Math Instruction: Preschool, Kindergarten, and Beyond!

The Three Elements of Early Math

By Diane Hurst

Math in the early years—starting in preschool and continuing into the primary grades—is built from a framework of three main parts: *counting,* using the *basic operations*, and memorization of *math facts*. These three elements are the bare bones framework of all K-3rd grade math programs. Of course, there are a few other math topics that children also need to learn, such as measurement, shapes, using money, telling time, and using the calendar. But most of the time and effort in early math goes into learning the elements that make up the framework of mathematics. Whether the curriculum you choose is simple or elaborate, these three elements (*counting*, using the *basic operations*, and knowing *math facts*) will give your child a solid start in mathematics. Following are some ideas for teaching these three elements.

Counting

Young children can say counting rhymes with you. Two traditional rhymes are:

One, two, three, four,
Mary at the cottage door.
Five, six, seven, eight,
Eating cherries off a plate.

One, two, buckle my shoe
Three, four, shut the door
Five, six, pick up sticks
Seven, eight, lay them straight
Nine, ten, a big fat hen

Many board games use counting. A dice or spinner is used, and players count as they move their playing pieces. Playing board games is especially useful for helping young children to learn "how many" each number is. They can physically feel the numbers, as they move their playing pieces along the board. With older children, you can use a variation: Choose a number that you want to practice multiples of (counting by that number, also known as "skip counting"). Whatever number they roll on the dice they multiply by the chosen number. For example, if you want to practice counting by threes, if a five is rolled, they go fifteen spaces on the board. You can use both commercially available games, and your own home-made game boards. Making a game board is, in itself, an activity that many children like to do.

Basic Operations

Before they learn the meanings of the words "addition," "subtraction," "multiplication," and "division," children will have used these basic operations in their everyday life. Beads on a string are added together, four cookies are divided between two people, a chair is taken away from the circle for Musical Chairs, one flower looks twice as big as another.

When they first use each basic operation in arithmetic lessons, they will be likely to use the words “plus,” “take away,” “times,” and “goes into” for these operations. You can gradually teach other vocabulary such as “sum”, “product”, “remainder”, “quotient”, etc. Don’t be surprised if it takes many repetitions to learn these less often used math terms. I am sure some of my children had to hear the word “multiplication” at least a dozen times before they started to learn that “multiply” means “times.” But if you keep using the words, they will learn them.

It is helpful to use manipulatives (objects which can be arranged in groups for adding, subtracting, etc.) when learning the operations. Coins, buttons, or other counting items can be used. A convenient, effective, and easy-to-use manipulative aid is a 100-bead abacus. All four operations can be demonstrated and practiced using the abacus. As a mother of many young children, I felt like I’d discovered a wonderful time and worry-saving tool when we discovered the abacus. Just think—no little blocks or other small, choke-sized objects to fall on the floor for the crawling baby to find, and for me to have to sweep up and put away, or to end up--who knows how?—in odd places in every room of the house. With an abacus, all the little parts stay in one place.

My children have found the abacus very useful in learning beginning math. During kindergarten and first grade they used it regularly when doing their written math problems, writing down the answers only after physically moving the beads and visually “seeing” the answer. They always outgrew the need for this tool, usually by third grade, but its use in the early years eliminated any problem with guessing at answers or being frustrated or upset because they didn’t know an answer.

Memorization of Math Facts

Memorization of math facts begins when a child is doing his kindergarten arithmetic problems and says to you with enthusiasm, “I know what two plus two makes!” Whether he tells you about it or not, by repeatedly working simple math problems he begins to memorize the math facts.

Some children just seem to absorb the math facts like a sponge. They have little need for anything besides their regular math lessons to learn the facts. Others definitely need additional drill. If you are not sure what your child needs, it is better to give lots and lots of extra practice. Knowing the math facts “automatically” is what is needed to make math in higher grades much easier.

Many materials are available for learning math facts, ranging from computer drills, skip-counting tapes, and domino games, to printed drill pages.

Among the methods we have tried, one of our favorite ways to practice math facts that add up to ten is to use a card game. Two sets of cards, each having numerals for zero – ten, are used. You can easily make these cards out of tag board. Number cards are placed face down on the table. Players take turns turning over two cards to try to create sets of two numbers that add to make ten. These same cards can be also used to play, ”Go Fish,” with the object of making sets that add to make ten.

The method that has been least successful for us has been flashcards. They seemed tiresome, and if the child didn't know the answers it took a long time to learn them—probably because asking a child to tell you something he doesn't know is counterproductive.
Some people have found that just having the child write out the math facts again and again, for copywork, is a good way to teach them.

For both multiplication and division facts, we have found good success using drill pages. Using a series of drill pages that progresses in difficulty is an easy and effective way to learn math facts. We have tried several different drill programs, and found that the type that our kids liked the best used large type (a whole page of small print math facts just looks overwhelming!), and had a progression of pages which included review of previously learned facts (in this way, only a few new facts needed to be learned at a time, which was easier than learning a large number of multiplication facts at one time).

For a review of multiplication facts (once they have been learned), one of the simplest things we've done has been to have the child take a calculator, and drill himself. For example, to review the facts for *x six*, he would randomly input numbers times six, trying to guess the answer before hitting the equals sign and seeing the answer displayed.

Use of a "hundreds board" (a chart that has the numbers 1-100 written on it, grouped by tens) can provide review of math facts once they are learned. There are many games that can be played on a hundreds board. You can easily make your own hundreds board on a piece of poster board, or you can buy one ready-made. We have one that is made out of blue plastic, with the numbers embossed on it. You will need two or more colors of game chips to play games.

We like to play the game, "Multiple Climbing." For this game, each player uses a different color of chips. Players each put two chips on the "low end" of the hundred board (the end that has numbers 1-10); one on an odd number and one on an even number. Then they take turns rolling a die, and moving their chips to a multiple of the number rolled. Chips must be placed so that they move one space at a time—the multiple chosen has to share a side or a corner with the space the marker is on. The first player to get both his chips to the "high end" of the hundred board (the end that has numbers 91-100) is the winner. For this game, we use a reference page that we made, that tells us the multiples of 4 starting from 52. Knowing if a large number is a multiple of three is easy—you add all the digits, and if the resulting sum can be divided by three, the number is a multiple of three. To know if a large number is a multiple of six, you determine if it is a multiple of both two and three.

Another game we like is "Ambush." Each player uses a different color of chips, and places one chip on his turn, for a multiple of the number rolled on a die. Each player has a certain number of chips to play with—usually fifteen or twenty. The object of this game is to place a chip on both sides of one of your opponent's chips (either horizontally, vertically, or diagonally). After all the chips have been placed, the "captured" chips are counted, and whoever has the most is the winner.

As you can see, there are many ways to learn and practice the three basic elements of primary math. Some of these can occur naturally in day to day life, but to have a strong math framework, counting, learning the basic operations, and memorizing the math facts need to be done

regularly, as a part of your planned homeschool activities. Using math work pages is one way to cover these math topics, but you might want to consider using some additional materials-- such as counting rhymes, the abacus, printed or computer math drills, or playing some educational math games-- as well.

Diane and Michael Hurst have nine children, and have been homeschooling for over 25 years. They are beginning a curriculum business, called Gentle Shepherd Curriculum, for books and e-books that Diane has made. Their website is www.gentleshepherd.biz.

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