Unit No. 2

Logarithms

Exercise No. 2.3

Question No. 1

Find the Characteristic of the Given Numbers:

The characteristic of a logarithm is the whole number part when we express a number in scientific notation.

- **If the number is greater than 1, the characteristic is one less than the number of digits in the whole number part.**
- **If the number is between 0 and 1, the characteristic is negative and found using the position of the first significant digit.**

(i) 5287

Solution:

5287

- In scientific notation: 5.287×10^{3}
- The characteristic is 3.

(ii) 59.28

Solution:

59.28

- In scientific notation: 5.928×10^{1}
- The characteristic is 1.

(iii) 0.0567

Solution:

0.0567

- In scientific notation: 5.67×10^{-2}
- The characteristic is −2.

(iv) 234.7

Solution:

234.7

- In scientific notation: 2.347×10^{2}
- The characteristic is 2.

(v) 0.000049

Solution:

0.000049

- In scientific notation: 4.9×10^{-5}
- The characteristic is −5.

(vi) 145000

Solution:

145000

- In scientific notation: 1.45×10^{5}
- The characteristic is 5.

Question No. 2

Find the Logarithm of the Given Numbers:

Logarithm of a number (log N) is given by:

logN = Characteristic + Mantissa

(i) log 43

Solution:

log 43

$43 = 4.3 \times 10^{1}$

Characteristic = 1

Using log tables: log (4.3) ≈ 0.6335

Log 43 = 1 + 0.6335

= 1.6335

(ii) log 579

Solution:

log 579

$579 = 5.79 \times 10^{2}$

Characteristic = 2

Using log tables: log (5.79) ≈ 0.7627

Log 579= 2 + 0.7627

= 2.7627

(iii) log 1.982

Solution:

log 1.982

$1.982 = 1.982 \times 10^0$

Characteristic = 0

Using log tables: log (1.982) ≈ 0.2971

Log 1.982 = 0 + 0.2971

= 0.2971

(iv) log 0.0876

Solution:

log 0.0876

$0.0876 = 8.76 \times 10^{-2}$

Characteristic = −2

Using log tables: log (8.76) ≈ 0.9425

Log 0.0876= −2 + 0.9425

= -2 + 0.9425

= −1.0575

(v) log 0.047

Solution:

log 0.047

$0.047 = 4.7 \times 10^{-2}$

Characteristic = −2

Using log tables: log (4.7) ≈ 0.6721

Log 0.047= −2 + 0.6721

= −1.3279

(vi) log 0.000354

Solution:

log 0.000354

$0.000354 = 3.54 \times 10^{-4}$

Characteristic = −4

Using log tables: log (3.54) ≈ 0.5490

Log 0.000354= −4 + 0.5490

= −3.4510

Question No. 3

If log 3.177 = 0.5019, then find:

Given:

Log 3.177= 0.5019

(i) log 3177

Solution:

log 3177

= log (3.177×10^3)

= log 3.177 + 3 log 10

= 0.5019 + 3

= 3.5019

(ii) log 31.77

Solution:

Log 31.77

= log (3.177×10^1)

= log 3.177 + 1 log 10

= 0.5019 + 1

= 1.5019

(iii) log 0.03177

Solution:

Log 0.03177

= log (3.177×10^{-2})

= log 3.177 + (-2) log 10

= 0.5019 - 2

= -1.4981

Question No. 4

Find the Value of x:

(i) log x = 0.0065

Solution:

log x = 0.0065

Taking antilog:

x = antilog 0.0065

x = 1.015

(ii) log x = 1.192

Solution:

log x = 1.192

Taking antilog:

x = antilog 1.192

x = 15.56

(iii) log x = −3.434

Solution:

log x = −3.434

Taking antilog:

x = antilog -3.434:

x = 0.0003681

(iv) log x = −1.5726

Solution:

log x = −1.5726

Taking antilog:

x = antilog -1.5726:

x = 0.02675

(v) log x = 4.3561

Solution:

log x = 4.3561

Taking antilog:

x = antilog 4.3561:

x = 22700

(vi) log x= −2.0184

Solution:

log x= −2.0184

log x= −2.0184

Taking antilog:

x = antilog -2.0184

x = 0.009585