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Unit 6, Lesson 5: A New Way to Interpret a over b

Let's investigate what a fraction means when the numerator and denominator are not whole numbers.

5.1: Recalling Ways of Solving

Solve each equation. Be prepared to explain your reasoning.

1. $0.07 = 10m$

2. $10.1 = t + 7.2$

5.2: Interpreting $\frac{a}{b}$

Solve each equation.

1. $35 = 7x$

2. $35 = 11x$

3. $7x = 7.7$

4. $0.3x = 2.1$

5. $\frac{2}{5} = \frac{1}{2}x$

Are you ready for more?

Solve the equation. Try to find some shortcuts.

$$\frac{1}{6} \cdot \frac{3}{20} \cdot \frac{5}{42} \cdot \frac{7}{72} \cdot x = \frac{1}{384}$$

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5.3: Storytime Again

Take turns with your partner telling a story that might be represented by each equation. Then, for each equation, choose one story, state what quantity x describes, and solve the equation. If you get stuck, draw a diagram.

1. $0.7 + x = 12$

2. $\frac{1}{4}x = \frac{3}{2}$

Lesson 5 Summary

In the past, you learned that a fraction such as $\frac{4}{5}$ can be thought of in a few ways.

- $\frac{4}{5}$ is a number you can locate on the number line by dividing the section between 0 and 1 into 5 equal parts and then counting 4 of those parts to the right of 0.
- $\frac{4}{5}$ is the share that each person would have if 4 wholes were shared equally among 5 people. This means that $\frac{4}{5}$ is the result of *dividing* 4 by 5.

We can extend this meaning of *a fraction as a division* to fractions whose numerators and denominators are not whole numbers. For example, we can represent 4.5 pounds of rice divided into portions that each weigh 1.5 pounds as: $\frac{4.5}{1.5} = 4.5 \div 1.5 = 3$.

Fractions that involve non-whole numbers can also be used when we solve equations.

Suppose a road under construction is $\frac{3}{8}$ finished and the length of the completed part is $\frac{4}{3}$ miles. How long will the road be when completed?

We can write the equation $\frac{3}{8}x = \frac{4}{3}$ to represent the situation and solve the equation.

$$\frac{3}{8}x = \frac{4}{3}$$

$$x = \frac{\frac{4}{3}}{\frac{3}{8}}$$

$$x = \frac{4}{3} \cdot \frac{8}{3}$$

$$x = \frac{32}{9} = 3\frac{5}{9}$$

The completed road will be $3\frac{5}{9}$ or about 3.6 miles long.

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1. Select **all** the expressions that equal $\frac{3.15}{0.45}$.

   A. $(3.15) \cdot (0.45)$
   B. $(3.15) \div (0.45)$
   C. $(3.15) \cdot \frac{1}{0.45}$
   D. $(3.15) \div \frac{45}{100}$
   E. $(3.15) \cdot \frac{100}{45}$
   F. $\frac{0.45}{3.15}$

2. Which expressions are solutions to the equation $\frac{3}{4}x = 15$? Select **all** that apply.

   A. $\frac{15}{\frac{3}{4}}$
   B. $\frac{15}{\frac{4}{3}}$
   C. $\frac{4}{3} \cdot 15$
   D. $\frac{3}{4} \cdot 15$
   E. $15 \div \frac{3}{4}$

3. Solve each equation.

   a. $4x = 32$ b. $4 = 32x$ c. $10x = 26$ d. $26 = 100x$

4. For each equation, write a story problem represented by the equation. For each equation, state what quantity x represents. If you get stuck, draw a diagram.

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$\frac{3}{4} + x = 2$ $1.5x = 6$

5. Write as many mathematical expressions or equations as you can about the image. Include a fraction, a decimal number, or a percentage in each.

(from Unit 3, Lesson 13)

6. In a lilac paint mixture, 40% of the mixture is white paint, 20% is blue, and the rest is red. There are 4 cups of blue paint used in a batch of lilac paint.

   a. How many cups of white paint are used?
   b. How many cups of red paint are used?
   c. How many cups of lilac paint will this batch yield?

   If you get stuck, consider using a tape diagram.

   (from Unit 3, Lesson 12)

7. Triangle P has a base of 12 inches and a corresponding height of 8 inches. Triangle Q has a base of 15 inches and a corresponding height of 6.5 inches. Which triangle has a greater area? Show your

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reasoning.

(from Unit 1, Lesson 9)