Review Exercise 3

Q3. Find the value of 'x' in the following.

i) $\log_3 x = 5$

Sol. $\log_3 x = 5$

In exponential form

$x = 3^5$

$\Rightarrow \quad x = 243$

ii) $\log_4 256 = x$

Sol. $\log_4 256 = x$

In exponential form

$4^x = 256$

$4^x = 4^4$

$\Rightarrow \quad x = 4$

iii) $\log_{625} 5 = \frac{1}{4}x$

Sol. $\log_{625} 5 = \frac{1}{4}x$

In exponential form

$(625)^{\frac{1}{4}x} = 5$

$(5^4)^{\frac{1}{4}x} = 5$

$5^{4\times\frac{1}{4}x} = 5$

$5^x = 5^1$

$\Rightarrow \quad x = 1$

iv) $\log_{64} x = -\frac{2}{3}$

Sol. $\log_{64} x = -\frac{2}{3}$

In exponential form

$x = 64^{\frac{-2}{3}}$

$x = (4^3)^{\frac{-2}{3}}$

$= 4^{\not{3}\left(\frac{-2}{\not{3}}\right)}$

$x = 4^{-2}$

$x = \frac{1}{4^2}$

$x = \frac{1}{16}$

Q4. Find the value of 'x' in the following.

i) $\log x = 2.4543$

Characteristic = 2

Mantissa = .4543

x = antilog 2.4543

= 284.6

ii) $\log x = 0.1821$

Characteristic = 0

Mantissa = .1821

x = antilog 0.1821

= 1.521

iii) $\log x = 0.0044$

Characteristic = 0

Mantissa = .0044

x = antilog 0.0044

x = 1.010

iv) $\log x = \bar{1}.6238$

Characteristic = $\bar{1}$

Mantissa = .6238

x = antilog $\bar{1}.6238$

x = 0.4205

Q5. If log2 = 0.3010, log3 = 0.4771 and log 5 = 0.6990, then find the values of the following.

i) log45

Sol. log45

$= \log 3^2 \times 5$

$= \log 3^2 + \log 5$

$= 2\log 3 + \log 5$

$= 2(0.4771) + 0.6990$

$= 0.9542 + 0.6990$

$= 1.6532$

ii) $\log \frac{16}{15}$

$= \log \frac{2^4}{3 \times 5}$

$= \log 2^4 - \log 3 - \log 5$

$= 4\log 2 - \log 3 - \log 5$

$= 4(0.3010) - 0.4771 - 0.6990$

$= 1.2040 - 0.4771 - 0.6990$

$= 0.0279$

iii) **log 0.048**

$= \log \frac{48}{1000}$

$= \log \frac{16 \times 3}{10^3}$

$= \log \frac{2^4 \times 3}{2^3 \times 5^3}$

$= \log \frac{2 \times 3}{5^3}$

$= \log 2 + \log 3 - \log 5^3$

$= \log 2 + \log 3 - 3\log 5$

$= 0.3010 + 0.4771 - 3(0.6990)$

$= -1.3189$

$= -2 + 2 - 1.3189$

$= -2 + 0.6811$

$= \bar{2}.6811$

Q6. Simplify the following:

i) $\sqrt[3]{25.47}$

Sol. Let $x = (25.47)^{\frac{1}{3}}$

Taking log of both sides

$\log x = \log (25.47)^{\frac{1}{3}}$

$= \frac{1}{3}\log(25.47)$

$= \frac{1}{3}(1.4060)$

$\log x = 0.4687$

Characteristic = 0

Mantissa = .4687

x = antilog 0.4687

x = 2.942

ii) $\sqrt[5]{342.2}$

Sol. Let $x = (342.2)^{\frac{1}{5}}$

Taking log of both sides

$\text{Log } x = \log (342.2)^{\frac{1}{5}}$

$= \frac{1}{5}\log(342.2)$

$= \frac{1}{5}(2.5343)$

$\log x = 0.5069$

Characteristic = 0

Mantissa = .5069

x = antilog 0.5069

x = 3.213

iii) $\frac{(8.97)^3 \times (3.95)^2}{\sqrt[3]{15.37}}$

Sol: Let $x = \frac{(8.97)^3 \times (3.95)^2}{(15.37)^{\frac{1}{3}}}$

Taking log of both sides

$\log x = \log \frac{(8.97)^3 \times (3.95)^2}{(15.37)^{\frac{1}{3}}}$

$$= \log(8.97)^3 + \log(3.95)^2 - \log(15.37)^{\frac{1}{3}}$$

$$= 3\log(8.97) + 2\log(3.95) - \frac{1}{3}\log(15.37)$$

$$= 3(0.9528) + 2(0.5966) - \frac{1}{3}(1.1867)$$

$$= 2.8584 + 1.1932 - 0.3956$$

$\log x = 3.6560$

Characteristic = 3

Mantissa = .6560

x = antilog 3.6560

$x = 4529$

Objective

1. If $a^x = n$, then _____

(a) $a = \log_x n$ (b) $x = \log_n a$

(c) $x = \log_a n$ (d) $a = \log_n x$

2. The relation of $y = \log_z x$ implies

(a) $x^y = z$ (b) $z^y = x$

(c) $x^z = y$ (d) $y^z = x$

3. The logarithm of unity to any base is ___

(a) 1 (b) 10

(c) e (d) 0

4. The logarithm of any number to itself as base is___

(a) 1 (b) 0

(c) −1 (d) 10

5. log e = ____ where e ≈ 2. 718

(a) 0 (b) 0.4343

(c) ∞ (d) 1

6. The value of $\log\left(\frac{p}{q}\right)$ is ___

(a) log p −log q

(b) $\frac{\log p}{\log q}$

(c) log p + log q

(d) log q − log p

7. log m^n can be written as

(a) $(\log m)^n$ (b) m log n

(c) n log m (d) log (mn)

8. $\log_b a \times \log_c b$ can be written as___

(a) $\log_c a$ (b) $\log_a c$

(c) $\log_a b$ (d) $\log_b c$

9. $\text{Log}_y x$ will be equal to___

(a) $\frac{\log_z x}{\log_y z}$ (b) $\frac{\log_x z}{\log_y z}$

(c) $\frac{\log_z x}{\log_z y}$ (d) $\frac{\log_{zy}}{\log_z x}$

10. For common logarithm, the base is____

(a) 2 (b) 10

(c) e (d) 1

11. For natural logarithm, the base is___

(a) 10 (b) e

(c) 2 (d) 1

12. The integral part of the common logarithm of a number is called the___

(a) Characteristic (b) Mantissa

(c) Logarithm (d) None

13. The decimal part of the common logarithm of a number is called the _____:

(a) Characteristic (b) Mantissa

(c) Logarithm (d) None

14. If x = log y, then y is called the ___ of x.
(a) Antilogarithm (b) Logarithm
(c) Characteristic (d) None

15. If the characteristic of the logarithm of a number is $\bar{2}$, that number will have zero (s) immediately after the decimal point.
(a) One (b) Two
(c) Three (d) Four

16. If the characteristic of the logarithm of a number is 1, that number will have ____ digits in its integral part
(a) 2
(b) 3
(c) 4
(d) 5

17. The value of x in $\log_3 x = 5$ is_____
(a) 243 (b) 143
(c) 200 (d) 144

18. The value of x in log x = 2.4543 is
(a) 284.6 (b) 1.521
(c) 1.1010 (d) 0.4058

19. The number corresponding to a given logarithm is known as ___
(a) Logarithm (b)Antilogarithm
(c) Characteristic (d) None

20. 30600 in scientific notation is ___
(a) 3.06×10^4 (b) 3.006×10^4
(c) 30.6×10^4 (d) 306×10^4

21. 6.35×10^6 in ordinary notation is___
(a) 6350000 (b) 635000
(c) 6350 (d) 63500

22. A number written in the form $a \times 10^n$, where $1 \le a < 10$ and n is an integer is called ____
(a) Scientific notation
(b) Ordinary notation
(c) Logarithm notation
(d) None

23. log p – log q is same as
(a) $\log\left(\frac{q}{p}\right)$
(b) $\log(p-q)$
(c) $\frac{\log p}{\log q}$
(d) $\log\left(\frac{p}{q}\right)$

ANSWER KEY

1.	c	**2.**	b	**3.**	d	**4.**	a	**5.**	b
6.	a	**7.**	c	**8.**	a	**9.**	c	**10.**	b
11.	b	**12.**	a	**13.**	b	**14.**	a	**15.**	a
16.	a	**17.**	a	**18.**	a	**19.**	b	**20.**	a
21.	a	**22.**	a	**23.**	d				