Name ___KEY___ Hour____

Dimensional Analysis

Use the conversion factors from the unit conversions worksheet to solve the following dimensional analysis problems.

1. How many seconds in 1 year?

$$\frac{1yr}{} \left| \frac{365 \ days}{1 yr} \right| \frac{24 \ hrs}{1 day} \left| \frac{60 \ min}{1 \ hr} \right| \frac{60 \ s}{1 \ min} = 3.15 \times 10^7 \ sec.$$

2. How many cm in 0.5 mile?

$$\frac{.5mi}{} \left| \frac{1 \ km}{.62 \ mi} \right| \frac{1000 m}{1 km} \left| \frac{100 cm}{1m} \right| = 80645 cm$$

3. Fuel cost $3.79/gallon. What is the price per liter?

$$\frac{\$3.79}{1 g} \left| \frac{1 gal}{4 qts.} \right| \frac{1 qt}{1.06 L} = \$.89/L$$

4. If a car is travelling 45 mph, how fast are they going in m/s?

$$\frac{45 \ miles}{1 \ hr} \left| \frac{1 km}{.62 \ mi} \right| \frac{1000m}{1 km} \left| \frac{1 hr}{60 min} \right| \frac{1 min}{60 s}$$

$$= 20.2 \ m/s$$

5. A person should consume 2000 kcal per day. If a piece of candy is 8.8 kcal, how many pieces of candy could a person eat per day?

$$\frac{2000 kcal}{1 \ day} \left| \frac{1 \ piece}{8.8 \ kcal} \right. = 227.3 \ pieces/day$$

6. A large fish tank has a volume of 50 L. What is the volume of the fish tank in the units of in^3?

$$\frac{50\ L}{}\left|\frac{1000\ mL}{1\ L}\right|\frac{1\ cm^3}{1\ mL}\left|\frac{(1\ in)^3}{(2.54cm)^3}\right| = 3051.2\ in^3$$

7. Gas is $3.79/gallon. If a car averages 27 miles/gallon, how much will it cost the person to drive 8,000 miles across the country?

$$\frac{8000\ mi}{}\left|\frac{1\ gal}{27\ mi}\right|\frac{\$3.79}{1\ gal} = \$1,122.96$$

8. If a person is traveling 3.2 m/s, how long will it take them to go 2 miles?

$$\frac{2\ mi}{}\left|\frac{1\ km}{.62\ mi}\right|\frac{1000\ m}{1\ km}\left|\frac{1\ sec}{3.2\ m}\right| = 1008\ s$$

Percent Error

9. A race committee is mapping out a 26.2 mile race. The course that they designed is actually 26.34 miles. What is their percent error?

$$\left|\frac{26.2 - 26.34}{26.2}\right| \times 100 = 0.534\%$$

10. Lab group two records the mass of their product to be 6.05 grams after completing their lab. The teacher tells them the mass of their product should have been 6.40. What is their percent error?

$$\left|\frac{6.40 - 6.05}{6.40}\right| \times 100 = 5.47\%$$