THE MONTESSORI MATH MATERIALS

The Montessori math materials were designed to allow the child to explore a concept in the concrete form. The sequence of presentation begins with simple to more complex and from concrete to abstract. Children will progress through the concepts at their own developmental rate. The directress is to continuously assess their progress and needs as well as document the same information.

The materials themselves contain the pattern for presentation as well as understanding. The sequence for presentation and learning is:

1 - Concrete before Abstract
2 - Quantity
3 - Symbol
4 - Quantity and Symbol association

The layout of presentation of math materials - Left to right and Top to Bottom (Reading presentation) except when working with Place Value - Right to Left - as in computations / operations.

Math, as well as other areas utilizes, the 3-Period lesson. It is also imperative to reinforce the 3 period lesson with follow-up activites. These can either be extended work with the Montessori materials or with a teacher made material. The child will learn through the variety of exploration as well as the repetition of jobs. Take time to ensure that the child follows and understands the process involved in manipulating the Montessori materials. The preparation and comfort of the Directress is directly related to the child's attitude toward and ability with early math experiences. Please take this responsibility seriously! Use slow, precise, nonconfusing movements and appropriate language.

MONTESSORI MATH MANUAL - PART ONE
PREMATH CONCEPTS:

Premath concepts develop the foundations of mathematical thinking and problem solving.

TEMPORAL RELATIONS - Develops concepts of beginning and end as well as the ordering of events. Temporal relations develop the idea of time periods. Activies include:

1 Sequencing should be developed in all presentation of materials, routines, and activities
2 Refer to various blocks of time during the day by their name ie. snack time, rest time, et.
3 Use controls or signals to signify the beginning and end of a routine
4 Do the calendar daily
5 Sequencing cards
6 memory games
7 Clock observations
8 Sharing time

SPATIAL RELATIONSHIPS: Develops concepts of position in space, direction and distance.

1 - When doing the three period lesson, utilize a variety of prepositions such as (Position in space - on, under, over, beside, in, off, behind, etc.)

2 - When instructing a child, use words designating Movement and direction - walking, running to/away from, etc.

3 - Games such as hot and cold, or verbal descriptions of where to find things assist the child in developing concepts of distance.

SERIATION

Develops abilities to order a series / recognition of cumulative differences or graduated order. Sensorial activities which can be graduated are included.

CLASS INCLUSION

Develops skills in recognition of similarities and develops classification skills. Sorting activities that are found throughout the classroom develop this skill.

*note: Piaget identified 3 basic types of sorting.
a - Relational - grouping by function
b - Descriptive - grouping on basis of one or more attributes - beads by size or color / beads by two or more types and sizes.
c - Conceptual - grouping on basis of identity

ONE-TO-ONE CORRESPONDENCE

Naturalistic activities are included throughout the classroom.

PRACTICAL LIFE: Hangers, snacks, dressing frames, nuts/bolts, keys/locks

SENSORIAL: cylinder blocks, pink tower to brown stair, sound boxes

LANGUAGE: picture matching, metal insets

CULTURAL: map pieces to control

EQUIVALENCE:

Develops abilities to compare / recognize sameness of quantities and uses concepts of many/few or more/less.

Activities include:

1 - Match fixed sets of objects - beads, Red Rods to Number Rods etc.
2 - Match sets of discrete objects - compare subsets and regroup, ask for prediction larger or smaller. Make set of boys / girls - which is larger or smaller set? Then form pairs, if everyone is paired then it is equal.)
3 - Compare any two sets of discrete objects - comparing subsets difficult to estimate visually (counters, pennies/pencils).
4 - Make bar graphs - Who is tall with brown hair, tall with black hair, short with red hair, etc.
5 - Build sets of same or different objects from a model.

NUMBER RODS - QUANTITY (Numerical Rods / Red and Blue)
(Sometimes the rods are painted two other colors.)

MATERIALS:

1 - TEN WOODEN RODS
- Square on each end (2.5 x 2.5 cm)
- Varying in length from 1 meter to 10 cm
- Graded 10 cm increments, shortest - 10 cm / longest - 100 cm.
- Rods are painted, alternating red and blue every 10 cm.
- Rods, red both end segments are 10 cm. = 1, 30 cm = 3, 50 cm = 5, 70 cm = 7 and 90 cm = 9

2 - RUG (the longest rod must fit on the rug)

PREPARATION: Prior work with RED RODS and attempts to COUNT

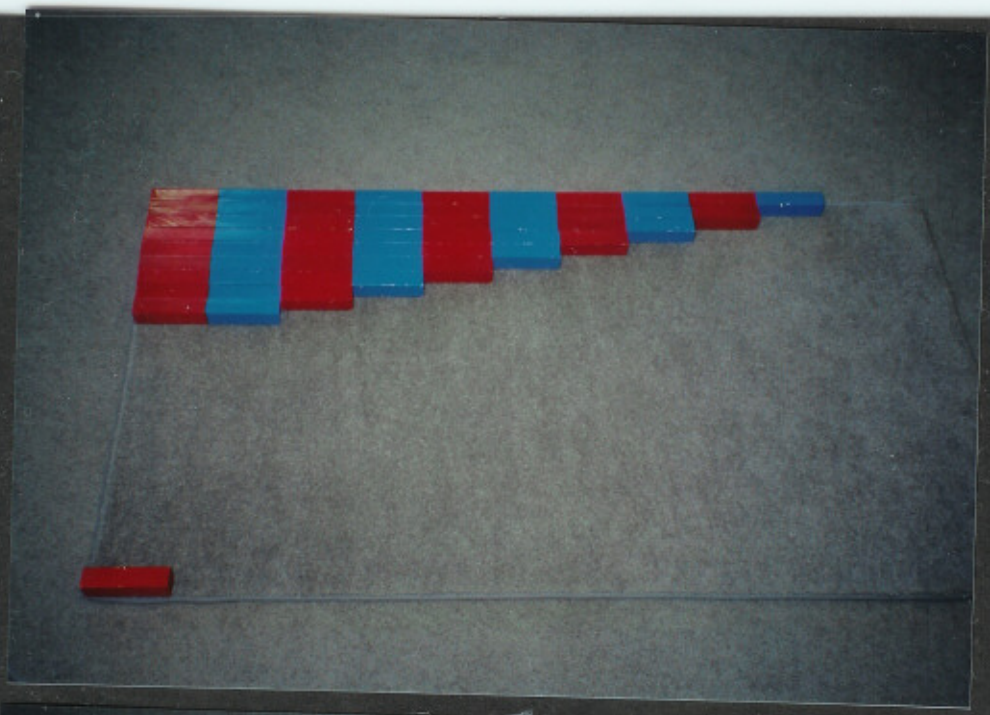
PRESENTATION: Presentations may be given to individuals or groups when appropriate. All presentations involve:
1 - **INVITING THE CHILD TO WORK WITH YOU**
2 - **NAMING THE WORK**
3 - **SHOWING WHERE THE WORK IS KEPT**
4 - **PREPARING A RUG.**

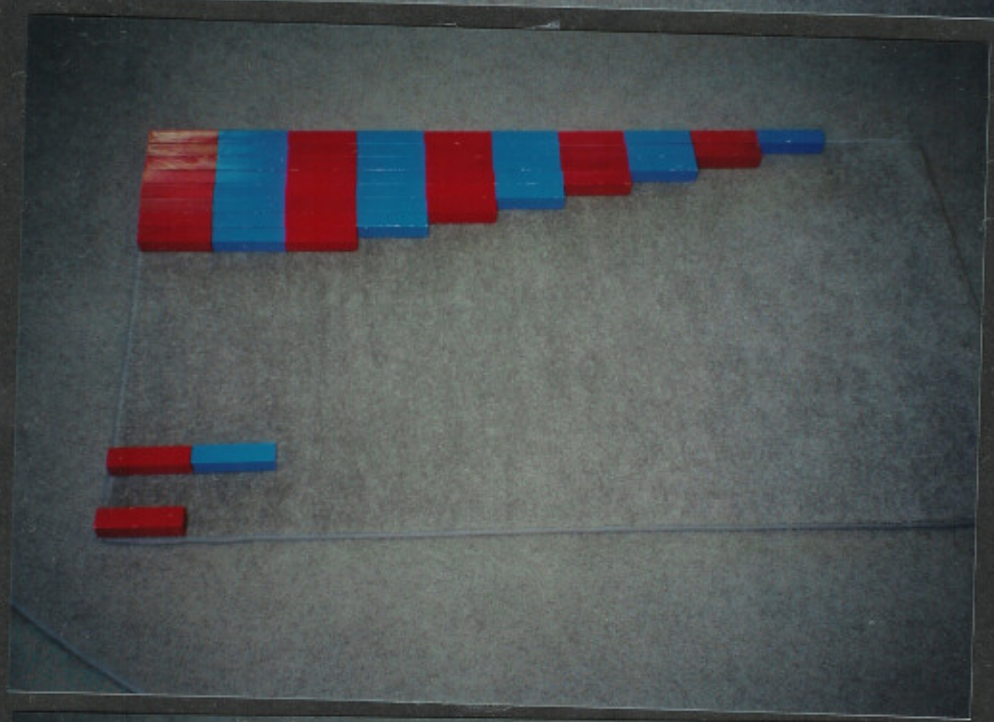
PRESENTATION 1 - SENSORIAL - BUILD A STAIR.

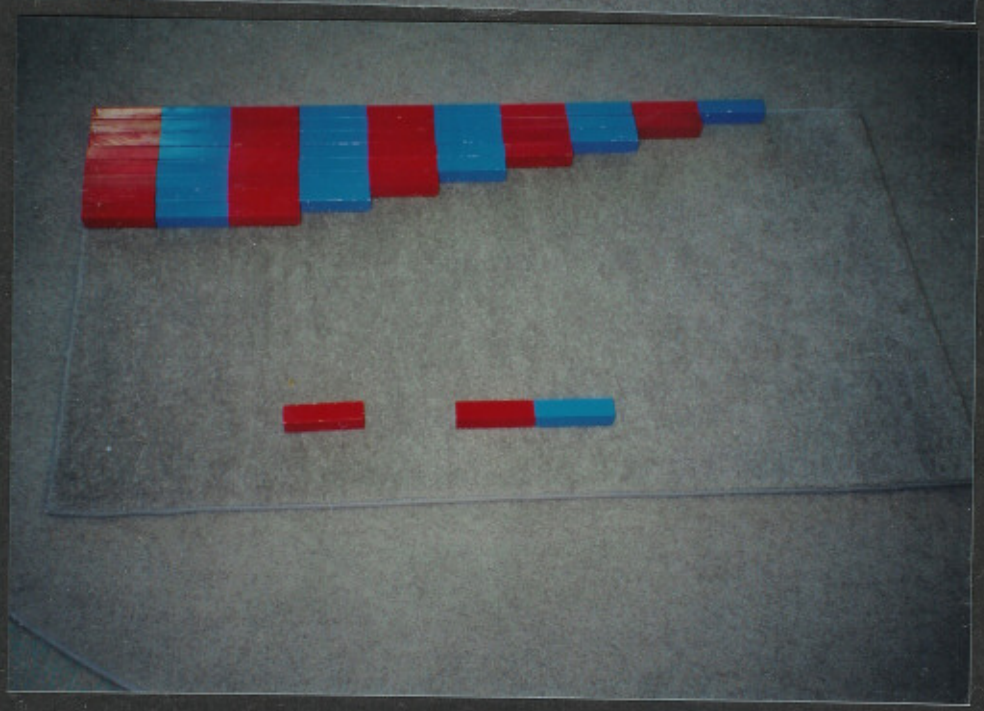
1 - Begin with the shortest rod.
2 - Carry rod to the rug horizontally by holding one hand on either end of the rod. If space is tight, carry rod vertically, close to the body with hands spaced toward top and bottom.
3 - Place shortest rod horizontally on bottom left-hand corner of rug, red end flush with left edge of rug.
4 - Bring each succeeding rod to the rug and place in a random parallel order / horizontally. Red segment ends will eventually be placed flush with left side of rug.
5 - Ask child to select next longest rod from the rug and place above the shortest rod.
6 - Invite child to build a stair with the first 5 rods.
7 - If the child can successfully build the 5 rod stair, ask them to continue building complete stair.
8 - When stair is finished, return the Number Rods to the shelf starting with the shortest rod first.

PRESENTATION 2 - THREE PERIOD LESSON - NUMBER RODS and NAMING

1 - Start building the Number Rod stair - using the shortest rod first placed halfway up the rug. The longest rod is positioned at the top of the rug. (MAY JUST START WITH FIRST 3 RODS and THEN PUT AWAY and CONTINUE LATER WITH OTHER RODS AS THE NAMES ARE LEARNED.)
2 - Select the shortest rod and bring down to the bottom left edge of the rug.







3 - **FIRST PERIOD:**
Indicate rod - "This is ONE". STROKE the rod from left to right. POINT to the rod, repeat "ONE".
4 - Ask child to repeat " ONE " and stroke rod as shown.
5 - Select next rod - " This is TWO ". Stroke from left to right the rods first color segment, stop, say ONE, continue stroking next color rod segment and say TWO.
6 - POINT to the rod, repeat " TWO ".
7 - Continue to " THREE " following same process and asking the child to repeat after each rod demonstration.
8 - **SECOND PERIOD:** Manipulation of rods.
Say to child, " SHOW ME THREE..., SHOW ME TWO..., SHOW ME ONE ... ".
9 - **THIRD PERIOD:**
Indicate a rod and say, " WHAT IS THIS ? " Verify response by counting segments. Repeat for each named rod.
10 - Return rods to the shelf. (REPEAT PROCESS)

DIRECT AIMS:

1 - Introduction to the quantity of numbers 1 to 10.
2 - Show relationships of sequential numbers 1 to 10.
3 - Introduce naming of numbers 1 to 10.
4 - Association of names of numbers with quantities 1 to 10.
5 - Preparation for counting, equivalence and computing.

INDIRECT AIMS:

1 - Preparation for math progressions.
2 - Concentration.
3 - Order.

POINTS OF INTEREST:

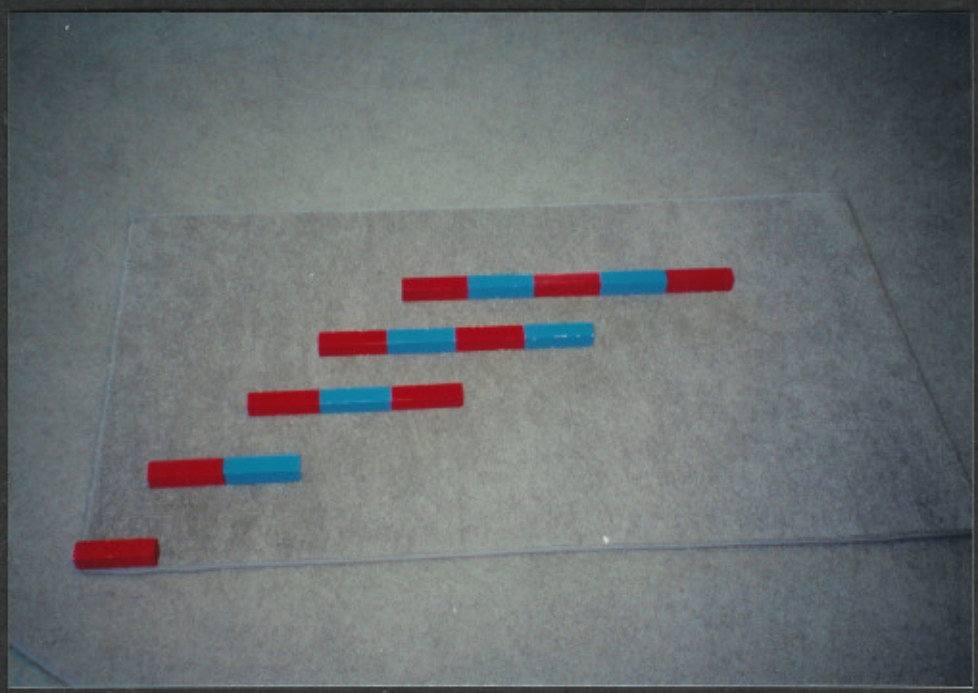
1 - Carrying the rods to the rug.
2 - Seeing and feeling the shortest and longest rod.
3 - Seeing the rods in a stair.
4 - The relationships between the length of rod and its number.
5 - Discovering the various relationships of the segments to the colors.
6 - Building stair halfway up the rug.
7 - Red ends are flush with the left edge of rug.

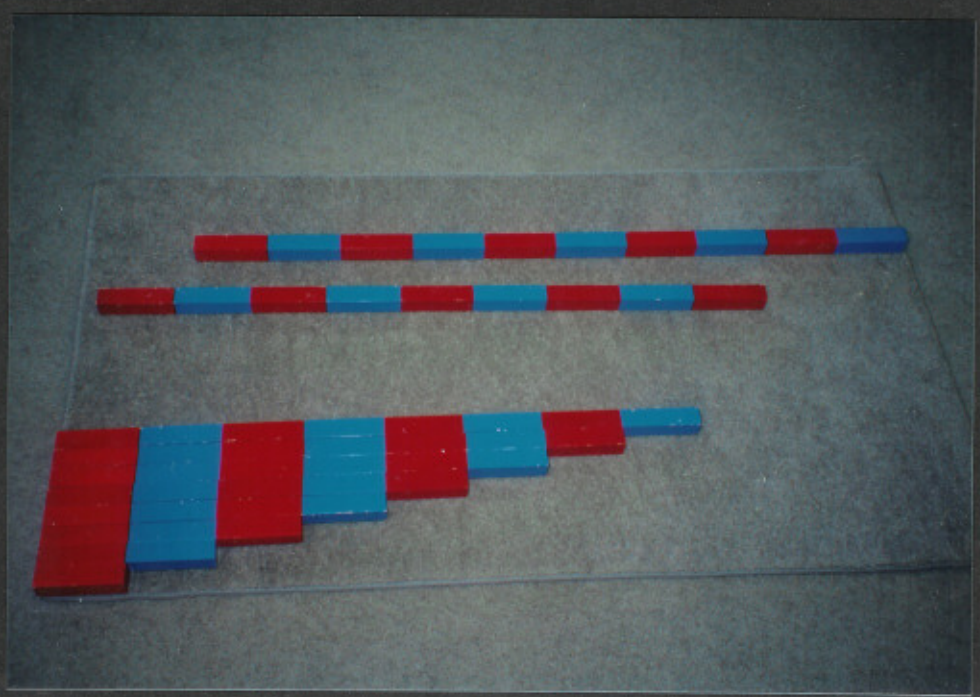
CONTROL OF ERROR:

1 - The alternating colors of red and blue.
2 - Seeing the rods out of order.
3 - Stroking the color segments and counting.
4 - The edge of the rug and alignment of rods.

LANGUAGE:

1 - Names of colors.
2 - Names of number segments.
3 - Shortest, longest, etc.





VARIATIONS:

1 - Ask child to build stair and point out certain segment numbers.
2 - Ask child to layout 2 rugs, build stair on 1 rug and rebuild onto second rug.
3 - Ask child to layout 2 rugs, build stair on 1 rug with even numbers and on second rug with odd numbers - 1,3,5,7,9 and 2,4,6,8,10.
4 - Ask child to build stair starting at the top of the rug using the longest rod first.
5 - Ask child to start with shortest and build a straight line with the longest rod at the end of the line.
6 - Count the rods having both ends painted red and then count rods with red and blue ends.
7 - Count the rods backwards.
8 - SETS - use 55 red/blue counting bears or pennies - Build stair starting with shortest rod (1) at the top of the rug. Place one object below the center of the rod. Place next rod (2) below object and place 2 objects below rod in the center of each segment. Continue until all rods are built as a stair with objects for each segment in rows between the rods.
9 - SUBSETS - use 2 rods to build the equivalent of a third rod / 1 and 2 equals the length of 3.
10 - Use the Red Rods combined with the Number Rods - alternate 1 with shortest, 2 with next Red Rod and so on until 10 is paired with the longest Red Rod.
11 - Build a maze - start by using the 10 rod and ending with the 1 rod in the center of the maze.
12 - Can use Number Rods with Pre-introduction to concept of Greater Than and Less Than, More and Less, Addition and Subtraction. Make and use symbols.

AGE: 3 to 4 and readiness.