Enrich

Find Equivalent Rates

You can use ratios to write rates different ways. Suppose a snake travels at a rate of 15 miles per hour and you want to write the rate in miles per minute.

Step 1 Write 15 miles per hour as $\dfrac{15 \text{ miles}}{1 \text{ hour}}$.

Step 2 Think: How are minutes and hours related? There are 60 minutes in 1 hour. Write this as a ratio so that the unit of hour is in the numerator: $\dfrac{1 \text{ hour}}{60 \text{ min}}$. This will divide out with the unit of hour in the denominator of our current rate.

Step 3 Multiply the rate in Step 1 by the ratio in Step 2: $\dfrac{15 \text{ miles}}{1 \text{ hour}} \cdot \dfrac{1 \text{ hour}}{60 \text{ min}}$.

$\dfrac{15 \text{ miles}}{1 \,\cancel{\text{hour}}} \cdot \dfrac{1 \,\cancel{\text{hour}}}{60 \text{ min}}$ Divide out the units of hour.

$\dfrac{15 \text{ miles} \cdot 1}{1 \cdot 60 \text{ min}} = \dfrac{15 \text{ miles}}{60 \text{ min}} = 0.25 \dfrac{\text{mile}}{\text{min}}$ Simplify.

The snake travels at a rate of 0.25 mile per minute.

Solve.

1. A zebra is traveling at a rate of 45 kilometers per hour. Write the rate in kilometers per minute.

2. A snail is traveling at a rate of 1.5 feet per minute.

   a. Write the rate in feet per second.

   b. Write the rate in feet per hour.

3. A student is reading his book at a rate of 15 pages per day.

   a. Write the rate in pages per week.

   b. Write the rate in pages per hour.

4. A squirrel is traveling at a rate of 12 miles per hour. Write the rate in miles per minute.

5. A bug is traveling at a rate of 18 inches per minute. Write the rate in feet per minute. (12 in. = 1 ft)