Alabama Achievement Level Descriptors

Grade 8 – Mathematics

The descriptions below provide a brief summary of typical performance for each level. The skills identified in each descriptor represent, but are not all-inclusive of, the skills a student should be able to demonstrate at each achievement level.

	Level 1: Emerging Learner	Level 2: Developing Learner	Level 3: Proficient Learner	Level 4: Distinguished Learner
The Number System	▪ Locates approximations of some irrational numbers on a number line. ▪ Identifies common irrational numbers. ▪ Approximates a multiple of π by multiplying by an approximation of π. ▪ Uses a calculator to approximate an irrational number.	▪ Uses rational approximations of irrational numbers to compare and order rational and irrational numbers. ▪ Determines rational approximations of some irrational numbers expressed as a square root. ▪ Recognizes the difference between rational and irrational numbers in terms of the structure of their decimal expansions.	▪ Recognizes the difference between rational and irrational numbers and identifies rational and irrational numbers. ▪ Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions. ▪ Recognizes that an approximation of an irrational number to a given number of decimal places cannot be exact.	▪ Recognizes that the sum of two rational numbers is a rational number. ▪ Explains and justifies comparisons of the size of irrational numbers.

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	Level 1: Emerging Learner	Level 2: Developing Learner	Level 3: Proficient Learner	Level 4: Distinguished Learner
Expressions and Equations	▪ Chooses units of appropriate size for measurements of very large or very small quantities from a description only. ▪ 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. ▪ Identifies a number expressed in scientific notation.	▪ Recognizes equivalent exponent expressions. ▪ Identifies $\sqrt{2}$ as irrational. ▪ Uses scientific notation to express very large and very small quantities. ▪ Adds and subtracts quantities represented in scientific notation. ▪ Identifies the solution of a linear system from a graph. ▪ Graphs proportional relationships. ▪ Determines the square roots of small perfect squares. ▪ Converts to and from scientific notation. ▪ Recognizes slope as change in y divided by change in x between any two points on a line. ▪ Recognizes that division by zero is undefined.	▪ Applies properties of integer exponents to generate equivalent expressions. ▪ Estimates square roots of decimals and rounds the results. ▪ 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. ▪ Explains $\sqrt{2}$ as irrational. ▪ Uses scientific notation to express very large and very small quantities and determine how much larger or smaller one quantity is over another. ▪ Performs operations on numbers in scientific notation and chooses units of appropriate size for measurements of very large or very small quantities.	▪ Explains solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. ▪ Explains the steps and justifies the conclusion that a linear equation has one, none, or infinitely many solutions. ▪ 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. ▪ 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.

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Expressions and Equations			▪ Solves linear systems and gives examples of linear systems with one solution, no solution, or infinitely many solutions. ▪ Interprets proportional relationships and identifies the unit rate as the slope of the graph. ▪ Compares two different proportional relationships represented in different ways. ▪ Recognizes that a constant rate of change indicates a linear equation. ▪ Solves a mathematical or real-world scenario involving a system of linear equations algebraically and/or graphically. ▪ Recognizes through the structure of a problem when the average rate of change is constant.	▪ Derives and interprets the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.

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Functions	▪ Identifies a function from a graph. ▪ Determines the rate of change for a function from a graph. ▪ 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.	▪ Determines the rate of change for a function from a graph or a table. ▪ Recognizes the graph of a linear function that represents a contextual situation.	▪ Recognizes that a function is a rule and compares the properties of two functions represented differently. ▪ Interprets the equation $y = mx + b$ as defining a linear function whose graph is a straight line and gives 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 a function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph.	▪ Uses functions to model and explain relationships between quantities. ▪ Interprets the rate of change and initial value of a linear function in mathematical and real-world problems. ▪ Reasons and draws conclusions from graphical models of a function.

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Functions	▪ Determines if a function is linear or nonlinear or where it increases or decreases from a graph only.	▪ Constructs a linear function to model the relationship between two quantities with values given in a table.	▪ Describes the functional relationship between two quantities by analyzing a graph. ▪ Writes a linear function that represents a given table of values. ▪ Matches a linear function to its graph.	▪ Creates an algebraic representation of a linear function to model a contextual situation.

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Geometry	▪ Solves for lengths within a right triangle involving common Pythagorean triples. ▪ Recognizes that the three angles of a triangle have a sum of 180˚. ▪ Recognizes when a figure has been rotated, reflected, translated, or dilated. ▪ 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 have a sum of 180° for angles formed when two lines are cut by a transversal.	▪ Applies the Pythagorean theorem to determine any unknown lengths in mathematical problems with common Pythagorean triples. ▪ Identifies congruent angles within a figure that includes parallel lines cut by a transversal. ▪ Describes the effects of translations and reflections of two-dimensional figures. ▪ Identifies the image of a point in the coordinate plane that has been translated by given amounts horizontally and vertically.	▪ 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. ▪ Uses the formulas for the volumes of cones, cylinders, and spheres and to solve real-world and mathematical problems. ▪ Verifies the properties of rotations, reflections, and translations. ▪ Describes the effects of dilations, translations, rotations, and reflections of two-dimensional figures. ▪ Verifies congruence using properties of dilations, translations, rotations, and reflections.	▪ Reasons abstractly about interior and exterior angles within a triangle and angles created when parallel lines are cut by a transversal. ▪ Explains and constructs proofs of the Pythagorean theorem and its converse. ▪ Recognizes that in similar figures the lengths of corresponding sides are proportional. ▪ Develops and justifies conjectures about the relationships between the angles formed by parallel lines cut by a transversal.

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Geometry	▪ Recognizes when to use the Pythagorean theorem.	▪ Determines a scale factor given similar figures. ▪ Recognizes that corresponding angles of similar figures are congruent. ▪ Determines the volume of a cylinder.	▪ Recognizes that a figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations ▪ Identifies the image of a figure in the coordinate plane that has been reflected over the *x*- or *y*-axis. ▪ Determines the measure of any angle formed by parallel lines cut by a transversal, given the measure of one other angle. ▪ Applies the Pythagorean theorem to determine unknown side lengths and to solve mathematical and real-world problems including involving distances between points in the coordinate plane. ▪ Uses proportions to find missing parts of similar figures.	▪ Reasons abstractly by applying general properties of similar and congruent figures.

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Statistics and Probability	▪ Answers basic questions from graphs and tables, including two-way tables. ▪ Identifies the scatterplot that represents given data. ▪ Recognizes whether a pattern of association in a scatterplot is nearly linear.	▪ Recognizes that patterns of association can be seen by displaying data in a two-way table. ▪ Distinguishes if a clear positive or negative association exists in data presented in a scatterplot.	▪ Constructs and interprets a two-way table summarizing data on two categorical variables collected from the same subjects. ▪ Uses relative frequencies calculated for rows or columns to describe possible association between the two variables. ▪ Constructs and interprets scatterplots for data to investigate patterns of association between two quantities. ▪ Describes patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	▪ Interprets the slopes and intercepts of linear models of best fit for data. ▪ Creates and uses a linear model for a set of bivariate data to solve problems in context.

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Statistics and Probability	▪ Creates a scatterplot from real-world data.	▪ Identifies or sketches a line that has good fit to the data on a scatterplot.	▪ 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. ▪ Informally fits a straight line to fit data presented in scatterplots.	