Topic 2- Scientific Notation

Scientific notation: a shorthand method to express very large or very small numbers.

Ex: $3\ 400\ 000\ 000 = 3.4 \times 10^{9}$

$0.0000000576 = 5.76 \times 10^{-8}$

General Structure:

(decimal number between 1 and 10) $\times$ (power of 10)

__._____ $\times$ 10

3.56×10^{7}

To convert a number from **standard form** to **scientific notation**:

1. Move the decimal point as much as needed to obtain a decimal number between 1 and 10.
   Eg. 3562 = 3562.0 → 3.562
2. The amount of places the decimal was moved becomes the exponent on the 10
   Eg. Moved the decimal 3 places → 10^{3}
3. $3562 = 3.562 \times 10^{3}$ in scientific notation.

**NOTE*:
If the decimal point moves left, the exponent on the 10 is **positive**; if it moves right the exponent is **negative**.

Example: Convert 250 883 to scientific notation.

1. 250 883 → 2.50883
2. Moved decimal 5 times to left → 10^{5}
3. So $2.50883 = 2.50883 \times 10^{5}$

Practice: Write the following numbers in scientific notation.

1. 8546 __._____ $\times$ 10
2. 23 000 __._____ $\times$ 10
3. 572.9 __._____ $\times$ 10
4. 2 990 000 __._____ $\times$ 10
5. 3418.06 __._____ $\times$ 10
6. 0.0003 __._____ $\times$ 10

7. 0.65743 __._____ × 10

8. 0.0224 __._____ × 10

To convert a number from **scientific notation** to **standard form**

1. CONVERSELY,
   positive exponent → move the decimal point to the *right*,
   negative exponent → move the decimal point to the *left*.

2. Move the decimal from its current place, the *amount* and *direction* specified by the exponent on the 10.
   Eg. $2.31 \times 10^{-3} \rightarrow 0.00231$

Practice: Convert these numbers to standard form.

1) $2 \times 10^{3} =$ _____

2) $2.331 \times 10^{5} =$ _____

3) $5 \times 10^{-3} =$ _____

4) $7.627 \times 10^{-5} =$ _____

5) $3.004 \times 10^{3} =$ _____

6) $5.23 \times 10^{4} =$ _____

7) $5.062 \times 10^{2} =$ _____