

Place Value Multiplication

Background Information



Students strengthen their understanding of place value by multiplying with the Checkerboard Material

After working with the bead frames, students have a better understanding of the hierarchies of numbers. In this section, the Checkerboard Material and the Bank Game are presented to reinforce the concept of hierarchy. Students are offered new ways to practice what they have learned.

The Checkerboard and Bank Game are appealing to students because the material seems immediately familiar. The Checkerboard is similar in appearance to a game board. Students move beads diagonally on the Checkerboard, as they do when playing checkers.

The Bank Game carries the suggestion of money, which is often an attractive idea to children. Also engaging is the fact that students can work together on the material and manipulate very large numbers.



Students enjoy working with the Bank Game

NAMC's Curriculum Support Material (CSM)

NAMC includes exercise sheets (both working and control copies) that can be used with the Checkerboard and Bank Game activities.

Exploring the Checkerboard



Exploring how the Checkerboard works

Purpose

To learn how to use and recognize quantities up to 9,999,999 on the Checkerboard.

Material

Checkerboard Material.

Math journal and pencil.

Presentation

- Most Montessori teachers introduce this concept in Year 2.
 - Invite a student to learn about the Checkerboard at a table or mat set up with the required material.
 - Introduce the student to the Checkerboard and invite him/her to make observations about the material. Briefly review the concept of place value, the idea of classes (simple, 1,000s, and 1,000,000s), and the fact that each class is made up of units, 10s, and 100s.
- Show the student that the Checkerboard's squares are colored to represent different place values: green squares for units; blue squares for 10s; and red squares for 100s.
 - Direct the student to the numbers labelled on the right side and bottom of the board, explaining that each row/column also represents a place value.

Part 1: Three-Period Lesson

- A student who is being introduced to the material for the first time will benefit from a three-period lesson about the place values on the Checkerboard.
- Beginning with the green square at the bottom right-hand corner of the board, name the place value of each square. Pointing to the green square, tell the student it represents simple units.
- Next, point to the blue squares above and to the left of the green square. Tell the student these squares represent simple 10s.
- Continue naming the squares across the board up to and including the final red square in the lower left corner that represents 100s in the millions class.
- When the squares have been named, begin the recognition portion of the three-period lesson. Ask the student to point to a square that represents 100s, 1,000s, and so on.

- Then, give the student the opportunity to recall what she/he has learned by pointing to different squares and asking what their values are.

Part 2: Understanding Place Value on the Checkerboard

- Ask the student to place her/his finger on one of the squares in the bottom row and move it diagonally up and to the right. What does he/she notice about the color of the diagonal? (She/he will say that it is one color: red, blue, or green.)

- Invite the student to determine the value of the squares on the diagonal. Ask the student to place his/her finger on one of the squares. For example, the red square in the bottom row, in the 100,000 column.

- Ask the student to determine the place value of the square by looking at the numbers labelled on the bottom (100,000) and right (1) of the board. In this example, the square's place value is 100,000 because $100,000 \times \text{units} = 100,000$.

- Ask the student to repeat the process with the other squares along the diagonal. In this example, he/she will find the value is 100,000 for each square on the red diagonal:

- in the second row,
 $10,000 \times 10 = 100,000$
- in the third row, $1,000 \times 100 = 100,000$
- in the fourth row,
 $100 \times 1,000 = 100,000$

- With the student, conclude that all the squares in a diagonal have the same value.

- Remind the student that the squares' colors also indicate place value. Using the same example, the red squares have a place value of 100 in the 1,000s class, which is the same as 100,000.

- Encourage the student to repeat the process using other diagonals until she/he is confident with the concept.

Part 3: Reading Numbers on the Checkerboard

- On another day, invite the student to learn how to build numbers on the Checkerboard at a table or mat set up with the required material.

- Invite the student to choose a Colored Bead Bar from the box and place it on one of the Checkerboard squares in the bottom row. For example, he/she might choose the pink 3-bar and place it on the green square in the 1,000 column.

- Ask the student what number she/he has represented on the Checkerboard. Explain that the bead bar is the quantity (3) and the square is the place value of the number (1,000). In this example, the number is 3,000.

- Place the bead bar on other squares, moving horizontally, diagonally, or vertically on the board. Each time, ask the student what number is represented.

- Return the pink 3-bar to the box.



Representing 502 on the Checkerboard

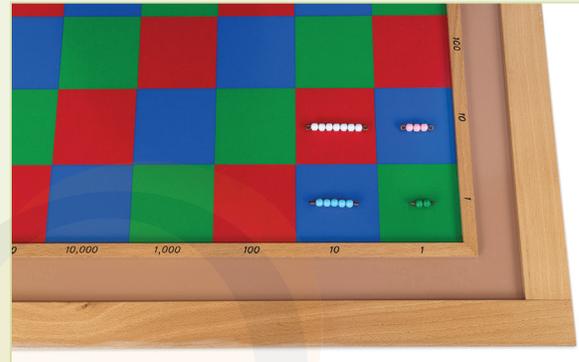
- Place a light blue 5-bar on the 100s square and a green 2-bar on the units square. Ask the student to read the number (502). Place the bead bars on other squares, each time asking the student to read the number. Include some other numbers with place values of 0. For example, 5,002 or 50,200.
- Return the bead bars to the box.

Part 4: Adding Numbers on the Checkerboard



Student adding numbers on the Checkerboard

- Invite the student to place the green 2-bar on the units square and a light blue 5-bar on the 10s square.



Adding the equation $730 + 52 =$ on the Checkerboard

- In the second row, ask the student to place a pink 3-bar on the 10s square and a white 7-bar on the 100s square. Ask the student to read the numbers (52 and 730).
- Show the student how to add the numbers by moving the bead bars down along the diagonal, so they keep their place value. The white 7-bar is now on the 100s square in the bottom row. The pink 3-bar is now in the 10s square with the light blue 5-bead bar. The green 2-bead bar remains alone.



Sliding the beads along the diagonal to the first row when adding on the Checkerboard

- Ask the student to add the beads in the 10s square ($3 + 5 = 8$) and exchange them for a brown 8-bar.
- Ask the student to read the sum aloud (782).



Exchanging the bead bars to find the sum

- Ask the student to return the bead bars to the box.
- Encourage the student to record three addition problems in her/his math journal and find the sums using the Checkerboard.

Extensions

- Encourage the student to draw, color, and label a checkerboard in his/her math journal.
- Invite the student to represent 7-digit numbers on the Checkerboard.
- Invite the student to build a checkerboard using colored paper squares or felt, starting with the bottom row. This reinforces the place value of each square and acts as a review activity.