Interactive Mathematics Program Curriculum Framework

School: __The Delaware MET_________ Curricular Tool: _IMP_________ Grade or Course _Year 1 (grade 9)

Standards Alignment	Unit Concepts / Big Ideas from *IMP*	Essential Questions	Assessments
Unit One: Patterns **Timeline: 13 days**			
Interpret expressions that represent a quantity in terms of its context. **CC.A-SSE.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$. **CC.F-IF.1** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by* $f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1)$ *for* $n \geq 1$. **CC.F-IF.3** Write a function that describes a relationship between two quantities. **CC.F-BF.1** Determine an explicit expression, a recursive process, or steps for calculation from a context. **CC.F-BF.1a** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. **CC.F-BF.2** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.**CC.G-CO.1**	Patterns emphasizes extended, open-ended exploration and the search for patterns. Important mathematics introduced or reviewed in Patterns includes In-Out tables, functions, variables, positive and negative numbers, and basic geometry concepts related to polygons. Proof, another major theme, is developed as part of the larger theme of reasoning and explaining. Students' ability to create and understand proofs will develop over their four years in IMP; their work in this unit is an important start. This unit focuses on several mathematical ideas: • Finding, analyzing, and generalizing geometric and numeric patterns • Analyzing and creating In-Out tables • Using variables in a variety of ways, including to express generalizations • Developing and using general principles for working with variables, including the distributive property • Working with order-of-operations rules for arithmetic • Using a concrete model to understand and do arithmetic with positive and negative integers • Applying algebraic ideas, including In-Out tables, in geometric settings • Developing proofs concerning consecutive sums and other topics	Can students use variables and algebraic expressions to represent concrete situations, generalize results, and describe functions? Can students use different representations of functions—symbolic, graphical, situational, and numerical—and understanding the connections between these representations? Can students use function notation? Can students model, and computing with signed numbers? Can students solve equations using trial and error?	All assessments are listed at the end of the curriculum map.

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Unit Two: Game of Pig **Timeline: 17 days**			
Represent data with plots on the real number line (dot plots, histograms, and box plots). **CC.S-ID.1** Distinguish between correlation and causation. **CC.S-ID.9** Decide if a specified model is consistent with results from a given data-generating process, e.g. using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?* **CC.S-IC.2** Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). **CC.S-CP.1** Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. **CC.S-CP.2** Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. **CC.S-CP.3** Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A and interpret the answer in terms of the model. **CC.S-CP.6** *Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.* **CC.S-CP.7** *– supplementary lesson is being developed by the publisher* *Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B),*	As an introduction to the probability concepts and skills needed to analyze the game of Pig, students work on a variety of problems involving chance occurrences. Through these experiences, they develop an understanding of the concept of expected value and learn to calculate expected value using an area model. They also encounter some real-life "games," such as buying insurance and playing the lottery, and discover that in such situations, expected value may not be the sole criterion for making a decision. In the unit activities, students explore these important mathematical ideas: • Learning what constitutes a "complete strategy" for a game and developing and analyzing strategies • Calculating probabilities as fractions, decimals, and percents by emphasizing equally likely outcomes and by constructing mathematical models, including area models and tree diagrams • Determining whether events are independent • Using the idea of "in the long run" to develop the concept of expected value and calculating and interpreting expected values • Solving problems involving conditional probability • Making and interpreting frequency bar graphs • Using simulations to estimate probabilities and compare strategies • Comparing the theoretical analysis of a	Can students apply basic methods for calculating probabilities? Can students construct area models and tree diagrams? Can students distinguish between theoretical and experimental probabilities? Can students plan and carry out simulations? Can students collect and analyze data? Can students construct frequency bar graphs? Can students calculate, and interpret expected value? Can students apply the concept of expected value to real-world situations?	All assessments are listed at the end of the curriculum map.

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and interpret the answer in terms of the model. **CC.S-CP.8** - *unit supplement to be developed* Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions. **CC.S-MD.1** Calculate the expected value of a random variable; interpret it as the mean of the probability distribution. **CC.S-MD.2** Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.* **CC.S-MD.3** Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. **CC.S-MD.5** Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.* **CC.S-MD.5a** Evaluate and compare strategies on the basis of expected values. *For example, compare a high-deductible versus a low deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.* **CC.S-MD.5b** Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). **CC.S-MD.6** Analyze decisions and strategies using probability concepts (e.g. product testing, medical testing, pulling a hockey goalie at the end of a game). **CC.S-MD.7**	situation with experimental results • Examining how the number of trials in a simulation affects the results		

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Unit Three: The Overland Trail **Timeline: 18 days**			
Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **CC.N-Q.1** Define appropriate quantities for the purpose of descriptive modeling. **CC.N-Q.2** Interpret parts of an expression, such as terms, factors, and coefficients. **CC.A-SSE.1a** Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.* **CC.A-SSE.2** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. **CC.A-SSE.3** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* **CC.A-CED.1** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. **CC.A-REI.1** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. **CC.A-REI.3** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). **CC.A-**	Building on students' work in *Patterns*, this unit develops the central mathematical idea of functions and their representations. Students will move among the following four "faces" of functions: situations, graphs, tables and rules. The focus of this unit is on linear functions. Students will use starting values and rate of change to characterize linear functions, build In-Out tables, draw graphs, and write equations to represent specific contexts. They will use tables, graphs, and symbols to solve linear equations and systems of linear equations. They will fit lines to real data and use graphs and symbols representing these lines to solve problems in the context of the unit. The main concepts and skills that students will encounter and practice during the course of this unit can be summarized by category. **Constraints and Decision Making** • Creating examples that fit a set of constraints • Finding numbers that fit several conditions • Using tables of information and lines of best fit to make predictions and estimates • Working with mean and median **Algorithms, Variables, and Notation** • Strengthening understanding of the distributive property • Developing numeric algorithms for	Can students interpret graphs and use graphs to represent situations? Can students relate graphs to their equations, with emphasis on linear relationships? Can students solve pairs of linear equations by graphing? Can students fit equations to data, both with and without graphing calculators? Can students develop and use principles for equivalent expressions, including the distributive property? Can students use the distributive property? Can students apply principles for equivalent equations to solve equations? Can students solve linear equations in one variable? Do students understand relationships between the algebraic expression defining a linear function and the graph of that function?	All assessments are listed at the end of the curriculum map.

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REI.10 Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. **CC.A-REI.11** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **CC.F-IF.2** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*. **CC.F-IF.4** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.* **CC.F-IF.5** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. **CC.F-IF.6** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. **CC.F-IF.7**	problem situations • Expressing algorithms in words and symbols • Interpreting algebraic expressions in words using summary phrases • Developing meaningful algebraic expressions **Basics of Graphing** • Reviewing the coordinate system • Interpreting graphs intuitively and using graphs intuitively to represent situations • Making graphs from tabular information • Quantifying graphs with appropriate scales • Using graphs to represent two-variable equations and data sets • Using multiple representations—graphs, tables, and algebraic relationships—to describe situations **Linear Equations, Graphs, and Situations** • Finding and interpreting lines of best fit intuitively • Seeing the role of constant rate in linear situations • Using rates and starting values, or other data points, to create equations for straight lines • Laying the groundwork for the concept of slope • Using the point of intersection of two graphs to find values that satisfies two conditions • Solving linear equations for one variable in terms of another • Solving problems involving two linear conditions		

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Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. **CC.F-IF.7b** Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. **CC.F-LE.1a** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. **CC.F-LE.1b** Interpret the parameters in a linear or exponential function in terms of a context. **CC.F-LE.5** Represent data on two quantitative variables on a scatter plot and describe how the variables are related. **CC.S-ID.6** Use a model function fitted to the data to solve problems in the context of the data. *Use given model functions or choose a function suggested by the context. Emphasize linear and exponential models.* **CC.S-ID.6a** *Informally assess the fit of a model function by plotting and analyzing residuals.* **CC.S-ID.6b** – *unit supplement to be developed* Fit a linear function for scatter plots that suggest a linear association. **CC.S-ID.6c** Interpret the slope (rate of change) and the intercept (constant term) of a linear fit in the context of the data. **CC.S-ID.7** *Compute (using technology) and interpret the correlation coefficient of a linear fit.* ***CC.S-ID.8*** *– supplementary lesson is being developed by the publisher*	• Solving linear equations in one variable **Graphs and Technology** • Making and interpreting graphs on a graphing calculator • Using the zoom and trace features to get information from a graphing calculator		

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Unit Four: The Pit and the Pendulum **Timeline: 18 day (90 minute blocks)**			
Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **CC.N-Q.3** Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.* **CC.A-SSE.1b** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. **CC.F-IF.7** Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. **CC.F-IF.7b** Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. **CC.F-BF.3** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two inputoutput pairs (include reading these from a table). **CC.F-LE.2** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. **CC.S-ID.2** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). **CC.S-ID.3**	This unit draws on and extends students' work in the first three units. It blends scientific experiments with the statistical concepts of normal distribution and standard deviation and the algebra of functions and graphs. The main concepts and skills that students will encounter and practice during the course of this unit are summarized below. References to graphing calculators should be understood to include other technology that might be available. **Experiments and Data** • Planning and performing controlled scientific experiments • Working with the concept of period • Recognizing and accommodating for the phenomenon of measurement variation • Collecting and analyzing data • Expressing experimental results and other data using frequency bar graphs **Statistics** • Recognizing the normal distribution as a model for certain kinds of data • Making area estimates to understand the normal distribution • Developing concepts of data spread, especially standard deviation • Working with symmetry and concavity in connection with the normal distribution and standard deviation • Applying standard deviation and the normal distribution in problem contexts • Distinguishing between population standard deviation and sample • Calculating the mean and standard deviation of data sets, both by hand and	• Can students describe normal distributions and their properties? • Can students use mean and standard deviation? • Can students use normal distribution, mean, and standard deviation?	All assessments are listed at the end of the curriculum map.

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Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets and tables to estimate areas under the normal curve. **CC.S-ID.4** Understand that statistics is a process for making inferences about population parameters based on a random sample from that population. **CC.S-IC.1** Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the United States and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?* **CC.S-MD.4**	with calculators • Using standard deviation to decide whether a variation in experimental results is significant **Functions and Graphs** • Using function notation • Using graphing calculators to explore the graphs of various functions • Fitting a function to data using a graphing calculator • Making predictions based on curve-fitting		
Unit Five: Shadows **Timeline: 17 days**			
Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* **CC.A-CED.4** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.**CC.G-CO.1** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a rigid motion on a figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. **CC.G-CO.6** Explain using rigid motions the meaning of congruence for triangles as the equality of all corresponding pairs of sides and all corresponding pairs of angles. **CC.G-CO.7**	The concept of similarity is the central theme of this unit. Through this concept, students explore the following important ideas from geometry and algebra. **Similarity and Congruence** • Developing intuitive ideas about the meaning of "same shape" and learning the formal definitions of similar and congruent • Discovering the special properties of triangles in connection with similarity, as well as other features of triangles as special polygons • Understanding the role of similarity in defining the trigonometric functions of sine, cosine and tangent **Proportional Reasoning and the Algebra of Proportions** • Understanding the meaning of	Do students understand the meaning of angles and angle measurement? Can students apply the relationships among angles of polygons, including angle-sum formulas? Can students apply criteria for similarity and congruence? Can students use properties of similar polygons to solve real-world problems? Can students use similarity to define right-triangle trigonometric functions? Can students apply right-	All assessments are listed at the end of the curriculum map.

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Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence. **CC.G-CO.8** Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.* **CC.G-CO.9** Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.* **CC.G-CO.10** – *supplementary lessons are being developed by the publisher to cover theorems not already included in the curriculum.* Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other and conversely, rectangle are parallelograms with congruent diagonals.* **CC.G-CO.11** – *supplementary lessons are being developed by the publisher to cover theorems not already included in the curriculum.* Verify experimentally the properties of dilations: A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. **CC.G-SRT.1a** Verify experimentally the properties of dilations: The dilation of a line segment is longer or shorter in the ratio given by the scale factor. **CC.G-SRT.1b** Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar;	proportionality in connection with similarity • Developing equations of proportionality from situations involving similar figures • Understanding the role of proportionality in nongeometric situations • Developing techniques for solving equations involving fractional expressions **Polygons and Angles** • Developing angle sum formulas for triangles and other polygons • Discovering the properties of angles formed by a transversal across parallel lines • Discovering the triangle inequality and investigating its extension to polygons **Logical Reasoning and Proof** • Working with the concept of counterexample in understanding the criteria for similarity • Proving conjectures about vertical and polygon angle sums • Understanding the role of the parallel postulate in proofs **Right Triangles and Trigonometry** • Learning standard terminology for triangles, including hypotenuse, leg, opposite side, and adjacent side • Learning the right triangle definitions of *sine, cosine,* and *tangent* • Using sine, cosine, and tangent to solve real-world problems **Experiments and Data Analysis** • Planning and carrying out controlled experiments • Collecting and analyzing data	triangle trigonometry to real-world problems? Do students understand the meaning of angles and their measurement? Do students recognize relationships among angles of polygons, including angle-sum formulas? Can students define and apply properties of similarity and congruence? Can students use properties of similar polygons to solve real-world problems? Can students use similarity to define right-triangle trigonometric functions? Can students apply right-triangle trigonometry to real-world problems?	

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explain using similarity transformations the meaning of similarity for triangles as the equality of all pairs of angles and the proportionality of all pairs of sides. **CC.G-SRT.2** Use the properties of similarity transformations to establish the AA criterion for similarity of triangles. **CC.G-SRT.3** Prove theorems about triangles using similarity transformations. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean theorem proved using triangle similarity.* **CC.G-SRT.4** Use triangle congruence and similarity criteria to solve problems and to prove relationships in geometric figures. **CC.G-SRT.5** Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. **CC.G-SRT.6** Explain and use the relationship between the sine and cosine of complementary angles. **CC.G-SRT.7** Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **CC.G-SRT.8** Find the point on a directed line segment between two given points that divide the segment in a given ratio. **CC.G-GPE.6**	• Identifying key features in graphs of data **Mathematical Modeling** • Using a geometric diagram to represent a real-world situation • Using scale drawings to solve problems • Applying properties of similar triangles to real-world situations • Exploring how models provide insight in a variety of situations		

Assessment Opportunities in this Unit:

End-of-Unit Assessments:
Each unit concludes with in-class and take-home assessments. The in-class assessment is intentionally short so that time pressures will not affect student performance. Students may use graphing calculators and their notes from previous work when they take the assessments.

On-Going Assessments:
Ongoing assessment includes the daily work of determining how well students understand key ideas and what level of achievement they have attained in acquiring key skills. Students' written and oral work provides many opportunities for teachers to gather this information.

- *Presentations on Calculator Exploration:* These presentations will give you information on how comfortable students are with calculators and open-ended investigation.

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- *Pulling Out Rules:* This activity will help you gauge how well students understand the basic ideas of In-Out tables and evaluate their ability in writing rules to describe tables.
- *You're the Chef:* This summary activity will tell you how well students understand the arithmetic of positive and negative integers.
- *Presentations on Consecutive Sums:* These presentations will indicate how students are developing in their ability to conduct independent mathematical investigations.
- *An Angular Summary:* This activity will help you gauge students' understanding of the sum of the angles in a polygon and related formulas.
- *Border Varieties:* This activity will reflect students' understanding of the use of variables.
- *Pig Strategies:* This activity will help you gauge how well students understand the rules of Pig and assess their comfort level with the idea of strategy.
- *0 to 1, or Never to Always:* This activity will illustrate students' grasp of the 0-to-1 scale for probability.
- *Two-Dice Sums and Products:* This activity will show how well students understand and can work with two-dimensional area models.
- *Spinner Give and Take:* This activity can provide a baseline of students' initial understanding of the meaning of "the long run," in preparation for work with expected value.
- *Spins and Draws:* This activity will tell you how well students understand and can work with expected value.
- *A Fair Deal for the Carrier?:* This activity will inform you about students' ability to find probabilities in two-stage situations.
- *Little Pig Strategies:* This activity will tell you how well prepared students are for the detailed analysis of Little Pig.
- *The Best Little Pig:* This activity will inform you of students' grasp of the big picture in the analysis of Little Pig.
- *Creating Families:* This assignment will give you information on how well students can deal with verbal constraints.
- *Laced Travelers:* This activity will tell you whether students can put arithmetic processes into words.
- *Ox Expressions at Home:* This assignment will help you assess how well students understand meaningful algebraic expressions
- *Graph Sketches:* This activity will give you a sense of how well students understand graphs.
- *Who Will Make It?* This activity can help you gauge students' ability to make meaningful inferences from graphs.
- *All Four, One--Linear Functions:* This assignment will give you information about students' understanding of the connections among different ways to represent a situation.
- *Straight Line Reflections:* This activity will give you a sense of how well students understand concepts related to straight-line graphs.
- *More Fair Share for Hired Hands:* This assignment can provide information on student understanding of the connection between graphs and equations.
- *Family Comparisons by Algebra:* This activity will help you evaluate students' ability to represent situations using equations and their facility with solving linear equations.
- *Initial Experiments:* This activity will tell you how well students understand the idea of isolating a single variable.
- *Pulse Analysis:* This assignment will tell you about students' understanding of mean and frequency bar graphs.
- *Kai and Mai Spread Data:* This activity will give you a baseline of information about students' understanding of data spread.
- *Penny Weight Revisited:* This activity will guide you in determining students' intuitive understanding of standard deviation.
- *Pendulum Conclusions:* This assignment will tell you how well students can reason using the concept of standard deviation.
- *Graphing Summary:* This activity will give you information on what students know about the shape of graphs of various functions.
- *Mathematics and Science:* This assignment will give you insight into what students see as the key ideas of the unit.
- *Shadow Data Gathering* and *Working with Shadow Data:* These activities, which ask students to set up and conduct controlled experiments (as in the unit *The Pit and the Pendulum*), will provide evidence of their understanding of the unit problems.
- *Similar Problems:* This assignment will provide evidence of students' ability to write and solve proportions derived from similar figures.
- *Angles and Counterexamples:* This activity will help you assess students' ability to create and solve linear equations derived from a geometric context and their developing understanding of similarity.
- *Angles, Angles, Angles:* This assignment will give you information on students' knowledge of facts about angles created by intersecting lines (including

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transversals of parallel lines) and interior angles of polygons.

- *Mirror Madness:* This activity will tell you whether students can use the reflective property of mirrors along with the concept of similarity to do indirect measurement.
- *A Shadow of a Doubt:* This activity will provide evidence about whether students understand the general solution to the lamp shadow problem.
- *The Tree and the Pendulum:* This assignment will illustrate students' ability to use trigonometry to do indirect measurement.
- *A Bright, Sunny Day:* This activity will provide evidence of students' understanding of the general solution to the sun shadow problem.

NOTE: When developed in Phase II, individual units will better define the assessment tools and demonstrate how they will be used formatively and summative.

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