**HAZLETON AREA SCHOOL DISTRICT**



Math Curriculum

Grade 7 Pre-Algebra

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| **Topic 1:** | Operations of Rational Numbers; Properties of Operations  |
| **Weeks:** |  5 Weeks |
| **PA Standards:** | CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with 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. |

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| **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 NumbersSumDifferenceTerminating DecimalRepeating DecimalAdditive InverseAbsolute ValueCommutative PropertyAssociative PropertyNon-Zero DivisorRestrictionDomainOfQuantityIrrational NumbersTerminating Decimals |
|  | ***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.
 | Symbols of Inclusion |

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| **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. |

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| **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 ModelUniform PermutationIndependentlyCombined Frequency |

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| **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.  |
| **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. |

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| **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.
 | PopulationSampleFallacyValidInvalidRandom SamplingMeanMedianModeRangeQuartilesInterquartile RangeDistribution |

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| **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. 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.2.3.7.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. |

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| **Weeks** | **Topic** | **Eligible Content** | **Concepts and Competencies****The learner will:** | **Tier 2 & 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.
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| 1 week | ***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.
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| 1 week | ***Percentages**** Apply to Real-World Situations
* Percent
 | **M07.A-R.1.1.6** Use proportional relationships to solve multi-step ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease.**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.
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| **Topic 5:** | Algebraic Expressions and Equations |
| **Weeks:** | 6 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. |
| **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. |

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| **Weeks** | **Topic** | **Eligible Content** | **Concepts and Competencies****The learner will:** | **Tier 2 & 3 Vocabulary** |
| 2Weeks | ***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.
 | Variable ConstantCoefficientMultiplicative Inverses |
| 4Weeks | ***Equations & Inequalities**** Write and Solve Multi-Step Equations for Real-World Situations Using all Forms of Signed Numbers
* 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.2.1.1** 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?)**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.)**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 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 EqualityProperties of Inequality |

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| **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. |

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| **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.
 | SupplementaryComplementaryVerticalStraight AnglesAdjacent AnglesTransversalCorrespondingAlternate InteriorAlternate Exterior |
| 1 Week | * 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.
 | AcuteObtuseEquiangularScaleneIsoscelesEquilateralCongruent |

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| **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. |

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| **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.
 | RadiusDiameterCircumferencePerimeterParallelogramTrapezoidRhombusRectangleSquareVertex/VerticesBase |

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| **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. |

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| **Weeks** | **Topic** | **Eligible Content**  | **Concepts and Competencies****The learner will:** | **Tier 2 & 3 Vocabulary** |
| 2Weeks | ***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.
 | RadiusDiameterCircumferencePerimeterParallelogramTrapezoidRhombusRectangleSquareFacesVertex/VerticesEdgesLateral SidesBasesPlaneCompositeFigure |