

BAHRIA COLLEGE ZAFAR CAMPUS E-8
ISLAMABAD

CLASS: IX

SUBJECT: MATHS

ClassNotes

Unit 3

Logarithms

Introduction

- Logarithms were originally developed to simplify complex arithmetic calculations.
- They were designed to transform multiplicative processes into additive ones.

If at first this seems like no big deal,
then try multiplying
2,234,459,912 and 3,456,234,459.

(Without a calculator!)

- Clearly, it is a lot easier to add these two numbers.
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Scientific notation is the way that scientists easily handle very large numbers or very small numbers. For **example**, instead of writing 0.00000000056, we write 5.6×10^{-9} .

65000000.



6.5×10^7

Convert the following #s in ordinary notation to standard scientific notation.

1) 4,030,000

➤ 4.03×10^6

2) .0000988

➤ 9.88×10^{-5}

3) .000000023

➤ 2.3×10^{-8}

$$2 \times 10^{-9}$$

000000002.



9 8 7 6 5 4 3 2 1

0.000000002

Convert from scientific notation to ordinary notation.

10) 1.915×10^7

➤ 19,150,000

11) 6.73×10^{-9}

➤ 0.00000000673

12) 2.9×10^{-8}

➤ 0.000000029

Exercise 3.1

Q1. Express each of the following numbers in scientific notation.

(1) 5700

(2) 49,800,000

(3) 96,000,000

(4) 416.9

(5) 83,000

(6) 0.00643

(7) 0.0074

(8) 60,000,000

(9) 0.00000000395

(10) $\frac{275,000}{0,0025}$

Note:

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

Solution:

1) 5700

$$\frac{5700}{1000} \times 1000 = 5.70 \times 10^3$$

2) 49,800,000

$$\frac{49,800,000}{10000000} \times 10000000 = 4.98 \times 10^7$$

3) 96,000,000

$$\frac{96,000,000}{10000000} \times 10000000 = 9.6 \times 10^7$$

4) 416.9

$$\frac{416.9}{10} = 4169 \times 10^{-1}$$

$$\frac{416.9}{1000} = 1000 \times 10^{-1} = 4.169 \times 10^{3-1} = 4.169 \times 10^2$$

5) 83,000

$$\frac{83,000}{10000} \times 10000 = 8.3 \times 10^4$$

6) 0.00643

$$\frac{0.00643}{100000} \times 643 \times 10^{-5}$$

$$\frac{643}{100} \times 100 \times 10^{-5} = 6.43 \times 10^{2-5} = 6.43 \times 10^{-3}$$

7) 0.0074

$$\frac{0074}{10000} = 74 \times 10^{-4}$$

$$\frac{74}{10} = 10 \times 10^{-4} = 7.4 \times 10^{1-4} = 7.4 \times 10^{-3}$$

8) 60,000,000

$$\frac{60000000}{10000000} \times 10000000 = 6.0 \times 10^7$$

9) 0.00000000395

$$\frac{00000000395}{100000000000} = 395 \times 10^{-11}$$

$$\frac{395}{100} \times 100 \times 10^{-11} = 3.95 \times 10^{2-11} = 3.95 \times 10^{-9}$$

10) $\frac{275,000}{0,0025}$

$$= \frac{275,000}{0,0025}$$

$$= \frac{275 \times 10^3}{25 \times 10^{-4}}$$

$$= 11 \times 10^{3+4}$$

$$= \frac{11}{10} \times 10 \times 10^7 = 1.1 \times 10^{7+1}$$

$$= 1.1 \times 10^8$$

Q2 Express the following numbers in ordinary notation

(1) 6.4×10^{-4}

(2) 5.06×10^{10}

(3) 9.018×10^{-6}

(4) 7.865×10^8

Solution:

1) 6.4×10^{-4}

$$6.4 \times 10^{-4} = \frac{6.4}{10^4}$$

$$\frac{6.4}{10000} = 0.00064$$

2) 5.06×10^{10}

$$5.06 \times 10^{10}$$

$$= \frac{506}{100} \times 10^{10} = 506 \times 10^{10-2}$$

$$506 \times 10^8 = 50,600,000,000$$

3) 9.018×10^{-6}

$$= \frac{9.018}{1000} \times 10^{-6} = 9018 \times 10^{-6-3}$$

$$= 9018 \times 10^{-9} = \frac{9018}{100000000}$$

$$= 0.000009018$$

4) 7.865×10^8

$$7.865 \times 10^8$$

$$= \frac{7.865}{1000} \times 10^8 = 7865 \times 10^{8-3}$$

$$= 7865 \times 10^5 = 785,500,000$$

