Literal Equations & Dimensional Analysis

Name Key Class Period _____

Conversions Factors			
1 kg = 2.2 lbs	0.621 mi = 1.00 km	1 gal = 3.79 L	2.54 cm = 1 in
1 cc is 1 cm^3	20 drops = 1 mL	1 mL = 1 cm^3	264.2 gal = 1 cubic meter

Solve each problem using dimensional analysis. Every number must have a unit. Work must be shown. Conversion factors are given above.

1. How many miles will a person run during a 10 kilometer race?

$$\frac{10\ \text{Km}}{1} \cdot \frac{0.621\ \text{mi}}{1\ \text{Km}} = 6.21\ \text{miles}$$

2. The moon is 250,000 miles away. How many feet is it from earth?

$$\frac{250{,}000\ \text{mi}}{1} \cdot \frac{5280\ \text{ft.}}{1\ \text{mi}} = 1{,}320{,}000{,}000\ \text{feet}$$

3. A family pool holds 10,000 gallons of water. How many cubic meters is this?

$$\frac{10{,}000\ \text{gal.}}{1} \cdot \frac{1\ m^3}{264.2\ \text{gal.}} = 37.85\ m^3$$

4. Sixty miles per hour is how many feet per second?

$$\frac{60\ \text{mi}}{1\ \text{hr.}} \cdot \frac{5280\ \text{ft.}}{1\ \text{mi}} \cdot \frac{1\ \text{hr.}}{60\ \text{min.}} \cdot \frac{1\ \text{min.}}{60\ \text{sec.}} = 88\ \text{ft./sec.}$$

5. 14.8 minutes per 2 cups is how many seconds per pint?

$$\frac{14.8\ \text{min}}{2\ \text{cups}} \cdot \frac{60\ \text{sec.}}{1\ \text{min.}} \cdot \frac{2\ \text{cups}}{1\ \text{pt.}} = 888\ \text{sec./pt.}$$

6. 65 feet per 400 seconds is how many yards per hour?

$$\frac{65\ \text{ft.}}{400\ \text{sec.}} \cdot \frac{1\ \text{yd.}}{3\ \text{ft.}} \cdot \frac{60\ \text{sec.}}{1\ \text{min}} \cdot \frac{60\ \text{min.}}{1\ \text{hr.}} = 195\ \text{yd/hr.}$$

7. 21 meters per 5 days is how many Kilometers per seconds?

$$\frac{21\ m}{5\ \text{days}} \cdot \frac{1\ \text{Km}}{1000\ m} \cdot \frac{1\ \text{day}}{24\ \text{hrs.}} \cdot \frac{1\ \text{hr.}}{60\ \text{min}} \cdot \frac{1\ \text{min.}}{60\ \text{sec.}} = 0.0000000049\ \text{Km/sec.}$$

8. 30 gallons per 20 minutes is how many pints per day?

$$\frac{30\ \text{gal.}}{20\ \text{min.}} \cdot \frac{4\ \text{qts}}{1\ \text{gal.}} \cdot \frac{2\ \text{pts}}{1\ \text{qt.}} \cdot \frac{60\ \text{min.}}{1\ \text{hr.}} \cdot \frac{24\ \text{hrs.}}{1\ \text{day}} = 17{,}280\ \text{pts/day}$$

9. A small herd of cattle consumes fourteen bales of hay in two weeks. How many bales will this herd consume in a year?

$\frac{14 \text{ bales}}{2 \text{ weeks}} \cdot \frac{52 \text{ weeks}}{1 \text{ year}} = \boxed{364 \text{ bales/year}}$

10. Trent purchases 44 euros worth of souvenirs while on vacation in France. If $1 U.S. = 0.678 euros, find the cost of the souvenirs in U.S. dollars. Round to the nearest cent.

$\frac{44 \text{ euros}}{1} \cdot \frac{1 \$}{0.678 \text{ euros}} = \boxed{\$64.90}$

8. If a 2 day rafting trip covers a distance of 60 miles and you are expected to raft 8 hours each day, how many miles must you raft each hour?

$\frac{60 \text{ miles}}{2 \text{ days}} = \frac{30 \text{ miles}}{1 \text{ day}}$

30 miles in 8 hrs.

$\frac{30}{8} = \boxed{3.75 \text{ mi/hr.}}$

9. The formula $C = \pi d$ represents the circumference of a circle, or the distance around the circle, where d is the diameter. If an airplane could fly around Earth at the equator without topping, it would have traveled about 24, 900 miles. Find the diameter of Earth to the nearest whole number.

$\frac{C}{\pi} = \frac{\pi d}{\pi}$

$d = \frac{C}{\pi}$

$d = \frac{24,900}{\pi} = 7925.92$

$\boxed{7926 \text{ miles}}$

10. The price of a ream of paper is $4.00. There are 500 sheets of paper in a ream. If a sheet of paper weighs 0.50 oz., what is the price of one pound of paper? (16 oz = 1 pound)

$\frac{4}{500} = 0.008$

$\$0.008$ per sheet

$\frac{0.5X}{0.5} = \frac{16}{0.5}$

$X = 32$

32 sheets is 1 lb.

$32(0.008) = \boxed{\$0.26}$

11. What is the cost to drive from Atlanta to Orlando, a distance of 475 miles, if the cost of gasoline is $3.59 a gallon and the minivan gets 25 miles per gallon?

$\frac{475}{25} = 19$ gal

$19(3.59) = \boxed{\$68.21}$