Chemistry 101
In-Class Assignment 1
Unit Conversion Worksheet

Try the following conversions.

Convert:

1. 1.6 m into mm

$$\frac{1.6\ m}{} \times \frac{1000\ mm}{1\ m} = 1600\ mm$$

2. 36 g into kg

$$\frac{36\ g}{} \times \frac{1\ kg}{1000\ g} = 0.036\ kg$$

3. 470. mi into km

$$\frac{470.\ mi}{} \times \frac{5280\ ft}{1\ mi} \times \frac{12\ in}{1\ ft} \times \frac{2.54\ cm}{1\ in} \times \frac{1\ m}{100\ cm} \times \frac{1\ km}{1000\ m} = 756\ km$$

4. 1.43 kg/L into g/mL

$$\frac{1.43\ kg}{L} \times \frac{1\ L}{1000\ mL} \times \frac{1000\ g}{1\ kg} = 1.43\ g/mL$$

5. 86 inches into m

$$\frac{86\ in}{} \times \frac{2.54\ cm}{1\ in} \times \frac{1\ m}{100\ cm} = 2.2\ m$$

6. 9.3 $\times 10^{-5}$ g into μg

$$\frac{9.3 \times 10^{-5}\ g}{} \times \frac{10^6\ \mu g}{1\ g} = 93\ \mu g$$

7. 30 feet per second into miles per hour

$$\frac{30\ ft}{s} \times \frac{1\ miles}{5280\ ft} \times \frac{60\ s}{1\ min} \times \frac{60\ min}{1\ hr} = 20\ miles/hr$$

8. 18 mm into m

$$\frac{18\ mm}{} \times \frac{1\ m}{1000\ mm} = 0.018\ m$$

9. 400. nm into m

$$\frac{400.\ nm}{} \times \frac{1\ m}{10^9\ nm} = 4.00 \times 10^{-7}\ m$$

10. 1.54 $\times 10^{-10}$ m into mm

$$\frac{1.54 \times 10^{-10}\ m}{} \times \frac{1000\ mm}{1\ m} = 1.54 \times 10^{-7}\ mm$$

11. 0.43 L into dL

$$\frac{0.43\ L}{} \times \frac{10\ dL}{1\ L} = 4.3\ dL$$

12. 87 dL into mL

$$\frac{87\ dL}{} \times \frac{1\ L}{10\ dL} \times \frac{1000\ mL}{1\ L} = 8700\ mL$$

13. 8 mL into L

$$\frac{8\ mL}{} \times \frac{1\ L}{1000\ mL} = 0.008\ L$$

14. 1.01 L into mL

$$\frac{1.01\ L}{} \times \frac{1000\ mL}{1\ L} = 1010\ L$$

15. Levoxyl is a drug used to treat hypothyroidism. If a patient takes one 75 μg tablet per day, how many milligrams of Levoxyl are in their 1 month (30 day) supply?

$$\frac{75\ \mu g}{day} \times \frac{1\ mg}{1000\ \mu g} \times \frac{30\ days}{1\ month} = 2.3\ g$$

16. A common pain reliever contains 500 mg of Acetaminophen per tablet. The package directions recommend taking no more than 8 tablet in a 24 hour period. How many grams of Acetaminophen a day is the maximum recommended dose?

$$\frac{500\ mg}{tablet} \times \frac{8\ tablets}{day} \times \frac{1\ g}{1000\ mg} = 4\ g/day$$

17. Suppose you have folder containing 94 MB (megabytes) of material on your computer's hard drive that you want to back up. This would fit on a 100 MB zip, but your zip drive recently broke. How many floppy disks would you need to use to back up the folder? (A floppy disk holds about 1.38 megabytes of electronic material).

$$94\ MB \times \frac{1\ floppy}{1.38\ MB} = about\ 68\ floppies$$

18. Brad's computer has 23.5 GB (gigabytes: 1 GB = 1024 MB) of free space. His drive has a capacity of 40.0 GB. A typical writable CD will hold about 700 MB of electronic material. How many CD's does Brad need to completely back up his computer? How many floppies?

$$Used\ Space: 40.0\ GB - 23.5\ GB = 16.5\ GB$$

$$16.5\ GB \times \frac{1024\ MB}{1\ GB} \times \frac{1\ CD}{700\ MB} = 24.1\ CDs$$

As the material will fill over 24 CDs, Brad will need at least 25 to back up his computer - and possibly more as he may not be able to fill each CD to capacity.

If he were to use floppies:

$$16.5\ GB \times \frac{1024\ MB}{1\ GB} \times \frac{1\ floppy}{1.38\ MB} \approx 12,000\ floppies!$$

19. A popular web site states that a 130 pound person will burn 472 Cal/hr bicycling (moderate effort) and 649 Cal/hr rock climbing (ascending). Alexandra (who happens to weigh 130 pounds) has decided to start a training program bicycling for 45 minutes, 3 times/week as well as rock climbing for 1.5 hours every Saturday. How many extra Calories will Alexandra burn in 8 weeks of training? What percentage of those calories are from bicycling?

bicycling:

$$\frac{45\ min}{workout} \times \frac{3\ workouts}{week} \times \frac{8\ weeks}{training\ program} \times \frac{1\ hr}{60\ min} \times \frac{472\ Cal}{hr} = 8496\ \frac{Cal}{training\ program}$$

rockclimbing:

$$\frac{1.5\ hr}{workout} \times \frac{1\ workout}{week} \times \frac{8\ weeks}{training\ program} \times \frac{649\ Cal}{hr} = 7788\ \frac{Cal}{training\ program}$$

total: 8496 Cal + 7788 Cal = 16,284 (round to 2 sig figs) = 16,000 Cal

% from bicycling: 52%

20. Samantha wants to buy a car that gets excellent gas mileage. She is trying to decide between a Honda Insight and a Honda Civic Hybrid.

Model (2003)	Fuel Economy City	Highway
Honda Insight	57	56
Honda Civic Hybrid	45	51
Data from the EPA's Green Vehicle Guide: http://www.epa.gov/greenvehicles/		

She likes the Civic better, but the Insight's gas mileage is tempting. Assuming Samantha drives about 12,000 miles per year, and about 60% of her miles are city driving, how much more gasoline would she use per year in the Civic? If gasoline costs about $1.55 per gallon in her area, how much more will she spend on gasoline in the Civic?

city miles $= 12000\ miles \times 0.60 = 7200\ miles$

highway miles$= 12000\ miles \times 0.40 = 4800\ miles$

Insight:
city: $7200\ mi \times \frac{1\ gallon}{57\ miles} = 126\ gallons$
highway: $4800\ mi \times \frac{1\ gallon}{56\ miles} = 86\ gallons$
total: $212\ gallons$

Civic:
city: $7200\ mi \times \frac{1\ gallon}{45\ miles} = 160\ gallons$
highway: $4800\ mi \times \frac{1\ gallon}{51\ miles} = 94\ gallons$
total: $254\ gallons$

The Civic will use 254 - 212 = 42 gallons more gasoline per year at a cost of:

$$42\ gallons \times \frac{\$1.55}{gallon} = \$65$$