Lesson 19: Compare to 1

- Let's explain what happens when we multiply a fraction by a fraction greater than, less than, or equal to 1.

Warm-up: What Do You Know About $\frac{15}{14} \times \frac{23}{30}$?

What do you know about $\frac{15}{14} \times \frac{23}{30}$?

19.1: Compare Fraction Products on the Number Line

1. Match the expressions and number lines that show the same value.

   ○ $\frac{2}{5} \times \frac{4}{3}$
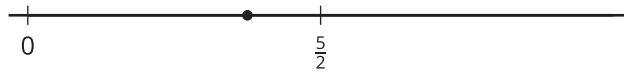
   ○ $\frac{3}{4} \times \frac{5}{2}$

   ○ $\frac{4}{3} \times \frac{5}{2}$

   ○ $\left(1 + \frac{1}{3}\right) \times \frac{5}{2}$

   ○ $\left(1 - \frac{3}{5}\right) \times \frac{4}{3}$

   ○ $\left(1 - \frac{1}{4}\right) \times \frac{5}{2}$

A

0          $\frac{5}{2}$

B

0          $\frac{5}{2}$

C

0          $\frac{4}{3}$
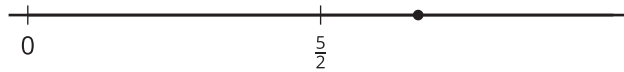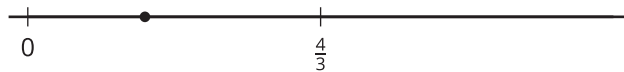
2. Choose one of the expressions from each set and explain whether the value is greater than or less than the second factor.

19.2: True Statement

1. Rewrite each expression as a sum or difference of 2 products.

   a. $\left(1 - \frac{2}{5}\right) \times \frac{4}{7}$

   b. $\left(1 + \frac{1}{5}\right) \times \frac{4}{7}$

   c. $\left(1 - \frac{3}{8}\right) \times \frac{4}{7}$

   d. $\left(1 + \frac{1}{8}\right) \times \frac{4}{7}$

2. Fill in each blank with < or > to make the inequality true.

   a. $\left(1 - \frac{2}{5}\right) \times \frac{4}{7}$ _____ $\frac{4}{7}$

   b. $\left(1 + \frac{1}{5}\right) \times \frac{4}{7}$ _____ $\frac{4}{7}$

   c. $\left(1 - \frac{3}{8}\right) \times \frac{4}{7}$ _____ $\frac{4}{7}$
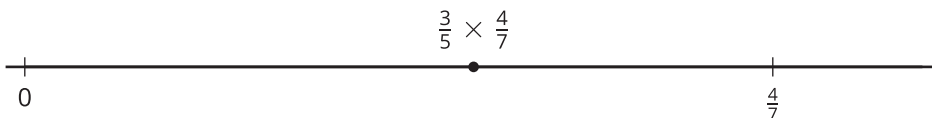
   d. $\left(1 + \frac{1}{8}\right) \times \frac{4}{7}$ _____ $\frac{4}{7}$

3. Describe the value of the product when $\frac{4}{7}$ is multiplied by a fraction greater than 1. Explain your reasoning.

   _____

   _____

4. Describe the value of the product when $\frac{4}{7}$ is multiplied by a fraction less than 1. Explain your reasoning.

   _____

   _____

Section Summary

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$$\tfrac{3}{5} \times \tfrac{4}{7}$$

In this section, we learned how to compare the size of a product to the size of the factors. To compare $\frac{3}{5} \times \frac{4}{7}$ with $\frac{4}{7}$, for example, we can put them on a number line. Since $\frac{3}{5}$ is 3 equal parts with 5 parts in the whole, it is to the left of $\frac{4}{7}$, only part of the way there. We can also see this by writing $\frac{3}{5}$ as $1 - \frac{2}{5}$.

$$\left(1 - \tfrac{2}{5}\right) \times \tfrac{4}{7} = \tfrac{4}{7} - \left(\tfrac{2}{5} \times \tfrac{4}{7}\right)$$

The product is less than $\frac{4}{7}$ because it is $\frac{4}{7}$ minus a fraction.