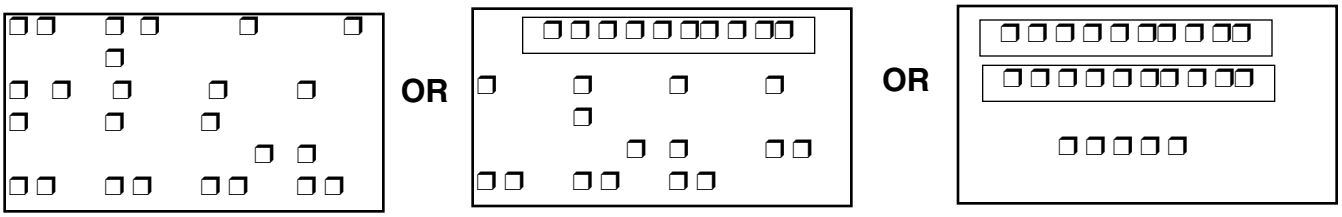
Children's Development of Mathematical Concepts - Grades 1 & 2

Since your children were babies, they have been learning about the world and forming concepts -- including ideas about math. Now that they are in elementary school, that strong "math foundation" they built will be helpful in their future learning. Here are many concepts your children will be learning early in elementary school:

NUMBER SENSE AND OPERATIONS:

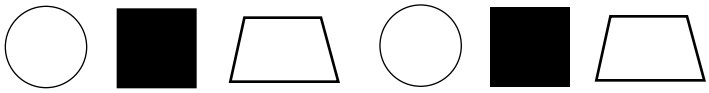
- ❒ naming and writing large whole numbers (up to 1,000)
- ❒ counting forwards, backwards, and "skip count," e.g., 5, 10., 15, 20...
- ❒ identifying **place value** of digits, starting with two-digit numbers, then progressing to three-digit numbers ("53" is five groups of 10 (50) and three ones (3); 134 is a group of one hundred (100), three groups of 10 (30) and four ones (4). They will probably be using hands-on materials, such as "base-ten" blocks to learn place value.
- ❒ representing numbers in a variety of ways, for example, the number "25" can look like:



25 ones | **a group of 10 and 15 ones** | **two groups of 10 and 5 ones**

- ❒ simple fractions, such as 1/2, 1/3, 3/4
- ❒ the inverse relationships between addition and subtraction (e.g., 7+5=12 is related to 12-5=7 or 12-7=5)
- ❒ adding and subtracting two- and three-digit numbers
- ❒ various meanings of *addition,* such as "plus," "combined," or "more"; various meanings of subtraction, such as, "less" or "take away," as well as the concept of "equal."
- ❒ how numbers are used in daily life, such as to find amounts (cardinal numbers), to determine order (first, second, etc.), for measurements, and the value of coins and monetary bills

PATTERNS, RELATIONSHIPS, AND ALGEBRA: When they were in Kindergarten, they may have made patterns with shape cut-outs or blocks, for example, by arranging them in a sequence such as this:



Now, in addition to practicing patterns dealing with shape, size, color, or letter, they are learning to create and describe simple number patterns, such as:

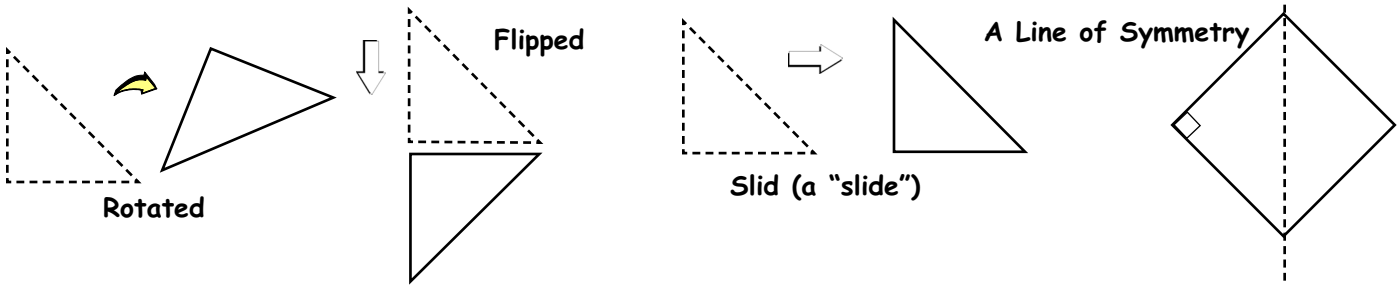
2, 5, 8, 11, __, 17...

When they were preschoolers, children learned to compare objects by size, color, or other physical attributes. Now, they are learning to compare the value of whole numbers using symbols, such as less than (<) , equal to (=), and greater than (>). They are also learning to write simple number sentences, such as 2 + 8 = 10, to represent "mathematical relationships."

CONTINUED ON FOLLOWING PAGE...

Children's Development of Mathematical Concepts - Grades 1 & 2 (continued)

GEOMETRY AND SPATIAL RELATIONSHIPS: When children were younger, they learned to recognize shapes. In elementary school, they learn how to describe the properties of those shapes in more detail, such as the length of a shape's sides, or the number of corners, faces, edges, or sides it has. They learn to draw simple shapes, as well as learn how to identify shapes that have been turned (rotated), reflected (flipped), enlarged, or translated (slid). They are learning to identify symmetry in two-dimensional shapes and are better able to "predict" what will happen when they put shapes together and take them apart.



MEASUREMENT (AND TIME): In elementary school, children learn how to identify dates using a calendar, how to tell time on analog and digital clocks, and how to measure and compare objects by length, weight, area, and volume. When they were younger, they may have learned how to measure using **non-standard units**, such as how long something was in blocks, or paper clips. In early elementary school, children are introduced to measuring using **standard units,** such as inches, feet, grams, liters, pounds, etc. Around age seven, children start to realize that even if a certain amount of liquid is poured from one container into another, the amount of the liquid remains the same.

DATA ANALYSIS, STATISTICS, AND PROBABILITY: In school, they are learning how to gather small amounts of data via observations and interviews, then how to organize, classify, and visually represent the data using charts, tables, bar graphs, pictographs, tallies, and/or Venn diagrams. For first and second graders, this might mean looking at the weather each day with their teacher, and recording the number of sunny, cloudy, rainy, or snowy days there are -- the "data" -- on a simple graph.Their skills in predicting and understanding cause and effect relationships -- knowing which outcomes of experiments are "most likely" -- develop. They learn to use data to solve simple problems.

WEATHER CHART - JANUARY

Sunny Days:	𝍸	5
Rainy Days:	|||	3
Cloudy Days:	𝍸 |	6
Snowy Days:	||	2

See "Home Activities for Math Skills Development: Grades 1 & 2" for ideas on how to support children's math development at home!

Sources: **"Family Board Games Build Math Skills"** by Julie Tiss, M.Ed.Washington Parent Magazine at www.washingtonparent.com/articles/9707/math.html; "Help Your Child to Learn to Develop an Understanding of Math Concepts," by Susan Jindrich at www.meddybemps.com; the Massachusetts Mathematics Curriculum Frameworks (2000); and **"Math Standards Links"** by the University of Massachusetts School of Education at www.ccbit.cs.umass.edu/SchoolofEducation/Preservice/standardsconnector/annframeworks/math/mathtarget.html.

HOME ACTIVITIES FOR MATH SKILLS DEVELOPMENT: GRADES 1 & 2

Reinforce Number Sense and Operations:

- Children this age still need practice counting up to large numbers and recognizing written numbers. Count objects with your child wherever you go. Point out numbers, especially large ones, in books, the environment, or around the home. Say, "That number says "one thousand, one hundred forty-five."
- In school, your young children are probably learning to solve math problems by using hands-on manipulatives, such as unifix cubes or blocks. Encourage this, especially when doing math homework.

- If you roll your spare change, let your children help you count the coins. Use this moment to teach, or reinforce their knowledge of the value of coins. Say, "That is a **nickel** and it is worth **five cents**," for example. Let your children help you count money when buying something either at the store, restaurant, or from a vending machine.
- Talk about fractions whenever possible. For example, when cutting a carrot into five, equally-sized pieces, say, "I'm cutting this carrot into **fifths** -- five equal parts."
- Read books that integrate math themes into them. Ask your children's teacher or librarian for suggestions.
- Make or buy "connect the numbers" pictures that use large numbers. These pictures will give children practice in recognizing written numbers.
- Encourage them to guess, or estimate, "how many" items there are in a set. For example, say "How many pieces of macaroni do you think are in your bowl?"

Use Math Vocabulary:

- Your elementary school child may be coming home with math homework containing some unfamiliar words; when we were children, our teachers used different math vocabulary! To learn "the lingo" of today's math, visit: **www.harcourtschool.com/glossary/math2/index_temp.html.** This Web site lists vocabulary used at various grade levels, along with definitions and examples. Use math vocabulary whenever possible, including during homework.
- Encourage your children to teach you new math words they learn at school.
- When out, point to shapes. Ask, how many **sides/faces/corners** does that shape have?
- Play guessing games to reinforce math vocabulary, such as names of shapes and positional words. For example, say, "I'm thinking of an object at home. It is **round** and it is kept **under** the sink. What do you think it is?"

Play with Patterns:

- Make "number patterns" for your child to figure out; for example, say, "I'm thinking of a number pattern. It goes like this: 2, 4, 6,8, 10. What number comes next?" Start with easy patterns, then try more difficult ones.

CONTINUED ON THE FOLLOWING PAGE...

HOME ACTIVITIES FOR MATH SKILLS DEVELOPMENT: GRADES 1 & 2 CONTINUED...

REINFORCE MEASUREMENT AND TIME:

- Encourage them to practice measuring objects around the house using a ruler or tape measure. Have them weigh items on the bathroom (or kitchen) scale. Let them help you prepare simple meals and snacks that involve measuring.
- Watch the weather together. Talk about the temperatures and what they mean.
- Post a large calendar in a spot where your children can see it. Write down important dates and appointments. Tell them of up-coming events, "On January 23, we have a doctor's appointment," or,"February 12 is grandma's birthday so we have to send her a card."
- Reinforce concepts of time. Point to the clock and say, "It's six-o-clock. It's time to wash up for dinner."

PLAY GAMES THAT REINFORCE MATHEMATICAL CONCEPTS:

There are many commercial games available that help children learn about math, for example:

- Chinese Checkers, Checkers, Connect Four, and Battleship can help build **visual perceptual organization.** Children need visual perceptual organization skills to read and create charts and graphs accurately, as well as align columns in complex math problems, such as adding three-digit numbers or doing long division.
- Clue Junior and Guess Who for enhancing **logical reasoning**, **planning**, and **cause and effect relationships**
- Monopoly Junior for **money skills**
- Tangrams for **geometry**, **patterns,** and **spatial relationships**
- Multi-piece puzzles (25 pieces) for **spatial relationships and part-to-whole concepts**

ENCOURAGE PROBLEM SOLVING:

- Ask your children for suggestions on ways to solve simple problems. For example, say, "We have to prepare for your birthday party. What do we need? What should we do first?" They may come up with ideas -- picking a date, sending invitations, buying refreshments, etc. Practice in solving simple situations will help your child develop logical reasoning skills - which carries over into math!

Sources: **"Family Board Games Build Math Skills"** by Julie Tiss, M.Ed.Washington Parent Magazine at www.washingtonparent.com/articles/9707/math.html; "Help Your Child to Learn to Develop an Understanding of Math Concepts," by Susan Jindrich at www.meddybemps.com; the Massachusetts Mathematics Curriculum Frameworks (2000); and **"Math Standards Links"** by the University of Massachusetts School of Education at www.ccbit.cs.umass.edu/SchoolofEducation/Preservice/standardsconnector/annframeworks/math/mathtarget.html.