

Exercise 3.2

Q.1 Find the common logarithms of each of the following numbers.

(i) 232.92

Solution: 232.92

Suppose $x = 232.92$

Taking log

$\log x = \log 232.92$

$Ch = 2$

Mantissa = 0.3672

$\log x = 2.3672$ **Ans**

(ii) 29.326

Solution: 29.326

Suppose $x = 29.326$

Taking log

$\log x = \log 29.326$

$Ch = 1$

Mantissa = 0.4672

$\log x = 1.4672$ **Ans**

(iii) 0.00032

Solution: 0.00032

Suppose $x = 0.00032$

Taking log

$\log x = \log 0.00032$

$Ch = \bar{4}$

Mantissa = 0.5051

$\log x = \bar{4}.5051$ **Ans**

(iv) 0.3206

Solution: 0.3206

Suppose $x = 0.3206$

Taking log:

$\log x = \log 0.3206$

$Ch = \bar{1}$

Mantissa = 0.5059

$\log x = \bar{1}.5059$ **Ans**

Q.2 If $\log 31.09 = 1.4926$, find the value of the following.

If

$\log 31.09 = 1.4926$

Then

(i) $\log 3.109 = 0.4926$

(ii) $\log 310.9 = 2.4926$

(iii) $\log 0.003109 = \bar{3}.4926$

(iv) $0.3109 = \bar{1}.4926$

Solution:

(i) $\log 3.109$

Characteristics = 0

Mantissa = 0.4926

$\log 3.109 = 0.4926$ **Ans**

(ii) $\log 310.9$

Characteristics = 2

Mantissa = 0.4926

$\log 310.9 = 2.4926$ **Ans**

(iii) $\log 0.003109$

Characteristics = $\bar{3}$

Mantissa = 0.4926

$\log 0.003109 = \bar{3}.4926$ **Ans**

(iv) $\log 0.3109$

Characteristics = $\bar{1}$

Mantissa = 0.4926

$\log 0.3109 = \bar{1}.4926$ **Ans**

Q.3 Find the numbers whose common logarithms are

(i) 3.5621

Solution:

$\log x = 3.5621$

$Ch = 3$ (If ch is positive, then plus for reference point)

Mantissa = 0.5621

$x = \text{antilog } 3.5621$

$x = 3649.0$ **Ans**

(ii) $\bar{1}.7427$

Solution:

$\log x = \bar{1}.7427$

$Ch = \bar{1}$

$$\text{Mantissa} = 0.7427$$

$$x = \text{anti log } \bar{1}.7427$$

$$x = 0.5530 \text{ Ans}$$

Q.4 What replacement for the unknown in each of the following will make the true statements?

(i) $\log_3 81 = L$

Solution: $\log_3 81 = L$

Writing in exponential form.

$$3^L = 81$$

$$3^L = 3^4$$

\therefore Bases are equal so

$$L = 4 \text{ Ans}$$

(ii) $\log_a 6 = 0.5$

Solution: $\log_a 6 = 0.5$

$$a^{0.5} = 6$$

$$a^{\frac{1}{2}} = 6$$

$$\sqrt{a} = 6 \text{ Taking square on both}$$

sides

$$\sqrt{(a)^2} = (6)^2$$

$$a = 36 \text{ Ans}$$

(iii) $\log_5 n = 2$

Write in exponential form

$$5^2 = n$$

$$25 = n$$

$$\text{Or } n = 25 \text{ Ans}$$

(iv) $10^p = 40$

Solution: $10^p = 40$

Changing into logarithmic form

$$p = \log_{10} 40$$

$$= \log 40$$

$$= 1.6021 \text{ Ans}$$

Q.5 Evaluate.

(i) $\log_2 \frac{1}{128}$

Solution: $\log_2 \frac{1}{128}$

Suppose $\log_2 \frac{1}{128} = x$

Writing in exponential form.

$$2^x = \frac{1}{128}$$

$$2^x = \frac{1}{2^7}$$

$$2^x = 2^{-7}$$

\therefore Bases are equal so

$$x = -7 \text{ Ans}$$

(ii) **log 512 to the base $2\sqrt{2}$**

Solution: $\log_{2\sqrt{2}} 512 = x$

Writing in exponential form

$$(2\sqrt{2})^x = 512$$

$$\left(2^1 \cdot 2^{\frac{1}{2}}\right)^x = 2^9$$

$$\left(2^{\frac{3}{2}}\right)^x = 2^9$$

$$2^{\frac{3}{2}x} = 2^9$$

\therefore Bases are equal so

$$\frac{3}{2}x = 9$$

$$x = \frac{9 \times 2}{3}$$

$$x = \frac{18}{3}$$

$$x = 6 \text{ Ans}$$

Q.6 Find the value of x from the following statements.

(i) $\log_2 x = 5$

Solution: $\log_2 x = 5$

Write in exponential form.

$$2^5 = x$$

$$32 = x \text{ Ans}$$

(ii) $\log_{81} 9 = x$

Solution: $\log_{81} 9 = x$

Writing in the exponential form.

$$81^x = 9$$

$$(9^2)^x = 9$$

$$9^{2x} = 9$$

$$2x = 1$$

$$x = \frac{1}{2} \text{ Ans}$$

(iii) $\log_{64} 8 = \frac{x}{2}$

Solution: $\log_{64} 8 = \frac{x}{2}$

Writing in exponential form.

$$64^{\frac{x}{2}} = 8$$

$$(8^2)^{\frac{x}{2}} = 8$$

$$8^x = 8$$

$$x = 1 \text{ Ans}$$

(iv) $\log_x 64 = 2$

Solution: $\log_x 64 = 2$

Writing in exponential form

$$x^2 = 64$$

$$x^2 = 8^2$$

$$x = 8 \text{ Ans}$$

(v) $\log_3 x = 4$

Solution: $\log_3 x = 4$

$$3^4 = x$$

$$81 = x$$

Or $x = 81 \text{ Ans}$