

Grade 6 Mathematics

Achievement level descriptions (ALDs) describe a student's level of achievement (e.g., Below Grade Level, On Grade Level, Proficient) on a large-scale assessment. The purpose of the ALD development framework is to enable valid inferences about student content area knowledge and skill in relation to a state's content standards measured on a large-scale assessment.

Achievement Level	Achievement Level Descriptions
Level 1	Students at this level demonstrate that they are well below grade level with respect to the challenging content of the <i>B.E.S.T. Standards</i> .
Level 2	Students at this level demonstrate that they are below grade level with respect to the challenging content of the <i>B.E.S.T. Standards</i>. A student performing at Level 2: - defines a rational number; plots, orders, and compares integers. - given a mathematical context, represents quantities on a horizontal number line that have opposite direction using rational numbers. - finds the absolute value of a rational number. - solves mathematical problems with one step involving absolute value; or compares absolute values. - multiplies and divides positive multi-digit numbers with decimals to the hundredths. - using models, computes products of positive fractions and computes quotients involving unit fractions and fractions. - solves two-step real-world problems involving addition, subtraction, and multiplication with positive multi-digit decimals or positive fractions. - given a mathematical context, finds the greatest common factor within 500 or least common multiple with factors to 15 of two whole numbers. - identifies the common factor between the sum of two composite whole numbers. - evaluates positive whole numbers with natural number exponents up to 5. - identifies composite whole numbers as products of single prime factors. - identifies equivalent forms of positive terminating decimals with fraction notation with denominators of 1000. - given a mathematical context, translates written descriptions into linear algebraic expressions limited to one term. - represents an algebraic inequality on a number line wherein the variable is on the left side of the inequality. - evaluates algebraic expressions using substitution and order of operations with one variable and using positive integers. - applies properties of operations to identify equivalent algebraic expressions with positive integer coefficients. - given an equation or inequality and a specified set of positive integers, determines which values make the equation or inequality true or false. - given a visual model such as a number line, solves for a variable in a one-step equation within a mathematical context using addition or subtraction, where all terms and solutions are positive integers.

Achievement Level	Achievement Level Descriptions
Level 2	- given a visual model such as a number line, solves for a variable in a one-step equation within a mathematical context using multiplication and division, where all terms and solutions are positive integers. - using a visual model, determines the unknown decimals or fractions in an equation involving any of the four operations, relating three numbers, with the unknown in any position. - given a real-world context, writes part-to-part ratios to show the relative sizes of two quantities in the same units using appropriate notation: a/b, a to b, or $a:b$ where $b \neq 0$. - using a visual model and given a real-world context, identifies a rate for a ratio of quantities with different units. - uses a two- or three-column table to display equivalent part-to-part ratios and part-to-part-to-whole ratios. - identifies ratio relationships to solve mathematical problems involving percentages using the relationship between two quantities. - using visual models, solves mathematical and real-world problems involving ratios, rates, and unit rates. - plots integer ordered pairs in all four quadrants and on both axes. - finds distances between integer ordered pairs, limited to either the same x-coordinate or y-coordinate in the same quadrant. - solves mathematical problems by plotting integer ordered pairs on a coordinate plane. - identifies the relationship between the area of a rectangle and the area of a right triangle. - solves mathematical problems with positive integers involving the area of quadrilaterals by decomposing them into triangles or rectangles. - solves mathematical problems with a given visual model or using a formula, finds the volume of a right rectangular prism with one positive rational number as edge length. - given a mathematical context, finds the surface area of right rectangular prisms and right rectangular pyramids given the figure's net using positive integers. - given a numerical data set limited to positive integers, within a real-world context, finds mean, median, mode, and range. - given a box plot within a real-world context, determines the minimum, the lower quartile, the median, the upper quartile, and the maximum. - given a histogram or line plot within a real-world context, describes the spread and distribution of the data including any symmetry, skewness, and the range. - identifies histograms to corresponding sets of numerical data within real-world contexts. - given a real-world scenario, describes how changes in data values impact measures of center.
Level 3	Students at this level demonstrate on grade level success with the challenging content of the <i>B.E.S.T. Standards</i>. A student performing at Level 3: defines a rational number; plots, orders, and compares positive and negative rational numbers when given in the same form.

Achievement Level	Achievement Level Descriptions
Level 3	• given a mathematical or real-world context, represents and compares quantities on a number line that have opposite direction using rational numbers. • given a mathematical context, interprets the absolute value of a rational number as the distance from zero on a number line. • solves mathematical problems with one step involving absolute value, including the comparison of absolute value. • multiplies positive multi-digit numbers with decimals to the thousandths, including using a standard algorithm, and divides positive multi-digit numbers with decimals to hundredths, including using a standard algorithm. • with or without models, computes products and quotients of positive fractions, involving at least one unit fraction. • solves two-step real-world problems involving any of the four operations with positive multi-digit decimals or positive fractions. • given a mathematical context, finds the greatest common factor within 1000 and least common multiple with factors to 25 of two whole numbers. • identifies the sum of two composite whole numbers having a common factor, as a common factor multiplied by the sum of two whole numbers. • evaluates positive rational numbers with natural number exponents up of 5. • expresses two-digit composite whole numbers as products of prime factors using natural number exponents. • identifies equivalent forms of positive rational numbers including fractions, terminating decimals, and percentages. • using a visual model such as manipulatives or a number line, adds and subtracts integers. • using a visual model such as manipulatives or a number line, multiplies and divides integers. • given a mathematical or real-world context, translates written descriptions into linear algebraic expressions limited to one term and translates linear algebraic expressions limited to one term into written descriptions. • translates a real-world written description into algebraic inequality form and represents that inequality on a number line. • evaluates algebraic expressions using substitution and order of operations with one variable and any integer. • applies properties of operations to generate equivalent algebraic expressions with positive integer coefficients. • given an equation or inequality and a specified set of integers, determines which values make the equation or inequality true or false, including variables in multiple terms. • without a visual model, solves for a variable in a one-step equation within a mathematical context using addition and subtraction, where all terms and solutions are integers. • without a visual model, solves for a variable in a one-step equation within a mathematical context using multiplication and division, where all terms and solutions are integers. • without a visual model, determines the unknown decimals or fractions in an equation involving any of the four operations, relating three numbers, with the unknown in any position.

Achievement Level	Achievement Level Descriptions
Level 3	- given a real-world context, writes and interprets part-to-part and part-to-whole ratios to show the relative sizes of two quantities in the same units using appropriate notation: a/b, a to b, or $a:b$ where $b \neq 0$. - with or without a visual model, given a real-world context, calculates a rate for a ratio of quantities with different units. - completes a two- or three-column table to display equivalent part-to-part ratios and part-to-part-to-whole ratios. - applies ratio relationships to solve mathematical problems involving percentages using the relationship between two quantities. - solves mathematical problems involving ratios, rates, and unit rates, including comparisons and mixtures. - plots rational number ordered pairs in all four quadrants and on both axes. - finds distances between ordered pairs of rational numbers, limited to the same y-coordinate or the same x-coordinate, in the same quadrant, represented on a coordinate plane. - solves mathematical or real-world problems by plotting ordered pairs of rational numbers on a coordinate plane, including finding the perimeter or area of a rectangle contained in one quadrant. - applies the formula for the area of a triangle to find the area of a triangle. - solves mathematical problems with positive rational numbers involving the area of composite figures by decomposing them into triangles or rectangles. - solves mathematical problems with a given visual model or using a formula, finds the volume of a right rectangular prism with positive rational number edge lengths. - given a mathematical context, finds the surface area of right rectangular prisms and right rectangular pyramids using the figure's net using dimensions with one rational number. - recognizes statistical questions that would generate numerical data. - given a numerical data set within a real-world context, finds mean, median, mode, and range. - given a box plot within a real-world context, determines the interquartile range and range. - given a histogram or line plot within a real-world context, qualitatively describes the spread and distribution of the data, including any symmetry, skewness, gaps, clusters, outliers, and the range. - identifies box plots and histograms to corresponding sets of numerical data within real-world contexts. - given a real-world scenario, determines and describes how changes in data values impact measures of center; identifies measures of center appropriate for the scenario.
Level 4	Students at this level demonstrate a proficient level of success with the challenging content of the <i>B.E.S.T. Standards</i>. A student performing at Level 4: - defines a rational number; plots, orders, and compares positive rational numbers when given in different forms. - given a mathematical or real-world context, represents quantities that have opposite direction using rational numbers, compares the quantities on a number line, and explains the meaning of zero within its context.

Achievement Level	Achievement Level Descriptions
Level 4	• given a real-world context, interprets the absolute value of a rational number as the distance from zero on a number line. • solves mathematical problems with two steps or real-world problems with up to two steps involving absolute value, including the comparison of absolute value. • multiplies and divides positive multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency. • computes products and quotients of positive fractions, including mixed numbers with procedural fluency. • solves multi-step real-world problems involving any of the four operations with positive multi-digit decimals or positive fractions, including mixed numbers. • given a real-world context, finds the greatest common factor within 1000 and least common multiple with factors to 25 of two whole numbers. • rewrites the sum of two composite whole numbers having a common factor as a common factor multiplied by the sum of two whole numbers. • evaluates positive rational numbers and integers with natural number exponents up to 5. • expresses composite whole numbers as products of prime factors using natural number exponents. • rewrites positive rational numbers in different but equivalent forms including fractions, terminating decimals, and percentages. • adds and subtracts integers with procedural fluency. • multiplies and divides integers with procedural fluency. • given a mathematical or real-world context, translates written descriptions into linear algebraic expressions limited to two terms and translates linear algebraic expressions limited to two terms into written descriptions. • translates a real-world written description into algebraic inequality form and represents an inequality with the variable on the right or left side of the inequality on a number line. • evaluates algebraic expressions using substitution and order of operations with two or more variables and any integer. • applies properties of operations to generate equivalent algebraic expressions with integer coefficients. • given an equation or inequality and a specified set of integers, determines which values make the equation or inequality true or false, including variables in multiple terms and variables on either side of the equal sign or inequality symbol. • writes and solves for a variable in an equation within a mathematical or real-world context using addition and subtraction, where all terms and solutions are integers, including variables on either side of the equal sign. • writes and solves for a variable in an equation within a mathematical or real-world context using multiplication and division, where all terms and solutions are integers, including variables on either side of the equal sign. • determines the unknown decimals or fractions, including mixed numbers and fractions greater than one, in an equation involving any of the four operations, relating three numbers, with the unknown in any position, including the unknown and different operations on either side of the equal sign.

Achievement Level	Achievement Level Descriptions
Level 4	- given a real-world context, writes and interprets part-to-part and part-to-whole ratios to show the relative sizes of two quantities in the different units using appropriate notation: a/b, a to b, or $a:b$ where $b \neq 0$. - given a real-world context, calculates and interprets a unit rate for a ratio of quantities with different units. - generates a two- or three-column table to display equivalent part-to-part ratios and part-to-part-to-whole ratios. - applies ratio relationships to solve real-world problems involving percentages using the relationship between two quantities. - solves mathematical or real-world problems involving ratios, rates, and unit rates, including comparisons, mixtures, and ratios of lengths and a conversion within the same measurement system. - plots rational number ordered pairs in all four quadrants and on both axes and identifies the x- or y-axis as the line of reflection when two ordered pairs have an opposite x- or y-coordinate. - finds distances between ordered pairs of rational numbers, limited to the same y-coordinate or the same x-coordinate, in any quadrant, represented on a coordinate plane. - solves mathematical or real-world problems by plotting ordered pairs of rational numbers on a coordinate plane, including finding the perimeter or area of a rectangle with vertices in multiple quadrants. - derives a formula for the area of a right triangle using a rectangle and applies that formula to find the area of a triangle. - solves mathematical or real-world problems with positive rational numbers involving the area of quadrilaterals and composite figures by decomposing them into triangles or rectangles or finds a missing side when given the area. - solves mathematical or real-world problems involving the volume of right rectangular prisms with positive rational number edge lengths or finds a missing edge length when given a volume. - given a mathematical or real-world context, finds the surface area of right rectangular prisms and right rectangular pyramids using the figure's net using positive rational numbers. - formulates statistical questions that would generate numerical data. - given a numerical data set within a real-world context, finds and interprets mean, median, mode, and range. - given a box plot within a real-world context, uses this summary of the data to describe the spread and distribution. - given a histogram or line plot within a real-world context, qualitatively describes and interprets the spread and distribution of the data, including any symmetry, skewness, gaps, clusters, outliers, and the range. - creates box plots and histograms to represent the set of the numerical data within real-world contexts. - given a real-world scenario, determines and describes how changes in data values impact measures of center and variation; identifies measures of center and variation appropriate for the scenario.

Achievement Level	Achievement Level Descriptions
Level 5	Students at this level demonstrate exemplary success with the most challenging content of the <i>B.E.S.T. Standards</i>. A student performing at Level 5: • defines a rational number; explains and justifies how to plot, order, and compare positive and negative rational numbers when given in the same form and when positive rational numbers are represented in different forms. • given a real-world context, interprets and explains the meaning of the absolute value of a rational number in its context. • solves and explains mathematical or real-world problems with up to two steps involving absolute value, including the justification of the comparison of absolute value. • analyzes an error in the multiplication or division computation using a standard algorithm and justifies the reasoning. • computes products and quotients of positive fractions by positive fractions, including mixed numbers with procedural fluency and explains relationship between multiplication and division, reciprocals, and algorithms. • solves multi-step real-world problems involving any of the four operations with positive multi-digit decimals or positive fractions, including mixed numbers, and interprets the solution in the context of the situation. • given a mathematical or real-world context, finds the greatest common factor within 1000 and least common multiple with factors to 25 of two whole numbers and explains the relationship between the greatest common factor and rewriting equivalent fractions. • rewrites the sum of two composite whole numbers having a common factor, as a common factor multiplied by the sum of two whole numbers and justifies rewriting it multiple ways. • uses reasoning to determine the unknown exponential value when given an equation with a known integer base equal to an equivalent value. • rewrites positive rational numbers in equivalent forms including fractions, terminating decimals, and percentages, and explains the relationship between representations. • adds and subtracts integers with procedural fluency and explains and justifies why the inverse relationship exists between addition and subtraction with integers using properties of operations. • multiplies and divides integers with procedural fluency and explains why the inverse relationship exists between multiplication and division with integers using properties of operations. • given a mathematical or real-world context, analyzes an error in the translation of a written description into a linear algebraic expression or in the translation of a linear algebraic expression into a written description and justifies the reasoning. • translates a real-world written description into algebraic inequality form and represents an inequality with the variable on the right or left side of the inequality on a number line and translates an algebraic inequality into a real-world written description. • evaluates algebraic expressions using substitution and order of operations and justifies using the order of operations. • explains how the properties of operations generate equivalent algebraic expressions.

Achievement Level	Achievement Level Descriptions
Level 5	- identifies multiple representations of the same equation using addition and subtraction, demonstrating how multiple equations can answer the same question. - identifies multiple representations of the same equation using multiplication and division, demonstrating how multiple equations can answer the same question. - describes how comparative relational thinking is used to determine the unknown decimal or fraction, including mixed numbers and fractions greater than one, in an equation involving any of the four operations, relating three numbers, with the unknown in any position, including the unknown and different operations on either side of the equal sign. - interprets and explains the relationship between ratios presented in a two- or three-column table. - explains the relationship between the percent, the part, and the whole and how it generates equivalent ratios. - solves mathematical or real-world problems involving ratios, rates, and unit rates, including comparisons, mixtures, ratios of lengths and more than one conversion within the same measurement system. - plots rational number ordered pairs in all four quadrants and on both axes; identifies and explains why the x- or y-axis is the line of reflection when two ordered pairs have an opposite x- or y-coordinate. - solves mathematical and real-world problems including determining the fourth vertex of a rectangle. - justifies the relationship between the area of a rectangle and the area of a right triangle. - solves mathematical or real-world problems with positive rational numbers involving the area of quadrilaterals and composite figures by decomposing the shapes in different ways and showing how they are equivalent. - explains what makes a question statistical. - creates box plots and histograms to represent and interpret sets of numerical data within real-world contexts; distinguishes between truthful and deceptive data.