

Dimensional Analysis Worksheet 5.27

1. Use Dimensional Analysis to solve the following problems.

- a. How many seconds old are you? (Express with 1 sig fig in scientific notation.) (assume 22 yr old)

$$\frac{22 \text{ yr}}{1 \text{ yr}} \times \frac{365 \text{ d}}{1 \text{ yr}} \times \frac{24 \text{ hr}}{1 \text{ d}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{60 \text{ sec}}{1 \text{ min}} = 694,740,000 = 695,000,000 = 6.9 \times 10^8$$

- b. Convert the distance from school to home from miles to inches. (1 sig fig in sci. not.) (assume 5.2 mi.)

$$\frac{5.2 \text{ mi}}{1 \text{ mi}} \times \frac{5280 \text{ ft}}{1 \text{ mi}} \times \frac{12 \text{ in}}{1 \text{ ft}} = 321,472 = 300,000 = 3.0 \times 10^5 \text{ in}$$

- c. How many kilometers is it from school to home? (Express with 1 sig fig in scientific notation.)

$$\frac{5.2 \text{ mi}}{1 \text{ mi}} \times \frac{1.6 \text{ km}}{1 \text{ mi}} = 8.32 = 8.0 \text{ km}$$

- d. A person's weight is 150 pounds. Convert their kilograms. (1 sig. - 150 pounds)

$$\frac{150 \text{ lb}}{1 \text{ lb}} \times \frac{0.45 \text{ kg}}{1 \text{ lb}} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 67.5 = 68.0 \text{ kg}$$

2. After using the conversion factors that are listed in the table below.

- a. Your teacher says it's raining the wet 10-degree equivalent. How many centigrade is that?

$$\frac{100 \text{ degrees}}{180 \text{ degrees}} \times \frac{360 \text{ degrees}}{180 \text{ degrees}} \times \frac{1 \text{ degree}}{1 \text{ degree}} \times \frac{10 \text{ degrees}}{180 \text{ degrees}} = 200 \times 2 = 400 \text{ cent. degree}$$

- b. Later the temp is discontinuous 54 kelvins deep under water. Convert this to meters.

$$\frac{10 \text{ kelvins}}{1 \text{ kelvin}} \times \frac{1 \text{ meter}}{1000 \text{ meters}} \times \frac{1 \text{ meter}}{1 \text{ meter}} \times \frac{54 \text{ kelvins}}{1 \text{ kelvin}} \times \frac{1 \text{ meter}}{1000 \text{ meters}} = 540000 = 540 \text{ m}$$

- c. Fortunately you aren't off! You are standing on a horizontal island that is located 10.1 degrees north of the equator. How many kilometers is that?

$$10.1 \text{ degrees} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{1600 \text{ km}}{1 \text{ km}} \times \frac{1 \text{ km}}{1 \text{ km}} \times \frac{1 \text{ km}}{1000 \text{ m}} \times \frac{1 \text{ km}}{1000 \text{ m}} \times \frac{10.1 \text{ degrees}}{1 \text{ degree}} = 161600 \text{ km}$$

- d. If you are standing in 10 gallons of fresh water a day. How many liters is that?

$$\frac{10 \text{ gal}}{1 \text{ gal}} \times \frac{1 \text{ liter}}{1.05 \text{ gal}} \times \frac{1 \text{ liter}}{1 \text{ liter}} \times \frac{1 \text{ liter}}{1.05 \text{ gal}} = 9.52 \text{ liters}$$

- e. To reach the top of a giant tree for a pencil you will have to climb 7.6 meters. How many hands is that?

$$\frac{7.6 \text{ m}}{1 \text{ m}} \times \frac{100 \text{ cm}}{1 \text{ m}} \times \frac{1 \text{ hand}}{25.4 \text{ cm}} \times \frac{1 \text{ hand}}{1 \text{ hand}} = 29.92 = 30 \text{ hands}$$

- f. The island is rich with tea white peppers. You can collect 1.6 pecks a day. How many liters could you collect in 1 month?

$$\frac{1.6 \text{ pecks}}{1 \text{ peck}} \times \frac{30 \text{ d}}{1 \text{ d}} \times \frac{1 \text{ liter}}{1.25 \text{ d}} \times \frac{1 \text{ liter}}{1 \text{ liter}} = 38.4 \text{ liters}$$

g. $\frac{3.5 \text{ IS}}{1} \times \frac{36 \text{ mi}^2}{1 \text{ IS}} \times \frac{(5.2 \times 10^3)^2 \text{ ft}^2}{1 \text{ mi}^2} \times \frac{1 \text{ yd}^2}{9 \text{ ft}^2} = 3.9 \times 10^8 \text{ yd}^2$