Benchmark Achievement Level Descriptors (Benchmark ALDs)

Overview and Purpose

The development of Achievement Level Descriptors (ALDs) is a critical step in communicating student performance in terms of levels or categories of performance on any standardized assessment. For Minnesota Comprehensive Assessments (MCAs), ALDs are developed in collaboration with educators during the first year of full implementation. The ALDs provide a description of grade-level student performance on MCAs for each of the achievement levels of Exceeds the Standards, Meets the Standards, Partially Meets the Standards, and Does Not Meet the Standards. These statements are included on a student's MCA score report to aid families in score interpretation. More detail regarding the development of the MCA Achievement Level Descriptors is on Testing 1, 2, 3.

Over the years, educators have requested more specific descriptions of the knowledge, skills and abilities of students who typically score in each of the different MCA achievement levels beyond what the traditional ALDs offer. In response to this need, Minnesota Department of Education (MDE) staff collaborated to outline more specific descriptions, the Benchmark ALDs for Mathematics and Reading. The purpose of Benchmark ALDs is to

1. promote equity for all students across the state by clarifying expected learning outcomes for instruction and local assessment of Minnesota Academic Standards in Reading and Mathematics; and
2. support teachers' analysis of the depth of their curriculum, instruction, and classroom assessments.

The Mathematics and Reading Benchmark ALDs were developed by

- reviewing test questions and test data for all operational MCA III questions, in many cases 800–1,000 questions per grade;
- grouping items within each benchmark based on student performance on the items relative to their overall performance on the MCAs; and
- reviewing the achievement level groupings of questions within each benchmark for commonalities in the skills, understanding and context needed to correctly answer the items. Each Benchmark ALD describes some of the skills typically demonstrated by students whose overall performance on the MCAs is at that achievement level. These skills are in addition to the descriptions at the lower achievement levels.

Released Examples

Where possible, released examples that illustrate skills described in the benchmark and achievement level are listed in the document. To view examples, click on "Released Example" in the Benchmark ALD tables or go to the Minnesota Question Tool (https://public.education.mn.gov/nqt/). Once at the Minnesota Question Tool (MQT) site, you can enter or copy and paste the released example identification number into the "Search by Question ID" field. Note that within the MQT you can find additional questions that are aligned to the academic standards but are not specifically listed in the Benchmark ALD tables.

Example items are not currently available for all benchmarks and achievement levels in the Benchmark ALD tables. MDE will update the document as more released examples become available.

Training Module

Watch the training module to learn how to use the Benchmark ALDs to evaluate the rigor of classroom assessments and instructional materials: https://testing123.education.mn.gov/test/plan/success/.

This module will help educators understand how the Benchmark ALDs can be used to facilitate the learning outcomes defined in the Minnesota K–12 Academic Standards in Mathematics and Reading and to evaluate the rigor of classroom assessment and instruction.

Grade 5 Mathematics Benchmark Achievement Level Descriptors

Number & Operation

Divide multi-digit numbers; solve real-world and mathematical problems using arithmetic. (5.1.1)

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5.1.1.1 **Divide multi-digit numbers using efficient and generalizable procedures based on knowledge of place value, including standard algorithms. Recognize that quotients can be represented in a variety of ways, including a whole number with a remainder, a fraction or mixed number or a decimal.**	Identifies the results, as a whole number with a remainder, of division of 3- or 4-digit numbers by 1- or 2-digit numbers **Released Examples:** 43833, 250095, 254082	Identifies the results, as a whole number with a remainder or a fraction, of division of 3- or 4-digit numbers by 1- or 2-digit numbers Identifies the remainder portion of a quotient	Identifies quotients, as a whole number with a remainder, a mixed number, or a decimal, of division of 3- or 4-digit numbers by 1- or 2-digit numbers **Released Examples:** 254074, 254920	Computes and represents quotients in all forms as a whole number with a remainder, a mixed number, and a decimal **Released Examples:** 254921, 255600

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5.1.1.2 **Consider the context in which a problem is situated to select the most useful form of the quotient for the solution and use the context to interpret the quotient appropriately.**	Solves one-step, real-world problems involving division of 2-digit numbers by a 1-digit divisor that is not 7 or 8	Solves real-world problems involving division of 3- and 4-digit numbers by 1- and 2-digit divisors Interprets the remainder as what is "left over" **Released Examples:** 44142, 256117	Determines the "fewest/least" and "greatest/most" of something in context with whole number dividends and divisors Interprets the quotient and remainder in context **Released Examples:** 254031, 254063	Knows when to divide in a problem-solving situation and explains reasoning Determines the "fewest/least" and "greatest/most" of something in any context **Released Examples:** 255001, 256043
5.1.1.3 **Estimate solutions to arithmetic problems in order to assess the reasonableness of results.**	Assessed within 5.1.1.4	Assessed within 5.1.1.4	Assessed within 5.1.1.4	Assessed within 5.1.1.4

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5.1.1.4 **Solve real-world and mathematical problems requiring addition, subtraction, multiplication and division of multi-digit whole numbers. Use various strategies, including the inverse relationships between operations, the use of technology and the context of the problem to assess the reasonableness of results.**	Solves one-step, real-world problems involving addition, subtraction, multiplication, or division **Released Examples:** 250092, 254064	Solves two-step, real-world problems involving addition and/or subtraction and multiplication or division **Released Examples:** 253056, 253060	Solves multi-step, real-world problems involving addition, subtraction, multiplication, and division Compares computed rates or quantities **Released Examples:** 254085, 251044, 254705	Uses various strategies to solve complex and detailed multi-step problems involving addition, subtraction, multiplication, and division Assesses the reasonableness of results **Released Examples:** 254927, 256024

Read, write, represent and compare fractions and decimals; recognize and write equivalent fractions; convert between fractions and decimals; use fractions and decimals in real-world and mathematical situations. (5.1.2)

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5.1.2.1 **Read and write decimals using place value to describe decimals in terms of groups from millionths to millions.**	Identifies, reads, and writes a decimal, from hundreds to hundredths	Matches a decimal written in words with the correct symbol representation, from thousands to thousandths Identifies place-value location in decimals, from hundred thousands to hundred thousandths **Released Examples:** 251022, 256086	Writes decimals as symbols and words, from millions to millionths **Released Examples:** 43841, 255252	Converts between various representations of decimals, from millions to millionths, including decimals with multiple leading zeros Identifies place-value location of decimals written in words, from millions to millionths

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5.1.2.2 **Find 0.1 more than a number and 0.1 less than a number. Find 0.01 more than a number and 0.01 less than a number. Find 0.001 more than a number and 0.001 less than a number.**	Finds 0.1 more or less than given numbers written to the hundredths place Finds 0.01 more or less than given numbers written to the hundredths place **Released Examples:** 255007, 256005	Finds 0.1, 0.01, and 0.001 more or less than given numbers to the thousandths place **Released Examples:** 254159, 254168	Finds 0.1, 0.01, and 0.001 more or less than given numbers in context given tables and word formats **Released Example:** 256025	Finds the difference between two numbers that are 0.1, 0.01, or 0.001 apart **Released Examples:** 255002, 256004

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5.1.2.3 **Order fractions and decimals, including mixed numbers and improper fractions, and locate on a number line.**	Locates decimals on a number line with a scale of the same fractional unit	Identifies greatest or smallest fraction (denominators up to 20) Orders decimals from greatest to least Locates decimals on a number line **Released Examples:** 254109, 254501, 254665	Locates mixed numbers and improper fractions on a number line Identifies decimal between two other decimals Identifies fraction between two other fractions Orders decimals, fractions, and mixed numbers **Released Example:** 254500	Locates decimals, fractions, and mixed numbers on a number line Orders a combination of decimals, fractions, mixed numbers, and improper fractions Identifies decimal between two fractions **Released Examples:** 44240, 251094

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5.1.2.4 **Recognize and generate equivalent decimals, fractions, mixed numbers and improper fractions in various contexts.**	Recognizes equivalent simple fractions (e.g., denominators 2, 4, 8, 10, 16) **Released Examples:** 253156, 254662	Converts between decimals and fractions, including mixed numbers (e.g., denominators 4, 10) Converts between improper fractions and mixed numbers (e.g., denominators 3, 5, 6, 15) Recognizes equivalent fractions, including improper fractions (e.g., denominators 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 25) Writes fractions from contexts or fraction models, including mixed numbers **Released Examples:** 254933, 256069	Converts between decimals and fractions, including mixed numbers and improper fractions (e.g., denominators 5, 8, 16, 20, 25, 50, 100) Recognizes equivalent fractions, including improper fractions (e.g., denominators 20, 50, 100) Writes decimals from contexts **Released Examples:** 254503, 256008	Makes fraction models to represent improper fractions Finds multiple representations for a number, including decimals, fractions, mixed numbers, and improper fractions **Released Example:** 254504

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5.1.2.5 **Round numbers to the nearest 0.1, 0.01 and 0.001.**	Rounds decimals to the nearest tenth and hundredth	Rounds decimals to the nearest tenth, hundredth, and thousandth **Released Example:** 254163	Rounds multiple decimals to the nearest tenth, hundredth, and thousandth **Released Examples:** 254046, 254142	Writes equivalent decimal values by rounding to the nearest tenth, hundredth, or thousandth

Add and subtract fractions, mixed numbers and decimals to solve real-world and mathematical problems. (5.1.3)

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5.1.3.1 **Add and subtract decimals and fractions using efficient and generalizable procedures, including standard algorithms.**	Solves one-step addition or subtraction problems involving decimals **Released Examples:** 251024, 254056	Adds or subtracts two simple fractions with unlike denominators up to 12 Adds or subtracts, without regrouping, two simple mixed numbers with denominators up to 12, where one denominator is a multiple of the other **Released Examples:** 254689, 256114	Adds and subtracts multi-step addition and subtraction problems involving both decimals and fractions Adds both fractions and mixed numbers that require regrouping from the whole numbers and fractional parts Subtracts fractions and mixed numbers with denominators up to 12, where one denominator is a multiple of the other	Subtracts mixed numbers with unlike denominators that require regrouping

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5.1.3.2 **Model addition and subtraction of fractions and decimals using a variety of representations.**	Uses fraction models to add fractions with same denominators up to 12	Uses fraction models to add two fractions with denominators up to 12, where one denominator is a multiple of the other Represents addition of decimals with base ten blocks **Released Example:** 256092	Uses fraction models to subtract fractions and mixed numbers with denominators up to 12, where one denominator is a multiple of the other Represents addition and subtraction of decimals with base ten blocks and number lines Creates fraction models to represent addition and subtraction of fractions with different denominators up to 12 **Released Examples:** 750129, 255603, 256071	Uses number lines to represent subtraction of decimals with different denominators **Released Example:** 255010

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5.1.3.3 **Estimate sums and differences of decimals and fractions to assess the reasonableness of results.**	Assessed within 5.1.3.4	Assessed within 5.1.3.4	Assessed within 5.1.3.4	Assessed within 5.1.3.4

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5.1.3.4 **Solve real-world and mathematical problems requiring addition and subtraction of decimals, fractions and mixed numbers, including those involving measurement, geometry and data.**	Solves one-step, real-world problems involving addition and subtraction of decimals to the tenths and decimals associated with money **Released Examples:** 250077, 252075	Solves multi-step, real-world problems involving addition and subtraction of decimals Solves one- and two-step, real-world problems involving addition and subtraction of fractions with denominators up to 12, where one denominator is a multiple of the other or the common denominator is a multiple of both Adds mixed numbers with denominators up to 4 **Released Examples:** 254728, 252015, 254092	Solves straightforward multi-step, real-world problems involving addition and subtraction of decimals and fractions, including mixed numbers with denominators up to 12 **Released Examples:** 254701, 44235	Solves unique and complex multi-step, real-world and mathematical problems involving addition and subtraction of a combination of decimals, fractions, and mixed numbers **Released Examples:** 253313, 254687

Algebra

Recognize and represent patterns of change; use patterns, tables, graphs and rules to solve real-world and mathematical problems. (5.2.1)

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5.2.1.1 **Create and use rules, tables, spreadsheets and graphs to describe patterns of change and solve problems.**	Recognizes an algebraic rule for a one-operation pattern Finds and uses multi-step rules in a pattern and applies them to find unknown values **Released Examples:** 251077, 254100, 254766	Finds and uses patterns in geometric objects to find unknown values Finds a two-step rule involving whole numbers in input-output table or list, describes the rule, and uses it to find unknown values Finds a linear pattern from a graph to identify additional values **Released Examples:** 250116, 254101	Finds missing values using tables, numeric patterns, geometric patterns, graphs, and input-output tables Describes multi-step and complex rules in patterns **Released Examples:** 251073, 253098, 254505	Creates and uses patterns in tables of values to identify incorrect and unknown values Finds rules that describe patterns given sequentially and nonsequentially in lists and tables of values **Released Example:** 253097

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5.2.1.2 **Use a rule or table to represent ordered pairs of positive integers and graph these ordered pairs on a coordinate system.**	Graphs ordered pairs of positive integers on a coordinate system with a scale of 1 **Released Example:** 256075	Finds missing ordered pairs of positive integers in a table, and graphs the pairs on a coordinate system with a scale of 1 or 2 Uses linear rules (with integer slopes) to find missing positive integer *y*-values given positive integer *x*-values, and graphs the pairs on a coordinate system with a scale of 1 or 2 **Released Example:** 256076	Uses linear rules to find missing positive integer *x*- and *y*-values, and graphs the pairs on a coordinate system Finds ordered pairs of positive integers from linear rules, including those with fraction slopes, of points on a coordinate system **Released Example:** 42464	Identifies correctly plotted points on a coordinate system that follow a written linear rule Finds ordered pairs of positive integers from a linear pattern of points on a coordinate system, where the new ordered pairs may not be shown in the image of the coordinate system

Use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving whole numbers. (5.2.2)

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5.2.2.1 **Apply the commutative, associative and distributive properties and order of operations to generate equivalent numerical expressions and to solve problems involving whole numbers.**	Uses order of operations to simplify expressions involving whole numbers in two or three steps **Released Example:** 44056	Resorts to calculation to verify commutative, associative, and distributive properties to identify equivalent expressions Uses order of operations to find unknown values in equivalent expressions	Applies commutative, associative, and distributive properties to identify equivalent expressions	Applies the commutative, associative, and distributive properties and order of operations to identify multiple equivalent expressions and to simplify multi-step expressions Determines missing operation symbols (+, –, ×, ÷) to form equivalent expressions

Understand and interpret equations and inequalities involving variables and whole numbers, and use them to represent and solve real-world and mathematical problems. (5.2.3)

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5.2.3.1 **Determine whether an equation or inequality involving a variable is true or false for a given value of the variable.**	Identifies which 1-digit value of a variable makes an equation (containing whole numbers less than 20 and at most two operations of +, –, and ×) true	Identifies which 1-digit value of a variable makes an equation (containing whole numbers less than 40 and at most two operations where one is division) true or vice versa (given the value) and identifies the equation Determines which 1-digit value of a variable makes an equation or inequality (containing whole numbers and uses combinations of operations +, –, and ×) true or vice versa (given the value) and identifies the equation or inequality	Determines whether multiple equations and inequalities involving a variable are true or false Determines which positive integer value of a variable makes an equation or inequality (containing whole numbers less than 100 and using combinations of operations +, –, ×, and ÷ in various representations) true or vice versa (given the value) and identifies the equation or inequality	Determines which value(s) for a given variable makes multiple equations or inequalities (including fractions and mixed numbers) true

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5.2.3.2 **Represent real-world situations using equations and inequalities involving variables. Create real-world situations corresponding to equations and inequalities.**	Identifies simple real-world situations using an equation involving a variable	Identifies real-world situations using equations and inequalities involving one or two variables	Identifies inequalities that represent real-world situations Identifies what the parts of an inequality represent in a real-world situation Identifies when to use an equation or an inequality to represent a real-world situation	Creates equations or inequalities to represent real-world situations

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5.2.3.3 **Evaluate expressions and solve equations involving variables when values for the variables are given.**	Evaluates expressions involving whole numbers and up to two variables by computing with given 1-digit values for the variable(s) **Released Example:** 44385	Evaluates expressions and equations involving division of expressions, repetition of a variable, or up to three variables by computing with given values of the variables	Evaluates expressions involving multiple variables, repetition of variables, grouping symbols, and division by computing with given values of the variables Solves simple equations when values for the variables are given	Evaluates complex expressions involving a combination of variables, repeated variables, grouping symbols, and division of expressions by computing with given values of the variable Evaluates multiple expressions and equations involving variables by computing with given values of the variables

Geometry & Measurement

Describe, classify, and draw representations of three-dimensional figures. (5.3.1)

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5.3.1.1 **Describe and classify three-dimensional figures including cubes, prisms and pyramids by the number of edges, faces or vertices as well as the types of faces.**	Finds number of faces and vertices for cubes, prisms, and pyramids Identifies cubes, prisms, and pyramids by the number of faces and vertices Identifies cubes, prisms, and pyramids from side and top views	Finds number of faces, edges, and vertices for cubes, prisms, and pyramids Names parts of prisms and pyramids	Identifies cubes, prisms, and pyramids from descriptions of attributes (such as sides) Describes distinct attributes of prisms and pyramids using correct vocabulary Classifies and compares two or more prisms and pyramids by their attributes	Understands the connections between two- and three-dimensional representations of prisms and pyramids

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5.3.1.2 **Recognize and draw a net for a three-dimensional figure.**	Identifies names of cylinders, cubes, prisms, and square pyramids from traditional nets	Recognizes square and rectangular prisms and pyramids from less traditional nets, and vice versa	Identifies correct nets, including non-traditional nets, that would make a cylinder, cube, prism, or pyramid (including triangular pyramids) Draws simple nets that would make rectangular prisms **Released Example:** 44317	Understands the connections between two-dimensional nets and three-dimensional representations of cylinders, prisms, and pyramids Draws nets that would make cylinders, prisms, and pyramids

Determine the area of triangles and quadrilaterals; determine the surface area and volume of rectangular prisms in various contexts. (5.3.2)

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5.3.2.1 **Develop and use formulas to determine the area of triangles, parallelograms and figures that can be decomposed into triangles.**	Determines the area of parallelograms given the base length and height	Uses formulas to calculate areas of triangles and parallelograms given base length and height	Uses formulas to calculate areas of figures that are shown decomposed into triangles and parallelograms Matches a triangle and a parallelogram with the same areas **Released Example:** 252159	Calculates areas of complex figures that can be decomposed into triangles and parallelograms Matches multiple triangles and parallelograms with the same areas

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5.3.2.2 **Use various tools and strategies to measure the volume and surface area of objects that are shaped like rectangular prisms.**	Uses formulas to calculate volumes of rectangular prisms with given 1-digit dimensions Finds surface areas of rectangular prisms from nets with unit grids	Calculates and compares the volumes of multiple rectangular prisms	Calculates surface areas of rectangular prisms given a net or three-dimensional image with labeled side lengths **Released Example:** 255019	Finds missing dimensions of rectangular prisms given volume or surface area Calculates volume of rectangular prisms by decomposing into smaller cubes Calculates an unknown side length given the surface areas and other side lengths of rectangular prisms given a net

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5.3.2.3 **Understand that the volume of a three-dimensional figure can be found by counting the total number of same-sized cubic units that fill a shape without gaps or overlaps. Use cubic units to label volume measurements.**	Assessed within 5.3.2.2	Assessed within 5.3.2.2	Assessed within 5.3.2.2	Assessed within 5.3.2.2

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5.3.2.4 **Develop and use the formulas *V* = *ℓwh* and *V* = *Bh* to determine the volume of rectangular prisms. Justify why base area *B* and height *h* are multiplied to find the volume of a rectangular prism by breaking the prism into layers of unit cubes.**	Uses formulas to calculate volumes of rectangular prisms when given 1-digit side lengths	Uses the formulas *V* = *Bh* and *V* = *ℓwh* to calculate volumes of rectangular prisms when dimensions are given	Demonstrates the accuracy of the formula *V* = *Bh* by decomposing rectangular prisms into layers **Released Example:** 255030	Compares rectangular prisms with the same volume to find an unknown dimension Finds unknown base areas of rectangular prisms given volume and height

Data Analysis

Display and interpret data; determine mean, median and range. (5.4.1)

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5.4.1.1 **Know and use the definitions of the mean, median and range of a set of data. Know how to use a spreadsheet to find the mean, median and range of a data set. Understand that the mean is a "leveling out" of data.**	Calculates the median value in a table of up to 9 items, all with whole-number values less than 100	Applies rote procedures for calculating mean, median (when values are presented in order), and range **Released Example:** 253008	Calculates mean, median, and range for data provided in a variety of formats (e.g., tables, bar graphs) and not presented in order Finds an unknown data value given the mean or range of the data Fluently works with data categories labeled with numbers	Conceptually understands mean, median, and range Finds unknown data values given the mean, median, and/or range of the data, and data can be provided in a variety of formats (e.g., tables, bar graphs)

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5.4.1.2 **Create and analyze double-bar graphs and line graphs by applying understanding of whole numbers, fractions and decimals. Know how to create spreadsheet tables and graphs to display data.**	Reads double-bar graphs and line graphs Matches data tables to double-bar graphs and line graphs of data Adds data to simple double-bar graphs and line graphs from data tables	Interprets simple double-bar graphs and line graphs to solve problems Constructs double-bar graphs and line graphs from descriptions and applies appropriate labels Solves simple, one-step problems using data from a double-bar graph or line graph **Released Examples:** 255036, 254796	Works fluently with double-bar graphs or line graphs to solve problems and make comparisons, including situations with inverse relationships to numeric values (e.g., efficiency and time) Works fluently with fractional and decimal data points	Analyzes complex situations that include double-bar graphs and line graphs to solve problems, find multiple missing data values, and make interpretations