

Exercise 2.2

(1)

Q1: Express each of the following in logarithmic form.

(i) $10^3 = 1000$

Solution:

$$10^3 = 1000$$

Its logarithmic form is:

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

$$(ii) 2^8 = 256$$

Solution:

$$2^8 = 256$$

Its logarithmic form is:

$$\log_2 256 = 8$$

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

Solution:

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

Its logarithmic form is:

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

$$(iv) 20^2 = 400$$

Solution:

$$20^2 = 400$$

(2)

(3)

Its logarithmic form is:

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

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

Solution:

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

Its logarithmic form is:

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

$$(vi) 11^2 = 121$$

Solution:

$$11^2 = 121$$

Its logarithmic form is:

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

(vii) $P = q^r$

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Solution:

$$P = q^r$$

or

$$q^r = P$$

Its logarithmic form is:

$$\log_{\sqrt{q}} P = r$$

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

Solution:

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

Its logarithmic form is:

$$\log_{\sqrt{32}} \frac{1}{2} = -\frac{1}{5}$$

Q2: Express each of the following in exponential form: (5)

(i) $\log_5 125 = 3$

Solution:

$$\log_5 125 = 3$$

Its exponential form is:

$$5^3 = 125$$

(ii) $\log_2 16 = 4$

Solution:

$$\log_2 16 = 4$$

Its exponential form is:

$$2^4 = 16$$

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

Solution:

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

Its exponential form is:

$$23^0 = 1$$

(iv) $\log_5 5 = 1$

Solution:

$$\log_5 5 = 1$$

Its exponential form is:

$$5^1 = 5$$

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

Solution:

$$\log_2 \frac{1}{8} = -3$$

Its exponential form is :

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

(vi) $\frac{1}{2} = \log_{\sqrt{9}} 3$

Solution :

$$\frac{1}{2} = \log_{\sqrt{9}} 3$$

or

$$\log_{\sqrt{9}} 3 = \frac{1}{2}$$

Its exponential form is :

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

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

Solution :

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

or

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

Its exponential form is :

(8)

$$10^5 = 100000$$

$$(viii) \log_4 \frac{1}{6} = -2$$

Solution:

$$\log_4 \frac{1}{6} = -2$$

Its exponential form is :

$$4^{-2} = \frac{1}{6}$$

Q3: Find the value of x in each of the following.

$$(i) \log_n 64 = 3$$

Solution:

$$\log_n 64 = 3$$

Its exponential form is:

$$x^3 = 64$$

$$x^3 = 4^3$$

$$\therefore x = 4$$

$$\boxed{x = 4}$$

4	64
4	16
4	4
	1

(ii) $\log_5 1 = x$

Solution:

$$\log_5 1 = x$$

Its exponential form is:

$$5^x = 1$$

$$5^x = 5^0$$

$$\therefore 5^x = 1$$

$$\boxed{x = 0}$$

$$(iii) \log_n 8 = 1$$

(10)

Solution:

$$\log_n 8 = 1$$

Its exponential form is:

$$n^1 = 8$$

$$n^1 = 8^1$$

$$\boxed{n = 8}$$

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

Solution:

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

Its exponential form is:

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

or

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

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

$$(x)' = \left(\frac{1}{1000}\right)'$$

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

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

Solution:

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

Its exponential form is.

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

or

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

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

$$x = 2^3$$

$$x = 2 \times 2 \times 2$$

$$x = 8$$

$$(vi) \log_2 1024 = x$$

Solution:

$$\log_2 1024 = x$$

Its exponential form is.

$$2^x = 1024$$

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

$$\boxed{x = 10}$$

(12)

2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1