

Notes for the Teacher

Students are informally introduced to a rectangular array model of multiplication in this series of three games. In the first game, students are given empty boxes of chocolates of varying dimensions. Students fill the boxes with chocolate bars that are 1, 2, and 5 squares long, and then skip count to find the total number of chocolate squares. In the second game, students are given the total number of chocolate squares and the number of columns in which they are arranged, and they must find the number of rows. In the third game, students are given the total number of chocolate squares and the number of rows, and they must find the number of columns.

Objectives:

- Students will subdivide a rectangular array into strips of size 1, 2, and 5 squares and then skip count to determine the total number of squares in the array.
- Students will interpret the meaning of the terms *row* and *column*.

Common Core Mathematical Practices: (1) Make sense of problems and persevere in solving them; (2) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (5) Use appropriate tools strategically; (7) Look for and make use of structure.

Common Core State Content Standards: 2.OA4, 3.OA1, 3

Grade Range: Grades 3–4

Game A: Introduce

Open **Fill a Box with Chocolate--Skip Counting Techniques.gsp**. Use a projector to show sketch page “Introduce.” Point to the empty chocolate box. Explain that you want to know how many squares of chocolate fit in the box.

Ask, “How many rows of chocolate does the box hold?” (4 rows) “How many columns of chocolate does the box hold?” (6 columns)

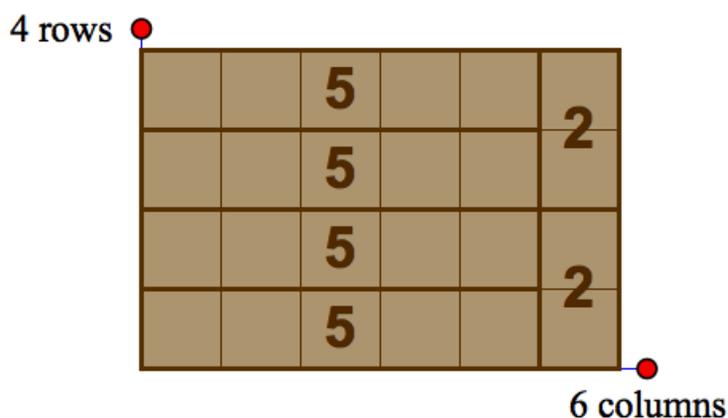
If students are unclear about the meaning of *rows* and *columns*, press the *Show Rows* button with the **Arrow** tool. Have the students count the number of rows. Then press the *Show Columns* button and have students count the number of columns. Press the *Hide Both* button to hide the rows and columns.

Point to the bars of chocolate. Explain that the chocolates come in bars of 1, 2, or 5 squares. Drag either bar of 2 chocolate squares into the box using the **Arrow** tool. Then

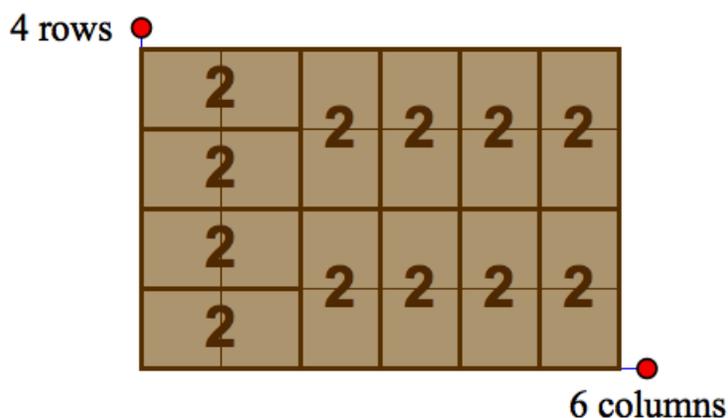
press the *Reset All Chocolate* button to empty the box. Explain that students can fill the box with chocolate bars in any way they like, but the bars should not overlap.

Ask several volunteers to come to the computer and fill the box with chocolate bars in different ways and then count the number of squares of chocolate the box holds. Because it's easy to skip count by 2s and 5s, it should not be necessary for students to count the squares one by one.

Here are some ways that students might fill the box along with the ways they might count the total number of squares:



Count aloud: “5, 10, 15, 20, 22, 24”



Count aloud: “2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24”

Next, go to page “Game A.” Explain that students will be given the number of rows and columns of a box, and they have to find how many squares of chocolate the box holds. Ask, “How many columns does your box need to have?” (5 columns) “How many rows does your box need?” (3 rows) Ask a volunteer to make a 5×3 box by dragging the two red points with the **Arrow** tool.

As before, work with the class to determine how many squares of chocolate the box holds. Then demonstrate how to get a new problem by pressing the *Next Problem* button.

Game A: Explore

Distribute the worksheet. Assign students to partners and send them in pairs to the computers. Have them open **Fill a Box with Chocolate--Skip Counting Techniques.gsp** and go to sketch page “Game A.”

Tell students to take turns solving the problems. Be sure students understand how to record their work on the worksheet. Explain to students that their drawings of the boxes should be sketches, so they do not need to spend a lot of time being exact.

Observe students as they work. What different strategies are they using? Are students trying to fill the box with the largest-sized bars of chocolate (the bars with 5 squares)? Do they use only single chocolates? Do they take into consideration the size of the rows and columns before picking chocolate bars? Recognizing students’ strategies will give you insight into their understanding of numbers.

Game A: Discuss

Bring students together and discuss Game A. Ask, “How did you figure out how many total squares of chocolate the box holds?” Sample student responses may include:

- *I used as many bars of 2 chocolate squares as possible and then filled the rest of the box with bars of single squares. I skip counted by twos and then added the ones. The bars of 2 chocolates worked well when the rows and columns were even.*
- *It’s easy for me to skip count by fives, so I tried using as many bars of 5 chocolate squares as I could. It was great when there were 5 rows or 5 or 10 columns. I could just use all bars of 5 chocolate squares.*

Game B: Introduce

Go to sketch page “Game B.” Explain that this new game is similar to the previous game, but now students are given the total number of chocolates the box holds and the number of columns. Students need to find the number of rows.

Ask, “How many squares of chocolate should the box hold?” (28 pieces) “How many columns *should* the box have?” (4 columns) Drag the column point so there are 4 columns. Ask, “How can we find the number of rows?” Let a volunteer come to the computer and work on the problem. A sample strategy is, “I used bars of 2 chocolate squares to fill the 4×2 box. That gave me 2, 4, 6, 8 chocolate squares. Then I kept

adding rows and filling with bars of 2 chocolate squares until I got 28. It took 7 rows to fill the box with 28 chocolate squares. I skip counted with each new row:

3 rows: 10, 12 chocolates
4 rows: 14, 16 chocolates
5 rows: 18, 20 chocolates
6 rows: 22, 24 chocolates
7 rows: 26, 28 chocolates.”

Game B: Explore

Assign students to partners, and send them in pairs to the computers. Have them open **Fill a Box with Chocolate--Skip Counting Techniques.gsp** and go to sketch page “Game B.”

Tell students to take turns solving problems.

Observe students as they work. Watch for students who are still using bars with 1 square to fill the box. Encourage them to try using bars with 2 or 5 squares.

Game B: Discuss

Bring students together and discuss the activity. Ask, “How did you figure out the number of rows?” Students will likely say they added rows and filled them with chocolate until they reached the total number of pieces of chocolate.

Game C

Go to sketch page “Game C.”

Game C is identical to Game B, but now students have to find the number of columns instead of the number of rows needed to fill the boxes of chocolate. By playing both Games B and C, students will reinforce their understanding of the vocabulary terms *row* and *column*.

Related Activities:

- *Construct a Building—Multiplication Array Model*
- *Bunny Times*

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