MULTIPLICATION

FACT FLUENCY

EXPLORE THE COMMUTATIVE PROPERTY

LESSON 1

The Simplified Math Curriculum™

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TODAY'S OBJECTIVE

Today we will explore the commutative property of multiplication.

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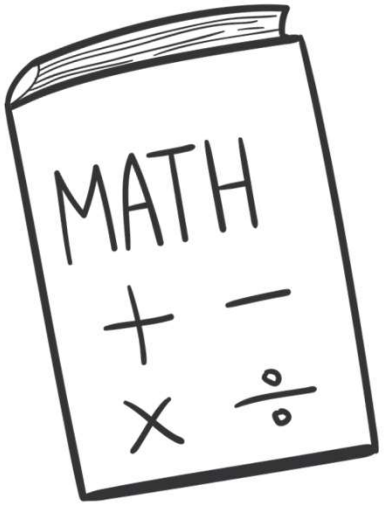
TAKE OUT YOUR

MATH JOURNALS



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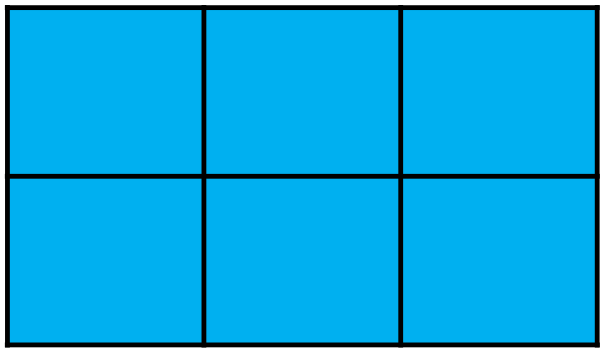
WATCH ME FIRST

Today we are going to explore the commutative property using rectangular arrays and number lines.

FIRST…LET'S EXPLORE RECTANGULAR ARRAYS

Rectangular arrays help us to represent multiplication facts.



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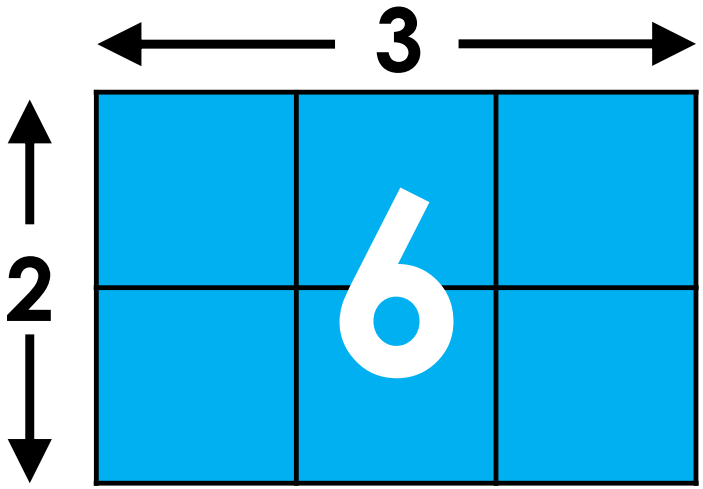
What's a rectangular array?

A rectangular array is an arrangement of objects into rows and columns that form a rectangle.

For example, this model shows that 2 × 3 = 6



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Let's Review

What do the numbers in a multiplication equation represent?

factor		factor		product
2	×	3	=	6
(# of groups)		(# of objects in each group)		(total number of objects)

2 groups of 3 is the same as 6

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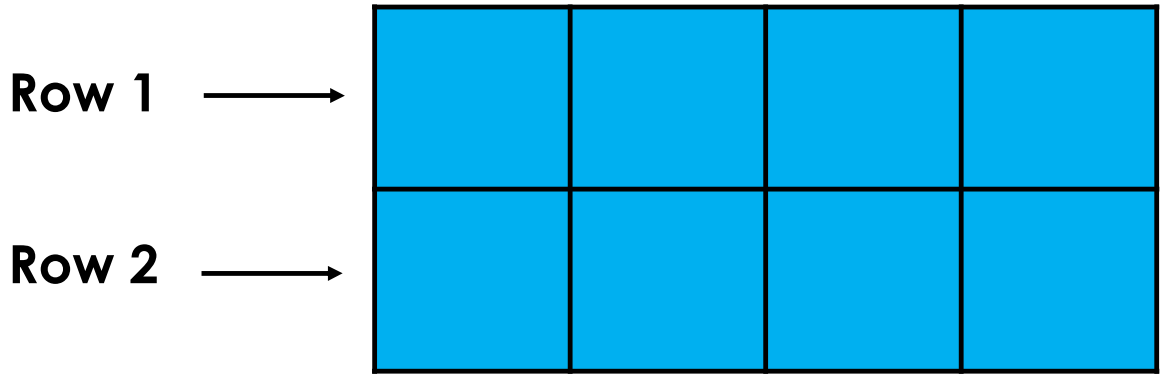
WATCH ME FIRST

I want to find the product of 2 x 4.
I'll create a rectangular array to help.



There are 2 equal rows. Each row is made up of 4 squares.

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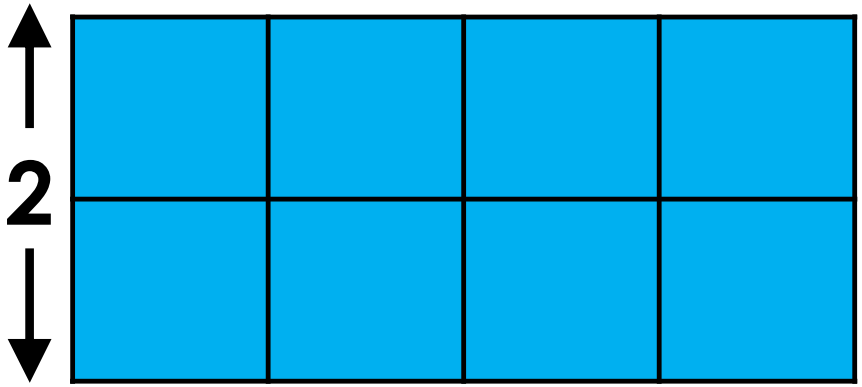
WATCH ME FIRST

I'll start by recording the number of rows or groups in the array.



2 (# of groups) × _____ = _____

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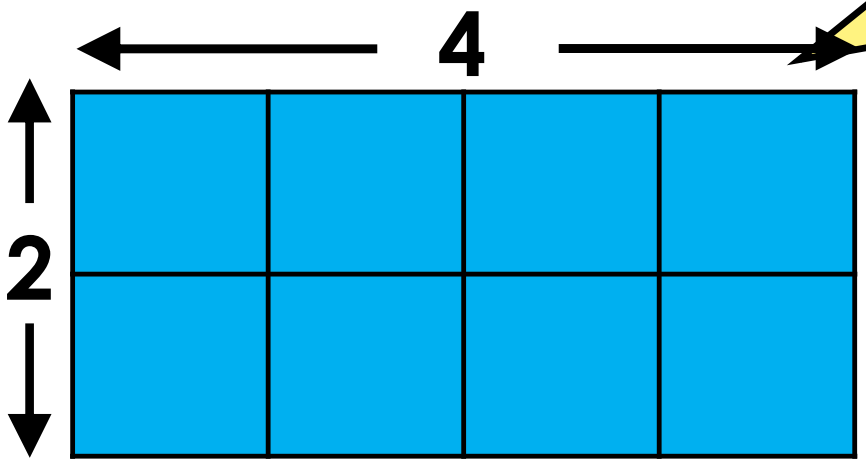
WATCH ME FIRST

Next, I'll record the number of objects in each group. In this case it will be the number of squares in each group.



$$\underset{\text{(\# of groups)}}{2} \times \underset{\text{(\# of objects in each group)}}{4} = \_\_\_\_$$

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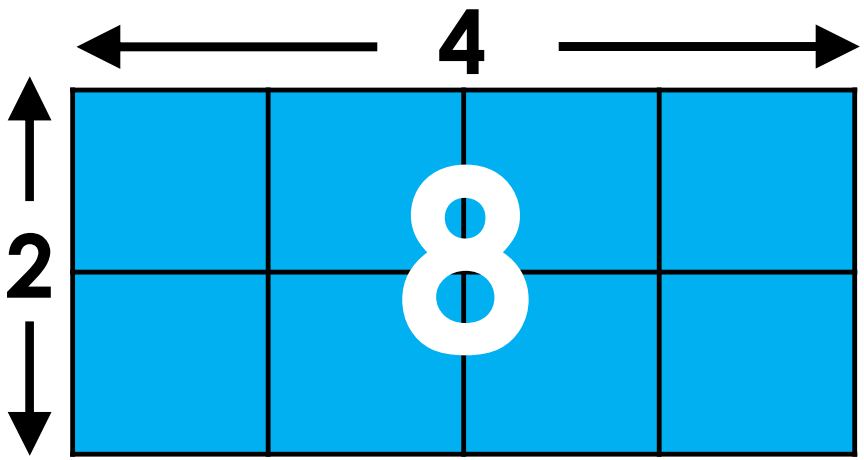
WATCH ME FIRST

Finally, I'll record the total number of squares which is the product.



I can also read the equation as:

2 groups of 4 equals 8

$$\underset{\text{(\# of groups)}}{2} \times \underset{\text{(\# of objects in each group)}}{4} = \underset{\text{(Total Number of Objects)}}{8}$$

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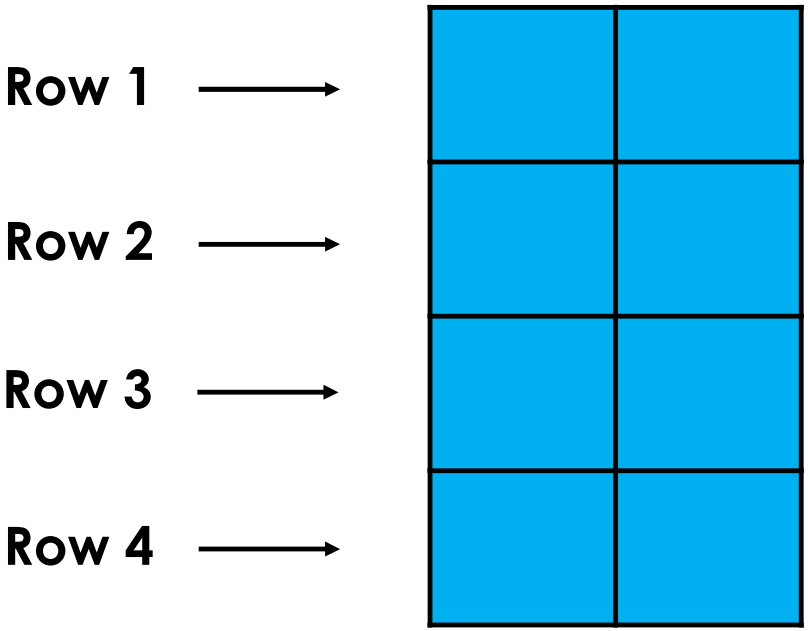
WATCH ME FIRST

Now I want to reverse the factors and find the product of 4 and 2. I'll use a rectangular array to help again.



There are 4 equal rows. Each row is made up of 2 squares.

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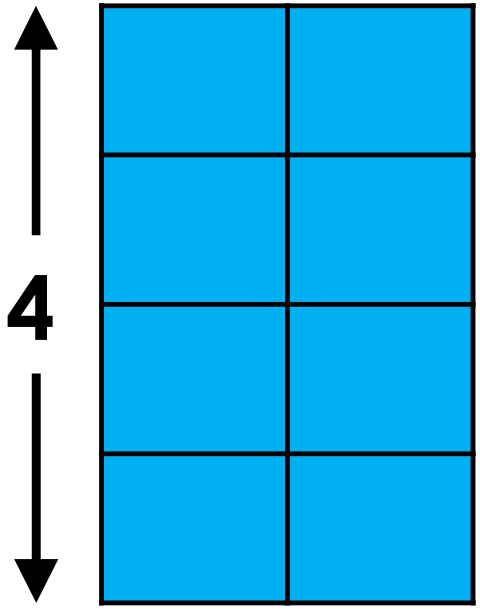
WATCH ME FIRST

I'll start by recording the number of rows or groups in the array.



$$\underset{\text{(\# of groups)}}{4} \times \_\_\_\_ = \_\_\_\_$$

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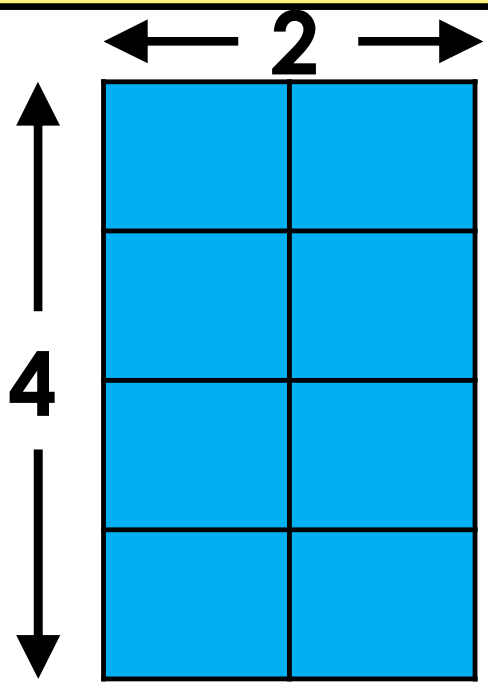
WATCH ME FIRST

Next, I'll record the number of objects in each group. In this case it will be the number of squares in each row.



$$\underset{\text{(\# of groups)}}{4} \times \underset{\text{(\# of objects in each group)}}{2} = \_\_\_\_$$

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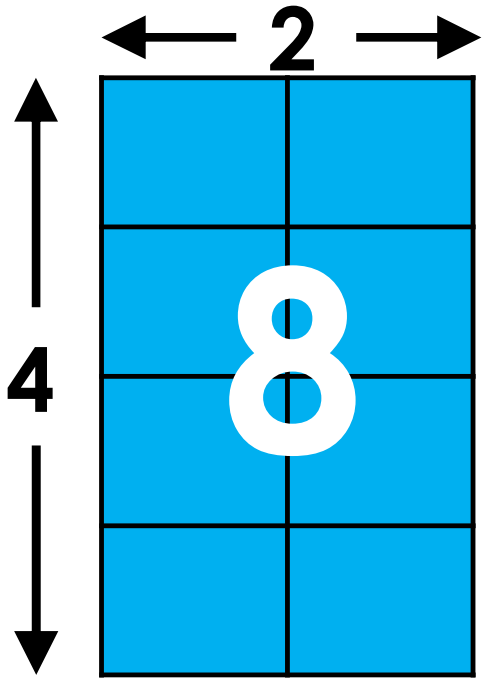
WATCH ME FIRST

Finally, I'll record the total number of squares which is the product.



I can also read the equation as:

4 groups of 2 equals 8

$$\underset{\text{(\# of groups)}}{4} \times \underset{\text{(\# of objects in each group)}}{2} = \underset{\text{(Total Number of Objects)}}{8}$$

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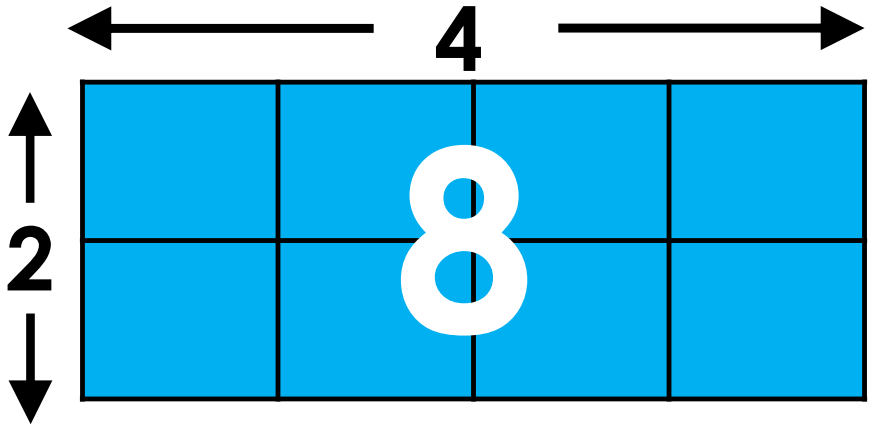
WATCH ME FIRST

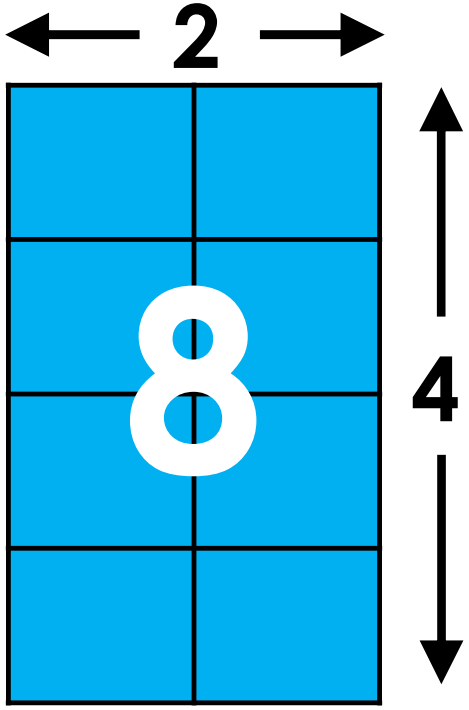
I wonder how 2 × 4 and 4 × 2 are the same?

Both have the same product: 8

AND both facts have the same factors: 2 & 4



2 × 4 = 8



4 × 2 = 8

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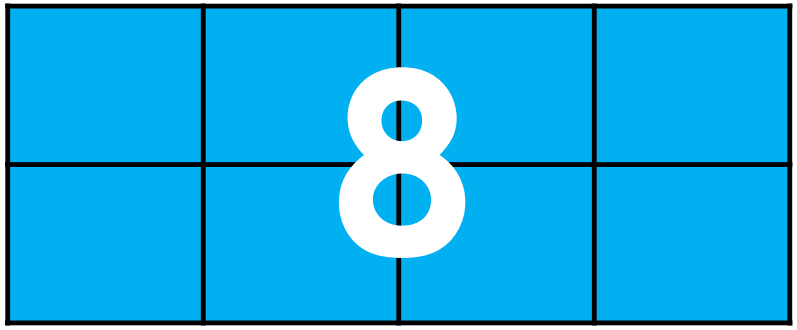
WATCH ME FIRST

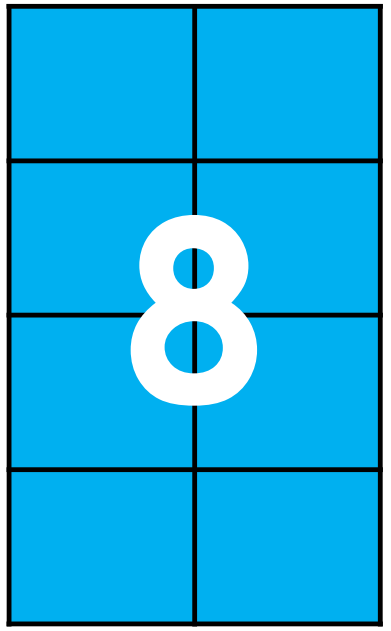
I wonder how 2 × 4 and 4 × 2 are <u>different</u>?

The order of factors are reversed.

The models look different.



$2 \times 4 = 8$



$4 \times 2 = 8$

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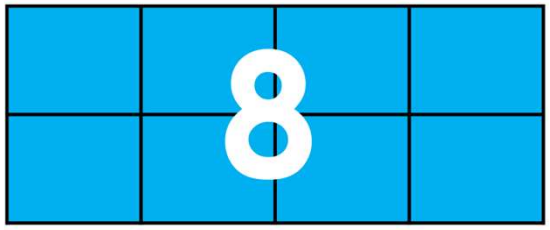
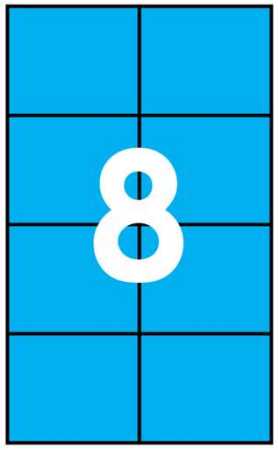
Vocabulary Highlight

When multiplying numbers, reversing the order of factors does not change the product. This is called the **commutative property of multiplication**.

EXAMPLE



$2 \times 4 = 8$



$4 \times 2 = 8$

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LET'S WORK TOGETHER

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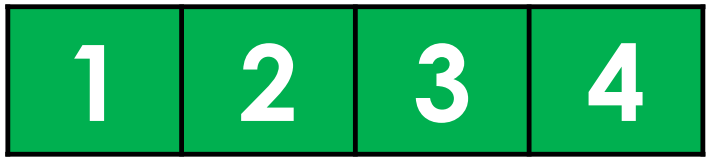
Problem #1a
LET'S WORK TOGETHER

Mrs. Coleman arranged the desks into 5 equal rows. Four desks were in each row. Use the graph paper to create a rectangular array to find the total number of desks that she moved.



How many desks are in each row?

There are 4 desks in each row.

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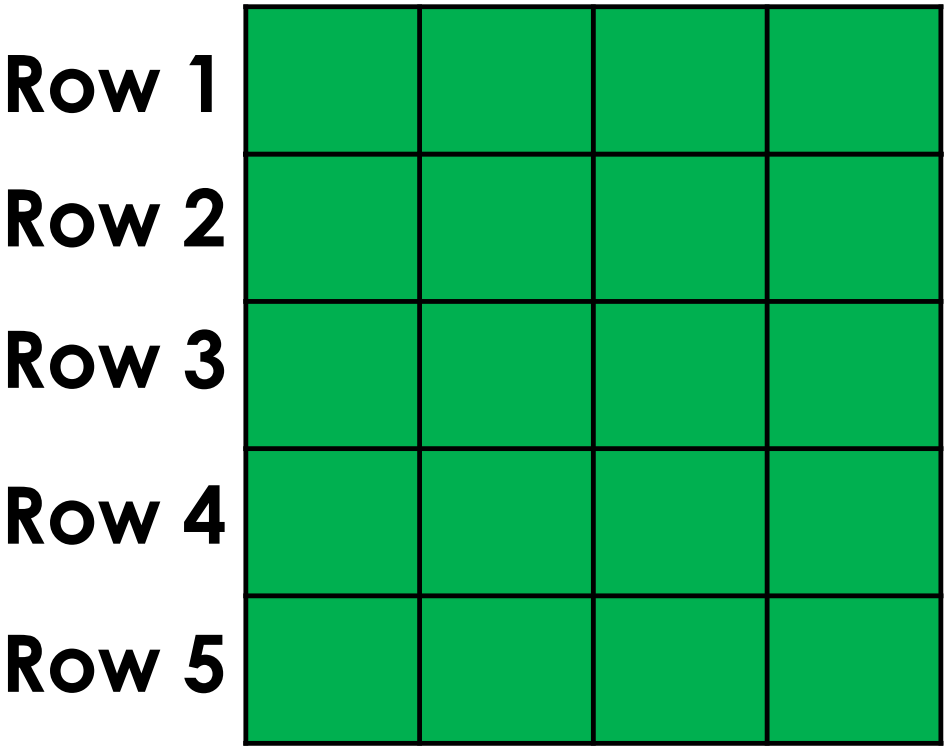
Problem #1a
LET'S WORK TOGETHER

Mrs. Coleman arranged the desks into 5 equal rows. Four desks were in each row. Create a rectangular array to find the total number of desks that she moved.



How many rows are there?

There are 5 rows of desks.

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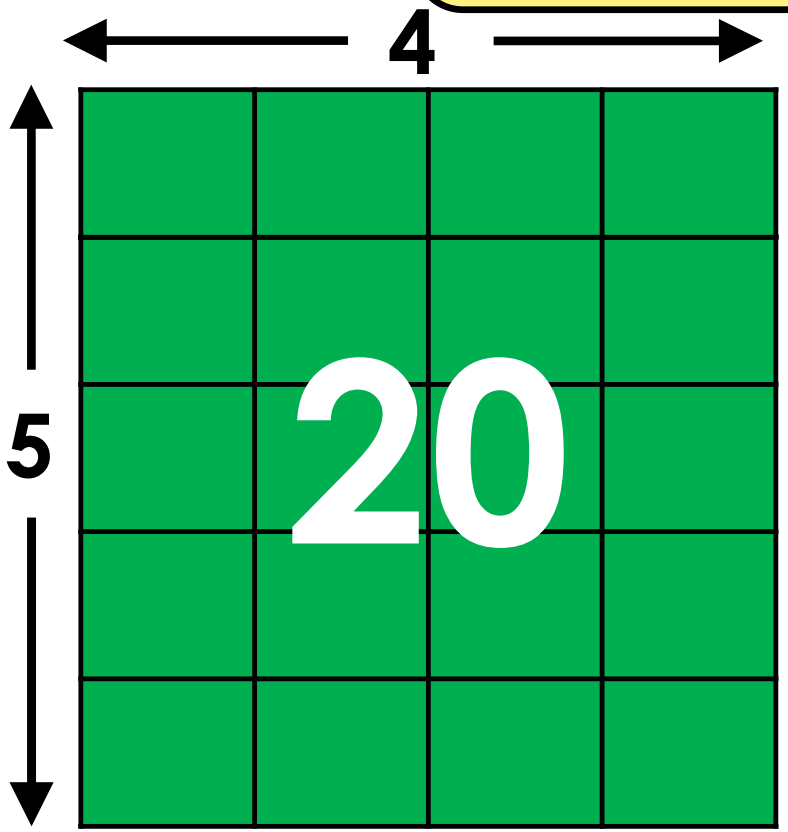
Problem #1a
LET'S WORK TOGETHER

Mrs. Coleman arranged the desks into 5 equal rows. Four desks were in each row. Create a rectangular array to find the total number of desks that she moved.



What's a multiplication equation that shows the total number of desks?

$5 \times 4 = 20$

She moved 20 desks.

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Now let's reverse the factors and solve a new problem.

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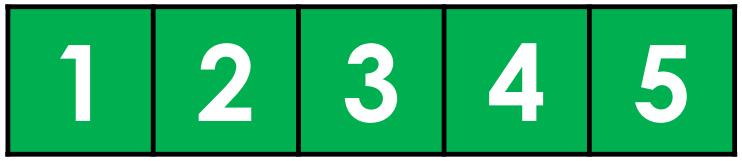
Problem #1b
LET'S WORK TOGETHER

Mrs. Coleman rearranged the desks. She made 4 equal rows with five desks in each row. Use the graph paper to create a rectangular array to find the total number of desks.



How many desks are in each row now?

There are 5 desks in each row.

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Problem #1b
LET'S WORK TOGETHER

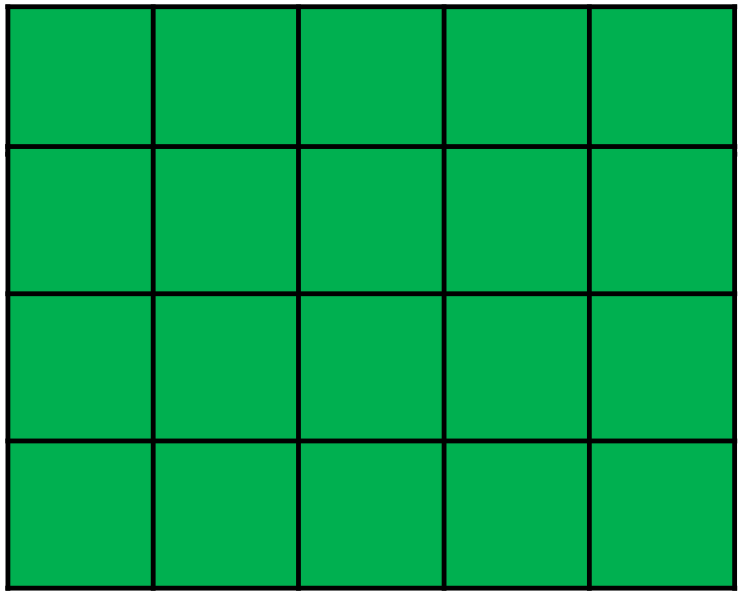
Mrs. Coleman rearranged the desks. She made 4 equal rows with five desks in each row. Use the graph paper to create a rectangular array to find the total number of desks.

Row 1

Row 2

Row 3

Row 4



How many rows of desks are there?

There are 4 rows of desks.

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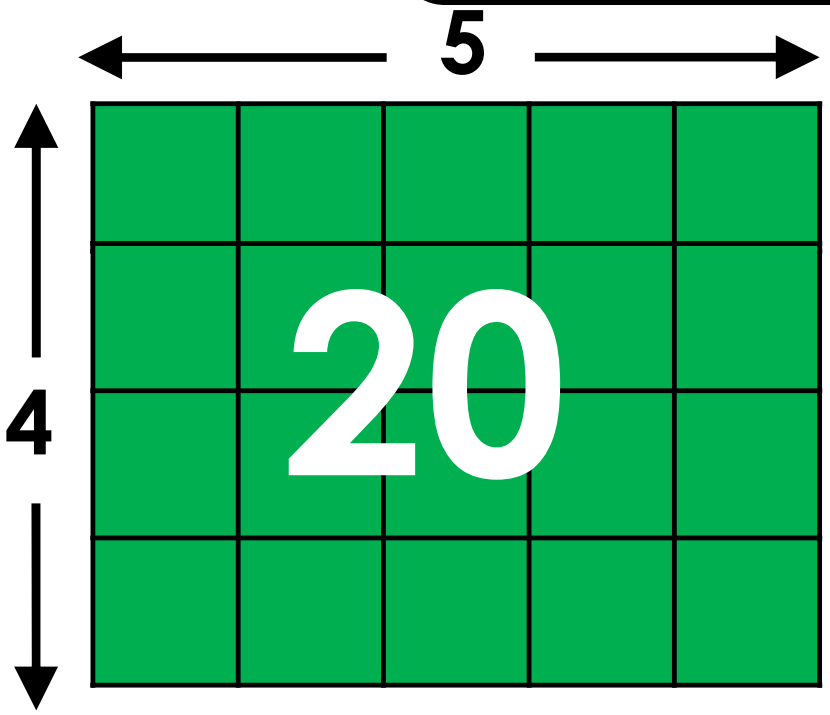
Problem #1b
LET'S WORK TOGETHER

Mrs. Coleman rearranged the desks. She made 4 equal rows with five desks in each row. Use the graph paper to create a rectangular array to find the total number of desks.



Write a multiplication equation to show the total number of desks.

$4 \times 5 = 20$

She rearranged 20 desks.

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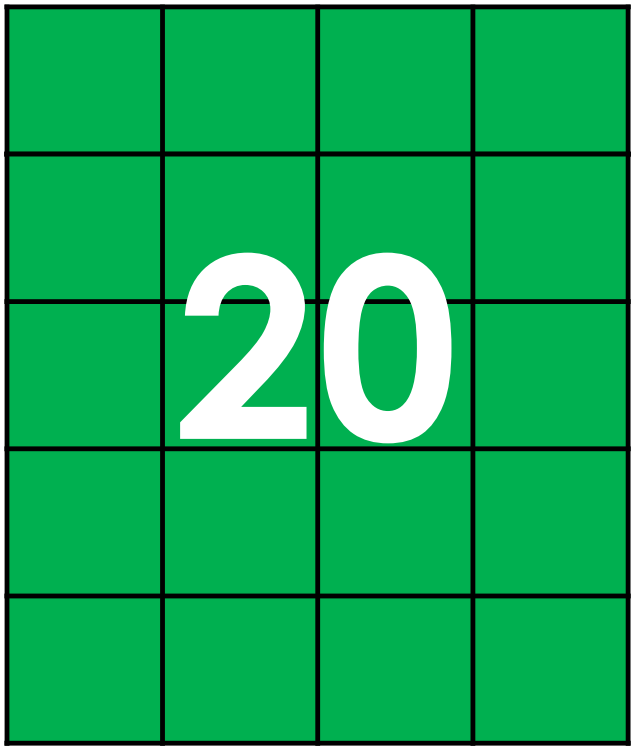
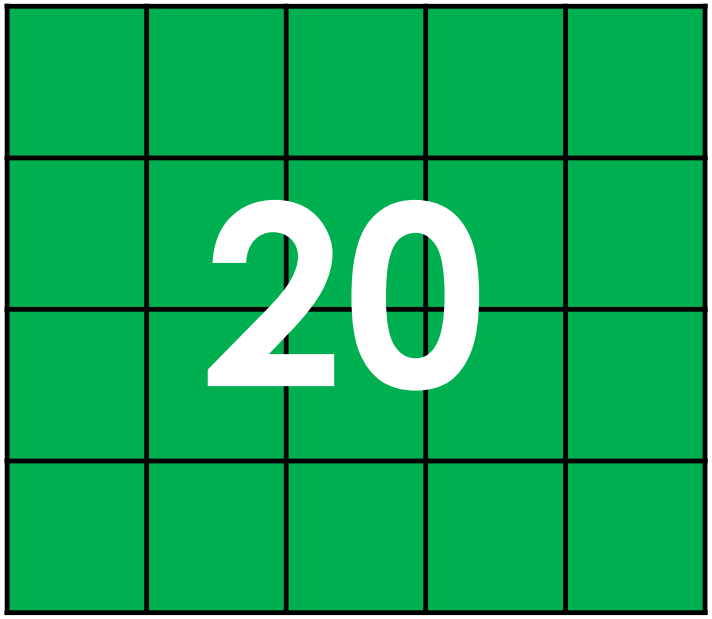
Problem #1
LET'S WORK TOGETHER

How are 5 × 4 and 4 × 5 the same? Different?



5 × 4 = 20



4 × 5 = 20

Similarities

- ✓ Both use the same factors: (5 and 4)
- ✓ Both have the same product (20).

Differences

- ✓ The order of the factors are reversed.
- ✓ The arrays are rotated making them look different.

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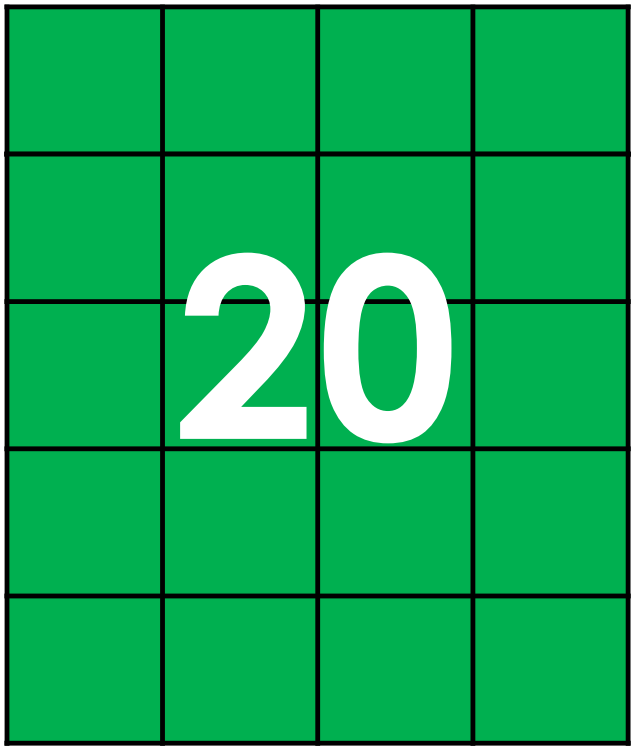
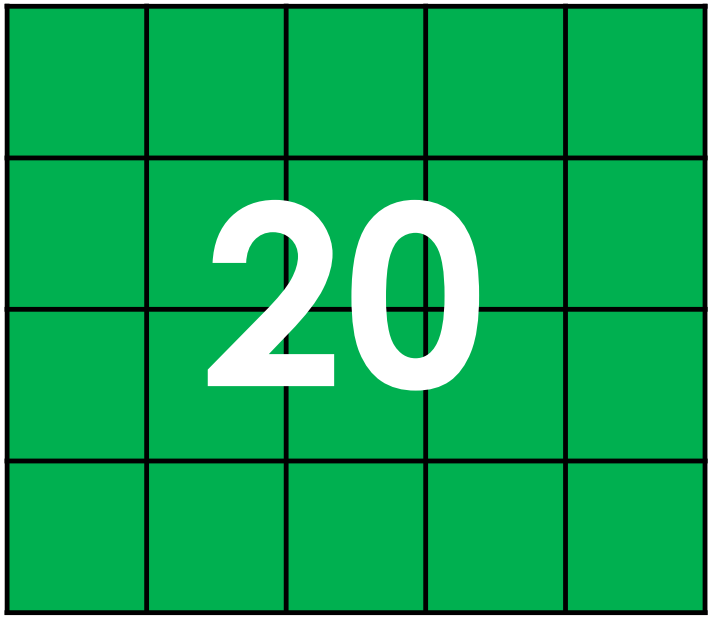
Problem #1
LET'S WORK TOGETHER

Use the models to explain the commutative property.





$5 \times 4 = 20$ Commutative property $4 \times 5 = 20$

Explain

When multiplying numbers, reversing the order of the factors does not change the product.

This is called the **commutative property** of multiplication.

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LET'S DO ONE MORE TOGETHER...

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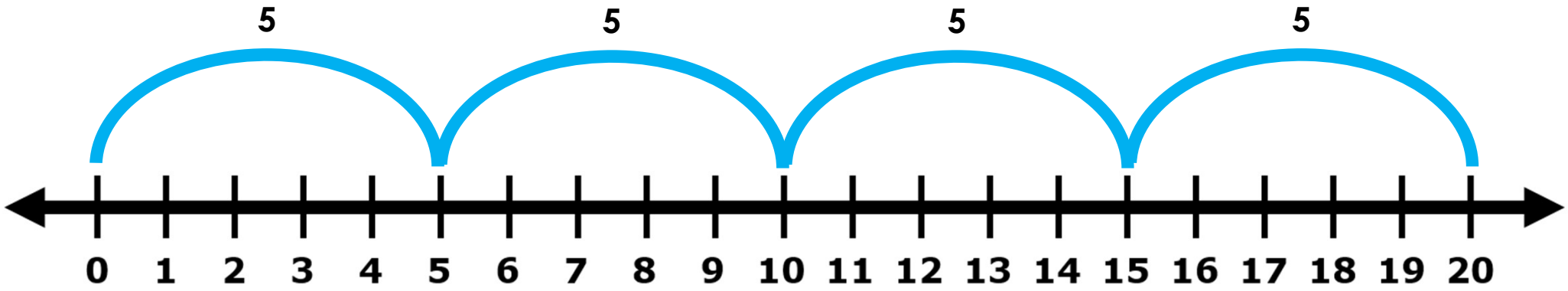
What's a number line?

It is a model that represents numbers as points on a line.

We can use number lines to help us solve multiplication problems by skip counting.



4 jumps of 5 is the same as 20, 4 x 5 = 20

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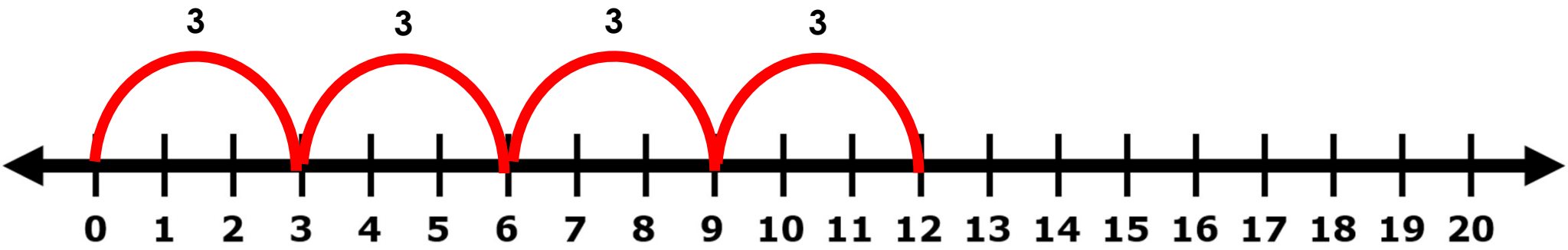
Problem #2

LET'S WORK TOGETHER

Sara and Kim played a game. Sara jumped 3 feet four times. When it was Kim's turn, she jumped 4 feet three times. Which student jumped the farthest?



Let's start by drawing Sara's jumps.
How many jumps did she make?
How far was each jump?

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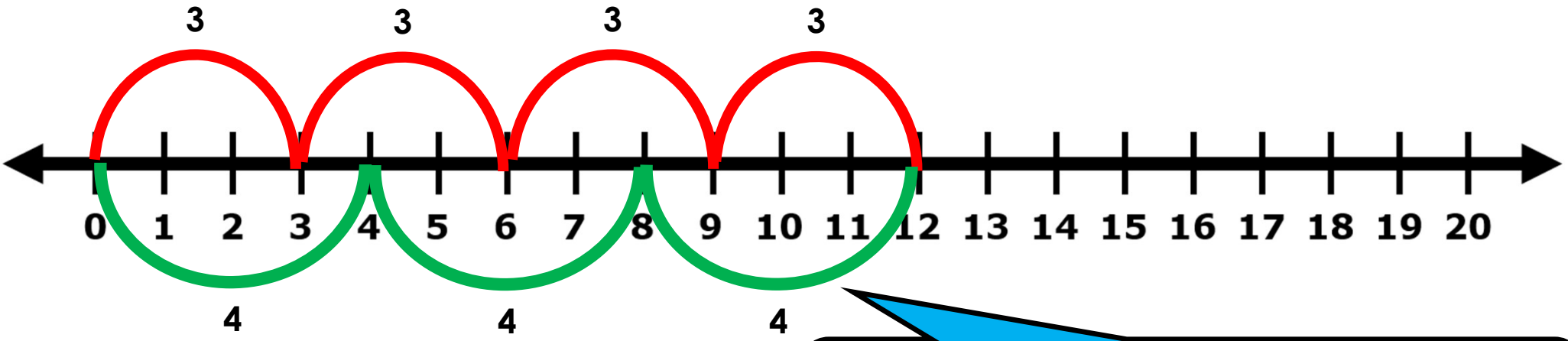
Problem #2
LET'S WORK TOGETHER

Sara and Kim played a game. Sara jumped 3 feet 4 times. When it was Kim's turn, she jumped 4 feet 3 times. Which student jumped the farthest?



Now let's draw Kim's jumps.
How many jumps did she make?
How far was each jump?

In a double number line, you will use the top and bottom of the line to explore math concepts.

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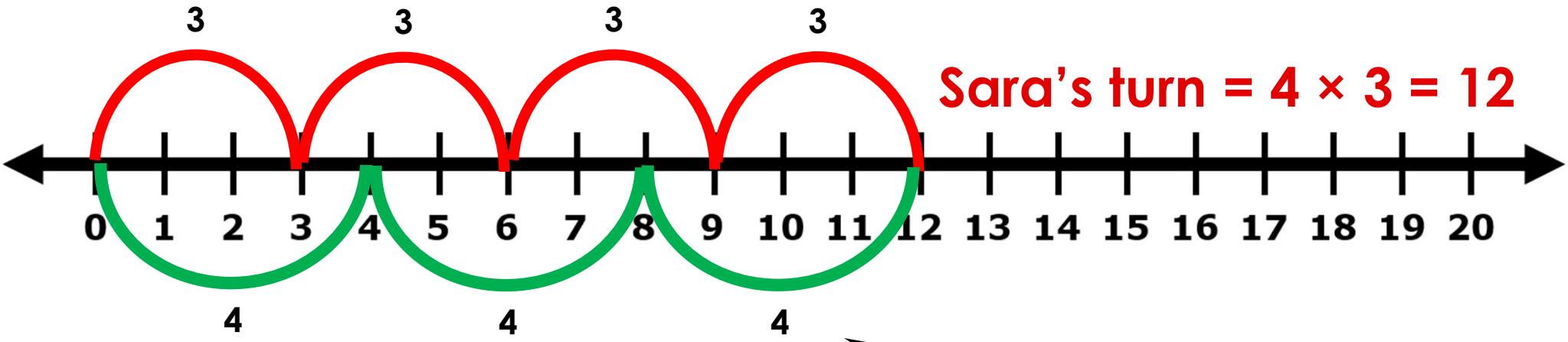
Problem #2
LET'S WORK TOGETHER

Sara and Kim played a game. Sara jumped 3 feet four times. When it was Kim's turn, she jumped 4 feet three times. Which student jumped the farthest?



Sara's turn = 4 × 3 = 12

What multiplication equation represents Sara's turn?

4 × 3 = 12

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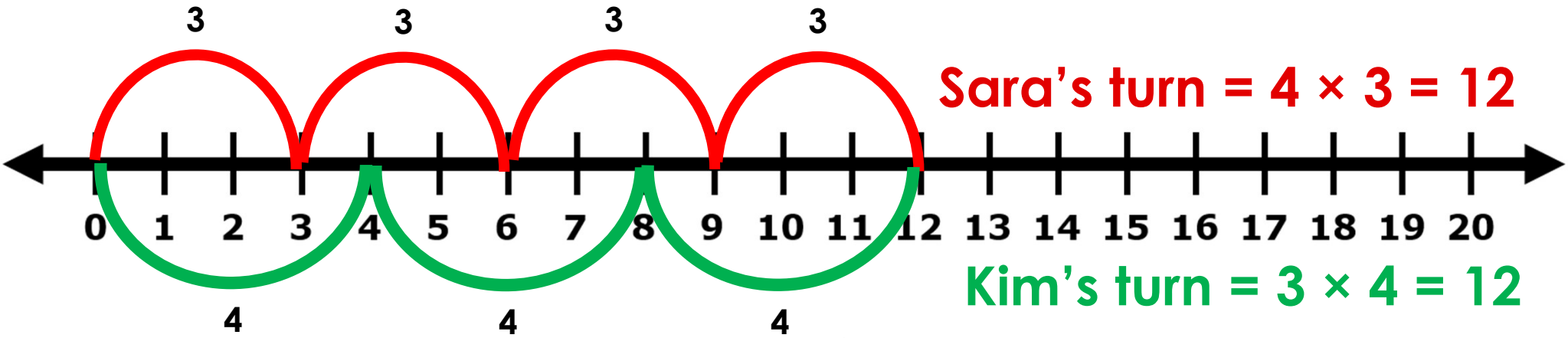
Problem #2
LET'S WORK TOGETHER

Sara and Kim played a game. Sara jumped 3 feet 4 times. When it was Kim's turn, she jumped 4 feet 3 times. Which student jumped the farthest?



Sara's turn = 4 × 3 = 12

Kim's turn = 3 × 4 = 12

What multiplication equation represents Kim's turn?

3 × 4 = 12

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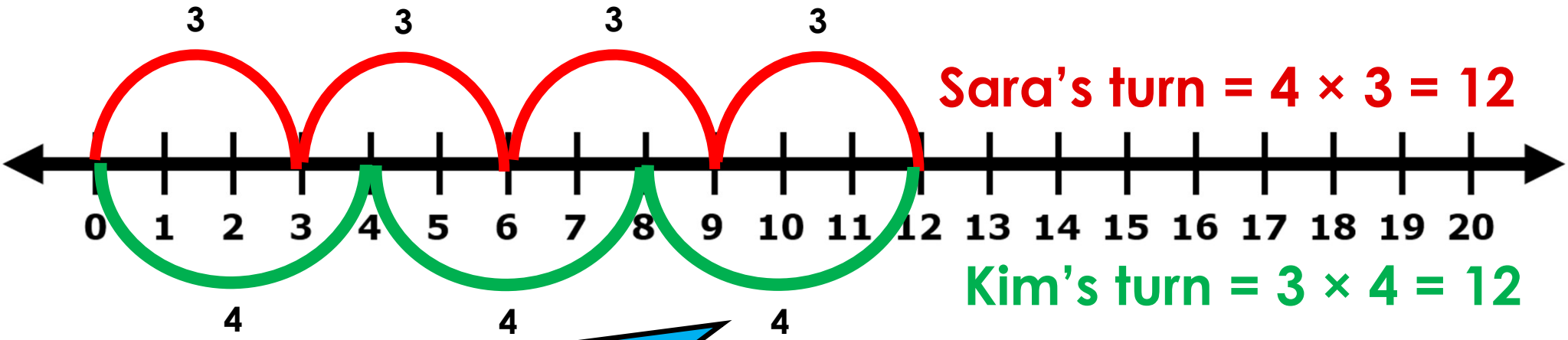
Problem #2
LET'S WORK TOGETHER

Sara and Kim played a game. Sara jumped 3 feet 4 times. When it was Kim's turn, she jumped 4 feet 3 times. Which student jumped the farthest?



Sara's turn = 4 × 3 = 12

Kim's turn = 3 × 4 = 12

Who jumped farthest? Why?

They jumped the same distance. It's the commutative property!

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CHECK - IN

- What did you notice?
- Can you make a connection to anything else you already know? How?
- Do you have any questions?

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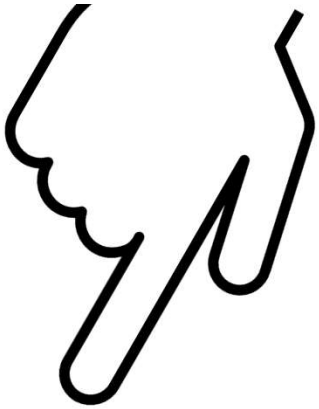

Now It's "YOUR TURN" to Solve

Don't forget to show your work!

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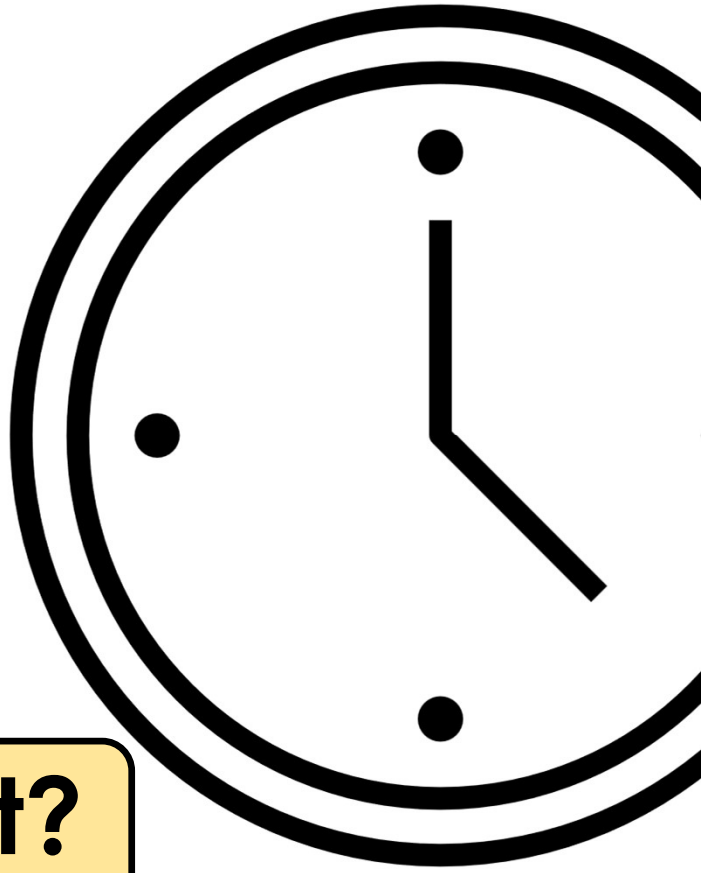
Time to Discuss and Check Your Answers



How did you solve it?

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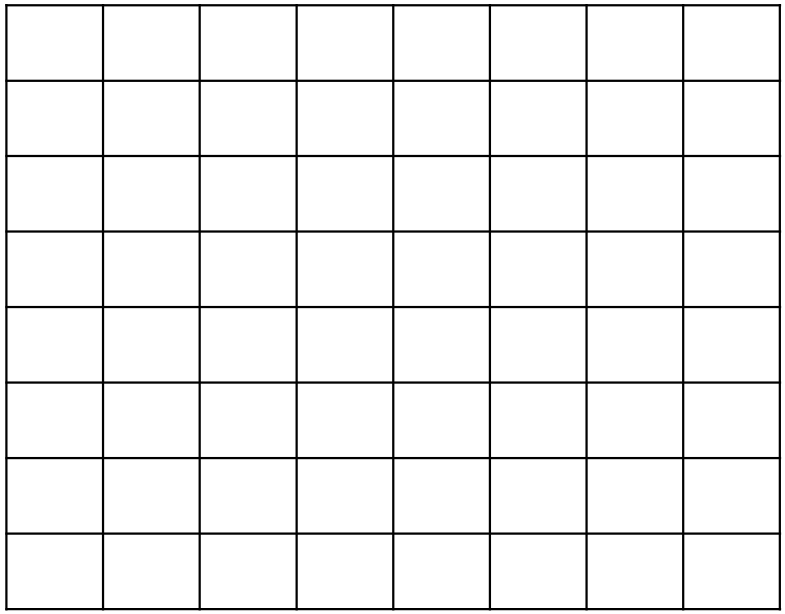
Problem #1
YOUR TURN

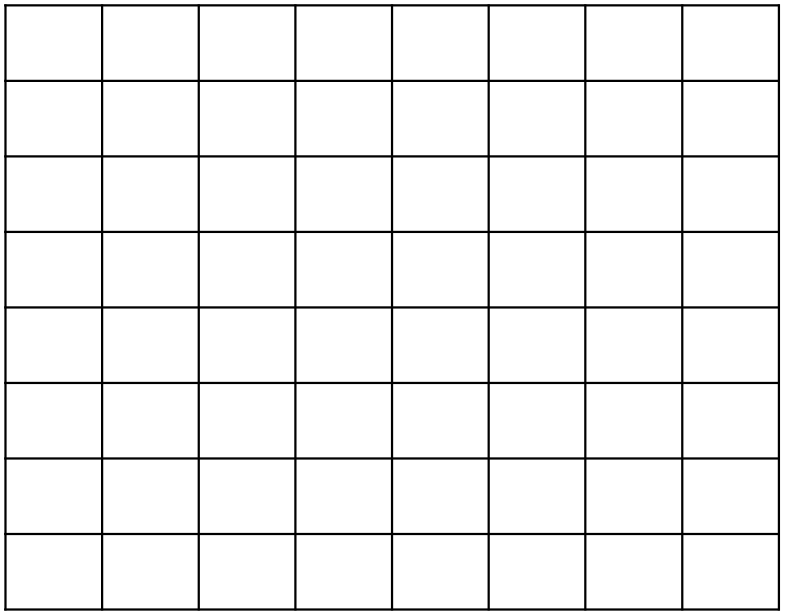
Use the graph paper to create a rectangular array for 2 × 6. Next, create another rectangular array to show the commutative property. Fill in the blanks for both facts.



Fact #1:

_____ × _____ = _____

(Factor) (Factor) (Product)



Fact #2:

_____ × _____ = _____

(Factor) (Factor) (Product)

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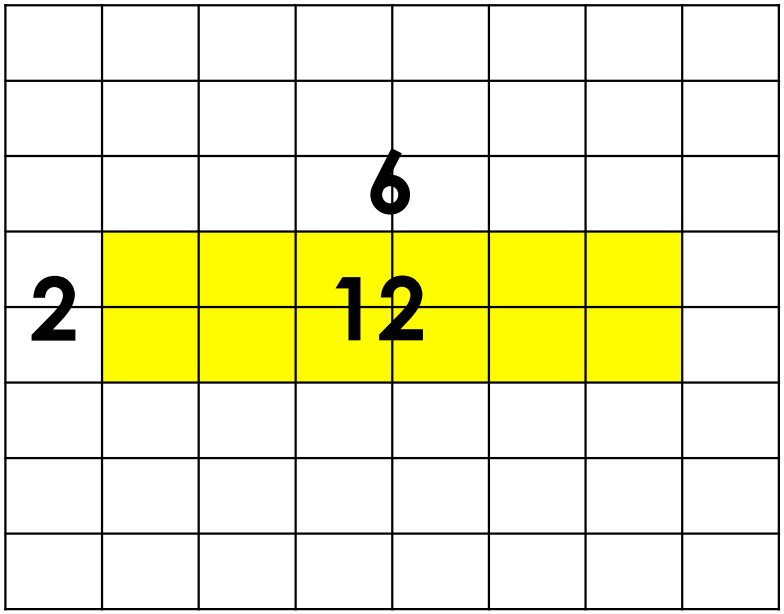
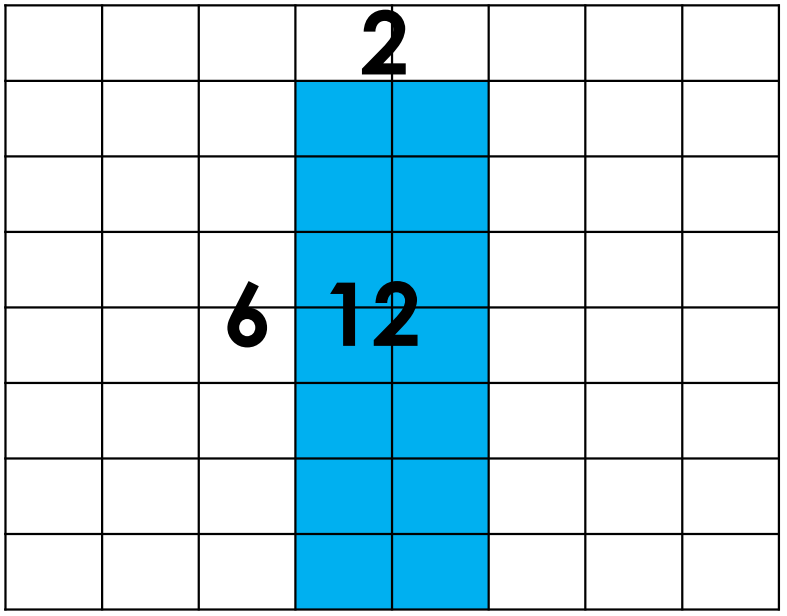
Problem #1
YOUR TURN

Use the graph paper to create a rectangular array for 2 × 6. Next, create another rectangular array to show the commutative property. Fill in the blanks for both facts.





Fact #1:

$$\underset{\text{(Factor)}}{2} \times \underset{\text{(Factor)}}{6} = \underset{\text{(Product)}}{12}$$

Fact #2:

$$\underset{\text{(Factor)}}{6} \times \underset{\text{(Factor)}}{2} = \underset{\text{(Product)}}{12}$$

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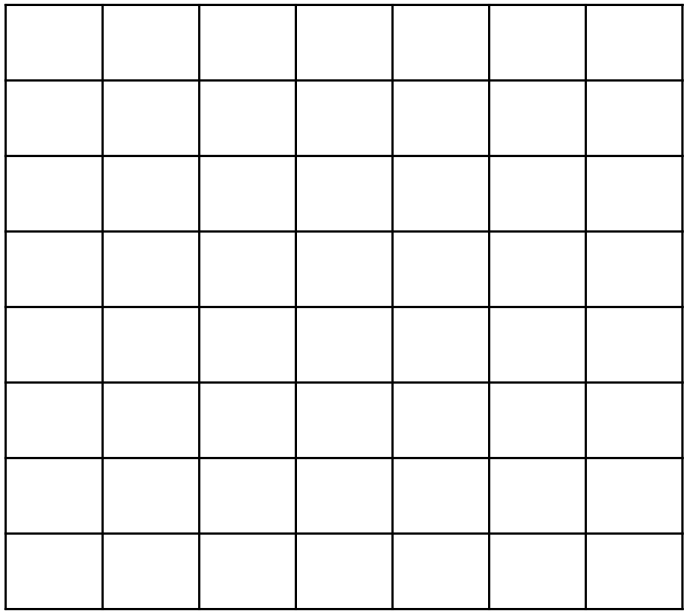
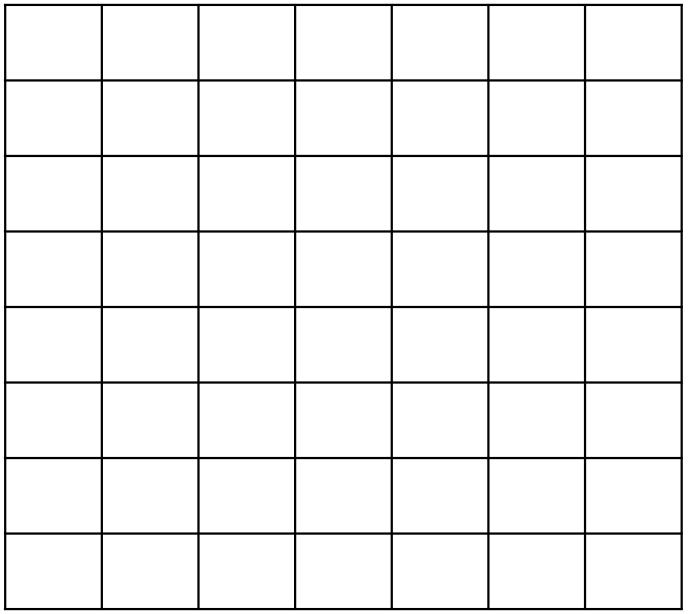
Problem #2
YOUR TURN

Use the graph paper to draw a rectangular array to find the products of 3 × 5 and 5 × 3. What does this problem show you about multiplication?





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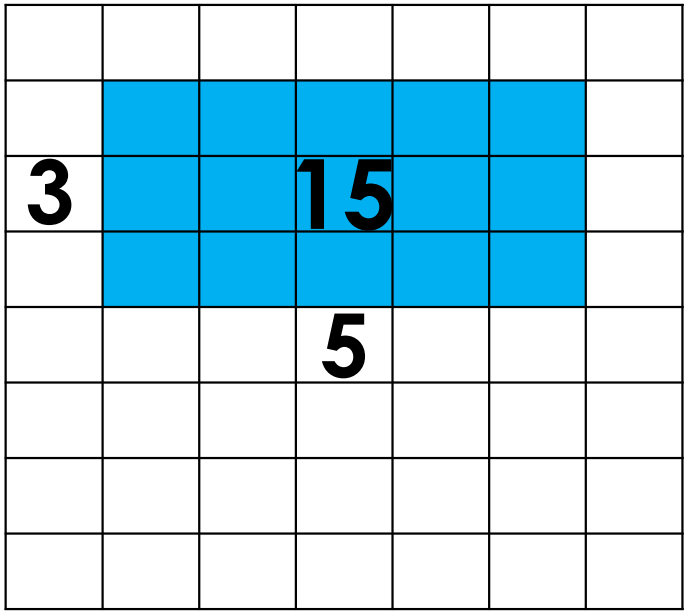
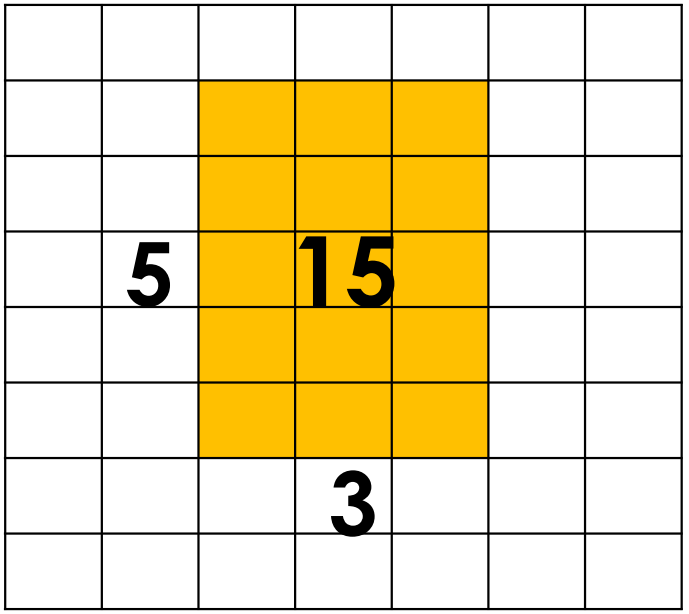
Problem #2
YOUR TURN

Use the graph paper to draw a rectangular array to find the products of 3 × 5 and 5 × 3. What does this problem show you about multiplication?





The product of 3 × 5 is 15. The product of 5 × 3 is 15.
This shows me that if the order of the factors are reversed, the product will remain the same. This is called the commutative property.

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Problem #3
YOUR TURN

How can the commutative property help you learn multiplication facts?

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Problem #3
YOUR TURN

How can the commutative property help you learn multiplication facts?

The commutative property helps because I will not have to learn all 144 facts. Learning half of my multiplication facts will help me automatically know the other half.

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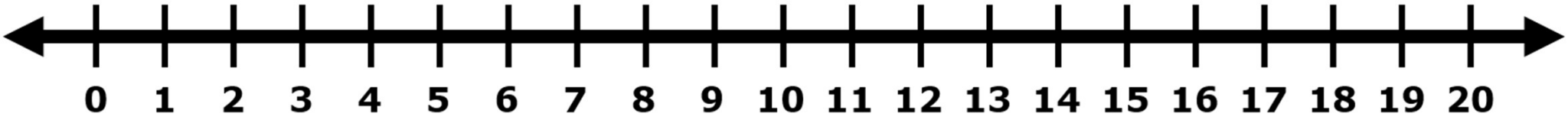
Problem #4
YOUR TURN

Use the double number line to solve 4 × 2 and 2 × 4. Name one thing that is the same and one thing that is different between the facts.



Same	
Different	

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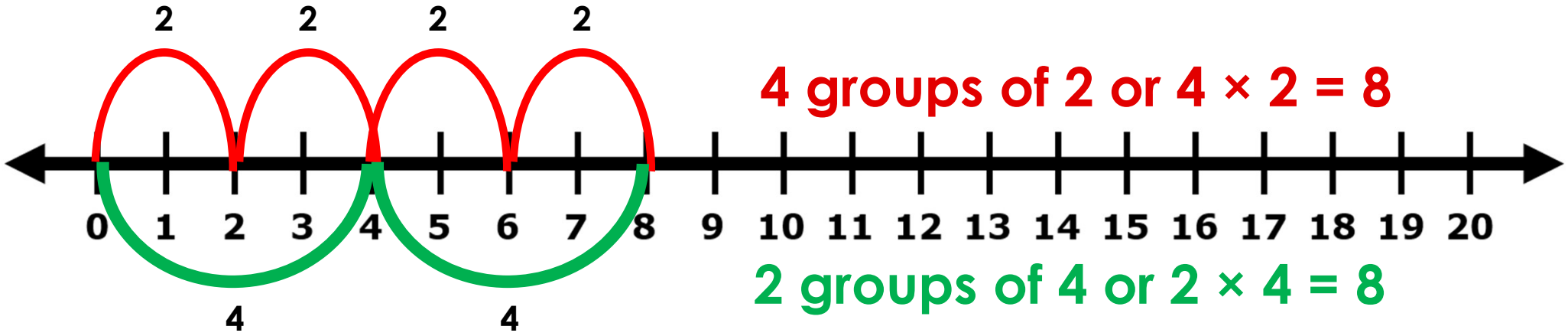
Problem #4
YOUR TURN

Use the double number line to solve 4 × 2 and 2 × 4. Name one thing that is the same and one thing that is different between the facts.



Answers May Vary

Same	Example: The product for both facts is 8; the factors are the same
Different	Example: One has 4 groups and the other has 2 groups

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Problem #5
YOUR TURN

You know that 3 × 8 equals 24. How could you find the product of 8 × 3? Explain your answer.

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Problem #5
YOUR TURN

You know that 3 × 8 equals 24. How could you find the product of 8 × 3? Explain your answer.

3 × 8 and 8 × 3 have the same factors. However, the factors are reversed. Due to the commutative property, I know the product will be the same. Therefore, 8 × 3 equals 24.

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Let's Reflect

It's reflection time!

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