Exercise - 3.1

Need of Scientific Notation (K.B)

There are so many numbers that we use in science and technical work that are either very small or large.
While writing these numbers in ordinary notation (Standard notation) there is always chance of making an error by omitting a zero or writing more than actual number of zeros. To overcome this problem, scientists have developed a concise, precise and convenient method to write very small or very large numbers, that is called scientific notation of expressing an ordinary number.

Scientific Notation (K.B)

(LHR 2018, SGD 2017, RWP 2017)

A number written in the form $a \times 10^n$, where $1 \le a < 10$ and n is an integer, is called the scientific notation.

For example:

The distance from the Earth to the Sun is 150,000,000 Km approximately.
In scientific notation 150,000,000 km = 1.5×10^8 km.

Example # 1 (A.B)

Write each of the following ordinary numbers in scientific notation

(i) 30600 **(ii)** 0.000058

Solution:

(i) $30600 = 3.06 \times 10^4$

(move decimal point four places to the left)

(ii) $0.000058 = 5.8 \times 10^{-5}$

(move decimal point five places to the right)

Note (U.B+K.B)

Steps to change an ordinary number into scientific notation:

(i) Place the decimal point after the first non-zero digit of given number.

(ii) We multiply the number obtained in step (i), by 10^n if we shifted the decimal points n places to the left

(iii) We multiply the number obtained in step (i) by 10^{-n} if we shifted the decimal points n places to the right.

On the other hand, if we want to change a number from scientific notation to ordinary (standard) notation, we simply reverse the process.

Example # 2 (A.B)

Change each of the following numbers from scientific notation to ordinary notation.

(i) 6.35×10^6 **(ii)** 7.61×10^{-4}

Solution

(i) $6.35 \times 10^6 = 6350000$

(Move the decimal point six places to the right)

(ii) $7.61 \times 10^{-4} = 0.000761$

(GRW 2018, SGD 2019, D.G.K 2017)

(Move the decimal point four places to the left).

Exercise 3.1

Q.1 Express each of the following numbers in scientific notations.

(i) 5700 **(MTN 2017, FSD 2018)** **(A.B)**
$= 5.7 \times 10^3$

(ii) 49,800,000 **(A.B)**
$= 4.98 \times 10^7$

(iii) 96000000 **(MTN 2017)** **(A.B)**
$= 9.6 \times 10^7$

(iv) 416.9 **(A.B)**
$= 4.169 \times 10^2$

(v) 83000 **(A.B)**
$= 8.3 \times 10^4$

(vi) 0.00643 **(A.B)**
(LHR 2017, FSD 2017, BWP 2017, D.G.K 2017)
$= 6.43 \times 10^{-3}$

(vii) 0.0074 **(A.B)**
$= 7.4 \times 10^{-3}$

(viii) 60,000,000 **(A.B)**
$= 6 \times 10^7$

(ix) 0.00000000395 **(A.B)**
(SWL 2019, D.G.K 2013)
$= 3.95 \times 10^{-9}$

(x) $\frac{275000}{0.0025}$ **(LHR 2013)** **(A.B)**
$= \frac{2.75 \times 10^5}{2.5 \times 10^{-3}}$

Q.2 Express the following number in ordinary notation.
(LHR 2017, GRW 2017, 19, 21, SWL 2019, FSD 2017, BWP 2019)

(i) 6×10^{-4} **(A.B)**
$= 0.0006$

(ii) 5.06×10^{10} **(A.B)**
$= 50600000000$

(iii) 9.018×10^{-6} **(A.B)**
$= 0.000009018$

(iv) 7.865×10^8 **(A.B)**
$= 786500000$

Logarithm **(K.B)**
(LHR 2018, RWP 2014, D.G.K 2017)

Logarithm are useful tools for accurate and rapid computations. Logarithms base 10 are known as common logarithms and those with base *e* are known as natural logarithm.