

MATHEMATICS STANDARD

Grade – First

Standard

Benchmark

Indicators

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

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. Identify multiple categories for sorting data.
- 2. Collect and organize data into charts using tally marks.
- 3. Display data in picture graphs with units of 1 and bar graphs with intervals of 1.
- 4. Read and interpret charts, picture graphs and bar graphs as sources of information to identify main ideas, draw conclusions, and make predictions.
- 5. Construct a question that can be answered by using information from a graph.
- 6. Arrange five objects by an attribute, such as size or weight, and identify the ordinal position of each object.
- 7. Answer questions about the number of objects represented in a picture graph, bar graph or table graph; e.g., category with most, how many more in a category compared to another, how many altogether in two categories.
- 8. Describe the likelihood of simple events as possible/impossible and more likely/less likely; e.g., when using spinners or number cubes in classroom activities.

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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:
 - a. objects; i.e., non-standard units;
 - b. U.S. customary units: inch, foot, yard, ounce, pound, cup, quart, gallon, minute, hour, day, week and year;
 - c. metric units: centimeter, meter, grams, 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. Recognize and explain the need for fixed units and tools for measuring length and weight; e.g., rulers and balance scales.
- 2. Tell time to the hour and half hour on digital and analog (dial) timepieces.
- 3. Order a sequence of events with respect to time; e.g., summer, fall, winter and spring; morning, afternoon and night.
- 4. Estimate and measure weight using non-standard units; e.g., blocks of uniform size.
- 5. Estimate and measure lengths using non-standard units; i.e., centimeters, inches and feet.

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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 the 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 ordinals numbers.
- G. Model, represent and explain addition as combining sets and counting on..
- 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 ordinal numbers to order objects; e.g., first, second, third.
- 2. Recognize and generate equivalent forms for the same number using physical models, words and number expressions; e.g., concept of ten is described by “10 blocks,” full ten frame, numeral 10, $5+5$, $15-5$, one less than 11, my brother’s age.
- 3. Read and write the numerals for numbers to 100.
- 4. Count forward to 100, count backwards from 100, and count forward or backward starting at any number between 1 and 100.
- 5. Use place value concepts to represent whole numbers using numerals, words, expanded notation and physical models with ones and tens. For example:
 - a. Develop a system to group and count by twos, fives and tens.
 - b. Identify patterns and groupings in a 100’s chart and relate to place value concepts.

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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. Recognize the first digit of a two-digit number as the most important to indicate size of a number and the nearness to 10 or 100.

6. Identify and state the value of a penny, nickel, dime, quarter and dollar.

7. Determine the value of a small collection of coins (with a total value up to one dollar) using 1 or 2 different type coins, including pennies, nickels, dimes and quarters.

8. Show different combinations of coins that have the same value.

9. Represent commonly used fractions using words and physical models for halves, thirds and fourths, recognizing fractions are represented by equal size parts of a whole and of a set of objects.

10. Model, represent and explain addition as combining sets (part + part = whole) and counting on. For example:

a. Model and explain addition using physical materials in contextual situations.

b. Draw pictures to model addition.

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

- c. Write number sentences to represent addition.
- d. Explain that adding two whole numbers yields a larger whole number.
- 11. Model, represent and explain subtraction as take-away and comparison. For example:
 - a. Model and explain subtraction using physical materials in contextual situations.
 - b. Draw pictures to model subtraction.
 - c. Write number sentences to represent subtraction.
 - d. Explain that subtraction of whole numbers yields an answer smaller than the original number.
- 12. Use conventional symbols to represent the operations of addition and subtraction.
- 13. Model and represent multiplication as repeated addition and rectangular arrays in contextual situations; e.g., four people will be at my party and if I want to give 3 balloons to each person, how many balloons will I need to buy?
- 14. Model and represent division as sharing equally in contextual situations; e.g., sharing cookies.

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

15. Demonstrate that equal means “the same as” using visual representations.

16. Develop strategies for basic addition facts, such as:

- a. counting all;
- b. counting on;
- c. one more, two more;
- d. doubles;
- e. doubles plus or minus one;
- f. make ten;
- g. using ten frames;

17. Develop strategies for basic subtraction facts, such as:

- a. relating to addition (for example, think of $7-3=?$ as “3 plus ? equals 7”);
- b. one less, two less;
- c. all but one (for example, $8-7$, $5-4$);
- d. using tens frames;
- e. missing addends.

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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.

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

- 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 as symbol, such as, ○, □, ▲ .
- G. Describe and compare qualitative and quantitative changes.

- 1. Sort, classify and order objects by two or more attributes, such as color and shape, and explain how objects were sorted.
- 2. Extend sequences of sounds, shapes, or simple number patterns, and create and record similar patterns. For example:
 - a. Analyze and describe patterns with multiple attributes using numbers and shapes; e.g., AA, B, aa, b, AA, B, aa, b,..
 - b. Continue repeating and growing patterns with materials, pictures and geometric items; e.g., XO, XOO, XOOO, XOOOO.
- 3. Describe orally the basic unit or general plan of a repeating or growing pattern.
- 4. Solve open sentences by representing an expression in more than one way using the commutative property; e.g., $4+5=5+4$ or the number of blue balls plus red balls is the same as the number of red balls plus blue balls ($R+B=B+R$).
- 5. Describe orally and model a problem situation using words, objects or number phrase or sentence.

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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.

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

- 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, compare and sort two-dimensional shapes; i.e., square, circle, ellipse, triangle, rectangle, rhombus, trapezoid, parallelogram, pentagon and hexagon. For example:
 - a. Recognize and identify triangles and rhombuses independent of position, shape or size;
 - b. Describe two-dimensional shapes using attributes such as number of sides and number of vertices (corners or angles).
- 2. Create new shapes by combining or cutting apart existing shapes.
- 3. Identify the shapes of the faces of three-dimensional objects.
- 4. Extend the use of location words to include distance (near, far, close to) and directional words (left, right).
- 5. Copy figures and draw simple two-dimensional shapes from memory.

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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.

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

- 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.

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

I. Communicate mathematical thinking
by using everyday language and
appropriate mathematical language.