



Montessori Matters



E2 Writer's Café featured impersonations of key historical figures from the ancient Egyptian, Greek, and Roman civilizations. Additional pictures are include.

Congratulations!

Congratulations to Theo Thayib, sixth year student, for winning the South Eastern Minnesota Youth Orchestra concerto competition. Theo performed Concerto no. 4 for Cello and Orchestra, Opus 65, first movement, by Georg Goltermann, at the philharmonic level. Theo played before a panel of three judges. As a result of his winning performance, Theo will perform this concerto on May 20th with the orchestra. Bravo!

On the Calendar

For calendar dates, go to www.rmschool.org

Rochester Montessori School

Individualized Instruction • Academic Study • Spanish • Environmental Education • Technology in Instruction • the Arts and • becoming an International Baccalaureate Middle School program.

Because how children learn influences who they will become.

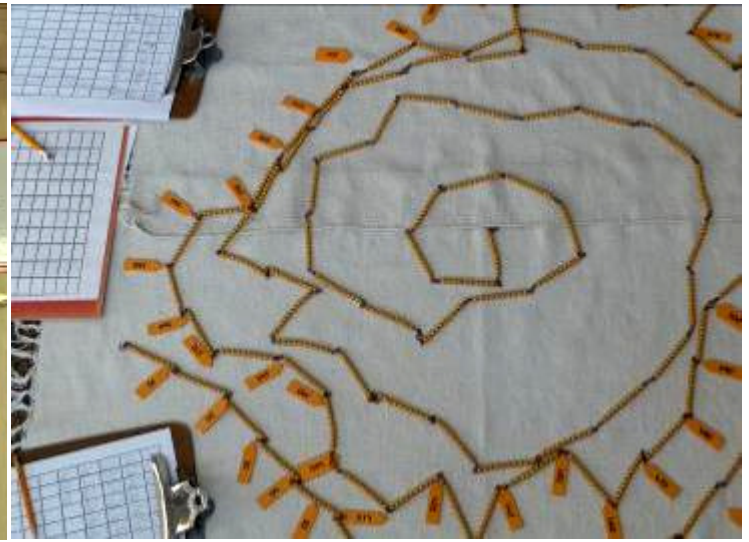
The Meaning of Number

By Paul Epstein, Ph.D.

Young children readily count. Counting is, however, different from knowing the meaning of number. Our way of life challenges children in their attempts to understand number because a number can take on one of three meanings.

When we say "three" and mean how many, we refer to the *cardinal* meaning of number: there are 3 children in the group. When we say "three" and point to the 3rd object in a row, we refer to the *ordinal* meaning of number. And, when we say "three" and mean who it is, as in a player's number on a shirt, we refer to the *nominal* meaning of number: 3.

It's easy to confuse children if we mix our meanings of number. When children mostly learn math through memorization, for example, they tend to understand the ordinal meaning of number but not the cardinal meaning. Without cardinal meaning, children struggle with computation, es-



(left) A kindergarten student researches and writes a book on curvilinear figures. (right) A study of place value culminates in Children’s House with counting and labeling multiples of ten from 1 to 1,000. Since the age of three, children hold and count unit beads, bars of ten, squares of one hundred, and cubes of one thousand. The 1,000 chain is familiar territory!

pecially with multiplication and fractions.

Dr. Maria Montessori described young children as having a “mathematical mind.” By this she meant that children want to understand mathematically. They naturally observe and explore patterns and relationships, classify objects into sets, create sequences, and solve problems. The Montessori early childhood curriculum is particularly designed to engage children in these experiences.

The exercises of Practical Life include sorting activities. The child works with a set of objects and groups together objects that share the same attributes – color, shape, and size. Children sequence objects in many of the Sensorial exercises. The set of ten Red Rods, for example, are sorted by their length, from ten centimeters to one meter. The set of ten Pink Cubes are sorted by their volumes, from one centimeter cubed to ten centimeters cubed. These activities involve children with all three meanings of number: There are 10 red rods (cardinal meaning). Point to the 10th red rod (ordinal meaning). When children place a written numeral 10 on the longest Red Rod, they have

given a nominal meaning to the rod.

There are several types of exercises in the Montessori early childhood Mathematics curriculum including numeration, place value, operations, and problem solving. Numeration engages children with learning the cardinal meaning for number. Children explore materials that teach numeration from 1 to 10, the teen numbers, and numbers to 99. Materials used to teach the

meaning of place value include a small golden bead (one), a bar of ten beads, a square of 100 beads, and a cube of 1000 beads. In subsequent exercises, children use beads and build numbers such as 4,583. Numeral cards, and learning to write numerals, are part of these exercises. Children combine objects and investigate the

operations of addition, subtraction, multiplication, and division. Children also develop a number problem solving approaches. They may look for patterns, arrange objects, make drawings, estimate, and even act out the problem.

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The elementary program builds upon these experiences and expands the scope of work. Children use materials to explore fractions and decimals and calculate sums, differences, products, and quotients well into the hundred millions or hundred millionths. Children explore the Wooden Hierarchy material and carry an actual model of a million. The Checkerboard enables exploring products such as $546,831 \times 4,935$. The Decimal Checkerboard is used to calculate $56,452 \times 35.891$. A material called "Racks and Tubes" is used to compute quotients such as $3,856,193 \div 8,361$. Children build a variety of trinomials with the Cubing Material and discover a number of exponential patterns. Building models such as $(2+5+8)^3$ leads later to understanding an algebraic trinomial $(a+b+c)^3$

Children require years of guided experiences with mathematical manipulatives if they are to truly understand the meanings of number and think mathematically. This proposition is far different from merely memorizing.



(above and right) Some of the enacted historical figures by E2 students during this year's Writer's Café.

