

7-1

Reteaching

Ratios and Proportions

Problem

About 15 of every 1000 light bulbs assembled at the Brite Lite Company are defective. If the Brite Lite Company assembles approximately 13,000 light bulbs each day, about how many are defective?

Set up a proportion to solve the problem. Let x represent the number of defective light bulbs per day.

$$\frac{15}{1000} = \frac{x}{13,000}$$

$$15(13,000) = 1000x \quad \text{Cross Products Property}$$

$$195,000 = 1000x \quad \text{Simplify.}$$

$$\frac{195,000}{1000} = x \quad \text{Divide each side by 1000.}$$

$$195 = x \quad \text{Solve for the variable.}$$

About 195 of the 13,000 light bulbs assembled each day are defective.

Exercises

Use a proportion to solve each problem.

- About 45 of every 300 apples picked at the Newbury Apple Orchard are rotten. If 3560 apples were picked one week, about how many apples were rotten?
- A grocer orders 800 gal of milk each week. He throws out about 64 gal of spoiled milk each week. Of the 9600 gal of milk he ordered over three months, about how many gallons of spoiled milk were thrown out?
- Seven of every 20 employees at V & B Bank Company are between the ages of 20 and 30. If there are 13,220 employees at V & B Bank Company, how many are between the ages of 20 and 30?
- About 56 of every 700 picture frames put together on an assembly line have broken pieces of glass. If 60,000 picture frames are assembled each month, about how many will have broken pieces of glass?

Algebra Solve each proportion.

$$5. \frac{300}{1600} = \frac{x}{4800}$$

$$6. \frac{40}{140} = \frac{700}{x}$$

$$7. \frac{x}{2000} = \frac{17}{400}$$

$$8. \frac{35}{x} = \frac{150}{2400}$$

$$9. \frac{x}{1040} = \frac{290}{5200}$$

$$10. \frac{x}{42,000} = \frac{87}{500}$$

$$11. \frac{x}{380} = \frac{180}{5700}$$

$$12. \frac{1200}{90,000} = \frac{270}{x}$$

$$13. \frac{325}{x} = \frac{7306}{56,200}$$

7-1

Reteaching (continued)

Ratios and Proportions

In a proportion, the products of terms that are diagonally across the equal sign from each other are the same. This is called the *Cross Products Property* because the products cross at the equal sign.

$$\begin{array}{ccc} \begin{array}{c} a \\ \hline b \end{array} = \begin{array}{c} c \\ \hline d \end{array} & \longrightarrow & b \times c \\ & & b \times c = a \times d \\ & \longrightarrow & a \times d \end{array}$$

Proportions have other properties:

Property (1) $\frac{a}{b} = \frac{c}{d}$ is equivalent to $\frac{b}{a} = \frac{d}{c}$.

Use reciprocals of the ratios.

Property (2) $\frac{a}{b} = \frac{c}{d}$ is equivalent to $\frac{a}{c} = \frac{b}{d}$.

Switch b and c in the proportion.

Property (3) $\frac{a}{b} = \frac{c}{d}$ is equivalent to $\frac{a+b}{b} = \frac{c+d}{d}$.

Add the denominator to the numerator.

Problem

How can you use the Cross Products Property to verify Property (3)?

$\frac{a}{b} = \frac{c}{d}$ is equivalent to $ad = bc$.

$\frac{a+b}{b} = \frac{c+d}{d}$ is equivalent to $(a+b)d = b(c+d)$.

Cross Products Property

$$ad + bd = bc + bd$$

Distributive Property

$$ad = bc$$

Subtraction Property of Equality

So, $\frac{a}{b} = \frac{c}{d}$ is equivalent to $\frac{a+b}{b} = \frac{c+d}{d}$.

Exercises

Use the proportion $\frac{x}{10} = \frac{2}{z}$. Complete each statement. Justify your answer.

14. $\frac{x}{2} = \frac{\square}{\square}$

15. $\frac{10}{x} = \frac{\square}{\square}$

16. $\frac{x+10}{10} = \frac{\square}{\square}$

17. The ratio of width to length of a rectangle is 7 : 10. The width of the rectangle is 91 cm. Write and solve a proportion to find the length.

18. The ratio of the two acute angles in a right triangle is 5 : 13. What is the measure of each angle in the right triangle?