

**Dimensional Analysis**

- Another area where ratios are useful is dimensional analysis, also known as unit analysis.
- Unit analysis involves using ratios to **convert** a given unit of measure to another unit of measure.

Conversions		
1 hour = 3600 seconds	1 mile = 5280 feet	1 yard = 3 feet
1 meter = 3.28 feet	1 km = 0.62 miles	1 light second = 300,000,000 meters
1 kg = 2.2 lbs.	1 lb. = 0.45 kg	1 quart = 0.946 liters
1 m/s = 2.2 miles/hour	1 foot = 12 inches	1 inch = 2.54 cm = 25.4 mm

Single Units:

- 1) 17 years into minutes
- 2) 22,647 inches into miles
- 3) 165 pounds into kilograms

Unit Rates:

4) 1100 ~~feet~~ per second into miles per hour

$$\frac{1100 \cancel{\text{ft}}}{1 \cancel{\text{sec}}} \cdot \frac{60 \cancel{\text{sec}}}{1 \cancel{\text{min}}} \cdot \frac{60 \cancel{\text{min}}}{1 \cancel{\text{hr}}} \cdot \frac{1 \text{ mile}}{5280 \cancel{\text{ft}}} = 750 \text{ miles per hour}$$

*(Note: The final result 750 miles per hour is circled in a cloud shape in the original image.)*

- 5) 721 lbs per week into kg per second
- 6) 27 miles per gallon into kilometers per liter

## Solving Word Problems

7) Mary made 15,000 ml of tea for a party. She served the tea divided equally in 8 pitchers. The guests at the party drank 6 pitchers. In order to store the tea, she needs to put the remaining about into 20 oz. bottles. How many 20 oz. bottles will she need to store the leftover tea? (1 liter = 33.8 oz.)

8) Josh is training on an irregular track. The length of one lap on the track is 2000m. Josh runs 5 laps on the track in 1.06 hours. What is Josh's mile pace (min/mile) on average during his workout?

How far?  $2000 \times 5 = 10000 \text{ meters}$

$$\frac{10 \text{ km}}{1.06 \text{ hrs}} \cdot \frac{1 \text{ hrs}}{60 \text{ mins}} \cdot \frac{1 \text{ mile}}{1.609 \text{ km}}$$

$$\frac{1.06 \times 60 \times 1.609}{10 \times 1 \times 1} =$$

$$10.233 \text{ min/mile}$$

$$1 \text{ mile} = 1.609 \text{ km}$$

$$10000 \text{ m} = 10 \text{ km}$$

$$31 \text{ ft}$$

$$= 0.097772 \text{ miles/min}$$

9) A company using cubic trucks to ship their products across the country. The products are packed in cubic boxes before being loaded into the truck. If the truck has a volume of  $512 \text{ m}^3$  and each moving box has a volume of  $64000 \text{ cm}^3$ , how many boxes high can fit into the truck?