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Creative Paths to Math

Nurture your child's mathematical mind.

By Douglas Clements PhD and Julie Sarama

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Five-year-old Alex bounds into the kitchen with her 3-year-old brother Paul and announces, "When Paul is 6, I'll be 8; when Paul is 9, I'll be 11; when Paul is 12, I'll be 14!" and so on, up to 20. "How on earth did you figure all that out?" asks her father. "It's easy. You just go: three, FOUR, five; six, SEVEN, eight; nine, TEN, eleven," says Alex, who clapped at four, seven, and 10 to make a very strong rhythm with a soft-loud-soft pattern. This short conversation reflects the potential all young children have to learn mathematics. Math helps them make more sense of their physical and social world; what's more, children already use math every day: "That doesn't fit me. I grew too big!" "No fair! She has more than I do!"

Math surrounds children: They count stairs as they go up or down, help you measure ingredients as you cook, classify their toys into groups, set the table with exactly one of each item for each person, draw a map of the backyard, and notice the shapes of boxes and cans at the store. Even more amazing, like Alex, they invent mathematical ideas and strategies

and develop informal mathematical knowledge that is surprisingly complex and sophisticated. They might, for example, create ways to make a new shape by putting together shapes they already have. And with proper guidance, they can begin to see these ideas as "mathematics" and build upon them, which is crucial for understanding and learning more formal math later on.

Even if you struggled with math as a child, you can positively support your child now. You'll also be happy to know that math is taught differently today. The new ways of teaching and learning mathematics no longer depend on "knowing the one right way" to solve problems. Instead, teachers now ask children (and adults) to be open and curious about mathematical situations, problems, and the ways to solve them.

In fact, the math-oriented activities that you and your child engage in every day – consciously or not – are a great starting place for exploring and discussing mathematics. Ask your child (and yourself!), "How could we figure this out?" "How did you solve that?" If you stay open to learning more math yourself, you'll set the right tone to help your child learn. And remember: Math is more than just dealing with numbers.

Why Kids Benefit From a Strong Start

Children start building mathematical ideas and skills within their first year. One compelling research study found that when three pictures (with two dots, one dot, and three dots) were hung in front of a 6-month-old infant, her eyes would move to the picture of three dots when she heard three drumbeats.

Between 1 and 2 years of age, a child begins to show interest in playing with shapes. By 3, he will enjoy matching games and making patterns, and by age 4 most children begin developing early number and geometry understanding, from accurate counting of objects to making shapes. Four-year-old Zachery's grandmother saw this when she walked him out of preschool. He stopped, pointed, and exclaimed, "Look, grandma! Hexagons! Hexagons all over the sidewalk. You can put them together with no spaces!" Zachery's class was learning to combine shapes to make designs and patterns, as well as learning the shapes' names.

Young children like doing math, so early childhood is a great time for children to become interested in counting, sorting, geometry, patterning, measuring, and estimating. By talking to your child about how she is playing or what she is doing, you will help her become aware of math and build a mathematical vocabulary. For example, you might say that you notice each side of your 5 year old's building is the mirror image of the other. Let her know that there is a word that describes that kind of building – symmetrical. Similarly, if two children each claim their building is the largest, you might discuss how one is taller or wider or contains more blocks. If your child wants to measure how wide each building is, offer a string or ruler.

Drawing Out the Math in Play Time

The most powerful math learning is often "hidden" inside children's play. Research has shown that nearly half of children's natural play includes some form of math. For example, children classify objects (stacking blocks by shape or sorting them by color); measure things ("This cloth isn't big enough to cover the table"); count just about anything (coins, candy, people, toys, and so on); transform objects (stretching dough and making a flat circular shape); recognize patterns and shapes (building a symmetrical structure by putting a two unit block over two blocks); and explore spatial relations (finding a location or following directions). Here's what you can do:

- Encourage play with a mathematical slant. Be sure to supply lots of math-friendly materials like blocks and beads (for children 4 and up).
- Invite children to use their bodies. With their fingers, they can show numbers, from answering the familiar "How old are you?" to showing numbers in different ways (five as three



on one hand and two on the other). Your child might like to pretend to be in a ball (sphere) or a box (rectangular), feeling the edges and corners. Ask your 4 year old to show you how many feet and arms she has. If you ask her to show you her "three arms," she will no doubt protest, and show you her two arms emphatically to "prove" it!

- Point out physical surroundings. Look for signs of different shapes when you take a walk or the shape of items around the house – and don't forget about both two-dimensional (the front of a book is a rectangle) and three-dimensional shapes (a ball is a sphere and a soup can is a cylinder).

Just about everywhere you look, inside and outside of play, you'll find opportunities to talk about math, geometry, and shapes in particular – and your child's natural creativity will make it easy. Mathematical literacy is essential for succeeding in a competitive world, and it also supports language literacy: Children learn vocabulary, reasoning, and communication; most important, they develop a love of learning. Our world can be better understood with mathematics, so invite your child to experience it in all that she does.

About the Author

Douglas H. Clements, Ph.D., is a professor of early childhood education at the State University of New York at Buffalo. He has also taught preschool and kindergarten.