Solve Multiplication Facts

Objective Use known multiplication facts and arrays to help solve other multiplication facts.	**Materials** 1-inch grid paper, counters

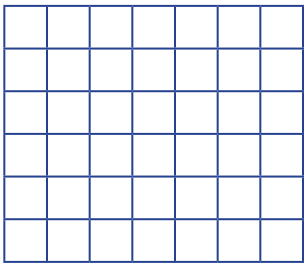
This activity builds on multiplication concepts such as skip counting and repeated addition to find the total number of objects in a rectangular array. Foundational skills for this activity include fluency with multiplication facts that have at least one factor that is 5 or less.

In this activity, students decompose unknown facts into basic facts they have already mastered. To do this, they use the Distributive Property, but they do not need to know the name of the property or define it. Using a visual model helps students see why breaking a multiplication problem into smaller parts is an effective strategy. Gaining understanding of this property with basic facts will help when students need to break apart larger numbers and find partial products. Using strategies to become fluent with basic multiplication facts is also key to the understanding of division.

Step by Step

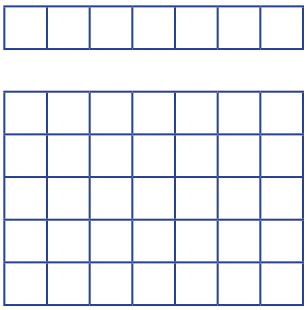
20–30 minutes

1 Model a 6 × 7 array.



- Provide the student with 1-inch grid paper. Instruct her to cut a rectangle that is 6 squares tall and 7 squares wide.
- Have the student place one counter in each square. Having the student make an array on grid paper makes it easier to keep the rows and columns aligned.
- Ask: *How many counters are there?* (42) *What basic fact does the array show?* Guide the student to understand that the array demonstrates that the product of 6 and 7 is 42.

2 Decompose into known facts.



- Have the student remove the counters from the grid paper and cut one row off the top of the array, so that she now has a 1 × 7 array and a 5 × 7 array. Align the 1 × 7 section over the 5 × 7 section, with space in between.
- Have the student place one counter in each square. Ask: *How many counters are there? Why is this the same as the number of counters in the previous array?* Lead the student to conclude that there are, again, 42 counters because the total number of squares has not changed by dividing the original rectangle.
- Ask: *What basic facts does each array show?* (1 × 7 and 5 × 7) *What are the products of these facts?* (7 and 35)
- Ask the student to push the two sections back together so they are touching. Ask: *What can you do with the products 7 and 35 to find the answer to 6 × 7? What is the answer?* (add them together; 7 + 35 = 42)
- Discuss why this strategy works. Lead the student to understand that 6 × 7 is equal to (1 × 7) + (5 × 7) because 6 can be decomposed into 1 + 5.

3 Decompose a different way.

- Cut another 6 × 7 rectangle from grid paper. Show the student how to cut it into two 3 × 7 sections and find the answer by doubling.
- Repeat with another 6 × 7 rectangle, this time cutting it into 2 × 7 and 4 × 7 sections. In this case, the student is starting with an easy fact, doubling it, and adding the two products.
- Have the student identify which strategy to decompose the fact was easiest for her. Discuss why different students might prefer different ways and why all of the ways lead to the correct answer.

4 Practice with other facts.

- Give the student additional basic facts, such as 6 × 8 or 9 × 7. Provide grid paper or counters for the student to use to construct arrays.
- Put students in pairs (or be the student's partner). Each student should individually decompose the fact to find the product, modeling with counters or grid paper. Then have pairs share with each other how they found the answer.

Check for Understanding

Provide the student with a 2 × 8 rectangle and a 5 × 8 rectangle cut from grid paper. Ask the student to identify which basic fact can be solved if the two rectangles are combined to make one larger rectangle. Then have the student explain how to find the product using the given the rectangles. (7 × 8; find 2 × 8 = 16 and 5 × 8 = 40 and then add to get 16 + 40 = 56)

For the student who struggles, use the chart below to help pinpoint where extra help may be needed.

If you observe…	the student may…	…then try
the student is not able to place the two rectangles together to form a 7 × 8 rectangle	not be able to visualize how the two fit together.	having the student cut apart other rectangles and then put them back together.
the student does not count squares correctly to identify the basic fact	not understand how an area model relates to an array.	allowing the student to place counters on the grid paper.
the student struggles to add 16 + 40	not be fluent with two-digit addition.	providing practice using base-ten blocks and the standard algorithm.