



PARENT magazine

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Earlier editions of the YVY newsletter focused on social skills and literacy, two of the essential domains for School Readiness addressed by the National Common Core Standards with which the Head Start approach to School Readiness is aligned. The following addresses another important component of School Readiness, Early Mathematics.

EARLY MATH= Preparing Preschoolers 4 Success

What role does mathematics have in the preschool classroom? We all know that young children are taught to count early on. But the mathematical knowledge that young children need in order to succeed in school goes much beyond this. Much of the research on young children's learning has focused on reading and literacy, as these are obviously necessary for a child's success in school and in life. Only recently have researchers begun to focus on early math in recognition of the importance that foundational math skills have in children's later success.

Children are naturally interested in mathematical ideas. Who hasn't heard a preschooler complaining that he or she has less of something than another child or that "his piece of cake is bigger than mine"?

Children also have a rudimentary sense of distance ("My house is very far from your house") and time ("This car ride is very long"). As young children explore their environment, they begin to notice relationships that are the foundations of math. They can sort things, match things, compare things, put together puzzles, and build complicated structures with blocks. Mathematics helps children make sense of the world around them. Building on children's

natural interest in mathematical ideas and guiding their understanding can help children's readiness for the more

complicated mathematical ideas they will encounter in grade school and beyond.

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Thinking Mathematically

Parents can help children grow in their mathematical abilities in all the basic areas of early math.

Numbers and Operations

Count things!

Encourage children to count all sorts of objects. Count children waiting for the bus, steps on the staircase, places at the table, yellow lego pieces, stop signs on the way home from school. When possible, point to or touch what you are counting. Sum up the number of objects counted so the child realizes that the last number is the total quantity.

Solve simple number problems with your child.

This recipe calls for three eggs. I only have two eggs in this egg box. How many do I need to take from the new box?

Find numbers all around you

Point out numbers on houses, shoe sizes on shoe boxes, prices in the grocery store.

Geometry and Spatial Sense

Find shapes in the environment.

Encourage children to identify shapes all around them. The kitchen table is a rectangle, a round tray is a circle, a ball is a sphere. Play "I Spy," looking for shapes, both indoors and outside.

Encourage children to play with objects that have different shapes and to make new shapes.

When children handle blocks, boxes, containers, and puzzles, they learn about different shapes. Provide materials so that children can create new shapes by folding paper, building with blocks, or molding with clay.

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Early Math *(continued from page 5)*

A position statement jointly prepared by the National Association for the Education of Young children and the National Council of Teachers of Mathematics identifies three key areas that are particularly important for three- to six-year olds in order for them to have a proper foundation for later, more complex math skills: numbers and operations, geometry and spatial sense, and measurement. Patterning, a component of algebra, also merits special mention.

Numbers and Operations

This area can also be referred to as "number sense." The beginning skill in this area is simply learning how to count. But most young children, even if they know how to count, do not yet understand what the numbers actually mean. Developing number sense means that the child understands that the number five, for example, will tell her how many of something there is. A child may be able to identify the numeral "5" and yet not understand that this can refer to five of anything. The child also needs to learn that if she counts five objects, the last counting word tells her how many there are altogether. By the time the child is six years old, she should be able to count out groups of ten in collections up to 100. Once a child can see small groups of objects (from three to six, depending on age) and immediately label them with a number without counting, we know that the child understands what numbers mean.

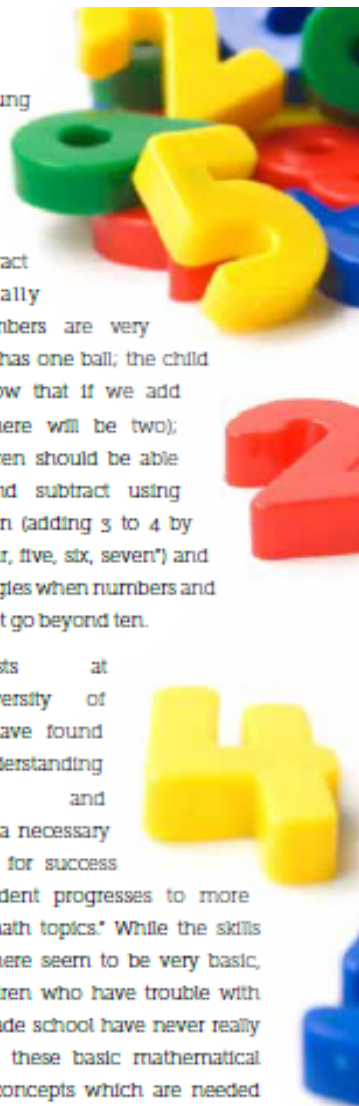
The "operations" section of this skill refers to understanding the uses of numbers and their relationships. If we have five blocks, and we take one away, how many do we have left? Are there enough chairs for everyone at the table? How can we tell? Who is second in line?

Very young children should be able to add and subtract non-verbally when numbers are very low (a box has one ball; the child should know that if we add another, there will be two); older children should be able to add and subtract using counting on (adding 3 to 4 by saying "Four, five, six, seven") and other strategies when numbers and totals do not go beyond ten.

Psychologists at the University of Missouri have found that "understanding numbers and quantity is a necessary foundation for success as the student progresses to more complex math topics." While the skills described here seem to be very basic, many children who have trouble with math in grade school have never really understood these basic mathematical concepts, concepts which are needed for gaining number sense.

Geometry and Spatial Sense

For very young children, geometry refers to their ability to recognize, match, and name different shapes, both flat and three dimensional. By the time a child is in first grade, he should be able to recognize and name many different shapes and describe their properties. He will understand that shapes are the same if they are large or small, red or blue or any other color, that shapes remain the same even if they are turned, and he will be able to sort them by size, shape, color, or other attributes.





Spatial sense refers to a child's understanding of directionality, order, and position.

The child must understand spatial vocabulary,

(including location and position

words (on/off, over/under,

in/out), movement

words (up/down, forward/backward), and distance

words (near/far). The child should be able to describe locations of objects with spatial words such as "under" and "behind" and build with blocks or make

a picture by combining paper shapes or other shaped materials. Putting a puzzle

together, for example, indicates that a child is aware of proper positioning in a space.

Measurement

Measurement is an important way for children to look for relationships in the world around them. Children start understanding measurement by recognizing attributes of objects that can be measured such as length, weight, size, distance, or amount. The child can then begin to compare and sort according to these attributes ("Jack is taller than me; this block is heavier/longer/thinner than the other block"). Children can also learn to measure using non-traditional units of measurement, such as their own footsteps.

Patterning

There are many patterns in our world. There are, of course, the patterns that we see in design, but there are also many different kinds of patterns in our lives. A daily schedule is a pattern; the days of the week recur in a pattern; a rhyme in a poem is a pattern; a recurring motif in music or art is a pattern. Children need to be able to identify patterns and relationships to understand the structure of things. They must first learn to recognize patterns, then learn to copy them and, finally, to create them. For example, children can tell that a strand of beads alternates red and white beads and can notice a pattern of tall and short blocks. They can recognize patterns in the environment. They can notice and discuss patterns in arithmetic (adding 1 to each number gives us the next number).

Patterning is an underlying concept in algebraic thinking. Training children to recognize and create patterns will help them understand the more complex patterns in algebra later on.

While researchers have found that children learn to read in a predictable sequence, they have also found that children do not seem to learn basic mathematical concepts in the same way. With reading, one skill is needed to prepare for the next, higher-level skill. However, young children seem to learn the different skills required for math through different pathways.

All the basic skills, however, need to be achieved by the time a child is in grade school because from that point on, math knowledge is incremental; one skill depends on the previous skill learned. Without a good foundation, children cannot do well because the math becomes increasingly complex.

Young children's thinking is concrete;

Thinking Mathematically (continued from page 6)

Use spatial vocabulary, words that describe position, distance, and direction.

The toy is under the table, look higher to see the ball, we are not going far.

Measurement

Measure things together.

This recipe calls for half a cup of water. We need to cut this paper in half.

Use comparisons.

Which skirt is longer/shorter? Who is older/younger?

Patterning

Create patterns.

Work with blocks, beads, or other material to create a recurring design. Create patterns by clapping, tapping, or other physical activities. Have your child make up his own pattern.

Find patterns.

These are patterns all around us in clothing, buildings, wallpaper, and toys. Encourage your child to describe these patterns.

In addition to learning mathematical concepts and relationships, children must learn basic aspects of problem solving and reasoning. When parents talk with children about problems, patterns, and mathematical connections, this helps children think about what they are doing and helps clarify their thoughts. When parents help a child to solve problems by discussing the child's own ideas and solutions and giving the child time to solve the problem, this helps build the child into an eager, enthusiastic problem solver.

