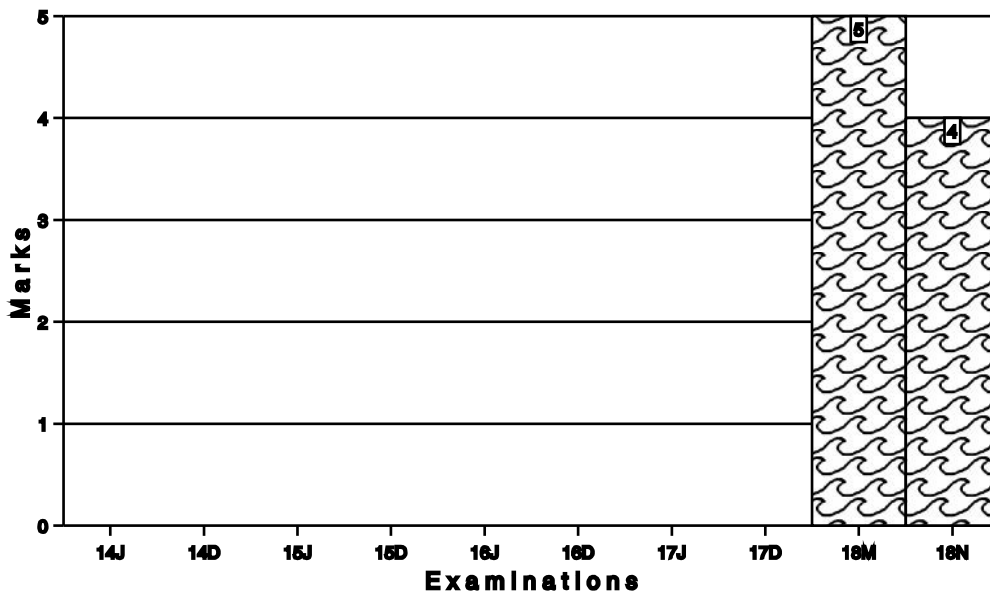


CHAPTER	<h1 style="margin: 0;">1</h1> <h2 style="margin: 0;">RATIO AND PROPORTION, INDICES AND LOGARITHMS</h2>
1	

Marks of Objective, Short Notes, Distinguish Between, Descriptive & Practical Questions

Legend



For detailed analysis Login at www.scannerclasses.com
for registration and password see first page of this book.

MULTIPLE CHOICE QUESTIONS AND ANSWERS

2006 - NOVEMBER

[1] Two numbers are in the ratio 2 : 3 and the difference of their squares is 320. The numbers are:

- (a) 12, 18
 - (b) 16, 24
 - (c) 14, 21
 - (d) None.
- (1 mark)

Answer:

(b) Let numbers be $2x$ and $3x$.

$$\text{Therefore, } (3x)^2 - (2x)^2 = 320$$

$$9x^2 - 4x^2 = 320$$

$$5x^2 = 320$$

$$x^2 = 64$$

$$x = 8$$

$$\text{Numbers are: } 2x = 2 \times 8 = 16$$

$$3x = 3 \times 8 = 24$$

[2] If $p : q$ is the sub-duplicate ratio of $p - x^2 : q - x^2$, then x^2 is :

- (a) $\frac{p}{p+q}$
 - (b) $\frac{q}{p+q}$
 - (c) $\frac{qp}{p-q}$
 - (d) None.
- (1 mark)

Answer:

(d) As per the given information :

$$\frac{p-x^2}{q-x^2} = \frac{P^2}{q^2}$$

$$q^2(p - x^2) = P^2(q - x^2)$$

$$pq^2 - x^2q^2 = p^2q - p^2x^2$$

$$x^2(p^2 - q^2) = pq(p - q)$$

$$x^2 = \frac{pq(p-q)}{p^2 - q^2}$$

$$x^2 = \frac{pq}{p+q}$$

[3] An alloy is to contain copper and zinc in the ratio 9 : 4. The zinc required to melt with 24 kg of copper is :

(a) $10\frac{2}{3}$ kg

(b) $10\frac{1}{3}$ kg

(c) $9\frac{2}{3}$ kg

(d) 9kg

(1 mark)

Answer:

(a) Let the quantity of copper and zinc in an alloy be $9x$ kg and $4x$ kg.

Therefore, $9x = 24$

$$x = \frac{24}{9} = \frac{8}{3} = 2\frac{2}{3} \text{ kg.}$$

$$\text{So zinc} = 4x = 4 \times \frac{8}{3} \text{ kg.}$$

$$= 10\frac{2}{3} \text{ kg.}$$

[4] $7 \log \left(\frac{16}{15} \right) + 5 \log \left(\frac{25}{24} \right) + 3 \log \left(\frac{81}{80} \right)$ is equal to :

(a) 0

(b) 1

(c) $\log 2$

(d) $\log 3$

Answer:

$$(c) 7 \text{ Log} \left(\frac{16}{15} \right) + 5 \text{ Log} \left(\frac{25}{24} \right) + 3 \text{ Log} \left(\frac{81}{80} \right)$$

$$= 7(\log 16 - \log 15) + 5(\log 25 - \log 24) + 3 \log (\log 81 - \log 80)$$

$$= 7 [4 \log 2 - (\log 3 + \log 5)] + 5 [2 \log 5 - (3 \log 2 + \log 3)] + 3 [4 \log 3 - (4 \log 2 + \log 5)]$$

$$= 28 \log 2 - 7 \log 3 - 7 \log 5 + 10 \log 5 - 15 \log 2 - 5 \log 3 + 12 \log 3 - 12 \log 2 - 3 \log 5 = \log 2$$

2007 - FEBRUARY

- [5] Two numbers are in the ratio 7 : 8. If 3 is added to each of them, their ratio becomes 8 : 9. The numbers are :

- (a) 14,16 (b) 24,27
(c) 21,24 (d) 16,18 (1 mark)

Answer:

- (c) Let the numbers be $7x$ and $8x$.

$$\text{So, } \frac{7x + 3}{8x + 3} = \frac{8}{9}$$

$$9(7x + 3) = 8(8x + 3)$$

$$63x + 27 = 64x + 24$$

$$x = 3$$

$$\text{Numbers are : } 7x = 7 \times 3 = 21$$

$$8x = 8 \times 3 = 24$$

- [6] A box contains ₹ 56 in the form of coins of one rupee, 50 paise and 25 paise. The number of 50 paise coin is double the number of 25 paise coins and four times the numbers of one rupee coins. The numbers of 50 paise coins in the box is :

- (a) 64 (b) 32
(c) 16 (d) 14 (1 mark)

Answer:

- (a) Let the number of one – rupee coins be x .

Then, number of 50 paise coins is $4x$

and number of 25 – paise coins is $2x$

So,

$$x + \frac{4x}{2} + \frac{2x}{4} = 56$$

$$4x + 8x + 2x = 56 \times 4$$

$$14x = 224$$

$$x = \frac{224}{14} = 16$$

$$\text{Number of 50 paise coins is } 4 \times 16 = 64$$

[7] Value of $(a^{1/8} + a^{-1/8})(a^{1/8} - a^{-1/8})(a^{1/4} + a^{-1/4})(a^{1/2} + a^{-1/2})$ is :

- (a) $a + \frac{1}{a}$ (b) $a - \frac{1}{a}$
 (c) $a^2 + \frac{1}{a^2}$ (d) $a^2 - \frac{1}{a^2}$ (1 mark)

Answer:

$$\begin{aligned} \text{(b)} & (a^{1/8} + a^{-1/8})(a^{1/8} - a^{-1/8})(a^{1/4} + a^{-1/4})(a^{1/2} + a^{-1/2}) \\ &= (a^{1/4} - a^{-1/4})(a^{1/4} + a^{-1/4})(a^{1/2} + a^{-1/2}) \\ & \quad [\text{using } (a^2 - b^2) = (a - b)(a + b)] \\ &= (a^{1/2} - a^{-1/2})(a^{1/2} + a^{-1/2}) \\ &= a^1 - a^{-1} \\ &= a - \frac{1}{a} \end{aligned}$$

[8] The value of the expression :

$$a^{\log_a b \cdot \log_b^c \cdot \log_c^d \cdot \log_d t}$$

- (a) t (b) abcdt
 (c) $(a + b + c + d + t)$ (d) None. (1 mark)

Answer:

$$\begin{aligned} \text{(a)} & a^{\log_a b \cdot \log_b^c \cdot \log_c^d \cdot \log_d t} \\ &= a^{\frac{\log b}{\log a} \times \frac{\log^c b}{\log^c a} \cdot \frac{\log^d c}{\log^d b} \cdot \frac{\log^t d}{\log^t c}} = \left[\text{using } \log a^b = \frac{\log b}{\log a} \right] \\ &= a^{\frac{\log t}{\log a}} \\ &= a \log_a^t \\ &= t [\text{using } a^{\log_a^m a} = m] \end{aligned}$$

[9] If $\log_{10000} x = \frac{-1}{4}$, then x is given by:

- (a) $\frac{1}{100}$ (b) $\frac{1}{10}$
 (c) $\frac{1}{20}$ (d) None of these. (1 mark)

3.6**Solved Scanner CA Foundation Paper - 3A (New Syllabus)****Answer:**

(b) $\text{Log}_{1000} x = -\frac{1}{4}$

$(10,000)^{-1/4} x = [\text{using } \log a^b = x, = a^x = b]$

$$\frac{1}{(10,000)^{1/4}} = x$$

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

2007 - MAY

[10] Eight people are planning to share equally the cost of a rental car. If one person withdraws from the arrangement and the others share equally entire cost of the car, then the share of each of the remaining persons increased by :

(a) 1/9

(b) 1/8

(c) 1/7

(d) 7/8

(1 mark)

Answer:**(c)** When number of people = 8then, the share of each person = $\frac{1}{8}$ of the total cost.

When number of people = 7

then, the share of each person = $\frac{1}{7}$ of the total costIncrease in the share of each person = $\frac{1}{7} - \frac{1}{8} = \frac{1}{56}$ i.e. $\frac{1}{7}$ of $\frac{1}{8}$, i.e. $\frac{1}{7}$ of the original share of each person.

[11] A bag contains ₹ 187 in the form of 1 rupee, 50 paise and 10 paise coins in the ratio 3:4:5. Find the number of each type of coins :

(a) 102, 136, 170

(b) 136, 102, 170

(c) 170, 102, 136

(d) None.

(1 mark)

Answer:

(a) Let the number of coins be $3x, 4x,$ and $5x$.

$$\text{Then, } 3x + \frac{4x}{2} + \frac{5x}{10} = 187$$

$$30x + 20x + 5x = 187 \times 10$$

$$55x = 1870$$

$$x = \frac{1870}{55} = 34$$

Number of coins:

$$\text{One rupee} = 3x = 3 \times 34 = 102$$

$$50 \text{ paise} = 4x = 4 \times 34 = 136$$

$$10 \text{ paise} = 5x = 5 \times 34 = 170$$

[12] Simplification of $\frac{x^{m+3n} \cdot x^{4m-9n}}{x^{6m-6n}}$ is :

(a) x^m

(b) x^{-m}

(c) x^n

(d) x^{-n}

(1 mark)

Answer:

(b) $\frac{x^{m+3n} \cdot x^{4m-9n}}{x^{6m-6n}}$

$$= \frac{x^{m+3n+4m-9n}}{x^{6m-6n}} \left[\text{using } \frac{x^a \cdot x^b}{x^c} \right]$$

$$= \frac{x^{5m-6n}}{x^{6m-6n}}$$

$$= x^{5m-6n-6m+6n} \left[\text{using } \frac{x^a}{x^b} = x^{a-b} \right]$$

$$= x^{-m}$$

[13] If $\log(2a - 3b) = \log a - \log b$, then $a =$:

(a) $\frac{3b^2}{2b-1}$

(b) $\frac{3b}{2b-1}$

(c) $\frac{b^2}{2b+1}$

(d) $\frac{3b^2}{2b+1}$

(1 mark)

3.8**■ Solved Scanner CA Foundation Paper - 3A (New Syllabus)****Answer:**

(a) $\log(2a - 3b) = \log a - \log b$

$$\log(2a - 3b) = \log\left(\frac{a}{b}\right)$$

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

$$2ab - 3b^2 = a$$

$$2ab - a = 3b^2$$

$$a(2b - 1) = 3b^2$$

$$a = \frac{3b^2}{2b-1}$$

2007 - AUGUST[14] On simplification $\frac{1}{1+z^{a-b}+z^{a-o}} + \frac{1}{1+z^{b-o}+z^{b-a}} + \frac{1}{1+z^{o-a}+z^{o-b}}$ reduces to :

(a) $\frac{1}{z^{2(a+b+c)}}$

(b) $\frac{1}{z^{(a+b+c)}}$

(c) 1

(d) 0

(1 mark)

Answer:

$$\begin{aligned}
\text{(c)} \quad & \frac{1}{1+z^{a-b}+z^{a-o}} + \frac{1}{1+z^{b-o}+z^{b-a}} + \frac{1}{1+z^{o-a}+z^{o-b}} \\
&= \frac{1}{1+\frac{z^{-b}}{z^a} + \frac{z^{-o}}{z^a}} + \frac{1}{1+\frac{z^{-o}}{z^b} + \frac{z^{-a}}{z^b}} + \frac{1}{1+\frac{z^{-a}}{z^{-b}} + \frac{z^{-b}}{z^{-o}}} \\
&= \frac{z^{-a}}{z^{-a}+z^{-b}+z^{-o}} + \frac{z^{-b}}{z^{-b}+z^{-o}+z^{-a}} + \frac{z^{-o}}{z^{-o}+z^{-a}+z^{-b}} \\
&= \frac{z^{-a}+z^{-b}+z^{-o}}{z^{-a}+z^{-b}+z^{-o}} \\
&= 1
\end{aligned}$$

[15] Ratio of earnings of A and B is 4 : 7. If the earnings of A increase by 50% and those of B decrease by 25%, the new ratio of their earning becomes 8 : 7. What is A's earning ?

- (a) ₹ 21,000 (b) ₹ 26,000
(c) ₹ 28,000 (d) Data inadequate. (1 mark)

Answer:

(d) Let the earning of A and B be $4x$ and $7x$ respectively.

$$\text{New earning of A} = 4x \times 150\% = 6x$$

$$\text{New earning of B} = 7x \times 75\% = 5.25x$$

$$\text{Then, } \frac{6x}{5.25x} = \frac{8}{7}$$

This does not give the value of x

So, the given data is inadequate.

[16] P, Q and R are three cities. The ratio of average temperature between P and Q is 11 : 12 and that between P and R is 9 : 8. The ratio between the average temperature of Q and R is :

- (a) 22 : 27 (b) 27 : 22
(c) 32 : 33 (d) None. (1 mark)

Answer:

$$(b) \frac{P}{Q} = \frac{11}{12} \text{ and } \frac{P}{R} = \frac{9}{8}$$

$$\frac{P}{Q} = \frac{11 \times 9}{12 \times 9} = \frac{99}{108} \text{ and } \frac{P}{R} = \frac{9 \times 11}{8 \times 11} = \frac{99}{88}$$

$$\text{Therefore, } \frac{Q}{R} = \frac{108}{88} = \frac{27}{22}$$

So, Q : R = 27:22

[17] $\frac{1}{\log_{ab}(abc)} + \frac{1}{\log_{bc}(abc)} + \frac{1}{\log_{ca}(abc)}$ is equal to :

- (a) 0 (b) 1
(c) 2 (d) -1 (1 mark)

3.10

■ Solved Scanner CA Foundation Paper - 3A (New Syllabus)

Answer:

$$\begin{aligned} \text{(c) } & \frac{1}{\log_{ab}^{(abc)}} + \frac{1}{\log_{bc}^{(abc)}} + \frac{1}{\log_{ca}^{(abc)}} \\ & = \frac{1}{\log(ab)} + \frac{1}{\log(bc)} + \frac{1}{\log(ca)} \\ & \quad \left[\text{using } \log_a b = \frac{\log b}{\log a} \right] \\ & = \frac{\log(ab)}{\log(abc)} + \frac{\log(bc)}{\log(abc)} + \frac{\log(ca)}{\log(abc)} \\ & = \frac{\log(ab \times bc \times ca)}{\log abc} \\ & = \frac{\log a^2 b^2 c^2}{\log(abc)} \\ & = \frac{\log(abc)^2}{\log abc} = \frac{2 \log(abc)}{\log(abc)} = 2 \end{aligned}$$

[18] Number of digits in the numeral for 2^{64} . [Given $\log 2 = 0.30103$]:

- (a) 18 digits (b) 19 digits
(c) 20 digits (d) 21 digits. (1 mark)

Answer:

$$\begin{aligned} \text{(c) } & 2^{64} \\ & = 64 \log 2 \\ & = 64 \times 0.30103 \\ & = 19.26592 \\ & \text{Number of digit in } 2^{64} = 20. \end{aligned}$$

2007 - NOVEMBER

[19] ₹ 407 are to be divided among A, B and C so that their shares are in

the ratio $\frac{1}{4} : \frac{1}{5} : \frac{1}{6}$. The respective shares of A, B, C are :

3.12

Solved Scanner CA Foundation Paper - 3A (New Syllabus)

Answer:

$$(d) 4^x = 5^y = 20^z = k \text{ (say)}$$

$$4 = k^{1/x}$$

$$5 = k^{1/y}$$

$$20 = k^{1/z}$$

$$4 \times 5 = 20$$

$$k^{1/x} \times k^{1/y} = k^{1/z}$$

$$k^{1/x + 1/y} = k^{1/z} \quad (x^m \times x^n = x^{m+n})$$

$$\frac{x+y}{k^{xy}} = k^{1/z}$$

$$\text{Therefore, } = \frac{x+y}{xy} = \frac{1}{z} \quad (x^m = x^n \quad m = n)$$

$$z = \frac{xy}{x+y}$$

$$[22] \left(\frac{\sqrt{3}}{9}\right)^{5/2} \left(\frac{9}{3\sqrt{3}}\right)^{7/2} \times 9 \text{ is equal to :}$$

(a) 1

(b) $\sqrt{3}$

(c) $3\sqrt{3}$

(d) $\frac{3}{9\sqrt{3}}$

(1 mark)

Answer:

$$(a) \left(\frac{\sqrt{3}}{9}\right)^{5/2} \left(\frac{9}{3\sqrt{3}}\right)^{7/2} \times 9$$

$$= \left(\frac{3^{1/2}}{3^2}\right)^{5/2} \left(\frac{3^2}{3 \cdot 3^{1/2}}\right)^{7/2} \times 3^2$$

$$= \left(3^{1/2-2}\right)^{5/2} \left(\frac{3^2}{3^{3/2}}\right)^{7/2} \times 3^2$$

$$= \left(3^{-3/2}\right)^{5/2} \left(3^{2-3/2}\right)^{7/2} \times 3^2$$

$$\begin{aligned}
 &= 3^{\frac{-15}{4}} \left(3^{\frac{1}{2}} \right)^{\frac{7}{2}} \times 3^2 \\
 &= 3^{\frac{-15}{4}} \times 3^{\frac{7}{4}} \times 3^2 \\
 &= 3^{\frac{-15}{4} + \frac{7}{4} + 2} \\
 &= 3^{-2+2} = 3^0 = 1
 \end{aligned}$$

[23] The value $\frac{\log_3 8}{\log_9 16 \cdot \log_4 10}$ is :

- (a) $3 \log_{10} 2$ (b) $7 \log_{10} 3$
 (c) $3 \log_e z$ (d) None. (1 mark)

Answer:

(a) $\frac{\log_3 8}{\log_9 16 \cdot \log_4 10}$

$$\begin{aligned}
 &= \log_3^8 \cdot \log_{16}^9 \cdot \log_{10}^4 \\
 &= \log_3^{2^3} \cdot \log_{4^2}^{3^2} \cdot \log_{10}^{2^2} \\
 &= 3 \log_3^2 \cdot \frac{2}{4} \log_2^3 \cdot 2 \log_{10}^2 \\
 &= \frac{3 \log 2}{\log 3} \cdot \frac{1 \log 3}{2 \log 2} \cdot \frac{2 \log 2}{\log 10} \\
 &= \frac{3 \log 2}{\log 10} \\
 &= 3 \log_{10}^2
 \end{aligned}$$

2008 - FEBRUARY

[24] In 40 litres mixture of glycerine and water, the ratio of glycerine and water is 3:1. The quantity of water added in the mixture in order to make this ratio 2:1 is:

- (a) 15 litres (b) 10 litres
 (c) 8 litres (d) 5 litres. (1 mark)

3.14**■ Solved Scanner CA Foundation Paper - 3A (New Syllabus)****Answer:**

(d) Quantity of glycerine = $40 \times \frac{3}{4} = 30$ litres

Quantity of water = $40 \times \frac{1}{4} = 10$ litres

Let x liters of water be added to the mixture.

Then, total quantity of mixture = $(40 + x)$ litres

total quantity of water in the mixture = $(10 + x)$ litres.

So, $\frac{30}{10+x} = \frac{2}{1}$

$$30 = 20 + 2x$$

$$2x = 10$$

$$x = 5 \text{ litres}$$

Therefore, 5 litres of water must be added to the mixture.

[25] The third proportional between $(a^2 - b^2)$ and $(a + b)^2$ is :

(a) $\frac{a+b}{a-b}$

(b) $\frac{a-b}{a+b}$

(c) $\frac{(a-b)^2}{a+b}$

(d) $\frac{(a+b)^3}{a-b}$

(1 mark)

Answer:

(d) Let the third proportional be x.

$$\therefore \frac{a^2 - b^2}{(a+b)^2} = \frac{(a+b)^2}{x}$$

By cross – multiplication

$$x = (a+b)^2 \frac{(a+b)^2}{(a^2 - b^2)}$$

$$x = \frac{(a+b)^3}{(a-b)}$$

[26] If $2^x - 2^{x-1} = 4$ then x^x is equal to :

(a) 7

(b) 3

(c) 27

(d) 9

(1 mark)

Answer:

(c) $2^x - 2^{x-1} = 4$

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

$$2^x \left[1 - \frac{1}{2} \right] = 4$$

$$2^x \left[\frac{1}{2} \right] = 4$$

$$2^x = 8$$

$$2^x = 2^3$$

$$x = 3$$

$$x^x = 3^3$$

$$= 27$$

[27] If $x = \frac{e^n - e^{-n}}{e^n + e^{-n}}$, then the value of n is:

(a) $\frac{1}{2} \log_e \frac{1+x}{1-x}$

(b) $\log_e \frac{1+x}{1-x}$

(c) $\log_e \frac{1-x}{1+x}$

(d) $\log_e \frac{1-x}{1+x}$

(1 mark)

Answer:

(a) $x = \frac{e^n - e^{-n}}{e^n + e^{-n}}$

$$\frac{1}{x} = \frac{e^n + e^{-n}}{e^n - e^{-n}}$$

Applying Componendo & Dividendo

$$\frac{1+x}{1-x} = \frac{e^n + e^{-n} + e^n - e^{-n}}{e^n + e^{-n} - e^n + e^{-n}}$$

$$\frac{1+x}{1-x} = \frac{2+e^n}{2e^{-n}}$$

3.16**■ Solved Scanner CA Foundation Paper - 3A (New Syllabus)**

$$\frac{1+x}{1-x} = e^{2n} \frac{1+x}{1-x} = 2n$$

$$\text{Log} \left(\frac{1+x}{1-x} \right) = 2n, \quad n = \frac{1}{2} \text{Log} e \left(\frac{1+x}{1-x} \right)$$

[28] log 144 is equal to :

(a) $2 \log 4 + 2 \log 2$

(b) $4 \log 2 + 2 \log 3$

(c) $3 \log 2 + 4 \log 3$

(d) $3 \log 2 - 4 \log 3$

(1 mark)

Answer:

(b) Log 144

$$= \text{Log} (16 \times 9) = \log 16 + \log 9$$

$$= \log 2^4 + \log 3^2$$

$$= 4\log 2 + 2\log 3.$$

2008 - JUNE

[29] In what ratio should tea worth ₹ 10 per kg be mixed with tea worth ₹ 14 per kg, so that the average price of the mixture may be ₹ 11 per kg?

(a) 2:1

(b) 3:1

(c) 3:2

(d) 4:3

(1 mark)

Answer:

(b) Let x quantity of tea worth ₹10per kg. be mixed with y quantity worth 14 per kg.

$$\text{Total price of the mixture} = 10x + 14y.$$

and

$$\text{Total quantity of the mixture} = x + y$$

$$\text{Average price of mixture will be } \frac{10x+14y}{x+y} = 11$$

$$10x + 14y = 11x + 11y$$

$$3y = x$$

$$\frac{x}{y} = \frac{3}{1}$$

or $x : y = 3 : 1$ which is the required ratio.

[30] The ages of two persons are in the ratio 5:7. Eighteen years ago their ages were in the ratio of 8:13, their present ages (in years) are :

- (a) 50, 70 (b) 70, 50
(c) 40, 56 (d) None. (1 mark)

Answer:

(a) Let the present ages of persons be $5x$ & $7x$.
Eighteen years ago, their ages = $5x - 18$ and $7x - 18$.
According to given:

$$\frac{5x-18}{7x-18} = \frac{8}{13}$$

$$65x - 234 = 56x - 144$$

$$9x = 90$$

$$x = 10$$

Their present ages are $5x = 5 \times 10 = 50$ years

$7x = 7 \times 10 = 70$ years.

[31] If $x = y^a$, $y = z^b$ and $z = x^c$ then abc is:

- (a) 2 (b) 1
(c) 3 (d) 4 (1 mark)

Answer:

(b) $Z = x^c$

$$Z = (y^a)^c (\because y^a = x)$$

$$Z = y^{ac}$$

$$Z = (z^b)^{ac} (\because z^b = y)$$

$$Z = Z^{abc}$$

$$abc = 1 (\because x^m = x^n \text{ then } m = n)$$

[32] If $\log_2 [\log_3 (\log_2 x)] = 1$, then x equals :

- (a) 128 (b) 256
(c) 512 (d) None. (1 mark)

Answer:

(c) $\log_2 [\log_3 (\log_2 x)] = 1$

$$= \log_3 (\log_2 x) = 2^1 \text{ (Converting into exponential form)}$$

$$= \log_2 x = 3^2 \text{ (Converting into exponential form)}$$

$$= \log_2 x = 9$$

$$= x = 2^9 \text{ (Converting into exponential form)}$$

$$x = 512.$$

2008 - DECEMBER

[33] If $\log \left(\frac{a+b}{4} \right) = \frac{1}{2} (\log a + \log b)$ then: $\frac{a}{b} + \frac{b}{a}$

- (a) 12 (b) 14
(c) 16 (d) 8

(1 mark)

Answer:

$$(b) \log \left(\frac{a+b}{4} \right) = \frac{1}{2} (\log a + \log b)$$

$$\log \left(\frac{a+b}{4} \right) = \log (ab)^{1/2}$$

[Since, $\log_a mn = \log_a m + \log_a n$ and $n \log_a m = \log_a m^n$]

Take antilog on both sides.

$$\frac{a+b}{4} = \sqrt{ab}$$

$$a + b = 4\sqrt{ab}$$

Squaring both sides

$$(a + b)^2 = (4\sqrt{ab})^2$$

$$a^2 + b^2 + 2ab = 16ab$$

$$a^2 + b^2 = 14ab$$

$$\frac{a}{b} + \frac{b}{a} = 14, \text{ which is the required answer}$$

[34] If A, B and C started a business by investing ₹ 1,26,000, ₹ 84,000 and ₹ 2,10,000. If at the end of the year profit is ₹ 2,42,000 then the share of each is :

- (a) 72,600, 48,400, 1,21,000 (b) 48,400, 1,21,000, 72,600
(c) 72,000, 49,000, 1,21,000 (d) 48,000, 1,21,400, 72,600

(1 mark)

Answer:

(a) Given : Capital invested by :

A : ₹ 126,000, B : ₹ 84,000, C : ₹ 2,10,000

The ratio of their investments is :

$$126 : 84 : 210 = 3 : 2 : 5$$

Profit (at year end) = ₹ 2,42,000 gives

$$\text{A's Share} = \frac{3}{10} \times 2,42,000 = ₹ 72,600$$

$$\text{B's Share} = \frac{2}{10} \times 2,42,000 = ₹ 48,400$$

$$\text{C's Share} = \frac{5}{10} \times 2,42,000 = ₹ 1,21,000$$

2009 - JUNE

[35] If $\frac{p}{q} = -\frac{2}{3}$ then the value of $\frac{2p+q}{2p-q}$ is :

- (a) 1 (b) -1/7
(c) 1/7 (d) 7

(1 mark)

Answer:

(c) $\frac{q}{p} = \frac{2}{3}$

So, $P = \frac{-2q}{3}$ (i)

Now, $\frac{2p+q}{2q-p}$

Substituting the value of p from (i)

$$\begin{aligned} &= \frac{2\left(\frac{-2q}{3}\right) + q}{2\left(\frac{-2q}{3}\right) - q} \\ &= \frac{\frac{-4q}{3} + q}{\frac{-4q}{3} - q} \end{aligned}$$

3.20 ■ *Solved Scanner* CA Foundation Paper - 3A (New Syllabus)

$$\begin{aligned} &= \frac{-4q + 3q}{3} \\ &= \frac{-4q - 3q}{3} \\ &= \frac{-q \times 3}{3 \times -7q} \\ &= \frac{1}{7} \end{aligned}$$

[36] Fourth proportional to $x, 2x, (x+1)$ is:
(a) $(x + 2)$ (b) $(x - 2)$
(c) $(2x + 2)$ (d) $(2x - 2)$ (1 mark)

Answer:

(c) Let the fourth proportional to $x, 2x, (x + 1)$ be t , then,

$$\frac{x}{2x} = \frac{x+1}{t}$$

$$\frac{1}{2} = \frac{x+1}{t}$$

$$t = 2x + 2$$

\therefore Fourth proportional to $x, 2x, (x + 1)$ is $(2x + 2)$

i.e. $x : 2x :: (x + 1) : (2x + 2)$

[37] If $x = 3^{1/3} + 3^{-1/3}$ then find value of $3x^3 - 9x$
(a) 3 (b) 9
(c) 12 (d) 10 (1 mark)

Answer:

(d) $x = 3^{1/3} + 3^{-1/3}$ (1)

On cubing both sides, we get

$$x^3 = (3^{1/3} + 3^{-1/3})^3$$

$$x^3 = 3 + 3^{-1} + 3 \times 3^{1/3} \times \frac{1}{3^{1/3}} (3^{1/3} + 3^{-1/3})$$

$$x^3 = 3 + \frac{1}{3} + 3(3^{1/3} + 3^{-1/3})$$

$$x^3 = 3 + \frac{1}{3} + 3x \quad [\text{Using (1)}]$$

$$x^3 - 3x = \frac{9+1}{3}$$

$$3(x^3 - 3x) = 10$$

$$\therefore 3x^3 - 9x = 10$$

[38] Find the value of : $[1 - \{1 - (1 - x^2)^{-1}\}^{-1}]^{-1/2}$

(a) $1/x$

(b) x

(c) 1

(d) None of these.

(1 mark)

Answer:

(b) $[1 - \{1 - (1 - x^2)^{-1}\}^{-1}]^{-1/2}$

$$= \left[1 - \left\{ 1 - \frac{1}{1 - x^2} \right\}^{-1} \right]^{-1/2}$$

$$= \left[1 - \left\{ \frac{1 - x^2 - 1}{1 - x^2} \right\}^{-1} \right]^{-1/2}$$

$$= \left[1 - \left\{ \frac{-x^2}{1 - x^2} \right\}^{-1} \right]^{-1/2}$$

$$= \left[1 - \left\{ \frac{1 - x^2}{x^2} \right\}^{-1} \right]^{-1/2}$$

$$= \left[1 + \frac{1 - x^2}{x^2} \right]^{-1/2} = \left[\frac{x^2 + 1 - x^2}{x^2} \right]^{-1/2}$$

$$= \left[\frac{1}{x^2} \right]^{-1/2} = (x^2)^{1/2}$$

$$= x$$

[39] $\log(m + n) = \log m + \log n$, m can be expressed as :

(a) $m = \frac{n}{n-1}$

(b) $m = \frac{n}{n+1}$

(c) $m = \frac{n+1}{n}$

(d) $m = \frac{n+1}{n-1}$

(1 mark)

Answer:

(a) $\log(m + n) = \log m + \log n$

$\log(m + n) = \log(mn)$ [$\because \log(ab) = \log a + \log b$]

Taking Antilog on both side

Antilog [$\log(m + n)$] = Antilog [$\log mn$]

$m + n = mn$

$mn - m = n$

$m(n - 1) = n$

$m = \frac{n}{n - 1}$

[40] $\log_4(x^2 + x) - \log_4(x + 1) = 2$.

Find x

(a) 16

(b) 0

(c) -1

(d) None of these.

(1 mark)

Answer:

(a) $\text{Log}_4(x^2 + x) - \text{Log}_4(x + 1) = 2$

$\text{Log}_4\left(\frac{x^2 + x}{x + 1}\right) = 2$ [$\because \log_a m - \log_a n = \log_a\left(\frac{m}{n}\right)$]

$4^2 = \frac{x^2 + x}{x + 1}$

$16 = \frac{x^2 + x}{x + 1}$

$16x + 16 = x^2 + x$

$x^2 - 15x - 16 = 0$

$x^2 - 16x + x - 16 = 0$

$x(x - 16) + 1(x - 16) = 0$

$(x + 1)(x - 16) = 0$

$x = -1$ or $x = 16$

Since $x = -1$ is not possible therefore $x = 16$

2009 - DECEMBER

[41] $\frac{2^n + 2^{n-1}}{2^{n+1} - 2^n}$

- (a) 1/2 (b) 3/2
 (c) 2/3 (d) 1/3 (1 mark)

Answer:

(b) $\frac{2^n + 2^{n-1}}{2^{n+1} - 2^n}$
 $= 2^n \left(1 + \frac{1}{2}\right)$
 $= 2^n (2 - 1)$
 $= \frac{3}{2} = \frac{3}{2}$
 $= 1$

[42] If $2^x \times 3^y \times 5^z = 360$ Then what is the value of x, y, z,?

- (a) 3, 2, 1 (b) 1, 2, 3
 (c) 2, 3, 1 (d) 1, 3, 2 (1 mark)

Answer:

(a) $2^x \times 3^y \times 5^z = 360$(1)

The factors of 360 are:

$2^3 \times 3^2 \times 5$.

$2^3 \times 3^2 \times 5^1 = 360$(2)

On comparing (1) and (2), we get;

$x = 3, y = 2$ and $z = 1$

[43] Find the value of $[\log_{10} \sqrt{25} - \log_{10} (2)^3 + \log_{10} (4)^2]^x$

- (a) x (b) 10
 (c) 1 (d) None. (1 mark)

3.24

■ **Solved Scanner CA Foundation Paper - 3A (New Syllabus)**

Answer:

$$\begin{aligned} \text{(c)} & [\log_{10} \sqrt{25} - \log_{10}(2^3) + \log_{10}(4^2)]^x \\ &= [\log_{10} 5 - 3 \log_{10} 2 + \log_{10}(2^4)]^x \\ &= [\log_{10} 5 - 3 \log_{10} 2 + 4 \log_{10} 2]^x \\ &= [\log_{10} 5 + \log_{10} 2]^x \\ &= [\log_{10}(5 \times 2)]^x \quad [\log(mn) = \log m + \log n] \\ &= [\log_{10} 10]^x \\ &= 1^x \quad [\because \log_a a = 1] \\ &= 1 \end{aligned}$$

2010 - JUNE

[44] If $\log_a b + \log_a c = 0$ then

(a) $b = c$

(b) $b = -c$

(c) $b = c = 1$

(d) b and c are reciprocals. (1 mark)

Answer:

(d) $\log_a b + \log_a c = 0$

$$\log_a bc = 0$$

$$a^0 = bc$$

$$bc = 1$$

$$\therefore b = \frac{1}{c}$$

So, b and c are reciprocals.

[45] What must be added to each term of the ratio $49 : 68$, so that it becomes $3 : 4$?

(a) 3

(b) 5

(c) 8

(d) 9

(1 mark)

Answer:

(c) Let the number added be x

$$\frac{49 + x}{68 + x} = \frac{3}{4}$$

$$196 + 4x = 204 + 3x$$

$$x = 8$$

[46] The students of two classes are in the ratio 5 : 7, if 10 students left from each class, the remaining students are in the ratio of 4 : 6 then the number of students in each class is:

- (a) 30, 40 (b) 25, 24
 (c) 40, 60 (d) 50, 70 (1 mark)

Answer:

(c) Let the ratio be 5x : 7x

If 10 student left, Ratio became 4 : 6

$$\frac{5x - 10}{7x - 10} = \frac{4}{6}$$

$$30x - 60 = 28x - 40$$

$$2x = 20$$

$$x = 10$$

∴ No. of students in each class is 5x and 7x

i.e. 50, 70

2010 - DECEMBER

[47] The value of $2 \log x + 2 \log x^2 + 2 \log x^3 + \dots + 2 \log x^n$ will be :

- (a) $\frac{n(n+1)\log x}{2}$ (b) $n(n+1) \log x$
 (c) $n^2 \log x$ (d) None of these. (1 mark)

Answer:

(b) $2 \log x + 2 \log x^2 + 2 \log x^3 + \dots$

$$2[\log x + \log x^2 + \log x^3 + \dots]$$

$$2[\log x + 2 \log x + 3 \log x + \dots]$$

$$2 \log x [1 + 2 + 3 + \dots + n]$$

$$2 \log x \times \frac{n(n+1)}{2}$$

$$= n(n+1) \log x$$

3.26**Solved Scanner CA Foundation Paper - 3A (New Syllabus)**

[48] The recurring decimal 2.7777..... can be expressed as:

- (a) $\frac{24}{9}$ (b) $\frac{22}{9}$
 (c) $\frac{26}{9}$ (d) $\frac{25}{9}$

(1 mark)

Answer:**(d)** 2.7777

$$2 + 0.7 + 0.07 + 0.007 + \dots\dots\dots$$

$$2 + \left(\frac{7}{10} + \frac{7}{100} + \frac{7}{1000} + \dots\dots\dots \right)$$

$$2 + 7 \left(\frac{1}{10} + \frac{1}{100} + \frac{1}{1000} + \dots\dots\dots \right)$$

$$2 + 7 \left(\frac{1/10}{1 - 1/10} \right)$$

$$= 2 + 7 \times \frac{1}{9}$$

$$= 2 + \frac{7}{9}$$

$$= \frac{18+7}{9}$$

$$= \frac{25}{9}$$

[49] Solve : $\left(\frac{\log_{10}x - 3}{2} \right) + \left(\frac{11 - \log_{10}x}{3} \right) = 2$

- (a) 10^{-1} (b) 10^2
 (c) 10 (d) 10^3

(1 mark)

Answer:

$$(a) \left(\frac{\log_{10}x - 3}{2} \right) + \left(\frac{11 - \log_{10}x}{3} \right) = 2$$

$$3 \log_{10}x - 9 + 22 - 2 \log_{10}x = 12$$

$$\log_{10}x + 13 = 12$$

$$\log_{10}x = -1$$

$$x = 10^{-1}$$

[50] If A:B= 2:5, then (10A + 3B):(5A+2B) is equal to:

- (a) 7:4 (b) 7:3
 (c) 6:5 (d) 7:9

(1 mark)

Answer:

$$\begin{aligned} \text{(a)} \quad \frac{A}{B} &= \frac{2}{5} = \frac{2k}{5k} \\ \frac{10A + 3B}{5A + 2B} &= \frac{20k + 15k}{10k + 10k} = \frac{35k}{20k} \\ &= \frac{35}{20} \\ &= \frac{7}{4} \end{aligned}$$

2011 - JUNE

[51] If $n = m!$ where ('m' is a positive integer > 2) then the value of :

$$\frac{1}{\log_2^n} + \frac{1}{\log_3^n} + \frac{1}{\log_4^n} + \dots + \frac{1}{\log_m^n}$$

- (a) 1 (b) 0
 (c) -1 (d) 2

(1 mark)

Answer:

(a) Given : $n = M!$ for $M \geq 2$

$$\frac{1}{\log_2^n} + \frac{1}{\log_3^n} + \frac{1}{\log_4^n} + \dots + \frac{1}{\log_m^n}$$

or, $= \log_n^2 + \log_n^3 + \log_n^4 + \dots + \log_n^m$

$= \log_n (2 \times 3 \times 4 \times \dots \times m)$

$= \log_n (m!)$

$= \log_n^n$

$= 1$

$$\left(\because \log_b^a = \frac{1}{\log_a^b} \right)$$

$(\therefore \log^{(mn)} = \log^m + \log^n)$

3.28**■ Solved Scanner CA Foundation Paper - 3A (New Syllabus)**

[52] In a film shooting, A and B received money in a certain ratio and B and C also received the money in the same ratio. If A gets ₹ 1,60,000 and C gets ₹ 2,50,000. Find the amount received by B ?

- (a) ₹ 2,00,000 (b) ₹ 2,50,000
(c) ₹ 1,00,000 (d) ₹ 1,50,000 (1 mark)

Answer:

(a) Given : A : B = B : C

$$\Rightarrow B^2 = A \times C$$

or $B = \sqrt{A \times C}$

& A = 1,60,000 ; C = 2,50,000

$$B = \sqrt{1,60,000 \times 2,50,000}$$

$$B = 2,00,000$$

2011 - DECEMBER

[53] The ratio Compounded of 4:5 and sub-duplicate of "a":9 is 8:15. Then Value of "a" is:

- (a) 2 (b) 3
(c) 4 (d) 5 (1 mark)

Answer:

(c) Sub duplicate ratio of a : 9 = $\sqrt{a} : \sqrt{9}$, Compound Ratio (C.R.) = 8:15

Compound Ratio of 4:5 and sub duplicate ratio of a:9 is given by

$$C.R = \frac{4}{5} \times \frac{\sqrt{a}}{\sqrt{9}}$$

$$\frac{8}{15} = \frac{4}{5} \times \frac{\sqrt{a}}{\sqrt{9}}$$

$$\sqrt{a} = \frac{8 \times 5 \times \sqrt{9}}{15 \times 4}$$

$$\sqrt{a} = \frac{8 \times 5 \times 3}{15 \times 4}$$

$$\sqrt{a} = 2$$

$$\text{On squaring } (\sqrt{a})^2 = 2^2$$

$$a = 4$$

[54] If $\log_2 x + \log_4 x = 6$, then the Value of x is :

- (a) 16 (b) 32
(c) 64 (d) 128

(1 mark)

Answer:

(a) If $\log_2 x + \log_4 x = 6$

$$\frac{\log x}{\log 2} + \frac{\log x}{\log 4} = 6$$

$$\frac{\log x}{\log 2} + \frac{\log x}{\log 2^2} = 6$$

$$\frac{\log x}{\log 2} + \frac{\log x}{2 \log 2} = 6$$

$$\frac{\log x}{\log 2} \left[1 + \frac{1}{2} \right] = 6$$

$$\frac{\log x}{\log 2} \times \frac{3}{2} = 6$$

$$\frac{\log x}{\log 2} = 6 \times \frac{2}{3}$$

$$\frac{\log x}{\log 2} = 4$$

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

$$\log x = \log 2^4$$

$$x = 2^4$$

$$x = 16$$

[55] If X Varies inversely as square of Y and given that Y = 2 for X = 1, then the Value of X for Y = 6 will be:

- (a) 3 (b) 9
(c) 1/3 (d) 1/9

(1 mark)

3.30 ■ **Solved Scanner CA Foundation Paper - 3A (New Syllabus)**

Answer:

(d) Given x varies inversely as square of y

i. e. $x \propto \frac{1}{y^2}$

$$x = k \frac{1}{y^2}$$

$$x = \frac{k}{y^2} \dots \dots \dots (1)$$

Given $x = 1$, $y = 2$ then

$$1 = \frac{k}{(2)^2} \quad k = 1 \times 4 = 4$$

Now putting $y = 6$, $k = 4$ in equation (1)

$$x = \frac{4}{6^2}$$

$$x = \frac{4}{36} = \frac{1}{9}$$

2012 - JUNE

[56] The value of $\frac{(3^{n+1} + 3^n)}{(3^{n+3} - 3^{n+1})}$ is equal to:

- (a) 1/5
 - (b) 1/6
 - (c) 1/4
 - (d) 1/9
- (1 mark)

Answer:

$$\begin{aligned} \text{(b)} \quad \frac{3^{n+1} + 3^n}{3^{n+3} - 3^{n+1}} &= \frac{3^n \cdot 3^1 + 3^n}{3^n \cdot 3^3 - 3^n \cdot 3^1} \\ &= \frac{3^n (3^1 + 1)}{3^n (3^3 - 3)} \\ &= \frac{(3 + 1)}{(27 - 3)} \\ &= \frac{4}{24} \\ &= \frac{1}{6} \end{aligned}$$

[57] If $\log_x y = 100$ and $\log_2 x = 10$, then the value of 'y' is :

- (a) 2^{10} (b) 2^{100}
 (c) $2^{1,000}$ (d) $2^{10,000}$ (1 mark)

Answer:

(c) Given $\log_x y = 100$ (1)

$\log_2 x = 10$(2)

Multiply eq (1) & (2)

$$\log_x y \cdot \log_2 x = 100 \times 10$$

$$\frac{\log y}{\log x} \times \frac{\log x}{\log 2} = 1,000$$

$$\log y = 1,000 \log 2$$

$$\log y = \log 2^{1,000}$$

$$\Rightarrow y = 2^{1,000}$$

[58] Which of the numbers are not in proportion ?

- (a) 6, 8, 5, 7 (b) 7, 14, 6
 (c) 18, 27, 12, 18 (d) 8, 6, 12, 9 (1 mark)

Answer:

(a) If say a, b, c, d are in proportion they bear a common ratio that is

$$\frac{a}{b} = \frac{c}{d}$$

Option (A) $\frac{6}{8} \neq \frac{5}{7}$

Option (B) $\frac{7}{3} = \frac{14}{6}$

Option (C) $\frac{18}{27} = \frac{12}{18}$

Option (D) $\frac{8}{6} = \frac{12}{9}$

3.32

Solved Scanner CA Foundation Paper - 3A (New Syllabus)

2012 - DECEMBER

[59] Find the value of x , if $x(x)^{1/3} = (x^{1/3})^x$

(a) 3

(b) 4

(c) 2

(d) 6

(1 mark)

Answer:(b) If $x^1 (x)^{1/3} = (x^{1/3})^x$

$$x^{1+1/3} = x^{\frac{1}{3}x}$$

$$x^{4/3} = x^{\frac{1}{3}x}$$

on comparing

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

$$3x = 12 \Rightarrow x = 4$$

[60] Which of the following is true.

$$\text{If } \frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca} = \frac{1}{abc}$$

(a) $\log(ab + bc + ca) = abc$ (b) $\log\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right) = abc$ (c) $\log(abc) = 0$ (d) $\log(a + b + c) = 0$ (1 mark)**Answer:**

(d) Given

$$\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca} = \frac{1}{abc}$$

$$\frac{c + a + b}{abc} = \frac{1}{abc}$$

$$a + b + c = 1$$

taking log on both side

$$\log(a + b + c) = \log 1$$

$$\log(a + b + c) = 0$$

[61] Find two numbers such that mean proportional between them is 18 and third proportional between them is 144

(a) 9, 36

(b) 8, 32

(c) 7, 28

(d) 6, 24

(1 mark)

Answer:

(a) Let two Nos. be x and y

Mean proportion between x and y is 18

So, x , 18, y are in proportion

$$x : 18 :: 18 : y$$

$$\frac{x}{18} = \frac{18}{y}$$

$$xy = 324$$

$$x = \frac{324}{y} \quad (1)$$

If third proportion between x & y be 144

So, x , y , 144 are in proportion

$$x : y :: y : 144$$

$$\frac{x}{y} = \frac{y}{144}$$

$$y^2 = 144x \quad (2)$$

Putting the value of x in equation (2)

$$y^2 = 144 \times \frac{324}{y}$$

$$y^3 = 144 \times 324$$

$$y = \sqrt[3]{144 \times 324}$$

$$y = \sqrt[3]{3 \times 3 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3}$$

$$y = \sqrt[3]{6 \times 6 \times 6 \times 6 \times 6 \times 6}$$

$$y = 6 \times 6$$

$$y = 36$$

Putting $y = 36$ in equation (1)

$$x = \frac{324}{36} = 9$$

$$x = 9, y = 36$$

3.34

■ Solved Scanner CA Foundation Paper - 3A (New Syllabus)

2013 - JUNE

[62] For what value of x , the equation $(\log_{\sqrt{x}} 2)^2 = \log_x^2$ is true?

(a) 16

(b) 32

(c) 8

(d) 4

(1 mark)

Answer:

(a) Given

$$(\log_{\sqrt{x}} 2)^2 = \log_x 2$$

$$\left(\frac{\log 2}{\log \sqrt{x}} \right)^2 = \left(\frac{\log 2}{\log x} \right)$$

$$\left(\frac{\log 2}{\log x^{1/2}} \right)^2 = \frac{\log 2}{\log x}$$

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

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

$$4 \left(\frac{\log 2}{\log x} \right)^2 = \left(\frac{\log 2}{\log x} \right)^1$$

$$4 \frac{\log 2}{\log x} = 1$$

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

$$\log 2^4 = \log x$$

$$\Rightarrow 2^4 = x \Rightarrow \boxed{x = 16}$$

[63] The mean proportional between 24 and 54 is :

(a) 33

(b) 34

(c) 35

(d) 36

(1 mark)

Answer:

$$\begin{aligned} \text{(d) Mean Proportion} &= \sqrt{24 \times 54} \\ &= \sqrt{1296} \\ &= 36 \end{aligned}$$

[64] The triplicate ratio of 4 : 5 is:

- (a) 125 : 64 (b) 16 : 25
 (c) 64 : 125 (d) 120 : 46

(1 mark)

Answer:

(c) The triplicate Ratio of 4 : 5 = $4^3 : 5^3$
 = 64 : 125

2013 - DECEMBER

[65] If $\sqrt[3]{a} + \sqrt[3]{b} + \sqrt[3]{c} = 0$ then the value of $\left(\frac{a+b+c}{3}\right)^3$

- (a) abc (b) 9abc
 (c) $\frac{1}{abc}$ (d) $\frac{1}{9abc}$

(1 mark)

Answer:

(a) If $\sqrt[3]{a} + \sqrt[3]{b} + \sqrt[3]{c} = 0$
 $a^{1/3} + b^{1/3} + c^{1/3} = 0$
 $a^{1/3} + b^{1/3} = -c^{1/3}$ (i)

Cube on both side

$$\begin{aligned} (a^{1/3} + b^{1/3})^3 &= (-c^{1/3})^3 \\ (a^{1/3})^3 + (b^{1/3})^3 + 3 \cdot a^{1/3} \cdot b^{1/3} (a^{1/3} + b^{1/3}) &= -c \\ a + b + 3a^{1/3} \cdot b^{1/3} \cdot (-c^{1/3}) &= -c \\ a + b - c \cdot 3a^{1/3} \cdot b^{1/3} \cdot c^{1/3} &= -c \\ a + b + c &= 3a^{1/3} \cdot b^{1/3} \cdot c^{1/3} \\ \left(\frac{a+b+c}{3}\right) &= \frac{3a^{1/3} \cdot b^{1/3} \cdot c^{1/3}}{3} \\ \left(\frac{a+b+c}{3}\right)^3 &= (a^{1/3} \cdot b^{1/3} \cdot c^{1/3})^3 = abc \end{aligned}$$

[66] Find three numbers in the ratio 1 : 2 : 3, so that the sum of their squares is equal to 504

- (a) 6, 12, 18 (b) 3, 6, 9
 (c) 4, 8, 12 (d) 5, 10, 15

(1 mark)

3.36**■ Solved Scanner CA Foundation Paper - 3A (New Syllabus)****Answer:****(a)** Since Ratio of three Number is 1 : 2 : 3

First No. = x

Second No. = 2x

Third No. = 3x

Sum of squares of numbers = 504

$(x)^2 + (2x)^2 + (3x)^2 = 504$

$x^2 + 4x^2 + 9x^2 = 504$

$14x^2 = 504$

$x^2 = \frac{504}{14}$

$x^2 = 36$

$x = 6$

First No. = x = 6

Second No. = 2x = 2 × 6 = 12

Third No. = 3x = 3 × 6 = 18

[67] The value of $\log_4 9 \cdot \log_3 2$ is:

(a) 3

(b) 9

(c) 2

(d) 1

(1 mark)

Answer:**(d)** $\log_4 9 \cdot \log_3 2$

$= \frac{\log 9}{\log 4} \cdot \frac{\log 2}{\log 3}$

$= \frac{\log 3^2}{\log 2^2} \cdot \frac{\log 2}{\log 3}$

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

$= 1$

[68] The value of $(\log_y x \cdot \log_z y \cdot \log_x z)^3$ is

(a) 0

(b) -1

(c) 1

(d) 3

(1 mark)

Answer:

$$\begin{aligned}
 \text{(c) } & (\log_y x \cdot \log_z y \cdot \log_x z)^3 \\
 & = \left(\frac{\log x}{\log y} \cdot \frac{\log y}{\log z} \cdot \frac{\log z}{\log x} \right)^3 \\
 & = (1)^3 \\
 & = 1
 \end{aligned}$$

[69] Divide 80 into two parts so that their product is maximum, then the numbers are:

- (a) 25, 55
 - (b) 35, 45
 - (c) 40, 40
 - (d) 15, 65
- (1 mark)

Answer:

(c) The sum of two No. = 80

First No. = x

Second No. = (80 - x)

Product two No = x. (80 - x)

P = 80x - x² (1)

w.r.f. (x)

$\frac{dp}{dx} = 80 - 2x$ (2)

$\frac{d^2p}{dx^2} = - 2$ (3)

For max/minima

$\frac{dp}{dx} = 0$

80 - 2x = 0

2x = 80

x = 40

x = 40 in equation (iii)

$\frac{d^2p}{dx^2} = - 2$ (Negative)

function is maximum at x = 40

Numbers are 40, (80 - 40)

= 40, 40

3.38**Solved Scanner CA Foundation Paper - 3A (New Syllabus)****2014 - JUNE**[70] If $x : y = 2:3$, then $(5x+2y):(3x-y) = \underline{\hspace{2cm}}$ (a) $19 : 3$ (b) $16 : 3$ (c) $7 : 2$ (d) $7 : 3$

(1 mark)

Answer:**(b)** Given,

$$x : y = 2 : 3$$

$$\text{Let } x = 2k, y = 3k$$

$$(5x + 2y) : (3x - y)$$

$$= \frac{(5x + 2y)}{(3x - y)}$$

$$= \frac{5 \times 2k + 2 \times 3k}{3 \times 2k - 3k}$$

$$= \frac{10k + 6k}{6k - 3k}$$

$$= \frac{16k}{3k}$$

$$= 16 : 3$$

[71] If $(25)^{150} = (25x)^{50}$; then the value of x will be :(a) 5^3 (b) 5^4 (c) 5^2 (d) 5

(1 mark)

Answer:

(b) If $(25)^{150} = (25x)^{50}$
 $25^{150} = 25^{50} \cdot x^{50}$
 $\frac{25^{150}}{25^{50}} = x^{50}$
 $25^{100} = x^{50}$
 $(5^2)^{100} = x^{50}$
 $5^{200} = x^{50}$
 $(5^4)^{50} = x^{50}$
 $5^4 = x$
 $x = 5^4$

[72] The value of $\left(\frac{y^a}{y^b}\right)^{a^2+ab+b^2} \times \left(\frac{y^b}{y^c}\right)^{b^2+bc+c^2} \times \left(\frac{y^c}{y^a}\right)^{c^2+ca+a^2}$ is equal to ____ .

- (a) y (b) -1
 (c) 1 (d) None of these (1 mark)

Answer:

$$\begin{aligned} \text{(c)} \quad & \left(\frac{y^a}{y^b}\right)^{a^2+ab+b^2} \cdot \left(\frac{y^b}{y^c}\right)^{b^2+bc+c^2} \cdot \left(\frac{y^c}{y^a}\right)^{c^2+ca+a^2} \\ &= (y^{a-b})^{a^2+ab+b^2} \cdot (y^{b-c})^{b^2+bc+c^2} \cdot (y^{c-a})^{c^2+ca+a^2} \\ &= y^{a^3-b^3} \cdot y^{b^3-c^3} \cdot y^{c^3-a^3} \\ &= y^{a^3-b^3+b^3-c^3+c^3-a^3} \\ &= y^0 = 1 \end{aligned}$$

[73] If the salary of P is 25% lower than that of Q and the salary of R is 20% higher than that of Q, the ratio of the salary of R and P will be:

- (a) $5 : 8$ (b) $8 : 5$
 (c) $5 : 3$ (d) $3 : 5$ (1 mark)

Answer:

(b) Let Salary of Q = 100
 Salary of P = $100 - 25\%$ of 100
 $= 100 - 25$
 $= 75$
 Salary of R = $100 + 20\%$ of 100
 $= 100 + 20$
 $= 120$

Ratio of salary of R and P = $120 : 75 = 8 : 5$

[74] If $x^2+y^2=7xy$, then $\log \frac{1}{3}(x+y) =$ ____.

- (a) $(\log x + \log y)$ (b) $\frac{1}{2}(\log x + \log y)$
 (c) $\frac{1}{3}(\log x / \log y)$ (d) $\frac{1}{3}(\log x + \log y)$ (1 mark)

3.40**Solved Scanner CA Foundation Paper - 3A (New Syllabus)****Answer:**

(b) If $x^2 + y^2 = 7xy$

$$x^2 + y^2 + 2xy = 7xy + 2xy$$

$$(x + y)^2 = 9xy$$

taking log on both side

$$\log (x + y)^2 = \log 9xy$$

$$2 \log (x + y) = \log 9 + \log x + \log y$$

$$2 \log (x + y) = \log 3^2 + \log x + \log y$$

$$2 \log (x + y) = 2 \log 3 + \log x + \log y$$

$$2 \log (x + y) - 2 \log 3 = \log x + \log y$$

$$2 \left[\log \frac{(x+y)}{3} \right]$$

$$= \log x + \log y$$

$$\log \frac{(x+y)}{3} = \frac{1}{2} [\log x + \log y]$$

[75] A person has assets worth ₹ 1,48,200. He wish to divide it amongst his wife, son and daughter in the ratio 3 : 2 : 1 respectively. From this assets, the share of his son will be:

(a) ₹ 24,700

(b) ₹ 49,400

(c) ₹ 74,100

(d) ₹ 37,050

(1 mark)

Answer:**(b)** A person has Assets worth = ₹ 1,48,200

Ratio of share of wife, son & daughter

$$= 3 : 2 : 1$$

Sum of Ratio = $3 + 2 + 1 = 6$

Share of Son = $\frac{2}{6} \times 1,48,200$

$$= 49,400$$

[76] If $x = \log_{24} 12$, $y = \log_{36} 24$ and $z = \log_{48} 36$, then $xyz + 1 =$ ____

(a) $2xy$ (b) $2xz$ (c) $2yz$

(d) 2

(1 mark)

Answer:**(c)** If $x = \log_{24} 12$, $y = \log_{36} 24$ and $z = \log_{48} 36$ then

$$XYZ + 1$$

$$\begin{aligned}
&= \log_{24} 12 \times \log_{36} 24 \times \log_{48} 36 + 1 \\
&= \frac{\log 12}{\log 24} \cdot \frac{\log 24}{\log 36} \cdot \frac{\log 36}{\log 48} + 1 \\
&= \frac{\log 12}{\log 48} + 1 \\
&= \frac{\log 12 + \log 48}{\log 48} \\
&= \frac{\log(12 \times 48)}{\log 48} \\
&= \frac{\log(576)}{\log 48} \\
&= \frac{\log 24^2}{\log 48} \\
&= \frac{2 \log 24}{\log 48} \\
&= 2 \cdot \frac{\log 24}{\log 36} \cdot \frac{\log 36}{\log 48} \\
&= 2 \cdot \log_{36} 24 \cdot \log_{48} 36 \\
&= 2 y z
\end{aligned}$$

2014 - DECEMBER

[77] If $\log x = a + b$, $\log y = a - b$ then the value of $\log \frac{10x}{y^2} =$ _____.

(a) $1 - a + 3b$

(b) $a - 1 + 3b$

(c) $a + 3b + 1$

(d) $1 - b + 3a$

(1 mark)

Answer:(a) Given $\log x = a + b$, $\log y = a - b$

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

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

$$= 1 + (a + b) - 2(a - b)$$

$$= 1 + a + b - 2a + 2b$$

$$= 1 - a + 3b$$

3.42

Solved Scanner CA Foundation Paper - 3A (New Syllabus)

[78] If $x = 1 + \log_p qr$, $y = 1 + \log_q rp$ and $z = 1 + \log_r pq$ then the value of

$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \underline{\hspace{2cm}}$$

(a) 0

(b) 1

(c) -1

(d) 3

(1 mark)

Answer:

(b) If $x = 1 + \log_p qr$, $y = 1 + \log_q rp$, $z = 1 + \log_r pq$

$$x = 1 + \frac{\log qr}{\log p}$$

$$x = \frac{\log p + \log qr}{\log p}$$

$$x = \frac{\log pqr}{\log p}$$

$$\frac{1}{x} = \frac{\log p}{\log pqr}$$

Similarly

$$\frac{1}{y} = \frac{\log q}{\log pqr}$$

$$\frac{1}{z} = \frac{\log r}{\log pqr}$$

$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{\log p}{\log pqr} + \frac{\log q}{\log pqr} + \frac{\log r}{\log pqr}$$

$$= \frac{\log p + \log q + \log r}{\log pqr}$$

$$= \frac{\log pqr}{\log pqr}$$

$$= 1$$

[79] For three months, the salary of a person are in the ratio 2 : 4 : 5. If the difference between the product of salaries of the first two months and last two months is ₹ 4,80,000; then the salary of the person for the second month will be:

(a) ₹ 4,000

(b) ₹ 6,000

(c) ₹ 8,000

(d) ₹ 12,000

(1 mark)

Answer:

(c) Ratio of the salary of a person in three months = 2 : 4 : 5

Let, Salary of Ist month = 2x
 Salary of IInd month = 4x
 Salary of IIIrd month = 5x

Given

(Salary of Product of last two months) – (Salary of Product Ist two months)

$$= 4,80,00,000$$

$$(4x \cdot 5x) - (2x \cdot 4x) = 4,80,00,000$$

$$20x^2 - 8x^2 = 4,80,00,000$$

$$12x^2 = 4,80,00,000$$

$$x^2 = 40,00,000$$

$$x = 2,000$$

$$\text{Salary of the person for second month} = 4x = 4 \times 2,000 = 8,000$$

2015 - JUNE

[80] A dealer mixes rice costing ₹ 13.84 per Kg. with rice costing ₹ 15.54 and sells the mixture at ₹ 17.60 per Kg. So, he earns a profit of 14.6% on his sale price. The proportion in which he mixes the two qualities of rice is:

(a) 3 : 7

(b) 5 : 7

(c) 7 : 9

(d) 9 : 11

(1 mark)

Answer:

(a) Let SP of mixture is ₹ 100

$$\text{Then Profit} = 14.6\% \text{ of } 100$$

$$= 14.6$$

$$\text{CP of mixture} = (100 - 14.6)$$

$$= 85.4$$

$$\text{If SP is ₹ 100 then CP} = 85.4$$

$$\text{If SP is ₹ 1 then CP} = \frac{85.4}{100}$$

3.44**Solved Scanner CA Foundation Paper - 3A (New Syllabus)**

$$\begin{aligned} \text{If SP is ₹ 17.60 then CP} &= \frac{85.4}{100} \times 17.60 \\ &= 15.0304 \end{aligned}$$

$$\text{CP of the Mixture per kg} = ₹ 15.0304$$

$$\begin{aligned} 2^{\text{nd}} \text{ difference} &= \text{Profit by SP 1 kg of } 2^{\text{nd}} \text{ kind @ ₹ 15.0304} \\ &= 15.54 - 15.0304 \\ &= 0.5096 \end{aligned}$$

$$\begin{aligned} 1^{\text{st}} \text{ difference} &= ₹ 15.0304 - 13.84 \\ &= ₹ 1.1904 \end{aligned}$$

$$\begin{aligned} \text{The Require Ratio} &= (2^{\text{nd}} \text{ difference}) : (1^{\text{st}} \text{ difference}) \\ &= 0.5096 : 1.1904 \\ &= 3 : 7 \end{aligned}$$

[81] If $p^x = q$, $q^y = r$ and $r^z = p^6$, then the value of xyz will be:

(a) 0

(b) 1

(c) 3

(d) 6

(1 mark)

Answer:

$$\begin{aligned} \text{(d) If } p^x &= q, q^y = r \text{ and } r^z = p^6 \\ q &= p^x, q^y = r \text{ and } r^z = p^6 \\ (q^y)^z &= p^6 \\ [(p^x)^y]^z &= p^6 \\ p^{xyz} &= p^6 = xyz = 6 \end{aligned}$$

[82] If $\log x = m + n$ and $\log y = m - n$, then $\log (10x/y^2) =$

(a) $3n - m + 1$ (b) $3m - n + 1$ (c) $3n + n + 1$ (d) $3m + n + 1$

(1 mark)

Answer:

(a) $\log x = m + n$ and $\log y = m - n$

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

$$\begin{aligned} &= \log 10 + \log x - 2 \log y \\ &= 1 + \log x - 2 \log y \\ &= 1 + (m + n) - 2(m - n) \\ &= 1 + m + n - 2m + 2n \\ &= 3n - m + 1 \end{aligned}$$

[83] If $15(2p^2 - q^2) = 7pq$, where p and q are positive, then $p : q$ will be:

- (a) 5 : 6 (b) 5 : 7
 (c) 3 : 5 (d) 8 : 3 (1 mark)

Answer:

(a) If $15(2p^2 - q^2) = 7pq$
 $30p^2 - 15q^2 = 7pq$
 $30p^2 - 7pq - 15q^2 = 0$
 $30p^2 - 25pq + 18pq - 15q^2 = 0$
 $5p(6p - 5q) + 3q(6p - 5q) = 0$
 $(6p - 5q)(5p + 3q) = 0$
 If $6p - 5q = 0$ and $5p + 3q = 0$
 $6p = 5q$ $5p = -3q$
 $\frac{p}{q} = \frac{5}{6} = p : q = 5 : 6$ $\frac{p}{q} = \frac{-3}{5}$
 (not possible)

2015 - DECEMBER

[84] The ratio of third proportion of 12, 30 to the mean proportion of 9, 25 is:

- (a) 2:1 (b) 5:1
 (c) 7:15 (d) 3:5 (1 mark)

Answer:

(b) The third proportion of 12,30
 $c = \frac{b^2}{a} = \frac{(30)^2}{12} = \frac{900}{12} = 75$
 The Mean proportion of 9,25
 $b = \sqrt{ac} = \sqrt{9 \times 25} = \sqrt{225} = 15$
 Ratio of third proportion of 12, 30
 and Mean proportion of 9, 25 = 75:15
 = 5:1

3.46**Solved Scanner CA Foundation Paper - 3A (New Syllabus)**[85] The value of $\log_5 3 \times \log_3 4 \times \log_2 5$.

- (a) 0 (b) 1
 (c) 2 (d) $\frac{1}{2}$ (1 mark)

Answer:

$$\begin{aligned}
 \text{(c) } & \log_5 3 \times \log_3 4 \times \log_2 5 \\
 &= \frac{\cancel{\log 3}}{\log 5} \times \frac{\log 4}{\cancel{\log 3}} \times \frac{\log 5}{\log 2} \\
 &= \frac{\log 4}{\log 2} \\
 &= \frac{\log 2^2}{\log 2} \\
 &= \frac{2 \log 2}{\log 2} = 2
 \end{aligned}$$

[86] What number must be added to each of the numbers 10, 18, 22, 38 to make the numbers is proportion?

- (a) 2 (b) 4
 (c) 8 (d) None of these. (1 mark)

Answer:**(a)** Let x to be addedThen $(10 + x)$, $(18 + x)$, $(22 + x)$, $(38 + x)$ are in prop.

Product of Extremes = Product of Mean

$$(10 + x)(38 + x) = (18 + x)(22 + x)$$

$$380 + 10x + 38x + x^2 = 396 + 18x + 22x + x^2$$

$$48x + 380 = 396 + 40x$$

$$48x - 40x = 396 - 380$$

$$8x = 16$$

$$x = 2$$

[87] The value of $\frac{2^n + 2^{n-1}}{2^{n+1} - 2^n}$ is:

- (a) $\frac{1}{2}$ (b) $\frac{3}{2}$
 (c) $\frac{2}{3}$ (d) 2 (1 mark)

Answer:

$$\begin{aligned}
 \text{(b)} \quad \frac{2^n + 2^{n-1}}{2^{n+1} - 2^n} &= \frac{2^n + 2^n \cdot 2^{-1}}{2^n \cdot 2^1 - 2^n} \\
 &= \frac{2^n(1 + 2^{-1})}{2^n(2^1 - 1)} \\
 &= \frac{\left(\frac{1}{1} + \frac{1}{2}\right)}{(2 - 1)} \\
 &= \frac{\left(\frac{2 + 1}{2}\right)}{1} \\
 &= \left(\frac{3}{2}\right)
 \end{aligned}$$

2016 - JUNE

[88] The integral part of a logarithm is called _____ and the decimal part of a logarithm is called _____.

- (a) Mantissa, Characteristic (b) Characteristic, Mantissa
(c) Whole, Decimal (d) None of these.

Answer:

(b) The integral part of a logarithms is called **Characteristic** and the decimal part of a logarithm is called **mantissa**.

[89] The value of $\left[\frac{x^2 - (y-z)^2}{(x+z)^2 - y^2} + \frac{y^2 - (x-z)^2}{(x+y)^2 - z^2} + \frac{z^2 - (x-y)^2}{(y+z)^2 - x^2} \right]$ is

- (a) 0 (b) 1
(c) -1 (d) ∞ (1 mark)

Answer:

$$\begin{aligned}
 \text{(b)} \quad &\frac{x^2 - (y-z)^2}{(x+z)^2 - y^2} + \frac{y^2 - (x-z)^2}{(x+y)^2 - z^2} + \frac{z^2 - (x-y)^2}{(y+z)^2 - x^2} \\
 &= \frac{(x+y-z)(x-y+z)}{(x+z+y)(x+z-y)} + \frac{(y+x-z)(y-x+z)}{(x+y+z)(x+y-z)} + \frac{(z+x-y)(z-x+y)}{(y+z+x)(y+z-x)}
 \end{aligned}$$

3.48

■ *Solved Scanner CA Foundation Paper - 3A (New Syllabus)*

$$\begin{aligned}
 &= \frac{x+y-z}{x+y+z} + \frac{y+z-x}{x+y+z} + \frac{z+x-y}{x+y+z} \\
 &= \frac{x+y-z + y+z-x + z+x-y}{x+y+z} \\
 &= \frac{x+y+z}{x+y+z} = 1
 \end{aligned}$$

[90] X, Y, Z together starts a business. If X invests 3 times as much as Y invests and Y invests two third of what Z invests, then the ratio of capitals of X, Y, Z is:

(a) 3:9:2

(b) 6:3:2

(c) 3:6:2

(d) 6:2:3

(1 mark)

Answer:

(d) Given $x = 3y$ and $y = \frac{2}{3}z$

$$\frac{x}{y} = \frac{3}{1} \text{ and } \frac{y}{z} = \frac{2}{3}$$

$$x : y = 3 : 1 \text{ and } y : z = 2 : 3$$

$$= 3 \times 2 : 1 \times 2$$

$$= 6 : 2$$

$$x : y : z = 6 : 2 : 3$$

[91] If $\log_4(x^2 + x) - \log_4(x+1) = 2$, then the value of X is:

(a) 2

(b) 3

(c) 16

(d) 8

(1 mark)

Answer:

(c) If $\log_4(x^2 + x) - \log_4(x + 1) = 2$

$$\log_4 \left\{ \frac{(x^2+x)}{(x+1)} \right\} = 2$$

$$\log_4 \left\{ \frac{x(x+1)}{(x+1)} \right\} = 2$$

$$\log_4 x = 2$$

$$x = 4^2$$

$$x = 16$$

[92] Value of $\frac{1}{\log_3 60} + \frac{1}{\log_4 60} + \frac{1}{\log_5 60}$ is :

- (a) 0 (b) 1
 (c) 5 (d) 60 (1 mark)

Answer:

$$\begin{aligned}
 \text{(b) } & \frac{1}{\log_3 60} + \frac{1}{\log_4 60} + \frac{1}{\log_5 60} \\
 & = \log_{60} 3 + \log_{60} 4 + \log_{60} 5 \\
 & = \log_{60} (3 \times 4 \times 5) \\
 & = \log_{60} 60 \\
 & = 1
 \end{aligned}$$

$\because \left[\frac{1}{\log_a b} = \log_b a \right]$

2016 - DECEMBER

[93] If $3^x = 5^y = 75^z$, then

- (a) $x + y - z = 0$ (b) $\frac{2}{x} + \frac{1}{y} = \frac{1}{z}$
 (c) $\frac{1}{x} + \frac{2}{y} = \frac{1}{z}$ (d) $\frac{2}{x} + \frac{1}{z} = \frac{1}{y}$ (1 mark)

Answer:

(c) If $3^x = 5^y = 75^z = k$ (let)
 then $3^x = k, 5^y = k, 75^z = k$
 $3 = k^{1/x}, 5 = k^{1/y}, 75 = k^{1/z}$

we know that

$$\begin{aligned}
 75 & = 3 \times 5 \times 5 \\
 k^{\frac{1}{z}} & = k^{\frac{1}{x}} \cdot k^{\frac{1}{y}} \cdot k^{\frac{1}{y}} \\
 k^{\frac{1}{z}} & = k^{\frac{1}{x} + \frac{1}{y} + \frac{1}{y}}
 \end{aligned}$$

3.50**Solved Scanner CA Foundation Paper - 3A (New Syllabus)**

on comparing

$$\frac{1}{z} = \frac{1}{x} + \frac{1}{y} + \frac{1}{y}$$

$$\frac{1}{z} = \frac{1}{x} + \frac{2}{y}$$

$$\frac{1}{x} + \frac{2}{y} = \frac{1}{z}$$

[94] If $\log 2 = 0.3010$ and $\log 3 = 0.4771$, then the value of $\log 24$ is:

(a) 1.0791

(b) 1.7323

(c) 1.3801

(d) 1.8301

(1 mark)

Answer:(c) If $\log 2 = 0.3010$ and $\log 3 = 0.4771$ then $\log 24 = \log (2 \times 2 \times 2 \times 3)$

$$= \log 2 + \log 2 + \log 2 + \log 3$$

$$= 3 \log 2 + \log 3$$

$$= 3 \times 0.3010 + 0.4771$$

$$= 0.9030 + 0.4771$$

$$= 1.3801$$

[95] If $abc = 2$, then the value of $\frac{1}{1+a+2b^{-1}} + \frac{1}{1+\frac{1}{2}b+c^{-1}} + \frac{1}{1+c+a^{-1}}$ is:

(a) 1

(b) 2

(c) 3

(d) $\frac{1}{2}$

(1 mark)

Answer:(a) If $abc = 2$

$$ab = \frac{2}{c} = 2c^{-1}$$

$$a = \frac{2}{bc} = 2b^{-1}c^{-1}$$

$$bc = \frac{2}{a} = 2a^{-1}$$

$$b = \frac{2}{ca} = 2c^{-1}a^{-1}$$

$$ca = \frac{2}{b} = 2b^{-1}$$

$$c = \frac{2}{ab} = 2a^{-1}b^{-1}$$

$$\begin{aligned}
 \text{Given } & \frac{1}{1+a+2b^{-1}} + \frac{1}{1+\frac{1}{2}b+c^{-1}} + \frac{1}{1+c+a^{-1}} \\
 = & \frac{1}{1+a+2b^{-1}} + \frac{2b^{-1}}{2b^{-1}(1+\frac{1}{2}b+c^{-1})} + \frac{a}{a(1+c+a^{-1})} \\
 = & \frac{1}{(1+a+2b^{-1})} + \frac{2b^{-1}}{2b^{-1}+1+2b^{-1}c^{-1}} + \frac{a}{a+ac+1} \\
 = & \frac{1}{1+a+2b^{-1}} + \frac{2b^{-1}}{2b^{-1}+1+a} + \frac{a}{a+2b^{-1}+1} \\
 = & \frac{1+2b^{-1}+a}{1+a+2b^{-1}} \\
 = & 1
 \end{aligned}$$

[96] There are total 23 coins of ₹ 1, ₹ 2 and ₹ 5 in a bag. If their value is ₹ 43 and the ratio of coins of ₹ 1 and ₹ 2 is 3:2. Then the number of coins of ₹ 1 is:

- (a) 12 (b) 5
 (c) 10 (d) 14 (1 mark)

Answer:

(a) Total no. of coins = 23
 Ratio of ₹ 1 coin : ₹ 2 coins = 3 : 2
 let No. of ₹ 1 coins = 3x
 No. of ₹ 2 coins = 2x
 No. of ₹ 5 coins = 23 - 3x - 2x
 = 23 - 5x

Total value of all coins = 43
 $3x \times 1 + 2x \times 2 + (23 - 5x) \times 5 = 43$
 $3x + 4x + 115 - 25x = 43$
 $-18x = 43 - 115$
 $-18x = -72$
 $x = \frac{-72}{-18} = 4$

No. of ₹ 1 coins = 3x = 3 × 4 = 12

2017 - JUNE

[97] If $a : b = 2 : 3$, $b : c = 4 : 5$ and $c : d = 6 : 7$, then $a : d$ is:

(a) $24 : 35$

(b) $8 : 15$

(c) $16 : 35$

(d) $7 : 15$

(1 mark)

Answer:

$$(c) \ a : b = 2 : 3 \quad \frac{a}{b} = \frac{2}{3} \text{ _____ (i)}$$

$$b : c = 4 : 5 \quad \frac{b}{c} = \frac{4}{5} \text{ _____ (ii)}$$

$$c : d = 6 : 7 \quad \frac{c}{d} = \frac{6}{7} \text{ _____ (iii)}$$

Multiply equation (i) & (ii) & (iii)

$$\frac{a}{b} \times \frac{b}{c} \times \frac{c}{d} = \frac{2}{3} \times \frac{4}{5} \times \frac{6}{7} = \frac{16}{35}$$

[98] The value of $\log (1^3 + 2^3 + 3^3 + \dots + n^3)$ is equal to:

(a) $3 \log 1 + 3 \log 2 + \dots + 3 \log n$

(b) $2 \log n + 2 \log (n+1) - 2 \log 2$

(c) $\log n + \log (n+1) + \log (2n+1) - \log 6$

(d) 1

(1 mark)

Answer:

$$(b) \ \log (1^3 + 2^3 + 3^3 + \dots + n^3)$$

$$= \log (n^3)$$

$$= \log \left[\frac{n(n+1)}{2} \right]^2$$

$$= 2 \log \left[\frac{n(n+1)}{2} \right]$$

$$= 2 [\log n + \log (n+1) - \log 2]$$

$$= 2 \log n + 2 \log (n+1) - 2 \log 2$$

[99] If $a = \frac{\sqrt{6} + \sqrt{5}}{\sqrt{6} - \sqrt{5}}$ and $b = \frac{\sqrt{6} - \sqrt{5}}{\sqrt{6} + \sqrt{5}}$ then the value of $\frac{1}{a^2} + \frac{1}{b^2}$ is equal to:

(a) 480

(b) 482

(c) 484

(d) 486

(1 mark)

Answer:

$$(b) \text{ If } a = \frac{\sqrt{6}+\sqrt{5}}{\sqrt{6}-\sqrt{5}} \text{ and } b = \frac{\sqrt{6}-\sqrt{5}}{\sqrt{6}+\sqrt{5}}$$

$$\begin{aligned} a + b &= \frac{\sqrt{6}+\sqrt{5}}{\sqrt{6}-\sqrt{5}} + \frac{\sqrt{6}-\sqrt{5}}{\sqrt{6}+\sqrt{5}} \\ &= \frac{(\sqrt{6}+\sqrt{5})^2 + (\sqrt{6}-\sqrt{5})^2}{(\sqrt{6}-\sqrt{5})(\sqrt{6}+\sqrt{5})} \\ &= \frac{6+5+2\sqrt{30}+6+5-2\sqrt{30}}{(\sqrt{6})^2 - (\sqrt{5})^2} \\ &= \frac{22}{6-5} = \frac{22}{1} = 22 \end{aligned}$$

$$a \cdot b = \left(\frac{\sqrt{6}+\sqrt{5}}{\sqrt{6}-\sqrt{5}} \right) \left(\frac{\sqrt{6}-\sqrt{5}}{\sqrt{6}+\sqrt{5}} \right) = 1$$

$$\begin{aligned} \frac{1}{a^2} + \frac{1}{b^2} &= \frac{b^2+a^2}{a^2 b^2} = \frac{(a+b)^2 - 2ab}{(ab)^2} \\ &= \frac{(22)^2 - 2 \times 1}{(1)^2} = \frac{484 - 2}{1} = 482 \end{aligned}$$

2017 - DECEMBER

[100] The ratio of the number of ₹ 5 coins and ₹ 10 coins is 8 : 15. If the value of ₹ 5 coins is ₹ 360, then the number of ₹ 10 coins will be:

- (a) 72 (b) 120
(c) 135 (d) 185 (1 mark)

Answer:

(c) Ratio of ₹ 5 coins and ₹ 10 coins = 8 : 15

$$\text{Let the No. of ₹ 5 coins} = 8x$$

$$\text{and the No. of ₹ 10 coins} = 15x$$

$$\text{The value of ₹ 5 coins} = ₹ 5 \times 8x$$

$$360 = 40x$$

3.54**Solved Scanner CA Foundation Paper - 3A (New Syllabus)**

$$x = \frac{360}{40}$$

$$x = 9$$

$$\begin{aligned} \text{No. of ₹ 10 coins} &= 15x \\ &= 15 \times 9 \\ &= 135 \end{aligned}$$

[101] If $\log_3 [\log_4 (\log_2 x)] = 0$, then the value of 'x' will be:

- (a) 4 (b) 8
(c) 16 (d) 32 (1 mark)

Answer:

(c) If $\log_3 [\log_4 (\log_2 x)] = 0$

$$\log_4 (\log_2 x) = 3^0 \quad [\because \log_a b = x \Rightarrow b = a^x]$$

$$\log_4 (\log_2 x) = 1$$

$$\log_2 x = 4^1$$

$$\log_2 x = 4$$

$$x = 2^4$$

$$x = 16$$

[102] If $\log \left(\frac{x-y}{2} \right) = \frac{1}{2}(\log x + \log y)$, then the value of $x^2 + y^2 =$ _____.

- (a) 2xy (b) 4xy
(c) $2x^2y^2$ (d) 6xy (1 mark)

Answer:

(d) If $\log \left(\frac{x-y}{2} \right) = \frac{1}{2}(\log x + \log y)$

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

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

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

$$\left(\frac{x-y}{4} \right)^2 = xy$$

$$x^2 + y^2 - 2xy = 4xy$$

$$x^2 + y^2 = 4xy + 2xy$$

$$x^2 + y^2 = 6xy$$

[103] If $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{5}$ and $\frac{1}{x}$ are in proportion, then the value of 'x' will be:

(a) $\frac{15}{2}$

(b) $\frac{6}{5}$

(c) $\frac{10}{3}$

(d) $\frac{5}{6}$

(1 mark)

Answer:

(a) If $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{5}$, $\frac{1}{x}$ are in proportion

then, product of extremes = Product of means

$$\frac{1}{2} \times \frac{1}{x} = \frac{1}{3} \times \frac{1}{5}$$

$$\frac{1}{2x} = \frac{1}{15}$$

$$2x = 15$$

$$x = 15/2$$

2018 - MAY

[104] If $p : q$ is the sub-duplicate ratio of $p - x^2 : q - x^2$, then x^2 is :

(a) $\frac{p}{p + q}$

(b) $\frac{q}{p + q}$

(c) $\frac{qp}{p-q}$

(d) None.

(1 mark)

Answer:

(d) Sub duplicate ratio of $(p - x^2) : (q - x^2) = \sqrt{p - x^2} : \sqrt{q - x^2}$

$$p : q = \sqrt{p - x^2} : \sqrt{q - x^2}$$

$$\frac{p}{q} = \frac{\sqrt{p - x^2}}{\sqrt{q - x^2}}$$

an squaring both side

$$\frac{p^2}{q^2} = \frac{p - x^2}{q - x^2}$$

3.56**Solved Scanner CA Foundation Paper - 3A (New Syllabus)**

$$p^2 (q - x^2) = q^2(p - x^2)$$

$$p^2q - p^2x^2 = q^2p - q^2x^2$$

$$p^2q - q^2p = p^2x^2 - q^2x^2$$

$$pq (p - q) = (p^2+q^2)x^2$$

$$pq (p - q) = (p+q)(p - q)x^2$$

$$x^2 = \frac{pq(p-q)}{(p+q)(p-q)}$$

$$x^2 = \frac{pq}{(p+q)}$$

[105] The value of the expression :

$$a^{\log_a b \cdot \log_b^c \cdot \log_c^d \cdot \log_d^t}$$

(a) t

(b) abcdt

(c) (a + b + c + d + t)

(d) None

(1 mark)

Answer:

(a) $a^{\log_a b \cdot \log_b^c \cdot \log_c^d \cdot \log_d^t}$

$$= a \frac{\log^b}{\log^a} \cdot \frac{\log^c}{\log^b} \cdot \frac{\log^d}{\log^c} \cdot \frac{\log^t}{\log^d}$$

$$= a \frac{\log^t}{\log^a}$$

$$= a \log_a^t \quad [\because e^{\log_a x} = x]$$

$$= t$$

[106] The mean proportional between 24 and 54 is:

(a) 33

(b) 34

(c) 35

(d) 36

(1 mark)

Answer:

(d) Mean proportion $b = \sqrt{ac}$

$$= \sqrt{24 \times 54}$$

$$= \sqrt{1,296}$$

$$= 36$$

[107] The value of $\log_4 9 \cdot \log_3 2$ is:

(a) 3

(b) 2

(c) 9

(d) 1

(1 mark)

Answer:

$$\begin{aligned}
 \text{(d) } \log_4 9 \cdot \log_3 2 &= \frac{\log 9}{\log 4} \cdot \frac{\log 2}{\log 3} \\
 &= \frac{\log 3^2}{\log 2^2} \cdot \frac{\log 2}{\log 3} \\
 &= \frac{2 \log 3}{2 \log 2} \cdot \frac{\log 2}{\log 3} \\
 &= 1
 \end{aligned}$$

$$[108] \frac{2^n + 2^{n-1}}{2^{n+1} - 2^n}$$

$$\text{(a) } \frac{1}{2}$$

$$\text{(b) } \frac{3}{2}$$

$$\text{(c) } \frac{2}{3}$$

$$\text{(d) } \frac{1}{3}$$

(1 mark)

Answer:

$$\begin{aligned}
 \text{(b) } \frac{2^n + 2^{n-1}}{2^{n+1} - 2^n} &= \frac{2^n + 2^n \cdot 2^{-1}}{2^n \cdot 2^1 - 2^n} \\
 &= \frac{2^n + (1 + 2^{-1})}{2^n \cdot (2 - 1)} \\
 &= \frac{\left(1 + \frac{1}{2}\right)}{1} \\
 &= \frac{3}{2} \\
 &= \frac{3}{2}
 \end{aligned}$$

2018 - NOVEMBER

[109] $\frac{3x-2}{5x+6}$ is the duplicate ratio of $\frac{2}{3}$ then find the value of x:

(a) 2

(b) 6

(c) 5

(d) 9

(1 mark)

Answer:

(b) $\frac{3x-2}{5x+6}$ is the duplicate ratio of $\frac{2}{3}$

$$\text{i.e. } \frac{3x-2}{5x+6} = \frac{2^2}{3^2}$$

$$\frac{3x-2}{5x+6} = \frac{4}{9}$$

$$27x - 18 = 20x + 24$$

$$27x - 20x = 24 + 18$$

$$7x = 42$$

$$x = 6$$

[110] $\frac{2^{m+1} \times 3^{2m-n+3} \times 5^{n+m+4} \times 6^{2n-m}}{6^{2m+n} \times 10^{n+1} \times 15^{m+3}}$

(a) 3^{2m-2n} (b) 3^{2n-2m}

(c) 1

(d) None of the above

(1 mark)

Answer:

$$\begin{aligned} \text{(c) } & \frac{2^{m+1} \times 3^{2m-n+3} \times 5^{n+m+4} \times 6^{2n-m}}{6^{2m+n} \times 10^{n+1} \times 15^{m+3}} \\ &= \frac{2^{m+1} \times 3^{2m-n+3} \times 5^{n+m+4} \times (2 \times 3)^{2n-m}}{(2 \times 3)^{2m+n} \times (2 \times 5)^{n+1} \times (3 \times 5)^{m+3}} \\ &= \frac{2^{m+1} \times 3^{2m-n+3} \times 5^{n+m+4} \times 2^{2n-m} \times 3^{2n-m}}{2^{2m+n} \times 3^{2m+n} \times 2^{n+1} \times 5^{n+1} \times 3^{m+3} \times 5^{m+3}} \\ &= \frac{2^{m+1+2n-m} \times 3^{2m-n+3+2n-m} \times 5^{n+m+4}}{2^{2m+n+n+1} \times 3^{2m+n+m+3} \times 5^{n+1+m+3}} \\ &= \frac{2^{2m+2n+1} \times 3^{3m+n+3} \times 5^{m+n+4}}{2^{2m+2n+1} \times 3^{3m+n+3} \times 5^{m+n+4}} = 1 \end{aligned}$$

[111] If $x:y:z = 7:4:11$ then $\frac{x+y+z}{z}$ is:

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

(1 mark)

Answer:**(a)** If $x:y:z = 7:4:11$ Let $x = 7k, y = 4k, z = 11k$

$$\frac{x+y+z}{z} = \frac{7k+4k+11k}{11k} = \frac{22k}{11k} = 2$$

[112] $\log_2 \log_2 \log_2 16 = ?$

- (a) 0 (b) 3
(c) 1 (d) 2

(1 mark)

Answer:

$$\begin{aligned} \text{(c)} \quad & \log_2 \log_2 \log_2 16 \\ &= \log_2 \log_2 (\log_2 2^4) \\ &= \log_2 \log_2^4 \log_2^2 \\ &= \log_2 \log_2^4 \quad (\because \log_2^2 = 1) \\ &= \log_2 \log_2^{2^2} \\ &= \log_2^2 \cdot \log_2^2 \\ &= 1 \times 1 \\ &= 1 \end{aligned}$$