

Mathematics Content Strands

M1 Numbers and Operations

Number pervades all areas of mathematics. The other four Content Standards as well as all five Process Standards are grounded in understanding number. Central to this standard is the development of number sense, which allows students to naturally combine or decompose numbers, solve problems using the relationships among operations and knowledge of the base-ten system, and make a reasonable estimate for the answer to a problem.

Computational fluency – having and using efficient and accurate methods for computing – is essential. Students should be able to perform computations in different ways, including mental calculations, estimation, and paper-and-pencil calculations using mathematically sound algorithms. All students should use calculators at appropriate times, setting the calculator aside when the instructional focus is on developing computational algorithms.

Pre-Kindergarten through Grade 12 instructional programs should enable all students to:

- understand numbers, ways of representing numbers, relationships among numbers and number systems;
- understand meanings of operations and how they relate to one another;
- understand how to compute fluently and make reasonable estimates.

M2 Algebra

The ideas of algebra are a major component of the school mathematics curriculum and help to unify it. Mathematical investigations and discussions of arithmetic and its properties frequently include aspects of algebraic reasoning. Such experiences present rich contexts and opportunities for enhancing mathematical understanding and are an important precursor to the more formalized study of algebra in the middle and secondary grades. A strong foundation in algebra should be in place by the end of the eighth grade, and all high school students should pursue ambitious goals in algebra.

Pre-Kindergarten through Grade 12 instructional programs should enable all students to:

- understand patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships;
- analyze change in various contexts.

M3 Geometry

Geometry and spatial sense are fundamental components of mathematics learning. They offer ways to interpret and reflect on our physical environment and can serve as tools for the study of other topics in mathematics and science. Geometry is a natural area of mathematics for the development of students' reasoning and justification skills that build across the grades.

Geometry should be learned using concrete models, drawings, and dynamic software. As the study of the relationships among shapes and their properties becomes more abstract, students should come to understand the role of definitions and theorems and be able to construct their own proofs.

Pre-Kindergarten through Grade 12 instructional programs should enable all students to:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations;
- use visualization, spatial reasoning, and geometric modeling to solve problems.

M4 Measurement

The study of measurement is crucial in the K-12 mathematics curriculum because of its practicality and pervasiveness in many aspects of everyday life. Measurement is possibly the area of mathematics that is most important when considering everyday applications of mathematics, and highlights connections between mathematics and areas outside of the school curriculum such as social studies, science, art, and physical education. The study of measurement helps students establish connections within mathematics and provides an opportunity for learning about and unifying ideas concerning number and operations, algebra, geometry, statistics, probability, and data analysis.

Pre-Kindergarten through Grade 12 instructional programs should enable all students to:

- understand measurable attributes of objects and the units, systems, and processes of measurement;
- apply appropriate techniques, tools, and formulas to determine measurements.

Data Analysis and Probability

To analyze data and reason statistically are essential to be an informed citizen, employee, and consumer. The amount of statistical information available to help make decisions in business, politics, research, and everyday life is staggering. Through experiences with the collection and analysis of data, students can learn to make sense of and interpret information and allow them to make appropriate arguments and recognize inappropriate arguments as well.

Pre-Kindergarten through Grade 12 instructional programs should enable all students to:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data;
- develop and evaluate inferences and predictions that are based on data;
- understand and apply basic concepts of probability.

Mathematics Process Standards

The DoDEA PK-12 mathematics program includes the process standards: problem solving, reasoning and proof, communication, connections, and representation. Instruction in mathematics must focus on process standards in conjunction with all PK-12 content standards throughout the grade levels.

Problem Solving	Reasoning and Proof	Communication	Connections	Representation
<p>Instructional programs from Pre-Kindergarten through Grade 12 should enable all students to:</p> <ul style="list-style-type: none"> • build new mathematical knowledge through problem solving; • solve problems that arise in mathematics and in other contexts; • apply and adapt a variety of appropriate strategies to solve problems; • monitor and reflect on the process of mathematical problem solving. 	<p>Instructional programs from Pre-Kindergarten through Grade 12 should enable all students to:</p> <ul style="list-style-type: none"> • recognize reasoning and proof as fundamental aspects of mathematics; • make and investigate mathematical conjectures; • develop and evaluate mathematical arguments and proofs; • select and use various types of reasoning and methods of proof. 	<p>Instructional programs from Pre-Kindergarten through Grade 12 should enable all students to:</p> <ul style="list-style-type: none"> • organize and consolidate their mathematical thinking through communication; • communicate their mathematical thinking coherently and clearly to peers, teachers, and others; • analyze and evaluate the mathematical thinking and strategies of others; • use the language of mathematics to express mathematical ideas precisely. 	<p>Instructional programs from Pre-Kindergarten through Grade 12 should enable all students to:</p> <ul style="list-style-type: none"> • recognize and use connections among mathematical ideas; • understand how mathematical ideas interconnect and build on one another to produce a coherent whole; • recognize and apply mathematics in contexts outside of mathematics. 	<p>Instructional programs from Pre-Kindergarten through Grade 12 should enable all students to:</p> <ul style="list-style-type: none"> • create and use representations to organize, record, and communicate mathematical ideas; • select, apply, and translate among mathematical representations to solve problems; • use representations to model and interpret physical, social, and mathematical phenomena.

DoDEA Mathematics Standards: Grade 1

Strand:
Standards:

M1 Numbers and Operations

In Grade 1, all students should:

- 1.M.1a:** count and group objects into ones and tens up to 100;
Example: Separate a group of 27 blocks into two groups of ten blocks and 7 single blocks.
- 1.M.1b:** position and identify the order of objects using ordinal numbers up to 10;
Example: Line up 6 children. Identify the ordinal position of each child.
- 1.M.1c:** identify the number of tens and ones in numbers less than 100;
Example: How many tens and how many ones are in 58? Describe how you know.
- 1.M.1d:** identify and generate equivalent forms of the same number using concrete objects and number statements;
Example: Fill in the blank: _____ tens and 5 ones = 155.
- 1.M.1e:** express the concepts of one-digit whole number addition and subtraction using objects, drawings, number sentences, and verbal explanations;
Example: Draw a picture that represents the following story: I had 8 pennies but lost 3 of them.
- 1.M.1f:** explain and use the inverse relationship between addition and subtraction to solve problems and check solutions;
Example: How can you determine how many pennies you started with if you lost 3 and now have 5?

1.M.1g: select, explain, and use addition and subtraction strategies to solve real-world problems;

Example: Jill posted 6 of her pictures on the refrigerator. If she posts 3 more, how many pictures will there be on the refrigerator?

1.M.1.h: describe using their own words an estimate of the number of objects in groups up to 100 and verify the results;

Example: I can hold 6 teddy bear counters in my hand. How many will fit in the jar?

1.M.1i: recognize wholes and parts of wholes, i.e., $\frac{1}{2}$, $\frac{1}{3}$, and, $\frac{1}{4}$.

Example: Draw a rectangle and separate it into 4 equal parts and shade $\frac{1}{4}$.

**Strand:
Standards:**

M2 Algebra

In Grade 1, all students should:

1.M.2a: sort, classify, and order objects by two or more attributes and explain how objects were sorted;

Example: Sort a box of pencils into two groups and explain your groupings.

1.M.2b: identify, describe, extend, and create repeating patterns and number sequences;

Example: A number pattern begins with 1, 3, 5. Tell what the next number will be and explain how you decided on that number.

1.M.2c: solve open sentences using the commutative property of addition;

Example: Fill in the blank: $5 + \underline{\quad} = 3 + 5$.

1.M.2d: write equations using mathematical symbols;

Example: Joe bounces the ball 7 times and stops. He bounces it 3 more times. Write a number sentence that will show how many times Joe bounced the ball.

1.M.2e: model and describe problem situations using representations, such as words, objects, number phrases, or sentences;

Example: Three geese land in a pond. Four more geese join them. Five geese fly away. Use your counters to show how many geese are left in the pond.

1.M.2f: model equivalency between sets using concrete materials;

Example: Using your connecting cubes show that 15 single cubes is the same as 10 connected cubes and 5 single cubes.

Strand:
Standard:

M3 Geometry

In Grade 1, all students should:

1.M.3a: identify triangles, rectangles, squares, and circles as the faces of three-dimensional objects;

Example: Look at a collection of solid objects and find the triangles.

1.M.3b: create new shapes by combining, cutting, or taking apart existing shapes;

Example: Use tangram pieces to construct triangles.

1.M.3c: give and follow directions to find a place or object;

Example: Show someone how to get to the school cafeteria by making a map or diagram.

1.M.3d: identify and determine whether two-dimensional shapes are congruent, i.e., same shape and size; or similar, i.e., same shape and proportional size;

Example: Use pattern blocks to make a design. Using different pattern blocks, make a congruent shape.

1.M.3e: identify symmetry in objects and figures;

Example: Find examples of symmetry in the classroom.

1.M3f: identify geometric shapes and structures in the environment;
Example: Find as many rectangles as you can on the playground.

**Strand:
Standards:**

M4 Measurement

In Grade 1, all students should:

1.M.4a: identify common instruments used for measurement, i.e., rulers, scales, measuring cups;
Example: Which is the best tool for measuring the length of your desk? Why do you think so?

1.M.4b: measure and differentiate objects using both comparative terms and standard units of measure, e.g., inches, centimeters;
Example: Compare two pieces of string, and determine which is shorter. Use a ruler to measure the length of each. Does the measure match your findings? Explain why.

1.M.4c: estimate and measure a variety of attributes of objects using standard and nonstandard units;
Example: Estimate and measure attributes of a textbook, e.g., length, width, height, weight.

1.M.4d: identify repeating patterns of time, e.g., days of the week, months of the year;
Example: Describe how the seasons represent a repeating pattern.

1.M.4e: tell time to the hour and half hour using digital and analog timepieces;
Example: If the minute hand is on the 6 and the hour hand is on the 9 what time is it?

1.M.4f: order a sequence of events that occur over time;
Example: Order the days of the week. List season-specific events that occur throughout the year.

1.M4g: make estimates about the passage of time in events, e.g., tasks being completed, living things growing, etc.

Example: How long does it take to eat lunch?

Strand:
Standards:

M5 Data Analysis and Probability

In Grade 1, all students should:

1.M.5a: use interviews and observations to gather data about themselves and their surroundings;

Example: Collect data on how many people are in their families.

1.M.5b: collect, organize, represent, and interpret data using concrete objects, pictures, tallies, and graphs;

Example: Collect data on how many people are in their families. Make a class graph, and compare and contrast findings.

1.M.5c: compare and contrast similar data sets;

Example: Compare family graph findings with similar data from other classes.

1.M.5d: construct questions and make predictions that can be answered by using information from a graph or table.

Example: Students ask questions and make predictions based on data from family graphs.