

EXERCISE # 2.2

Q#1: Express each of the following in logarithmic form:

(i) $10^3 = 1000$

Solution:

$$10^3 = 1000$$

$$\log_{10} 1000 = 3$$

(ii) $2^8 = 256$

Solution:

$$2^8 = 256$$

$$\log_2 256 = 8$$

(iii) $3^{-3} = \frac{1}{27}$

Solution:

$$3^{-3} = \frac{1}{27}$$

$$\log_3 \frac{1}{27} = -3$$

(iv) $20^2 = 400$

Solution:

$$20^2 = 400$$

$$\log_{20} 400 = 2$$

(v) $16^{-\frac{1}{4}} = \frac{1}{2}$

Solution:

$$16^{-\frac{1}{4}} = \frac{1}{2}$$

$$\log_{16} \frac{1}{2} = -\frac{1}{4}$$

(vi) $11^2 = 121$

Solution:

$$11^2 = 121$$
$$\boxed{\log_{11} 121 = 2}$$

(vii) $p = q^r$

Solution:

$$p = q^r$$
$$\boxed{\log_q p = r}$$

(viii) $(32)^{-\frac{1}{5}} = \frac{1}{2}$

Solution:

$$(32)^{-\frac{1}{5}} = \frac{1}{2}$$
$$\boxed{\log_{32} \frac{1}{2} = -\frac{1}{5}}$$

Q#2: Express each of the following in exponential form:

(i) $\log_5 125 = 3$

Solution:

$$\log_5 125 = 3$$
$$\boxed{5^3 = 125}$$

(ii) $\log_2 16 = 4$

Solution:

$$\log_2 16 = 4$$
$$\boxed{2^4 = 16}$$

(iii) $\log_{23} 1 = 0$

Solution:

$$\log_{23} 1 = 0$$
$$\boxed{23^0 = 1}$$

(iv) $\log_5 5 = 1$

Solution:

$$\log_5 5 = 1$$
$$\boxed{5^1 = 5}$$

(v) $\log_2 \frac{1}{8} = -3$

Solution:

$$\log_2 \frac{1}{8} = -3$$
$$\boxed{2^{-3} = \frac{1}{8}}$$

(vi) $\frac{1}{2} = \log_9 3$

Solution:

$$\frac{1}{2} = \log_9 3$$
$$\boxed{9^{\frac{1}{2}} = 3}$$

(vii) $5 = \log_{10} 100000$

Solution:

$$5 = \log_{10} 100000$$
$$\boxed{10^5 = 100000}$$

(viii) $\log_4 \frac{1}{16} = -2$

Solution:

$$\log_4 \frac{1}{16} = -2$$
$$\boxed{4^{-2} = \frac{1}{16}}$$

Q#3: Find the value of x in each of the following:

(i) $\log_x 64 = 3$

Solution:

$$\log_x 64 = 3$$

$$x^3 = 64$$

$$x^3 = 4^3$$

$$\boxed{x = 4}$$

(ii) $\log_5 1 = x$

Solution:

$$\log_5 1 = x$$

$$5^x = 1$$

$$5^x = 5^0$$

$$\boxed{x = 0}$$

(iii) $\log_x 8 = 1$

Solution:

$$\log_x 8 = 1$$

$$x^1 = 8$$

$$\boxed{x = 8}$$

(iv) $\log_{10} x = -3$

Solution:

$$\log_{10} x = -3$$

$$10^{-3} = x$$

$$x = 10^{-3}$$

$$x = \frac{1}{10^3}$$

$$\boxed{x = \frac{1}{1000}}$$

(v) $\log_4 x = \frac{3}{2}$

Solution:

$$\log_4 x = \frac{3}{2}$$

$$4^{\frac{3}{2}} = x$$

$$x = 4^{\frac{3}{2}}$$

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

$$x = 2^3$$

$$\boxed{x = 8}$$

(vi) $\log_2 1024 = x$

Solution:

$$\log_2 1024 = x$$

$$2^x = 1024$$

$$2^x = 2^{10}$$

$$\boxed{x = 10}$$

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