Chapter # 3

LAWS OF EXPONENTS AND LOGARITHM

EXERCISE 3.1

Simplify:

Q.1 $2^5 \cdot 2^2$

Solution:

$= 2^5 \times 2^2$
$= 2^{5+2}$
$= 2^7$ ***Ans***

Q.2 $3^3 \cdot 3^4 \cdot 3^5$

Solution:

$= 3^3 \times 3^4 \times 3^5$
$= 3^{3+4+5}$
$= 3^{12}$ ***Ans***

Q.3 $x^5 \cdot x^7$

Solution:

$= x^5 \times x^7$
$= x^{5+7}$
$= x^{12}$ ***Ans***

Q.4 $(1/2)^2 \cdot \left(\frac{1}{2}\right)^3 \cdot (1/2)^4$

Solution:

$= (1/2)^2 \times (1/2)^3 \times (1/2)^4$
$= (1/2)^{2+3+4}$
$= (1/2)^9$ ***Ans***

Q.5 $bc^2 \cdot b^2c^3$

Solution:

$= bc^2 \times b^2c^3$
$= b \times c^2 \times b^2 \times c^3$

$= b^{1+2} \times c^{2+3}$

$= b^2 \times c^5$

$= b^3c^5$ **Ans**

Q.6 $x^2 \cdot x^6 \cdot x^8$

Solution:

$= x^2 \times x^6 \times x^8$

$= x^{2+6+8}$

$= x^{16}$ **Ans**

Q.7 $(2^2)^3$

Solution:

$= (2^2)^3$

$= 2^{2\times 3}$

$= 2^6$ **Ans**

Q.8 $(a^4)^3$

Solution:

$= (a^4)^3$

$= a^{4\times 3}$

$= a^{12}$ **Ans**

Q.9 $[(-3)^2]^4$

Solution:

$= [(-3)^2]^5$

$= (-3)^{2-5}$

$= (-3)^3$ **Ans**

Q.10 $\left[\left(\frac{-2}{7}\right)^2\right]^4$

Solution:

$$\left[\left(\frac{-2}{7}\right)^2\right]^9$$

$$=\left(\frac{-2}{7}\right)^{2\times 9}$$

$$=\left(\frac{-2}{7}\right)^{18}$$ **Ans**

Q.11 $(2 \times 3)^3$

Solution:

$$(2 \times 3)^3$$
$$= (6)^3$$
$$= 6 \times 6 \times 6$$
$$= 216 \quad \textit{Ans}$$

Q.12 $\left(\frac{1}{3} \times \frac{1}{5}\right)^2$

Solution:

$$\left(\frac{1}{3} \times \frac{1}{5}\right)^2 = \left(\frac{1}{15}\right)^2$$
$$= \frac{1}{15} \times \frac{1}{15}$$
$$= \frac{1}{225} \quad \textit{Ans}$$

Q.13 $[3 \times (-4)]^2$

Solution:

$$[3 \times (-4)]^2$$
$$= [-12]^2$$
$$= -12 \times -12$$
$$= 144 \textit{ Ans}$$

$$[3 \times (-4)^2$$
$$= (3)^2\ (-4)^2$$
$$= 9 \times 16$$
$$= 144 \textit{ Ans}$$

Q.14 $(a^2b^3)^4$

Solution:

$$(a^2b^3)^4$$
$$= (a^2)^4 - b^{3 \times 4}$$
$$= a^{2 \times 4} - b^{12}$$
$$= a^8b^{12} \quad \textit{Ans}$$

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EXERCISE 3.2

Q.1 $\left(\frac{3}{4}\right)^3$

Solution:

$$\left(\frac{3}{4}\right)^3$$

$$= \frac{3^3}{4^3} = \frac{3 \times 3 \times 3}{4 \times 4 \times 4} = \frac{27}{64} \text{ Ans}$$

Q.2 $\left(\frac{x}{y}\right)^4$

Solution:

$$\left(\frac{x}{y}\right)^4$$

$$= \frac{x^4}{y^4} \text{ Ans}$$

Q.3 $\left(\frac{-p}{q}\right)^3$

Solution:

$$\left(\frac{-p}{q}\right)^3$$

$$= \frac{-p^3}{q^3} \text{ Ans}$$

Q.4 $\left(\frac{2a}{3b}\right)^5$

Solution:

$$\left(\frac{2a}{3b}\right)^5$$

$$= \frac{(2a)^5}{(3b)^5}$$

$$= \frac{2^5 \cdot a^5}{3^5 \cdot b^5}$$

$$= \frac{32a^5}{243b^5} \text{ Ans}$$

Q.5 $\left(\frac{a^2b^3}{c^4}\right)^2$

Solution:

$$\left(\frac{a^2b^3}{c^4}\right)^2$$

$$= \frac{(a^2b^3)^2}{(c^4)^2}$$

$$= \frac{a^{2\times2} \cdot b^{3\times2}}{C^{4\times2}}$$

$$= \frac{a^4b^6}{c^8} \quad \text{Ans}$$

Q.6 $\frac{3^7}{3}$

Solution:

$$= \frac{3^7}{3}$$

$$= 3^{7-1}$$

$$= 3^6$$

$$= 729 \text{ Ans}$$

Q.7 $\frac{a^3}{a^2}$

Solution:

$$= \frac{a^3}{a^2}$$
$$= a^{3-2}$$
$$= a \text{ Ans}$$

Q.8 $\frac{a^9b^7}{a^3b}$

Solution:

$$\frac{a^9b^7}{a^3b}$$
$$= a^{9-3} \cdot b^{7-1}$$
$$= a^6b^6 \quad \text{Ans}$$

Q.9 $\frac{(a+b)^7}{(a+b)^3}$

Solution:

$$\frac{(a+b)^7}{(a+b)^3}$$
$$= (a+b)^{7-3}$$
$$= (a+b)^4 \quad \text{Ans}$$

Q.10 $\frac{(p+q)^{15}\,(r+s)^9}{(p+q)\,(r+s)^2}$

Solution:

$$= \frac{(p+q)^{15}\,(r+s)^9}{(p+q)\,(r+s)^2}$$
$$= (p+q)^{15-1}\,(r+s)^{9-2}$$

$= (p+q)^{14} \cdot (r+s)^{7}$ **Ans**

Simplify or write the following expressions in such a way that the exponents are positive:

Q.11 $\dfrac{p^4}{p^7}$

Solution:

$$\frac{p^4}{p^7}$$

$$= \frac{1}{p^{7-4}}$$

$$= \frac{1}{p^3} \quad \textbf{Ans}$$

Q.12 $\dfrac{b^2 \cdot b^5}{b^8}$

Solution:

$$= \frac{b^2 \cdot b^5}{b^8}$$

$$= \frac{b^7}{b^8}$$

$$= \frac{1}{b^{8-7}}$$

$$= \frac{1}{b} \quad \textbf{Ans}$$

Q.13 $4a^3b^{-7}$

Solution:

$$4a^3b^{-7}$$

$$= \frac{4a^3}{b^7} \quad \textbf{Ans}$$

Q.14 $\frac{2a^{-3}}{b^{-4}}$

Solution:

$$= \frac{2a^{-3}}{b^{-4}}$$

$$= \frac{2b^4}{a^3} \quad \textbf{Ans}$$

Q.15 $\frac{8p^{-6}}{-4q^2}$

Solution:

$$\frac{8p^{-6}}{-4q^2}$$

$$= \frac{8}{-4q^2p^6}$$

$$= \frac{-4 \times -2}{-4q^2p^6}$$

$$= \frac{-2}{q^2p^6} \quad \textbf{Ans}$$



EXERCISE 3.3

Simplify:

Q.1 $\sqrt{(1/5)^2}$

Solution:

$$= \left(\frac{1}{5}\right)^{\frac{1}{2}\times 2} = 1/5 \text{ Ans}$$

Q.2 $\sqrt{(2/13)^2}$

Solution:

$$= \left(\frac{2}{13}\right)^{\frac{1}{2}\times 2} = 2/3 \text{ Ans}$$

Q.3 $\sqrt{(36/96)^2}$

Solution:

$$= \left(\frac{36}{96}\right)^{\frac{1}{2}\times 2}$$

$$= \overset{3}{\cancel{36}}/\overset{6}{\cancel{96}} = 3/8 \text{ Ans}$$

Q.4 $\sqrt{(-7)^2} = (-7)^{1/2\times 2}$

Solution:

$$= \sqrt{+7\times+7}$$

$$= 7 \text{ Ans}$$

Q.5 $\sqrt{(-3/10)^2} = \sqrt{(3/10)^2}$

$$= (3/10)^{2\times 1/2} = 3/10 \text{ Ans}$$

Q.6 $\sqrt{(-xy)^2} = \sqrt{(xy)^2}$

$$= (xy)^{2\times 1/2} = xy \text{ Ans}$$

Find the redicand and the index in the following:

Q.7 $\sqrt[3]{24} = \sqrt[3]{8 \times 3} = \sqrt[3]{2^3 \times 3} = 2\sqrt[3]{3}$

Here redicand = 2 and Index = 3 ***Ans***

Q.8 $\sqrt[4]{\frac{2}{3}}$

Here redicand = $\frac{2}{3}$ and Index 4 ***Ans***

Q.9 $\sqrt[6]{\frac{5}{7}}$

Here redicand = $\frac{5}{7}$ and Index 6 ***Ans***

Q.10 $\sqrt[5]{ab}$

Here redicand = ab and Index = 5 ***Ans***

Q.11 $\sqrt[3]{\frac{p}{q}}$

Here redicand = $\frac{p}{q}$ and Index = 3 ***Ans***

Simplify and find the answers in positive exponents:

Q.12 $3a^{-4}b^2$

$= \frac{3b^2}{a^4}$ ***Ans***

Q.13 $\sqrt{16}\,\frac{x^{-2}}{y^{-3}} = \sqrt{4^2} \times \frac{y^3}{x^2}$

$= \frac{4y^3}{x^2}$ ***Ans***

Q.14 $\sqrt[3]{8x^4y^{-5}z^{-6}}$

$= \sqrt[3]{2^3} \times \frac{x^4}{y^5z^6}$

$= 2^{3x\frac{1}{3x}} \frac{x^4}{y^5z^6} = \frac{2x^4}{y^5z^6}$ **Ans**

Q.15 $(ab)^3 \ (a^2b^{-4})$

$= a^3b^3a^2b^{-4} = a^{3+2}b^{3-4}$

$= a^5b^{-1} = \frac{a^5}{b}$ **Ans**

Q.16 $(3x^2)(y^{-3})^{1/3}$

$= (3x^2) \times (y^{-3}) \times \frac{1}{3}$

$= 3x^2y^{-1} = \frac{3x^2}{y}$ **Ans**

Q.17 $(p^{-1/2})^{-2/9}$

$= p^{(-1/2) \times (-2/9)}$

$= p^{1/9}$ **Ans**

Q.18 $\{(5)^{\frac{2}{7}}\}^{-7/2}$

$= (5)^{\frac{2}{7}} \times -7/2$

$= 5^{-1} = 1/5$ **Ans**

Write the following in scientific notation:

Q.19 ***15,000,000,000***

Solution:

$15,000,000,000$

$= 15 \times 1,000,000,000$

$= 15 \times 10^9$

$= 1.5 \times 10 \times 10^9$

$= 1.5 \times 10^{10}$ **Ans**

Q.20 57,000,000

Solution:

$$\begin{aligned} & 57,000,000 \\ &= 57 \times 1,000,000 \\ &= 57 \times 10^6 \\ &= 57 \times 10 \times 10^6 \\ &= 57 \times 10^7 \quad \textbf{Ans} \end{aligned}$$

Q.21 0.000,000,000,12

Solution:

$$\begin{aligned} & 0.000,000,00012 \\ &= \frac{12}{1.000,000,000,0} \\ &= \frac{12}{10^{10}} \\ &= 12 \times 10^{-10} \\ &= 12 \times 10 \times 10^{-10} \\ &= 1.2 \times 10^{-9} \quad \textbf{Ans} \end{aligned}$$

Q.22 0.000,000,000,000,305

Solution:

$$\begin{aligned} & 0.000,000,000,000,305 \\ &= \frac{305}{1.000,000,000,000} \\ &= \frac{305}{10^{15}} \\ &= 305 \times 10^{-15} \\ &= 3.05 \times 10 \times 10 \times 10^{-15} \\ &= 3.05 \times 10^2 \times 10^{-15} \\ &= 3.05 \times 10^{-13} \quad \textbf{Ans} \end{aligned}$$

Write the following numbers in usual form:

Q.23 1.034×10^{-5}

Solution:

$$1.034 \times 10^{-5}$$

$$= \frac{1.034}{10^5} = \frac{1034}{10^5 \times 1000}$$

$$= \frac{1035}{10^5 \times 10^3} = \frac{1034}{10^8}$$

$$= 0.000,010,34 \quad \textbf{Ans}$$

Q.24 4.56×10^7

Solution:

$$4.56 \times 10^7$$

$$= \frac{456}{100} \times 10^7$$

$$= \frac{456 \times 10^7}{10^2}$$

$$= 456 \times 10^{7-7}$$

$$= 456 \times 10^5$$

$$= 456 \times 1,000,000$$

$$= 456,000,000 \quad \textbf{Ans}$$

Q.25 9.421×10^{-13}

Solution:

$$9.421 \times 10^{-13}$$

$$= \frac{9421}{1000} \times 10^{-15}$$

$$= \frac{9421}{10^3 \times 10^{15}}$$

$$= \frac{9421}{10^{18}}$$

$$= 0.000,000,000,000,009,421 \quad \textbf{Ans}$$

Q.26 4.1×10^{20}

Solution:

$$4.1 \times 10^{20}$$

$$= \frac{41}{10} \times 10^{20}$$

$$= 41 \times 10^{20} \times 10^{-1}$$

$$= 41 \times 10^{19}$$

$$= 41{,}000{,}000{,}000{,}000{,}000{,}000{,}0$$



EXERCISE 3.4

Write the following equations in exponential form:

Q.1 $\log_6 36 = 2$

Solution:

$$\log_6 36 = 2$$
$$6^2 = 36 \quad \textit{Ans}$$

Q.2 $\log_5 125 = 3$

Solution:

$$\log_5 125 = 3$$
$$5^3 = 125 \quad \textit{Ans}$$

Q.3 $\log_{10} 100 = 2$

Solution:

$$\log_{10} 100 = 2$$
$$10^2 = 100 \quad \textit{Ans}$$

Q.4 $\log_a 1 = 0$

Solution:

$$\log_a 1 = 0$$
$$a^0 = 1 \quad \textit{Ans}$$

Q.5 $\log_4 64 = 3$

Solution:

$$\log_4 64 = 3$$
$$4^3 = 64 \quad \textit{Ans}$$

Write the following equations in logarithmic form:

Q.6 $3^4 = 81$

Solution:

$$3^4 = 81$$
$$\log_3 81 = 4 \quad \textit{Ans}$$

Q.7 $5^4 = 625$

Solution:

$$5^4 = 625$$
$$\log_5 625 = 4 \text{ Ans}$$

Q.8 $2^{-4} = 1/16$

Solution:

$$2^{-4} = 1/16$$
$$\log_2 1/16 = -4 \text{ Ans}$$

Q.9 $7^0 = 1$

Solution:

$$7^0 = 1$$
$$\log_7 1 = 0 \text{ Ans}$$

Q.10 $36^{1/2} = 6$

Solution:

$$36^{1/2} = 6$$
$$\log_{36} 6 = 1/2 \text{ Ans}$$

Q.11 $10^5 = 100000$

Solution:

$$10^5 = 100000$$
$$\log_{10} 100000 = 5 \text{ Ans}$$

Find the values of unknown a, x or N from the following equations.

Q.12 $\log_4 16 = x$

Solution:

$$\log_4 16 = x$$
or $$4^x = 16$$
or $$4^x = 4^2$$
or $$x = 2 \text{ Ans}$$

Q.13 $\log_{10} 10 = x$

Solution:

$$\log_{10} 10 = x$$
or $$10^x = 10$$
or $$10^x = 10^1$$
or $$x = 1 \text{ Ans}$$

Q.14 $\log_2 64 = x$

Solution:

$$\log_2 64 = x$$

or $$2^x = 64$$

or $$2^x = 26$$

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

Q.15 $\log_3 N = 4$

Solution:

$$\log_3 N = 4$$

or $$3^4 = N$$

or $$81 = N \text{ Ans}$$

Q.16 $\log_{16} N = 1/2$

Solution:

$$\log_{16} N = 1/2$$

or $$16^{1/2} = N$$

or $$\sqrt[2]{16} = N$$

or $$4 = N \text{ Ans}$$

Q.17 $\log_{27} N = 1/3$

Solution:

$$\log_{27} N = 1/3$$

or $$27^{1/3} = N$$

or $$\sqrt[2]{27} = N$$

or $$3 = N \text{ Ans}$$

Q.18 $\log_a 81 = 2$

Solution:

$$\log_a 81 = 2$$

or $$a^2 = 81$$

or $$a^2 = 93$$

or $$a = 9 \text{ Ans}$$

Q.19 $\log_a 128 = 7$

Solution:

$$\log_a 128 = 7$$

or $$a^7 = 128$$

or $$a^7 = 2^7$$

or $$a = 7 \text{ Ans}$$

Q.20 $\log_a 125 = 3$

Solution:

$$\log_a 125 = 3$$

or $$a_3 = 125$$

or $$a^3 = 5^3$$

or $$a = 5 \text{ Ans}$$

EXERCISE 3.5

Represent the given logarithms in the form of sum or difference of logarithms:

Q.1 $\log_a 5 \times 7$

Solution:

$\log_a 5 \times 7$

or $\log_a 5 + \log_a 7$ ***Ans***

Q.2 $\log_a 4 \times 7 \times 9$

Solution:

$\log_a 4 \times 7 \times 9$

or $\log_a 4 + \log_a 7 + \log_a 9$ ***Ans***

Q.3 $\log_a xy$

Solution:

$\log_a xy$

or $\log_a x + \log_a y$ ***Ans***

Q.4 $\log a\ U\ V\ W$

Solution:

$\log_a U\ V\ W$

or $\log_a U + \log_a V + \log_a W$ ***Ans***

Q.5 $\log_a x/y$

Solution:

$\log_a x/y$

or $\log_a x + \log_a y$ ***Ans***

Q.6 $\log_a lm/n$

Solution:

$\log_a lm/n$

or $\log_a l + \log_a m - \log_a n$ ***Ans***

Q.7 $\log_a UV/WX$

Solution:

$\log_a UV/WX$

or $\log_a U + \log_a V - \log_a W - \log_a X$ ***Ans***

Write the following in the form of a singular logarithm.

Q.8 $\log_a 3 + \log a\ 7$

Solution:

$$\log_a 3 + \log_a 7$$

or $\log_a 3 \times 7$

or $\log_a 21$ ***Ans***

Q.9 $\log_a x + \log_a y + \log_a z$

Solution:

$$\log_a x + \log_a y + \log_a z$$

or $\log_a xyz$

Q.10 $\log_{10} 3 + \log_{10} 4 - \log_{10} 5$

Solution:

$$\log_{10} 3 + \log_{10} 4 - \log_{10} 5$$

or $\log_{10} \frac{3 \times 4}{5}$

or $\log_{10} 12/5$ ***Ans***

Q.11 $3\log_{10} 5 + 4 \log_{10} 3$

Solution:

$$3 \log_{10} 5 + 4 \log_{10} 3$$

or $\log_{10} 5^3 \times 3^4$ ***Ans***

If $\log_{10} 2 = 0.3010$, $\log_{10} 3 = 0.4771$ ***and*** $\log_{10} 5 = 0.6990$. ***Find the values of the following logarithms.***

Q.12 $\log_{10} 6$

Solution:

$$\log_{10} 2 \times 3$$

$$= \log_{10} 2 + \log_{10} 3$$

Putting the values of $\log_{10} 2$ and $\log_{10} 3$, we get

$$0.3010 + 0.4771$$

$$= 0.7781$$ ***Ans***

Q.13 $\log_{10} 15$

Solution:

$$\log_{10} 15 = \log_{10} 3 \times 5$$
$$= \log_{10} 3 + \log_{10} 5$$

Putting the values of $\log_{10} 3$ and $\log_{10} 5$, we get

$$0.4771 + 0.6990$$
$$= 1.1751 \textbf{ Ans}$$

Q.14 $\log_{10} 30$

Solution:

$$\log_{10} 30$$
$$= \log_{10} 2 \times 3 \times 5$$
$$= \log_{10} 2 + \log_{10} 3 + \log_{10} 5$$

Putting the values, we get

$$0.4010 + 0.4771 + 0.6990$$
$$= 1.4771 \quad \textbf{Ans}$$

Q.15 $\log_{10} 8$

Solution:

$$\log_{10} 8$$
$$= \log_{10} 2^3$$
$$= 3 \log_{10} 2$$

By putting the values, we get

$$3 \times 0.3010$$
$$= 0.9020 \quad \textbf{Ans}$$

Q.16 $\log_{10} 9$ ***(this questions can be solved in 2 ways).***

Solution (i):

$$\log_{10} 9$$
$$= \log_{10} 3 \times 3$$
$$= \log_{10} 3 + \log_{10} 3$$

By putting the values, we get

$$0.4771 + 0.4771$$
$$= 0.9542 \quad \textbf{Ans}$$

Solution (ii):

$$\log_{10} 9$$
$$= \log_{10} 3^2$$
$$= 2 \log_{10} 3$$

By putting the value, we get

$$3 \times 0.4771$$
$$= 0.9542 \text{ Ans}$$

Q.17 $\log_{10} 125$

Solution:

$$\log_{10} 125$$
$$= \log_{10} 5^2$$
$$= 3 \log_{10} 5$$
$$3 \times 0.6990$$
$$= 2.0970 \text{ Ans}$$

Q.18 $\log_{10} \sqrt{5}$

Solution:

$$\log_{10} \sqrt{5}$$
$$= \log_{10} (5)^{1/2}$$
$$= 1/2 \log_{10} 5$$

By putting the value, we get

$$1/2 \times 0.6990$$
$$= 0.3495 \text{ Ans}$$

Q.19 $\log_{10} 4\sqrt{3}$

Solution:

$$\log_{10} 4\sqrt{3}$$
$$= \log_{10} 4 - \log_{10} \sqrt{3}$$
$$= \log_{10} 3 + \log_{10} 3^{\frac{1}{2}}$$
$$= 2 \log_{10} 2 + \tfrac{1}{2} \log_{10} 3$$

By putting the values, we get

$$2 \times 0.3010 + 1/2\ 0.4771$$
$$= 0.6020 + 0.2383$$
$$= 0.8405 \quad \text{Ans}$$

EXERCISE 3.6

Find the values of the following using the table of logarithms:

Q.1 log 5

Solution:

log 5
= 0.6990 Ans

Q.2 log 549

Solution:

log 549
= 2.7396 Ans

Q.3 log 57.4

Solution:

log 57.4
= 1.7589 Ans

Q.4 log 789.2

Solution:

log 789.2
= 3.8972 Ans

Q.5 log 27986

Solution:

log 27986
= 4.4470 Ans

Note: Mentica of a number, comprising 4 digits can be known by a table, so the mentica of 2799 has been found out instead of 27986.

Q.6 log 7.46

Solution:

log 7.46
= 0.8777 Ans

Q.7 log 457000

Solution:

log 457000
= 5.6599 Ans

Q.8 log 0.4721

Solution:

log 0.4721
= 1.6740 Ans

Q.9 log 0.0067

Solution:

log 0.0067
= $\bar{3}$.8261 Ans

Q.10 log 0.05708

Solution:

log 0.05708
= $\bar{2}$.7565 Ans

Find out anti-logarithms of the following:

Q.11 1.9445

Solution:

antilog of *1.9445*
= 88.00
= 88 Ans

Q.12 2.4425

Solution:

antilog of *2.4425*
= 277.0
= 277 Ans

Q.13 3.8763

Solution:

antilog of *0.5537*
= 3.579 Ans

Q.14 0.5537

Solution:

antilog of 0.5537

= 3.579 **Ans**

Q.15 $= \bar{2}.8716$

Solution:

antilog of $= \bar{2}.8716$

= 0.07440 **Ans**

Q.16 $= \bar{3}.7757$

Solution:

antilog of $= \bar{3}.7757$

= 0.0067067 **Ans**

Q.17 $= \bar{2}.1476$

Solution:

antilog of $= \bar{2}.1476$

= 0.01406 **Ans**

EXERCISE 3.7

Solve the following with the help of logarithms:

Q.1 4.578×62.16

Solution:

Suppose $x = 4.578 \times 62.16$

then $\log x = \log (4.578 \times 62.16)$

or $\log x = \log 4.578 + \log 62.16$

$= 0.6607 + 0.17935$

$= 2.4542$

Now antilog of 2.4542

$= 284.5$ ***Ans***

Q.2 16.78×15.8

Solution:

Suppose $x = (16.78 \times 15.8)$

$\log x = \log 16.78 \times 15.8$

$\log x = \log 16.78 + \log 15.8$

$= 1.2248 + 1.1987$

$= 2.4235$

Antilog of 2.4235

$= 265.5$ ***Ans***

Q.3 $3.97 \times 1.45 \times 7.89$

Solution:

Suppose $x = (3.99 \times 1.45 \times 7.89)$

$\log x = \log 3.97 \times 1.45 \times 7.89$

$\log x = \log 3.97 + \log 1.45 - \log 7.89$

$= 0.5988 + 0.1614 + 0.8901$

$= 1.6573$

Antilog of 1.6573

$= 45.42$ ***Ans***

Q.4 $\frac{15.57}{4.23}$ (اس سوال کو سائنسی کیلکولیٹر سے مزید حل کرنا ہے)

Solution:

Suppose

$$\frac{15.57}{4.23}$$

$$\therefore \quad \log x = \log \frac{15.57}{4.23}$$

$$\therefore \quad \log x = \log 15.57 - \log 4.23$$

Q.5 $\frac{26.69}{8.31}$

Solution:

Suppose $\frac{26.69}{8.31}$

$$\therefore \quad \log x = \log \frac{26.69}{8.31}$$

$$\therefore \quad \log x = \log 26.69 - \log 8.31$$

$$= 1.4265 - 0.9196$$

$$0.5068$$

Antilog of 0.5068

$$= 3.212 \text{ Ans}$$

Q.6 $\frac{8.57 \times 24.7}{7.51}$

Solution:

Suppose $x = \frac{8.57 \times 24.7}{7.51}$

$$\therefore \quad \log x = \log \frac{8.57 \times 24.7}{7.51}$$

$$\therefore \quad \log x = \log 12.3 + \log 6.78 - 2.16$$

$$= 1.0899 + 0.8312 - 0.3345$$

$$= 1.9211 - 0.3345$$

$$= 1.5866$$

Antilog of 1.5866

$= 38.60$

Q.8 $(3.54)^6$

Solution:

$$x = (3.54)^6$$

$$\therefore \quad \log x = \log (4.54)^6$$

$$\log x = 6 \log (3.54)$$

$$= 6 \times 0.5490$$

$$= 3.7940$$

Antilog of 3.2940

$= 1968$ **Ans**

Q.9 $\sqrt{8.57}$

Solution:

Suppose $x = \sqrt{8.57}$

$$\therefore \quad \log x = \log \sqrt{8.57}$$

$$\therefore \quad \log x = \frac{1}{2} \log 8.57$$

$$= \frac{1}{2} \times 0.9330$$

$$= 0.4665$$

Antilog of 0.4665

$= 2.927$ **Ans**

Q.10 $\sqrt{125.4}$

Solution:

Suppose $x = \sqrt{125.4}$

or $\log x = \log \sqrt{125.4}$

$$\log x = (125.4)^9$$

$$= 1/2 \log 125.4$$

$$= 1/2 \times 2.0983$$

Antilog of 1.0491

$= 11.19$ **Ans**

Q.11 $\sqrt[5]{12.4}$ (اس سوال کو سائنسی کیلکولیٹر سے مزید حل کرنا ہے)

Solution:

Suppose $x = \sqrt{12.4}$

or $x = (12.4)^{1/5}$

$\therefore \log x = \log (12.4)^{1/5}$

$= 1/5 \log 12.4$

$= 1/2 \times 1.0945$

$= 0.2189$

Antilog of 0.2189

$= 1.655$ ***Ans***

Q.12 $\sqrt{\dfrac{7.24}{2.12}}$ (اس سوال کو سائنسی کیلکولیٹر سے حل کرنا ہے)

Solution:

Suppose $\sqrt{\dfrac{7.24}{2.12}}$

or $x = \left(\dfrac{7.24}{2.12}\right)^{1/2}$

$\log x = \log \left(\dfrac{7.24}{2.12}\right)^{1/2}$

$= \dfrac{1}{2} \log \dfrac{7.24}{2.12}$

$= \dfrac{1}{2} (\log 7.24 - \log 2.12)$

$= \dfrac{1}{2} (0.8597 - 0.3263)$

$= \dfrac{1}{2} \times 0.5334$

$= 0.2667$

Antilog of 0.2667

$= 1.848$ ***Ans***

Q.13 $\dfrac{(84.5)^{1/3}\sqrt{39.7}}{23.4}$

Solution:

Suppose $x = \dfrac{(84.5)^{1/3}\sqrt{39.7}}{23.4}$

or $x = \dfrac{(84.5)^{1/3}(39.7)^{1/2}}{23.4}$

or $\log x = \log \dfrac{(84.5)^{1/3}(39.7)^{1/2}}{23.4}$

or $\log x = 1/3 \log 84.5 + 1/2 \log 39.7 - \log 23.4$

$= 1/3 \times 1.9269 + 1/2 \times 1.5988 - 1.3692$

$= 1.4417 - 1.3692$

$= 0.0725$

Antilog of 0.0725

$= 1.81$ ***Ans***

Q.14 $\dfrac{(6.49)^2\, 2\sqrt{8.21}}{17.9}$

Solution:

Suppose $x = \dfrac{(6.49)^2\, 2\sqrt{8.21}}{17.9}$

or $x = \dfrac{(6.49)^2 \times (8.21)^{1/3}}{17.9}$

$\therefore \quad \log x = \log \dfrac{(16.49)^2 \times (8.21)^{1/3}}{17.9}$

$= 2 \log 6.49 + 1/3 \log 8.21 - \log 17.9$

$= 1.9292 - 1.2529$

$= 0.6763$

Antilog of 0.6963

$= 4.745$ ***Ans***

Q.15 $3.97 \times 1.45 \times 7.89$

Solution:

$\therefore \quad \log x = \log 3.97 + \log 1.45 + \log 7.89$

$\therefore \quad \log x = 0.5988 + 0.1614 + 0.8971$

$= 1.6373$

$x = \text{antilog } 1.6573$

$= 45.42$

$= 45.42$ **Ans**

Q.16 $85.7 \times 2.47 \div 8.89$

Solution:

$\therefore \quad \log x = \log 85.7 + \log 2.47 \div \log 8.89$

$= 1.9330 + 0.3927 \div 0.9489$

$= 1.3768$

$x = \text{Antilog } 1.3768$

$= 23.81$

$\therefore \quad 23.81$ **Ans**

Q.17 $67.35 \times 48.27 \div (16.18)^2$

Solution:

Suppose $x = 67.35 \times 48.27 \div (16.18)^2$

$\therefore \quad \log x = \log 67.35 + \log 48.27 - \log (16.18)^2$

$= \log 67.35 + \log 48.27 - 2 \log 16.18$

$= 1.828 + 1.6836 - 2(1.2090)$

$= 1.8283 + 1.6836 - 2.4180$

$= 1.0939$

$\therefore \quad x = \text{Antilog } 1.0939$

$\therefore \quad x = 12.42$ **Ans**

Q.18 $(84.5)^{1/3} (39.7)^{1/2} \div (23.4)^{1/2}$

Solution:

Suppose

$x = (84.5)^{1/3} (39.7)^{1/2} \div (23.4)^{1/2}$

$\log x = 1/3 \log 84.5 + 1/2 \log 39.7 - 1/2 \log 23.4$

$= 1/3(1.9269) + 1/2(1.5988) - 1/2(1.3692)$

$= 0.6423 + 0.7994 - 0.6846$

$= 1.4417 - 0.6846$

$= 0.7571$

$\therefore \quad x = \text{Antilog } 0.7571 = 5.7166$ **Ans**