

Dimensional Analysis Quiz Review

Perform the following calculations using dimensional analysis. Show your work. Give answers with the proper number of significant digits and unit.

- a) Convert 2.457 gallons to milliliters.

$$2.457 \text{ gal} \times \frac{3.7854 \text{ L}}{1 \text{ gal}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = \boxed{9301 \text{ mL}}$$

- b) Convert 921.4 nanometers to feet.

$$921.4 \text{ nm} \times \frac{1 \text{ m}}{10^9 \text{ nm}} \times \frac{1.0936 \text{ yd}}{1 \text{ m}} \times \frac{3 \text{ ft}}{1 \text{ yd}} = \boxed{3.023 \times 10^{-6} \text{ ft}}$$

- c) Convert 78.5 mi/hr to in/min.

$$\frac{78.5 \text{ mi}}{1 \text{ hr}} \times \frac{5280 \text{ ft}}{1 \text{ mi}} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{1 \text{ hr}}{60 \text{ min}} = \boxed{82,900 \text{ in/min}}$$

- d) Imagine you've got a 2-liter bottle of soda and some glasses that hold 12 fluid ounces. How many full glasses of soda will you be able to pour from that one bottle?

$$2 \text{ L} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{1 \text{ floz.}}{30 \text{ mL}} \times \frac{1 \text{ glass}}{12 \text{ floz.}} = 5.56 \text{ glasses} = \boxed{5 \text{ full glasses}}$$

- e) Some species of *Paramecium* can move at the rate of  $1.00 \times 10^3 \mu\text{m/s}$ . What is the equivalent rate in km/h?

$$\frac{1.00 \times 10^3 \mu\text{m}}{1 \text{ s}} \times \frac{60 \text{ s}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{1 \text{ m}}{10^6 \mu\text{m}} \times \frac{1 \text{ km}}{1000 \text{ m}} = \boxed{3.60 \times 10^{-3} \text{ km/hr}}$$

- f) A girl needs to heat a reaction mixture for 9.85 hours. How long must the mixture be heated in minutes?

$$9.85 \text{ hr} \times \frac{60 \text{ min}}{1 \text{ hr}} = \boxed{591 \text{ min}}$$