

**Converting Rates**

Definition	Example 1	Example 2
A ratio that compares quantities measured in different units is called a <b>rate</b> .	$\frac{40 \text{ ft}}{10 \text{ sec}}$	$\frac{10 \text{ stickers}}{2 \text{ candies}}$
A <b>unit rate</b> is a rate with a denominator of 1 unit.	$6 \text{ mi/hr}$	$50 \text{¢/bag of chips}$
A <b>conversion factor</b> is a ratio of two equivalent measures in different units. <i>It is always equal to 1.</i>	$\frac{12 \text{ in}}{1 \text{ ft}}$	$\frac{60 \text{ min}}{1 \text{ hr}}$

**Compare Unit Rates**

**Ex. 7** You are shopping for T-shirts. Which store offers the best deal?

Store A: \$25 for 2 shirts    Store B: \$45 for 4 shirts    Store C: \$30 for 3 shirts

$$\frac{\$45}{4 \text{ shirts}} = \$11.25/\text{shirts}$$

$$\frac{\$25}{2 \text{ shirts}} = \$12.50/\text{shirts}$$

$$\frac{\$30}{3 \text{ shirts}} = \$10/\text{shirts}$$

Best Deal: C    worse deal: A

**Words**

- Write each scenario as a ration.
- Make sure the units line up.
- Divide and compare.

**You Try 8** Bellingham, Washington, had an area of  $25.4 \text{ mi}^2$  and a population of 74,547 during one year. Bakersfield, California, had an area of  $113.1 \text{ mi}^2$  and a population of 295,536 during the same year. Which city had a greater number of people per square mile?

$$\begin{aligned} \checkmark B: & \frac{74,547 \text{ people}}{25.4 \text{ mi}^2} \\ & = 2934.9 \text{ ppl/mi} \end{aligned}$$

$$\begin{aligned} C: & \frac{295,536 \text{ people}}{113.1 \text{ mi}^2} \\ & = 2613.0 \text{ ppl/mi} \end{aligned}$$

**Common Conversions**

Time	1h = 60min = 3600s; 1min = 60s; 1 day = 24h; 1 week = 7 days; 1 year = 52 weeks = 365 days
Distance	1 mi = 760yd = 5280ft; 1 yd = 3 ft; 1m = 3.28ft
Volume	1 liter = 1000mL; 1 gal = 3.785L = 3785mL = 128 fl oz; 1 mL = 0.0338 fl oz

## Convert 1 Unit

Ex. 1 How many hours is 330 min?

$$\frac{330 \text{ min}}{1} \cdot \frac{1 \text{ hr}}{60 \text{ min}} = \frac{330 \cancel{\text{ min}} \cdot 1 \text{ hr}}{60 \cancel{\text{ min}}} = 5.5 \text{ hr}$$

Words

- multiply by the conversion factor
- makes sure old units cancel.

Ex. 2 How many feet is 50 yd?

$$50 \text{ yd} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} = \frac{50 \cancel{\text{ yd}} \cdot 3 \text{ ft}}{1 \cancel{\text{ yd}}} = 150 \text{ ft}$$

You Try 3 How many gallons is 400 liters?

$$\frac{400 \text{ L}}{1} \cdot \frac{1 \text{ gal}}{3.785 \text{ L}} = \frac{400 \cancel{\text{ L}} \cdot 1 \text{ gal}}{3.785 \cancel{\text{ L}}} = 105.6 \text{ gal}$$

## Convert Rates (2 Units)

Ex. 4 A student ran a 50-yd dash in 5.8s. What is her speed in miles per hour (mi/h)?

$$\frac{50 \cancel{\text{ yd}}}{5.8 \cancel{\text{ s}}} \cdot \frac{1 \text{ mi}}{1760 \cancel{\text{ yd}}} = \frac{3600 \cancel{\text{ s}}}{1 \text{ hr}} = \frac{50 \cdot 3600}{5.8 \cdot 1760} = \frac{18,000}{4408} = 40.8 \frac{\text{mi}}{\text{hr}}$$

Words

- multiply by the conversion factors.
- make sure old units cancel
- multiply across. Divide for a final answer.

Ex. 5 A car is traveling at a speed of 55mi/h. What is the car's speed in ft/min?

$$\frac{55 \cancel{\text{ mi}}}{1 \cancel{\text{ hr}}} \cdot \frac{5280 \text{ ft}}{1 \cancel{\text{ mi}}} \cdot \frac{1 \cancel{\text{ hr}}}{60 \text{ min}} = \frac{55 \cdot 5280}{60} = \frac{290400}{60} = 4840 \frac{\text{ft}}{\text{min}}$$

You Try 6 A tank is filling at a rate of 40gal/min. What is the rate in mL/s?

$$\frac{40 \text{ gal}}{1 \text{ min}} \cdot \frac{3785 \text{ mL}}{1 \text{ gal}}$$

finish tomorrow

## Key Idea for Conversions

We can multiply by the conversion factor \_\_\_\_\_

because the conversion factor is

really just \_\_\_\_\_. Make sure \_\_\_\_\_!!!!!!!!!!!!!!!!!!!!!!