Converting Measurement with metric prefixes

1) list value in standard scientific notation

750 pm = _____ Mm

2) insert conversion factor with unit you have opposite. Put a "1" (10^0) by the biggest prefix

3) find the number of smaller units in the larger unit (how much the prefixes are separated) This separation is the exponent of the smaller prefix

1) 7.5×10^2 pm = _____Mm

2) 7.5×10^2 pm $\left(\frac{10^0 \text{ Mm}}{10^{?} \text{ pm}}\right)^{-12}$ = _____Mm

put a "1" (10^0) by the largest prefix

mega: Mm = 10^6 m

pico: pm = 10^{-12} m

3) 7.5×10^2 pm $\left(\frac{10^0 \text{ Mm}}{10^{18} \text{ pm}}\right)^{-12}$ = 18 7.5×10^{-16} Mm

exponents:

2 + 0 = 2

2 - (18) = -16

exponential separation

4) multiply to measurement by the conversion factor (mult. to the top and divide by the bottom) remember to cancel units you have (leaving the one you want) and to add exponents when you multiply and subtract exponents when you divide

Converting mixed units:

1) insert conversion factor with unit you have opposite. Put a "1" by the biggest unit. List the number of the smaller units that equals the bigger unit

2) Multiply (and divide) the measurement to the conversion factor. (note the units) that cancel and what ones are left.

1100 ft/s = _____ m/s

$1100 \frac{\text{ft}}{\text{s}} \left(\frac{1 \text{ m}}{3.28 \text{ ft}}\right)$ = 335 m/s

770. miles/hr = _____ m/s

$770. \frac{\text{miles}}{\text{hr}} \left(\frac{1610 \text{ m}}{1 \text{ mile}}\right)\left(\frac{1 \text{ hr}}{3600 \text{ s}}\right) = 344 \text{ m/s}$

SIGNIFICANT FIGURES

1. All non-zero figures are significant: 112.6 has four sig. figs.
2. All zeroes between non-zero figures are significant: 108.005 has six sig. figs.
3. Zeroes to the right of a non-zero figure, but to the left of an understood decimal point are NOT significant unless indicated to be significant (usually a line over the zero or listed in standard scientific notation) 200 has one sig. fig. and 2.00 x 102 has three sig. figs.
4. All zeroes to the right of a decimal point, but to the left of a non-zero figure, are NOT significant: 0.00647 has three sig. figs.
5. All zeroes to the right of a decimal point and following a non-zero figure are significant: both 0.07080 and 20.00 have four sig. figs.
6. Rules for Addition and Subtraction (think place!) The answer should have the same number of decimal places as the quantity have the least number of decimal places: 10.6 cm + 3.34 cm = 13.9 cm
7. Rules for Multiplication and Division (think number!) The number of significant figures should NOT be greater than the number of significant figures in the least precise factor: 6.2 cm x 3.44 cm = 21 cm2
8. Rules for Rounding:

   A. If the digit to be dropped is less than five, simple eliminate it. 134.3 g to 3 sig. Figs. = 134 g

   B. If the digit to be dropped is more than five, (or a 5 followed by any non zero) add 1 to the preceding digit. 134.6 g to 3 sig. Figs. = 135 g 134.501 g to 3 sig. figs. = 135 g

   C. If the digit to be dropped is five, inspect the preceding digit.
   If it is even, simply eliminate the five. 134.5 g to 3 sig. Figs. = 134 g
   If it is odd, add 1 to the preceding digit. 133.5 g to 3 sig. Figs. = 134 g