

## **MATHEMATICS CONTENT STANDARDS GRADE 1**

By the end of first grade, students count, read, and write numbers to 100, and add and subtract numbers to 20. Students understand and use the concept of “ones”, “tens” and “hundreds” in place value. They measure in standard (inch/cm) units and non-standard units. Students understand time to the hour and half hour. They describe data, analyze and solve simple problem situations.

### **NUMBER SENSE STANDARDS**

Numbers determine and define quantities and relationships. They are used to make comparisons, interpret information, solve problems, and make decisions. Number sense is an understanding of number relationships. Students use estimation to make good judgments about the reasonableness of results and make sense of the many ways in which numbers are used. Number sense offers rich opportunities for investigating real-life applications and developing mathematical concepts and connections through problem solving. The number system has power that is deeper than counting, collecting and computing. Through exploration, usage and reflective thought, students construct number meaning and interpret the multiple uses encountered in the real world.

As students work with each new family of numbers (whole numbers, fractions, decimals, percents, integers, real numbers) they engage in three major tasks. First, they must develop a conceptual understanding of the number family and its relationships to other sets of numbers previously studied. Then, students develop meaning for the operations of addition, subtraction, multiplication and division for each family of numbers. Finally, after building a strong conceptual foundation, students must work to acquire fluency and facility with both numbers and their operations.

The acquisition of proficiency with basic facts must be encouraged and mastered, because it allows students to work confidently as they progress in their mathematical studies. However, brain research shows that rote rehearsal may not be the best method of developing this kind of proficiency. Teachers are encouraged to use a wide variety of experiences and tasks to develop this fluency with number, while maintaining student interest and enthusiasm.

In addition, it is important for students to experience meaningful computational algorithms. Many of our standard algorithms are not consistent with the mathematical principles of place value. Students need to develop meaning during their early experiences with addition, subtraction, multiplication and division algorithms. Over time, many students will adopt the standard algorithms for convenience and efficiency. However, students using non-standard algorithms that they understand will remember and be able to use them much more effectively than students using standard algorithms that they have simply memorized. The understanding of multiplication, for example, should not be confused with fluency in using a multiplication algorithm.

Finally, while computation is a powerful part of mathematics, we need to recognize the importance of all five strands. All students must have opportunities to grow in all areas of mathematics as they continue to become proficient in computational skills.

- Students understand the relationships among numbers, quantities and place value, and use whole numbers up to 100.
  - **Count, read and write whole numbers to 100 and understand place value**
  - Compare and order whole numbers to 100 using the symbols for less than, equal to, or greater than ( $<$ ,  $=$ ,  $>$ ).
  - Represent equivalent forms of the same number through the use of physical models, diagrams and number expressions (to 20).
  - **Count and group objects into ones and tens**
  - **Identify and know the value of coins to \$1.00 and show different combinations of coins that equal the same value.**
  
- Students demonstrate the meaning of addition and subtraction and use these operations to solve problems.
  - **Know the addition facts (sums to 20) and the corresponding subtraction facts, and commit them to memory.**
  - Use the inverse relationship between addition and subtraction to solve problems.
  - Identify one more than, one less than, ten more than, ten less than a given number.
  - Count by 2's, 5's and 10's with numbers to 100.
  - Show the meaning of addition (putting together, increasing) and subtraction (taking away, comparing, finding the difference).
  - **Solve addition and subtraction problems with one- and two-digit numbers.**
  - Find the sum of three one-digit numbers.
  
- Students use estimation strategies in computation and problem solving that involve numbers that use the ones, tens, and hundreds places.
  - Make reasonable estimates when comparing larger or smaller numbers.
  
- **Students use a variety of strategies to estimate and compute mentally.**

## **ALGEBRA AND FUNCTIONS STANDARDS**

Algebra is the language of all mathematics and science, and a tool for solving problems. It is the language of operation, symbol manipulation, and variables. It describes and interprets relationships among quantities. Algebra is generalized arithmetic interwoven through all strands, and is closely connected to functions. A function is a relationship among quantities and can be represented using tables, graphs and algebraic symbols. Functions often represent a way of generalizing a numerical pattern. When there is a functional relationship between two quantities, the value of the first quantity determines the corresponding value of the second. The study of functions enables students to see relationships and to make predictions based on those relationships.

- Students use addition and subtraction number sentences, objects, drawings, symbols, and words to solve problems.
  - Understand the meaning of the symbols  $+$ ,  $-$ ,  $=$ .

- ☐ **Write and solve number sentences from problem situations that express relationships involving addition and subtraction.**
  - ☐ Create problem situations that lead to number sentences involving addition and subtraction.
- Students sort objects, and create, complete, and describe patterns involving numbers, shape, size, rhythm or color.
  - ☐ Describe, extend and explain how to get to the next element in simple repeating patterns (rhythmic, numeric, color, and shape patterns).

## **MEASUREMENT AND GEOMETRY STANDARDS**

Through the study of geometry, students link mathematics to space and form in the world around them and in the abstract. In this strand, the students are exposed to and investigate one-dimensional, two-dimensional and three-dimensional space by exploring shape, area, and volume; studying lines, angles, points and surfaces; and engaging in other visual and concrete experiences.

- Students use direct comparison, standard and non-standard units to describe the measurements of objects.
  - ☐ Compare the length, weight and volume of two or more objects using direct comparison, standard or non-standard units.
  - ☐ **Measure the length of an object to the nearest inch or centimeter.**
  - ☐ Estimate and determine the area and perimeter of solid figures by using non-standard units of measurement.
  - ☐ **Tell time to the nearest half hour and compare time related to events (e.g., before/after, shorter/longer).**
- **Students identify and describe common geometric figures, classify them by common attributes and describe their relative position/or their location in space.**
  - ☐ Identify, describe, and compare triangles, rectangles, squares and circles, including the faces of three-dimensional objects.
  - ☐ Classify familiar plane and solid objects by common attributes like color, position, shape, size, roundness, number of corners, and explain which attributes are being used for classification.
  - ☐ Give and follow directions about location.
  - ☐ Describe and arrange objects in space in terms of proximity, position and direction (e.g., near, far, below, above, up, down, behind, in front of, next to, left/right).
  - ☐ Visualize and represent symmetry, similarity and congruence in geometric shapes and figures.

## **STATISTICS, DATA ANALYSIS, AND PROBABILITY**

The study of statistics helps students learn to collect and organize information in a variety of graphs, charts, and tables to make the data easier for the students and others to understand. Students learn to interpret data and to make decisions based on their interpretations. Students learn probability, the study of chance, so that numerical data can be used to predict future events and outcomes.

- **Students collect, organize, record, represent and compare categorical data on simple graphs and charts.**
  - Sort objects and data by common attributes and describe the groups formed using categorical labels.
  - Collect, record, represent, and compare data (e.g., largest, smallest, most often, least often), using pictures, bar graphs, tally charts and picture graphs, and explain how the data were organized and represented.
- Students sort objects and create and describe patterns by numbers, shapes, sizes, rhythms, or colors.
  - **Describe, extend, and explain ways to get to a next element in simple repeating patterns (e.g., rhythmic, numeric, color, and shape)**

## **MATHEMATICAL REASONING, PROBLEM SOLVING, & COMMUNICATION STANDARDS**

The study of mathematics is much more than following procedures to determine answers to math computations and word problems. The student of mathematics is learning how to think clearly while solving problems that don't necessarily have predetermined single solutions. This skill is not only essential across all academic subject areas, but extends into virtually every career and job. More often than not, this thinking clearly must be done while working with and getting along with others, sharing information, expertise, and ideas. Frequently, reasoning has to be communicated to others, formally and informally, in writing and orally. Mathematical Reasoning is the study of thinking clearly.

- **Students make decisions about how to approach problems.**
  - Clarify the information given in the problem and the question to be solved.
  - Identify missing information.
  - Look for connections and think ahead:
    - “Have I done something like this before?”
    - “What do I think I’m going to have to do?”
    - “What type of answer am I expecting?”
    - “I have an idea about the mathematical steps I need to take”
    - “How am I going to overcome the obstacles?”
- **Students use strategies, skills and concepts in finding solutions.**
  - Predict outcomes and make reasonable estimates.
  - Use tools and strategies such as manipulatives or sketches to model problems.

- ☐ Make precise calculations and check the validity of the results from the context of the problem.
- **Students communicate results by explaining their process and solution.**
  - ☐ Explain the reasoning used with concrete objects and pictorial representations.
- **Students determine a solution is complete and make connections to similar problems.**
  - ☐ Evaluate the reasonableness of the solution in the context of the original situation.
  - ☐ Discuss similarities and differences with other problems.
  - ☐ Create and solve new problems similar to the original by either changing the story while keeping the numbers the same, or by changing the numbers while keeping the story the same.