

MAFS.5.NF.2.5

Interpret multiplication as rescaling.

- Understand that multiplying a fraction > 1 and a given number results in a product $>$ either factor. Examples: $2 \times \frac{5}{4} = \frac{10}{4}$ or $2\frac{1}{2}$; $\frac{10}{4} > 2$ or $2\frac{1}{2} > 2$
- Understand that multiplying a fraction < 1 and a given number results in a product $<$ the given number. Examples: $3 \times \frac{1}{4} = \frac{3}{4}$; $\frac{3}{4} < 3$
- Understand that multiplying a fraction < 1 times a fraction < 1 results in a number $<$ either fraction. Examples: $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$; $\frac{1}{4} < \frac{1}{2}$ For example, $\frac{1}{6} \times 9 < \frac{1}{3} \times 9$ because $\frac{1}{6} < \frac{1}{3}$.
- Draw models of multiplication of fractions by given numbers to compare the size of products.

What does the Identity Property of Multiplication tell us?

Anytime you multiply a number by 1, the product will be that same number.

Identity Property of Multiplication

Let's practice!

What is 5×1 ? 5

What is 12×1 ? 12

What is 24×1 ? 24

Why is the product
of any number
multiplied times 1,
that same number?

We know that the Identity Property of Multiplication is true because multiplication is repeated addition.

5 x 1 is just one 5!

Or it could be 5 ones!

12 x 1 is just one 12!

Or it could be 12 ones!

24 x 1 is just one 24!

Or it could be 24 ones!

Since we KNOW that the Identity Property of Multiplication is true, we can use that knowledge to help us estimate when we multiply fractions!

What do we know happens when we multiply by a number that is greater than 1? For example 4×2 ?

$$4 \times 2$$

If we remember that multiplication is repeated addition, then we know that 4×2 is the same as $4 + 4$ (add the number 4 two times).

Or it could be $2 + 2 + 2 + 2$ (add the number 2 four times). Either way the answer is...

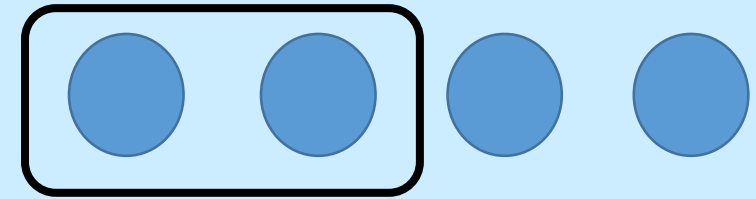
8

What do you think happens when we multiply by a number that is less than 1? For example $4 \times \frac{1}{2}$?

$$4 \times \frac{1}{2}$$

If we remember that multiplication is repeated addition, then we know that $4 \times \frac{1}{2}$ is the same as $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$ (add the number $\frac{1}{2}$ four times).

Or it could be $\frac{1}{2}$ of 4.



Either way the answer is...

2

Let's use what we know about the Identity Property of Multiplication to answer the following:

Will the product of $9 \times \frac{1}{3}$ be greater than, equal to, or less than 9?

Let's use what we know about the Identity Property of Multiplication to answer the following:

Will the product of $9 \times \frac{1}{3}$ be greater than, equal to, or less than 9?

The product of $9 \times \frac{1}{3}$ will be **less than 9** because $\frac{1}{3}$ is less than 1.

Try this one:

If I want to modify a recipe that normally serves 8 to serve 12 instead...

Should I multiply by $\frac{2}{3}$ or by $\frac{3}{2}$?

Try this one:

If I want to modify a recipe that normally serves 8 to serve 12 instead...

Should I multiply by $\frac{2}{3}$ or by $\frac{3}{2}$?

I should multiply by $\frac{3}{2}$ because it is greater than 1. $\frac{3}{2}$ is $1\frac{1}{2}$. That means 8 plus $\frac{1}{2}$ of 8. $8 + 4 = 12$.

MAFS.5.NF.2.4

Multiply a fraction or whole number by a fraction.

- Understand a number sentence can be restated as a word sentence.
Examples: $5 \times \frac{3}{4}$ is the same as 5 groups of $\frac{3}{4}$, $\frac{1}{2} \times \frac{1}{2}$ is the same as $\frac{1}{2}$ of a group of $\frac{1}{2}$.
- Understand that a whole number multiplied by a fraction can be represented as repeated addition. Example: $6 \times \frac{3}{4} = \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4}$.
- Create a story context for an equation of the form $(\frac{a}{b}) \times q$. ☐ Multiply a fraction by a whole number.
- Multiply a fraction by a fraction including improper fractions and mixed numbers.
- Use visual models (area models, tape diagrams, number lines) to represent multiplication of a fraction by a whole number and a fraction by a fraction.

Multiplying a fraction times a whole number:

$$8 \times \frac{2}{3}$$

First, will the product be greater than, equal to, or less than 8?

Multiplying a fraction times a whole number:

$$8 \times \frac{2}{3}$$

It will be less than 8 because $\frac{2}{3}$ is less than 1.

Multiplying a fraction times a whole number:

$$8 \times \frac{2}{3}$$

It will be less than 8 because $\frac{2}{3}$ is less than 1.

Second, will the product be greater than, equal to, or less than $\frac{2}{3}$?

Multiplying a fraction times a whole number:

$$8 \times \frac{2}{3}$$

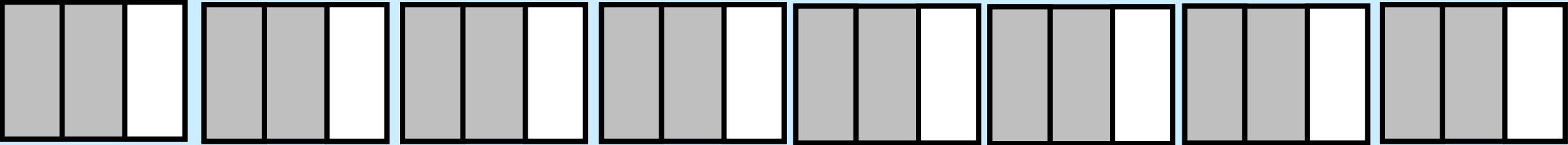
It will be less than 8 because $\frac{2}{3}$ is less than 1.

It will be greater than $\frac{2}{3}$ because 8 is greater than 1.

Multiplying a fraction times a whole number:

$$8 \times \frac{2}{3}$$

We could make a model:



Multiplying a fraction times a whole number:

$$8 \times \frac{2}{3}$$

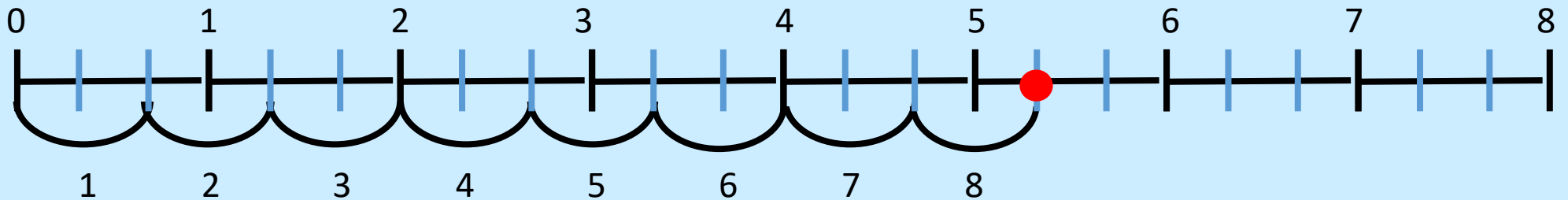
We could rewrite the problem:

$$8 \times 2 \div 3$$

Multiplying a fraction times a whole number:

$$8 \times \frac{2}{3}$$

We could make a number line:



Multiplying a fraction times a whole number:

$$8 \times \frac{2}{3} = \frac{16}{3} \text{ or } 5 \frac{1}{3}$$

Let's try another one:

$$5 \times \frac{4}{5}$$

First, will the product be greater than, equal to, or less than 5?

Let's try another one:

$$5 \times \frac{4}{5}$$

It will be less than 5 because $\frac{4}{5}$ is less than 1.

Multiplying a fraction times a whole number:

$$5 \times \frac{4}{5}$$

It will be less than 5 because $\frac{4}{5}$ is less than 1.

Second, will the product be greater than, equal to, or less than $\frac{4}{5}$?

Multiplying a fraction times a whole number:

$$5 \times \frac{4}{5}$$

It will be less than 5 because $\frac{4}{5}$ is less than 1.

It will be greater than $\frac{4}{5}$ because 5 is greater than 1.

Multiplying a fraction times a whole number:

$$5 \times \frac{4}{5}$$

How would we solve this with repeated addition?

Multiplying a fraction times a whole number:

$$5 \times \frac{4}{5}$$

How would we solve this with repeated addition?

$$\frac{4}{5} + \frac{4}{5} + \frac{4}{5} + \frac{4}{5} + \frac{4}{5} = \frac{20}{5} \text{ or } 4$$

Multiplying a fraction times a whole number:

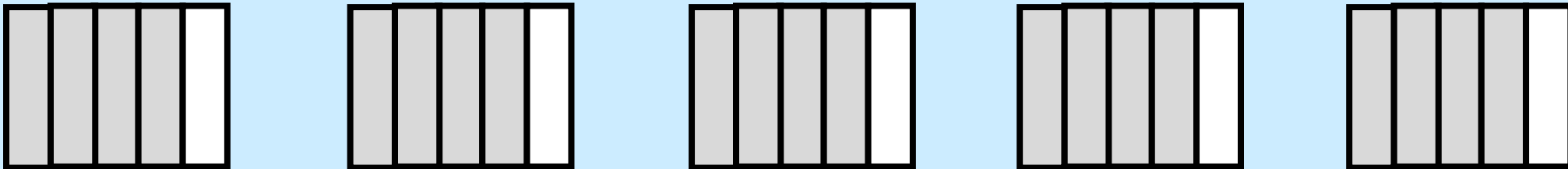
$$5 \times \frac{4}{5}$$

How would we solve this with a model?

Multiplying a fraction times a whole number:

$$5 \times \frac{4}{5}$$

How would we solve this with a model?



20 fifths or 4 wholes.

Multiplying a fraction times a whole number:

$$5 \times \frac{4}{5}$$

How would we rewrite this to solve with operations?

Multiplying a fraction times a whole number:

$$5 \times \frac{4}{5}$$

How would we rewrite this to solve with operations?

$$5 \times 4 \div 5$$

$$5 \times 4 = 20 \text{ and } 20 \div 5 = 4$$

Multiplying a fraction times a whole number:

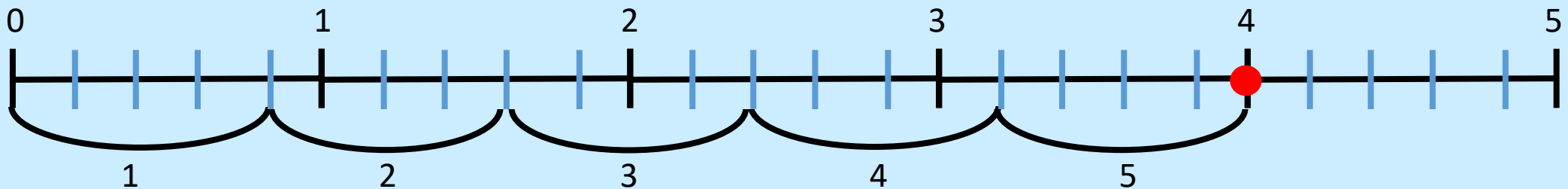
$$5 \times \frac{4}{5}$$

How would we solve this with a number line?

Multiplying a fraction times a whole number:

$$5 \times \frac{4}{5}$$

How would we solve this with a number line?



Practice in your math book!

Go Math!

Chapter 7, Lesson 1

Pages 291-294