

## 11

## Ratio and Proportion

A.2.2.1 A.2.2.2 A.2.2.3 A.2.2.4 A.2.2.5

## Example

Which number can be placed in the box to make this proportion true?

$$\frac{\square}{50} = \frac{3}{75}$$

- A 2                      C 12  
B 5                      D 20

## Example

A plane flew 1,260 miles in 3 hours. What is its speed in miles per hour (mph)?

- A 210 mph              C 630 mph  
B 420 mph              D 1,260 mph

## Review

- A **ratio** is a *comparison*, such as 2 is to 5. It can be written as the fraction  $\frac{2}{5}$  or as 2:5.
- A **proportion** shows that *two ratios are equal*. 2 is to 5 as 8 is to 20 means  $\frac{2}{5} = \frac{8}{20}$ .
- A true (or valid) proportion follows the **Means-Extremes Property**: the product of the **means** equals the product of the **extremes**. The **cross products** must be equal.
- A **rate** compares two quantities with *different units*, such as *miles per hour*, *miles per gallon*, or *price per pound*.
- A rate with a denominator of 1 is called a **unit rate**.
- You can set up and solve a proportion with rates just as you do with ratios.
- A percent is a ratio in which the denominator is 100:  $68\% = \frac{68}{100}$  or 68:100.

## Thinking It Through

When making a true proportion, the product of the means must equal the product of the extremes. Another way of saying this is to say that *the cross products must be equal*:

$$\square \times 75 = 3 \times 50 \quad \text{Multiply each numerator by the other fraction's denominator.}$$

$$\square \times 75 = 150$$

$$\square = \frac{150}{75} \quad \text{Divide both sides by 75.}$$

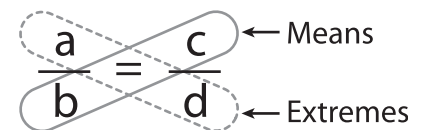
The number that should be placed in the box is 2, *answer choice A*.

## Thinking It Through

The problem asks for the speed in *miles per hour*, so you need to calculate a unit rate. Divide:  $1,260 \div 3 = 420$

The plane's speed is *420 mph*, *choice B*.

## Means-Extremes Property



$$a \times d = b \times c$$

or

$$ad = bc$$

# Ratio and Proportion

**DIRECTIONS** Read and solve each question. Then circle the letter of the best answer.

- For every \$180 Ahmad puts in the bank, his parents buy him 3 movie tickets. Over the course of one year, Ahmad put \$900 in the bank. How many movie tickets did Ahmad receive?
  - 12
  - 15
  - 24
  - 30
- Which of the following shows a unit rate?
  - $\frac{6 \text{ minutes}}{2 \text{ problems}}$
  - $\frac{\$2.00}{1 \text{ ride}}$
  - $\frac{96 \text{ miles}}{4 \text{ gallons}}$
  - $\frac{7,500 \text{ revolutions}}{15 \text{ minutes}}$
- The ratio of your weight on Earth to your weight on the moon is 6 to 1. If you weigh 126 pounds on Earth, how much would you weigh on the moon?
  - 21 pounds
  - 42 pounds
  - 132 pounds
  - 756 pounds
- Which proportion can be used to solve the problem below?  
If it takes 4 hours to cook a 7-pound turkey, how many hours will it take to cook a 19-pound turkey?
  - $\frac{4}{7} = \frac{19}{b}$
  - $\frac{b}{7} = \frac{4}{19}$
  - $\frac{7}{4} = \frac{b}{19}$
  - $\frac{4}{7} = \frac{b}{19}$
- Erin runs a direct mail business. She finds that 3% of the people she mails to buy something. If she mails 72,000 catalogs, how many sales will her company make?
  - 216
  - 2,160
  - 24,000
  - 2,400,000



Let  $m$  represent your weight on the moon. Set up a proportion and solve.