Math, 7-8

Communicates clearly and explains reasoning so others can follow how a problem is solved.

: Uses appropriate mathematical language.

: Uses appropriate forms of mathematical representations to present information correctly.

: Moves between different forms of mathematical representations.

: Communicates through lines of reasoning that are complete and coherent.

ALT 1 - Communication Rubric

4 **Highly Proficient**	**3** **Proficient**	**2** **Nearly Proficient**	**1** **Developing**
The student is able to: • consistently use appropriate mathematical language • use appropriate forms of mathematical representation to consistently present information correctly • move effectively between different forms of mathematical representation • communicate through lines of reasoning that are complete, coherent and concise • present work that is consistently organized using a logical structure.	The student is able to: • usually use appropriate mathematical language • usually use appropriate forms of mathematical representation to present information correctly • usually move between different forms of mathematical representation • communicate through lines of reasoning that are complete and coherent • present work that is usually organized using a logical structure.	The student is able to: • use some appropriate mathematical language • use appropriate forms of mathematical representation to present information adequately • communicate through lines of reasoning that are complete • adequately organize information using a logical structure.	

Reasons mathematically to solve problems in real-life contact.

: Identifies the relevant elements of the authentic real-life situation.

: Selects adequate mathematical strategies to model the authentic real-life situation.

: Applies the selected mathematical strategies to reach a valid solution to the authentic real-life situation.

: Explains the degree of accuracy of the solution.

: Explains whether the solution makes sense in the context of the authentic real-life situation.

ALT 2 - Modeling Rubric

4 **Highly Proficient**	**3** **Proficient**	**2** **Nearly Proficient**	**1** **Developing**
The student is able to: • identify the relevant elements of the authentic real-life situation • select appropriate mathe matical strategies to model the authentic real-life situation • apply the selected mathematical strategies to reach a correct solution to the authentic real-life situation • justify the degree of accuracy of the solution • justify whether the solution makes sense in the context of the authentic real-life situation.	The student is able to: • identify the relevant elements of the authentic real-life situation • select adequate mathem atical strategies to model the authentic real-life situation • apply the selected mathematical strategies to reach a valid solution to the authentic real-life situation • explain the degree of accuracy of the solution • explain whether the solution makes sense in the context of the authentic real-life situation.	The student is able to: • identify the relevant elements of the authentic real-life situation • select, with some success, adequate mathematica l strategies to model the authentic real-life situation • apply mathematical strategies to reach a solution to the authentic real-life situation • discuss whether the solution makes sense in the context of the authentic real-life situation.	

Recognizes patterns and describes them as relationships or general rules.

: Selects and applies mathematical problem-solving techniques to correctly identify the pattern.

: Pattern is described as relationship or general rule.

: Verifies the validity of these general rules.

: Conclusions are consistent with the correct findings.

ALT 3 - Patterns Rubric

4 **Highly Proficient**	**3** **Proficient**	**2** **Nearly Proficient**	**1** **Developing**
The student is able to: • select and apply mathematical problem-solving techniques to discover complex patterns • describe patterns as general rules consistent with correct findings • prove, or verify and justify, these general rules.	The student is able to: • Select and apply mathematical problem-solving techniques to correctly identify the pattern. • Pattern is described as a relationship or general rule • Verify the validity of these general rules. • Conclusions are consistent with the correct findings.	The student is able to: • Apply mathematical problem-solving techniques to recognize patterns. • Suggest a relationship or general rule with findings.	

Uses properties of operations, proportional relationships, and fractions to generate expressions and solve equations.

: Applies and extends previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

: Applies and extends previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

: Solves real-world and mathematical problems involving the four operations with rational numbers.

: Computes unit rate associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

: Recognizes and represents proportional relationships between quantities.

: Uses proportional relationships to solve multi-step ratio and percent problems.

: Applies properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

: Understands that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

: Solves multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form using tools strategically. Applies properties of operations; converts between forms as appropriate; and assesses the reasonableness of answers.

: Uses variables to represent quantities in a real-world or mathematical problems, and constructs simple equations and inequalities to solve problems by reasoning about the quantities.

ALT 4 - Expressions and Equations Rubric

4 **Highly Proficient**	**3** **Proficient**	**2** **Nearly Proficient**	**1** **Developing**
• In addition to being proficient on the long-term target, I can demonstrate one or more of the following… • Consistently utilize efficient strategies to accurately solve problems in familiar situations • Apply understanding of long-term learning targets to unfamiliar situations and/or to solve complex problems • Use precise and relevant communication to justify mathematical thinking • Connect knowledge	• Applies and extends previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. • Applies and extends previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. • Solves real-world and mathematical problems involving the four operations with rational numbers. • Computes unit rate associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. • Recognizes and represents	• I am beginning to and occasionally demonstrate proficiency of one or more of the following concepts…	

to other learning targets and/or advanced problem sets.	proportional relationships between quantities. • Uses proportional relationships to solve multistep ratio and percent problems. • Applies properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. • Understands that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. • Solves multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form using tools strategically. • Applies properties of operations; converts between forms as appropriate; and assesses the reasonableness of answers.	

Draws, constructs, and describes geometric figures and relationships between them, and solves problems involving angle measure, area, surface area, and volume.

: Solves problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

: Draws, with a variety of tools, geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

: Describes the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms, and right rectangular pyramids.

: Knows the formulas for the area and circumference of a circle and uses them to solve problems; gives an informal derivation of the relationship between the circumference and the area of a circle.

: Uses facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

: Solves 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.

ALT 5 - Geometric Figures and Measurement Rubric

4 **Highly Proficient**	**3** **Proficient**	**2** **Nearly Proficient**	**1** **Developing**
• In addition to being proficient on the long-term target, I can demonstrate one or more of the following… • Consistently utilize efficient strategies to accurately solve problems in familiar situations • Apply understanding of long-term learning targets to unfamiliar situations and/or to solve complex problems • Use precise and relevant communication to justify mathematical thinking • Connect knowledge to other learning targets and/or advanced problem sets.	• Solves problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. • Draws, with a variety of tools, geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. • Describes the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms, and right rectangular pyramids. • Knows the formulas for the area and circumference of a circle and uses them to solve problems; gives an informal derivation of the relationship between the circumference and the area of a circle. • Uses facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an	• I am beginning to and occasionally demonstrate proficiency of one or more of the following concepts…	

	unknown angle in a figure. • Solves 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.	

Works with expressions and equations using integer exponents.

: Knows and applies the properties of integer exponents to generate equivalent numerical expressions.

: Uses numbers expressed in the form of a single digit times an integer power of 10 to estimate very large and very small quantities, and to express how many times as much one is than the other.

: Performs operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

: Uses scientific notation and choose units of appropriate size for measurements of very large or very small quantities.

: Interprets scientific notation that has been generated by technology.

ALT 6 - Exponents Rubric

4 **Highly Proficient**	**3** **Proficient**	**2** **Nearly Proficient**	**1** **Developing**
• In addition to being proficient on the long-term target, I can demonstrate one or more of the following… • Consistently utilize efficient strategies to accurately solve problems in familiar situations	• Knows and applies the properties of integer exponents to generate equivalent numerical expressions • Uses numbers expressed in the form of a single digit times an integer power of 10 to estimate very large and very small quantities, and to express how many times as much one is than the other.	• I am beginning to and occasionally demonstrate proficiency of one or more of the following concepts…	

• Apply understanding of long-term learning targets to unfamiliar situations and/or to solve complex problems • Use precise and relevant communication to justify mathematical thinking • Connect knowledge to other learning targets and/or advanced problem sets.	• Performs operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. • Uses scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interprets scientific notation that has been generated by technology.	

Analyzes and solves linear equations and systems of linear equations.

: Solves linear equations in one variable.

: Analyzes and solves pairs of simultaneous linear equations.

ALT 7 - Systems Rubric

4 **Highly Proficient**	**3** **Proficient**	**2** **Nearly Proficient**	**1** **Developing**
• In addition to being proficient on the long-term target, I can demonstrate one or more of the following… • Consistently utilize efficient strategies to accurately solve problems in familiar situations • Apply understanding of long-term learning targets to unfamiliar situations and/or to solve complex problems • Use precise and relevant communication to justify mathematical thinking • Connect knowledge to other learning targets and/or	• Solves linear equations in one variable. • Analyzes and solves pairs of simultaneous linear equations	• I am beginning to and occasionally demonstrate proficiency of one or more of the following concepts…	

advanced problem sets.		

Defines, evaluates, compares, and uses linear functions to model relationships between quantities and bivariate data.

: Graphs proportional relationships, interpreting the unit rate as the slope of the graph. Compares two different proportional relationships represented in different ways.

: Uses similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx b for a line intercepting the vertical axis b.

: Understands that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output (function notation not required).

: Compares properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

: Interprets the equation y = mx b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

: Constructs a function to model a linear relationship between two quantities. Determines the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interprets the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

: Describes qualitatively the functional relationship between two quantities by analyzing a graph. Sketch a graph that exhibits the qualitative features that has been described verbally.

: Constructs and interprets scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describes patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

: Knows that straight lines are widely used to model relationships between two quantitative variables.

: Uses the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

: Understands that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table.

: Constructs and interprets a two-way table summarizing data on two categorical variables collected from the same subjects.

: Uses relative frequencies calculated for rows and columns to describe possible association between the two variables.

ALT 8 - Linear Functions and Bivariate Data Rubric

4 **Highly Proficient**	**3** **Proficient**	**2** **Nearly Proficient**	**1** **Developing**
• In addition to being proficient on the long-term target, I can demonstrate one or more of the following… • Consistently utilize efficient strategies to accurately solve problems in familiar situations • Apply understanding of long-term learning targets to unfamiliar situations and/or to solve complex problems • Use precise and relevant communication to justify mathematical thinking • Connect knowledge to other learning targets and/or advanced problem sets.	• Graphs proportional relationships, interpreting the unit rate as the slope of the graph. • Compares two different proportional relationships represented in different ways. • Uses similar triangles to explain why the slope *m* is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation *y=mx* for a line through the origin and the equation *y = mx b* for a line intercepting the vertical axis *b*. • Understands that a function is a rule that assigns to each input exactly one output, the graph of a function is the set of ordered pairs consisting of an input and the corresponding output (function notation is not required). • Compares properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). • Interprets the equation *y = mx b* as defining a linear function,	• I am beginning to and occasionally demonstrate proficiency of one or more of the following concepts…	

	whose graph is a straight line; give examples of functions that are not linear. • Constructs a function to model a linear relationship between two quantities. • Determines the rate of change and initial value of the function from a description of a relationship or from two *(x, y)* values, including reading these from a table or from a graph. • Interprets the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. • Describes qualitatively the functional relationship between two quantities by analyzing a graph • Sketches a graph that exhibits the qualitative features that has been described verbally.	

Understands congruence and similarity using transformational geometry, triangle-angle relationships, and parallel lines cut by transversals.

: Verifies experimentally the properties of rotations, reflections and translations.

: Understands that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; find two congruent figures, describes a sequence that exhibits the congruence between them.

: Describes the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

: Uses informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.

ALT 9 - Geometry Rubric

4 **Highly Proficient**	3 **Proficient**	2 **Nearly Proficient**	1 **Developing**
• In addition to being proficient on the long-term target, I can demonstrate one or more of the following… • Consistently utilize efficient strategies to accurately solve problems in familiar situations • Apply understanding of long-term learning targets to unfamiliar situations and/or to solve complex problems • Use precise and relevant communication to justify mathematical thinking • Connect knowledge to other learning targets and/or advanced problem sets.	• Verifies experimentally the properties of rotations, reflections and translations. • Understands that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; finds two congruent figures, describes a sequence that exhibits the congruence between them. • Describes the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. • Uses informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.	• I am beginning to and occasionally demonstrate proficiency of one or more of the following concepts…	

Understands and applies the Pythagorean Theorem using rational and irrational numbers.

: Knows that numbers that are not rational are called irrational. Understands informally that every number has a decimal expansion.

: Uses rational approximations of irrational numbers to compare the size of irrational numbers, locates them approximately on a number line diagram, and estimates the value of expressions.

: Uses square and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p where p is a positive rational number. Evaluates

square roots of small perfect squares and cube roots of small perfect cubes. Knows that v2 is irrational.

: Explains the proof of the Pythagorean Theorem and its converse.

: Applies the Pythagorean Theorem to determine unknown side lengths in right triangles in the real world and mathematical problems in two and three dimensions.

: Applies the Pythagorean Theorem to find the distance between two points in a coordinate system.

ALT 10 - Pythagorean Theorem Rubric

4 **Highly Proficient**	**3** **Proficient**	**2** **Nearly Proficient**	**1** **Developing**
• In addition to being proficient on the long-term target, I can demonstrate one or more of the following… • Consistently utilize efficient strategies to accurately solve problems in familiar situations • Apply understanding of long-term learning targets to unfamiliar situations and/or to solve complex problems • Use precise and relevant communication to justify mathematical thinking • Connect knowledge to other learning targets and/or advanced problem sets.	• Knows that numbers that are not rational are called irrational. • Understands informally that every number has a decimal expansion. • Uses rational approximations of irrational numbers to compare the size of irrational numbers, locates them approximately on a number line diagram, and estimates the value of expressions. • Uses square and cube roots symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$ where p is a positive rational number. • Evaluates square roots of small perfect squares and cube roots of small perfect cubes. Knows that sqrt(2) is irrational. • Explains the proof of the Pythagorean Theorem and its converse. • Applies the Pythagorean Theorem to determine unknown side lengths in right triangles in the real world and mathematical problems in two	• I am beginning to and occasionally demonstrate proficiency of one or more of the following concepts…	

	and three dimensions. • Applies the Pythagorean Theorem to find the distance between two points in a coordinate system.	