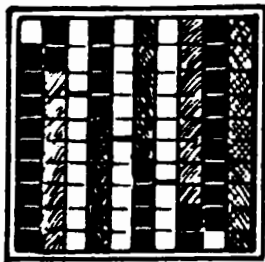


# The Number Boxes

## Level I



### The 10-Box (no number names yet)

- To fit together the blocks so they form the combinations that fill the 10-box
- To build a stair with the blocks from the smallest to the largest
- To find the missing block when one step has been removed.

**Introduction** — The length of the 10-box (2) represents the sum total of 10; the blocks represent the numbers. By fitting blocks together in the 10-box, children discover that there are ten different combinations with a total of 10. They gain insight into the following number combinations:  $1 + 9$ ,  $2 + 8$ ,  $3 + 7$ ,  $4 + 6$ ,  $5 + 5$ ,  $6 + 4$ ,  $7 + 3$ ,  $8 + 2$ ,  $9 + 1$ , and  $10 + 0$ .

These facts are studied first because the base of our number system is 10.

*Level I.* In the beginning, the children fill the 10-box with blocks as though they were working on a puzzle. Experimenting with these materials provides the children with experiences on the sensorimotor level. They should understand these relationships before they use number names or symbols.

*Experiments in the 10-Box.* Present the box already filled with all the blocks so the children can see how the finished task should look. Then remove the blocks and place them on a table. Start the game by putting a biggish block, such as 8, on the left side of the box and invite the children to fill the empty gap above the 8-block ( $8 + 2$ ). If they add a block that is too big ( $8 + 3$ ), encourage them to look for a block that just fits. Sometimes they fill a gap with two smaller blocks. Show them how to replace these blocks with a single block. They must do this to keep the little blocks free, for they will be needed to go with other big blocks.

\*Keep in mind that what we do with the 10 Box is also done with the other numbers boxes 1-9 in order to teach their number combinations.

## **What Kind of Thinking Is Going On?**

Many mathematicians describe mathematical thinking as often spatial and visual. This describes the thinking process of the children using these materials. Each time they put a block in the box, they measure with their eyes to judge the size of the number block that will fit with it. They systematically study the relationships between each separate number block and the total, 10. They see that when the first addend is big, the second one must be smaller, and vice versa. When they make a mistake, they can feel and see in what way that block does not fit. A teacher doesn't need to say, "Wrong." They see that the block is wrong by a certain amount and this tells them what kind of change to make. If the block is too big, that directs them to look for a smaller block. When they find a block that just fits, they feel a satisfaction that is unforgettable. This success helps them remember the combinations. They enjoy thinking for themselves. They know the discoveries they have made are reliable. They have learned to perform a task by gaining insight into its structure. Later they will be able to reconstruct any forgotten fact by recreating an image of it in their minds. They will use these images to reason mathematically.

### **Filling the 10-Box (no number names yet)**

- Start with the box filled with combinations of blocks.
- Dump all the blocks onto the table.
- Hold up the empty box so that it faces the children.
- Fill the first row as a demonstration (use any two blocks, such as the 7-block and the 3-block); begin on the children's left.
- Next, put in a big block, perhaps the 8-block.
- \* Say, "Now, I put in a block for you. Can you find the block that fits in here?" (point).
- Call on a child. Continue filling the box in the same way.

*Note:* The combinations of blocks are put together as in a puzzle. Encourage each child to experiment to find the block that fits. Put a big block in first; it is easier to estimate a gap the size of 1, 2, 3, or 4 units.

Now, I put in a block for you.

Can you find the block that fits in here?



## **Building the Stair (Forming a Sequence)**

- At first, use only one set of blocks 1 to 10. (Later use all 19 blocks.)
- Scatter blocks 1 to 10 on the table.
- Hold up the empty 10-box.
- Begin the stair in the lower left corner with blocks 1, 2, and 3.
- \* Ask, "Which block comes next?"
- Say, "Is it right? Climb up with your finger."
- Give children turns putting in the next step of the stair until it is finished.

*Note:* This is a difficult task. There is no groove to indicate the size block being looked for. Once children realize that the next larger block is at the same time the smallest in the group of remaining blocks, they have the key to the situation. Encourage them to experiment. They often try a block the same size as the previous step, then one too big, then too small, and finally the right one. Let them test the stair by climbing up with one finger. At some time, let each child build the stair alone.

Which block comes next?

Is it right?  
Climb up  
with your  
finger.

