Sampurna Jan 2026

Quantitative Aptitude

DPP: 4

Ratio and Proportion, Indices and Logarithm

Q1 The value of $\log_2\ 16$ is
(A) 4
(B) 8
(C) 16
(D) None of the above

Q2 The value of $\log_{60}\ 3 + \log_{60}\ 4 + \log_{60}\ 5$ is
(A) $\log_{60}\ 12$
(B) $\log_{60}\ 30$
(C) 1
(D) 0

Q3 Which of the following statements does not hold?
(A) $\log_{100}\ 1 = 0$
(B) $\log_5\ 5 = 1$
(C) $log(2+3) = log\ (2 \times 3)$
(D) $log(1+2+3) = log\ 1 + log\ 2 + log\ 3$

Q4 Find $\log_4\ 8$.
(A) 1.5
(B) 2
(C) 1
(D) None

Q5 The value of log $\frac{1}{3}$ to the base 9 is
(A) $-\frac{1}{2}$
(B) $\frac{1}{2}$
(C) 1
(D) None of these

Q6 The value of $\log \frac{a^2}{bc} + log\frac{b^2}{ca} + log\frac{c^2}{ab}$ is
(A) 0
(B) 1
(C) -1
(D) None

Q7 If $2\ \log\ x\ =\ 4\ \log\ 3$, then x is equal to
(A) 3
(B) 9
(C) 2
(D) None of these

Q8 The value of $\log_2\ \log_2\ \log_2 16$ is
(A) 0
(B) 2
(C) 1
(D) None of these

Q9 $\log_b\ \left(a^{\frac{1}{2}}\right)\ \log_c\ \left(b^3\right)\ \log_a\ \left(c^{\frac{2}{3}}\right)$ is equal to
(A) 0
(B) 1
(C) -1
(D) None

Q10 Given that $\log_{10} 2 = x\ \&\ \log_{10} 3 = y$, then $\log_{10} 60$ is expressed in terms of x and y as
(A) $x - y + 1$
(B) $x + y + 1$
(C) $x - y - 1$
(D) None of these

Q11 The value of $\frac{1}{\log_a(ab)} + \frac{1}{\log_b(ab)}$ is
(A) 0
(B) 1
(C) -1
(D) None

Q12 The value of $\log_8 128 \times \log_6 \left(\frac{1}{216}\right)$ is
(A) -7
(B) 7
(C) $\frac{1}{7}$
(D) $-\frac{2}{7}$

Q13 The value of $\log_3 16 \times \log_4 9$ is
(A) 1
(B) 2
(C) 4
(D) None

Q14 If $\log\ x = m + n$ & $\log\ y = m - n$, then find the value of $\log\left(\frac{10x}{y^2}\right)$.
(A) $1 + m - 3n$
(B) $1 - m + 3n$
(C) $1 + 3m - n$
(D) $1 - 3m + n$

Q15 The value of $4\ log\ \frac{8}{25} - 3\ log\ \frac{16}{125} - log\ 5$ is
(A) 0
(B) 1
(C) 2
(D) -1

Answer Key

Q1	(A)	Q9	(B)
Q2	(C)	Q10	(B)
Q3	(C)	Q11	(B)
Q4	(A)	Q12	(A)
Q5	(A)	Q13	(C)
Q6	(A)	Q14	(B)
Q7	(B)	Q15	(A)
Q8	(C)		

Hints & Solutions

Q1 Text Solution:

$\log_2\ 16$ can be written as

$\log_2\ 2^4$

$= 4\ \log_2\ 2\ \ (\because\ log\, m^n = n\, log\, m)$

$= 4 \times 1\ \ (\because\ log_a\ a = 1)$

$= 4$

Therefore, $\log_2\ 16 = 4$

Hence, the correct option is (A).

Q2 Text Solution:

$\log_{60}\ 3 + \log_{60}\ 4 + \log_{60}\ 5$

$= \log_{60}\ (3 \times 4 \times 5)$

$(\because\ \log_a m\ + \log_a n\ = \log_a\ (mn))$

$= \log_{60}\ 60$

$= 1$

Hence, the correct option is (C).

Q3 Text Solution:

For option (A):

Since, $\log_a\ 1 = 0$ thus $\log_{100}\ 1 = 0$ is true.

For option (B):

As $\log_a\ a = 1$ thus $\log_5\ 5 = 1$ is also true.

For option (C):

We know $log(2 + 3) = log\, 5$

whereas $log\ (2 \times 3) = log\, 6 \neq log\ (2 + 3)$

Thus, $log(2 + 3) = log\ (2 \times 3)$ does not hold.

For option (D):

$log(1 + 2 + 3) =\ log\, 6$

Also,

$log\, 1 + log\, 2 + log\, 3 = log\ (1 \times 2 \times 3) = log\ 6$

Therefore,

$log(1 + 2 + 3) = log\, 1 + log\, 2 + log\, 3$

Hence, the correct option is (C).

Q4 Text Solution:

As we know,

$\log_{a^p}\ b\ =\ \frac{1}{p} \times\ \log_a\ b$

$Also\ \log_a\ b^q\ =\ q \times\ \log_a\ b$

Using the above two properties

$\log_4\ 8\ =\ \log_{2^2}\ 2^3$

$=\ \frac{3}{2}\ \times\ \log_2\ 2$

$=\ \frac{3}{2}\ \times\ 1\ =\ 1.5$

Hence, the correct option is (A).

Q5 Text Solution:

We know,

log $\frac{1}{3}$to the base 9 can be written as:

$\log_9\ \frac{1}{3}\ =\ \frac{\log\ \frac{1}{3}}{\log\ 9}$ $\left(u \sin g\ base\ change\ formula\right)$

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

$=\ \frac{-\ \log\ 3}{2 \times\ \log\ 3}$

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

Therefore, the value of log $\frac{1}{3}$ to the base 9 is $-\frac{1}{2}$.

Hence, the correct answer is option (A).

Q6 Text Solution:

Simplifying the given expression, we get

$\log \frac{a^2}{\text{bc}} + log\frac{b^2}{\text{ca}} + log\frac{c^2}{\text{ab}}$

$= log\ \left(\frac{a^2}{\text{bc}} \times \frac{b^2}{\text{ca}} \times \frac{c^2}{\text{ab}}\right)$

$(\because\ log\, m + log\, n = log\, mn)$

$= log\ \left(\frac{a^2b^2c^2}{a^2b^2c^2}\right)$

$= log\, 1$

$= 0\ \left(\because\ log\, 1 = 0\right)$

Therefore, the value of $\log \frac{a^2}{\text{bc}} + log\frac{b^2}{\text{ca}} + log\frac{c^2}{\text{ab}}$ is 0.

Hence, the correct option is (A).

Q7 Text Solution:

We know,

$2\ \log\ x\ =\ 4\ \log\ 3$

$\Rightarrow\ \log\ x\ =\ 2\ \log\ 3$

$\Rightarrow\ \log\ x\ =\ \log\ 3^2$

$\Rightarrow\ \log\ x\ =\ \log\ 9$

$\Rightarrow\ x\ =\ 9$

Therefore, the value of x is 9.

Hence, the correct option is (B).

Q8 Text Solution:

On simplifying, we get

$\log_2 \log_2 \log_2 16$

$= \log_2 \log_2 \log_2 (2^4)$

$= \log_2 \log_2 (4 \log_2 2)$

$(\because \log_a m^n = n \log_a m)$

$= \log_2 \log_2 (4) \ (\because \log_a a = 1)$

$= \log_2 \log_2 (2^2)$

$= \log_2 (2 \log_2 2) \ (\because \log_a m^n = n \log_a m)$

$= \log_2 2 \ (\because \log_a a = 1)$

$= 1$

Therefore, the value of $\log_2 \log_2 \log_2 16$ is 1.

Hence, the correct option is (C).

Q9 Text Solution:

Simplifying the given expression, we get

$\log_b \left(a^{\frac{1}{2}}\right) \log_c \left(b^3\right) \log_a \left(c^{\frac{2}{3}}\right)$

$= \frac{\log a^{\frac{1}{2}}}{\log b} \cdot \frac{\log b^3}{\log c} \cdot \frac{\log c^{\frac{2}{3}}}{\log a}$

$\left(\because \log_n m = \frac{\log m}{\log n}\right)$

$= \frac{\frac{1}{2} \log a}{\log b} \cdot \frac{3 \log b}{\log c} \cdot \frac{\frac{2}{3} \log c}{\log a}$

$(\because \log m^n = n \log m)$

$= \frac{\log a}{2 \log b} \cdot \frac{3 \log b}{\log c} \cdot \frac{2 \log c}{3 \log a}$

$= 1$

Therefore, the required value is 1.

Hence, the correct option is (B).

Q10 Text Solution:

$\log_{10} 60 = \log_{10}(2 \times 3 \times 10)$

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

$= x + y + 1$

Therefore, $\log_{10} 60$ is expressed in terms of x and y as $x + y + 1$.

Hence, the correct option is (B).

Q11 Text Solution:

Simplifying the given expression, we get

$\frac{1}{\log_a (ab)} + \frac{1}{\log_b (ab)}$

$= \frac{1}{\frac{\log (ab)}{\log (a)}} + \frac{1}{\frac{\log (ab)}{\log (b)}}$

$= \frac{\log (a)}{\log (ab)} + \frac{\log (b)}{\log (ab)}$

$= \frac{\log (a) + \log (b)}{\log (ab)}$

$= \frac{\log (ab)}{\log (ab)} \ (\because \log m + \log n = \log mn)$

$= 1$

Therefore, the value of $\frac{1}{\log_a (ab)} + \frac{1}{\log_b (ab)}$ is 1.

Hence, the correct option is (B).

Q12 Text Solution:

$\log_8 128 \times \log_6 \left(\frac{1}{216}\right)$

$= \log_{2^3} 2^7 \times \log_6 6^{-3}$

$= \frac{7}{3} \times \log_2 2 \times -3 \times \log_6 6$

$= -7 \times 1 \times 1$

$= -7$

Hence, the correct option is (A).

Q13 Text Solution:

$\log_3 16 \times \log_4 9 = \frac{\log 16}{\log 3} \times \frac{\log 9}{\log 4}$

$= \frac{\log 4^2}{\log 3} \times \frac{\log 3^2}{\log 4}$

$= \frac{2 \times \log 4}{\log 3} \times \frac{2 \times \log 3}{\log 4}$

$= 2 \times 2 = 4$

Hence, the correct option is (C).

Q14 Text Solution:

$\log \left(\frac{10x}{y^2}\right) = \log 10x - \log y^2$

$= \log 10 + \log x - 2 \times \log y$

$= 1 + (m + n) - 2(m - n)$

$= 1 + m + n - 2m + 2n$

$= 1 - m + 3n$

Hence, the correct option is (B).

Q15 Text Solution:

On simplifying the given expression, we get

$4\ log\ \frac{8}{25} - 3\ log\ \frac{16}{125} - log\ 5$

$= \log\ \left(\frac{8}{25}\right)^4 - \log\ \left(\frac{16}{125}\right)^3 - log\ 5$

$(\because\ n\ log\ m = log\ m^n)$

$= \log\ \left(\frac{2^3}{5^2}\right)^4 - \log\ \left(\frac{2^4}{5^3}\right)^3 - log\ 5$

$= log \frac{(2^3)^4}{(5^2)^4} - log \frac{(2^4)^3}{(5^3)^3} - log\ 5$

$= log\left(\frac{2^{12}}{5^8}\right) - log\left(\frac{2^{12}}{5^9}\right) - log\ 5$

$= log\ \left[\frac{2^{12}}{5^8} \div \frac{2^{12}}{5^9} \div 5\right]$

$(\because\ log\ a - log\ b = log \frac{a}{b})$

$= log\ \left[\frac{2^{12}}{5^8} \times \frac{5^9}{2^{12}} \times \frac{1}{5}\right]$

$= log\ \left(2^{12\ -12} \times 5^{9\ -\ 8\ -1}\right)$

$= log\ \left(2^0 \times 5^0\right)$

$= log\ 1\ \left(\because\ a^0 = 1\ for\ a \neq 0\right)$

$= 0\quad \left(\because \log\ 1\ =\ 0\right)$

Therefore, the required value is 0.

Hence, the correct option is (A).