

Chapter # 2

Logarithms

Exercise # 2.3

Question # 1: Find characteristic of the following numbers.

Characteristic is power of 10 when a number is in scientific notation

Mantissa is 'log' of coefficient/decimal part, of number in scientific notation

Rough Work

(i) **5287**

Characteristic = 3 (Answer)

5.287×10^3

(ii) **59.28**

Characteristic = 1 (Answer)

5.928×10^1

(iii) **0.0567**

Characteristic = -2 (Answer)

5.67×10^{-2}

(iv) **234.7**

Characteristic = 2 (Answer)

2.347×10^2

(v) **0.000049**

Characteristic = -5 (Answer)

4.9×10^{-5}

(vi) **145000**

Characteristic = 5 (Answer)

1.45×10^5

Question # 2: Find logarithm of the following numbers.

$\therefore \log(\text{Number}) = \text{Characteristic} + \text{Mantissa}$

Rough Work

(i) **43**

Characteristic = 1 Mantissa = 0.6335

$\log 43 = 1 + 0.6335$

$\log 43 = 1.6335$ (Answer)

4.3×10^1

(ii) **579**

Characteristic = 2 Mantissa = 0.7627

$\log 579 = 2 + 0.7627$

$\log 579 = 2.7627$ (Answer)

5.79×10^2

(iii) **1.982**

Characteristic = 0 Mantissa = 0.2971

$\log 1.982 = 0 + 0.2971$

$\log 1.982 = 0.2971$ (Answer)

1.982×10^0

(iv) **0.0876**

Characteristic = -2 Mantissa = 0.9425

$\log 0.0876 = -2 + 0.9425$

$\log 0.0876 = -1.0575$ (Answer)

8.76×10^{-2}

(v) **0.047**

Characteristic = -2 Mantissa = 0.6721

$\log 0.047 = -2 + 0.6721$

4.7×10^{-2}

$$\log 0.047 = -1.3279 \quad (\text{Answer})$$

(vi) **0.000354**

$$\text{Characteristic} = -4 \quad \text{Mantissa} = 0.5490$$

$$\log 0.000354 = -4 + 0.5490$$

$$\log 0.000354 = -3.4510 \quad (\text{Answer})$$

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

Question # 3: If $\log 3.177 = 0.5019$, then find:

Rough Work

(i) **$\log 3177$**

$$\text{Characteristic} = 3 \quad \text{Mantissa} = 0.5019$$

$$\log 3177 = 3 + 0.5019$$

$$\log 3177 = 3.5019 \quad (\text{Answer})$$

$$3.177 \times 10^3$$

(ii) **$\log 31.77$**

$$\text{Characteristic} = 1 \quad \text{Mantissa} = 0.5019$$

$$\log 31.77 = 1 + 0.5019$$

$$\log 31.77 = 1.5019 \quad (\text{Answer})$$

$$3.177 \times 10^1$$

(iii) **$\log 0.03177$**

$$\text{Characteristic} = -2 \quad \text{Mantissa} = 0.5019$$

$$\log 0.03177 = -2 + 0.5019$$

$$\log 0.03177 = -1.4981 \quad (\text{Answer})$$

$$3.177 \times 10^{-2}$$

Question # 4: Find the value of x .

(i) **$\log x = 0.0065$**

$$\text{Characteristic} = 0 \quad \text{Mantissa} = 0.0065$$

$$x = \text{antilog}(0.0065)$$

$$x = 1.015 \quad (\text{Answer})$$

(ii) **$\log x = 1.192$**

$$\text{Characteristic} = 1 \quad \text{Mantissa} = 0.192$$

$$x = \text{antilog}(0.192)$$

$$x = 1.556 \quad (\text{Due to Charac} = 1)$$

$$x = 15.56 \quad (\text{Answer})$$

(iii) **$\log x = -3.434$**

Adding and subtracting '4'

$$\log x = -4 + 4 - 3.434$$

$$\log x = -4 + 0.566$$

$$\text{Characteristic} = -4 \quad \text{Mantissa} = 0.566$$

$$x = \text{antilog}(0.566)$$

$$x = 3.6813 \quad (\text{Due to Charac} = -4)$$

$$x = 0.0003681 \quad (\text{Answer})$$

(iv) **$\log x = -1.5726$**

Adding and subtracting '2'

$$\log x = -2 + 2 - 1.5726$$

$$\log x = -2 + 0.4274$$

$$\text{Characteristic} = -2 \quad \text{Mantissa} = 0.4274$$

$$x = \text{antilog}(0.4274)$$

$$x = 2.6755 \quad (\text{Due to Charac} = -2)$$

$$x = 0.02675 \quad (\text{Answer})$$

(v) $\log x = 4.3561$

$$\text{Characteristic} = 4 \quad \text{Mantissa} = 0.3561$$

$$x = \text{antilog}(0.3561)$$

$$x = 2.2704 \quad (\text{Due to Charac} = 4)$$

$$x = 22704 \quad (\text{Answer})$$

(vi) $\log x = -2.0184$

Adding and subtracting '3'

$$\log x = -3 + 3 - 2.0184$$

$$\log x = -3 + 0.9816$$

$$\text{Characteristic} = -3 \quad \text{Mantissa} = 0.9816$$

$$x = \text{antilog}(0.9816)$$

$$x = 9.5852 \quad (\text{Due to Charac} = -3)$$

$$x = 0.009585 \quad (\text{Answer})$$

Alternative Method (Question # 4)

(i) $\log x = 0.0065$

Taking 'Antilog' on both sides

$$\text{Antilog } \log x = \text{Antilog}(0.0065)$$

$$x = 1.015$$

(iii) $\log x = -3.434$

Taking 'Antilog' on both sides

$$\text{Antilog } \log x = \text{Antilog}(-3.434)$$

$$x = 0.0003681$$

(v) $\log x = 4.3561$

Taking 'Antilog' on both sides

$$\text{Antilog } \log x = \text{Antilog}(4.3561)$$

$$x = 22704$$

(ii) $\log x = 1.192$

Taking 'Antilog' on both sides

$$\text{Antilog } \log x = \text{Antilog}(1.192)$$

$$x = 15.56$$

(iv) $\log x = -1.5726$

Taking 'Antilog' on both sides

$$\text{Antilog } \log x = \text{Antilog}(-1.5726)$$

$$x = 0.02675$$

(vi) $\log x = -2.0184$

Taking 'Antilog' on both sides

$$\text{Antilog } \log x = \text{Antilog}(-2.0184)$$

$$x = 0.009585$$