

**CHAPTER 3501**  
**DEPARTMENT OF EDUCATION**  
**GRADUATION STANDARDS**

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3501.0660 ACADEMIC STANDARDS FOR KINDERGARTEN THROUGH GRADE 12.

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3501.0905 GRADE 1 STANDARDS.  
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3501.1410 PHYSICAL EDUCATION STANDARDS.

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#### **ACADEMIC STANDARDS FOR LANGUAGE ARTS**

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#### **3501.0660 ACADEMIC STANDARDS FOR KINDERGARTEN THROUGH GRADE 12.**

Subpart 1. **Purpose and application.** The purpose of these standards is to establish statewide standards for English Language Arts that govern instruction of students in kindergarten through grade 12. School districts shall assess a student's performance using criteria in subparts 2 to 4.



**Subp. 2. Reading.**

A. The student will demonstrate knowledge of oral language, phonological and phonemic awareness, phonics, and morphology to read accurately and fluently.

B. The student will read and comprehend independently both self-selected and teacher-directed texts; complex literary and informational texts; and texts from multiple sources representing perspectives and identities like and unlike their own from dominant, nondominant, and marginalized social groups.

C. The student will independently read and comprehend both self-selected and teacher-directed complex literary and informational texts representing perspectives of historical and contemporary Dakota and Anishinaabe people.

D. The student will read critically to comprehend, interpret, and analyze themes and central ideas in complex literary and informational texts.

E. The student will apply knowledge of text structure to understand and evaluate a wide variety of complex literary and informational texts.

F. The student will analyze influences on content, meaning, and style of text, including fact and fiction, time period, and author perspective and identity, including Dakota and Anishinaabe perspective, in complex literary and informational texts.

G. The student will evaluate arguments and specific claims from complex informational texts.

H. The student will examine the impact of vocabulary, including words and phrases, on content, style, and meaning of complex literary and informational texts.

I. The student will access and gather information from a variety of sources representing diverse perspectives and assess the relevance and credibility of the information.

**Subp. 3. Writing.**

A. The student will demonstrate knowledge of oral language, orthography, grammar, and mechanics to express ideas in writing.

B. The student will write routinely for various purposes and disciplines, representing one's own personal perspective, identity, and voice.

C. The student will develop and strengthen writing by using a writing process, including planning, drafting, revising, editing, and publishing.

D. The student will write arguments to support claims and to persuade in an analysis of topics or texts using valid reasoning and evidence, while considering the audience and context.

E. The student will write informative or explanatory texts to examine and convey complex ideas and information clearly and accurately through use of informational and literary text, while considering the audience and context.

F. The student will write narratives, poetry, and other creative texts with details and effective technique to express ideas.

G. The student will engage in inquiry-based learning and research processes to create texts and presentations for a variety of purposes and audiences.

H. The student will use evidence from sources to support writing, correctly cite those sources, and demonstrate an understanding of the rights and obligations of using intellectual property.

**Subp. 4. Speaking, listening, viewing, and exchanging ideas.**

A. The student will exchange ideas in discussion and collaboration as a listener, speaker, and participant by:

(1) including the voices and perspectives of Dakota and Anishinaabe people as well as other perspectives, identities, and cultures like and unlike their own; and

(2) expressing one's own ideas, stories, and experiences.

B. The student will communicate with others by applying knowledge of vocabulary, language, structure, and features of spoken language, while considering the audience and context.

C. The student will thoughtfully and safely access, analyze, and create written, oral, and digital content applicable to a variety of purposes, audiences, and disciplines.

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**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.

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### **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.

B. The student will use number sentences involving addition and subtraction basic facts to represent and solve real-world and mathematical problems. The student will create real-world situations corresponding to number sentences.

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

A. The student will describe characteristics of basic shapes. The student will use basic shapes to compose and decompose other objects in various contexts.

B. The student will use basic concepts of measurement in real-world and mathematical situations involving length, time, and money.

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### **3501.0710 GRADE 2 STANDARDS.**

#### **Subpart 1. Number and operation.**

A. The student will compare and represent whole numbers up to 1,000 with an emphasis on place value and equality.

B. The student will demonstrate mastery of addition and subtraction basic facts. The student will add and subtract one- and two-digit numbers in real-world and mathematical problems.

#### **Subp. 2. Algebra.**

A. The student will recognize, create, describe, and use patterns and rules to solve real-world and mathematical problems.

B. The student will use number sentences involving addition, subtraction, and unknowns to represent and solve real-world and mathematical problems. The student will create real-world situations corresponding to number sentences.

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

A. The student will identify, describe, and compare basic shapes according to their geometric attributes.

B. The student will understand length as a measurable attribute. The student will use tools to measure length.

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

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**3501.0715 GRADE 3 STANDARDS.**

**Subpart 1. Number and operation.**

A. The student will compare and represent whole numbers up to 100,000 with an emphasis on place value and equality.

B. The student will add and subtract multidigit whole numbers. The student will represent multiplication and division in various ways. The student will solve real-world and mathematical problems using arithmetic.

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

**Subp. 2. Algebra.**

A. The student will use single-operation input-output rules to represent patterns and relationships, and to solve real-world and mathematical problems.

B. The student will use number sentences involving multiplication and division basic facts and unknowns to represent and solve real-world and mathematical problems. The student will create real-world situations corresponding to number sentences.

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

A. The student will use geometric attributes to describe and create shapes in various contexts.

B. The student will understand perimeter as a measurable attribute of real-world and mathematical objects. The student will use various tools to measure distances.

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

Subp. 4. **Data analysis.** The student will collect, organize, display, and interpret data. The student will use labels and a variety of scales and units in displays.

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## **3501.0720 GRADE 4 STANDARDS.**

### **Subpart 1. Number and operation.**

A. The student will demonstrate mastery of multiplication and division basic facts. The student will multiply multidigit numbers and solve real-world and mathematical problems using arithmetic.

B. The student will represent and compare fractions and decimals in real-world and mathematical situations. The student will use place value to understand how decimals represent quantities.

### **Subp. 2. Algebra.**

A. The student will use input-output rules, tables, and charts to represent patterns and relationships and to solve real-world and mathematical problems.

B. The student will use number sentences involving multiplication, division, and unknowns to represent and solve real-world and mathematical problems. The student will create real-world situations corresponding to number sentences.

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

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

B. The student will understand angle and area as measurable attributes of real-world and mathematical objects. The student will use various tools to measure angles and areas.

C. The student will use translations, reflections, and rotations to establish congruency and understand symmetries.

Subp. 4. **Data analysis.** The student will collect, organize, display, and interpret data, including data collected over a period of time and data represented by fractions and decimals.

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**3501.0725 GRADE 5 STANDARDS.****Subpart 1. Number and operation.**

A. The student will divide multidigit numbers. The student will solve real-world and mathematical problems using arithmetic.

B. The student will read, write, represent, and compare fractions and decimals. The student will recognize and write equivalent fractions, and convert between fractions and decimals. The student will use fractions and decimals in real-world and mathematical situations.

C. The student will add and subtract fractions, mixed numbers, and decimals to solve real-world and mathematical problems.

**Subp. 2. Algebra.**

A. The student will recognize and represent patterns of change. The student will use patterns, tables, graphs, and rules to solve real-world and mathematical problems.

B. The student will use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving whole numbers.

C. The student will understand and interpret equations and inequalities involving variables and whole numbers, and use them to represent and solve real-world and mathematical problems.

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

A. The student will describe, classify, and draw representations of three-dimensional figures.

B. The student will determine the area of triangles and quadrilaterals. The student will determine the surface area and volume of rectangular prisms in various contexts.

**Subp. 4. Data analysis.** The student will display and interpret data. The student will determine mean, median, and range.

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**3501.0730 GRADE 6 STANDARDS.****Subpart 1. Number and operation.**

A. The student will read, write, represent, and compare positive rational numbers expressed as fractions, decimals, percents, and ratios. The student will write positive integers as products of factors. The student will use these representations in real-world and mathematical situations.

B. The student will understand the concept of ratio and its relationship to fractions and to the multiplication and division of whole numbers. The student will use ratios to solve real-world and mathematical problems.

C. The student will multiply and divide decimals, fractions, and mixed numbers. The student will solve real-world and mathematical problems using arithmetic with positive rational numbers.

**Subp. 2. Algebra.**

A. The student will recognize and represent relationships between varying quantities. The student will translate from one representation to another. The student will use patterns, tables, graphs, and rules to solve real-world and mathematical problems.

B. The student will use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving positive rational numbers.

C. The student will understand and interpret equations and inequalities involving variables and positive rational numbers. The student will use equations and inequalities to represent real-world and mathematical problems. The student will use the idea of maintaining equality to solve equations. The student will interpret solutions in the original context.

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

A. The student will calculate perimeter, area, surface area, and volume of two- and three-dimensional figures to solve real-world and mathematical problems.

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

C. The student will choose appropriate units of measurement and use ratios to convert within measurement systems to solve real-world and mathematical problems.

**Subp. 4. Data analysis and probability.** The student will use probabilities to solve real-world and mathematical problems. The student will represent probabilities using fractions, decimals, and percents.

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**3501.0735 GRADE 7 STANDARDS.**

**Subpart 1. Number and operation.**

A. The student will apply, read, write, represent, and compare positive and negative rational numbers, expressed as integers, fractions, and decimals.

B. The student will calculate with positive and negative rational numbers, and rational numbers with whole number exponents, to solve real-world and mathematical problems.

**Subp. 2. Algebra.**

A. The student will understand the concept of proportionality in real-world and mathematical situations, and distinguish between proportional and other relationships.

B. The student will recognize proportional relationships in real-world and mathematical situations. The student will represent these and other relationships with tables, verbal descriptions, symbols, and graphs. The student will solve problems involving proportional relationships and explain results in the original context.

C. The student will apply understanding of order of operations and algebraic properties to generate equivalent numerical and algebraic expressions containing positive and negative rational numbers and grouping symbols. The student will evaluate such expressions.

D. The student will represent real-world and mathematical situations using equations with variables. The student will solve equations symbolically, using the properties of equality. The student will also solve equations graphically and numerically. The student will interpret solutions in the original context.

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

A. The student will use reasoning with proportions and ratios to determine measurements, justify formulas, and solve real-world and mathematical problems involving circles and related geometric figures.

B. The student will analyze the effect of change of scale, translations, and reflections on the attributes of two-dimensional figures.

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

A. The student will use mean, median, and range to draw conclusions about data and make predictions.

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

C. The student will calculate probabilities and reason about probabilities using proportions to solve real-world and mathematical problems.

**Statutory Authority:** *MS s 120B.023*

**History:** *33 SR 507*

**Published Electronically:** *October 3, 2013*

**3501.0740 GRADE 8 STANDARDS.**

Subpart 1. **Number and operation.** The student will read, write, compare, classify, and represent real numbers, and use them to solve problems in various contexts.

**Subp. 2. Algebra.**

A. The student will understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions.



B. The student will recognize linear functions in real-world and mathematical situations. The student will represent linear functions and other functions with tables, verbal descriptions, symbols, and graphs. The student will solve problems involving these functions and explain results in the original context.

C. The student will generate equivalent numerical and algebraic expressions and use algebraic properties to evaluate expressions.

D. The student will represent real-world and mathematical situations using equations and inequalities involving linear expressions. The student will solve equations and inequalities symbolically and graphically. The student will interpret solutions in the original context.

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

A. The student will solve problems involving right triangles using the Pythagorean Theorem and its converse.

B. The student will solve problems involving parallel and perpendicular lines on a coordinate system.

Subp. 4. **Data analysis and probability.** The student will interpret data using scatterplots and approximate lines of best fit. The student will use lines of best fit to draw conclusions about data.

**Statutory Authority:** *MS s 120B.023*

**History:** *33 SR 507*

**Published Electronically:** *October 3, 2013*

**3501.0745 GRADES 9 THROUGH 11 STANDARDS.**

**Subpart 1. Algebra.**

A. The student will understand the concept of function, and identify important features of functions and other relations using symbolic and graphical methods where appropriate.

B. The student will recognize linear, quadratic, exponential, and other common functions in real-world and mathematical situations. The student will represent these functions with tables, verbal descriptions, symbols, and graphs. The student will solve problems involving these functions, and explain results in the original context.

C. The student will generate equivalent algebraic expressions involving polynomials and radicals. The student will use algebraic properties to evaluate expressions.

D. The student will represent real-world and mathematical situations using equations and inequalities involving linear, quadratic, exponential, and  $n^{\text{th}}$  root functions. The student will solve equations and inequalities symbolically and graphically. The student will interpret solutions in the original context.

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

A. The student will calculate measurements of plane and solid geometric figures. The student will know that physical measurements depend on the choice of a unit and that they are approximations.

B. The student will construct logical arguments based on axioms, definitions, and theorems in order to prove theorems and other results in geometry.

C. The student will know and apply properties of geometric figures to solve real-world and mathematical problems and to logically justify results in geometry.

D. The student will solve real-world and mathematical geometric problems using algebraic methods.

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

A. The student will display and analyze data. The student will use various measures associated with data to draw conclusions, identify trends, and describe relationships.

B. The student will explain the uses of data and statistical thinking to draw inferences, make predictions, and justify conclusions.

C. The student will calculate probabilities and apply probability concepts to solve real-world and mathematical problems.

**Statutory Authority:** *MS s 120B.023*

**History:** *33 SR 507*

**Published Electronically:** *October 3, 2013*

**3501.0800** [Repealed, 45 SR 449]

**Published Electronically:** *November 23, 2020*

**3501.0805** [Repealed, 45 SR 449]

**Published Electronically:** *November 23, 2020*

**3501.0810** [Repealed, 45 SR 449]

**Published Electronically:** *November 23, 2020*

**3501.0815** [Repealed, 45 SR 449]

**Published Electronically:** *November 23, 2020*

**ACADEMIC STANDARDS FOR THE ARTS****3501.0820 ACADEMIC ARTS STANDARDS FOR KINDERGARTEN THROUGH GRADE 12.**

Subpart 1. **Application.** School districts that apply the statewide academic standards in the arts to measure accountability in media arts, dance, music, theater, or visual arts shall assess a student's performance using the criteria in subparts 2 to 6.

Subp. 2. **Foundations.** The student will use foundational knowledge and skills while responding to, creating, and presenting artistic work.

Subp. 3. **Create.**

- A. The student will generate and develop original artistic ideas.
- B. The student will create original artistic work.
- C. The student will revise and complete original artistic work.

Subp. 4. **Perform (dance, music, and theater) and present (media arts and visual arts).**

A. In dance, music, and theater:

- (1) The student will develop and refine artistic techniques and work for performance.
- (2) The student will make artistic choices in order to convey meaning through performance.

B. In media arts and visual arts:

- (1) The student will develop and refine artistic techniques and work for presentation.
- (2) The student will make artistic choices in order to convey meaning through presentation.

Subp. 5. **Respond.**

- A. The student will analyze and construct interpretations of artistic work.
- B. The student will evaluate artistic work by applying criteria.

Subp. 6. **Connect.**

A. The student will integrate knowledge and personal experiences while responding to, creating, and presenting artistic work.

B. The student will demonstrate an understanding that artistic works influence and are influenced by personal, societal, cultural, and historical contexts, including the contributions of Minnesota American Indian tribes and communities.

**Statutory Authority:** *MS s 120B.02; 120B.021*

**History:** 45 SR 449

**Published Electronically:** November 23, 2020

## ACADEMIC STANDARDS IN SCIENCE

### 3501.0900 KINDERGARTEN STANDARDS.

#### Subpart 1. **The nature of science and engineering.**

A. The practice of science. The student will understand that scientific inquiry is a set of interrelated processes used to pose questions about the natural world and investigate phenomena.

B. The practice of engineering. The student will understand that some objects occur in nature. The student will understand that others have been designed and processed by people.

Subp. 2. **Physical science; matter.** The student will understand that objects can be described in terms of the materials they are made of and their physical properties.

Subp. 3. **Earth and space science; interdependence within the earth system.** The student will understand that weather can be described in measurable quantities and changes from day to day and with the seasons.

#### Subp. 4. **Life science.**

A. Structure and function in living systems. The student will understand that living things are diverse with many different observable characteristics.

B. Interdependence among living systems. The student will understand that natural systems have many components that interact to maintain the living system.

**Statutory Authority:** *MS s 120B.02*

**History:** 34 SR 1609;

NOTE: This part is repealed effective September 2, 2025. 46 SR 325.

**Published Electronically:** October 5, 2021

### 3501.0905 GRADE 1 STANDARDS.

#### Subpart 1. **The nature of science and engineering.**

A. The practice of science. The student will understand that scientists work as individuals and in groups to investigate the natural world, emphasizing evidence and communicating with others.

B. Interactions among science, technology, engineering, mathematics, and society. The student will understand that designed and natural systems exist in the world. The student will understand that these systems are made up of components that act within a system and interact with other systems.

C. Interactions among science, technology, engineering, mathematics, and society. The student will understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.

Subp. 2. **Earth and space science; earth structure and processes.** The student will understand that earth materials include solid rocks, sand, soil, and water. The student will understand that these materials have different observable physical properties that make them useful.

Subp. 3. **Life science.**

A. Structure and function in living systems. The student will understand that living things are diverse with many different observable characteristics.

B. Interdependence among living systems. The student will understand that natural systems have many components that interact to maintain the system.

C. Evolution in living systems. The student will understand that plants and animals undergo a series of orderly changes during their life cycles.

**Statutory Authority:** *MS s 120B.02*

**History:** *34 SR 1609;*

NOTE: This part is repealed effective September 2, 2025. 46 SR 325.

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## **3501.0910 GRADE 2 STANDARDS.**

Subpart 1. **The nature of science and engineering.**

A. The practice of science. The student will understand that scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.

B. The practice of engineering. The student will understand that engineering design is the process of identifying a problem and devising a product or process to solve the problem.

Subp. 2. **Physical science.**

A. Matter. The student will understand that objects can be described in terms of the materials they are made of and their physical properties.

B. Matter. The student will understand that the physical properties of materials can be changed, but not all materials respond the same way to what is done to them.

C. Motion. The student will understand that the motion of an object can be described by a change in its position over time.

D. Motion. The student will understand that the motion of an object can be changed by push or pull forces.

Subp. 3. **Earth and space science; interdependence within the earth system.** The student will understand that weather can be described in measurable quantities and changes from day to day and with the seasons.

Subp. 4. **Life science.**

A. Structure and function in living systems. The student will understand that living things are diverse with many different observable characteristics.

B. Interdependence among living systems. The student will understand that natural systems have many components that interact to maintain the system.

C. Evolution in living systems. The student will understand that plants and animals undergo a series of orderly changes during their life cycles.

**Statutory Authority:** *MS s 120B.02*

**History:** *34 SR 1609;*

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### **3501.0915 GRADE 3 STANDARDS.**

Subpart 1. **The nature of science and engineering.**

A. The practice of science. The student will understand that scientists work as individuals and in groups, emphasizing evidence, open communication, and skepticism.

B. The practice of science. The student will understand that scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.

C. Interactions among science, technology, engineering, mathematics, and society. The student will understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.

D. Interactions among science, technology, engineering, mathematics, and society. The student will understand that tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.

Subp. 2. **Physical science; energy.** The student will understand that energy appears in different forms, including sound and light.

Subp. 3. **Earth and space science.**

A. The universe. The student will understand that the sun and moon have locations and movements that can be observed and described.

B. The universe. The student will understand that objects in the solar system as seen from Earth have various sizes and distinctive patterns of motion.

**Subp. 4. Life science.**

A. Structure and function in living systems. The student will understand that living things are diverse with many different characteristics that enable them to grow, reproduce, and survive.

B. Evolution in living systems. The student will understand that offspring are generally similar to their parents, but may have variations that can be advantageous or disadvantageous in a particular environment.

**Statutory Authority:** *MS s 120B.02*

**History:** *34 SR 1609;*

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**3501.0920 GRADE 4 STANDARDS.**

**Subpart 1. The nature of science and engineering.**

A. The practice of engineering. The student will understand that engineers design, create, and develop structures, processes, and systems that are intended to improve society and may make humans more productive.

B. The practice of engineering. The student will understand that engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.

C. Interactions among science, technology, engineering, mathematics, and society. The student will understand that the needs of any society influence the technologies that are developed and how they are used.

**Subp. 2. Physical science.**

A. Matter. The student will understand that objects have observable properties that can be measured.

B. Matter. The student will understand that solids, liquids, and gases are states of matter that have unique properties.

C. Energy. The student will understand that energy appears in different forms, including heat and electromagnetism.

D. Energy. The student will understand that energy can be transformed within a system or transferred to other systems or the environment.

**Subp. 3. Earth and space science.**

A. Earth structure and processes. The student will understand that rocks are Earth materials that may vary in composition.

B. Interdependence within the Earth system. The student will understand that water circulates through the Earth's crust, oceans, and atmosphere in what is known as the water cycle.

C. Human interactions with Earth systems. The student will understand that in order to improve their existence, humans interact with and influence Earth systems.

**Subp. 4. Life science; human interactions with living systems.** The student will understand that microorganisms can get inside one's body and they may keep it from working properly.

**Statutory Authority:** *MS s 120B.02*

**History:** *34 SR 1609;*

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**3501.0925 GRADE 5 STANDARDS.**

**Subpart 1. The nature of science and engineering.**

A. The practice of science. The student will understand that science is a way of knowing about the natural world, is done by individuals and in groups, and is characterized by empirical criteria, logical argument, and skeptical review.

B. The practice of science. The student will understand that scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.

C. Interactions among science, technology, engineering, mathematics, and society. The student will understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.

D. Interactions among science, technology, engineering, mathematics, and society. The student will understand that tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.

**Subp. 2. Physical science; motion.** The student will understand that an object's motion is affected by forces and can be described by the object's speed and the direction it is moving.

**Subp. 3. Earth and space science.**

A. Earth structure and processes. The student will understand that the surface of the Earth changes. The student will understand that some changes are due to slow processes and some changes are due to rapid processes.



B. Human interactions with Earth systems. The student will understand that in order to maintain and improve their existence, humans interact with and influence Earth systems.

**Subp. 4. Life science.**

A. Structure and function in living systems. The student will understand that living things are diverse with many different characteristics that enable them to grow, reproduce, and survive.

B. Interdependence among living systems. The student will understand that natural systems have many components that interact to maintain the living system.

C. Human interactions with living systems. The student will understand that humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.

**Statutory Authority:** *MS s 120B.02*

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**3501.0930 GRADE 6 STANDARDS.**

**Subpart 1. The nature of science and engineering.**

A. The practice of engineering. The student will understand that engineers create, develop, and manufacture machines, structures, processes, and systems that impact society and may make humans more productive.

B. The practice of engineering. The student will understand that engineering design is the process of devising products, processes, and systems that address a need, capitalize on an opportunity, or solve a specific problem.

C. Interactions among science, technology, engineering, mathematics, and society. The student will understand that designed and natural systems exist in the world. The student will understand that these systems consist of components that act within the system and interact with other systems.

D. Interactions among science, technology, engineering, mathematics, and society. The student will understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.

**Subp. 2. Physical science.**

A. Matter. The student will understand that pure substances can be identified by properties which are independent of the sample of the substance and the properties can be explained by a model of matter that is composed of small particles.

B. Matter. The student will understand that substances can undergo physical changes which do not change the composition or the total mass of the substance in a closed system.

C. Motion. The student will understand that the motion of an object can be described in terms of speed, direction, and change of position.

D. Motion. The student will understand that forces have magnitude and direction and affect the motion of objects.

E. Energy. The student will understand that waves involve the transfer of energy without the transfer of matter.

F. Energy. The student will understand that energy can be transformed within a system or transferred to other systems or the environment.

**Statutory Authority:** *MS s 120B.02*

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### **3501.0935 GRADE 7 STANDARDS.**

#### **Subpart 1. The nature of science and engineering.**

A. The practice of science. The student will understand that science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument, and skeptical review.

B. The practice of science. The student will understand that scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.

C. Interactions among science, technology, engineering, mathematics, and society. The student will understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.

**Subp. 2. Physical science; matter.** The student will understand that the idea that matter is made up of atoms and molecules provides the basis for understanding the properties of matter.

#### **Subp. 3. Life science.**

A. Structure and function in living systems. The student will understand that tissues, organs, and organ systems are composed of cells and function to serve the needs of all cells for food, air, and waste removal.

B. Structure and function in living systems. The student will understand that all organisms are composed of one or more cells which carry on the many functions needed to sustain life.

C. Interdependence among living systems. The student will understand that natural systems include a variety of organisms that interact with one another in several ways.

D. Interdependence among living systems. The student will understand that the flow of energy and the recycling of matter are essential to a stable ecosystem.

E. Evolution in living systems. The student will understand that reproduction is a characteristic of all organisms and is essential for the continuation of a species. The student will understand that hereditary information is contained in genes which are inherited through asexual or sexual reproduction.

F. Evolution in living systems. The student will understand that individual organisms with certain traits in particular environments are more likely than others to survive and have offspring.

G. Human interactions with living systems. The student will understand that human activity can change living organisms and ecosystems.

H. Human interactions with living systems. The student will understand that human beings are constantly interacting with other organisms that cause disease.

**Statutory Authority:** *MS s 120B.02*

**History:** *34 SR 1609;*

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### **3501.0940 GRADE 8 STANDARDS.**

#### **Subpart 1. The nature of science and engineering.**

A. The practice of science. The student will understand that science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument, and skeptical review.

B. The practice of science. The student will understand that scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.

C. Interactions among science, technology, engineering, mathematics, and society. The student will understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.

D. Interactions among science, technology, engineering, mathematics, and society. The student will understand that science and engineering operate in the context of society and both influence and are influenced by this context.

E. Interactions among science, technology, engineering, mathematics, and society. The student will understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.

#### **Subp. 2. Physical science.**

A. Matter. The student will understand that pure substances can be identified by properties which are independent of the sample of the substance and the properties can be explained by a model of matter that is composed of small particles.

B. Matter. The student will understand that substances can undergo physical changes and chemical changes which may change the properties of the substance but do not change the total mass in a closed system.

C. Energy. The student will understand that waves involve the transfer of energy without the transfer of matter.

**Subp. 3. Earth and space science.**

A. Earth structure and processes. The student will understand that the movement of tectonic plates results from interactions among the lithosphere, mantle, and core.

B. Earth structure and processes. The student will understand that landforms are the result of the combination of constructive and destructive processes.

C. Earth structure and processes. The student will understand that rocks and rock formations indicate evidence of the materials and conditions that produced them.

D. Interdependence within the Earth system. The student will understand that the sun is the principal external energy source for the Earth.

E. Interdependence within the Earth system. The student will understand that patterns of atmospheric movement influence global climate and local weather.

F. Interdependence within the Earth system. The student will understand that water, which covers the majority of the Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle.

G. The universe. The student will understand that the Earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects.

H. Human interactions with Earth systems. The student will understand that in order to maintain and improve their existence, humans interact with and influence Earth systems.

**Statutory Authority:** *MS s 120B.02*

**History:** *34 SR 1609;*

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**3501.0945 GRADES 9 THROUGH 12 STANDARDS.**

**Subpart 1. The nature of science and engineering.**

A. The practice of science. The student will understand that science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument, and skeptical review.

B. The practice of science. The student will understand that scientific inquiry uses multiple interrelated processes to investigate and explain the natural world.

C. The practice of engineering. The student will understand that engineering is a way of addressing human needs by applying science concepts and mathematical techniques to develop new products, tools, processes, and systems.

D. The practice of engineering. The student will understand that engineering design is an analytical and creative process of devising a solution to meet a need or solve a specific problem.

E. Interactions among science, technology, engineering, mathematics, and society. The student will understand that natural and designed systems are made up of components that act within a system and interact with other systems.

F. Interactions among science, technology, engineering, mathematics, and society. The student will understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.

G. Interactions among science, technology, engineering, mathematics, and society. The student will understand that science and engineering operate in the context of society and both influence and are influenced by this context.

H. Interactions among science, technology, engineering, mathematics, and society. The student will understand that science, technology, engineering, and mathematics rely on each other to enhance knowledge and understanding.

**Subp. 2. Physical science.**

A. Matter. The student will understand that the structure of the atom determines chemical properties of elements.

B. Matter. The student will understand that chemical reactions involve the rearrangement of atoms as chemical bonds are broken and formed through transferring or sharing of electrons and the absorption or release of energy.

C. Motion. The student will understand that an object's mass and the forces on it affect the motion of an object.

D. Energy. The student will understand that energy can be transformed within a system or transferred to other systems or the environment, but is always conserved.

E. Human interactions with physical systems. The student will understand that there are benefits, costs, and risks to different means of generating and using energy.

**Subp. 3. Earth and space science.**

A. Earth structure and processes. The student will understand that the relationships among earthquakes, mountains, volcanoes, fossil deposits, rock layers, and ocean features provide evidence for the theory of plate tectonics.

B. Earth structure and processes. The student will understand that by observing rock sequences and using fossils to correlate the sequences at various locations, geologic events can be inferred and geologic time can be estimated.

C. Interdependence within the Earth system. The student will understand that the Earth system has internal and external sources of energy, which produce heat and drive the motion of material in the oceans, atmosphere, and solid earth.

D. Interdependence within the Earth system. The student will understand that global climate is determined by distribution of energy from the sun at the Earth's surface.

E. Interdependence within the Earth system. The student will understand that the cycling of materials through different reservoirs of the Earth's system is powered by the Earth's sources of energy.

F. The universe. The student will understand that the solar system, sun, and Earth formed over billions of years.

G. The universe. The student will understand that the Big Bang theory states that the universe expanded from a hot, dense, chaotic mass, after which chemical elements formed and clumped together to eventually form stars and galaxies.

H. Human interactions with Earth systems. The student will understand that people consider potential benefits, costs, and risks to make decisions on how they interact with natural systems.

#### Subp. 4. **Life science.**

A. Structure and function in living systems. The student will understand that organisms use the interaction of cellular processes as well as tissues and organ systems to maintain homeostasis.

B. Structure and function in living systems. The student will understand that cells and cell structures have specific functions that allow an organism to grow, survive, and reproduce.

C. Interdependence among living systems. The student will understand that the interrelationship and interdependence of organisms generate dynamic biological communities in ecosystems.

D. Interdependence among living systems. The student will understand that matter cycles and energy flows through different levels of organization of living systems and the physical environment, as chemical elements are combined in different ways.

E. Evolution in living systems. The student will understand that genetic information found in the cell provides information for assembling proteins, which dictate the expression of traits in an individual.

F. Evolution in living systems. The student will understand that variation within a species is the natural result of new inheritable characteristics occurring from new combinations of existing genes or from mutations of genes in reproductive cells.

G. Evolution in living systems. The student will understand that evolution by natural selection is a scientific explanation for the history and diversity of life on Earth.

H. Human interactions with living systems. The student will understand that human activity has consequences on living organisms and ecosystems.

I. Human interactions with living systems. The student will understand that personal and community health can be affected by the environment, body functions, and human behavior.

**Statutory Authority:** *MS s 120B.02*

**History:** *34 SR 1609;*

NOTE: This part is repealed effective September 2, 2025. 46 SR 325.

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### **3501.0950 GRADES 9 THROUGH 12 CHEMISTRY STANDARDS.**

#### **Subpart 1. The nature of science and engineering.**

A. Interactions among science, technology, engineering, mathematics, and society. The student will understand that developments in chemistry affect society and societal concerns affect the field of chemistry.

B. Interactions among science, technology, engineering, mathematics, and society. The student will understand that physical and mathematical models are used to describe physical systems.

#### **Subp. 2. Physical science.**

A. Matter. The student will understand that the periodic table illustrates how patterns in the physical and chemical properties of elements are related to atomic structure.

B. Matter. The student will understand that chemical and physical properties of matter result from the ability of atoms to form bonds.

C. Matter. The student will understand that chemical reactions describe a chemical change in which one or more reactants are transformed into one or more products.

D. Matter. The student will understand that states of matter can be described in terms of motion of molecules and that the properties and behavior of gases can be explained using the kinetic molecular theory.

**Statutory Authority:** *MS s 120B.02*

**History:** *34 SR 1609;*

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**3501.0955 GRADES 9 THROUGH 12 PHYSICS STANDARDS.****Subpart 1. The nature of science and engineering.**

A. Interactions among science, technology, engineering, mathematics, and society. The student will understand that developments in physics affect society and societal concerns affect the field of physics.

B. Interactions among science, technology, engineering, mathematics, and society. The student will understand that physical and mathematical models are used to describe physical systems.

**Subp. 2. Physical science.**

A. Motion. The student will understand that forces and inertia determine the motion of objects.

B. Motion. The student will understand that when objects change their motion or interact with other objects in the absence of frictional forces, the total amount of mechanical energy remains constant.

C. Energy. The student will understand that sound waves are generated from mechanical oscillations of objects and travel through a medium.

D. Energy. The student will understand that electrons respond to electric fields and voltages by moving through electrical circuits and this motion generates magnetic fields.

E. Energy. The student will understand that magnetic and electric fields interact to produce electromagnetic waves.

F. Energy. The student will understand that heat energy is transferred between objects or regions that are at different temperatures by the processes of convection, conduction, and radiation.

**Statutory Authority:** *MS s 120B.02*

**History:** *34 SR 1609;*

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**3501.0960 ACADEMIC SCIENCE STANDARDS FOR KINDERGARTEN THROUGH GRADE 12.****Subpart 1. Exploring phenomena or engineering problems.**

A. Asking questions and defining problems. Students will be able to ask questions about aspects of the phenomena they observe, the conclusions the students draw from their models or scientific investigations, each other's ideas, and the information they read.

B. Asking questions and defining problems. Students will be able to ask questions about a problem to be solved so constraints and specifications can be defined for possible solutions.



C. Planning and carrying out investigations. Students will be able to design and conduct investigations in the classroom, laboratory, and/or field to test students' ideas and questions, and organize and collect data to provide evidence to support claims the students make about phenomena.

**Subp. 2. Looking at data and empirical evidence to understand phenomena or solve problems.**

A. Analyzing and interpreting data. Students will be able to represent observations and data in order to recognize patterns in the data, the meaning of those patterns, and possible relationships between variables.

B. Using mathematics and computational thinking. Students will be able to use mathematics to represent physical variables and their relationships, compare mathematical expressions to the real world, and engage in computational thinking as the students use or develop algorithms to describe the natural or designed worlds.

**Subp. 3. Developing possible explanations of phenomena or designing solutions to engineering problems.**

A. Developing and using models. Students will be able to develop, revise, and use models to represent the students' understanding of phenomena or systems as they develop questions, predictions and/or explanations, and communicate ideas to others.

B. Constructing explanations and designing solutions. Students will be able to apply scientific principles and empirical evidence (primary or secondary) to explain the causes of phenomena or identify weaknesses in explanations developed by the students or others.

C. Constructing explanations and designing solutions. Students will be able to use their understanding of scientific principles and the engineering design process to design solutions that meet established criteria and constraints.

**Subp. 4. Communicating reasons, arguments, and ideas to others.**

A. Arguing from evidence. Students will be able to engage in argument from evidence for the explanations the students construct, defend, and revise their interpretations when presented with new evidence, critically evaluate the scientific arguments of others, and present counter arguments.

B. Arguing from evidence. Students will be able to argue from evidence to justify the best solution to a problem or to compare and evaluate competing designs, ideas, or methods.

C. Obtaining, evaluating, and communicating information. Students will be able to read and interpret multiple sources to obtain information, evaluate the merit and validity of claims and design solutions, and communicate information, ideas, and evidence in a variety of formats.

D. Obtaining, evaluating, and communicating information. Students will be able to gather information about and communicate the methods used by various cultures, especially those of Minnesota American Indian Tribes and communities, to develop explanations of phenomena and design solutions to problems.

**Statutory Authority:** *MS s 120B.02; 120B.021*

**History:** *46 SR 325*

NOTE: This part is effective September 2, 2025. 46 SR 325.

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**ACADEMIC STANDARDS FOR ENGLISH LANGUAGE DEVELOPMENT****3501.1200 SCOPE AND PURPOSE.**

The purpose of these standards is to establish statewide standards for English language development that govern the instruction of students identified as English learners under Minnesota Statutes, sections 124D.58 to 124D.65. The state of Minnesota's standards for English language development are the current standards developed by the World-Class Instructional Design and Assessment (WIDA) consortium.

**Statutory Authority:** *L 2011 1Sp11 art 2 s 46*

**History:** *36 SR 739; L 2012 c 239 art 1 s 33*

**Published Electronically:** *October 3, 2013*

**3501.1210 ENGLISH LANGUAGE DEVELOPMENT STANDARDS.**

Subpart 1. **Application.** English learners will meet the language development standards in subparts 2 through 6.

Subp. 2. **Social and instructional language.** English learners communicate for social and instructional purposes within the school setting.

Subp. 3. **The language of language arts.** English learners communicate information, ideas, and concepts necessary for academic success in the content area of language arts.

Subp. 4. **The language of mathematics.** English learners communicate information, ideas, and concepts necessary for academic success in the content area of mathematics.

Subp. 5. **The language of science.** English learners communicate information, ideas, and concepts necessary for academic success in the content area of science.

Subp. 6. **The language of social studies.** English learners communicate information, ideas, and concepts necessary for academic success in the content area of social studies.

**Statutory Authority:** *L 2011 1Sp11 art 2 s 46*

**History:** *36 SR 739; L 2012 c 239 art 1 s 33*

**Published Electronically:** *October 3, 2013*

**ACADEMIC STANDARDS FOR SOCIAL STUDIES**

**3501.1300** [Repealed, 48 SR 839]

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**3501.1305** [Repealed, 48 SR 839]

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**3501.1310** [Repealed, 48 SR 839]

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**3501.1315** [Repealed, 48 SR 839]

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**3501.1320** [Repealed, 48 SR 839]

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**3501.1325** [Repealed, 48 SR 839]

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**3501.1340** [Repealed, 48 SR 839]

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**3501.1345** [Repealed, 48 SR 839]

**Published Electronically:** *September 19, 2024*

**3501.1350 ACADEMIC STANDARDS FOR SOCIAL STUDIES.**

Subpart 1. **Purpose.** The purpose of these standards is to establish statewide standards for social studies that govern instruction of students in kindergarten through grade 12. School districts shall assess a student's performance using criteria in subparts 2 through 6.

Subp. 2. **Citizenship and government.**

A. Civic Skills: The student will apply civic reasoning and demonstrate civic skills for the purpose of informed and engaged lifelong civic participation.

B. Democratic Values and Principles: The student will explain democratic values and principles that guide governments, societies, and communities and analyze the tensions within the United States constitutional government.

C. Rights and Responsibilities: The student will explain and evaluate rights, duties, and responsibilities in democratic society.

D. Governmental Institutions and Political Processes: The student will explain and evaluate processes, rules, and laws of the United States governmental institutions at local, state, and federal levels and within Tribal Nations.

E. Public Policy: The student will analyze how public policy is shaped by governmental and nongovernmental institutions, and how people and communities take action to solve problems and shape public policy.

F. Tribal Nations: The student will evaluate the unique political status, trust relationships, and governing structures of sovereign Tribal Nations and the United States.

**Subp. 3. Economics.**

A. Economic Inquiry: The student will use economic models and reasoning and data analysis to construct an argument and propose a solution related to an economic question. The student will evaluate the impact of the proposed solution on various communities that would be affected.

B. Fundamental Economics Concepts: The student will analyze how scarcity and artificial shortages force individuals, organizations, communities, and governments to make choices and incur opportunity costs. The student will analyze how the decisions of individuals, organizations, communities, and governments affect economic equity and efficiency.

C. Personal Finance: The student will apply economic concepts and models to develop individual and collective financial goals and strategies for achieving these goals, taking into consideration historical and contemporary conditions that either inhibit or advance the creation of individual and generational wealth.

D. Microeconomics: The student will explain and evaluate how resources are used and how goods and services are distributed within different economic systems. The student will analyze how incentives influence the decisions of consumers, producers, and governments. The student will evaluate the intended and unintended consequences of these decisions from multiple perspectives.

E. Macroeconomics: The student will measure and evaluate the well-being of nations and communities using a variety of indicators. The student will explain the causes of economic ups and downs. The student will evaluate how government actions affect a nation's economy and individuals' well-being within an economy.

F. Global and International Economics: The student will explain why people trade and why nations encourage or limit trade. The student will analyze the costs and benefits of international trade and globalization on communities and the environment.

**Subp. 4. Geography.**

A. Geospatial Skills and Inquiry: The student will apply geographic tools, including geospatial technologies, and geographic inquiry to solve spatial problems.

B. Places and Regions: The student will describe places and regions, explaining how they are influenced by power structures.

C. Human Systems: The student will analyze patterns of movement and interconnectedness within and between cultural, economic, and political systems from a local to global scale.

D. Human-Environment Interaction: The student will evaluate the relationship between humans and the environment, including climate change.

E. Culture: The student will investigate how a sense of place is impacted by different cultural perspectives.

**Subp. 5. United States and world history.**

A. Context, Change, and Continuity: The student will ask historical questions about context, change, and continuity in order to identify and analyze dominant and nondominant narratives about the past.

B. Historical Perspectives: The student will identify diverse points of view and describe how one's frame of reference influences historical perspective.

C. Historical Sources and Evidence: The student will investigate a variety of historical sources by:

- (1) analyzing primary and secondary sources;
  - (2) identifying perspectives and narratives that are absent from the available sources;
- and
- (3) interpreting the historical context, intended audience, purpose, and author's point of view of these sources.

D. Causation and Argumentation: The student will integrate evidence from multiple historical sources and interpretations into a reasoned argument or compelling narrative about the past.

E. Connecting Past and Present: The student will use historical methods and sources to identify and analyze the roots of a contemporary issue. The student will design a plan to address it.

**Subp. 6. Ethnic studies.**

A. Identity: The student will analyze the ways power and language construct the social identities of race, religion, geography, ethnicity, and gender. The student will apply understandings to one's own social identities and other groups living in Minnesota, centering those whose stories and histories have been marginalized, erased, or ignored.

B. Resistance: The student will describe how individuals and communities have fought for freedom and liberation against systemic and coordinated exercises of power locally and globally. The student will identify strategies or times that have resulted in lasting change. The student will organize with others to engage in activities that could further the rights and dignity of all.

C. Ways of Knowing and Methodologies: The student will use ethnic and Indigenous studies methods and sources in order to understand the roots of contemporary systems of oppression and apply lessons from the past that could eliminate historical and contemporary injustices.

**Statutory Authority:** *MS s 120B.021*

**History:** *48 SR 839*

**NOTE:** These standards are effective at the beginning of the 2026-2027 school year.

**Published Electronically:** *September 19, 2024*

**ACADEMIC STANDARDS FOR PHYSICAL EDUCATION****3501.1400 SCOPE AND PURPOSE.**

The purpose of these standards is to establish statewide standards for physical education that govern instruction of students in kindergarten through grade 12. The state of Minnesota's standards for physical education are the current standards developed by SHAPE America (Society of Health and Physical Educators).

**Statutory Authority:** *MS s 120B.02; 120B.021*

**History:** *42 SR 712*

**Published Electronically:** *January 4, 2018*

**3501.1410 PHYSICAL EDUCATION STANDARDS.**

Subpart 1. **Application.** Students will meet the physical education standards in subparts 2 to 6.

Subp. 2. **Motor skills.** The student will demonstrate competency in a variety of motor skills and movement patterns.

Subp. 3. **Movement and performance.** The student will apply knowledge of concepts, principles, strategies, and tactics to movement and performance.

Subp. 4. **Physical activity and fitness.** The student will demonstrate the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness.

Subp. 5. **Personal and social behavior.** The student will exhibit responsible personal and social behavior that respects self and others.

Subp. 6. **Value of physical activity.** The student will recognize the value of physical activity for health, enjoyment, challenge, self-expression, and social interaction.

**Statutory Authority:** *MS s 120B.02; 120B.021*

**History:** *42 SR 712*

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