

Day 8: Rate Conversions

"per" = $\frac{\quad}{\quad}$

Rate $\frac{\text{thing}}{\text{time}}$

Ratio (fraction) comparing 2 quantities with different units

Examples: $\frac{\text{beats}}{\text{min}}$ (bpm) $\frac{\text{miles}}{\text{hr}}$ (mph)
 $\frac{\text{ft}}{\text{sec}}$

Most of the rates we are going to discuss today include both an amount and a time frame such as miles per hour or words per minute. When we convert our rates, we are going to change the units in **both** the numerator and denominator.

a. Mrs. Dombrowski can run about 2 miles in 16 minutes. How fast is she running in miles per hour? (Use 60 minutes = 1 hour)

$$\frac{2 \text{ miles}}{16 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = \frac{2 \cdot 60 \text{ miles}}{16 \cdot 1 \text{ hr}} = \frac{120 \text{ miles}}{16 \text{ hrs}}$$

$$= \frac{7.5 \text{ mi}}{\text{hr}} = 7.5 \text{ mph}$$

b. Convert 45 miles per hour to feet per minute. (Use 5280 feet = 1 mile, 60 minutes = 1 hour)

$$\frac{45 \text{ miles}}{1 \text{ hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} = \frac{45 \cdot 5280 \text{ ft}}{60 \text{ min}}$$

$$= \boxed{3960 \frac{\text{ft}}{\text{min}}}$$

c. Convert 36 inches per second to miles per hour. (Use 5280 ft = 1 mi, 12 in = 1 ft, 60 min = 1 hr, 60 sec = 1 min)

$$\frac{36 \text{ in}}{1 \text{ sec}} \cdot \frac{1 \text{ ft}}{12 \text{ in}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = \frac{36 \cdot 60 \cdot 60 \text{ mi}}{(12 \cdot 5280) \text{ hr}}$$

$$= \boxed{2.045 \frac{\text{mi}}{\text{hr}}}$$

d. Convert 32 feet per second to meters per minute. (Use 1 in = 2.54 cm, 100 cm = 1 m, 1 ft = 12 in)

$$\frac{32 \text{ ft}}{\text{sec}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} \cdot \frac{2.54 \text{ cm}}{1 \text{ in}} \cdot \frac{1 \text{ m}}{100 \text{ cm}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} = \frac{585.22 \text{ m}}{\text{min}}$$

$\frac{\text{ft}}{\text{sec}} \rightarrow \frac{\text{m}}{\text{min}}$

e. The top speed of a coyote is 43 miles per hour. Find the approximate speed in kilometers per minute. (Use 1 mile = 1.610 meters, 1000 m = 1 km)

$$\frac{43 \text{ mi}}{\text{hr}} \cdot \frac{1610 \text{ m}}{1 \text{ mi}} \cdot \frac{1 \text{ km}}{1000 \text{ m}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} = \frac{1.15 \text{ km}}{\text{min}}$$

$\frac{\text{mi}}{\text{hr}} \rightarrow \frac{\text{km}}{\text{min}}$

f. The Prichard family drinks 2 quarts of milk per day. How many gallons of milk do they drink in a week? (Use 4 quarts = 1 gallon)

$$\frac{2 \text{ qt}}{\text{day}} \cdot \frac{1 \text{ gal}}{4 \text{ qt}} \cdot \frac{7 \text{ day}}{1 \text{ wk}} = \frac{2 \cdot 7 \text{ gal}}{4 \text{ wk}} = 3.5 \text{ gal/wk}$$

$\frac{\text{qt}}{\text{day}} \rightarrow \frac{\text{gal}}{\text{wk}}$