

Unit Title: “Estimating Fish Population: Geometric and Algebraic Ratios”

Course: Algebra I (Middle School)

Subject Area: Mathematics

Time Frame: 13 days

Standards

Algebra I Standards	Sunshine State Standards Benchmarks	NCEE New Standards
<p>The student will:</p> <p>7.6 Determine the slope of a line when given two points on a line or an equation of the line.</p> <p>9.4 Solve equations involving proportions.</p>	<p>MA.C.3.3.2 The student identifies and plots ordered pairs in all four quadrants of a rectangular coordinate system and applies simple properties of lines.</p> <p><i>Expectations</i> The student:</p> <ul style="list-style-type: none"> • When given an equations or its graph, find ordered-pair solutions. • When given the graph of a line, identifies the slope of the line (including the slope of vertical and horizontal lines). • When given the graph of a linear relationship, determine the x- and y-intercepts of the line. • When given the graph of a linear relationship, applies and explains the properties of lines on a graph. <p>MA.D.1.3.1 The student describes a wide variety of patterns, relationships, and functions through</p>	<p>The student:</p> <p>M3a Discovers, describes, and generalizes patterns, including linear, exponential, and simple quadratic relationships, i.e., those of the form $f(n) = n^2$ or $f(n) = cn^2$, for constant c, including $A = \pi r^2$, and represents them with variables and expressions.</p> <p>M3b Represents relationships with tables, graphs in the coordinate plane, and verbal or symbolic rules.</p> <p>M3c Analyzes tables, graphs, and rules to determine functional relationships.</p> <p>M3d Finds solutions for unknown quantities in linear equations and in simple equations and inequalities.</p> <p>M6g Reads and organizes data on charts and graphs, including scatter plots, bar, line, and circle graphs, and Venn diagrams; calculates mean and median.</p>

	<p>models, such as manipulatives, tables, graphs, expressions, equations, and inequalities.</p> <p><i>Expectations</i> The student:</p> <ul style="list-style-type: none"> • Reads, analyzes, and describes graphs of linear relationships. • Uses variables to represent unknown quantities in real-world problems. • Uses the information provided in a table, graph, or rule to determine if a function is linear and justifies reasoning. • Finds a function rule to describe tables of related input-output variables. • Predicts outcomes based upon function rules. <p>MA.D.2.3.1 The student represents and solves real-world problems graphically, with algebraic expression, equations, and inequalities.</p> <p><i>Expectations</i> The student:</p> <ul style="list-style-type: none"> • Translates verbal expressions and sentences into algebraic expressions, equations, and inequalities. • Translates algebraic expressions, equations, or inequalities representing real-world relationships into verbal expressions or sentences. • Solve single- and multi-step linear equations and inequalities in concrete or abstract form. • Graph linear equations on the coordinate 	
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	<p>plane using tables of values.</p> <ul style="list-style-type: none">• Graphically displays real-world situations represented by algebraic equations or inequalities.• Evaluate algebraic expressions, equations, and inequalities by substituting integral values for variables and simplifying the results.• Simplifies algebraic expressions that represent real-world situations by combining like terms and applying the properties of real numbers.	
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Desired Results

Enduring Understanding	Essential Questions	Knowledge and Skills
<p>Students will understand:</p> <ul style="list-style-type: none"> The concept of rate – how one variable changes with respect to another – is central to representing the relationship between variables and predicting pairs of values that fit the relationship. A linear relationship is one in which there is a constant rate of change between the two variables; the change in y that is associated with a particular change in x will remain the same over the range of the function. 	<ul style="list-style-type: none"> How is a point on a graph related to a table, an equation, or the context? How does a solution to an equation relate to a graph, a table, or the context? What kind of problems can be solved by using mathematical tables and equations? 	<p>Students will know</p> <ul style="list-style-type: none"> Key terms (e.g., coefficient, coordinate pair, linear, linear relationship, point of intersection, rise, run, slope, y-intercept). <p>Students will be able to</p> <ul style="list-style-type: none"> Determine the slope of a line when given two points on a line or an equation of the line. Solve equations involving proportions.

Acceptable Evidence

Performance Tasks	Quizzes, Test, and Work Samples	Observations and Dialogues
<ul style="list-style-type: none"> Exploring Ratios Students use dot paper to explore patterns of similar figures. Students build a working definition of <i>similar</i> in mathematical terms and begin to see connections between geometry and algebra. Enlarging and Reducing Pictures Students deepen their understanding of what it means for two figures to be similar. Students discover the usefulness of similarity and scale factors by solving real-world problems. Each problem focuses on the concept of similarity and determining the scale factor is the key to its solution. Ratios of Perimeters and Areas Students explore the relationship between the areas of similar 	<p>Check-Up 1 Quiz A Check-Up 2 Quiz B Unit Test</p>	<p>Teacher observations of students during work on performance tasks. Accountable talk during work on performance tasks.</p>

Performance Tasks	Quizzes, Test, and Work Samples	Observations and Dialogues
<p>figures. The idea that area does not grow at the same rate as side length when a figure is enlarged so that its shape is preserved is difficult to grasp. Through experiments, students explore what it takes for figures to be similar. The explorations help student build mental images to support their evolving ideas about the relationship between scale factor and area.</p> <ul style="list-style-type: none"> • Similar Triangles Students apply their new knowledge about similarity to triangles to real-world problems. • Estimating Fish Population Students explore comparisons with an emphasis on the use of division for finding decimal or percent rates. The simulation of estimating fish population is a good connection to science and statistics This is a simulation of a procedure used by Fish and Game scientist to estimate the number of fish in a lake at a given time. Each team has a lake (paper sack) full of fish (beans), and a net (a small cup). Students record the total number of tagged fish in the lake, the total number of fish in the sample, and the number of tagged fish in the sample. Using the information student write a proportion and solve for the total number of fish in the lake, 		