



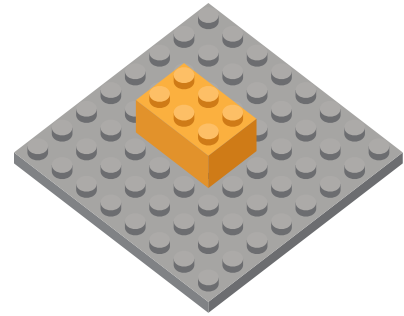
## Multiplication with Array Models

from *Multiplication Using LEGO® Bricks—Teacher Edition*

### Part 1: Show Them How #1

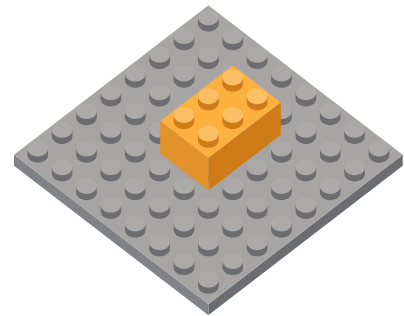
1. Make an array/area model of  $3 \times 2$  using one brick.

Array model showing  $3 \times 2$ : 3 studs across and 2 studs down.



2. Make an array/area model of  $2 \times 3$  using one brick.

Array model showing  $2 \times 3$ : 2 studs across and 3 studs down.



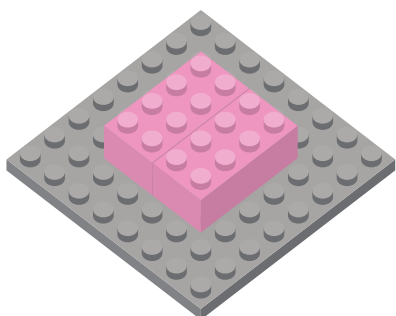
3. By counting the studs, students can determine the answer to each problem: 6.

4. Use the terminology:

The **product** (6) is found by multiplying the two **factors** (3 and 2) together:  $3 \times 2 = 6$

5. Discuss how these two array models are alike and different.

Both give the same answer, but the solution is different because the orientation (vertical versus horizontal) is different. These two multiplication facts ( $2 \times 3$  and  $3 \times 2$ ) have the same outcome in terms of answer or product. However, they mean something different in terms of geometric concepts. For example, if you are building a store and want the front of the store to have the longest side facing the street front, you want to use the  $3 \times 2$  model. For engineering, orientation is important when modeling multiplication!

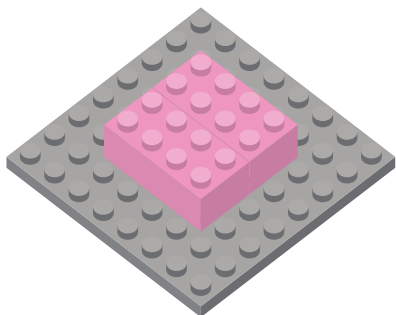


## Show Them How #2

1. Model  $4 \times 4$  using two bricks.

2. Ask students what they notice about the orientation in this model that is different from the previous one.

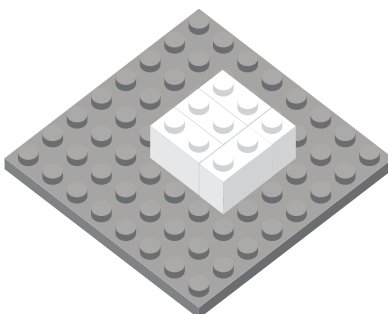
*Answer:* The orientation does not matter because all sides are the same length.



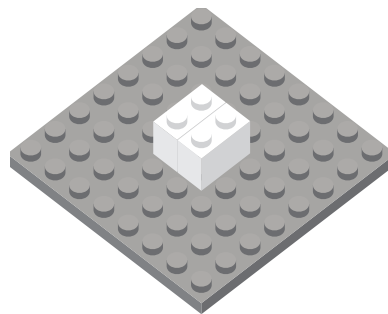
3. Make another array model that this holds true for.

*Answer:* Building any square number will result in this effect.

Examples:



$$3 \times 3 = 9$$



$$2 \times 2 = 4$$

## Multiplication with Array Models

from *Multiplication Using LEGO® Bricks* — Student Edition

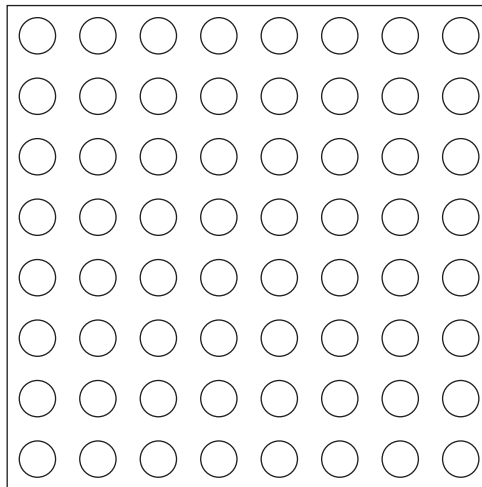
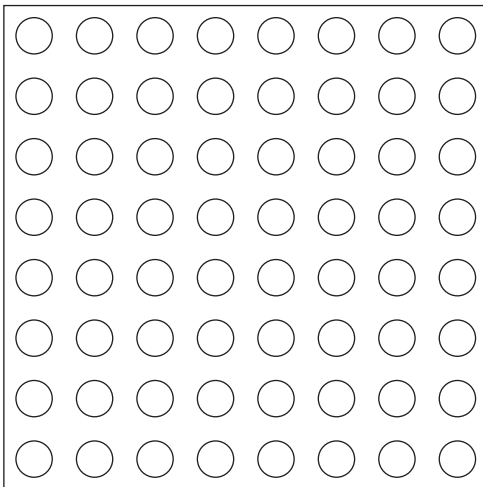


# MULTIPLICATION USING ARRAY/AREA MODELS

1. Make an array/area model of  $3 \times 2$  using only one brick.

Use the same sized brick to make an array/area model of  $2 \times 3$ .

Draw your array/area models. Label each model to show which multiplication sentence it represents.



What is the difference between the two models? Explain your thinking. Be sure to include the word *product* in your explanation.

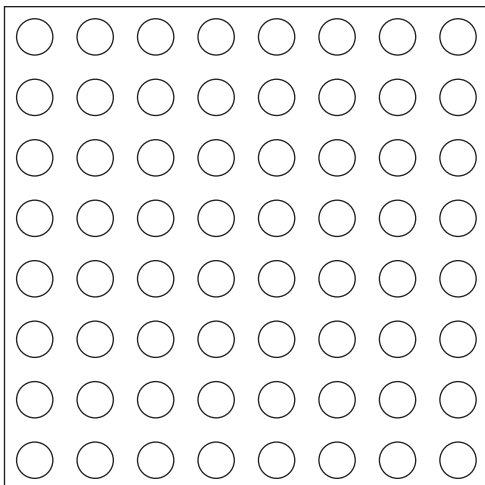
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2. Make an array/area model of  $4 \times 4$  using two bricks. Draw your model.



What do you notice about this model that is different from the  $3 \times 2$  and  $2 \times 3$  models?

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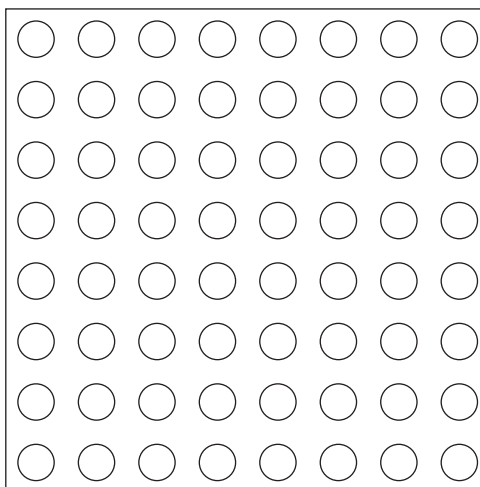
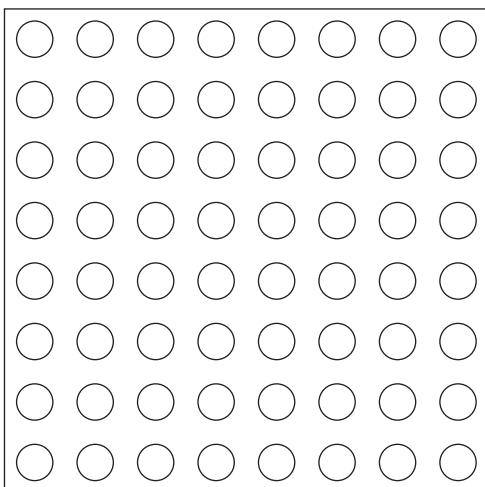
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What is the multiplication sentence for this model? \_\_\_\_\_

What is the product? \_\_\_\_\_

3. Build two more array/area models that have the same rule as the one that models  $4 \times 4$ . Draw your models. Label each model with a multiplication sentence containing the factors and the product.



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