MATH 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 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 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 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 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. Identifies rational or irrational numbers. Converts familiar rational numbers with one repeating digit to fraction form.	Compares and orders rational and irrational numbers. Identifies irrational decimal expansions as approximations. Identifies rational and irrational numbers and converts less familiar rational numbers to fraction form.	Places irrational numbers on a number line. Uses approximations of irrational numbers to estimate the value of an expression. Converts decimals into rational numbers.	Explains how to get more precise approximations of square roots. Notices and explains the patterns that exist when writing rational numbers as fractions.
Range	8.NS.2	COMBINED WITH 8.NS.1			
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.	Utilizes properties of integer exponents to order or evaluate multiple numerical expressions with integer exponents.
Range	8.EE.2	Evaluates square and cube roots of small perfect squares and cubes.	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 10 to estimate very large quantities.	Uses numbers expressed in the form of a single digit times an integer power of 10 to estimate very large and very small quantities.	Expresses how many times a number written as an integer power of 10 compares to another number written as an integer power of 10 to estimate very large or very small quantities.	Converts between decimal notation and scientific notation and compares numbers written in different notations.
Range	8.EE.4	Represents very large and very small quantities in scientific notation and uses 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 compare 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.	Justifies whether two representations are proportional or not by comparing their properties.
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 points 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.7 (ab)	Solves simple linear equations with integer coefficients.	Solves simple multi-step linear equations with rational coefficients and identifies equations that have one solution, infinitely many solutions, or no solutions.	Solves complex multi-step linear equations with rational coefficients and variables and provides examples of equations that have one solution, infinitely many solutions, or no solutions.	Justifies why an equation has one solution, infinitely many solutions, or no solutions.

Range	8.EE.8 (abc)	Identifies systems of equations that have one solution, infinitely many solutions, or no solutions from a graph. Estimates the solution of a system given a graph.	Identifies and solves systems of equations that have one solution, infinitely many solutions, or no solutions algebraically, by inspection, and graphically.	Provides and solves examples of systems of equations that have one solution, infinitely many solutions, or no solutions. Solves real-world and mathematical problems leading to two linear equations in two variables.	Creates and utilizes a system of linear equations.
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 relation is a function 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 a representation of a relation and explains why it is a function or is not a function.
Range	8.F.2	Given a function expressed as an equation, creates a graph.	Given a representation of a function, creates another representation of that function.	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.
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 graphical description of the linear function.	Determines the rate of change and initial value of the function from two (*x,y*) values. Creates a graph of identified information.	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 and describes graph that exhibits given qualitative features of a function.	Interprets qualitative features of a function in a context.
			Geometry		
		The Level 1 Student:	**The Level 2 Student:**	**The Level 3 Student:**	**The Level 4 Student:**
Range	8.G.1	Identifies the lines or line segments that correspond from one translation to another.	Identifies the angles that correspond from one transformation to another using reflection and/or translation.	Can verify experimentally the properties of rotations, reflections, and translations.	Can recognize and explain the properties of rotations, reflections, and translations in real-world graphic illustrations and visual representations.
Range	8.G.2	Identifies two congruent figures using rotations, reflections, or transformations	Identifies a transformation between two congruent figures.	Describes a sequence of rigid transformations between two congruent figures.	Can recognize and explain congruent figures in real-world graphic illustrations and visual representations
Range	8.G.3	Identifies a visual representation of a dilation, translation, rotation, or reflection.	Describes the effect of reflections and translations on two-dimensional figures using coordinates and coordinate notation.	Describes the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates and coordinate notation.	Describes the effect of multiple transformations including dilation on two-dimensional figures using coordinates and coordinate notation.
Range	8.G.4	Recognizes that it takes a combination of transformations and dilation to produce a similar figure.	Identifies dilations of figures by a given scale factor and transformations.	Describes a sequence of rigid transformations and dilation 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 the measures of 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.	Give an informal argument that a triangle can only have one 90 angle. Give an informal argument for the pairs of angles that are supplementary when parallel lines are cut by a transversal.

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 hypotenuse side length given the Pythagorean Theorem.	Calculates unknown side lengths using the Pythagorean Theorem given at least two different side lengths of a right triangle.	Applies the Pythagorean Theorem to real-world situations in two and three dimensions to determine unknown side lengths.	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.	Describes 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					
Range	8.SP.1	Constructs a scatter plot.	Constructs a scatter plot and describes the pattern as positive, negative, or no relationship.	Describes patterns in a scatter plot 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 justifies the best one.
Range	8.SP.3	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.