8th Grade Mathematics — Performance Level Descriptors

Reporting Categories	Needs Support	Close	Ready	Exceeding
The Number System Students deepen understanding and fluency with rational numbers and learn that there are irrational numbers, which are close to rational numbers.	A student performing at the Needs Support level: • approximates a multiple of π by multiplying an approximation of π. • uses a calculator to approximate an irrational number.	A student performing at the Close level: • uses rational approximations of irrational numbers to compare and order rational and irrational numbers. • finds a rational approximation of an irrational number expressed as a square root by using properties of square roots. • recognizes the difference between rational and irrational numbers in terms of the structure of their decimal expansions.	A student performing at the Ready level: • understands that an approximation of an irrational number to a given number of decimal places cannot be exact. • uses the regularity of a repeating decimal to understand conversion of a repeating decimal to fraction form.	A student performing at the Exceeding level: • understands and can show that if one adds two rational numbers, the result must be a rational number.
Expressions and Equations Focus is on reasoning about expressions and equations, in particular linear equations. Students work with radicals and integer exponents.	A student performing at the Needs Support level: • recognizes that the slope of a line can be positive, negative, zero, or undefined. • substitutes known values for variables to solve a linear equation with whole number coefficients and results. • recognizes that the solution to a system of linear equations in two variables is the intersection point of the lines. • understands a number expressed in scientific notation. • looks for and makes use of structure of a linear equation as needed to test a solution through substitution.	A student performing at the Close level: • finds square roots of small perfect squares. • converts to and from scientific notation. • finds slope as change in y divided by change in x between two points on a line. • recognizes that the procedure for finding slope, when applied to a vertical line, requires division by zero, which is undefined and so is consistent with undefined slope for the line. • estimates the solution to a system of linear equations by inspecting the graph. • looks for and makes use of structure of a linear equation as needed to solve an equation with a variable on one side. • recognizes that division by zero is undefined. • recognizes that the solution to a linear system of equations is the intersection point of the lines on the graph.	A student performing at the Ready level: • estimates square roots of decimals and rounds the results. • understands that a constant rate of change indicates a linear equation. • identifies from the graphs of linear equations whether a system has one solution, no solution, or infinitely man solutions. • compares and orders numbers in scientific notation. • solves a system of simple linear equations algebraically. • looks for and makes use of structure as needed to guide the solution of a multiple step linear equation. • recognizes through the structure of a problem when the average rate of change is constant.	A student performing at the Exceeding level: • recognizes that expressions with negative integer exponents can be rewritten with whole number exponents using reciprocals. • creates a system of simple linear equations from a context. • creates a moderately complex linear equation from a context and solves the equation algebraically. • performs operations on numbers written in scientific notation. • uses the structure of expressions containing exponents to avoid errors.
Functions Focus is on understanding linear functions and using them in modeling. Students think about general functions and the idea that for a valid input there is a well-defined output, contrasting with statistical variability.	A student performing at the Needs Support level: • evaluates a function when given the function and the value of the independent variable. • identifies whether the slope of a given line is positive or negative. • makes use of structure of a function in order to identify the quantities being related.	A student performing at the Close level: • constructs a linear function to model the relationship between two quantities with values given in a table.	A student performing at the Ready level: • recognizes a linear function that represents a given table of values. • recognizes the graph of a linear function that represents a contextual situation. • matches a linear equation to its graph. • reasons and draws conclusions from graphical models of a function. • uses the structure of the graph to determine the nature of the solution.	A student performing at the Exceeding level: • creates an algebraic representation of a linear function to model a contextual situation.
Geometry Focus is on congruence and similarity as well as the Pythagorean theorem. Students continue to solve real-world geometry problems and incorporate cylinders, cones, and spheres.	A student performing at the Needs Support level: • uses the structure of congruence notation to determine corresponding parts of congruent triangles. • recognizes that similar figures have the same shape but not necessarily the same size. • identifies angles having the same measure and angle pairs whose measures sum to 180° for angles formed when two lines are cut by a transversal. • recognizes when to use the Pythagorean theorem. • identifies a cylinder along with its radius and height. • makes use of the structure of 3-dimensional figures in identifying the figures and their components.	A student performing at the Close level: • finds the image of a point in the coordinate plane that has been translated by given amounts horizontally and vertically. • finds a scale factor given similar figures. • understands that corresponding angles of similar figures are congruent. • finds the volume of a cylinder.	A student performing at the Ready level: • identifies or sketches the image of a figure in the coordinate plane that has been reflected over the x- or y-axis. • finds the measure of any angle formed by parallel lines cut by a transversal, given the measure of other angles. • determines graphically whether two lines are parallel or perpendicular. • uses the Pythagorean theorem to solve problems involving distances between points in the coordinate plane. • uses proportions to find missing parts of similar figures. • uses the volume of a cylinder in real-world application. • uses structure to identify situations where the Pythagorean theorem might be useful.	A student performing at the Exceeding level: • recognizes that in similar figures the lengths of corresponding sides are proportional. • makes and justifies conjectures about the relationships between the angles formed by parallel lines cut by a transversal. • reasons abstractly by applying general properties of similar and congruent figures.
Statistics and Probability Focus is on association and modeling appropriate associations with linear functions.	A student performing at the Needs Support level: • recognizes whether a pattern of association in a scatterplot is nearly linear. • creates a scatterplot model given real-world data.	A student performing at the Close level: • distinguishes clear positive or negative association in data presented in a scatterplot. • identifies or sketches a line that has good fit to the data on a scatterplot.	A student performing at the Ready level: • determines approximate slope or y-intercept of an estimated line of best fit for a data set presented in a scatterplot. • distinguishes clear positive or negative association in data summarized in a two-way table.	A student performing at the Exceeding level: • creates and uses a linear model for a set of bivariate data to solve problems in context.
Modeling Producing, interpreting, understanding, evaluating, and improving mathematical models.	A student performing at the Needs Support level: • determines relationships between quantities in routine mathematical or real-world contexts, and solves related problems involving two or fewer steps. • uses a coordinate plane and understands its parts. • identifies the components of a given linear model.	A student performing at the Close level: • identifies important information, determines relationships between quantities in mathematical or real-world contexts, and provides a limited interpretation of the results in the context of the problem. • identifies parts of a coordinate plane to include: axes, quadrants, origin, and the signs of the ordered pairs as they occur in each quadrant. • uses a simple equation to solve problems.	A student performing at the Ready level: • uses the relationship between two quantities to create a linear function to model the situation. • uses a coordinate plane to model linear equations and systems. • solves equations when that requires multiple steps.	A student performing at the Exceeding level: • interprets and evaluates a linear model for effectiveness in solving a problem and, if indicated, makes adjustments to improve the model as it applies to the situation.

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Justification and Explanation Giving reasons, explaining "Why?"	A student performing at the Needs Support level: • uses conditional statements. • draws and labels relevant visual representations. • explains steps of a procedure. • provides a counterexample. • uses a pattern or sequence to draw a conclusion.	A student performing at the Close level: • uses and cites conditional statements, specific aspects of created visual representations, and/or computations or procedures to clarify an argument or draw a conclusion. • draws conclusions using both a specific and general evidentiary statement or provide general support for a claim in order to reach a conclusion.	A student performing at the Ready level: • justifies and defends conclusions by explaining errors in reasoning or calculations, providing counterexamples, applying relevant classification schemes, and/or verifying statements or claims used to draw a conclusion.	A student performing at the Exceeding level: • provides a coherent, logical argument or solution pathway by providing evidence to support claims. • provides thorough justification and defends conclusions by using multiple, connected statements and incorporating justification techniques such as explaining errors in reasoning or calculations, providing counterexamples, applying relevant classification schemes, and/or verifying statements or claims used to draw a conclusion.
Foundation Integrate and continue to grow with topics from prior grades.	A student performing at the Needs Support level: • identifies perfect squares. • recognizes rational numbers in decimal form. • creates and solves linear equations of the form $px = r$ or $x + q = r$. • graphs geometric figures in the coordinate plane. • solves problems involving mean and range.	A student performing at the Close level: • creates expressions and equations including from two-variable data. • creates and solves linear equations of the form $px + q = r$ or $p(x + q) = r$. • uses simple geometric theorems about angles. • solves problems with measures of central tendency. • draws inferences about a population based on the results of a random sample. • converts among measurement units and systems. • uses place value accurately. • maintains accuracy in comparing and ordering numbers.	A student performing at the Ready level: • rounds to an appropriate place value to promote proper comparing and ordering. • graphs the solution set of an inequality of the form $px + q < r$ or $px + q > r$ on a number line. • recognizes spread of data in terms of the range. • computes the probability of compound events using, organized lists, tables, tree diagrams, or simulation.	A student performing at the Exceeding level: • understands that random sampling tends to avoid extremely unrepresentative samples.
Mathematical Practices Collected PLDS that focus on mathematical practices.	A student performing at the Needs Support level: • uses a calculator to approximate an irrational number. • looks for and makes use of structure of a linear equation as needed to test a solution through substitution. • makes use of structure of a function in order to identify the quantities being related. • makes use of the structure of 3-dimensional figures in identifying the figures and their components. • creates a scatterplot model given real-world data. • determines relationships between quantities in routine mathematical or real-world contexts, and solves related problems involving two or fewer steps. • uses a coordinate plane and understands its parts. • identifies the components of a given linear model. • uses conditional statements. • draws and labels relevant visual representations. • explains steps of a procedure. • provides a counterexample. • uses a pattern or sequence to draw a conclusion.	A student performing at the Close level: • recognizes the difference between rational and irrational numbers in terms of the structure of their decimal expansions. • looks for and makes use of structure of a linear equation as needed to solve an equation with a variable on one side. • recognizes that division by zero is undefined. • recognizes that the solution to a linear system of equations is the intersection point of the lines on the graph. • identifies or sketches a line that has good fit to the data on a scatterplot. • uses place value accurately. • maintains accuracy in comparing and ordering numbers. • identifies important information, determines relationships between quantities in mathematical or real-world contexts, and provides a limited interpretation of the results in the context of the problem. • identifies parts of a coordinate plane to include: axes, quadrants, origin, and the signs of the ordered pairs as they occur in each quadrant. • uses a simple equation to solve problems. • uses and cites conditional statements, specific aspects of created visual representations, and/or computations or procedures to clarify an argument or draw a conclusion. • draws conclusions using both a specific and general evidentiary statement or provide general support for a claim in order to reach a conclusion.	A student performing at the Ready level: • uses the regularity of a repeating decimal to understand conversion to fraction form. • rounds to an appropriate place value to promote proper comparing and ordering. • looks for and makes use of structure as needed to guide the solution of a multiple step linear equation. • recognizes through the structure of a problem when the average rate of change is constant. • reasons and draws conclusions from graphical models of a function. • uses the structure of the graph to determine the nature of the solution. • uses structure to identify situations where the Pythagorean theorem might be useful. • uses the relationship between two quantities to create a linear function to model the situation. • uses a coordinate plane to model linear equations and systems. • solves equations when that requires multiple steps. • justifies and defends conclusions by explaining errors in reasoning or calculations, providing counterexamples, applying relevant classification schemes, and/or verifying statements or claims used to draw a conclusion.	A student performing at the Exceeding level: • understands and can show that if one adds two rational numbers, the result must be a rational number. • uses the structure of expressions containing exponents to avoid errors. • reasons abstractly by applying general properties of similar and congruent figures. • interprets and evaluates a linear model for effectiveness in solving a problem and, if indicated, makes adjustments to improve the model as it applies to the situation. • provides a coherent, logical argument or solution pathway by providing evidence to support claims. • provides thorough justification and defends conclusions by using multiple, connected statements and incorporating justification techniques such as explaining errors in reasoning or calculations, providing counterexamples, applying relevant classification schemes, and/or verifying statements or claims used to draw a conclusion.