Department of Education

Adopted Permanent Rules Relating to Academic Standards for Mathematics

3501.0700 KINDERGARTEN STANDARDS.

Subpart 1. **Number and operation.**

A.   The student will understand the relationship between quantities and whole numbers up to 31.

B.   The student will use objects and pictures to represent situations involving combining and separating.

Subp. 2. **Algebra.** The student will recognize, create, complete, and extend patterns.

Subp. 3. **Geometry and measurement.**

A.   The student will recognize and sort basic two- and three-dimensional shapes and use them to model real-world objects.

B.   The student will compare and order objects according to location and measurable attributes.

3501.0705 GRADE 1 STANDARDS.

Subpart 1. **Number and operation.**

A. The student will count, compare, and represent whole numbers up to 120, with an emphasis on groups of tens and ones.

B. The student will use a variety of models and strategies to solve addition and subtraction problems in real-world and mathematical contexts.

Subp. 2. **Algebra.**

A. The student will recognize and create patterns and use rules to describe patterns.

2.1   B. The student will use number sentences involving addition and subtraction

2.2 basic facts to represent and solve real-world and mathematical problems. The student will

2.3 create real-world situations corresponding to number sentences.

2.4   Subp. 3. **Geometry and measurement.**

2.5   A. The student will describe characteristics of basic shapes. The student will use

2.6 basic shapes to compose and decompose other objects in various contexts.

2.7   B. The student will use basic concepts of measurement in real-world and

2.8 mathematical situations involving length, time, and money.

2.9 **3501.0710 GRADE 2 STANDARDS.**

2.10   Subpart 1. **Number and operation.**

2.11   A.   The student will compare and represent whole numbers up to 1,000 with

2.12 an emphasis on place value and equality.

2.13   B.   The student will demonstrate mastery of addition and subtraction basic

2.14 facts. The student will add and subtract one- and two-digit numbers in real-world and

2.15 mathematical problems.

2.16   Subp. 2. **Algebra.**

2.17   A.   The student will recognize, create, describe, and use patterns and rules to

2.18 solve real-world and mathematical problems.

2.19   B.   The student will use number sentences involving addition, subtraction, and

2.20 unknowns to represent and solve real-world and mathematical problems. The student will

2.21 create real-world situations corresponding to number sentences.

2.22   Subp. 3. **Geometry and measurement.**

2.23   A.   The student will identify, describe, and compare basic shapes according to

2.24 their geometric attributes.

3.1   B.   The student will understand length as a measurable attribute. The student

3.2   will use tools to measure length.

3.3   C.   The student will use time and money in real-world and mathematical

3.4   situations.

3.5   **3501.0715 GRADE 3 STANDARDS.**

3.6   Subpart 1. **Number and operation.**

3.7   A.   The student will compare and represent whole numbers up to 100,000 with

3.8   an emphasis on place value and equality.

3.9   B.   The student will add and subtract multidigit whole numbers. The student will

3.10   represent multiplication and division in various ways. The student will solve real-world

3.11   and mathematical problems using arithmetic.

3.12   C.   The student will understand meanings and uses of fractions in real-world and

3.13   mathematical situations.

3.14   Subp. 2. **Algebra.**

3.15   A.   The student will use single-operation input-output rules to represent patterns

3.16   and relationships, and to solve real-world and mathematical problems.

3.17   B.   The student will use number sentences involving multiplication and division

3.18   basic facts and unknowns to represent and solve real-world and mathematical problems.

3.19   The student will create real-world situations corresponding to number sentences.

3.20   Subp. 3. **Geometry and measurement.**

3.21   A.   The student will use geometric attributes to describe and create shapes

3.22   in various contexts.

3.23   B.   The student will understand perimeter as a measurable attribute of real-world

3.24   and mathematical objects. The student will use various tools to measure distances.

4.1   C. The student will use time, money, and temperature to solve real-world and

4.2 mathematical problems.

4.3   Subp. 4. **Data analysis.** The student will collect, organize, display, and interpret

4.4 data. The student will use labels and a variety of scales and units in displays.

4.5 **3501.0720 GRADE 4 STANDARDS.**

4.6   Subpart 1. **Number and operation.**

4.7   A. The student will demonstrate mastery of multiplication and division basic

4.8 facts. The student will multiply multidigit numbers and solve real-world and mathematical

4.9 problems using arithmetic.

4.10   B. The student will represent and compare fractions and decimals in real-world

4.11 and mathematical situations. The student will use place value to understand how decimals

4.12 represent quantities.

4.13   Subp. 2. **Algebra.**

4.14   A. The student will use input-output rules, tables, and charts to represent

4.15 patterns and relationships and to solve real-world and mathematical problems.

4.16   B. The student will use number sentences involving multiplication, division,

4.17 and unknowns to represent and solve real-world and mathematical problems. The student

4.18 will create real-world situations corresponding to number sentences.

4.19   Subp. 3. **Geometry and measurement.**

4.20   A. The student will name, describe, classify, and sketch polygons.

4.21   B. The student will understand angle and area as measurable attributes of

4.22 real-world and mathematical objects. The student will use various tools to measure angles

4.23 and areas.

5.1   C. The student will use translations, reflections, and rotations to establish

5.2 congruency and understand symmetries.

5.3   Subp. 4. **Data analysis.** The student will collect, organize, display, and interpret

5.4 data, including data collected over a period of time and data represented by fractions

5.5 and decimals.

5.6 **3501.0725 GRADE 5 STANDARDS.**

5.7   Subpart 1. **Number and operation.**

5.8   A. The student will divide multidigit numbers. The student will solve real-world

5.9 and mathematical problems using arithmetic.

5.10   B. The student will read, write, represent, and compare fractions and decimals.

5.11 The student will recognize and write equivalent fractions, and convert between fractions

5.12 and decimals. The student will use fractions and decimals in real-world and mathematical

5.13 situations.

5.14   C. The student will add and subtract fractions, mixed numbers, and decimals to

5.15 solve real-world and mathematical problems.

5.16   Subp. 2. **Algebra.**

5.17   A. The student will recognize and represent patterns of change. The student

5.18 will use patterns, tables, graphs, and rules to solve real-world and mathematical problems.

5.19   B. The student will use properties of arithmetic to generate equivalent numerical

5.20 expressions and evaluate expressions involving whole numbers.

5.21   C. The student will understand and interpret equations and inequalities

5.22 involving variables and whole numbers, and use them to represent and solve real-world

5.23 and mathematical problems.

5.24   Subp. 3. **Geometry and measurement.**

6.1   A.   The student will describe, classify, and draw representations of

6.2 three-dimensional figures.

6.3   B.   The student will determine the area of triangles and quadrilaterals. The

6.4 student will determine the surface area and volume of rectangular prisms in various

6.5 contexts.

6.6   Subp. 4. **Data analysis.** The student will display and interpret data. The student

6.7 will determine mean, median, and range.

6.8 **3501.0730 GRADE 6 STANDARDS.**

6.9   Subpart 1. **Number and operation.**

6.10   A.   The student will read, write, represent, and compare positive rational

6.11 numbers expressed as fractions, decimals, percents, and ratios. The student will write

6.12 positive integers as products of factors. The student will use these representations in

6.13 real-world and mathematical situations.

6.14   B.   The student will understand the concept of ratio and its relationship to

6.15 fractions and to the multiplication and division of whole numbers. The student will use

6.16 ratios to solve real-world and mathematical problems.

6.17   C.   The student will multiply and divide decimals, fractions, and mixed numbers.

6.18 The student will solve real-world and mathematical problems using arithmetic with

6.19 positive rational numbers.

6.20   Subp. 2. **Algebra.**

6.21   A.   The student will recognize and represent relationships between varying

6.22 quantities. The student will translate from one representation to another. The student will

6.23 use patterns, tables, graphs, and rules to solve real-world and mathematical problems.

6.24   B.   The student will use properties of arithmetic to generate equivalent numerical

6.25 expressions and evaluate expressions involving positive rational numbers.

7.1   C.   The student will understand and interpret equations and inequalities

7.2 involving variables and positive rational numbers. The student will use equations and

7.3 inequalities to represent real-world and mathematical problems. The student will use the

7.4 idea of maintaining equality to solve equations. The student will interpret solutions in

7.5 the original context.

7.6   Subp. 3. **Geometry and measurement.**

7.7   A.   The student will calculate perimeter, area, surface area, and volume of two-

7.8 and three-dimensional figures to solve real-world and mathematical problems.

7.9   B.   The student will understand and use relationships between angles in

7.10 geometric figures.

7.11   C.   The student will choose appropriate units of measurement and use ratios to

7.12 convert within measurement systems to solve real-world and mathematical problems.

7.13   Subp. 4. **Data analysis and probability.** The student will use probabilities to solve

7.14 real-world and mathematical problems. The student will represent probabilities using

7.15 fractions, decimals, and percents.

7.16 **3501.0735 GRADE 7 STANDARDS.**

7.17   Subpart 1. **Number and operation.**

7.18   A.   The student will apply, read, write, represent, and compare positive and

7.19 negative rational numbers, expressed as integers, fractions, and decimals.

7.20   B.   The student will calculate with positive and negative rational numbers, and

7.21 rational numbers with whole number exponents, to solve real-world and mathematical

7.22 problems.

7.23   Subp. 2. **Algebra.**

8.1　　　　　A.　The student will understand the concept of proportionality in real-world and

8.2　　mathematical situations, and distinguish between proportional and other relationships.

8.3　　　　　B.　The student will recognize proportional relationships in real-world and

8.4　　mathematical situations. The student will represent these and other relationships with

8.5　　tables, verbal descriptions, symbols, and graphs. The student will solve problems

8.6　　involving proportional relationships and explain results in the original context.

8.7　　　　　C.　The student will apply understanding of order of operations and algebraic

8.8　　properties to generate equivalent numerical and algebraic expressions containing positive

8.9　　and negative rational numbers and grouping symbols. The student will evaluate such

8.10　　expressions.

8.11　　　　　D.　The student will represent real-world and mathematical situations using

8.12　　equations with variables. The student will solve equations symbolically, using the

8.13　　properties of equality. The student will also solve equations graphically and numerically.

8.14　　The student will interpret solutions in the original context.

8.15　　　Subp. 3. **Geometry and measurement.**

8.16　　　　　A.　The student will use reasoning with proportions and ratios to determine

8.17　　measurements, justify formulas, and solve real-world and mathematical problems

8.18　　involving circles and related geometric figures.

8.19　　　　　B.　The student will analyze the effect of change of scale, translations, and

8.20　　reflections on the attributes of two-dimensional figures.

8.21　　　Subp. 4. **Data analysis and probability.**

8.22　　　　　A.　The student will use mean, median, and range to draw conclusions about

8.23　　data and make predictions.

8.24　　　　　B.　The student will display and interpret data in a variety of ways, including

8.25　　circle graphs and histograms.

9.1   C.   The student will calculate probabilities and reason about probabilities using

9.2   proportions to solve real-world and mathematical problems.

9.3   **3501.0740 GRADE 8 STANDARDS.**

9.4   Subpart 1. **Number and operation.** The student will read, write, compare, classify,

9.5   and represent real numbers, and use them to solve problems in various contexts.

9.6   Subp. 2. **Algebra.**

9.7   A.   The student will understand the concept of function in real-world and

9.8   mathematical situations, and distinguish between linear and nonlinear functions.

9.9   B.   The student will recognize linear functions in real-world and mathematical

9.10   situations. The student will represent linear functions and other functions with tables,

9.11   verbal descriptions, symbols, and graphs. The student will solve problems involving these

9.12   functions and explain results in the original context.

9.13   C.   The student will generate equivalent numerical and algebraic expressions

9.14   and use algebraic properties to evaluate expressions.

9.15   D.   The student will represent real-world and mathematical situations using

9.16   equations and inequalities involving linear expressions. The student will solve equations

9.17   and inequalities symbolically and graphically. The student will interpret solutions in

9.18   the original context.

9.19   Subp. 3. **Geometry and measurement.**

9.20   A.   The student will solve problems involving right triangles using the

9.21   Pythagorean Theorem and its converse.

9.22   B.   The student will solve problems involving parallel and perpendicular lines

9.23   on a coordinate system.

10.1   Subp. 4. **Data analysis and probability.** The student will interpret data using

10.2   scatterplots and approximate lines of best fit. The student will use lines of best fit to draw

10.3   conclusions about data.

10.4   **3501.0745 GRADES 9 THROUGH 11 STANDARDS.**

10.5   Subpart 1. **Algebra.**

10.6   A.   The student will understand the concept of function, and identify important

10.7   features of functions and other relations using symbolic and graphical methods where

10.8   appropriate.

10.9   B.   The student will recognize linear, quadratic, exponential, and other common

10.10   functions in real-world and mathematical situations. The student will represent these

10.11   functions with tables, verbal descriptions, symbols, and graphs. The student will solve

10.12   problems involving these functions, and explain results in the original context.

10.13   C.   The student will generate equivalent algebraic expressions involving

10.14   polynomials and radicals. The student will use algebraic properties to evaluate expressions.

10.15   D.   The student will represent real-world and mathematical situations using

10.16   equations and inequalities involving linear, quadratic, exponential, and n^{th} root functions.

10.17   The student will solve equations and inequalities symbolically and graphically. The

10.18   student will interpret solutions in the original context.

10.19   Subp. 2. **Geometry and measurement.**

10.20   A.   The student will calculate measurements of plane and solid geometric

10.21   figures. The student will know that physical measurements depend on the choice of a unit

10.22   and that they are approximations.

10.23   B.   The student will construct logical arguments based on axioms, definitions,

10.24   and theorems in order to prove theorems and other results in geometry.

11.1   C.   The student will know and apply properties of geometric figures to solve

11.2 real-world and mathematical problems and to logically justify results in geometry.

11.3   D.   The student will solve real-world and mathematical geometric problems

11.4 using algebraic methods.

11.5   Subp. 3. **Data analysis and probability.**

11.6   A.   The student will display and analyze data. The student will use various

11.7 measures associated with data to draw conclusions, identify trends, and describe

11.8 relationships.

11.9   B.   The student will explain the uses of data and statistical thinking to draw

11.10 inferences, make predictions, and justify conclusions.

11.11   C.   The student will calculate probabilities and apply probability concepts to

11.12 solve real-world and mathematical problems.

11.13 **REPEALER.** Minnesota Rules, parts 3501.0560; 3501.0565; 3501.0570; 3501.0575;

11.14 3501.0580; 3501.0585; 3501.0590; 3501.0595; 3501.0600; 3501.0605; and 3501.0610,

11.15 are repealed.