RISE PLD Mathematics Grade 8

PLD	Standard	Below Proficient	Approaching Proficient	Proficient	Highly Proficient
Policy		The Level 1 student is below proficient in applying mathematics knowledge/ skills as specified in the Utah Core State Standards. The student generally performs significantly below the standard for the grade-level/course, is likely able to partially access grade level content and engages with higher order thinking skills with extensive support.	The Level 2 student is approaching proficient in applying mathematics knowledge/skills as specified in the Utah Core State Standards. The student generally performs slightly below the standard for the grade level/course, is able to access grade-level content and engages in higher order thinking skills with some independence and support.	The Level 3 student is proficient in applying mathematics knowledge/skills as specified in the Utah Core State Standards. The student generally performs at the standard for the grade level/course, is able to access grade-level content, and engages in higher order thinking skills with some independence and minimal support.	The Level 4 student is highly proficient in applying mathematics knowledge/ skills as specified in the Utah Core State Standards. The student generally performs significantly above the standard for the grade level/course, is able to access above grade-level content, and engages in higher order thinking skills independently.
Number System					
		The Level 1 Student:	The Level 2 Student:	The Level 3 Student:	The Level 4 Student:
Range	8.NS.1	Identifies square roots of non-square numbers and pi as irrational numbers. Understands that every number has a decimal expansion.	Compares and orders rational and irrational numbers. Identifies irrational decimal expansions as approximations.	Places irrational numbers on a number line.	Explains how to get more precise approximations of square roots.
Range	8.NS.2	Identifies rational or irrational numbers and converts familiar rational numbers with one repeating digit to fraction form.	Identifies rational and irrational numbers and converts less familiar rational numbers to fraction form.	Uses approximations of irrational numbers to estimate the value of an expression.	Notices and explains the patterns that exist when writing rational numbers as fractions.
Range	8.NS.3	Calculates the sum or difference of two radicals. Evaluates the square root of perfect squares and cube root of perfect cubes.	Calculates the product or quotient of two radicals. Simplifies radicals including square roots.	Performs all four operations with radicals. Simplifies radicals including square roots and cube roots.	Performs operations on radicals in real-world and complex mathematical situations.
Expressions and Equations					
		The Level 1 Student:	The Level 2 Student:	The Level 3 Student:	The Level 4 Student:
Range	8.EE.1	Knows the properties of natural number exponents.	Applies the properties of natural number exponents to generate equivalent numerical expressions.	Knows and applies the properties of integer exponents to generate equivalent numerical expressions.	Uses properties of integer exponents to order or evaluate multiple numerical expressions with integer exponents.
Range	8.EE.2	Evaluates square roots of small perfect squares.	Solves mathematical equations (without context) of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number, and the solutions are rational.	Uses 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 and knows that $\sqrt{2}$ is irrational.	Explains how square roots and cube roots relate to each other and to their radicands.
Range	8.EE.3	Uses numbers expressed in the form of a single digit times an integer power of ten.	Uses numbers expressed in the form of a single digit times an integer power of 10 to estimate very small quantities.	Expresses how many times a number written as an integer power of 10 is than another number written as an integer.	Converts between decimal notation and scientific notation and compares numbers written in different notations.

PLD	Standard	Below Proficient	Approaching Proficient	Proficient	Highly Proficient
Range	8.EE.4	Represents very large and very small quantities in scientific notation and use appropriate units.	Multiplies and divides numbers in scientific notation.	Performs operations with numbers expressed in scientific notation, including problems with numbers written in both decimal and scientific notation and interprets scientific notation that has been generated by technology.	Calculates and interprets values written in scientific notation within a context.
Range	8.EE.5	Graphs proportional relationships, interpreting the unit rate as the slope.	Graphs proportional relationships, interpreting the unit rate as the slope and compares two different proportional relationships using the same representation.	Graphs proportional relationships, interpreting the unit rate as the slope of the graph and compares two different proportional relationships represented in different ways.	Generates a representation of a proportional relationship with specific qualities.
Range	8.EE.6	Determines the slope of a line given a graph.	Derives the equation $y = mx$ for a line through the origin.	Recognizes and explains why the slope m is the same between any two distinct on a non-vertical line in the coordinate plane and derives the equation $y = mx + b$ for a line intercepting the vertical axis at b.	Compares and contrasts situations in which similar triangles would and would not yield the same slope.
Range	8.EE.7a 8.EE.7b 8.EE.7c	Solves simple linear equations with integer coefficients.	Solves linear equations with rational coefficients and identifies equations that have one solution, infinitely many solutions, or no solutions.	Solves linear equations and inequalities with rational coefficients and variables on both sides and provides examples of equations that have one solution, infinitely many solutions, or no solutions. Solves single-variable absolute value equations.	Justifies why an equation has one solution, infinitely many solutions, or no solution.
Range	8.EE.8a 8.EE.8b 8.EE.8c	Identifies systems of equations that have one, infinite, or no solutions from graph. Estimates the solution of a system given a graph.	Solves a system of linear equations algebraically, by inspection, and graphically.	Provides examples of systems of equations that have one solution, infinitely many solutions, or no solutions. Creates and utilizes a system of linear equations to solve a real-world problem.	Creates a system of equations or situation given a solution and/or parameters.
Functions					
		The Level 1 Student:	The Level 2 Student:	The Level 3 Student:	The Level 4 Student:
Range	8.F.1	Identifies whether a relation is a function from a graph or a mapping.	Identifies whether a function is a relation from any representation.	Explains that a function is a rule that assigns to each input exactly one output and that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	Creates any representation of a relation and explain why it is a function or not a function.
Range	8.F.2	Compares properties (e.g., slope, y-intercept, values) of two functions in a graph.	Compares properties (i.e., slope, y-intercept, values) of two functions each represented in the same way.	Compares properties (i.e., slope, y-intercept, values) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or verbal descriptions).	Justifies whether two functions represented in different ways are equivalent or not by comparing their properties.

PLD	Standard	Below Proficient	Approaching Proficient	Proficient	Highly Proficient
Range	8.F.3	Determines whether a function is linear or nonlinear from a graph.	Determines whether a function is linear or nonlinear from an equation in the form $y = mx + b$.	Determines whether or not a function is linear or nonlinear (from a graph, table and equation). Give examples of functions that are not linear.	Explains why the function is linear or nonlinear.
Range	8.F.4	Determines the rate of change of the function from a verbal description of the linear function.	Determines the rate of change and initial value of the function from two (x, y) values.	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. Constructs a function to model a linear relationship between two quantities.	Identifies what prevents a set of values in either a table or graph from being linear and adjusts the values to make them linear.
Range	8.F.5	Describes qualitatively the functional relationship between two quantities by analyzing some features of a graph (e.g., linear and nonlinear).	Describes qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear).	Sketches a graph that exhibits given qualitative features of a function.	Interprets qualitative features of a function in a context.

Geometry and Statistics and Probability

Geometry

PLD	Standard	The Level 1 Student:	The Level 2 Student:	The Level 3 Student:	The Level 4 Student:
Range	8.G.1	Identifies or creates a translation of a geometric figure.	Creates an image of a geometric figure using a reflection and/or translation.	Creates an image of a geometric figure using a sequence of transformations.	Recognizes that rigid transformations maintain angle measure and side length.
Range	8.G.2	Identifies two congruent figures.	Describes a rigid transformation between two congruent figures. that exhibits the congruence between them.	Describes a sequence of rigid transformations between two congruent figures.	Compares rigid and non-rigid transformations and explains the relationship between transformations and congruence.
Range	8.G.3	Identifies a dilation, translation, rotation, or reflection.	Describes the effect of reflections and translations on two-dimensional figures using coordinates.	Describes the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates and coordinate notation. Observes that orientation of the plane is preserved in rotations and reflections.	Describes the effect of multiple transformations including a dilation on two-dimensional figures using coordinates and coordinate notation.
Range	8.G.4	Recognizes that a dilation produces a similar figure.	Creates dilations of figures by a given scale factor.	Describes a sequence of rigid transformations and a dilation and that results in similar figures.	Recognizes that a dilation with a scale factor of 1 leads to congruence.
Range	8.G.5	Knows that the sum of angles of a triangle equals 180 and identifies angle pairs when parallel lines are cut by a transversal.	Finds unknown angle measures in a triangle, and unknown angle measures for angle pairs when parallel lines are cut by a transversal.	Gives an informal argument for: • sum of angles of a triangle equals 180 • the measure of an exterior angle of a triangle is equal to the sum of the measures of the non-adjacent angles • congruent angle relationships when parallel lines are cut by a transversal.	Gives an informal argument that a triangle can only have one 90-degree angle. Gives an informal argument for the pairs of angles that are supplementary when parallel lines are cut by a transversal.

PLD	Standard	Below Proficient	Approaching Proficient	Proficient	Highly Proficient
Range	8.G.6	Knows the Pythagorean Theorem and that it applies to right triangles.	Understands the proof of the Pythagorean Theorem and its converse.	Understands and explains the proof of the Pythagorean Theorem and its converse.	Models a proof of the Pythagorean Theorem and its converse using a pictorial representation.
Range	8.G.7	Calculates unknown sign lengths given the Pythagorean Theorem.	Calculates unknown side lengths using the Pythagorean Theorem given a picture of a right triangle.	Applies the Pythagorean Theorem to real-world situations in two and three dimensions to determine unknown side lengths.	Finds multiple leg lengths given a hypotenuse of an isosceles triangle or finds multiple leg lengths when two triangles with the same hypotenuse are given. Recognizes situations and applies the Pythagorean Theorem in multi-step problems.
Range	8.G.8	Applies the Pythagorean Theorem to find the distance between two points in a coordinate system with the right triangle drawn where the Pythagorean Theorem is given.	Applies the Pythagorean Theorem to find the distance between two points in a coordinate system with the right triangle drawn where the Pythagorean Theorem is not given.	Applies the Pythagorean Theorem to find the distance between two points in a coordinate system.	Finds the coordinates of a point which is a given distance (non-vertical and non-horizontal) from another point.
Range	8.G.9	Finds the volume of cylinder.	Finds the volume of a cone, cylinder, or sphere.	Knows the formulas for the volumes of cones, cylinders, and spheres, and uses them to solve real-world mathematical problems.	Justifies the relationship between the formulas for volumes of cones, cylinders, or spheres. Explains the derivation of the formulas for cones, cylinders, and spheres.
			Statistics and Probability		
		The Level 1 Student:	**The Level 2 Student:**	**The Level 3 Student:**	**The Level 4 Student:**
Range	8.SP.1	Constructs a scatter plot.	Constructs a scatter plot and describes the pattern as positive, negative or no relationship.	Describes patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	Constructs and interprets scatter plots for bivariate measurements data to investigate patterns of association between two quantities.
Range	8.SP.2	Recognizes a straight line can be used to describe a linear association on a scatter plot.	Draws a straight line on a scatter plot that closely fits the data points.	Judges how well the trend line fits the data by looking at the closeness of the data points.	Compares more than one trend line for the same scatter plot and justify the best one.
Range	8.SP.3	Identifies the slope and y-intercept of a linear model on a scatter plot. Given a linear model and its scatter plot, identify the slope and y-intercept.	Identifies possible data points given a linear model. Given a linear model, create possible data points.	Interprets the meaning of the slope as a rate of change and the meaning of the y-intercept in the context given a linear model.	Creates and uses a linear model based on a set of bivariate data to solve a problem in a context.
Range	8.SP.4	Completes a partially filled-in two-way table and interpret the table by row or column.	Constructs a two-way table of categorical data.	Interprets and describes relative frequencies for possible associations from a two-way table.	Interprets and compares relative frequencies to identify patterns of association.