

ACTIVITY IA7.4: Arrays on the 100-bead Rack

Intended learning: To explore arrays of various dimensions.

Instructional mode: Longer, inquiry mode for individuals, pairs or whole class.

Materials: 100-bead rack (commercially available or constructed with two colours of pony beads and pipe cleaners attached to a foam board. See Figure 7.15).

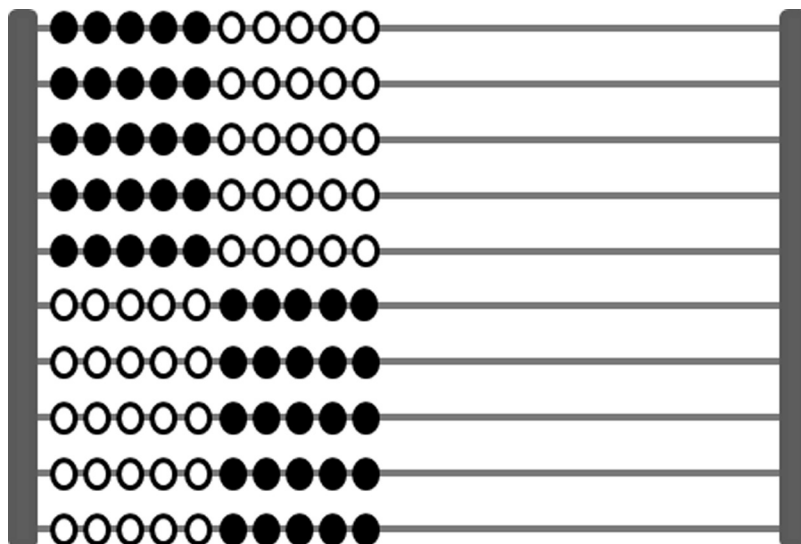


Figure 7.15 100-Bead arithmetic rack

Description: This activity allows students to explore easily arrays of any dimension up to 10×10 . It is useful to establish a convention for beads that are 'in play' and beads that are 'out of play'. For example, you might establish that the beads that are in play to form the array are the beads that are pushed to the left beginning with the top row. This is particularly important for monitoring student work in larger groups. Have the student construct an array of specified dimensions. *Use your bead rack to construct an array of four rows with three beads in each row. How many beads do you have altogether? How do you know?* Repeat this procedure to construct arrays of other dimensions.

Responses, variations and extensions:

- The bead rack can be used to count by a number in the range one to ten. For example, a student counts by sixes (6, 12, 18 ...) and for each count the teacher pushes six beads on a row.

- The teacher might specify a particular product made with a given number of rows. *Make me an array with a total of 28 beads arranged on 7 equal rows.* The student must determine how many beads to put on each row.
- The teacher might specify a product made of rows of a specified number. *Use rows of 4 to make me an array with a total of 28 beads.* The student must determine how many rows are needed to construct the array. *How many rows did you need?*
- Investigate notions of commutative principle by comparing related arrays. *What do you notice about this array with six rows of four beads and this other array with four rows of six beads?*
- For arrays with at least one factor greater than five, notions of the distributive principle can be used to facilitate calculation. *This array has four rows of eight beads. How could we use the colour to help us determine the product?* $8 \times 4 = (5 + 3) \times 4 = (5 \times 4) + (3 \times 4) = 20 + 12 = 32$
- The teacher can construct a screened array for a given product and ask students for possible dimensions. *I have an array with 24 dots. What is one way I could have made my array? Are there other ways? Let's display each different array on your bead racks. Notate each different array with an expression or equation. Did we find them all? How can we know for sure that we found them all?* Possible suggestions would be an organized list or rainbow factoring (see Figure 7.16). *Could we have done 12 rows of 2? Why or why not?* [The bead rack has the constraints of a maximum of 10 rows and a maximum of ten beads on each row, but a student might suggest using more than one bead rack.]

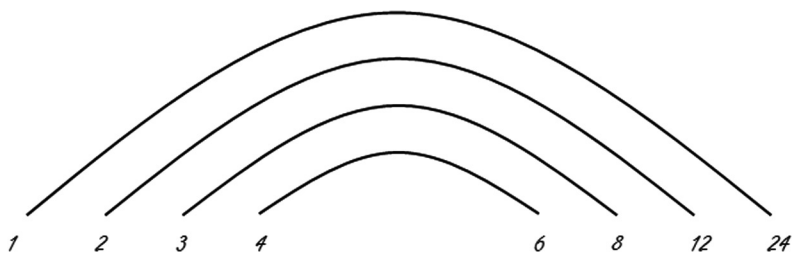


Figure 7.16 Rainbow factoring for 24