

Objective: TSWBAT solve and apply
Proportions

Vocabulary

- ① proportion - an equation that states two ratios are equal
- ② cross products - the result of multiplying the denominator of one ratio by the numerator of the other ratio

* the cross products of a proportion are equal

Example:

$$\frac{3}{4} \times \frac{9}{12}$$

$$36 = 36$$

$$\frac{1}{2} \times \frac{8}{16}$$

$$16 = 16$$



Problem 1 Solving a Proportion Using the Multiplication Property

What is the solution of the proportion $\frac{7}{8} = \frac{m}{12}$?

$$\frac{7}{8} = \frac{m}{12}$$

$$12 \cdot \frac{7}{8} = 12 \cdot \frac{m}{12} \quad \text{Multiply each side by 12.}$$

$$\frac{84}{8} = m \quad \text{Simplify.}$$

$$10.5 = m \quad \text{Divide.}$$

take note

Property Cross Products Property of a Proportion

Words The cross products of a proportion are equal.

Algebra If $\frac{a}{b} = \frac{c}{d}$, where $b \neq 0$ and $d \neq 0$, then $ad = bc$.

Example $\frac{3}{4} = \frac{9}{12}$, so $3(12) = 4(9)$, or $36 = 36$.



Problem 2 Solving a Proportion Using the Cross Products Property

What is the solution of the proportion $\frac{4}{3} = \frac{8}{x}$?

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


$$4x = 3(8) \quad \text{Cross Products Property}$$

$$4x = 24 \quad \text{Multiply.}$$

$$x = 6 \quad \text{Divide each side by 4 and simplify.}$$



Got It? 2. a. What is the solution of the proportion $\frac{y}{3} = \frac{3}{5}$?

 b. **Reasoning** Would you rather use the Cross Products Property or the Multiplication Property of Equality to solve $\frac{3}{5} = \frac{13}{b}$? Explain.



Problem 3 Solving a Multi-Step Proportion

What is the solution of the proportion $\frac{b-8}{5} = \frac{b+3}{4}$?

$$\frac{b-8}{5} = \frac{b+3}{4}$$

$$4(b-8) = 5(b+3) \quad \text{Cross Products Property}$$

$$4b - 32 = 5b + 15 \quad \text{Distributive Property}$$

$$4b - 32 - 4b = 5b + 15 - 4b \quad \text{Subtract } 4b \text{ from each side.}$$

$$-32 = b + 15 \quad \text{Simplify.}$$

$$-47 = b \quad \text{Subtract 15 from each side and simplify.}$$



Got It? 3. What is the solution of the proportion $\frac{n}{5} = \frac{2n+4}{6}$?



Problem 4 Using a Proportion to Solve a Problem

Music A portable media player has 2 gigabytes of storage and can hold about 500 songs. A similar but larger media player has 80 gigabytes of storage. About how many songs can the larger media player hold?



Got It?

4. An 8-oz can of orange juice contains about 97 mg of vitamin C. About how many milligrams of vitamin C are there in a 12-oz can of orange juice?



Lesson Check

Do you know **HOW?**

Solve each proportion.

1. $\frac{b}{6} = \frac{4}{5}$

2. $\frac{5}{9} = \frac{15}{x}$

3. $\frac{w + 3}{4} = \frac{w}{2}$

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

5. **Music** A band went to a recording studio and recorded 4 songs in 3 h. How long would it take the band to record 9 songs if they record at the same rate?

Homework: Page 127, 10-36