

*Scientific Notation - Lesson 1*

Scientific Notation (aka Standard Form) -  
Converting Both Ways

LI

- Change numbers between Full Decimal Form and Scientific Notation.

SC

- Know how to move a decimal point in the correct direction.
- Use the 4-step strategy.

Scientific Notation is a convenient way of writing

**VERY BIG** and very small numbers

$$a \times 10^n$$

$a$  is any number (usually decimal) **between 1 and 10**  
(not equal to 10)

$n$  is an **integer** ( $\dots, -2, -1, 0, 1, 2, \dots$ )

$10^1$  means 10 ( $\times 10$ )

$10^2$  means  $10 \times 10 = 100$  ( $\times 100$ )

$10^3$  means  $10 \times 10 \times 10 = 1\,000$  ( $\times 1\,000$ )

etc.

$10^{-1}$  means  $\frac{1}{10}$  ( $\div 10$ )

$10^{-2}$  means  $\frac{1}{10^2} = \frac{1}{100}$  ( $\div 100$ )

$10^{-3}$  means  $\frac{1}{10^3} = \frac{1}{1\,000}$  ( $\div 1\,000$ )

etc.

Full Decimal Form to Scientific Notation

Step 1 : From the left, write down the first number that's not zero.

Step 2 : Put a decimal point after this number.

Step 3 : Write down the other numbers in order.

Step 4 : Then write  $\times 10^n$ , where  $n$  is the number of decimal places moved to get to the number in the question.

Example 1

Write 48 300 in scientific notation.

48 300 (same as 48 300 . 0)

$$= 4.83 \times 10^4$$

Example 2

Write 0 . 075 6 in scientific notation.

0 . 075 6

$$= 7.56 \times 10^{-2}$$

Example 3

Write 3 . 431 in scientific notation.

3 . 431

$$= 3.431 \times 10^0$$

Write these numbers in scientific notation :

- |    |                     |    |                   |
|----|---------------------|----|-------------------|
| 1  | 0 . 003 67          | 13 | 0 . 607 8         |
| 2  | 46 000              | 14 | 4 . 044           |
| 3  | 1 665 000           | 15 | 0 . 008 02        |
| 4  | 9 . 85              | 16 | 0 . 000 018 608 7 |
| 5  | 0 . 007 009 7       | 17 | 0 . 044 9         |
| 6  | 0 . 000 000 025 698 | 18 | 777 000           |
| 7  | 0 . 700 2           | 19 | 9 046             |
| 8  | 0 . 022 2           | 20 | 0 . 000 000 058 2 |
| 9  | 854 300 000         | 21 | 0 . 000 000 027 7 |
| 10 | 0 . 000 008 211 27  | 22 | 9 821 000 000     |
| 11 | 90 900 000          | 23 | 8 843 200         |
| 12 | 0 . 000 743         | 24 | 30 976 700 000    |

**Answers**

- |    |                          |    |                          |
|----|--------------------------|----|--------------------------|
| 1  | $3.67 \times 10^{-3}$    | 13 | $6.078 \times 10^{-1}$   |
| 2  | $4.6 \times 10^4$        | 14 | $4.044 \times 10^0$      |
| 3  | $1.665 \times 10^6$      | 15 | $8.02 \times 10^{-3}$    |
| 4  | $9.85 \times 10^0$       | 16 | $1.86087 \times 10^{-5}$ |
| 5  | $7.0097 \times 10^{-3}$  | 17 | $4.49 \times 10^{-2}$    |
| 6  | $2.5698 \times 10^{-8}$  | 18 | $7.77 \times 10^5$       |
| 7  | $7.002 \times 10^{-1}$   | 19 | $9.046 \times 10^3$      |
| 8  | $2.22 \times 10^{-2}$    | 20 | $5.82 \times 10^{-8}$    |
| 9  | $8.543 \times 10^8$      | 21 | $2.77 \times 10^{-8}$    |
| 10 | $8.21127 \times 10^{-6}$ | 22 | $9.821 \times 10^9$      |
| 11 | $9.09 \times 10^7$       | 23 | $8.8432 \times 10^6$     |
| 12 | $7.43 \times 10^{-4}$    | 24 | $3.09767 \times 10^{10}$ |



Write these numbers in full decimal form :

1  $3.67 \times 10^{-4}$

2  $4.6 \times 10^5$

3  $1.665 \times 10^7$

4  $9.83 \times 10^0$

5  $7.0097 \times 10^{-2}$

6  $2.5698 \times 10^{-7}$

7  $7.004 \times 10^{-1}$

8  $2.202 \times 10^{-2}$

9  $8.543 \times 10^9$

10  $8.21127 \times 10^{-5}$

11  $9.09 \times 10^6$

12  $7.43 \times 10^{-5}$

13  $6.078 \times 10^{-3}$

14  $4.043 \times 10^0$

15  $8.02 \times 10^{-4}$

16  $1.86087 \times 10^{-6}$

17  $4.49 \times 10^{-1}$

18  $7.77 \times 10^7$

19  $9.046 \times 10^2$

20  $5.82 \times 10^{-9}$

21  $2.77 \times 10^{-7}$

22  $9.821 \times 10^{10}$

23  $8.8432 \times 10^5$

24  $3.09767 \times 10^{11}$

**Answers**

1	0 . 000 367	13	0 . 006 078
2	460 000	14	4 . 043
3	16 650 000	15	0 . 000 802
4	9 . 83	16	0 . 000 001 860 87
5	0 . 070 097	17	0 . 449
6	0 . 000 000 256 98	18	77 700 000
7	0 . 700 4	19	904 . 6
8	0 . 022 02	20	0 . 000 000 005 82
9	8 543 000 000	21	0 . 000 000 277
10	0 . 000 082 112 7	22	98 210 000 000
11	9 090 000	23	884 320
12	0 . 000 074 3	24	309 767 000 000