Operations * Graph the Solutions for Inequalities * Apply Estimation Strategies to Verify the Answers to Word Problems * Interpret the Meaning of a Solution Based on the Context of the Problem | **M07.B-E.2.2.2** Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers, and graph the solution set of the inequality. (Example: A salesperson is paid $50 per week plus $3 per sale. This week she wants her pay to be at least $100. Write an inequality for the number of sales the salesperson needs to make and describe the solutions.)  **A.1.1.1.4.1** Use estimation to solve problems. | * Create and calculate inequalities for real world situations following the order of operations. * Analyze and solve real world inequality word problems and construct a graph of the solution set. * Calculate real world problems following the order of operations using expressions, equations and inequalities and connect the results to equivalent forms. * Estimate solutions of real-world problems and check for accuracy. * Make inferences about reasonableness of solutions based upon the context of the problem. | Properties of Inequality |

|  |  |
| --- | --- |
| **Topic 6:** | Properties of Angles and Triangles |
| **Weeks:** | 3 Weeks |
| **PA Standards:** | CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.  CC.2.3.7.A.2 Visualize and represent geometric figures and describe the relationships between them. |
| **Math Practice Standards:** | (1) Make sense of problems and persevere in solving them; (2.) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (4.) Model with mathematics; (5) Use appropriate tools strategically.; (6) Attend to precision; (7) Look for and make use of structure; (8) Look for and make sense of regularity in repeated reasoning. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weeks** | **Topic** | **Eligible Content** | **Concepts and Competencies**  **The learner will:** | **Tier 2 & 3 Vocabulary** |
| 2 Weeks | ***Angles***   * Identify and Draw Supplementary, Complementary, Vertical, and Adjacent Angles * Solve Simple Equations for Angle Measures * Define and use angles formed by parallel lines cut by a transversal * Identify and Apply Angle Relationships to solve Multi-Step Real-World Problems | **M07.C-G.2.1.1** Identify and use properties of supplementary, complementary, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure.  **M07.C-G.2.1.2** Identify, and use properties of angles formed when two parallel lines are cut by a transversal (e.g., angles may include alternate interior, alternate exterior, vertical, corresponding). | * Identify and construct supplementary, complementary, vertical, and adjacent angles. * Formulate and solve an equation for unknown angle measures. * Identify and label angles formed by two parallel lines cut by a transversal. * Apply concepts of angle measures to solve multi-step real world problems to find unknown angle measures. | Supplementary  Complementary  Vertical  Straight Angles  Adjacent Angles  Transversal  Corresponding  Alternate Interior  Alternate Exterior |
| 1 Week | ***Triangles***   * Describe and Classify Triangles by Angles * Describe and Classify Triangle by Side Length * Triangle Inequality Theorem | **M07.C-G.1.1.2** Identify or describe the properties of all types of triangles based on angle and side measures.  **M07.C-G.1.1.3** Use and apply the triangle inequality theorem. | * Classify and compare triangles by angle measurement. * Classify and compare triangles by side measurements * Apply the triangle inequality theorem. | Acute  Obtuse  Equiangular  Scalene  Isosceles  Equilateral  Congruent |

|  |  |
| --- | --- |
| **Topic 7:** | 2 Dimensional Figures |
| **Weeks:** | 3 Weeks |
| **PA Standards:** | CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.  CC.2.3.7.A.2 Visualize and represent geometric figures and describe the relationships between them. |
| **Math Practice Standards:** | (1) Make sense of problems and persevere in solving them; (2.) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (4.) Model with mathematics; (5) Use appropriate tools strategically.; (6) Attend to precision; (7) Look for and make use of structure; (8) Look for and make sense of regularity in repeated reasoning. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weeks** | **Topic** | **Eligible Content** | **Concepts and Competencies**  **The learner will:** | **Tier 2 & 3 Vocabulary** |
| 3 Weeks | ***Area and Circumference***   * Find the Area and Circumference of a Circle * Solve Problems involving Area and Circumference of a Circle * Solve Real World Problems Using Area of 2 Dimensional Figures (triangles, quadrilaterals, polygons, cubes, and right prisms) | **M07.C-G.2.2.1** Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). Formulas will be provided.  **M07.C-G.2.2.2** Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided. | * Calculate the area and circumference of a circle given formulas. * Interpret diagrams and real-world objects to determine the appropriate measure and calculate the area or circumference. * Interpret diagrams and real-world objects to determine the appropriate measure and calculate the area of 2 dimensional figures. | Radius  Diameter  Circumference  Perimeter  Parallelogram  Trapezoid  Rhombus  Rectangle  Square  Vertex/Vertices  Base |

|  |  |
| --- | --- |
| **Topic 8:** | 3 Dimensional Figures |
| **Weeks:** | 2 Weeks |
| **PA Standards:** | CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.  CC.2.3.7.A.2 Visualize and represent geometric figures and describe the relationships between them. |
| **Math Practice Standards:** | (1) Make sense of problems and persevere in solving them; (2.) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (4.) Model with mathematics; (5) Use appropriate tools strategically.; (6) Attend to precision; (7) Look for and make use of structure; (8) Look for and make sense of regularity in repeated reasoning. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weeks** | **Topic** | **Eligible Content** | **Concepts and Competencies**  **The learner will:** | **Tier 2 & 3 Vocabulary** |
| 2 Weeks | ***Surface Area and Volume***   * Solve Real World Problems Using Volume, and Surface Area (triangles, quadrilaterals, polygons, cubes, and right prisms) * Describe and Draw the Net for Right Rectangular Prisms and Pyramids | **M07.C-G.2.2.1** Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). Formulas will be provided.  **M07.C-G.2.2.2** Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided.  **M07.C-G.1.1.4** Describe the two-dimensional figures that result from slicing three-dimensional figures. (Example: Describe plane sections of right rectangular prisms and right rectangular pyramids.) | * Interpret diagrams and real-world objects to determine the appropriate measure and calculate the volume and surface area of 3 dimensional figures. * Draw and identify the net for right rectangular prisms, and pyramids. | Radius  Diameter  Circumference  Perimeter  Parallelogram  Trapezoid  Rhombus  Rectangle  Square  Faces  Vertex/Vertices  Edges  Lateral Sides  Bases  Plane  Composite  Figure |

|  |  |
| --- | --- |
| **Topic 9:** | Functions |
| **Weeks:** | Material after the PSSAs |
| **PA Standards:** | CC.2.2.8.C.1 Define, evaluate, and compare functions. |
| **Math Practice Standards:** | (1) Make sense of problems and persevere in solving them; (2.) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (4.) Model with mathematics; (5) Use appropriate tools strategically.; (6) Attend to precision; (7) Look for and make use of structure; (8) Look for and make sense of regularity in repeated reasoning. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weeks** | **Topic** | **Eligible Content** | **Concepts and Competencies**  **The learner will:** | **Tier 2 & 3 Vocabulary** |
|  | ***Functions***   * Define and Understand a Function * Represent Functions Algebraically, Graphically and Numerically * Compare Properties of Two Functions | **M08.B-F.1.1.1** Determine whether a relation is a function.  **M08.B-F.1.1.2** Compare properties of two functions, each represented in a different way (i.e., algebraically, graphically, numerically in tables, or by verbal descriptions). 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.  **M08.B-F.1.1.3** 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.  **A1.1.2.1.1** Write, solve and/or apply a linear equation (including problem situations).  **A1.2.1.1.2** Determine if a relation is a function given a set of points or a graph.  **A1.2.1.2.1** Create, interpret and/or use the equation, graph or table of a linear function.  **A1.2.1.2.2** Translate from one representation of a linear function to another (graph, table and equation). | * Recognize or illustrate if a relation is also a function by assessing domain and range. * Create various representations of functions using tables, graphs, or verbal descriptions. * Compare two functions represented in different ways by analyzing their intercepts and rates of change. | Domain  Range  Relation |

|  |  |
| --- | --- |
| **Topic 10:** | Simplifying and Ordering Real Numbers |
| **Weeks:** | Material after the PSSAs |
| **PA Standards:** | CC.2.1.8.E.1 Distinguish between rational and irrational numbers using their properties.  CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers.  CC.2.2.8.B.1 Apply concepts of radicals and integer exponents to generate equivalent expressions. |
| **Math Practice Standards:** | (1) Make sense of problems and persevere in solving them; (2) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (4) Model with mathematics; (5) Use appropriate tools strategically; (6) Attend to precision; (7) Look for and make use of structure (8) Look for and make sense of regularity in repeated reasoning. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weeks** | **Topic** | **Eligible Content** | **Concepts and Competencies**  **The learner will:** | **Tier 2 & 3 Vocabulary** |
|  | ***Simplifying and Ordering Real Numbers***   * Simplifying Rational and Irrational Numbers to Decimal Form | **M08.A-N.1.1.1** Determine whether a number is rational or irrational. For rational numbers, show that the decimal expansion terminates or repeats (limit repeating to the thousandths).  **M08.A-N.1.1.2** Convert a terminating or repeating decimal to a rational number (limit repeating decimals to thousandths).  **A1.1.1.1.1** Compare and/or order any real numbers (rational and irrational may be mixed).  **A1.1.1.1.2** Simplify square roots (e.g., √24 = 2√6).  **M08.A-N.1.1.3** Estimate the value of irrational numbers without a calculator (limit whole number radicand to less than 144). Example: √5 is between 2 and 3 but closer to 2.  **M08.A-N.1.1.4** Use rational approximations of irrational numbers to compare and order irrational numbers.  **M08.A-N.1.1.5** Locate/identify rational and irrational numbers at their approximate locations on a number line. | * Convert and simplify terminating and repeating decimals into rational numbers without use of a calculator. | Perfect Square |
|  | ***Simplifying and Ordering Real Numbers***   * Laws of Exponents * Working with Roots and Radicals * Order and Compare Rational and Irrational Numbers * Apply and Interpret Using Scientific Notation | **M08.B-E.1.1.1** Apply one or more properties of integer exponents to generate equivalent numerical expressions without a calculator (with final answers expressed in exponential form with positive exponents). Properties will be provided. Example: 3^12 x 3^-15 = 3^-3 = 1/(3^3)  **M08.B-E.1.1.2** 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 perfect squares (up to and including 12^2) and cube roots of perfect cubes (up to and including 5^3) without a calculator. Example: If x^2 = 25 then x = ±√25.  **M08.B-E.1.1.3** Estimate very large or very small quantities by using numbers expressed in the form of a single digit times an integer power of 10 and express how many times larger or smaller one number is than another. 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 than the United States’ population.  **M08.B-E.1.1.4** Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Express answers in scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology (e.g., interpret 4.7EE9 displayed on a calculator as 4.7 × 10^9).  **A1.1.1.3.1** Simplify/evaluate expressions involving properties/laws of exponents, roots and/or absolute value to solve problems (exponents should be integers from -10 to 10). | * Apply properties of exponents to create equivalent expressions without use of a calculator. * All students will compute perfect square and cube roots without use of a calculator. * All students will use estimates of irrational numbers to compare and order irrational and rational numbers * All students will perform operations involving scientific notation to interpret extreme quantities. | Number Line  Scientific Notation |