

4.7

Applications and Problem Solving

OBJECTIVES

- a Solve applied problems involving decimals.

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EXAMPLE A Cost of Color Copies

The Copy Center is having a sale on color copies. The cost of a color copy is now 12 cents per page. You need to copy 530 flyers for your employer. How much, in dollars, would it cost?

Solution

530 copies



Familiarize. We make a drawing or at least visualize the situation. We let d = the number of dollars.

- a Solve applied problems involving decimals.

EXAMPLE A Cost of Color Copies

Solve. To solve the equation we carry out the multiplication.

$$\begin{array}{r} 530 \\ \times .12 \\ \hline 1060 \\ 5300 \\ \hline 63.60 \end{array}$$

Thus, $d = \$63.60$.

- a Solve applied problems involving decimals.

EXAMPLE B Computer Payment Plan

Bridget is purchasing a new computer for \$2826. She is borrowing the money from the bank and needs to pay it back in equal monthly payments for two years. How much does she pay each month?



- a Solve applied problems involving decimals.

EXAMPLE A Cost of Color Copies

Translate.

Number of copies needed		times		Cost per copy		is		Total Cost
530		↓		0.12		↓		=
								d

- a Solve applied problems involving decimals.

EXAMPLE A Cost of Color Copies

Check. We can check using approximation:

$$530 \cdot 0.12 \approx 530 \cdot 0.10 = 53.00$$

Note that 12 cents is larger than 10 cents so our answer makes sense.

State. It would cost \$63.60 to make 530 flyers.

- a Solve applied problems involving decimals.

EXAMPLE B Computer Payment Plan

Solution

Familiarize. Money is borrowed and repaid in equal monthly payments. We need to determine how many months are in two years. We let m = the size of each monthly payment.

a Solve applied problems involving decimals.

EXAMPLE B Computer Payment Plan

Translate. The amount is divided into payments of equal size. The amount of the payment will depend on the number of payments.

In two years there are: $12 \cdot 2 = 24$ months

Amount

Of monthly Payment	Total Payment is owed	Number divided by	Number of payments
m	$= \$2826$	\div	24

EXAMPLE B Computer Payment Plan

Check. To check, we first verify that there are 24 months in 2 years.

$24 \div 12 = 2$ years.

To check the monthly payment, estimate the product

$\$100 \cdot 24 = \2400

State. Bridget's monthly payments would be \$117.75.

a Solve applied problems involving decimals.

EXAMPLE B Computer Payment Plan

Solve. Carry out the division.

$$\begin{array}{r} 117.75 \\ 24 \overline{)2826.00} \\ \underline{24} \\ 42 \\ \underline{24} \\ 186 \\ \underline{168} \\ 180 \\ \underline{168} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

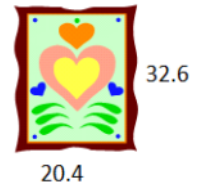
a Solve applied problems involving decimals.

EXAMPLE C Find the Area

A poster for an art exhibit has dimensions 20.4 in by 32.6 in. Find the area.

Solution

Familiarize. We first make a drawing. We let A = the area.



Translate. We use the formula

$A = l \cdot w$ and substitute.

$A = 32.6 \cdot 20.4$

(continued)

a Solve applied problems involving decimals.

EXAMPLE C Find the Area

Solve. We solve by carrying out the multiplication.

$$\begin{array}{r} 20.4 \\ \times 32.6 \\ \hline 1224 \\ 4080 \\ \hline 665.04 \end{array}$$

Check. We can obtain a partial check by estimating the product: $A = 20 \cdot 33 = 660$

This estimate is close so it's a good check.

State. The area of the poster is 665.04 square inches.

a Solve applied problems involving decimals.

EXAMPLE C Amount of Trees Planted

The Fulton County Soil and Water division has rented a tractor for \$87.95 per day plus \$4.25 an hour to assist in planting trees. They have budgeted \$120 per day for renting a tractor to plant trees in the county. For how many hours can they plant trees without exceeding the budget?

\$87.95 per day
\$4.25 per hour



(continued)

a Solve applied problems involving decimals.

EXAMPLE C Amount of Trees Planted

Familiarize. Suppose the division uses the tractor for 5 hours. Then the cost would be

daily rate + cost per hour · number of hours
 $\$87.95 + \$4.25 \cdot 5 = \$109.20$

Let h = number of hours used

a Solve applied problems involving decimals.

EXAMPLE C Amount of Trees Planted

Translate.

daily rate + cost per hour · number of hours = cost
 $\$87.95 + \$4.25 \cdot h = \$120$

Solve. $87.95 + 4.25h = 120$

$4.25h = 32.05$

$h = \frac{32.05}{4.25}$

$h = 7.5$

Subtracting 87.95 from both sides
Dividing both sides by 4.25
Rounding to the nearest tenth (continued)

a Solve applied problems involving decimals.

EXAMPLE C Amount of Trees Planted

Check. We check in the original problem.

Multiply 7.5 times \$4.25 = \$31.88

Add \$87.95 = \$119.83, which is just less than the allotted \$120.

State.

The Soil and Water district can use the tractor for 7.5 hours per day.

5.1

Introduction to Ratios

OBJECTIVES

- a** Find fraction notation for ratios.
- b** Simplify ratios.

Ratio

A **ratio** is the quotient of two quantities.

For every 50 chicks raised, 3 die within the first two days. The *ratio* of the number of chicks that die to the number raised is shown by fraction notation

$\frac{3}{50}$, or by the notation 3:50.

a Find fraction notation for ratios.

EXAMPLE A Find the ratio of 5 to 6.

Solution

The ratio is $\frac{5}{6}$.

Ratio Notation

The **ratio** of a to b is given by the fraction notation $\frac{a}{b}$, where a is the numerator and b is the denominator, or by the colon notation $a : b$.

a Find fraction notation for ratios.

EXAMPLE B Find the ratio of 25.6 to 100.

Solution

The ratio is $\frac{25.6}{100}$.

a Find fraction notation for ratios.

EXAMPLE C Pet Ownership

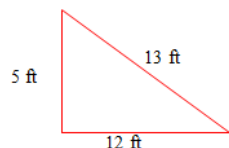
For every 5 people having a dog for a pet 2 others have a cat. What is the ratio of dog owners to cat owners?

Solution

The ratio is $\frac{5}{2}$.

a Find fraction notation for ratios.

EXAMPLE D Triangle Proportions

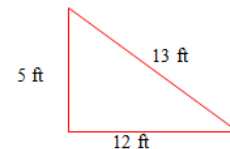


Solution

- a) $\frac{\text{Length of the shortest side}}{\text{Length of the longest side}} = \frac{5 \text{ ft}}{13 \text{ ft}} = \frac{5}{13}$.
- b) $\frac{\text{Length of the longest side}}{\text{Length of the shortest side}} = \frac{13 \text{ ft}}{5 \text{ ft}} = \frac{13}{5}$.

a Find fraction notation for ratios.

EXAMPLE D Triangle Proportions



Refer to the triangle.

- a) What is the ratio of the length of the shortest side to the length of the longest side?
- b) What is the ratio of the length of the longest side to the length of the shortest side?

b Simplify ratios.

Sometimes a ratio can be simplified. This provides one method of finding other pairs of numbers with the same ratio.

We write the ratio in fraction notation and then simplify:

$$\frac{20}{15} = \frac{5 \cdot 4}{5 \cdot 3} = \frac{5}{5} \cdot \frac{4}{3} = \frac{4}{3}$$

Simplified form does not contain decimals.

b Simplify ratios.

EXAMPLE E Simplify a Ratio

Find the ratio of 6 to 8. Then simplify and find two other numbers in the same ratio.

Solution

We write the ratio in fraction notation and then simplify:

$$\frac{6}{8} = \frac{2 \cdot 3}{2 \cdot 4} = \frac{2}{2} \cdot \frac{3}{4} = \frac{3}{4}$$

b Simplify ratios.

EXAMPLE F Simplify Decimal Ratio

Write the ratio of 3.6 to 7.2. Then simplify and find two other numbers in the same ratio.

b Simplify ratios.

EXAMPLE F Simplify Decimal Ratio

Solution Write the ratio.

$$\frac{3.6}{7.2}$$

Multiply by $\frac{10}{10}$ or 1, to clear the decimals.

$$\frac{3.6}{7.2} \cdot \frac{10}{10} = \frac{36}{72} = \frac{36 \cdot 1}{36 \cdot 2} = \frac{36}{36} \cdot \frac{1}{2} = \frac{1}{2}$$

The ratio 3.6 to 7.2 is equivalent to the ratio 1:2.