

Grade 4

The following curriculum focal points and related connections are the recommended content emphases for mathematics in grade 4. It is essential that these focal points be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

Grade 4 Curriculum Focal Points

Number and Operations and Algebra: Developing quick recall of multiplication facts and related division facts and fluency with whole number multiplication.

Students use understandings of multiplication to develop quick recall of the basic multiplication facts and related division facts. They apply their understanding of models for multiplication (i.e., equal sized groups, arrays, area models, equal intervals on the number line), place value, and properties of operations (in particular, the distributive property) as they develop, discuss, and use efficient, accurate, and generalizable methods to multiply multidigit whole numbers. They select appropriate methods and apply them accurately to estimate products or calculate them mentally, depending on the context and numbers involved. They develop fluency with efficient procedures, including the standard algorithm, for multiplying whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems.

Number and Operations: Developing an understanding of decimals, including the connections between fractions and decimals.

Students understand decimal notation as an extension of the base-ten system of writing whole numbers that is useful for representing more numbers, including numbers between 0 and 1, between 1 and 2, and so on. Students relate their understanding of fractions to reading and writing decimals that are greater than or less than 1, identifying equivalent decimals, comparing and ordering decimals, and estimating decimal or fractional amounts in problem solving. They connect equivalent fractions and decimals by comparing models to symbols and locating equivalent symbols on the number line.

Measurement: Developing an understanding of area and determining the areas of two-dimensional shapes.

Students recognize area as an attribute of two-dimensional regions. They learn that they can quantify area by finding the total number of same-sized units of area that cover the shape without gaps or overlaps. They understand that a square that is 1 unit on a side is the standard unit for measuring area. They select appropriate units, strategies (e.g., decomposing shapes), and tools for solving problems that involve estimating or measuring area. Students connect area measure to the area model that they have used to represent multiplication, and they use this connection to justify the formula for the area of a rectangle.

Connections to the Focal Points

Algebra: Students continue identifying, describing, and extending numeric patterns involving all operations and nonnumeric growing or repeating patterns. Through these experiences, they develop an understanding of the use of a rule to describe a sequence of numbers or objects.

Geometry: Students extend their understanding of properties of two-dimensional shapes as they find the areas of polygons. They build on their earlier work with symmetry and congruence in grade 3 to encompass transformations, including those that produce line and rotational symmetry. By using transformations to design and analyze simple tilings and tessellations, students deepen their understanding of two-dimensional space.

Measurement: As part of understanding two-dimensional shapes, students measure and classify angles.

Data Analysis: Students continue to use tools from grade 3, solving problems by making frequency tables, bar graphs, picture graphs, and line plots. They apply their understanding of place value to develop and use stem-and-leaf plots.

Number and Operations: Building on their work in grade 3, students extend their understanding of place value and ways of representing numbers to 100,000 in various contexts. They use estimation in determining the relative sizes of amounts or distances. Students develop understandings of strategies for multidigit division by using models that represent division as the inverse of multiplication, as partitioning, or as successive subtraction. By working with decimals, students extend their ability to recognize equivalent fractions. Students' earlier work in grade 3 with models of fractions and multiplication and division facts supports their understanding of techniques for generating equivalent fractions and simplifying fractions.

Related Expectations from Principles and Standards for School Mathematics Content Standards: Grade 4

The following content expectations are linked to the [Grade 4 focal points](#) or connections.

Number and Operations

- Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals
- Recognize equivalent representations for the same number and generate them by decomposing and composing numbers
- Use models, benchmarks, and equivalent forms to judge the size of fractions
- Recognize and generate equivalent forms of commonly used fractions, decimals, and (in Grade 7 Curriculum Focal Points) percents
- Understand the effects of multiplying and dividing whole numbers

- Identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems
- Understand and use properties of operations, such as the distributivity of multiplication over addition
- Develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems, such as 30×50
- Develop fluency in adding, subtracting, multiplying, and dividing whole numbers
- Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results
- Select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tool

Algebra

- Describe, extend, and make generalizations about geometric and numeric patterns
- Represent and analyze patterns and functions, using words, tables, and graphs
- Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers
- Express mathematical relationships using equations
- Model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions

Geometry

- Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes
- Investigate, describe, and reason about the results of subdividing, combining, and transforming shapes
- Explore congruence and similarity
- Describe location and movement using common language and geometric vocabulary
- Predict and describe the results of sliding, flipping, and turning two-dimensional shapes

- Describe a motion or a series of motions that will show that two shapes are congruent
- Identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs
- Use geometric models to solve problems in other areas of mathematics, such as number and measurement
- Recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in the classroom or in everyday life

Measurement

- Understand such attributes as length, area, weight (identified in Grades 1 and 2 Curriculum Focal Points), volume, and size of angle and select the appropriate type of unit for measuring each attribute
- Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems
- Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement
- Explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way
- Develop strategies for estimating the perimeters, areas, and volumes of irregular shapes
- Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles (measuring time and temperature is not identified as a focal point or connection)
- Select and use benchmarks to estimate measurements (also in Grade 2 Curriculum Focal Points)
- Develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms

Data Analysis and Probability

- Design investigations to address a question and consider how data-collection methods affect the nature of the data set
- Collect data using observations, surveys, and experiments
- Represent data using tables and graphs such as line plots, bar graphs, and line graphs

- Describe the shape and important features of a set of data and compare related data sets, with (in Grade 8 Curriculum Focal Points) an emphasis on how the data are distributed
- Compare different representations of the same data and evaluate how well each representation shows important aspects of the data (also in Grade 8 Curriculum Focal Points)
- Propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions (designing such studies is not identified as a focal point or connection)

