

NOTES on Unit Analysis (AKA Dimensional Analysis)

Use Unit Analysis (Dimensional Analysis) for the following problem. A cheetah ran 300 ft in 2.92 sec. What is the cheetah's speed in mph (miles per hour)?

1st step: Write the cheetah's speed as a Rate: $\frac{300 \text{ ft}}{2.92 \text{ sec}}$

2nd step: Before you start doing any math write down the units for your final answer. The UNITS in your answer should look like $\rightarrow \frac{\text{mi}}{\text{hr}}$

3rd step: Set up the problem in the following method. You will need to use the following Units of measurement. 1 mi = 5,280 ft 1 min = 60 sec and 1 hr = 60 min (ALWAYS REMEMBER THAT UNITS CANCEL OUT (DIVIDE OUT) IF 1 IS ON TOP AND 1 IS ON BOTTOM)

$$\frac{300 \text{ ft}}{2.92 \text{ sec}} \cdot \frac{1 \text{ mi}}{5,280 \text{ ft}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}}$$

$$\frac{1,080,000 \text{ mi}}{15417.6 \text{ hr}}$$

Use a calculator to get the value of the Numerator

Use a calculator to get the value of the Denominator

$$\approx \frac{70 \text{ mi}}{\text{hr}}$$

or mph

Write answer to the nearest mph

Common Units of measurement that you should know:

Length (Customary)	inch (in)	1 in = 2.54 cm
	foot (ft)	1 ft = 12 in
	yard (yd)	1 yd = 3 ft
	mile (mi)	1 mi = 1,609.3 km
	mile (mi)	1 mi = 5,280 ft
Length (Metric)	centimeter (cm)	
	meter (m)	1 m = 100 cm
	kilometer (km)	1 km = 1,000 m
Capacity (Customary)	fluid ounce (fl oz)	
	cup (c)	1 c = 8 fl oz
	pint (pt)	1 pt = 2 c
	quart (qt)	1 qt = 2 pt
	gallon (gal)	1 gal = 3.79 L
	gallon (gal)	1 gal = 4 qt
Capacity (Metric)	milliliter (mL)	
	liter (L)	1 L = 1,000 mL
Weight (Customary)	ounce (oz)	
	pound (lb)	1 lb = 16 oz
	pound (lb)	1 lb = .45 kg
	ton (t)	1 t = 2,000 lbs

If you need, use the chart above to do the following problems. Complete 1-4 in a similar method as we did the problem on the front page.

1. 32 in is how many ft? $\frac{32 \text{ in}}{1} \cdot \frac{1 \text{ ft}}{12 \text{ in}} = \frac{32 \text{ ft}}{12} = 2\frac{2}{3} \text{ ft}$

2. $\frac{\$27}{\text{hr}}$ is how much \$ per min? $\frac{\$27}{\text{hr}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} = \frac{\$27}{60 \text{ min}} = \frac{\$.45}{\text{min}}$

3. 5 gal is how many cups?

$$\frac{5 \text{ gal}}{1} \cdot \frac{4 \text{ qts}}{\text{gal}} \cdot \frac{2 \text{ pt}}{\text{qt}} \cdot \frac{2 \text{ c}}{\text{pt}} = 80 \text{ c}$$

4. A 13 year old student is EXACTLY how many sec?

$$\frac{13 \text{ years}}{1} \cdot \frac{365 \text{ days}}{\text{yr}} \cdot \frac{24 \text{ hrs}}{\text{day}} \cdot \frac{60 \text{ min}}{\text{hr}} \cdot \frac{60 \text{ sec}}{\text{min}}$$

$$409,968,000 \text{ sec}$$