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 4 Mathematics Benchmark Achievement Level Descriptors

Number & Operation

Demonstrate mastery of multiplication and division basic facts; multiply multi-digit numbers; solve real-world and mathematical problems using arithmetic. (4.1.1)

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4.1.1.1 **Demonstrate fluency with multiplication and division facts.**	Recalls basic multiplication facts, with one factor being digits 1 to 9 and the other 1 to 5 Divides when items are straightforward and the quotient is presented first and followed by the divisor **Released Examples:** 240574, 243015	Knows basic multiplication facts and recognizes some division facts in single expressions with divisors 1 to 9 **Released Example:** 245706	Knows division facts and finds quotients in multiple expressions with divisors 1 to 9 Uses the term "quotient" to aid in solving division problems Independently uses multiplication and division facts to solve multi-step situations	Applies multiplication and division facts to solve mathematical problems **Released Example:** 244051

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4.1.1.2 **Use an understanding of place value to multiply a number by 10, 100, and 1000.**	Multiplies 1- and 2-digit numbers by 10 and 100 **Released Examples:** 241350, 246059	Identifies the product of a 2-digit number and 10, 100, or 1000 Finds which multiple of 10 gives a specified product **Released Example:** 246061	Understands and uses the place-value system by multiplying 2-digit numbers by 10, 100, and 1000 Consistently multiplies 2-digit numbers by 10 and 100 in 2-step situations	Consistently multiplies values by 10, 100, and 1000 in multi-step situations
4.1.1.3 **Multiply multi-digit numbers using efficient and generalizable procedures based on knowledge of place value, including standard algorithms.**	Identifies the product of a 1-digit by up to a 3-digit number Identifies the product of a 2-digit by 2-digit number Computes inefficiently (e.g., uses repeated addition) **Released Examples:** 43734, 241029	Multiplies up to 2-digit numbers by 2- and 3-digit numbers **Released Examples:** 241048, 244118	Independently uses the standard algorithm to efficiently multiply 2-digit numbers by 2- and 3-digit numbers Uses partial products to multiply 2- and 3-digit numbers (decomposing one or both) Uses the term "product" to aid in solving multiplication problems **Released Example:** 44299	Identifies equivalent expressions of a product Solves for missing digits in factors of a product using the standard algorithm

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4.1.1.4 **Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.**	Assessed within 4.1.1.5	Assessed within 4.1.1.5	Assessed within 4.1.1.5	Assessed within 4.1.1.5

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4.1.1.5 **Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology and the context of the problem to assess the reasonableness of results.**	Solves two-step, real-world problems using addition or subtraction **Released Examples:** 240060, 242136	Solves basic, multi-step problems involving addition and subtraction using 2- and/or 3-digit numbers Solves basic multiplication problems involving whole numbers up to 5 Provides solutions up to 1000 **Released Example:** 242051	Solves multi-step, real-world problems involving addition, subtraction, and multiplication Provides solutions up to 10,000 **Released Examples:** 242189, 246062, 246099	Chooses correct operation in a problem-solving situation Uses various strategies to solve multi-step problems and assess the reasonableness of results Solutions up to 99,999 **Released Examples:** 242197, 245707, 246016

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4.1.1.6 **Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative and distributive properties and repeated subtraction.**	Divides 2-digit numbers by 1-digit divisors **Released Example:** 44133	Identifies the quotient of 3-digit numbers less than 200 by 1-digit divisors for mathematical and real-world context when the dividend is presented first **Released Examples:** 240101, 243018	Solves single-step problems involving division of 3-digit numbers by 2-digit divisors Uses the long-division algorithm and introductory use of the partial product method Solves division problems by solving for missing factor **Released Examples:** 244030, 244731, 244738	Understands and uses partial quotients strategy in conjunction with the commutative, associative, and distributive properties to divide 3-digit numbers by 2-digit numbers

Represent and compare fractions and decimals in real-world and mathematical situations; use place value to understand how decimals represent quantities. (4.1.2)

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4.1.2.1 **Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.**	Identifies fraction strips representing the same fractions	Identifies fraction circles representing the same fraction	Uses fraction models (such as fraction strips, fraction circles, other manipulatives, and written descriptions) to determine equivalent fractions Uses fully labelled number lines to plot equivalent fractions **Released Examples:** 245000, 242042, 244065	Interprets fraction models to identify multiple equivalent fractions Determines equivalent representation of fractions plotted on a number line with minimal labeling **Released Examples:** 43552, 43704, 244715, 245002, 245250, 245252, 245253, 245256, 245503, 245504

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4.1.2.2 **Locate fractions on a number line. Use models to order and compare whole numbers and fractions, including mixed numbers and improper fractions.**	Locates mixed numbers on a marked number line (from limited choices) **Released Example:** 245228	Locates mixed numbers on a number line Identifies proper fractions and mixed numbers represented as points on a number line **Released Example:** 246000	Orders proper fractions and mixed numbers using a number line **Released Example:** 245514	Uses a variety of fraction models to order and compare whole numbers, fractions, mixed numbers, and improper fractions **Released Examples:** 245224, 245226, 245227, 245229

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4.1.2.3 **Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators.**	Solves one-step addition and subtraction problems using models to add and subtract fractions with common denominators (e.g., 2, 4, 5, 8, 10) **Released Example:** 245264	Adds and subtracts fractions with common denominators using a structured model Identifies the order of steps to be taken when adding and subtracting fractions with common denominators **Released Example:** 244686	Adds and subtracts fractions with common denominators with one or more fraction models—either combining or eliminating parts of fraction models to find the solution Fluently works with twelfths Finds a sum of 1 or a difference of 0 when adding or subtracting fractions with like denominators **Released Examples:** 244693, 245005	Creates fraction models to add and subtract fractions with common denominators Develops a rule for addition and subtraction of fractions with common denominators **Released Examples:** 244162, 245004

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4.1.2.4 **Read and write decimals with words and symbols; use place value to describe decimals in terms of thousands, hundreds, tens, ones, tenths, hundredths and thousandths.**	Matches symbol and word representations of a decimal to the tenths place **Released Example:** 244683	Matches a decimal written in words to the correct numeric representation, from thousands to thousandths Identifies decimals (from hundreds to hundredths) in word, symbol, and expanded representations Identifies place value location in decimals, from hundreds to tenths **Released Examples:** 244682, 244737	Identifies place-value location in decimals, from thousands to thousandths Converts decimals from words or expanded representation to symbols, from thousands to thousandths Writes decimals based on the meaning of the digit value in the correct place value **Released Example:** 246052	Consistently converts between various representations of decimals up to 7 digits Identifies place-value location of decimals written in words, from thousands to thousandths **Released Example:** 43679

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4.1.2.5 **Compare and order decimals and whole numbers using place value, a number line and models such as grids and base 10 blocks.**	Orders decimals (including money) using place value and base 10 blocks **Released Example:** 242300	Orders decimals to the tenths place Orders decimals on a number line, to the tenths place	Recognizes and compares decimals to hundredths as being greater than, less than, or equal to other decimals as given in lists or on a number line Writes comparisons using inequality signs, >, =, or < **Released Example:** 244501	Compares and orders decimals to thousandths **Released Example:** 244504
4.1.2.6 **Read and write tenths and hundredths in decimal and fraction notations using words and symbols; know the fraction and decimal equivalents for halves and fourths.**	Reads and writes decimals to the tenths and hundredths place	Reads and comprehends decimal, fraction, and word equivalents for halves, fourths, tenths, and hundredths (fractions less than 1)	Reads and writes decimals up to thousandths Translates between decimals and mixed numbers for halves, fourths, tenths, and hundredths **Released Example:** 246007	Uses models to write decimals Writes numbers as multiple equivalent fractions and decimals **Released Examples:** 244055, 245203

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4.1.2.7 **Round decimals to the nearest tenth.**	Rounds numbers to the nearest ten or to the nearest whole number	Rounds numbers to the nearest tenth when written to the hundredths place and the hundredths place contains a 1 or a 2	Rounds decimals written to the hundredth to the nearest tenth and all digits are greater than 0 **Released Example:** 43859	Rounds multi-digit numbers to the nearest tenth Compares and identifies equivalent values rounded to the nearest tenth Identifies why "double-rounding" is incorrect **Released Examples:** 245272, 246021

Algebra

Use input-output rules, tables and charts to represent patterns and relationships and to solve real-world and mathematical problems. (4.2.1)

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4.2.1.1 **Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.**	Recognizes basic patterns in lists of numbers **Released Example:** 245060	Uses written rules to continue a pattern Finds simple rules for input-output tables and applies them to find missing values **Released Examples:** 244507, 244800	Recognizes an algebraic rule for a one-operation pattern Applies written rules for input-output tables Finds multi-step rules for input-output tables and applies them to find missing values **Released Examples:** 241405, 244795, 245054, 245206, 245283	Finds and applies multi-step complex rules for patterns presented in different formats Identifies input-output tables that represent real-world situations **Released Examples:** 245056, 245013, 245014, 245273, 245281

Use number sentences involving multiplication, division, and unknowns to represent and solve real-world and mathematical problems; create real-world situations corresponding to number sentences. (4.2.2)

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4.2.2.1 **Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.**	Identifies which symbol (+, −, ×, ÷) makes a simple number sentence true Matches a story line to a corresponding simple number sentence using (+, −, ×, ÷)	Identifies which symbol (+, −, ×, ÷) can be used to make equivalent expressions Represents real-world situations using simple number sentences **Released Example:** 242162	Identifies missing operation symbol(s) (+, −, ×, ÷) to make a number sentence true with one or more missing symbols Represents the meaning of a variable in a number sentence to describe real-world situations **Released Examples:** 242039, 246012, 246024	Translates between real-world situations and number sentences Creates a number sentence to represent real-world situations Represents the meaning of the parts of a number sentence to find multi-step solutions **Released Examples:** 244165, 245021, 246056

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4.2.2.2 **Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.**	Finds values for the unknowns that make single-operation (multiplication or division) number sentences true (numbers less than 100) **Released Examples:** 242154, 245214	Matches number sentences with an isolated unknown in situations involving multiplication and division **Released Example:** 245220	Represents real-world situations with a number sentence involving an unknown and one operation Finds values for the unknowns that make multiple-operation number sentences true (numbers less than 100) **Released Examples:** 241410, 244509	Solves for a variable in a number sentence to make an equation true in multi-step, multi-operation solution process Identifies multiple equations that represent real-world situations involving an unknown and at least one operation **Released Examples:** 43690, 244508, 245031, 246068

Geometry & Measurement

Name, describe, classify and sketch polygons. (4.3.1)

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4.3.1.1 **Describe, classify and sketch triangles, including equilateral, right, obtuse and acute triangles. Recognize triangles in various contexts.**	Names and classifies triangles by angles shown	Names, describes, and draws triangles by angles and sides shown **Released Example:** 43683	Names and describes multiple triangles by angles and sides in a variety of contexts and orientations Names triangles from a written description (without images)	Justifies properties of triangles by angles and sides **Released Examples:** 244690, 245241

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4.3.1.2 **Describe, classify, and draw quadrilaterals, including squares, rectangles, trapezoids, rhombuses, parallelograms, and kites. Recognize quadrilaterals in various contexts.**	Names common quadrilaterals shown **Released Example:** 244658	Classifies quadrilaterals by the number of parallel sides and right angles **Released Example:** 244001	Understands relationships between types of quadrilaterals. Names quadrilaterals from a written description (without images) **Released Examples:** 244011, 244015, 244785	Names and classifies multiple quadrilaterals in a variety of contexts and orientations, including by multiple properties Knows some quadrilaterals can be classified with more than one name **Released Examples:** 244723

Understand angle and area as measurable attributes of real-world and mathematical objects. Use various tools to measure angles and areas. (4.3.2)

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4.3.2.1 **Measure angles in geometric figures and real-world objects with a protractor or angle ruler.**	Not assessed on MCA-III	Not assessed on MCA-III	Not assessed on MCA-III	Not assessed on MCA-III
4.3.2.2 **Compare angles according to size. Classify angles as acute, right and obtuse.**	Classifies angles in a familiar orientation (e.g., one ray is horizontal) **Released Examples:** 240210, 244068, 244085, 244716, 244753, 244760	Classifies angles in polygons Identifies how changes in an angle can change its classification **Released Examples:** 242078, 244689, 244719	Classifies multiple angles in complex figures	Classifies multiple figures based on types of angles

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4.3.2.3 **Understand that the area of a two-dimensional figure can be found by counting the total number of same-size square units that cover a shape without gaps or overlaps. Justify why length and width are multiplied to find the area of a rectangle by breaking the rectangle into 1 × 1 unit squares and viewing these as grouped into rows and columns.**	Finds the area of rectangles containing a grid of unit squares **Released Examples:** 240228, 43786, 244701, 245711	Finds the area of rectangles containing part of a grid of unit squares Explains how to find the area of rectangles containing a grid of unit squares	Has a conceptual understanding of area as length times width Draws rectangles with a given area Calculates the area of rectangles in multiple ways **Released Examples:** 243109, 241469	Calculates area by decomposing shapes into rectangles **Released Examples:** 244070, 244172

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4.3.2.4 **Find the areas of geometric figures and real-world objects that can be divided into rectangular shapes. Use square units to label area measurements.**	Finds the area of rectangular shapes when displayed in a unit grid form **Released Example:** 246084	Finds the area of 1 or more rectangular shapes when displayed in unit grid form **Released Example:** 43711	Calculates the areas of well-labeled geometric figures that can be divided into rectangular shapes **Released Example:** 246072	Calculates area by decomposing shapes into rectangles **Released Examples:** 246085, 242222, 24477202, 244177, 246087, 246097

Use translations, reflections and rotations to establish congruency and understand symmetries. (4.3.3)

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4.3.3.1 **Apply translations (slides) to figures.**	Knows that a translation moves an object **Released Examples:** 243306, 243312	Identifies images from translations when shown on a grid	Identifies images from translations of shapes **Released Examples:** 244654, 244747	Applies and describes translations to shapes
4.3.3.2 **Apply reflections (flips) to figures by reflecting over vertical or horizontal lines and relate reflections to lines of symmetry.**	Identifies a line of symmetry in simple shapes **Released Examples:** 244060, 243311, 244072	Identifies lines of symmetry in complex shapes and complex situations Draws a line of symmetry in simple shapes **Released Examples:** 42240, 244019, 244653, 244702	Reflects shapes over lines **Released Example:** 244655	Identifies lines of symmetry in multiple shapes (compound as well as multiple single shapes) **Released Example:** 244022

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4.3.3.3 **Apply rotations (turns) of 90˚ clockwise or counterclockwise.**	Knows that a rotation turns an object **Released Example:** 43613	Identifies images from 90˚ rotations of simple shapes	Identifies images from 90˚ rotations of shapes **Released Examples:** 244676, 43761, 243317, 244750, 244764	Applies 90˚ rotations to shapes **Released Examples:** 243316, 244007, 244767
4.3.3.4 **Recognize that translations, reflections and rotations preserve congruency and use them to show that 2 figures are congruent.**	Identifies a congruent shape that is a reflection of a given shape **Released Examples:** 740778, 240174, 242212, 242213	Justifies that shapes are congruent because they are the results of a reflection	Identifies congruent shapes from multiple shapes shown Justifies that shapes are congruent because they are the results of a translation, reflection, or rotation **Released Examples:** 740143, 240015	Identifies multiple congruent and noncongruent shapes Has a conceptual understanding of congruency **Released Examples:** 240173, 245518

Data Analysis

Collect, organize, display and interpret data, including data collected over a period of time and data represented by fractions and decimals. (4.4.1)

Benchmark	Does Not Meet *A typical student at this level of mathematics succeeds at few of the most fundamental mathematics skills of the Minnesota Academic Standards.* **Some of the skills typically demonstrated may include:**	Partially Meets *A typical student at this level of mathematics partially meets the mathematics skills of the Minnesota Academic Standards.* **Some of the skills typically demonstrated may include:**	Meets *A typical student at this level of mathematics meets the mathematics skills of the Minnesota Academic Standards.* **Some of the skills typically demonstrated may include:**	Exceeds *A typical student at this level of mathematics exceeds the mathematics skills of the Minnesota Academic Standards.* **Some of the skills typically demonstrated may include:**
4.4.1.1 **Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.**	Identifies and plots data (whole numbers) from tables in simple bar graphs, timelines, pictographs, and Venn diagrams Identifies a basic interpretation of a data value (whole numbers) from a simple data display (tables, bar graphs, line plots, line graphs, pictographs, Venn diagrams) **Released Examples:** 241424, 244516	Displays data (including decimals) from tables and bar graphs and finds a missing value in a data display Interprets a data value (including decimals) from data displays (tables, bar graphs, timelines, line plots, pictographs) Finds missing key for pictographs Translates between tables and bar graphs or pictograms **Released Examples:** 245040, 740061	Collects, organizes, and displays data in bar graphs, timelines, pictograms, and Venn diagrams, (including elements not in a circle but in the sample space), including finding missing values Solves problems in data displays (tables, bar graphs, timelines, line plots, pictographs, Venn diagrams) involving fractions and decimals Solves for differences between data models, finds missing values, and creates equivalent models Uses timelines to show events in relation to one another **Released Examples:** 740060, 243074	Has a conceptual understanding of solving problems involving data displays, including tables, bar graphs, timelines (including hour increments), line plots, pictograms, and Venn diagrams (including 3 circles) Analyzes, interprets, and solves novel problems with real-world scenarios involving data displays (tables, bar graphs, timelines, line plots, pictograms, and Venn diagrams) **Released Examples:** 244766, 245032, 245041