Dimensional Analysis Worksheet KEY

1. **Use Dimensional Analysis to solve the following problems.**

a. How many seconds old are you? (Express with 2 sig figs in scientific notation.) [assume 22 yrs old]

$$\frac{22\ yr}{} \left| \frac{365\ d}{yr} \right| \frac{24\ h}{d} \left| \frac{3600\ s}{h} \right. = 693,792,000 = \mathbf{690,000,000} = \mathbf{6.9 \times 10^8}$$

b. Convert the distance from school to home from miles to inches. (2 sig figs in sci. not..) [assume 5.2 mi.]

$$\frac{5.2\ mi}{} \left| \frac{5280\ ft}{mi} \right| \frac{12\ in}{ft} = 329,472 = 330,000 = \mathbf{3.3 \times 10^5\ in}$$

c. How many kilometers is it from school to home? (Express with 2 sig figs in scientific notation.)

$$\frac{5.2\ mi}{} \left| \frac{88\ km}{55\ mi} \right. = 8.32 = \mathbf{8.3\ km}$$

d. A person's weight is 154 pounds. Convert this to kilograms. (1 lbs. = 454 grams)

$$\frac{154\ lb}{} \left| \frac{454\ g}{1\ lb} \right| \frac{kg}{1000g} = 69.916 = \mathbf{69.9\ kg}$$

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

a. Your cruise ship is leaving for a 610-league adventure. How many nautical miles is this?

$$\frac{610\ leagues}{} \left| \frac{5280\ yd}{league} \right| \frac{3\ ft}{1\ yd} \left| \frac{1\ naut.\ mile}{6076\ ft} \right. = 1590.256748 = \mathbf{1600\ naut.\ miles}$$

b. Later the ship is discovered at 38 fathoms deep under water. Convert this to meters.

$$\frac{38\ fathoms}{} \left| \frac{6\ ft}{fathom} \right| \frac{12\ in}{1\ ft} \left| \frac{2.54\ cm}{1\ in} \right| \frac{1\ m}{100\ cm} = 69.4944 = \mathbf{69\ m}$$

c. Fortunately you survived! You are stranded on a deserted island that is located 12.5 degrees north of the equator. How many kilometers is this?

$$\frac{12.5\ degrees}{} \left| \frac{69.047\ mi}{degree} \right| \frac{5280\ ft}{mi} \left| \frac{12\ in}{ft} \right| \frac{2.54\ cm}{in} \left| \frac{1\ m}{100\ cm} \right| \frac{km}{1000\ m} = \frac{138,900,469}{100,000} = \mathbf{1390\ km}$$

d. If you are rationed to 32 gills of fresh water a day. How many liters is this?

$$\frac{32\ gills}{} \left| \frac{pt}{4\ gills} \right| \frac{qt}{2\ pt} \left| \frac{1\ L}{1.06\ qt} \right. = 3.77358\ldots = \mathbf{3.8\ L}$$

f. To reach the top of a palm tree for a coconut you will have to climb 7.4 meters. How many hands is this?

$$\frac{7.4\ m}{} \left| \frac{100\ cm}{m} \right| \frac{in}{2.54\ cm} \left| \frac{hand}{4\ in} \right. = 72.83464\ldots = \mathbf{73\ hands}$$

g. The island is rich with hot chile peppers. You can collect 1.6 pecks a day. How many liters could you collect in **1 week**?

$$\frac{1.6\ pecks}{d} \left| \frac{32\ qt}{4\ pecks} \right| \frac{L}{1.06\ qt} \left| \frac{7\ d}{week} \right. = 84.52830\ldots = \mathbf{85\ L/week}$$

e. $\dfrac{3.5\ T.S.}{1} \times \dfrac{36\ mi^2}{1\ T.S.} \times \dfrac{(5280)^2\ ft^2}{1\ mi^2} \times \dfrac{1\ yd^2}{9\ ft^2} = 3.9 \times 10^8\ yd^2$