

## Activity 2: Units and Unit Conversions

*Note that in showing your work, link together a chain of fractions as illustrated in your workbook. For example, to convert 1 mile to meters:*

$$\text{distance in meters} = (1 \text{ mi}) \left( \frac{5280 \text{ ft}}{1 \text{ mi}} \right) \left( \frac{12 \text{ in}}{1 \text{ ft}} \right) \left( \frac{2.54 \text{ cm}}{1 \text{ in}} \right) \left( \frac{1 \text{ m}}{100 \text{ cm}} \right) = 1609 \text{ m}$$

*The conversion factors above may be useful for some of the problems today!*

1. Calculate the height of a 5'6" person in meters. (In case you're not familiar with this notation, 5'6" means 5 ft plus 6 in).
2. Without looking up any conversion factors, estimate the number of seconds in a year.

3. What is the area of a 15' x 11' room in  $\text{cm}^2$ ? Write your answer in standard scientific notation.

4. Suppose that you don't have a Prius (or the like) that automatically gives you the miles per gallon of your car. Further suppose that you know the following information: Last time that you filled up your car, it costs \$52. This allowed you to travel 200 miles. If the gas cost \$4 per gallon, how many miles per gallon did your car get on this fill-up?

5. Over a certain range of speeds, air resistance,  $f$ , is given as  $f = C A \rho v^2$ .

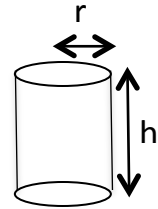
$C$  is a constant that depends on the shape and texture of the object,  $A$  is the cross-sectional area of the object in  $\text{m}^2$ ,  $\rho$  is the density of the fluid in  $\text{kg}/\text{m}^3$ , and  $v$  is the speed of the object relative to the fluid in  $\text{m}/\text{s}$ . Given

that  $f$  is a force in units of Newtons  $\left(1 \text{ N} = 1 \frac{\text{kg} \cdot \text{m}}{\text{s}^2}\right)$ , find the units of the

constant  $C$ .

6. In this “activity”, you will be given a small cylinder to measure, reviewing significant figures and units along the way.

Measure and record “h” to the nearest 0.01 cm: \_\_\_\_\_ cm



Measure and record “r” to the nearest 1 mm: \_\_\_\_\_ mm (*Divide the diameter by 2; note that dividing by a constant number (2 in this case) does not change the number of significant digits*).

Calculate the volume  $V$  of your cylinder in  $\text{m}^3$ , noting that  $V = \pi r^2 h$ . Make sure to use consistent units and don’t forget to pay attention to significant figures! Write your answer in standard scientific notation.

