

## 2-7 Notes

### Solving Proportions

A proportion is an equation that states that two ratios are equal. If a quantity in a proportion is unknown, you can solve a proportion to find the unknown quantity as shown below.

#### Problem

What is the solution of  $\frac{3}{4} = \frac{x}{14}$ ?

Cross Multiply:

$$\frac{3}{4} = \frac{x}{14}$$

$$(4)(x) = (3)(14)$$

$$4x = 42$$

$$\frac{4x}{4} = \frac{42}{4}$$

$$x = 10.5$$

Multiply diagonally across the proportion.

Multiply.

To isolate x, divide each side by 4.

Simplify.

Real world situations can be modeled using proportions.

#### Problem

A bakery can make 6 dozen donuts every 21 minutes. How many donuts can the bakery make in 2 hours?

A proportion can be used to answer this question. It is key for you to set up the proportion with matching units in both numerators and both denominators.

For this problem, you know that 2 hours is 120 minutes and 6 dozen is 72 donuts.

Correct:

$$\frac{72 \text{ donuts}}{21 \text{ min}} = \frac{x \text{ donuts}}{120 \text{ min}}$$

Incorrect:

$$\frac{72 \text{ donuts}}{21 \text{ min}} = \frac{120 \text{ min}}{x \text{ donuts}}$$

#### Problem

Solve this proportion using the cross products.

$$\frac{72 \text{ donuts}}{21 \text{ min}} = \frac{x \text{ donuts}}{120 \text{ min}}$$

$$21x = (72)(120)$$

$$21x = 8640$$

$$\frac{21x}{21} = \frac{8640}{21}$$

$$x = 411.43$$

Cross Products Property

Multiply.

Divide each side by 21.

Simplify.

411 donuts

## Exercises

Solve each proportion.

$$1. \frac{3}{4} = \frac{n}{7}$$

$$2. \frac{1}{3} = \frac{t}{10}$$

$$3. \frac{n}{5} = \frac{8}{20}$$

$$4. \frac{z}{6} = \frac{9}{8}$$

$$5. \frac{15}{5} = \frac{a}{11}$$

$$6. \frac{7}{2} = \frac{d}{8}$$

$$7. \frac{3}{5} = \frac{b}{8}$$

$$8. \frac{12}{m} = \frac{8}{3}$$

$$9. \frac{z}{2} = \frac{9}{6}$$

$$10. \frac{14}{v} = \frac{7}{3}$$

$$11. \frac{-4}{-9} = \frac{f}{-12}$$

$$12. \frac{13}{h} = \frac{2}{-6}$$

13. A cookie recipe calls for a half cup of chocolate chips per 3 dozen cookies. How many cups of chocolate chips should be used for 10 dozen cookies?

Solve each proportion. (*Hint: use the distribution property.*)

$$14. \frac{x-3}{-2} = \frac{4}{5}$$

$$15. \frac{12}{10} = \frac{y+6}{13}$$

$$16. \frac{5}{x-3} = \frac{2}{-6}$$