Introduction to Mathematics

A child can learn basic concepts of mathematics in either of two ways. He can learn by using concrete materials during the years when he enjoys manipulating equipment; or he can learn by abstract methods when he is in the elementary grades. Dr. Montessori demonstrated that if a child has access to mathematical equipment in his early years, he can easily and joyfully assimilate many facts and skills of arithmetic. On the other hand, these same facts and skills may require long hours of drudgery and drill if they are introduced to him later in abstract form.

After she observed that the child who becomes interested in counting likes to touch or move the items as he enumerates them, Dr. Montessori designed concrete materials to represent all types of quantities. In a Montessori environment, a child not only sees the symbol for 1, 1000, or ½, he can also hold each of the corresponding quantities in his hand.

Later, by combining this equipment, separating it, sharing it, counting it, and comparing it, he can demonstrate to himself the basic operations of arithmetic. This activity gives him the satisfaction of learning by discovery rather than by being told. Eventually he develops an early enthusiasm for the world of numbers.

THE BANK GAME

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Any exercise involving the exchange of the Golden Beads (or duplications of them) is usually called the Bank Game. The large quantity of material, that the children use as a source for the game, is referred to as The Bank. The children use The Bank whenever they want to change Units to Tens, Tens to Hundreds, Hundreds to Thousands, or vice versa. Adding, subtracting, multiplying and dividing four place numbers can all be done with the quantities in the Bank.

If two children wish to add, each one puts a quantity of bead material on a small tray and selects the corresponding cards to represent the quantity. They then combine the two quantities on a larger tray and select larger cards to represent their total.

For subtraction, the teacher places a large quantity of bead material with the corresponding large cards on a large tray. She then gives the child a smaller tray with a number printed on a smaller card. The child "takes away" this quantity of bead materials from the larger tray and puts it with the small cards. The quantity remaining on the larger tray is the answer. The child then finds the numeral cards to represent this remainder. With this process the children learn that subtraction is the breaking up of one large quantity into two smaller ones.

When learning division, the child is taught that division means sharing and that the answer (quotient) is always what one person receives. If he has the problem **1294** divided by **3**, he, serving as the Banker, asks three other children to get empty trays while he gets materials to represent the quantity **1294**. He wants to share this amount equally among the three children, beginning with the One Thousand Cube.

Since he obviously cannot divide the single cube, he changes it at The Bank for 10 Hundred Squares. He now has 12 Hundred Squares—these 10 plus the original 2 in the number **1294**—and he begins to share them among the 3 children. Each child receives 4 Hundred Squares. Next he divides the 9 Ten Bars; each child receives 3. Then he divides the 4 units; each child receives 1. One unit remains which he cannot divide. The answer is what one person receives, **431**, with a remainder of **1.**