Using an Algorithm to Divide Fractions

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Lesson # 11

Addressing	**6.NS.A.1** Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. (In general, $(a/b) \div (c/d) = ad/bc$.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?

Students, write your response!

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Let’s divide fractions using the rule we learned.

Today's Goals

- I can describe and apply a rule to divide numbers by any fraction.

Multiplying Fractions

Warm Up 11.1

Evaluate each expression.

1. $\frac{2}{3} \cdot 27$
2. $\frac{1}{2} \cdot \frac{2}{3}$
3. $\frac{2}{9} \cdot \frac{3}{5}$
4. $\frac{27}{100} \cdot \frac{200}{9}$
5. $\left(1\frac{3}{4}\right) \cdot \frac{5}{7}$

Dividing a Fraction by a Fraction

Activity 11.2

- MLR8: Discussion Supports
- Think Pair Share



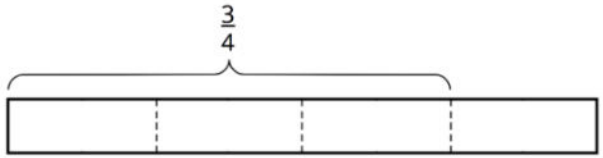
Work with a partner. One of you should work on the question labeled Partner A. The other should work on the question labeled Partner B.

1. Partner A.

Find the value of each expression, and answer the question by completing the diagram that has been started for you. Show your reasoning.

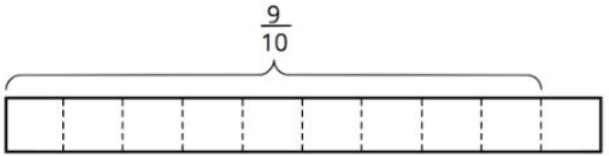
a. $\frac{3}{4} \div \frac{1}{8}$

How many $\frac{1}{8}$s in $\frac{3}{4}$?



b. $\frac{9}{10} \div \frac{3}{5}$

How many $\frac{3}{5}$s in $\frac{9}{10}$?



Pause when you are done to discuss with your partner.

Work with a partner. One of you should work on the question labeled Partner A. The other should work on the question labeled Partner B.

2. Partner B.

Elena said: "If you want to divide 4 by $\frac{2}{5}$, you can multiply 4 by 5, then divide it by 2 or multiply it by $\frac{1}{2}$."

Find the value of each expression using the strategy that Elena described.

a. $\frac{3}{4} \div \frac{1}{8}$

b. $\frac{9}{10} \div \frac{3}{5}$

Pause when you are done to discuss with your partner.

Now Let's Work With Your Partner

3. Complete this statement based on your observations:

   To divide a number n by a fraction $\frac{a}{b}$, we can multiply n by _____ and then divide the product by _____.

4. Select **all** equations that represent the statement you completed.

   a. $n \div \frac{a}{b} = n \cdot b \div a$

   b. $n \div \frac{a}{b} = n \cdot a \div b$

   c. $n \div \frac{a}{b} = n \cdot \frac{a}{b}$

   d. $n \div \frac{a}{b} = n \cdot \frac{b}{a}$

Let’s Talk About It

Using an Algorithm to Divide Fractions

Activity 11.3

- MLR7: Compare & Connect
- Anticipate, Monitor, Select, Sequence, Connect
- Think Pair Share

1. Calculate each quotient using your preferred strategy. Show your work and be prepared to explain your strategy.

   a. $\frac{8}{9} \div 4$

   b. $\frac{3}{4} \div \frac{1}{2}$

   c. $3\frac{1}{3} \div \frac{2}{9}$

   d. $\frac{9}{2} \div \frac{3}{8}$

   e. $6\frac{2}{5} \div 3$

2. After biking $5\frac{1}{2}$ miles, Jada has traveled $\frac{2}{3}$ of the length of her trip. How long (in miles) is the entire length of her trip? Write an equation to represent the situation, and find the answer using your preferred strategy.

Are you ready for more?

You have a pint of grape juice and a pint of milk. Transfer 1 tablespoon from the grape juice into the milk and mix it up. Then transfer 1 tablespoon of the mixture back to the grape juice. Which mixture is more contaminated?

Lesson Synthesis

In this lesson we noticed a more-efficient way to divide fractions.

We found that to divide $\frac{3}{2}$ by $\frac{2}{5}$, for example, we can multiply $\frac{3}{2}$ by 5 and then by $\frac{1}{2}$, or simply multiply $\frac{3}{2}$ by $\frac{5}{2}$.

Suppose we interpret $\frac{3}{2} \div \frac{2}{5}$ to mean 'how many $\frac{2}{5}$s are in $\frac{3}{2}$?' and use a tape diagram to find the answer. Where do we see the multiplication by 5 and by $\frac{1}{2}$ in the diagramming process?

Suppose we interpret $\frac{3}{2} \div \frac{2}{5}$ to mean '$\frac{2}{5}$ of what number is $\frac{3}{2}$?' and use a tape diagram to find the answer. Where do we see the multiplication by 5 and by $\frac{1}{2}$ in the diagramming process?

Today's Goals

- I can describe and apply a rule to divide numbers by any fraction.

Watering a Fraction of House Plants

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Cool Down 11.4

Cool Down

1. Find the value of $\frac{24}{25} \div \frac{4}{5}$. Show your reasoning.

2. If $\frac{4}{3}$ liters of water are enough to water $\frac{2}{5}$ of the plants in the house, how much water is necessary to water all the plants in the house? Write a multiplication equation and a division equation for the situation, then answer the question. Show your reasoning.