**WODSS SCIENCE** Name: _____

SCH 4CI Date: _____

## Counting Significant Figures

1. All **non-zeros** are significant — 2.314 has ____ sf
2. Zeros can be divided into 3 categories:
   a) Leading zeros are never significant — 0.001 has ____ sf
   b) Middle zeros are always significant — 130.008 has ____ sf
   c) End zeros:
      - If a decimal is anywhere in the number, end zeros are significant — 1.2300 has ____ sf
      - If there is no decimal, end zeros (trailing) are never significant — 19000 has ____ sf
3. When numbers are expressed in scientific notation, only the digits in the coefficient are significant
   $8.62 \times 10^4$ has _____ sf

Try some: How many significant figures do each of the following have?

a) 1.4563 m _____
b) 14.563 cm _____
c) 0.14563 m _____
d) 18.20 mm _____
e) 108.2 g _____
f) 45 g _____
g) 6 mm _____
h) 0.0062 kg _____
i) 1000 s _____
j) 800 m _____
k) 3.00 x 108 m _____

**Calculating with Significant Figures**

1. When **multiplying or dividing**, your answer should have the same number of sig figs as the number in the question with the lowest **sig figs**.
   ex. 57.059 x 1.26 =

2. When **adding or subtracting**, your answer should have the same number of decimal places as the number with the lowest **decimal** places.
   ex. 27.15 + 6.432 + 0.0005 =

3. Rounding - last digit ≥ 5 round up (for our course)
   - last digit < 5 round down

Try some: Calculate the following, with significant figures

1. 8.4 + 1.34 = _____
2. 9.70 – 8 = _____
3. $8.65 \times 2.416$ = _____
4. $6.450 \div 37$ = _____
5. 5.67 cm + 6.394 cm + 0.3 cm = _____
6. $5.63 \text{ cm} \times 33.569 \text{ cm} \times 23 \text{ cm}$ = _____
7. $98.55 + 2.05 \times 0.22$ = _____
8. $0.0002 - 15 \div 45$ = _____

## Scientific Notation

In order to handle very large and small numbers, scientists use a technique known as **scientific notation** (a number between 1 and 10, multiplied by base 10 raised to a power). The exponent tells you how many places the decimal has been moved, and in which direction **(positive = left, negative = right)**

Example. 1 2700

Example. 2 0.00045

Express the following in scientific notation:

23 700 000 =

0.0001 =

24000 =

0.000 000 61 =

0.000 052 =

186000 =

Expand the following:

$5.0 \times 10^{10} =$

$2.3 \times 10^{-5} =$

Express in scientific notation, the result of the following calculations.

$(1.78 \times 10^{-4}) \div (4.18 \times 10^{5}) =$

$(3.68 \times 10^{-3}) \times (8.41 \times 10^{2}) \times 0.248 =$

## Rearranging Equations

1. Attempt to isolate the required variable (i.e. the letter that you are required to solve for) so that only it is on the left side of the equal sign.
   e.g. solving for **b** in 2b = 6, we have to move 2 to the other side, therefore b = 6/2

   e.g. solving for **b** in ab = c, we have to move a to the other side, therefore b = c/a
2. "Cross-over": Top of fraction – move variable to bottom of fraction on opposite side
   Bottom of fraction – move variable to top of fraction on opposite side
3. Solve equation.

**Solve the following equations:**

| | | |
|---|---|---|
| i) for a: $2\mathbf{a} = 8$ | ii) for a: $6 = 4\mathbf{a}$ | iii) for a: $\mathbf{a}b = ef$ |
| iv) for a: $\frac{\mathbf{a}b}{cd} = \frac{ef}{gh}$ | v) for c: $\frac{ab}{\mathbf{c}d} = \frac{ef}{gh}$ | vi) for c: $a + b\mathbf{c} = def$ |