Dimensional Analysis Review

These are the conversion factors you are required to memorize. Try without peeking at your notes!

1 foot = 12 in	1 pound = 16 oz	1 cup = 8 fl oz
1 yard = 3 ft	1 ton (T) = 2000 lb	1 pint 2 c
1 yard = 36 in	1 inch = 2.54 cm	1 quart = 2 pt
1 mile = 5280 ft	1 mile = 1.61 km	1 gallon = 4 qt

Convert the following: (SHOW ALL WORK)

1. 4.22 g/cm to lbs/ft. ((hint: 454 g = 1 lb))

$$\left(\frac{4.22\ g}{1\ cm}\right)\left(\frac{2.54\ cm}{1\ in}\right)\left(\frac{12\ in}{1\ ft}\right)\left(\frac{1\ lb}{454\ g}\right) = 0.283\ lbs/ft$$

2. 10095 m/s to miles/s

$$\left(\frac{10095\ m}{1\ s}\right)\left(\frac{1\ km}{1000\ m}\right)\left(\frac{1\ mi}{1.61\ km}\right) = 6.27\ mi/s$$

3. 2.05×10^5 seconds into years.

$$\left(2.05(10)^5\ s\right)\left(\frac{1\ min}{60\ s}\right)\left(\frac{1\ hr}{60\ min}\right)\left(\frac{1\ d}{24\ hr}\right)\left(\frac{1\ yr}{365\ d}\right) = 6.50(10)^{-3}\ yr.$$

4. 0.0054 weeks into minutes

$$\left(0.0054\ wk\right)\left(\frac{7\ d}{1\ wk}\right)\left(\frac{24\ hr}{1\ d}\right)\left(\frac{60\ m}{1\ hr}\right) = 54\ min.$$

5. 498.82 cg to mg

$$\left(498.82\ cg\right)\left(\frac{1\ g}{100\ cg}\right)\left(\frac{1000\ mg}{1\ g}\right) = 4988.2\ mg$$

6. Traveling at 65 miles/hour, how many minutes will it take to drive 125 miles to San Diego?

$$\left(125\ mi\right)\left(\frac{1\ hr}{65\ mi}\right)\left(\frac{60\ min}{1\ hr}\right) = 115\ min.$$

7. Joe was driving sixty miles/ hour in his Honda Civic. How many ft/sec was Joe driving?

$$\left(60\ \frac{mi}{hr}\right)\left(\frac{1\ hr}{60\ min}\right)\left(\frac{1\ min}{60\ s}\right)\left(\frac{5280\ ft}{1\ mi}\right) = 88\ ft/s$$

8. Determine the number of years in 8.35×10^6 minutes.

$$\left(8.35(10)^6\ min\right)\left(\frac{1\ hr}{60\ min}\right)\left(\frac{1\ day}{24\ hr}\right)\left(\frac{1\ yr}{365\ day}\right) = 15.9\ yr$$

9. If a swimmer swims 85.4 yards in five minutes, how many meters will s/he swim in 70.0 seconds?

$$\left(\frac{85.4\ yd}{5\ min}\right)\left(\frac{3\ ft}{1\ yd}\right)\left(\frac{12\ in}{1\ ft}\right)\left(\frac{2.54\ cm}{1\ in}\right)\left(\frac{1\ m}{100\ cm}\right)\left(\frac{1\ min}{60\ s}\right)(70\ s) = 18.0\ m$$

10. At a given point in its orbit, the moon is 2.4×10^5 miles from earth. How long does it take light from a source on earth to reach a reflector on the moon and then return to earth? (speed of light is 3.0×10^8 m/s)

$$\left(\frac{1\ s}{3.0\ (10)^8\ m}\right)\left(\frac{1000\ m}{1\ km}\right)\left(\frac{1.61\ km}{1\ mi}\right)\left(4.8\ (10^5)\ mi\right) = 2.6\ s$$

11. A car consumes 25.00 gallons of fuel when driving a distance of 400.0 km. How many gallons will it consume when driving 250.0 miles?

$$(250\ mi)\left(\frac{1.61\ km}{1\ mi}\right)\left(\frac{25\ gal}{400\ km}\right) = 25.2\ g$$

12. Winnipeg is refilling the pool. How many gallons of water will it take if the pool is 50m by 25m by 1.5m? (hint : 1 gallon = 3.786 L and 1 cubic meter = 1000 Liters). Write your final answer in scientific notation.

$$(50\ m)(25\ m)(1.5\ m) = 1875\ m^3$$

$$\left(1875\ m^3\right)\left(\frac{1000\ L}{1\ m^3}\right)\left(\frac{1\ gal}{3.786\ L}\right) = 5.0\ (10)^5$$

13. If $1\ L = 10^{6}\ mm^3$, how many Dekaliters are in a tank that is 30 x 20 x 40 mm?

should be 10^6

$$(30\ mm)(20\ mm)(40\ mm) = 24000\ mm^3$$

$$\left(24000\ mm^3\right)\left(\frac{1\ L}{10^6\ mm^3}\right)\left(\frac{1\ DL}{10\ L}\right) = 0.0024\ DL$$