

Exercise 2.1

Q.1 Express the following numbers in scientific notation.

(i) 2000000

Solution:

$$2000000 = 2 \overbrace{.000000}^{\text{move 6 places left}}$$

$$= 2.0 \times 10^6$$

Move decimal point 6 places to the left.

(ii) 48900

Solution:

$$48900 = 4 \overbrace{.8900}^{\text{move 4 places left}}$$

$$= 4.89 \times 10^4$$

Move decimal point 4 places to the left.

(iii) 0.0042

Solution:

$$0.0042 = 4 \overbrace{.2}^{\text{move 3 places right}}$$

$$= 4.2 \times 10^{-3}$$

Move decimal point 3 places to the right.

(iv) 0.0000009

Solution:

$$0.0000009 = 9 \overbrace{.0000009}^{\text{move 7 places right}}$$

$$= 9.0 \times 10^{-7}$$

Move decimal point 7 places to the right.

(v) 73×10^3

Solution:

$$73 \times 10^3 = 7 \overbrace{.3}^{\text{move 1 place left}} \times 10^3$$

$$= 7.3 \times 10^1 \times 10^3$$

$$= 7.3 \times 10^{1+3} = 7.3 \times 10^4$$

Move decimal point 1 place to the left.

(vi) 0.65×10^2

Solution:

$$0.65 \times 10^2 = 6 \overbrace{.5}^{\text{move 1 place right}} \times 10^2$$

$$= 6.5 \times 10^{-1} \times 10^2 = 6.5 \times 10^{-1+2}$$

$$= 6.5 \times 10^1$$

Move decimal point 1 place to the right.

Q.2 Express the following numbers in ordinary notation.

(i) 8.04×10^2

Solution:

$$8.04 \times 10^2$$

Since exponent is positive 2, move decimal point 2 places to the right.

$$= 804 \times 10^{-2} \times 10^2$$

$$= 804 \times 10^{-2+2}$$

$$= 804 \times 10^0$$

$$\because 10^0 = 1$$

$$= 804 \times 1 = 804$$

(ii) 3×10^5

Solution

$$3 \times 10^5$$

Since exponent is positive 5, move decimal point 5 places to the right.

$$= 3.0 \times 10^5 = 300000.0 \times 10^{-5} \times 10^5$$

$$= 300000 \times 10^0$$

$$= 300000 \times 1 = 300000$$

(iii) 1.5×10^{-2}

Solution:

$$1.5 \times 10^{-2}$$

Since exponent is negative 2, move decimal point 2 places to the left.

$$= 0.015 \times 10^2 \times 10^{-2}$$

$$= 0.015 \times 10^{2-2}$$

$$= 0.015 \times 10^0$$

$$= 0.015 \times 1 = 0.015$$

(iv) 1.77×10^7

Solution:

$$1.77 \times 10^7$$

Since exponent is positive 7, move decimal point 7 places to the right.

$$= 17700000.0 \times 10^{-7} \times 10^7$$

$$= 17700000 \times 10^{-7+7}$$

$$= 17700000 \times 10^0$$

$$= 17700000 \times 1 = 17,700,000$$

(v) 5.5×10^{-6}

Solution:

Since exponent is negative 6, move decimal point 6 places to the left.

$$= 0.0000055 \times 10^6 \times 10^{-6}$$

$$= 0.0000055 \times 10^{6-6}$$

$$= 0.0000055 \times 10^0$$

$$= 0.0000055 \times 1$$

$$\because 10^0 = 1$$

$$= 0.0000055$$

(vi) 4×10^{-5}

Solution:

Since exponent is negative 5, move decimal point 5 places to the left.

$$= 0.00004 \times 10^5 \times 10^{-5}$$

$$= 0.00004 \times 10^{5-5}$$

$$\begin{aligned}
 &= 0.00004 \times 10^0 \\
 &= 0.00004 \times 1 \\
 &= 0.00004
 \end{aligned}$$

Q.3 The speed of light is approximately 3×10^8 meters per second. Express it in standard form.

Solution:

$$\begin{aligned}
 3 \times 10^8 \text{ m/s} &= 300,000,000 \times 10^{-8} \times 10^8 \text{ m/s} \\
 &= 300,000,000 \times 10^{-8+8} \text{ m/s} \\
 &= 300,000,000 \times 10^0 \text{ m/s} \\
 &= 300,000,000 \times 1 \text{ m/s} \\
 &= 300,000,000 \text{ m/s}
 \end{aligned}$$

Q.4 The circumference of the Earth at the equator is about 40075000 metres. Express this number in scientific notation.

Solution:

$$\overbrace{400\,75000}^{\downarrow} \text{m} = 4.0075 \times 10^7 \text{m}$$

Move decimal point 7 places to the left.

Q.5 The diameter of Mars is 6.779×10^3 km. Express this number in standard form. (Correction)

Solution:

$$\begin{aligned}
 \text{The diameter of Mars} &= 6.779 \times 10^3 \text{ km} \\
 &= 6779 \times 10^{-3} \times 10^3 \text{ km} \\
 &= 6779 \times 10^{-3+3} \text{ km} \\
 &= 6779 \times 10^0 \text{ km} \\
 &= 6779 \times 1 \text{ km} \\
 &= 6779 \text{ km}
 \end{aligned}$$

Q.6 The diameter of Earth is about 1.2756×10^4 km. Express this number in standard form.

Solution:

$$\begin{aligned}
 1.2756 \times 10^4 \text{ km} &= 12756 \times 10^{-4} \times 10^4 \text{ km} \\
 &= 12756 \times 10^{-4+4} \text{ km} \\
 &= 12756 \times 10^0 \text{ km} \\
 &= 12756 \times 1 \text{ km} \\
 &= 12756 \text{ km}
 \end{aligned}$$