Scientific Notation

Aim

- to write numbers in proper scientific notation
- to do calculations in scientific notation

Notes

- Purpose - to write very large or very small numbers in a way that is more easily interpreted
- Definition - number expressed as two factors, the first being a number between 1 and 10, and the second being a power of 10 [*NOTE:* for the first factor, $x, 1 \leq x < 10$]
- Examples
  - $2000 = 2.000 \times 10^3$
  - $0.000314 = 3.14 \times 10^{-4}$
- Calculations with scientific notation
  - Addition and Subtraction
    - numbers must be a multiple of the same power of 10
    - the first factor can then be added or subtracted
    - the power of 10 is not affected

Example

$1.35 \times 10^5 + 2.9 \times 10^4$

Procedure

① $2.9 \times 10^4 = 0.29 \times 10^5$

②
$$\begin{array}{r} 0.29 \times 10^5 \\ \underline{+\ 1.35 \times 10^5} \\ 1.64 \times 10^5 \end{array}$$

  - Multiplication
    - multiply first factors
    - add exponents

Example

$(2 \times 10^4) \times (1.5 \times 10^3)$

Result

3.0×10^7

  - Division
    - divide first factors
    - subtract exponents

Example

$$\frac{3.0 \times 10^5}{2.0 \times 10^3}$$

Result

1.5×10^2

Answer the questions below by circling the number of the correct response

1. Which of the following is written in proper scientific notation?
   (1) 0.25×10^3 (2) 2.5×10^2
   (3) 25×10^1 (4) 250

2. What is the value of the expression below?

$$\frac{1.3 \times 10^3}{6.5 \times 10^4}$$

   (1) 0.2×10^{-1} (3) 2.0×10^{-2}
   (2) 0.2×10^7 (4) 2.0×10^6

3. What is the product of 1.5×10^2 and 2.0×10^3?
   (1) 3.0×10^5 (3) 3.5×10^5
   (2) 3.0×10^6 (4) 3.5×10^6

4. What is the sum of 1.5×10^4 and 1.0×10^3?
   (1) 1.5×10^7 (2) 2.5×10^7
   (1) 1.6×10^7 (4) 1.6×10^4

5. What is the difference between 4.1×10^3 and 2.1×10^2?
   (1) 2.0×10^1 (3) 3.9×10^1
   (2) 2.0×10^3 (4) 3.9×10^3