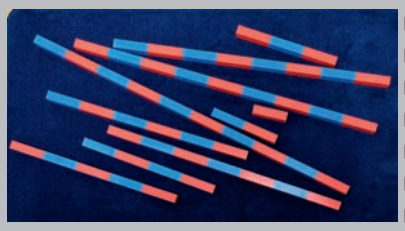
Amounts and numbers

Number rods

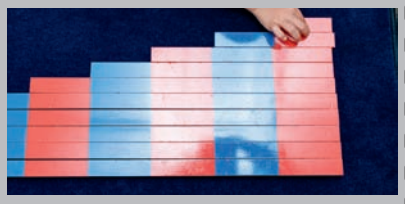
The 10 Rods lay in order on the shelf.

They are split into 10 mm widths of blue and red. The shortest rod is 10 cm long and the longest rod is 1 m long.

The teacher invites the children to carry the rods one by one to a rolled-out mat until all 10 rods are laying at random on the mat.

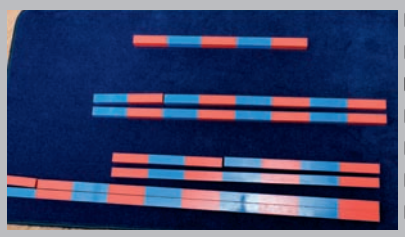


It is a pleasure for a small child to be allowed to experience how the order is lifted from the shelf and brought into a new order on the mat. That each individual rod is carried from the shelf to the mat corresponds to the young child's need for movement. The different weight and size are memorized by the muscle memory.



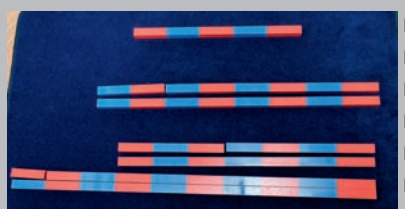
Now the rods are sorted according to size on the mat. The child can take an active part here as the order is already known from the shelf. Here it is interesting to observe if the child begins with the shortest or longest rod.

At the end the shortest rod is used to go up "the stair" to see if the graduations are the same.



The children discover the following while they are playing:

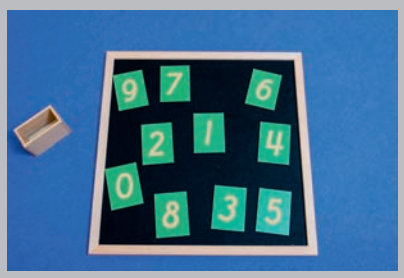
– that different forms can be made with the rods
– that different patterns can arise when laying the stairs
– that more rods together can make the length of a longer rod (addition)
– that one individual rod can be taken away again and only one remains (subtraction)



In the next step the names of the rods are introduced by the use of the "three-period-lesson".

Sandpaper numbers

This material consists of a wooden box containing 10 wooden tablets with sandpaper numbers from zero until nine glued on them. (These numbers are available in different fonts).



The 10 wooden tablets are laid on a prepared mat or a table.

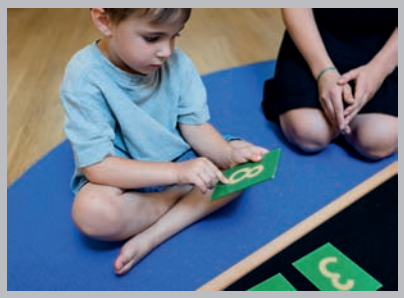
Note: Younger children can begin with fewer numbers!

The teacher introduces the names by means of the three-period-lesson.

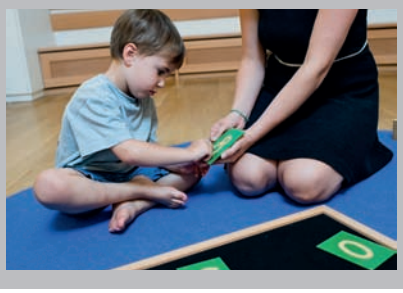
1st period — Making acquaintance with the numbers, where the educator traces their finger over the sandpaper numbers in the direction in which they are written, while saying the names.

"This is six".

"This is eight". etc.



Afterwards the educator gives the number cards to a child. The child traces over the sandpaper number using their fingers and says the name as well. The educator can also say the name again while the child is feeling the number. All the numbers (0 to 9) whatever the child wishes to learn are introduced by this method.



2nd period — Repetition to imprint the way the number is written and its name (muscle memory).

"Feel the 7!"

"Write the 9!"

"Go over the 1!" etc.

Laying number combinations with the pearl bars (11 to 19).

Children love to count. In order to be able to meet this need, there are some activities, which are summarized under the term “linear counting”.

For the work with the number combinations (11-19) the box with the coloured pearl bars and the tens pearl bars (gold bead material) are taken to a table or to a rolled-out mat.

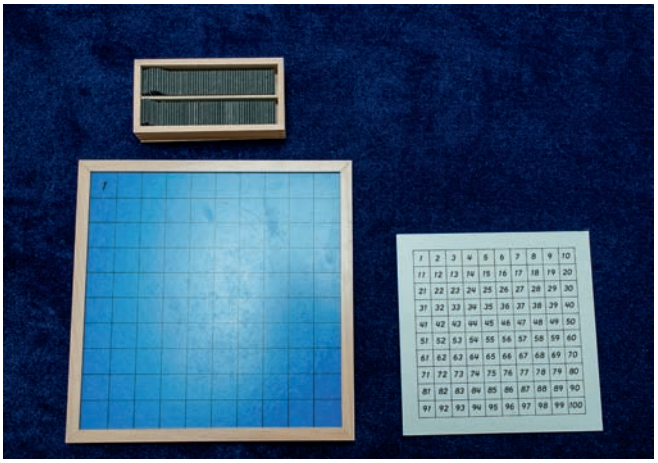
The educator divides the pearl bars onto a tray.

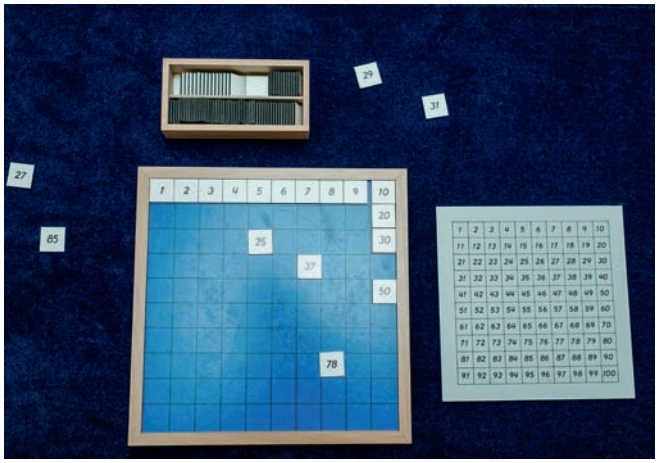
Now you begin with the first stage of the three-period-lesson, in which should you lay a ten-bar with a coloured pearl bar together and name the number.

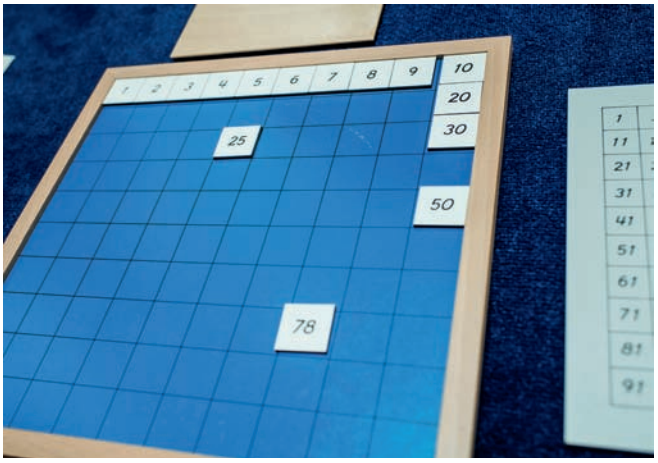
In the second stage the children are given various possibilities to handle the material and say the number, so that the picture and name can be stored in the memory, e.g. with the rows laid out: “Show me 12! Give me 14 in my hand!”, etc.

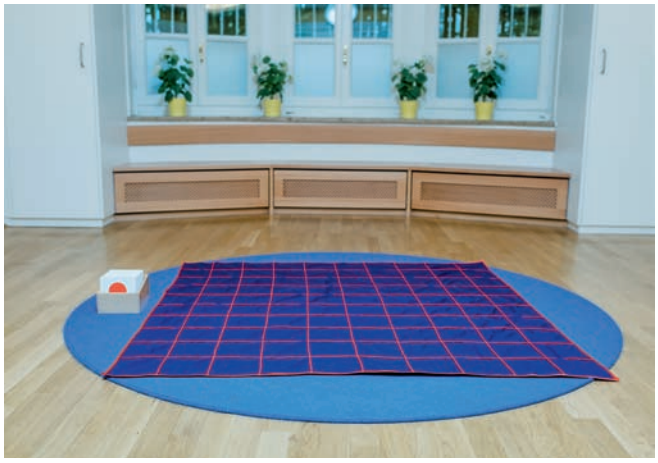
Or lay the pearls randomly on the tray and the educator gives the assignment order: “Make 14! Lay down 19! Build 12 using a ten-bar and a two-bar!” etc.

The hundreds board and the hundreds mat









Laying out the hundreds board is very popular with the children.

It is interesting to observe here the different strategies the children use:

– They begin with the number 1 and now search the row for the next number tile (2, 3, 4 etc) to lay on the board.
– They sort out the number tiles by ten and then lay them in a row on the board from 11 to 20.
– They take any number tile and search for the correct place on the board.
– They lay a row of numbers that all end with 0, such as 10, 20, 30, …. until 100, and then the numbers that all end in 5 etc.

The “Hundred Mat” is a bigger challenge. It not only contains the numbers from 1 to 100, but also additional symbols with their colours: for example: a pink triangle for three, a yellow square for four and a light blue pentagon for the five and so on.

There is a small version of this that is laid out on the table or a bigger version for the floor. This has the advantage that the children can do gymnastics on the numbers, which is a more intensive learning experience for the children.

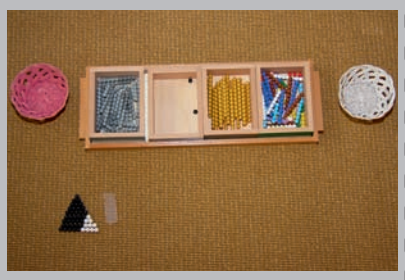
Subtraction snake game (“Devouring Snake”)

The material consists of a tray with four wooden boxes on it. In one box are the coloured pearl bars (3 to 4 pearl bars from each number).

In the second box are around 10 to 15 ten-bars (golden pearl material).

In the third box is the “black and white pearl stair”, which consists of a single pearl and one each from a two, three, four and five black pearl bars. From the six to the nine-bar come additional 1, 2, 3 and 3 white pearls to the five black pearls. In this box is also a plastic “tab”.

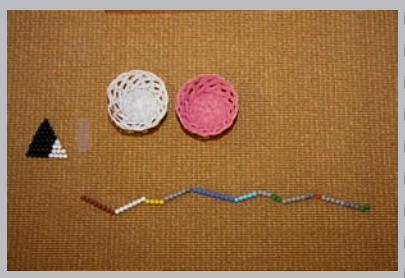
In the fourth box are the “devouring bead rods”, grey pearls, that like the black and white pearl bars are replaced by light grey. (This serves to identify the negative pearl unit more quickly – especially after the six).



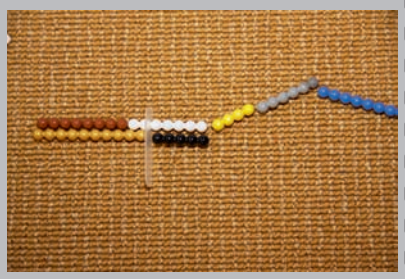
Two little baskets are also on the tray. One to collect the coloured pearl bars and the other to collect the “devourers”.

The educator takes the tray with the “devouring snake” to the table or to a prepared rolled out mat. A felt cloth on the table or a tray with a felt insert serves as a base.

The educator lays out the black-and-white stair and begins to lay out a snake with the coloured pearl bars.



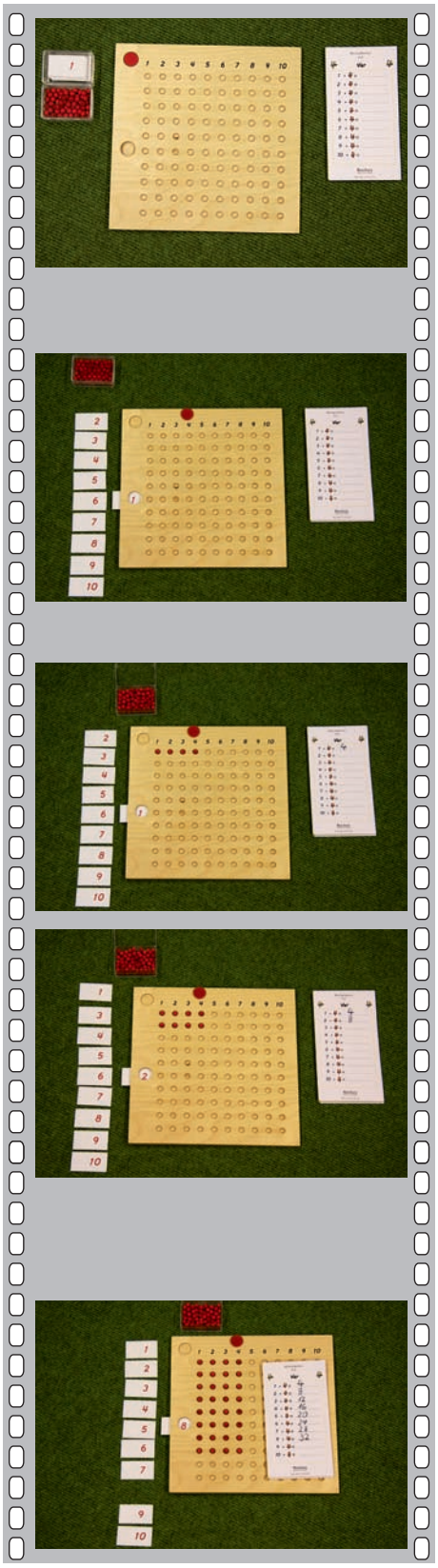
In between them the educator always lays a grey pearl bar as an “devourer”.



With help from the “tab” the coloured bead bars are counted through until 10 and then replaced with a ten-bar and a black and white pearl bar.

This time we cannot count until 10, as there is a grey pearl bar in front – a “devourer” is coming.

Small multiplication board



This material consists of a wooden board that has 100 indentations, 10 along the width and 10 along the height. At the top of the board the numbers 1 to 10 are printed. At the left-hand side of the board there is a small round window where a number strip can be inserted. Two small plastic boxes containing 100 red beads and the other containing plastic cards with the numbers from 1 to 10 printed on them, as well as a red wooden chip are also part of this work. There are also 10 work sheets with examples of the time tables from 1 to 10.

The educator takes the material to the table and lets the child choose a worksheet – here the four times table is being used.

The educator lays the red chip over the 4 on the top edge of the board to show that it is the fourth row that is being worked on. The plastic number cards are laid in a row on the table on the left side of the board. Next the educator takes the card with the number 1 and slides it into the round window so it can be seen.

“The example is called 1 x 4 = “, says the educator, taking four red pearls and laying them one after the other in the first row of holes. (Control of error: the last pearl in each row always lays under the four / respectively where the chip is).

The educator counts the beads again and asks the child to write the number 4 on the worksheet as the answer for the first example. The educator removes the card with the 1 on it from the window and takes the card with the 2 on it and pushes it so it can be seen in the window, and says: “Now the example is called 2 × 4 = just like the one on your worksheet.” Another four red beads are taken from the box and laid in the next row of holes. The educator counts all the beads on the board until eight is reached and asks the child to write it on the worksheet.

The child can continue with the game in the same rhythm. This rhythmic action has for younger children the character of a high challenge, in which they love the counting above all and are proud that they have “correct” arithmetic problems on paper as a document.

It often happens that a child will work on one worksheet after another, often several times! Sometimes always the same worksheet, until they nearly know it off by heart – just like poetry, rhymes and songs etc, through remembering by repeating it frequently. The criteria for this is naturally that the activity is freely chosen by the child and accordingly gives much joy.

Decimal system

Golden pearl material

The children have already come into contact with the decimal system in different ways, with the materials that have already been described. So, it makes sense to let children of kindergarten age have fun with the decimal system, especially since young children like to deal with large numbers because they are always impressed with everything that is large.

Therefore Maria Montessori designed the so named “golden pearl material” to appeal to all the children’s senses.

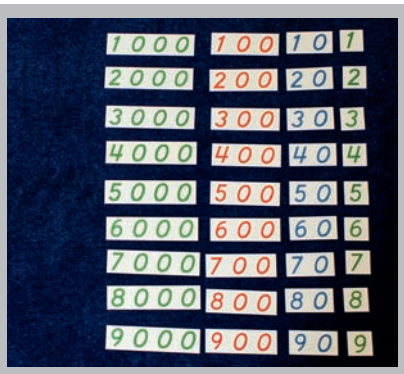
This material also makes it clear that Maria Montessori‘s appreciation for the child was paramount. So, it stands to reason that for the most important mathematical system that accompanies us everywhere in life, the children have a treasure of golden glass pearls in their hands.

The material to introduce the decimal system consists of a tray with a single gold pearl, a rod with 10 gold pearls, a platter with 100 gold pearls and a cube with 1000 gold pearls.

The educator takes the tray to a prepared, rolled out mat and gives a presentation in a three-period-lesson:

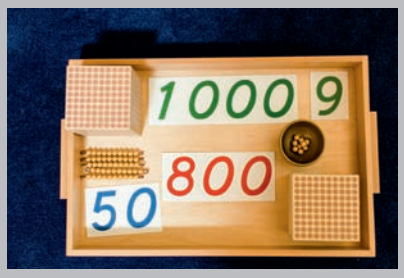
In the first period the four categories are named. First the educator lets each child take the pearl in their hand and says “this is the One!”

Cards in sequence



The educator asks the child to lay out the large number cards on the mat.

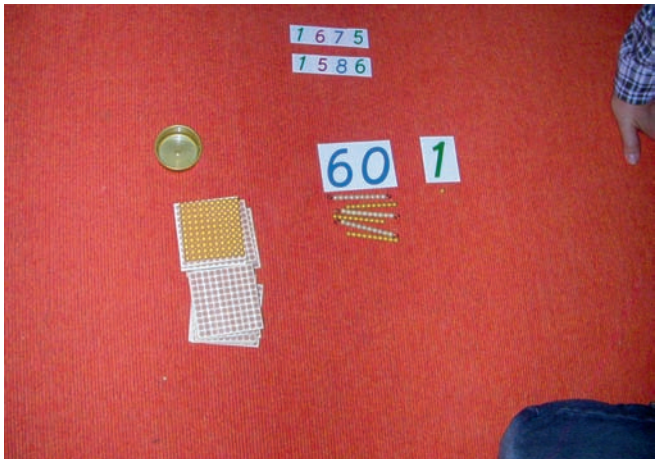
Each child that is playing gets a tray and the educator lays different number cards (one for each of the four categories) on the tray.



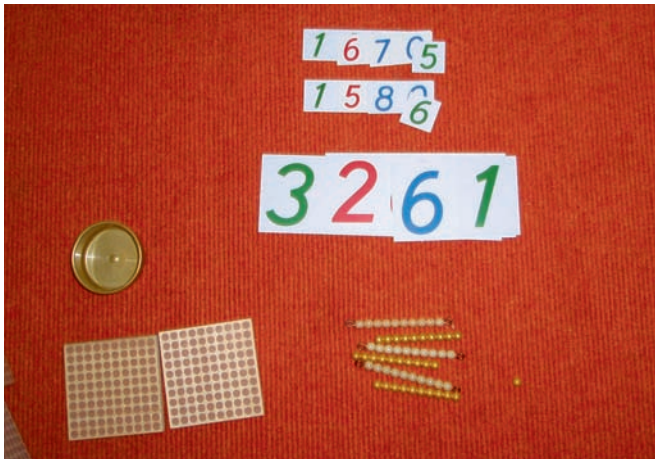
The children take their trays to “the Bank” and lay the corresponding amount of gold pearl material to the numbers. They return to the educator.

The educator takes the number card, that here make 1859 and superimposes one on top of the other, underneath the card with the thousand numbers on top of that card with the hundred numbers on top of that card with a 10 number and on top the unit card. Just like a magic trick the educator now pushes the cards together, that they come to the right of the unit card.

The educator shows the children how the number is read: 1859. The educator flips the card that has been read so that the children can see the corresponding number of zeros again. The educator pays special attention to the fact that at the end, the number of units is read first and then the tens by pointing to the number of units and then opening the number of tens.



Next the hundreds are added together (6 hundred-squares + 5 hundred-squares + 1 hundred-square, from the exchange of 10 ten-bars). 10 hundreds have to be exchanged at the “Bank” for a thousand-cube, which is then placed by the thousands. Two hundred-squares remain as an interim result, and the card with 200 is fetched from the large card set.



Finally the thousands are added together. There are three altogether. The card with 3000 is also fetched from the large card set.

The educator or the child pushes the four cards together to give the result 3261 and then lays them under the two numbers from the small card set.