

Number and Operation MCA-III Achievement Level Descriptors

General comments for all grade levels

Exceeds the Standard	Students at this level of mathematics exceed the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated very consistently may include:
Meets the Standard	Student at this level of mathematics meet the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:
Partially Meets the Standard	Students at this level partially meet the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:
Does Not Meet the Standard	Students at this level succeed at few of the fundamental mathematical skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:

Reflection Questions

- What patterns emerge in the **Number and Operations** Strand?
- What similarities and differences do you notice from grade to grade?
- How do the 'verbs' change at each of the 4 achievement levels?
- What can you do to assure all students meet the state standards for this strand?

3rd Grade

399	Exceeds the Standard	Solves real-world and mathematical problems using addition, subtraction, and multiplication; understands that the size of a fractional part is relative to the size of the whole.
366	Meets the Standard	Compares and represents whole numbers up to 100,000; solves real-world and mathematical problems using addition and subtraction; represents multiplication and division in various ways (reference MN Academic Standards 3.1.2.3); compares and orders fractions with common denominators.
350	Partially Meets the Standard	Represents whole numbers up to 1,000 using expanded notations; compares whole numbers up to 100,000; subtracts multi-digit whole numbers without regrouping; knows common multiplication and division facts (2s, 5s, 10s); writes fractions for a given representation, including number line.
340	Does Not Meet the Standard	Represents whole numbers with words; adds multi-digit whole numbers, matches fractions with correct area model.
301	Does Not Meet the Standard	

4th Grade

499	Exceeds the Standard	Chooses correct operation in a problem solving situation; uses various strategies to solve multi-step problems and assess the reasonableness of results; develops a rule for addition and subtraction of fractions with common denominators; compares and orders decimals to the thousandths.
466	Meets the Standard	Knows division facts; multiplies multi-digit numbers; solves multiplication problems when all relevant information is present and the question is clearly defined; solves division problems by solving for missing factor; connects relationship between multiplication and division; solves multi-step problems involving addition and subtraction; uses fraction models to determine equivalent fractions; reads and writes decimals up to thousandths.
450	Partially Meets the Standard	Knows basic multiplication facts and recognizes some division facts; knows decimal and fraction equivalents for halves and fourths; uses models to compute with fractions.
440	Does Not Meet the Standard	Partial recall of basic multiplication facts; computes inefficiently (e.g., uses repeated addition instead of multiplication); uses models to represent fractions.
401	Does Not Meet the Standard	

5th Grade

599	Exceeds the Standard	Efficiently divides and knows when to divide in a problem solving situation; adds and subtracts fluently with fractions and decimals.
563	Meets the Standard	Divides multi-digit numbers; solves division problems when all relevant information is present and the question is clearly defined; orders and compares common fractions and decimals; adds and subtracts fractions; adds and subtracts decimals.
550	Partially Meets the Standard	Knows basic division facts; knows benchmark decimal and fraction equivalents (e.g., $\frac{1}{2} = 0.5$, $\frac{1}{4} = 0.25$).
540	Does Not Meet the Standard	Partial mastery of basic division facts; recognizes fractions and decimals in familiar context.
501	Does Not Meet the Standard	

6th Grade

699	Exceeds the Standard	Recognizes when it is appropriate to apply the concept of factoring; sees connection between factoring and application in a problem solving situation; efficiently translates between fraction, decimal, and percent forms of positive rational number to solve problems; compares ratios and understands their relationship to fractions; recognizes ratios in context.
662	Meets the Standard	Understands the concept of factors and factoring (composing and decomposing numbers); determines equivalences among fractions, decimals, and percents but reverts to one representation to solve problems (e.g., changes everything to decimals); creates ratio to represent situation when given key words in context; understands concept of ratio.
650	Partially Meets the Standard	Names pairs of factors of numbers (e.g., $12 = 2 \times 6$, $12 = 3 \times 4$); recognizes equivalences among common fractions, decimals, and percents; recognizes a ratio (only) in numeric form; solves unit rate problems in a straight-forward context (division).
640	Does Not Meet the Standard	Can only name common pairs of factors of a given number (e.g., $12 = 3 \times 4$); uses decimals to separate numbers (e.g., $\frac{3}{4} = 3.4$); sees decimal in money context only; solves ratio or rate problems as multiplication and division problems.
601	Does Not Meet the Standard	

7th Grade

799	Exceeds the Standard	Conceptual understanding of rational numbers including justification of why a number is rational; solves non-routine (complex) problems/situations using rational numbers.
760	Meets the Standard	Recognizes rational numbers in various forms and converts between forms; compares positive and negative rational numbers; solves multi-step problems involving rational numbers in routine problems/situations including proportions; understands that absolute value is the distance from zero.
750	Partially Meets the Standard	Changes numbers in fractional form to decimal form and uses to compare; recognizes common repeating decimals and perfect squares under 100 as rational; solves multi-step problems involving familiar rational numbers when all relevant information is present and the question is clearly defined.
740	Does Not Meet the Standard	Changes numbers in fractional form to decimal form by dividing; recognizes that short terminating decimals, fractions, and whole numbers are rational; recognizes familiar numbers as rational; recognizes that a negative number is less than a positive number; solves one-step problems with integers; uses a set of defined steps to find a missing number in a given proportion.
701	Does Not Meet the Standard	

8th Grade

899	Exceeds the Standard	Conceptual understanding of real numbers.
861	Meets the Standard	Recognizes real numbers in various forms; compares real numbers; generates equivalent expressions involving rational numbers in routine problems/situations, including scientific notation.
850	Partially Meets the Standard	Recognizes familiar rational and irrational numbers.
840	Does Not Meet the Standard	Recognizes fractions and terminating decimals as rational numbers.
801	Does Not Meet the Standard	

Algebra MCA-III Achievement Level Descriptors

General comments for all grade levels

Meets State Standard	Exceeds the Standard Students at this level of mathematics exceed the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated very consistently may include:
Meets State Standard	Meets the Standard Student at this level of mathematics meet the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:
Partially Meets State Standard	Partially Meets the Standard Students at this level partially meet the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:
Does Not Meet State Standard	Does Not Meet the Standard Students at this level succeed at few of the fundamental mathematical skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:

Reflection Questions

- What patterns emerge in the Algebra Strand?
- What similarities and differences do you notice from grade to grade?
- How do the 'verbs' change at each of the 4 achievement levels?
- What can you do to assure all students meet the state standards for this strand?

3rd Grade

Meets State Standard	399 Exceeds the Standard Conceptual understanding of pattern (e.g., recognizes input-output relationship); interprets number sentences involving unknowns.
Meets State Standard	366 Meets the Standard Continues patterns to a specified term (e.g., given first three terms in a pattern, finds sixth term); represents real-world situations with a number sentence involving basic facts and an unknown.
Partially Meets State Standard	350 Partially Meets the Standard Identifies next number in a pattern; represents simple situations with a number sentence involving basic facts and an isolated unknown.
Does Not Meet State Standard	340 Does Not Meet the Standard Recognizes additive patterns in lists of numbers; recognizes basic facts represented in number sentences
Does Not Meet State Standard	301

4th Grade

Meets State Standard	499 Exceeds the Standard Uses multi-step rules for patterns presented in different formats; translates between real-world situations and number sentences.
Meets State Standard	466 Meets the Standard Uses a verbal rule for input-output table; recognizes an algebraic rule for a one-operation pattern; represents real-world situations with a number sentence involving an unknown.
Partially Meets State Standard	450 Partially Meets the Standard Uses a verbal rule to continue pattern; matches number sentences with an isolated unknown in situations involving only multiplication.
Does Not Meet State Standard	440 Does Not Meet the Standard Recognizes patterns in lists of numbers.
Does Not Meet State Standard	401

5th Grade

Meets State Standard	599 Exceeds the Standard Works fluently with patterns and/or rules involving more than one operation or complex problem; applies the commutative, associate and distributive properties; interprets inequalities using variables.
Meets State Standard	563 Meets the Standard Uses rules to generate patterns; translates between patterns and rules; applies commutative and associative properties; understands simple inequalities; represents a situation with an equation containing a variable.
Partially Meets State Standard	550 Partially Meets the Standard Recognizes patterns in a list of numbers; resorts to calculation to verify commutative and associative properties; solves verbal and simple one-step equations and inequalities by substituting a value for the unknown.
Does Not Meet State Standard	540 Does Not Meet the Standard Recognizes patterns that use skip counting; works with simple variable representations.
Does Not Meet State Standard	501

6th Grade

Meets State Standard	699 Exceeds the Standard Interprets equations and inequalities with multiple unknowns; understands that solving for a variable is not always the answer to the question.
Meets State Standard	662 Meets the Standard Represents relationships between varying quantities using equations and inequalities, involving variables, graphs, and verbal descriptions; uses the properties of arithmetic as well as order of operations to generate equivalent expressions and to solve problems.
Partially Meets State Standard	650 Partially Meets the Standard Solves one-step problems in straightforward situations; uses computational facts, instead of equality, to find solutions; recognizes patterns (e.g., multiplicative and additive patterns); recognizes relationships between varying quantities represented in tables, graphs, or verbal descriptions.
Does Not Meet State Standard	640 Does Not Meet the Standard Understands concept of variable as a place holder for an answer; recognizes patterns (additive) within lists of numbers; occasionally solves one-step problems in very familiar situations (money); can find missing whole number based on number facts, not algebraic properties.
Does Not Meet State Standard	601

7th Grade

Meets State Standard	799 Exceeds the Standard Distinguishes proportional relationships from other relationships; understands the concept of proportionality and applies it to non-routine problem solving situations; uses the properties as well as order of operations to generate equivalent algebraic expressions and solve non-routine problems; represents and solves equations involving non-routine representations
Meets State Standard	760 Meets the Standard Understands the concept of proportionality and applies to routine problem solving situations; uses properties of algebra as well as order of operations to generate equivalent algebraic expressions and solve problems; represents and solves equations involving one variable, symbolically.
Partially Meets State Standard	750 Partially Meets the Standard Matches a proportion to a given problem situation; writes algebraic expressions using the commutative and associative properties; solves equations numerically (by substitution).
Does Not Meet State Standard	740 Does Not Meet the Standard Represents simple context as a graph; relies on key words to determine operations to represent relationships; solves one-step equations in explicit situations following rote procedure, instead of the concept of equality.
Does Not Meet State Standard	701

8th Grade

Meets State Standard	899 Exceeds the Standard Conceptual understanding of dependent and independent variables; solves equations and inequalities and interprets solutions; represents non-routine linear situations with tables, verbal descriptions, symbols, equations, and graphs; converts between forms of a linear equation (i.e., standard, point-slope, slope-intercept); knows names of algebraic properties for justification in evaluating algebraic expressions; represents systems of linear equations provided a verbal description; solves a linear system algebraically and graphically and expresses the solution as an ordered pair.
Meets State Standard	861 Meets the Standard Recognizes a linear function in symbolic and graphic presentations; represents familiar and routine linear situations with tables, verbal descriptions, symbols, equations, and graphs and translates from one representation to another; identifies graphical properties of linear functions; generates and evaluates equivalent algebraic expressions; identifies systems of linear equations when provided a verbal description; identifies the solution of a linear system as the intersection of the two lines when given the graph; solves equations and inequalities using algebraic properties.
Partially Meets State Standard	850 Partially Meets the Standard Recognizes familiar linear functions in symbolic (using key variables) and graphic presentations; translates linear representations from an equation in slope-intercept form to a graph; identifies y-intercept and slope from graphical representation or an equation written in slope-intercept form; evaluates routine algebraic expressions; solves equations with variables using substitution.
Does Not Meet State Standard	840 Does Not Meet the Standard Recognizes linear functions in graphic presentations; translates linear representations from a table to a graph; identifies slope by counting whole number units on a graph; identifies patterns in a table of a linear function (e.g., recognizes patterns for x or y-values but not the relationship between x and y); substitutes "easy" numbers and evaluates simple expressions.
Does Not Meet State Standard	801

Geometry and Measurement MCA-III Achievement Level Descriptors

General comments for all grade levels

Exceeds the Standard	Exceeds the Standard Students at this level of mathematics exceed the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated very consistently may include:
Meets the Standard	Meets the Standard Student at this level of mathematics meet the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:
Partially Meets the Standard	Partially Meets the Standard Students at this level partially meet the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:
Does Not Meet the Standard	Does Not Meet the Standard Students at this level succeed at few of the fundamental mathematical skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:

Reflection Questions

- What patterns emerge in the **Geometry and Measurement** Strand?
- What similarities and differences do you notice from grade to grade?
- How do the 'verbs' change at each of the 4 achievement levels?
- What can you do to assure all students meet the state standards for this strand?

3rd Grade

Exceeds the Standard	Exceeds the Standard Distinguishes between parallel and perpendicular lines in a shape; conceptual understanding of perimeter; determines elapsed time and does not require a graphic.
Meets the Standard	Meets the Standard Identifies parallel and perpendicular lines; calculates perimeter; makes correct change from a dollar; tells time from an analog clock; determines elapsed time within an hour; solves problems involving reading a thermometer and calculating temperature.
Partially Meets the Standard	Partially Meets the Standard Names and describes polygons based on a familiar pictorial orientation by counting number of sides; determines perimeter using additive model.
Does Not Meet the Standard	Does Not Meet the Standard Recognizes parallel lines; matches a picture to the name of a familiar polygon (pattern blocks); knows to use a ruler to measure distance; knows the value of coins; reads a thermometer.

4th Grade

Exceeds the Standard	Exceeds the Standard Names and classifies polygons in a variety of contexts and orientations; conceptual understanding that polygons can be described using sides AND/OR angles; calculates area by decomposing shapes into rectangles; applies transformations to shapes; conceptual understanding of congruency (reference MN Academic Standards 4.3.3.4).
Meets the Standard	Meets the Standard Names and describes triangles and common quadrilaterals using definitions; classifies angles in a variety of orientations; conceptual understanding of area as length times width; identifies a transformation (reference MN Academic Standards 4.3.3).
Partially Meets the Standard	Partially Meets the Standard Names and describes polygons based on a familiar pictorial orientation using solely one attribute; identifies lines of symmetry; recognizes congruent shapes with the same orientation; calculates perimeter when all sides of a graphic are labeled.
Does Not Meet the Standard	Does Not Meet the Standard Names familiar polygons (e.g., pattern blocks); classifies angles in a familiar orientation (e.g., one ray is horizontal).

5th Grade

Exceeds the Standard	Exceeds the Standard Understands the connections between two- and three-dimensional representations; conceptual understanding of area, surface area, and volume.
Meets the Standard	Meets the Standard Classifies three-dimensional figures and describes distinct attributes using correct vocabulary; uses formulas to calculate area, surface area, and volume; decomposes familiar shapes.
Partially Meets the Standard	Partially Meets the Standard Recognizes similar attributes of three-dimensional figures; limited vocabulary for attributes of three-dimensional figures; recognizes area as a multiplicative model (e.g., multiplies two sides of any shape to find area).
Does Not Meet the Standard	Does Not Meet the Standard Distinguishes between two- and three-dimensional shapes; uses informal naming conventions.

6th Grade

Exceeds the Standard	Exceeds the Standard Determines area and perimeter of irregular shapes; determines surface area; understands and uses relationships between angles in geometric figures; converts among units of measure within a measurement system.
Meets the Standard	Meets the Standard Recognizes and applies formulas for two- and three-dimensional figures; determines area and perimeter of irregular shapes when key is one-square unit; recognizes vocabulary associated with angles; knows basic conversions among units within a measurement system (e.g., feet to inches, centimeters to meters).
Partially Meets the Standard	Partially Meets the Standard Calculates area and volume for basic figures (rectangles) when dimensions are provided; determines area and perimeter of irregular shapes by counting; calculates surface area when a net is provided; converts between feet and inches, hours and minutes.
Does Not Meet the Standard	Does Not Meet the Standard When determining area and perimeter of irregular shapes, counts by whole numbers (part is whole, diagonal is always one unit); associates 180 degrees with a triangle and 90 degrees with a right angle; finds one missing angle if given the other two in a triangle; given a problem requiring unit conversion, will multiply or divide.

7th Grade

Exceeds the Standard	Exceeds the Standard Justifies formulas for surface area and volume; can see relationships between circles and cylinders; solves problems involving scale factor and area ratios (with or without a diagram); uses algebraic rules to describe multiple translations or reflections on a grid.
Meets the Standard	Meets the Standard Uses formulas to calculate area and circumference of circles and volume and surface area of cylinders; uses proportions and ratios to solve problems involving scale drawings and conversions; uses verbal descriptions to perform translations or reflections on a grid.
Partially Meets the Standard	Partially Meets the Standard Uses formulas for area and circumference of a circle and volume of a cylinder when exact values to substitute are given; solves problems with similar figures when a diagram is provided with corresponding parts labeled with "friendly" numbers; uses verbal description to perform a single translation or reflection on a grid.
Does Not Meet the Standard	Does Not Meet the Standard Calculates the circumference of a circle when given the diameter; recognizes a translation or a reflection on a coordinate grid.

8th Grade

Exceeds the Standard	Exceeds the Standard Conceptual understanding of the Pythagorean Theorem and applies it in non-routine problems; understands and applies slopes of parallel and perpendicular lines graphically and symbolically.
Meets the Standard	Meets the Standard Applies the Pythagorean Theorem to solve problems; identifies parallel lines graphically and symbolically; partial connection of slope with perpendicular lines.
Partially Meets the Standard	Partially Meets the Standard Substitutes numbers in the Pythagorean Theorem to determine hypotenuse; partial connection of slope with parallel lines.
Does Not Meet the Standard	Does Not Meet the Standard Recognizes the equation for the Pythagorean Theorem; recognizes parallel or perpendicular lines on a graph.

Data Analysis and Probability MCA-III Achievement Level Descriptors

General comments for all grade levels

Meets State Standard	Exceeds the Standard Students at this level of mathematics exceed the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated very consistently may include:
Meets State Standard	Meets the Standard Student at this level of mathematics meet the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:
Partially Meets State Standard	Partially Meets the Standard Students at this level partially meet the mathematics skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:
Does Not Meet State Standard	Does Not Meet the Standard Students at this level succeed at few of the fundamental mathematical skills of the Minnesota Academic Standards. Some of the skills demonstrated may include:

Reflection Questions

- What patterns emerge in the **Data Analysis and Probability Strand**?
- What similarities and differences do you notice from grade to grade?
- How do the 'verbs' change at each of the 4 achievement levels?
- What can you do to assure all students meet the state standards for this strand?

3rd Grade

Meets State Standard	399 Exceeds the Standard Translates between data and data displays in a variety of situations.
Meets State Standard	366 Meets the Standard Interprets bar graphs, pictographs, and tally charts.
Partially Meets State Standard	350 Partially Meets the Standard Matches set of data with data display (e.g., table or graph).
Does Not Meet State Standard	340 Does Not Meet the Standard Reads data from a bar graph.
Does Not Meet State Standard	301

4th Grade

Meets State Standard	499 Exceeds the Standard Conceptual understanding of solving problems involving data displays, including timelines and Venn diagrams
Meets State Standard	466 Meets the Standard Collects, organizes, and displays data; solves problems in data displays involving fractions.
Partially Meets State Standard	450 Partially Meets the Standard Translates between tables and bar graphs.
Does Not Meet State Standard	440 Does Not Meet the Standard Displays data from a table in a bar graph
Does Not Meet State Standard	401

5th Grade

Meets State Standard	599 Exceeds the Standard Conceptual understanding of mean, median and range; analyzes complex situations that include data displays and making interpretations.
Meets State Standard	563 Meets the Standard Calculates mean, median and range, and data can be provided in a variety of formats (e.g., tables, bar graphs); works fluently with data displays and solving problems.
Partially Meets State Standard	550 Partially Meets the Standard Applies rote procedures for calculating mean, median and range (e.g., median is always middle number in a list); interprets simple displays of data to solve problems.
Does Not Meet State Standard	540 Does Not Meet the Standard Performs procedures for finding mean, median and range according to direct instructions; reads displays of data.
Does Not Meet State Standard	501

6th Grade

Meets State Standard	699 Exceeds the Standard Represents probabilities in real-world problems, including determining sample space in a variety of ways; understands concept of probability; solves problems involving compound probability.
Meets State Standard	662 Meets the Standard Determines sample space; understands simple probability in fractions, decimals, and percents.
Partially Meets State Standard	650 Partially Meets the Standard Determines sample space (i.e., the set of all possible outcomes) in a simple and very familiar context; understands simple probability expressed in fractional form.
Does Not Meet State Standard	640 Does Not Meet the Standard Determines probability as a fraction when sample space is given.
Does Not Meet State Standard	601

7th Grade

Meets State Standard	799 Exceeds the Standard Efficiently determines mean, median and range regardless of presentation; understands abstractly how change in data set impacts mean and median (quantity of change without recalculating); interprets circle graphs and histograms to solve problems; uses proportions to calculate probabilities and solve non-routine problems.
Meets State Standard	760 Meets the Standard Calculates mean, median and range from various data displays; understands impact of change in data set (increase or decrease); reads circle graphs and histograms to solve problems; calculates probability as a fraction of sample space.
Partially Meets State Standard	750 Partially Meets the Standard Calculates mean, median and range from a string of numbers (knows to order data set to determine median – or does not have to write down the ordered data set); reads circle graphs to solve problems; determines the sample space for an experiment using inefficient procedures; understands simple probability in fractions, decimals, and percents.
Does Not Meet State Standard	740 Does Not Meet the Standard Calculates mean, median and range from a string of numbers using rote procedures (numbers must be in increasing order to calculate median); matches a given data set to the graph of the data; determines sample space (i.e., the set of all possible outcomes) in a simple and very familiar context; understands simple probability expressed in fractional form.
Does Not Meet State Standard	701

8th Grade

Meets State Standard	899 Exceeds the Standard Given a data set, student determines the line of best fit and interprets the data; assesses reasonableness of predictions in non-routine situations
Meets State Standard	861 Meets the Standard Given a data set, student identifies the line of best fit and interprets the data; makes predictions about the data set.
Partially Meets State Standard	850 Partially Meets the Standard Given a data set, student identifies the line of best fit and makes statements about the general trend of the data.
Does Not Meet State Standard	840 Does Not Meet the Standard Generalizes the properties of the line of best fit of a graphed data set; displays data using scatterplots.
Does Not Meet State Standard	801