

3-5 Mathematics Georgia Performance Standards

K-12 Mathematics Introduction

The Georgia Mathematics Curriculum focuses on actively engaging the students in the development of mathematical understanding by using manipulatives and a variety of representations, working independently and cooperatively to solve problems, estimating and computing efficiently, and conducting investigations and recording findings. There is a shift towards applying mathematical concepts and skills in the context of authentic problems and for the student to understand concepts rather than merely follow a sequence of procedures. In mathematics classrooms, students will learn to think critically in a mathematical way with an understanding that there are many different ways to a solution and sometimes more than one right answer in applied mathematics. Mathematics is the economy of information. The central idea of all mathematics is to discover how knowing some things well, via reasoning, permit students to know much else—without having to commit the information to memory as a separate fact. It is the connections, the reasoned, logical connections that make mathematics manageable. As a result, implementation of Georgia's Performance Standards places a greater emphasis on problem solving, reasoning, representation, connections, and communication.

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By the end of grade three, students will understand place value. They will further develop their understanding and their skills with addition and subtraction of whole numbers and decimals. They will also expand their knowledge base of multiplication and division of whole numbers. Students will understand the concepts of length, perimeter, area, and time. Students will broaden their understanding of characteristics of previously studied geometric figures. They will solve problems by collecting, organizing, displaying, and interpreting data.

Instruction and assessment should include the use of manipulatives and appropriate technology. Topics should be represented in multiple ways including concrete/pictorial, verbal/written, numeric/data-based, graphical, and symbolic. Concepts should be introduced and used in the context of real world phenomena.

Concepts / Skills to Maintain

Comparison of numbers

Addition & subtraction of multi-digit numbers

Length (cm, m, in, ft, yd) and time

Geometric shapes

Make change

Area models (arrays) of multiplication

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NUMBER AND OPERATIONS

Students will use decimal fractions and common fractions to represent parts of a whole. They will also understand the four arithmetic operations for whole numbers and use them in basic calculations, and apply them in problem solving situations.

M3N1. Students will further develop their understanding of whole numbers and decimals and ways of representing them.

- a. Identify place values from tenths through ten thousands.
- b. Understand the relative sizes of digits in place value notation (10 times, 100 times, $\frac{1}{10}$ of a single digit whole number) and ways to represent them including word name, standard form, and expanded form.

M3N2. Students will further develop their skills of addition and subtraction and apply them in problem solving.

- a. Use the properties of addition and subtraction to compute and verify the results of computation.
- b. Use mental math and estimation strategies to add and subtract.
- c. Solve problems requiring addition and subtraction.
- d. Model addition and subtraction by counting back change using the fewest number of coins.

M3N3. Students will further develop their understanding of multiplication of whole numbers and develop the ability to apply it in problem solving.

- a. Describe the relationship between addition and multiplication, i.e. multiplication is defined as repeated addition.
- b. Know the multiplication facts with understanding and fluency to 10×10 .
- c. Use arrays and area models to develop understanding of the distributive property and to determine partial products for multiplication of 2- or 3-digit numbers by a 1-digit number.
- d. Understand the effect on the product when multiplying by multiples of 10.
- e. Apply the identity, commutative, and associative properties of multiplication and verify the results.
- f. Use mental math and estimation strategies to multiply.
- g. Solve problems requiring multiplication.

M3N4. Students will understand the meaning of division and develop the ability to apply it in problem solving.

- a. Understand the relationship between division and multiplication and between division and subtraction.
- b. Recognize that division may be two situations: the first is determining how many equal parts of a given size or amount may be taken away from the whole as in repeated subtraction, and the second is determining the size of the parts when the whole is separated into a given number of equal parts as in a sharing model.

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- c. Recognize problem-solving situations in which division may be applied and write corresponding mathematical expressions.
- d. Explain the meaning of a remainder in division in different circumstances.
- e. Divide a 2 and 3-digit number by a 1-digit divisor.
- f. Solve problems requiring division.
- g. Use mental math strategies to divide.

M3N5. Students will understand the meaning of decimal fractions and common fractions in simple cases and apply them in problem-solving situations.

- a. Identify fractions that are decimal fractions and/or common fractions.
- b. Understand that a decimal fraction (i.e. $\frac{3}{10}$) can be written as a decimal (i.e. 0.3).
- c. Understand the fraction $\frac{a}{b}$ represents a equal sized parts of a whole that is divided into b equal sized parts.
- d. Know and use decimal fractions and common fractions to represent the size of parts created by equal divisions of a whole.
- e. Understand the concept of addition and subtraction of decimal fractions and common fractions with like denominators.
- f. Model addition and subtraction of decimal fractions and common fractions with like denominators.
- g. Use mental math and estimation strategies to add and subtract decimal fractions and common fractions with like denominators.
- h. Solve problems involving decimal fractions and common fractions with like denominators.

MEASUREMENT

Students will understand and measure time and length. They will also model and calculate perimeter and area of simple geometric figures.

M3M1. Students will further develop their understanding of the concept of time by determining elapsed time of a full, half, and quarter-hour.

M3M2. Students will measure length choosing appropriate units and tools.

- a. Use the units kilometer (km) and mile (mi.) to discuss the measure of long distances.
- b. Measure to the nearest $\frac{1}{4}$ inch, $\frac{1}{2}$ inch and millimeter (mm) in addition to the previously learned inch, foot, yard, centimeter, and meter.
- c. Estimate length and represent it using appropriate units.
- d. Compare one unit to another within a single system of measurement.

M3M3. Students will understand and measure the perimeter of geometric figures.

- a. Understand the meaning of the linear unit and measurement in perimeter.
- b. Understand the concept of perimeter as being the length of the boundary of a geometric figure.

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- c. Determine the perimeter of a geometric figure by measuring and summing the lengths of the sides.

M3M4. Students will understand and measure the area of simple geometric figures (squares and rectangles).

- a. Understand the meaning of the square unit and measurement in area.
- b. Model (by tiling) the area of a simple geometric figure using square units (square inch, square foot, etc.).
- c. Determine the area of squares and rectangles by counting, addition, and multiplication with models.

GEOMETRY

Students will further develop their understanding of characteristics of previously studied geometric figures.

M3G1. Students will further develop their understanding of geometric figures by drawing them. They will also state and explain their properties.

- a. Draw and classify previously learned fundamental geometric figures and scalene, isosceles, and equilateral triangles.
- b. Identify and compare the properties of fundamental geometric figures.
- c. Examine and compare angles of fundamental geometric figures.
- d. Identify the center, diameter, and radius of a circle.

ALGEBRA

Students will understand how to express relationships as mathematical expressions.

M3A1. Students will use mathematical expressions to represent relationships between quantities and interpret given expressions.

- a. Describe and extend numeric and geometric patterns.
- b. Describe and explain a quantitative relationship represented by a formula (such as the perimeter of a geometric figure).
- c. Use a symbol, such as $\square$ and Δ , to represent an unknown and find the value of the unknown in a number sentence.

DATA ANALYSIS AND PROBABILITY

Students will gather, organize, and display data and interpret graphs.

M3D1. Students will create and interpret simple tables and graphs.

- a. Solve problems by organizing and displaying data in charts, tables, and graphs.
- b. Construct and interpret line plot graphs, pictographs, Venn diagrams, and bar graphs using scale increments of 1, 2, 5, and 10.

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Process Skills

Each topic studied in this course should be developed with careful thought toward helping every student achieve the following process standards.

M3P1. Students will solve problems (using appropriate technology).

- a. Build new mathematical knowledge through problem solving.
- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.
- d. Monitor and reflect on the process of mathematical problem solving.

M3P2. Students will reason and evaluate mathematical arguments.

- a. Recognize reasoning and proof as fundamental aspects of mathematics.
- b. Make and investigate mathematical conjectures.
- c. Develop and evaluate mathematical arguments and proofs.
- d. Select and use various types of reasoning and methods of proof.

M3P3. Students will communicate mathematically.

- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- c. Analyze and evaluate the mathematical thinking and strategies of others.
- d. Use the language of mathematics to express mathematical ideas precisely.

M3P4. Students will make connections among mathematical ideas and to other disciplines.

- a. Recognize and use connections among mathematical ideas.
- b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
- c. Recognize and apply mathematics in contexts outside of mathematics.

M3P5. Students will represent mathematics in multiple ways.

- a. Create and use representations to organize, record, and communicate mathematical ideas.
- b. Select, apply, and translate among mathematical representations to solve problems.
- c. Use representations to model and interpret physical, social, and mathematical phenomena.

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The following terms and symbols are often misunderstood. These concepts are not an inclusive list and should not be taught in isolation. However, due to evidence of frequent difficulty and misunderstanding associated with these concepts, instructors should pay particular attention to them and how their students are able to explain and apply them.

The definitions are for teacher reference only and are not intended to be memorized by students. Teachers should present these concepts to students with models and real life examples. Students should understand the concepts involved and be able to recognize and/or demonstrate them with words, models, pictures, or numbers.

Terms / Symbols:

quotient, whole number, decimal point, place value of $\frac{1}{10}$ (tenth), numerator, denominator, second (unit of time), $\div$, $\times$, decimal fraction, common fraction, elapsed time, scalene triangle, isosceles triangle, equilateral triangle, bar graph, mile, kilometer, center, diameter, radius, line plot graph