9th Class Math Review Exercise

Q. 1 Choose the correct option.

i. The standard form of 5.2×10^6 is:

(a) 52,000 (b) 520,000 **(c) $\mathbf{5,200,000}$** (d) $52{,}000{,}000$

ii. Scientific notation of 0.00034 is:

(a) 3.4×10^3 **(b) $\mathbf{3.4 \times 10^{-4}}$** (c) 3.4×10^4 (d) 3.4×10^{-3}

iii. The base of common logarithm is:

(a) 2 **(b) 10** (c) 5 (d) e

iv. $\log_2 2^3 =$

(a) 1 (b) 2 (c) 5 **(d) 3**

v. $\log 100 =$ Type equation here.

(a) 2 (b) 3 (c) 10 (d) 1

vi. If $\log 2 = 0.3010$, then $\log 200$ is:

(a) 1.3010 (b) 0.6010 **(c) 2.3010** (d) 2.000

vii. $\log(0) =$

(a) positive (b) negative (c) zero **(d) undefined**

viii. $\log 10{,}000 =$

(a) 2 (b) 3 **(c) 4** (d) 5

ix. $\log 5 + \log 3 =$ Type equation here.

(a) $\log 0$ (b) $\log 2$ (c) $\log\left(\frac{5}{3}\right)$ **(d) $\log 15$**

x. $3^4 = 81$ in logarithmic form is:

(a) $\log_3 4 = 81$ (b) $\log_4 3 = 81$ **(c) $\mathbf{\log_3 81 = 4}$** (d) $\log_4 81 = 3$

Answer Key

I	Ii	iii	iv	v	vi	vii	viii	ix	x
C	B	b	d	a	c	d	c	d	c

Important Additional MCQS (Correct option is marked in Bold)

If $a = b \times 10^n$ is written in scientific notation then:

(a) $0 \leq b \leq 10$ (b) $0 \leq b < 10$ (c) $1 \leq b \leq 10$ **(d) $\mathbf{1 \leq b < 10}$**

2. For the $\log 0.00327$, characteristic is:

(a) -2 **(b) -3** (c) 3 (d) 0

3. Characteristic of $\log 4.9 \times 10^{-5}$ is:

(a) -5 (b) 10 (c) 4 (d) 9

4. If $a^x = n$, then:

(a) $a = \log_x n$ (b) $x = \log_n a$ **(c) $\mathbf{x = \log_a n}$** (d) $a = \log_n x$

The relation of $y = \log_z x$ implies:

(a) $x' = z$ **(b)** $\boldsymbol{z^y = x}$ (c) $x^2 = y$ (d) $y^z = x$

6. The logarithm of unity to any base is:
(a) 1 (b) 10 (c) e **(d) 0**

7. The logarithm of any number to itself as base is:
(a) 1 (b) 0 (c) -1 (d) 10

8. The base of natural logarithm is:
(a) 0 (b) 1 (c) 10 **(d) e**

9. If $\log(x+3) = \log(15x-4)$ then x is:
(a) 0.5 (b) 7 (c) 17 (d) 2

10. If $\log_{\sqrt{x}} 25 = 4$ then x is:
(a) +5 (b) -5 (c) ± 5 (d) impossible

11. $\log_b g^h$ is:
(a) $g\log_b$ h (b) $\log_b$ (gh) **(c)** $\boldsymbol{(\log_h \ g) \times h}$ (d) $h\log_g b$

12. $\log_b$ x $-\log_b$ y is:
(a) $\frac{\log_b x}{\log_b y}$ **(b)** $\boldsymbol{\log_b \frac{x}{y}}$ (c) $\log_y x$ (d) $\frac{\log_b y}{\log_b x}$

13. $\log_b a \times \log_c b$ can be written as:
(a) $\boldsymbol{\log_c a}$ (b) $\log_a$ c (c) $\log_a b$ (d) $\log_b c$

14. $\log_y x$ will be equal to:
(a) $\frac{\log_z x}{\log_y z}$ (b) $\frac{\log_x z}{\log_y z}$ **(c)** $\boldsymbol{\frac{\log_z x}{\log_z y}}$ (d) $\frac{\log_z y}{\log_z x}$

15. $\log\left(\frac{1}{n}\right) =$
(a) $\log 1$ (b) $\log n$ (c) $\log(1 - \text{n})$ **(d)** $\boldsymbol{-\log n}$

16. If $\log\frac{a}{b} + \log\frac{b}{a} = \log(a+b)$, then: 09302142
(a) $\boldsymbol{a + b = 1}$ (b) $a - b = 1$ (c) $a = b$ (d) $a^2 - b^2 = 1$

17. log e = where $e \approx 2.718$
(a) 0 **(b) 0.4343** (c) ∞ (d) 1

18. $\log_e 10 =$ where e ≈ 2.71809302143
(a) 2.3026 (b) 0.4343 (c) e^{10} (d) 10

19. $\log_9 \frac{1}{81} =$
(a) -1 **(b) -2** (c) 2 (d)does not exist

20. $\log_7 7^{-3} + \log_2 4^3$ is:
(a) 0 (b) -3 **(c) 3** (d) ± 3

21. $\log_{\sqrt{10}} 100^2$ is:
(a) 2 (b) 1 (c) 4 **(d) 8**

22. $\log_{10} 10^0$ is:

(a) 2 **(b) 0** (c) 1 (d) impossible

23. The value of $\log\ 4 + \log\ 25$ is:

(a) 2 (b) 3 (c) 4 (d) 5

24. Evaluate $\log_7 \frac{1}{\sqrt{7}}$.

(a) -1 **(b)** $-\frac{1}{2}$ (c) $\frac{1}{2}$ (d) $\frac{1}{7}$

25. If $\log_b\ x = 4$ and $\log_b\ y = 2$ then value of $\log_b\ (x \times y^3)$ is:

(a) 5 (b) 7 (c) 9 **(d) 10**

Q. 2 Express the following numbers in scientific notations.

(i) 0.000567

Solution:

0.000567

$= 0.000567 = 5.67 \times 10^{-4}$

Move decimal point 4 places to the right.

(ii) 734

Solution:

734

$734 = 7.34 \times 10^2$

Move decimal point 2 places to the left.

(iii) 0.33×10^3

Solution

0.33×10^3

$0.33 \times 10^3 = 3.3 \times 10^{-1} \times 10^3$

$= 3.3 \times 10^{-1+3}$

$= 3.3 \times 10^2$

Move decimal point 1 place to the right.

Q. 3 Express the following numbers in ordinary notation.

(i) 2.6×10^3

Solution:

$= 2.6 \times 10^3$

Since, exponent is posituve 3 , move decimal point 3 places to the right.

$= 2600 \times 10^{-3} \times 10^3$

$= 2600 \times 10^0\ (\because 10^0 = 1)$

$= 2600 \times 1 = 2600$

(ii) 8.794×10^{-4}

Solution:

$= 8.794 \times 10^{-4}$

Since, exponent is negative four, move decimal point 4 places to the left.

$=0.0008794 \times 10^4 \times 10^{-4}$

$=$

0.0008794×10^0

$=0.0008794 \times 1 \ (\because 10^0 = 1)$

$=0.0008794$

(iii) 6×10^{-6}

Solution:

Since, exponent is negative six, move decimal point 6 places to the left.

$= 0.000006 \times 10^6 \times 10^{-6}$

$= 0.000006 \times 10^{6-6}$

$= 0.000006 \times 10^0$

$= 0.000006 \times 1 \ (\because 10^0 = 1)$

$= 0.000006$

Q. 4 Express each of the following logarithmic form.

(i) $3^7 = 2187$

Solution:

$3^7 = 2187$

$\Rightarrow \log_3 2187 = 7$

(ii) $a^b = c$

Solution

$a^b = c$

$\Rightarrow \log_c c = b$

(iii) $(12)^2 = 144$

Solution:

$(12)^2 = 144$

$\Rightarrow \log_{12} 144 = 2$

Q. 5 Express each of the following is exponential form.

(i) $\log_4 8 = x$

Solution

$\log_4 8 = x$

$\Rightarrow 4^x = 8$

(ii) $\log_9 729 = 3$

Solution:

$\log_0 729 = 3$

$\Rightarrow 9^3 = 729$

(iii) $\log_4 1024 = 5$

Solution:

$\log_4 1024 = 5$

$\Rightarrow 4^5 = 1024$

Solution:

Q. 6 Find value of x in the following.

(i) $\log_9 x = 0.5$

Solution:

$\log_9 x = 0.5$

In exponential form

$9^{0.5} = x$

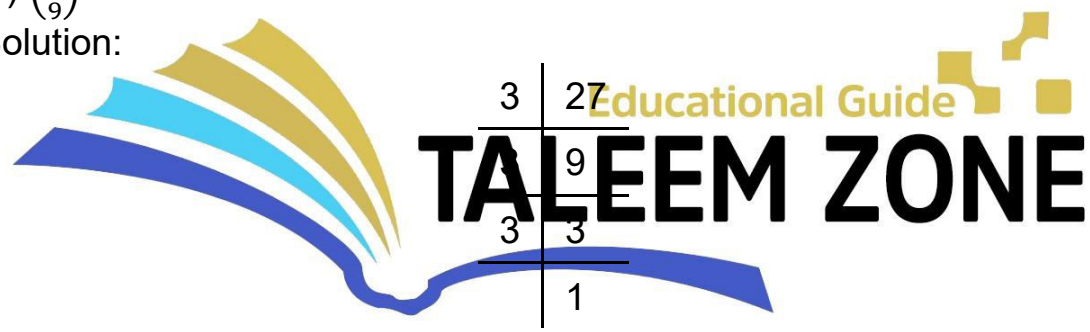
$9^{\frac{1}{2}} = x$

$\Rightarrow x = \sqrt{9}$

$x = 3$

(ii) $\left(\frac{1}{9}\right)^{3x} = 27$

Solution:



$\left(\frac{1}{9}\right)^{3x} = 27$

$\Rightarrow \left(\frac{1}{3^2}\right)^{3x} = 3^3$

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

$\Rightarrow 3^{-6x} = 3^3$

By comparing exponents, we get

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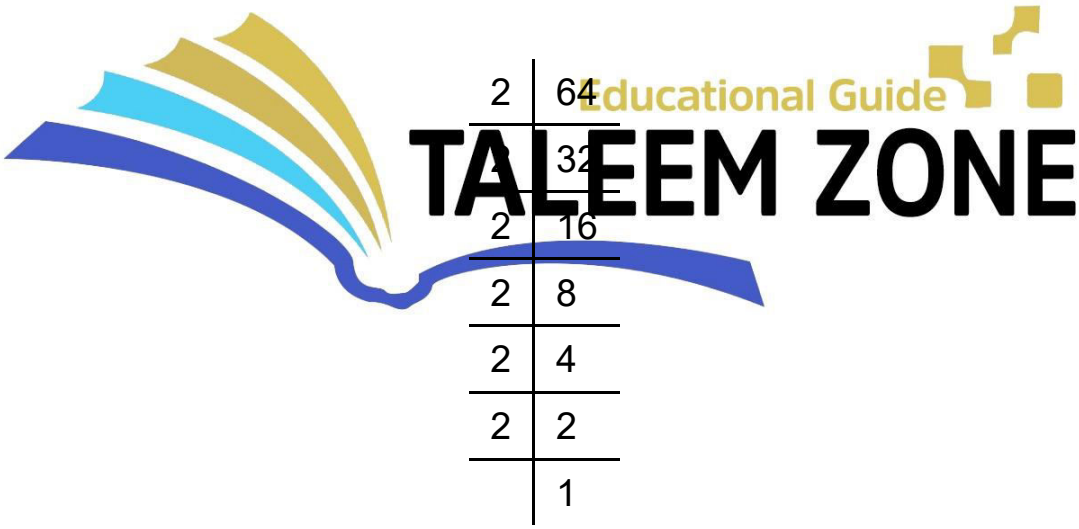
$$6x - 3$$
$$x = \frac{3}{6}$$
$$x = \frac{1}{-2}$$
$$x = -\frac{1}{2}$$

(iii) $\left(\frac{1}{32}\right)^{2x} = 64$

Solution:

$$\left(\frac{1}{32}\right)^{2y} = 64$$
$$\Rightarrow \left(\frac{1}{2^4}\right)^{2x} = 2^6$$
$$(2^4)^3 = 2^6$$
$$2^{-10x} = 2^6$$



2	64
2	32
2	16
2	8
2	4
2	2
	1

By comparing exponents, we get.

$$-10x = 6$$
$$x = \frac{6}{-10}$$
$$x = \frac{3}{-5}$$
$$\Rightarrow x = -\frac{3}{5}$$

Q. 7 Write the following as a single logarithm.

(i) $7\log x - 3\log y^2$

Solution:

$7\log\ x - 3\log\ y$

$\Rightarrow = \log\ x - \log\ (y^2)$

$= \log\ x - \log\ (y^n)$

$= \log\ \left(\frac{x}{y^n}\right)$

(ii) $3\log\ 4 - \log\ 32$

Solution:

$= 3\log\ 4 - \log\ 32$

$= \log\ 4^3 - \log\ 32$

$= \log\ 64 - \log\ 32$

$= \log\ \left(\frac{64}{32}\right)$

$= \log\ 2$

(iii) $\frac{1}{3}(\log_8\ 8 + \log_8\ 27) - \log_8\ 3$

Solution:

$= \frac{1}{3}(\log_4\ 8 + \log_4\ 27) - \log_4\ 3$

$= \frac{1}{3}\log_4\ (8 \times 27) - \log_4\ 3$

$= \frac{1}{3}\log_4\ 216 - \log_4\ 3$

$\log_5\ (210)\ \log_5\ 3$

$= \log_5\ \sqrt{216} - \log_5\ 3$

$\log_5\ \sqrt{6}\ln\ 5$

$= \log_5\ 6 - \log_5\ 3$

$\log_5\ \left(\frac{6}{3}\right)$

$= \log_5\ 2$

Q. 8 Expand the following using laws of logarithms:

(i) $\log\ (xyz^6)$

$= \log\ (xyz^6)$

$= \log\ x + \log\ y + \log\ z^6$

$= \log\ x + \log\ y + 6\log\ z$

(ii) $\log_3\ \sqrt[6]{m^5n^3}$

Solution:

$$= \log_3 \sqrt[6]{m^5 n^3}$$

$$= \log_3 (m^5 n^3)^{\frac{1}{6}}$$

$$= \frac{1}{6} \log_3 (m^5 n^3)$$

$$= \frac{1}{6} (\log_3 m^5 + \log_3 n^3)$$

$$= \frac{1}{6} [5\log_3 m + 3\log_3 n]$$

$$= \frac{1}{6} [5\log_3 m + 3\log_3 n]$$

(iii) $\log \sqrt{8x^3}$

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Solution:

$$= \log \sqrt{8x^3}$$

$$= \log \sqrt{2^3 x^3}$$

$$= \log \sqrt{(2x)^3}$$

$$= \log (2x)^{3\frac{1}{2}}$$

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

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

$$= \frac{3}{2} (\log 2 + \log x)$$

Q. 9 Find values of the following with the help of logarithm table:

Let $x = \sqrt[3]{68.24}$

Taking log of both sides

$\log x = \log \sqrt[3]{68.24}$

By Applying laws of logarithms

$\log x = \log (68.24)^{\frac{1}{3}}$

$\log x = \frac{1}{3}\log (68.24)$

$\log x = \frac{1}{3}(1.8340)$

$\log x = 0.6113$

Characteristic $= 0$

Mantissa $= .6113$

$x =$ antilog (0.6113)

$x = 4.086$

Thus $\sqrt[3]{68.24} \approx 4.086$

(ii) 319.8×3.543

Solution:

let $x = 319.8 \times 3.543$

Taking log of both sides

$\log x = \log (319.8 \times 3.543)$

$\log x = \log 319.8 + \log 3.543$

$\log x = 2.5049 + 0.5493$

$\log x = 3.0542$

Characteristic =3

Mantissa $= .0542$

$x =$ antilog (3.0542)

$x = 1133$

Thus $319.8 \times 3.543 \approx 1133$

(iii) $\frac{36.12 \times 750.9}{113.2 \times 9.98}$

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Solution:

Let

$$x = \frac{36.12 \times 750.9}{113.2 \times 9.98}$$

Taking log of both sides.

$$\log x = \log \frac{36.12 \times 750.9}{113.2 \times 9.98}$$

By applying laws of logarithms.

$\log x = \log (36.12 \times 750.9) - \log (113.2 \times 9.98)$

Thus $319.8 \times 3.543 \approx 1133$

(iii) $\frac{36.12 \times 750.9}{113.2 \times 9.98}$

Solution:
Let
$$x = \frac{36.12 \times 750.9}{113.2 \times 9.98}$$
Taking log of both sides.
$$\log x = \log \frac{36.12 \times 750.9}{113.2 \times 9.98}$$
By applying laws of logarithms.
$$\log x = \log (36.12 \times 750.9) - \log (113.2 \times 9.98)$$
$$\log x = (\log 36.12 + \log 750.9) - (\log 113.2 + \log 9.98)$$
$$logx = \log 3{,}6.12 + \log 7{,}50.9 - \log 1_{\wedge}13.2 - \log 9.98$$
$$\log x = 1.5577 + 2.8756 - 2.0538 - 0.9991$$
$$\log x = 4.4333 - 3.0529$$
$$\log x = 1.3804$$
Characteristic $= 1$
Mantissa $= .3804$
$$x = \text{antilog}(1.3804)$$
$$x = 24.01$$
Thus $\frac{36.12 \times 750.9}{113.2 \times 9.98} \approx 24.01$

Q. 10 In the year 2016, the population of a city was 22 millions and was growing at a rate of 2.5% per year. The function $P(t) = 22(1.025)^t$ gives the population in millions, t years after 2016. Use the model to determine in which year the population will reach 35 millions. Round to the nearest year.
Solution:
Given that
$$P(t) = 22(1.025)^t$$
Population for which time " t " is required 35 millions
$$35 = 22(1.025)^t$$
$$\frac{35}{22} = (1.025)^t$$
$$1.5909 = (1.025)^t$$
Taking log of both sides

$\log\ 1.5909 = \log\ (1.025)^{t}$

$0.2016 = t \times \log\ 1_{\Lambda.025}$

$0.2016 = t \times 0.0107$

$\frac{0.2016}{0.0107} = t$

18.84

$\Rightarrow t = 18.84$ years

On rounding off we get $t \approx 19$ years.

It means 19 years after 2016 i.e. $2016 + 19 = 2035$. Thus the population of the city will be 35 millions in 2035 (19 years after 2016).