

MATHEMATICS STANDARD

Grade – Second

Standard

Benchmark

Indicators

Number, Number Sense and Operations Standard

Students demonstrate number sense, including an understanding of number systems and operations and how they relate to one another. Students compute fluently and make reasonable estimates using paper and pencil, technology-supported and mental methods.

By the end of K-2 program, students will...

- A. Use place value concepts to represent whole numbers using numerals, words and physical models.
- B. Recognize, classify, compare and order whole numbers.
- C. Represent commonly used fractions using words and physical models.
- D. Determine the value of a collection of coins and dollar bills.
- E. Make change using coins for values up to one dollar.
- F. Count, using numerals and ordinal numbers.
- G. Model, represent and explain addition as combining sets and counting on.
- H. Model, represent and explain subtraction as comparison, take-away and part-to-whole.
- I. Model, represent and explain multiplication as repeated addition, rectangular arrays and skip counting.
- J. Model, represent and explain division as sharing equally, repeated subtraction and rectangular arrays.
- K. Demonstrate fluency in addition facts with addends through 9 and corresponding subtractions.

- 1. Use place value concepts to represent, compare and order whole numbers using physical models, numerals and words, with ones, tens, and hundreds. For example:
 - a. Recognize 10 can mean “10 ones” or a single entity (1 ten) through physical models and trading games.
 - b. Read and write 3-digit numerals (e.g., 243 as two hundred forty three, 24 tens and 3 ones, or 2 hundreds and 43 ones, etc.) and construct models to represent each.
- 2. Recognize and classify numbers as even or odd.
- 3. Count money and make using coins and a dollar bill.
- 4. Represent and write the value of money using the ¢ sign and in decimal form when using the \$ sign.
- 5. Represent fractions (halves, thirds, fourths, sixths and eighths), using words, numerals and physical models. For example:
 - a. Recognize that a fractional part can mean different amounts depending on the original quantity.
 - b. Recognize that a fractional part of a rectangle does not have to be shaded with contiguous parts.

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By the end of the K-2 program,
students will...

L. Demonstrate fluency in adding and subtracting multiples of 10, and recognize combinations that make 10.

M. Add and subtract two-digit numbers with and without regrouping.

c. Identify and illustrate parts of a whole and parts of sets of objects.

d. Compare and order physical models of halves, thirds and fourths in relation to 0 and 1.

6. Model, represent and explain subtraction as comparison, take-away and part-to-whole; e.g., solve missing addend problems by counting up or subtracting, such as “I had six baseball cards, my sister gave me more, and I now have ten. How many did she give me?” can be represented as $6 + ? = 10$ or $10 - 6 = ?$.

7. Model, represent and explain multiplication as repeated addition, rectangular arrays and skip counting.

8. Model, represent and explain division as sharing equally and repeated subtraction.

9. Model and use the commutative property for addition.

10. Demonstrate fluency in addition facts with addends through 9 and corresponding subtractions; e.g., $9 + 9 = 18$, $18 - 9 = 9$.

11. Add and subtract multiples of 10.

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By the end of the K-2 program,
students will...

- 12. Demonstrate multiple strategies for adding and subtracting 2- or 3-digit whole numbers, such as:
 - a. compatible numbers;
 - b. compensatory numbers;
 - c. informal use of commutative and associative properties of addition.
- 13. Estimate the results of whole number addition and subtraction problems using front-end estimation, and judge the reasonableness of the answers.

Measurement Standard

Students estimate and measure to a required degree of accuracy and precision by selecting and using appropriate units, tools and technologies.

By the end of the K-2 program, students will...

A. Explain the need for standard units of measure.

B. Select appropriate units for length, weight, volume (capacity) and time, using:

- objects; i.e., non-standard units;
- U.S. customary units: inch, foot, yard, ounce, pound, cup, quart, gallon, minute, hour, day, week and year;
- metric units: centimeter, meter, gram and liter.

C. Develop common referents for units of measure for length, weight, volume (capacity) and time to make comparisons and estimates.

D. Apply measurement techniques to measure length, weight and volume (capacity).

E. Recognize that using different units of measurement will yield different numbers for the same measurement.

1. Identify and select appropriate units for measure for:
 - a. length - centimeters, meters, inches, feet or yards;
 - b. volume (capacity) - liters, cups, pints or quarts;
 - c. weight- grams, ounces or pounds;
 - d. time-hours, half-hours, quarters-hours or minutes and time designations, a.m. or p.m.
2. Establish personal or common referents for units of measure to make estimates and comparisons; e.g., the width of a finger is a centimeter, a large bottle of soda pop is 2 liters, a small paper clip weighs about one gram.
3. Describe and compare the relationships among units of measure, such as centimeters and meters; inches, feet and yards; cups, pints and quarts; ounces and pounds; and hours, half-hours, and quarter-hours; e.g., how many inches in a foot?
4. Tell time to the nearest minute interval on digital and to the nearest 5 minute interval on analog (dial) timepieces.

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5. Estimate and measure the length and weight of common objects, using metric and the U.S. customary units, accurate to the nearest unit.
6. Select and use appropriate measurement tools; e.g., a ruler to draw a segment 3 inches long, a measuring cup to place 2 cups of rice in a bowl, a scale to weigh 50 grams of candy.
7. Make and test predictions about measurements, using different units to measure the same length or volume.

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**Geometry and Spatial Sense
Standard**

Students identify, classify, compare and analyze characteristics, properties and relationships of one-, two- and three-dimensional geometric figures and objects. Students use spatial reasoning, properties of geometric objects, and transformations to analyze mathematical situations and solve problems.

A. Describe and create plane figures: circle, rectangle, square, triangle, hexagon, trapezoid, parallelogram and rhombus, and identify them in the environment.

B. Describe solid objects: cube, rectangular prism, sphere, cylinder, cone and pyramid, and identify them in the environment.

C. Sort and compare two-dimensional figures and three-dimensional objects according to their characteristics and properties.

D. Identify, explain and model (superposition, copying) the concept of shapes being congruent and similar.

E. Recognize two- and three-dimensional objects from different positions.

F. Describe location, using comparative (before, after), directional (above, below), and positional (first, last) words.

G. Identify and draw figures with line symmetry.

1. Identify, describe, compare and sort three-dimensional objects (i.e., cubes, spheres, prisms, cones, cylinders and pyramids) according to the shape of the faces or the number of faces, edges or vertices.

2. Predict what new shapes will be formed by combining or cutting apart existing shapes.

3. Recognize two-dimensional shapes and three-dimensional objects from different positions.

4. Identify and determine whether two-dimensional shapes are congruent (same shape and size) or similar (same shape different size) by copying or using superposition (lay one thing on top of another).

5. Create and identify two-dimensional figures with line symmetry; e.g., what letter shapes, logos, polygons are symmetrical?

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Patterns, Functions and Algebra Standard

Students use patterns, relations and functions to model, represent and analyze problem situations that involve variable quantities. Students analyze, model and solve problems using various representations such as tables, graphs and equations.

- A. Sort, classify and order objects by size, number and other properties, and describe the attributes used.
- B. Extend sequences of sounds and shapes or simple number patterns, and create and record similar patterns.
- C. Create and extend patterns, and describe the rule in words.
- D. Model problem situations, using objects, pictures, numbers and other symbols.
- E. Solve open sentences and explain strategies.
- F. Represent an unknown quantity as a variable using a symbol, such as, $\square, \circ, \triangle$.
- G. Describe and compare qualitative and quantitative changes.

- 1. Extend simple number patterns (both repeating and growing patterns), and create similar patterns using different objects, such as using physical materials or shapes to represent numerical patterns.
- 2. Use patterns to make generalization and predictions; e.g., determine a missing element in a pattern.
- 3. Create new patterns with consistent rules or plans, and describe the rule or general plan of existing patterns.
- 4. Use objects, pictures, numbers and other symbols to represent a problem situation.
- 5. Understand equivalence and extend the concept to situations involving symbols; e.g., $4 + 5 = 9$ and $9 = 4 + 5$, and $4 + 5 = 3 + 6 = \triangle + \square \dots$
- 6. Use symbols to represent unknown quantities and identify values for symbols in an expression or equation using addition and subtraction; e.g., $+ O = 10$, $\triangle - 2 = 4$.
- 7. Describe qualitative and quantitative changes, especially those involving addition and subtraction; e.g., a student growing taller versus a student growing two inches in one year.

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**Data Analysis and Probability
Standard**

Students pose questions and collect, organize, represent, interpret and analyze data to answer those questions. Students develop and evaluate inferences, predictions and arguments that are based on data.

- A. Pose questions and gather data about everyday situations and familiar objects.
- B. Sort and classify objects by attributes, and organize data into categories in a simple table or chart.
- C. Represent data using objects, picture graphs and bar graphs.
- D. Describe the probability of chance events as more, less or equally likely to occur.

- 1. Pose questions, use observations, interviews and surveys to collect data, and organize data in charts, picture graphs and bar graphs.
- 2. Read, interpret and make comparisons and predictions from data represented in charts, line plots, pictures graphs and bar graphs.
- 3. Read and construct simple timelines to sequence events.
- 4. Write a few sentences to describe and compare categories of data represented in a chart or graph, and make statements about the data as a whole.
- 5. Identify untrue or inappropriate statements about a given set of data.
- 6. Recognize that data may vary from one population to another; e.g., favorite TV. shows of students and of parents.
- 7. List some of the possible outcomes of a single experiment, and predict whether given outcomes are more, less or equally likely to occur.
- 8. Use physical models and pictures to represent possible arrangements of 2 or 3 objects.

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Mathematical Processes Standard

Students use mathematical processes and knowledge to solve problems. Students apply problem-solving and decision-making techniques, and communicate mathematical ideas.

- A. Use a variety of strategies to understand problem situations; e.g., discussing with peers, stating problems in own words, modeling problems with diagrams or physical materials, identifying a pattern.
- B. Identify and restate in own words the question or problem and the information needed to solve the problem.
- C. Generate alternative strategies to solve problems.
- D. Evaluate the reasonableness of predictions, estimations and solutions.
- E. Explain to others how a problem was solved.
- F. Draw pictures and use physical models to represent problem situations and solutions.
- G. Use invented and conventional symbols and common language to describe a problem situation and solution.
- H. Recognize the mathematical meaning of common words and phrases, and relate everyday language to mathematical language and symbols.
- I. Communicate mathematical thinking by using everyday language and appropriate mathematical language.