

Lesson 1.3 Notes (Convert Unit Rates)**Key Concepts:**

- **Unit Ratio** – similar to a unit rate; must have a denominator of **1 unit**

$$\frac{12 \text{ inches}}{1 \text{ foot}} \quad \frac{16 \text{ ounces}}{1 \text{ pound}} \quad \frac{100 \text{ centimeters}}{1 \text{ meter}}$$

- The numerator and denominator of each of the unit ratios shown are **equal** in quantity.
- You can convert one rate to an equivalent rate by **multiplying by a unit ratio** (or its reciprocal).
 - When you convert rates, you **must include the units**.
 - The process of including units of measure as factors when you compute is called **dimensional analysis**.

Examples:

1. A remote control car travels at a rate of 10 feet per second. How many inches per second is this?

$$\frac{10 \text{ ft}}{1 \text{ sec}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} = \boxed{\frac{120 \text{ in.}}{1 \text{ sec}}}$$

2. A swordfish can swim at a rate of 60 miles per hour. How many feet per hour is this?
(Hint: 1 mile = 5280 feet)

$$\frac{60 \text{ mi}}{1 \text{ hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} = \boxed{316,800 \text{ ft/hr}}$$

3. Marvin walks at a speed of 7 feet per second. How many feet per hour is this?

$$\frac{7 \text{ ft}}{1 \text{ sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = \boxed{25,200 \text{ ft/hr}}$$

4. The average speed of one team in a relay race is about 10 miles per hour. What is this speed in feet per second?

$$\frac{10 \text{ mi}}{1 \text{ hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = \boxed{14.\overline{66} \text{ ft/sec}}$$