Rules of Scientific Notation

$$a \times 10^b$$

1. Coefficient (a) must be between 1 and 10.

2. Take this times base 10.

3. Exponent (b) is equal to number place values between where decimal *was* and where it *will be*.

4. Sign on exponent:

   a. negative for standard numbers between 0 and 1 (e.g., 0.001).

   b. positive for standard numbers > 1.

Rules for Significant Digits (I)

If you are reading a measurement from some device or instrument, write all the certain digits (marks) plus <u>one</u> estimated (between marks).

Atlantic-Pacific Rule (optional):

If the decimal point is <u>*p*</u>resent, start from <u>*P*</u>acific side <u>with first non-zero number</u> and count all other numbers as significant.

If the decimal point is <u>*a*</u>bsent, start from <u>*A*</u>tlantic side <u>with first non-zero number</u> and count all other numbers as significant.

Rules for Significant Digits (II) in Calculations

The answer to a calculation using measured values cannot be more precise than any single value used.

Multiplication and Division:

The answer to a multiplication or division problem must have as many significant digits as the measured value in the problem with the fewest number of significant digits.

Addition and Subtraction :

The answer to an addition or subtraction problem must have as many significant digits as results by rounding the answer to the last (l to r) place value that all the values added or subtracted have in common.

Rules for Dimensional Analysis

(1) When using the "train-track" method, draw a fraction line (horizontal).

(2) Then draw vertical line(s) to separate conversion factors.

GIVEN	KEEP	etc.	
	CANCEL		
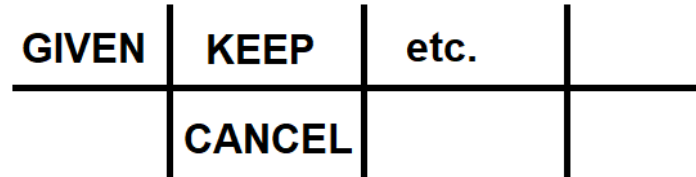
(3) Starting in the upper left-hand box, write the given.

(4) Write the unit you want to cancel (same unit as the given's) below the line, diagonal from the given, and the unit you want to keep above the line. See diagram above.

(5) Write a 1 in front of the larger unit to avoid negative exponents.

(6) Write how many smaller units make up one larger unit.

(Steps 4, 5, and 6 complete your conversion factor.)

(7) Cancel like units.

(8) Multiply everything across the top, then everything across the bottom.

(9) Divide what is left.   (10) Label your final answer.

NOTE: SOMETIMES IT HELPS TO CONVERT TO THE __BASE UNIT__ FIRST, THEN THE UNKNOWN, WHEN DOING METRIC CONVERSIONS.

THE METRIC SYSTEM