# Converting Units-Worksheet #1

Date:_____

1. Replace the metric prefix with the appropriate power of 10 and simplify to express the quantity in one of the following base units (m, g, s).

**e.g.** 0.00864 km = 0.00864 x $10^3$ m = 8.64 x $10^{-3}$ x $10^3$ m = 8.64 m

a) 0.00045 ds = $4.5\times10^{-4}\times10^{-1}\,s = 4.5\times10^{-5}\,s$

b) 5.6 x $10^{-4}$ Gm = $5.6\times10^{-4}\times10^{9}\,m = 5.6\times10^{5}\,m$

c) 8.69 x $10^5$ µs = $8.69\times10^{5}\times10^{-6}\,s = 8.69\times10^{-1}\,s$

d) 846 pg = $8.46\times10^{2}\times10^{-12}\,g = 8.46\times10^{-10}\,g$

e) 7.5 x $10^{14}$ ns = $7.5\times10^{14}\times10^{-9}\,s = 7.5\times10^{5}\,s$

f) 5.8 x $10^{-5}$ km = $5.8\times10^{-5}\times10^{3}\,m = 5.8\times10^{-2}\,m$

2. Perform the following units conversions using the "multiply by one" method and express the results in scientific notation.

a) 45 789 m = ? mm  cf: $1\,m = 10^3\,mm$

$\frac{45789\,m}{1}\times\frac{10^3\,mm}{m} = 4.5789\times10^{7}\,mm$

b) 773 pm = ? nm  cf: $1\,nm = 10^3\,pm$

$\frac{773\,pm}{1}\times\frac{1\,nm}{10^3\,pm} = 7.73\times10^{2}\,m\times10^{-3}\,m = 7.73\times10^{-1}\,m$

c) 1.5 Ms = ? Gs  cf: $1\,Gs = 10^3\,Ms$

$\frac{1.5\,Ms}{1}\times\frac{1\,Gs}{10^3\,Ms} = 1.5\times10^{-3}\,Gs$

d) 0.00186 ms = ? µs  cf: $1\,ms = 10^3\,\mu s$

$\frac{1.86\times10^{-3}\,ms}{1}\times\frac{10^3\,\mu s}{1\,ms} = 1.86\,\mu s$

e) 56 nm = ? cm  cf: $1\,cm = 10^7\,nm$

$\frac{56\,nm}{1}\times\frac{1\,cm}{10^7\,nm} = 5.6\times10^{-6}\,cm$

f) 6.5 years = ? seconds

$6.5\,yr\times\frac{365\,day}{yr}\times\frac{24\,h}{day}\times\frac{3600\,s}{h} = 2.0\times10^{8}\,s$

g) 135 km/h = ? m/s  cf: $1\,km = 1000\,m$, $1\,h = 3600\,s$

$\frac{135\,km}{h}\times\frac{1000\,m}{1\,km}\times\frac{1\,h}{3600\,s} = 37.5\,\frac{m}{s}$

h) 798 $mm^2$ = ? $cm^2$  cf: $1\,cm = 10\,mm$, $1\,cm^2 = 10^2\,mm^2$

$798\,mm^2\times\frac{1\,cm^2}{10^2\,mm^2} = 7.98\times10^{2}\times10^{-2}\,cm^2 = 7.98\,cm^2$

i) 32 m/s = ? km/h

$\frac{32\,m}{s}\times\frac{1\,km}{1000\,m}\times\frac{3600\,s}{1\,h} = 115.2\,km/h \sim 1.2\times10^{2}\,km/h$

j) 785 $cm^3$ = ? $m^3$  cf: $1\,m = 10^2\,cm$, $1\,m^3 = 10^6\,cm^3$

$785\,cm^3\times\frac{1\,m^3}{10^6\,cm^3} = 785\times10^{-6}\,m^3 = 7.85\times10^{-4}\,m^3$

3. Analyze the questions below to determine the units that would result from each of the following calculations.

a) 2 cm/s x 15 s  $\frac{cm}{s}\times s = cm$

b) 8 m ÷ 6s → $m/s$

c) 25 $m/s^2$ x 2s → $\frac{m}{s^2}\times s = \frac{m}{s}$

d) 5 m/s ÷0.2 s → $\frac{\frac{m}{s}}{s} = \frac{m}{s}\times\frac{1}{s} = \frac{m}{s^2}$

e) 2.5 kg ÷ 1.9 $kg/m^3$  $\frac{kg}{\frac{kg}{m^3}} = kg\times\frac{m^3}{kg} = m^3$

f) 7 kg•$m/s^2$ x 3.2 m  $\frac{kg\,m}{s^2}\times m = \frac{kg\,m^2}{s^2}$