

# Using Unit Rates

A unit rate is a special ratio that compares one quantity to one unit of another quantity. You can use unit rates to solve proportions.

Geraldo earns \$100 for 4 hours of work. If he works 7 hours at the same rate of pay, how much will he earn?

**Write a proportion.**

Use  $d$  for dollars earned.

$$\frac{\$100}{4 \text{ h}} = \frac{\$d}{7 \text{ h}}$$

**Find the unit rate.**

Divide the first term by the second term.

$$\$100 \div 4 = \$25$$

The unit rate is  $\frac{\$25}{1 \text{ h}}$ .

Think: Find an equal ratio with 1 as the second term.

$$\frac{100 \div 4}{4 \div 4} = \frac{25}{1}$$

**Multiply by the unit rate.**

$$\frac{\$25}{\text{h}} \times 7 \text{ h} = \$175$$

Think: Find an equal ratio.

$$\frac{25 \times 7}{1 \times 7} = \frac{175}{7}$$

So,  $\frac{\$100}{4 \text{ h}} = \frac{\$175}{7 \text{ h}}$ . Geraldo will earn \$175 when he works 7 hours.

Use unit rates to solve each proportion. Estimate to check reasonableness.

1.  $\frac{\boxed{\phantom{000}} \text{ g}}{2 \text{ kg}} = \frac{30 \text{ g}}{15 \text{ kg}}$

Unit Rate: \_\_\_\_\_

Multiply: \_\_\_\_\_

2.  $\frac{120 \text{ mi}}{3 \text{ gal}} = \frac{\boxed{\phantom{000}} \text{ mi}}{5 \text{ gal}}$

Unit Rate: \_\_\_\_\_

Multiply: \_\_\_\_\_

3.  $\frac{8 \text{ in.}}{2 \text{ wk}} = \frac{\boxed{\phantom{000}} \text{ in.}}{5 \text{ wk}}$

Unit Rate: \_\_\_\_\_

Multiply: \_\_\_\_\_

4.  $\frac{\$24}{3 \text{ wk}} = \frac{\$ \boxed{\phantom{000}}}{10 \text{ wk}}$

5.  $\frac{\boxed{\phantom{000}} \text{ oz}}{7 \text{ packs}} = \frac{64 \text{ oz}}{8 \text{ packs}}$

6.  $\frac{200 \text{ stamps}}{2 \text{ rows}} = \frac{\boxed{\phantom{000}} \text{ stamps}}{9 \text{ rows}}$

7. Wes used 49 quarts of oil when he changed the oil in 7 cars. Complete and solve the proportion to find how many quarts of oil he would use to change the oil in 20 cars, assuming that all cars need the same quantity of oil.

$$\frac{49 \text{ quarts}}{7 \text{ cars}} = \frac{\phantom{000}}{\phantom{000}}$$

8. **Writing to Explain** A café served 180 pickles with 60 sandwiches. If the ratio of sandwiches to pickles is always constant, explain how you can use unit rates and proportions to find how many pickles are needed to serve 32 sandwiches.