

Exercise - 2.3

Complete Solution by Mubashar Siddique

Question 1: Find the characteristic of the following numbers

1. **Number:** 5287

Digits before decimal = 4

$$\text{Characteristic} = 4 - 1 = 3$$

Answer: 3

2. **Number:** 59.28

Digits before decimal = 2

$$\text{Characteristic} = 2 - 1 = 1$$

Answer: 1

3. **Number:** 0.0567

Zeros before first non-zero digit = 1

$$\text{Characteristic} = -(1 + 1) = -2$$

Answer: -2

4. **Number:** 234.7

Digits before decimal = 3

$$\text{Characteristic} = 3 - 1 = 2$$

Answer: 2

5. **Number:** 0.000049

Zeros before first non-zero digit = 4

$$\text{Characteristic} = -(4 + 1) = -5$$

Answer: -5

6. **Number:** 145000

Digits before decimal = 6

$$\text{Characteristic} = 6 - 1 = 5$$

Answer: 5

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Question 2: Find the logarithm (base 10) of the following numbers

(i) 43

$$\text{Characteristic} = 2 - 1 = 1$$

$$\text{Mantissa} = 0.6335$$

$$\log(43) = 1 + 0.6335 = \mathbf{1.6335}$$

(ii) 579

$$\text{Characteristic} = 3 - 1 = 2$$

$$\text{Mantissa} = 0.7627$$

$$\log(579) = 2 + 0.7627 = \mathbf{2.7627}$$

(iii) 1.982

$$\text{Characteristic} = 1 - 1 = 0$$

$$\text{Mantissa} = 0.2971$$

$$\log(1.982) = 0 + 0.2971 = \mathbf{0.2971}$$

(iv) 0.0876

$$\text{Characteristic} = -(1 + 1) = -2$$

$$\text{Mantissa} = 0.9425$$

$$\log(0.0876) = -2 + 0.9425 = \mathbf{-1.0575}$$

(v) 0.047

$$\text{Characteristic} = -(1 + 1) = -2$$

$$\text{Mantissa} = 0.6721$$

$$\log(0.047) = -2 + 0.6721 = \mathbf{-1.3279}$$

(vi) 0.000354

$$\text{Characteristic} = -(3 + 1) = -4$$

$$\text{Mantissa} = 0.5490$$

$$\log(0.000354) = -4 + 0.5490 = \mathbf{-3.4510}$$

Question 3: If $\log 3.177 = 0.5019$, find the following

(i) $\log 3177$

$$\text{Characteristic} = 4 - 1 = 3$$

$$\text{Mantissa} = 0.5019$$

$$\log(3177) = 3 + 0.5019 = \mathbf{3.5019}$$

(ii) $\log 31.77$

$$\text{Characteristic} = 2 - 1 = 1$$

$$\text{Mantissa} = 0.5019$$

$$\log(31.77) = 1 + 0.5019 = \mathbf{1.5019}$$

(iii) $\log 0.03177$

$$\text{Characteristic} = -(1 + 1) = -2$$

$$\text{Mantissa} = 0.5019$$

$$\log(0.03177) = -2 + 0.5019 = \mathbf{-1.4981}$$

Q4: Find the value of x

(i) $\log x = 0.0065$

$$\text{Characteristic} = 0$$

$$\text{Mantissa} = 0.0065$$

$$\text{Table value of mantissa} = 1015$$

$$\log x = 0.0065 \Rightarrow x = \text{antilog}(1015)$$

$$x = 1.015 \quad \mathbf{\text{Answer}}$$

(ii) $\log x = 1.192$

$$\text{Characteristic} = 1$$

$$\text{Mantissa} = 0.192$$

$$\text{Table value of mantissa} = 1556$$

$$\log x = 1.192 \Rightarrow x = \text{antilog}(1556)$$

$$x = 15.56 \quad \mathbf{\text{Answer}}$$

(iii) $\log x = -3.434$

We make the number positive:

$$\log x = -3.434 = (-3.434 + 4) - 4 = 0.566 - 4 = -4 + 0.566$$

Characteristic = -4

Mantissa = 0.566

Table value of mantissa = 3681

$$\log x = -4 + 0.566 \Rightarrow x = \text{antilog}(3681)$$

Since characteristic is negative, we move the decimal point 4 places to the left:

$$x = 0.0003681 \quad \textbf{Answer}$$