MONTESSORI MATH

MATH INTRODUCTION

Pre-math Skills and Practical Life

Practical life lessons with many steps, like polishing a brass figure, are indirect preparation for advanced math problems. For example, when a child is doing a multiplication problem, such as long division, she needs to perform many steps to find the answer: and remembering the order of all the steps, for some students, can be difficult.

In the toddler and early preschool years, children begin with practical life lessons and materials that have one or two steps to them, like pouring or sweeping. Then they progress to practical life lessons and materials that have three or four steps, like watercolor painting or making a book with paper.

Therefore, math curriculum includes practical life work for toddlers and early preschoolers..

The Concept of Numbers

A toddler learns numbers as names: from possibly 1-5 but won't necessarily know how to count or that these numbers are symbols of the amounts of something; a preschool child will learn this and also learns 1) numbers one to ten, 2) that one, etc., is smaller and less than two, etc., 3) what zero is, 4) how to count to ten and 5) write her numbers from one to ten, before going on to the teens.

In elementary Montessori, children advance to larger numbers with the understanding (through hands-on experiences) that numbers (symbols) represent quantities.

They learn the teens, tens, hundreds, thousands, etc.

They learn the decimal system: units, tens, hundreds, thousands, and that each changes over at nine, ninety-nine, etc.
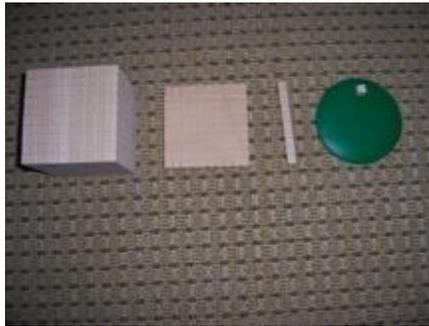
Montessori math simple addition lesson activities and DIY materials and video clips from a French blog here!

Upper Elementary Math Manipulatives

MATHEMATICS - GROUP II - DECIMAL SYSTEM

Exercise: PRESENTATION OF BEADS (1, 10, 100 and 1000)

Material: Tray or basket containing one unit bead, one ten bar, one hundred square, and one thousand cube (these are the Montessori Golden Beads and come in sets).

Other ten sets: you can purchase a non-Montessori plastic set (of the above material) as a substitute at LearningThings.com. I have a wooden set I bought at an educational store over 15 years ago.

Presentation:

1. Take out the unit bead. "This is one unit." Show it to the child. Place it to the right on table. "This is a ten bar." Show it to the child. "Let's count how many unit beads are in this." Count. "How many?" "Ten." "That is why we call this a ten bar."

"This is a hundred square. Let's count how many unit beads are in this. "Count. "How many units?" "100." "Now, the hundred square is made up of ten bars. Let's see how many ten bars we have here. One ten, two tens, three tens, four tens, five tens, six tens, seven tens, eight tens, nine tens, ten tens. Do you know how many ten bead bars are in a 100 square?" "Ten bead bars."

2. "Now look at this. Do you want to hold it? This is the 1,000 cube. There are 1,000 little unit beads in this cube. This 1,000 cube is made up of 100 squares. Let's see how many 100 squares are in a

1,000 cube." Count. "One 100, two 100s, three 100s, etc. (Trace hundred squares all the way around the cube as you count.) "Ten 100 squares make a 1,000 cube. There are 1,000 unit beads. That is why it is so heavy."

3. Right away, go into the three period lesson. First period. "This is 1 unit, can you say unit? This is a 10 bar, can you say 10 bar? This is a 100 square, can you say 100 square? This is a 1,000 cube, can you say 1,000 cube?"

Second period. Mix them up.

"Show me the 10 bar.'
"Show me the unit."
"Show me the 100 square."
"Show me the 1,000 cube."
"Give me the unit, please."
"Give me the ten bar, please."
"How many units in the 10 bar, please."
"How many units in the 10 bar?" "Let's count."
"Give me the 100 square. Thanks."
"How many beads in the 100 square?" Count."
"Give me the 1,000 cube please."
"How many unit beads are in the 1,000 cube?" "1,000."

Prolong the second Period as long as possible.

Third Period.
"What is this?" "100 square."
"What is this?' "10 bar."
"What is this?" "Unit."
"What is this?" "1,000 cube."

During the three period lesson, when moving the beads around, try to have the 1,000 cube and the unit bead next to each other as much as possible to show contrast.

Control of error: The Directress.

Indirect Aim: Mathematics.

Direct Aim: To make child aware of the decimal categories.

Age: 4 1/2 and up.

END

# PRESENTATION OF BEADS - Continued

Present ONLY IF....

Only if during the three period lesson you know that the child is having difficulty knowing how many units are in a ten bar, take a ten bar and build a ten bar with unit beads. Count them as you go. (Build right alongside of the ten bar.) Mix them up and ask if child would like to do it.

"Let's build a ten bar." Count. "One unit, two units, etc. Ten units make a ten bar!"

If the child can't comprehend that there are ten ten bars in the hundred square, say, "Let's build a hundred square." Count. "One ten, two tens, etc. Ten ten bars make a 100 square!" (It is fun to place the 100 square on top of the ten ten bars.)
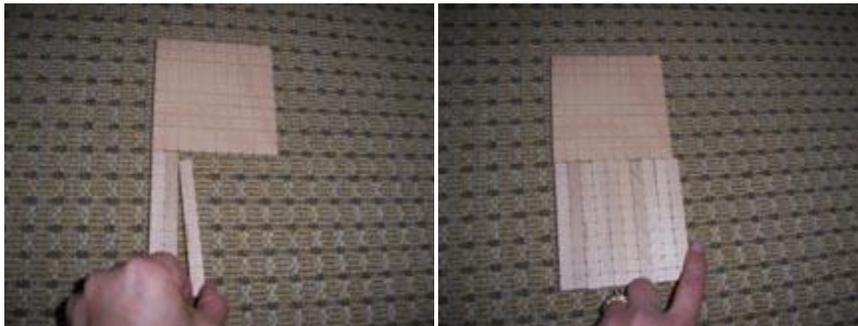
If the child can't comprehend that there are ten 100 squares in the 1000 cube, say, "Let's build a 1000 cube." Count. "One 100, two 100s, etc. Ten 100 squares make a 1000 cube!"
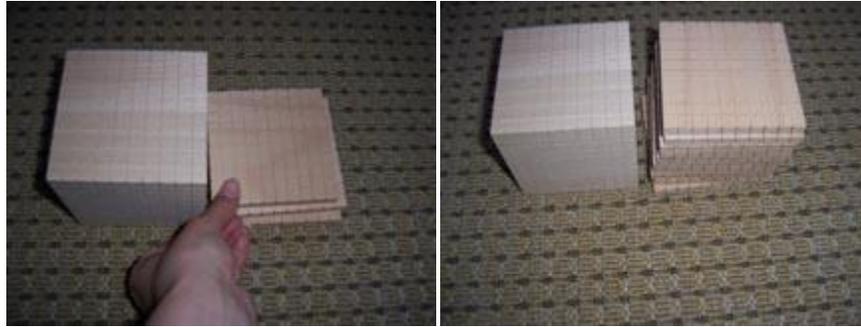
Control of error: The Directress.

Indirect Aim: Mathematics.

Direct Aim: To make child aware of the decimal categories.

Age: 4 1/2 and up.

END

Exercise: PRESENTATION OF CARDS

Material: cards corresponding to quantities and vary in size according to the number of zeros. There are 9 unit numbers, all green, 1-9. There are 9 tens in blue, 10-90. There are 9 hundreds in red, 100-900. There is 1 thousand, in green, 1,000.

Presentation:

1. Take out one unit, one ten, one hundred, and one thousand. Place on the table (or rug).

"Are there any numbers which you know on this table?" The child should recognize the one and ten. Bring out that the one unit is

green and the ten is blue. "This is 100. It is red" "This is 1,000. It is green."

2. Go right away into the three period lesson.

First period.
"This is one."
"This is ten."
"This is 100."
"This is 1,000."

Second period.
"Could you show me one please?"
"Could you show me 1000 please?"
"Could you show me ten please?"
"Could you show me 100 please?"

"Could you give me ten? What color is it. How many zeros in ten?"
"Could you give me 1,000? What color is it. How many zeros in 1,000?"
"Could you give me 100? What color is it. How many zeros in 100?"

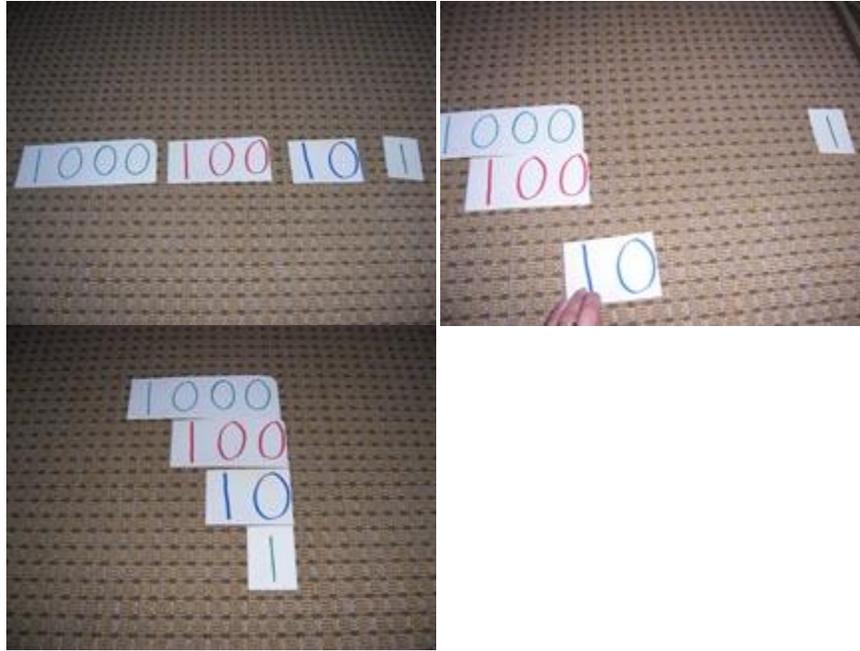Third Period.
"What is this?" "100."
"What is this?" "Ten."
"What is this?" "1,000."
"What is this?" "One."
"Can you place these numbers in order?"

Extension: Show the child how to make an upside down stair case with all the cards.

Control of Error: Directress.

Indirect Aim: Mathematics.

Direct Aim: To make child acquainted with symbols, and that although the quantities are always the same, the symbols are not.

Age: 4 1/2 and up.

END

Exercise: FUNCTION OF THE DECIMAL SYSTEM

Material: The golden beads as described before and also the cards as previously described. Two mats.

Presentation: We are now going on to function, to make the child aware of what the decimal system means. A system based on 10. You cannot talk to the children about this, you have to make them aware through experience. We start with quantity first.

1. Place in vertical lines at the right of one of the mats, first, the unit beads, count as you go, let the child count with you, "one unit, two units, three units, four units..." all the way to nine.

"What happens when we have 10 units?" "We get a 10 bar."
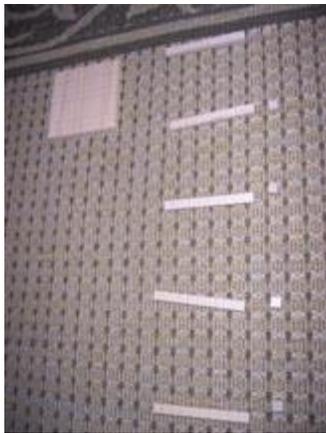

2. "One ten, two tens, three tens...".

* The above layout of the ten bars is the way we were shown in our Montessori training.
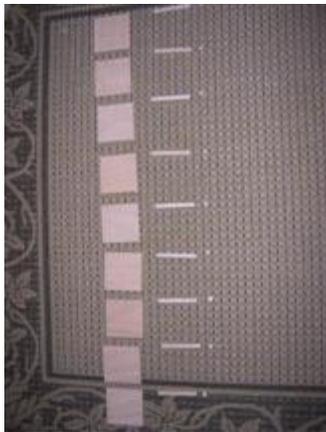
** The above layout of the ten bars is the way we presented them in our classroom, to be consistent with the teen and ten bead works.
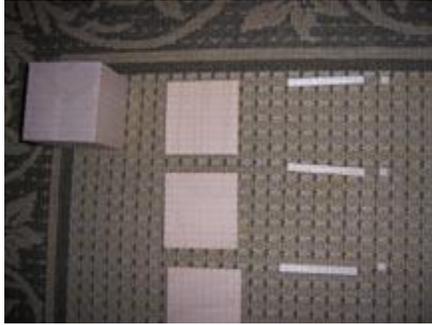
"What happens when we get ten tens?" "We get a 100 Square."

3. "One hundred, two hundreds, three hundreds..."

"What happens when we get ten hundreds? That becomes 1,000... we get a 1,000 cube."

4. Review the layout of the beads with the child: "So, how many units do we have there?" "1, 2, 3, 4, 5, 6, 7, 8, 9 units."

5. "How many 10 bars do we have there?" "One 10, two 10s, three 10s, four 10s, five 10s, six 10s, seven 10s, eight 10s, nine 10s."

6. "How many 100 squares do we have?" "One 100, two 100s, three 100s, four 100s, five 100s, six 100s, seven 100s, eight 100s, nine 100s."

7. "And if we add just one more 100 square to it we have a 1,000 cube."

Continue this lesson with the 1-1000 or 9000 cards:

Exercise: FUNCTION OF THE DECIMAL SYSTEM
Continued

Material: The cards as previously described, from 1 to 1000. Use the second mat.

"Now, on the second mat we will use the same procedure using our symbols on cards."
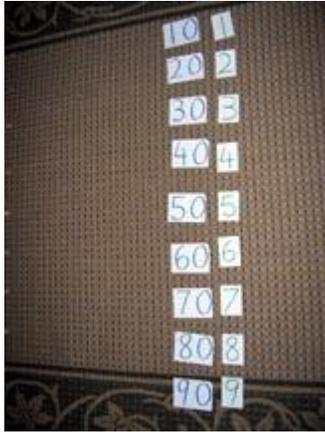
1. Place the units on the mat in a vertical line at the right of the mat. Count to nine as you place them. Let the child count. There will be no 10 unit.

2. Place the ten symbols in a vertical line next to the units.

"One ten, two tens, three tens, four tens..." Let the child count.

3. As soon as we have ten tens we start the third column with one hundred.

"One hundred, two hundreds..." to nine hundred.

4. As soon as we have ten hundreds it becomes one thousand and we start the next column with one thousand.

5. Invite the child to do it by himself. (This can be introduced at circle.)

Control of Error: Directress.

Indirect Aim: Mathematics.

Direct Aim: To make the child aware of the function of the decimal system.

YouTube clip of laying out the cards 1-9000 here.

END

Exercise: FORMATION OF COMPLEX NUMBERS

Presentation:

Picture gallery [here](). Password is formation .

1. In this exercise you will have mats set up as in the pervious exercise, but at different ends of the room.

2. "Today we are going to do something that we have done before. I am going to try to get you to give me something without saying what I want." Hand the child a 4 unit card in the corner of a tray. "Could you get me that?" The child gets 4 unit beads and places them in the container and hands them to you. "Thank you." "Now, let's see what you brought me." Point to the 4 unit card. " What does this say?" "4 units." "Now, let's see what you brought. Do you want to count them?" "1 unit, 2 units, 3 units, 4 units." "Good, now you can put the beads away and I will put away the cards. Would you like to do some more?"

3. Do as many as the child wants to do, one category at a time. Then do the reverse. Give the child some of one category of beads and ask for the card for that amount. Verification is the same.

Progression:

1. Now, get the child cards for 2 units and 8 tens and place correctly as shown in tray. Child gets the beads for the numbers handed to him on the tray. "Let's see what you brought me. What does this say?" Point to the 2 unit card. "2 units." "Let's see what you brought." Empty container. Count. "1 unit, 2 units." "What does this say?" Point to the 8 ten card. "8 tens." "Let's count." "1 ten, 2 tens, 3 tens, 4 tens, 5 tens, 6 tens, 7 tens, 8 tens." "Right. Now I would like to show you something. This is important." Place 2 units on 8 tens. Now it makes 82. "Do you know what this says?" "8 tens 2 units." "Yes, and we call this 82." Continue with the hundreds and thousands, always verifying from the units up.

2. Then turn the procedure around and give the child the five 10 beads and three unit beads and ask for the corresponding cards (50 and 3) for this amount. Verification is the same. Continue with magic trick, or let the child do it.

Next Progression:

1. Give the child either the card or beads where the ten is missing, then the hundreds missing, then the units missing; and only then go into two places missing numbers. As you are verifying, you can make a zero in the corresponding color to mark where the card would have been. Then, after the magic trick when reading the numbers, ask what place is missing and what color should it have been.

It is good to do these exercises in small groups. The children's interest is sustained longer, and once they get the hang of it they can practice with each other.

From combining symbols and quantities we have come to form complex numbers. This completes the initial stage of the decimal system.

END