

Name: **KEY**

WP Practice

Exam 1: Measurement

(Also review Math Essentials packet)

1. Physical chemical changes

- a. An egg is cooked on the stove. (circle one)

Physical change

Chemical change

- b. A piece of paper is ripped into small pieces. (circle one)

Physical change

Chemical change

- c. The frame of a bicycle begins to rust. (circle one)

Physical change

Chemical change

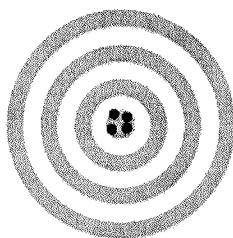
2. Counting significant figures (see Math Essentials packet)

3. Rounding significant figures (see Math Essentials packet)

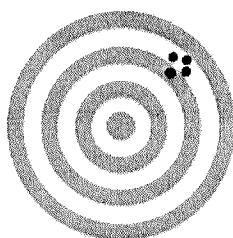
4. Scientific notation (see Math Essentials packet)

5. Precision vs accuracy

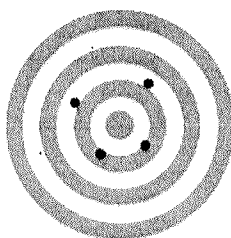
- a. Determine whether each of the following results are accurate and/or precise:



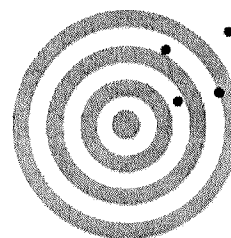
accurate
precise



accurate
precise



accurate
precise



accurate
precise

6. Metric conversions (see Math Essentials packet)

7. Temperature conversions

- a. Convert 23°C to Kelvin.

$$23 + 273 = \boxed{296\text{K}}$$

- b. Convert 83°C to Fahrenheit.

$$(83 \times 1.8) + 32 = \boxed{180^\circ\text{F}}$$

(round to 2 sig figs)

8. Calculations with significant figures (see Math Essentials packet)

9. Word problems

- a. You pull into a gas station in Switzerland and fill your rental car with gas. It takes 60.4 L of gasoline and they charge you 105 Swiss Francs. How much were you paying in dollars per gallon? Current exchange rate is 1.38 SF/dollar.

$$\frac{105 \text{ SF}}{60.4 \cancel{\text{L}}} \times \frac{1 \text{ dollar}}{1.38 \text{ SF}} \times \frac{1 \cancel{\text{L}}}{1.06 \cancel{\text{qt}}} \times \frac{4 \cancel{\text{qt}}}{1 \text{ gal}} = \boxed{\$4.75/\text{gal}}$$

- b. Suppose that a standard snail's pace is measured to be 0.040 ft per min. Measured in cm per second, what is the value of the snail's pace?

$$\frac{0.040 \cancel{\text{ft}}}{1 \text{ min}} \times \frac{12 \cancel{\text{in}}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \cancel{\text{in}}} \times \frac{1 \cancel{\text{min}}}{60 \text{ s}} = \boxed{0.020 \text{ cm/s}}$$

- c. Calculate the density, in g/cm³, of a 34.8 g rectangular solid object that measures 3.4 cm by 3.9 cm by 2.9 cm. Will the object sink or float in water?

$$d = \frac{m}{V} \quad V = l \times w \times h \quad d$$

$$d = \frac{m}{l \times w \times h} = \frac{34.8 \text{ g}}{(3.4 \text{ cm})(3.9 \text{ cm})(2.9 \text{ cm})} = \boxed{0.90 \text{ g/cm}^3}$$

It will float because it's less dense than water ($d_{\text{H}_2\text{O}} = 1.0 \text{ g/cm}^3$)

- d. Calculate the volume, in mL, of 34 g of carbon tetrachloride ($d = 1.59 \text{ g/mL}$).

$$\frac{1 \text{ mL}}{1.59 \cancel{\text{g}}} \times 34 \cancel{\text{g}} = \boxed{21 \text{ L}}$$

$1.59 \text{ g} = 1 \text{ mL}$

- e. Calculate the volume, in quarts, of 439 mg of ethyl alcohol. Density = 0.789 g/mL.

$$\frac{1 \cancel{\text{mL}}}{0.789 \cancel{\text{g}}} \times \frac{1 \cancel{\text{g}}}{1000 \cancel{\text{mg}}} \times 439 \cancel{\text{mg}} \times \frac{1 \cancel{\text{L}}}{1000 \cancel{\text{mL}}} \times \frac{1.06 \cancel{\text{qt}}}{1 \cancel{\text{L}}} = \boxed{5.90 \times 10^{-4} \text{ qt}}$$

$0.789 \text{ g} = 1 \text{ mL}$

- f. A piece of aluminum foil ($d_{\text{Al}} = 2.70 \text{ g/cm}^3$) measures 10.4 cm by 12.6 cm and has a mass of 1.334 g. Calculate the thickness, in mm, of the aluminum foil.

$$d = \frac{m}{V} = \frac{m}{l \times w \times h}$$

$$h = \frac{m}{d \times l \times w} = \frac{1.334 \text{ g}}{(2.70 \text{ g/cm}^3)(10.4 \text{ cm})(12.6 \text{ cm})} \times \frac{10 \text{ mm}}{1 \text{ cm}} = \boxed{0.0377 \text{ mm}}$$

↑
thickness