Sequence and Series – Arithmetic & Geometric Progression – CA Foundation Maths Study Material

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This Sequence and Series – Arithmetic & Geometric Progression – CA Foundation Maths Study Material is designed strictly as per the latest syllabus and exam pattern.

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Previous Year Exam Questions

Question 1.

The sum of all natural numbers between 100 and 1000 which are multiple of 5 is :

(a) 98,450

(b) 96,450

(c) 97,450

(d) 95,450

Answer:

(a) is Correct

Series is

S = 105 + 110+ 115 + ... + 995.

No. of terms = n = $\frac{l-a}{d}$ + 1 = $\frac{995-105}{5}$ + 1 = 179

Sum = $\frac{n}{2}$(a + l) = $\frac{179}{2}$ (105 + 995)

= 98,450

Question 2.

Find n such that may be the geometric mean between a and b:

(a) 1/2

(b) 1

(c) -1/2

(d) 0

Answer:

(c) is correct

Tricks "n + 1 " must be equal to $\frac{1}{2}$ (Always)

n + 1 = 1/2 ∴ n = $\frac{1}{2}$ – 1 = $-\frac{1}{2}$

Question 3.

The first and the last terms of an A.P. are – 4 and 146. The sum of the terms is 7171. The number of terms is : [1 Mark, Nov. 2006]

(a) 101

(b) 100

(c) 99

(d) None

Answer:

(a) is correct Given That; a = – 4 ; 1 = 146

Let No. of terms = n.

∴ $\frac{n}{2}$(a + l) = 717

or $\frac{n}{2}$(-4 + 146) = 7171

or n = $\frac{7171\times2}{142}$ = 101

Question 4.

If the first term of a G.P exceeds the second term by 2 and the sum to infinity is 50, the series is : [1 Mark, Nov. 2006]

(a) 10, 8, $\frac{32}{5}$, ...

(b) 10, 8, $\frac{5}{2}$, ...

(c) 10, $\frac{10}{3}$, $\frac{10}{9}$, ...

(d) None

Answer:

(a) is correct

Tricks Go by choices

a = 10 ; c. r. = r = $\frac{8}{10}$ = 0..8

S_∞ = $\frac{a}{1-r}$ = $\frac{10}{1-0.8}$ = 50

∴ (a) is correct.

Question 5.

The sum of square of first n natural numbers is : [1 Mark, Feb. 2007]

(a) $\frac{n(n+1)}{2}$

(b) $\frac{n(n+1)(2n+1)}{6}$

(c) $\frac{n(n-1)(n-1)}{6}$

(d) $\frac{n(n+1)(n+2)}{6}$

Answer:

(b)

$1^2 + 2^2 + 3^2 +$..... + to n terms = $\frac{n(n+1)(2n+1)}{6}$

Question 6.

Divide 30 into five parts in A.P., such that the first and last parts are in the ratio 2:3 :

(a) $\frac{24}{5}, \frac{27}{5}, 6, \frac{33}{5}, \frac{36}{5}$

(b) 6, $\frac{36}{5}, \frac{33}{5}, \frac{24}{5}, \frac{27}{5}$

(c) $\frac{27}{5}, \frac{24}{4}, \frac{36}{5}, \frac{33}{5}$, 6

(d) 6, $\frac{24}{5}, \frac{27}{5}, \frac{33}{5}, \frac{36}{5}$

Answer:

(a) Tricks Go by choices

$$\text{Series S} = \frac{24}{5}, \frac{27}{5}, \frac{30}{5}, \frac{33}{5}, \frac{36}{5}$$

$$\text{ratio of 1st and last} = \frac{\frac{24}{5}}{\frac{36}{5}}$$

$$= \frac{24}{5} \times \frac{5}{36} = \frac{2}{3} = 2:3.$$

Question 7.

If $a^{1/x} = b^{1/y} = c^{1/z}$ and a, b, c are in G.P; the x, y, z are in : [1 Mark, Feb. 2007]

(a) A.P.

(b) G.P.

(c) Both (a) & (b)

(d) None

Answer:

(a)

$a^{1/x} = b^{1/y} = c^{1/z} = k$(let)

$\therefore a = k^x$; $b = k^y$ and $c = k^z$

$\therefore$ a, b, c are in GP

$\therefore b^2 = ac$

or $k^{2y} = k^x k^z$

or $k^{2y} = k^{x+y} \Rightarrow 2y = x + z$

So x ; y ; z are AP

Question 8.

Find the sum to n terms of the series: [1 Mark, Feb. 2007]

7 + 77 + 777 + ... to n terms:

$(a)\ \frac{7}{9}(10^{n+1} - 10) - \frac{7n}{9}$

$(b)\ \frac{7}{9}(10^{n+1} - 10) + \frac{7n}{9}$

$(c)\ \frac{7}{81}(10^{n+1} - 10) - \frac{7n}{9}$

$(d)\ \frac{7}{81}(10^{n+1} - 10) + \frac{7n}{9}$

Answer:

(c) is correct

Tricks Go by choices

(c) It n = 2 Then S = 7 + 77 = 84

and $\frac{7}{81}[10^{2+1} - 10]\frac{-7\times 2}{9}$ = 84

(c) is correct

Question 9.

Find the sum of all natural numbers between 250 and 1,000 which are exactly divisible by 3 : [1 Mark, May 2007]

(a) 1,56,375

(b) 1,56,357

(c) 1,65,375

(d) 1,65,357

Answer:

(a) is correct

S = 252 + 255 + 258 + ... + 999

n = $\frac{999-252}{3}$ + 1 = 250 [$\because$ n = $\frac{l-a}{d}$ + 1]

s = $\frac{n}{2}$ (a +1) = $\frac{250}{2}$[252 + 999] = 156,375

(a) is correct

Question 10.

If the pth term of a G.P. is x and the qth term is y, then find the nth term:

(a) $\left[\frac{x^{(n-q)}}{y^{(n-p)}}\right]$

(b) $\left[\frac{x^{(n-q)}}{y^{(n-p)}}\right]^{(p-q)}$

(c) 1

(d) $\left[\frac{x^{(n-q)}}{y^{(n-p)}}\right]^{\frac{1}{p-q}}$

Answer:

(d) is correct

Let t, = a and c.r = rof a GP

$t_p = a.r^{p-1} = x$ (given) ..... (1)

$t_q = a.r^{q-1} = y$ (given) .....(2)

(1); (2) we get

$$r^{p-q} = \frac{x}{y} \therefore r = \left(\frac{x}{y}\right)^{\frac{1}{p-q}}$$

$\therefore$ From (1)

$$a.r^{p-1} = x$$

$$\text{or} \quad a = \frac{x}{r^{p-1}} = \frac{x}{\left\{\left(\frac{x}{y}\right)^{1/p-2}\right\}^{p-1}}$$

$$= a.\left\{\left(\frac{x}{y}\right)^{\frac{1}{p-q}}\right\}^{n-1} = \frac{x}{\left(\frac{x}{y}\right)^{\frac{p-1}{p-q}}} \frac{x}{\left(\frac{x}{y}\right)^{\frac{p-1}{p-q}}} \div \left(\frac{x}{y}\right)^{\frac{n-1}{p-q}}$$

$$= x\left(\frac{x}{y}\right)^{\frac{n-1}{p-q}-\frac{p-1}{p-q}}$$

$$= x\left(\frac{x}{y}\right)^{\frac{n-p}{p-q}} = \left[x^{p-q}\frac{x^{n-p}}{y^{n-p}}\right]^{\frac{1}{p-q}}$$

$$= \left[\frac{x^{n-q}}{y^{n-p}}\right]^{\frac{1}{p-q}}$$

(d) is correct Tricks!- GBC.

Question 11.

Aperson pays ₹ 975 in monthly instalments, each instalment is less than former by ₹ 5. The amount of first instalment is ₹ 100. In what time will the entire amount be paid? [1 Mark, May 2007]

(a) 26 months

(b) 15 months

(c) Both (a) & (b)

(d) 18 months

Answer:

(b) is correct

Tricks series is

Sn = 100 + 95 + 90 + to n months

Then $\frac{n}{2}$[2 × 100 + (n – 1).(-5)] = 975.

Then Go by choices

We get S_{26} = $\frac{26}{2}$ [200 +(26 – 1)(-5)] = ₹ 975

and also S_{15} = $\frac{15}{2}$ [200 + (15 – 1)(-5)] = ₹ 975

From Quest n = 15 Months will be taken not

= n = 26 because if loan is cleared in 15 months then why should we pay more instalment.

(b) is correct

Question 12.

If the sum of n terms of an A.P. is (3n2 -n) and its common difference is 6, then its first term is: [1 Mark, Aug. 2007]

(a) 3

(b) 2

(c) 4

(d) 1

Answer:

(b) is correct

Tricks S_n =$3n^2$ – n (given)

∴ S_1 = t_1

∴ t_1 = s_1 =3x 1^2 – 1 = 2

Question 13.

Find the sum of the series: 2 + 7 + 12 + ... 297. [1 Mark, Aug. 2007]

(a) 8970

(b) 8870

(c) 7630

(d) 9875

Answer:

(a) is correct

S = 2 + 7 + 12 + ... + 297

n = $\frac{l-a}{d} = \frac{297-2}{5}$ + 1 = 60

S= $\frac{n(1+l)}{2} = \frac{60}{2}$ (2 + 297) = 8970

∴ (a) is correct

Question 14.

A certain ball when dropped to the ground rebounds to of the height from which it falls; it is dropped from a height of 100 metres find the total distance it travels before finally coming to rest: [1 Mark, Aug. 2007]

(a) 600m

(b) 700m

(c) 900m

(d) 200m

Answer:

(c) is correct

$$S = 100 + 2\times100\times\frac{4}{5} + 2\times100\times\left(\frac{4}{5}\right)^2 + ...\text{to } \infty$$

$$= 100 + 200\times\frac{4}{5}\left[1 + \frac{4}{5} + ...\text{to } \infty \text{ in GP}\right]$$

$$= 100 + 40\times4\left[\frac{1}{1-4/5}\right]$$

$$= 100 + 160\times\frac{5}{1} = 100 + 800 = 900m$$

(c) is correct.

Question 15.

In a G.P if the (p + q)th term is m and (p – q)th term is n, then the pth term is: [1 Mark, Aug. 2007]

(a) mn

(b) $\sqrt{mn}$

(c) m^2

(d) n^2

Answer:

(b) is correct

Let t, = a and c.r = r of GP

$t_{p+q} = a.r^{p+q-1} = m$

$t_{p-q} = a.r^{p-q-1} = n$

(1) x (2); we get

$a^2.r^{p+q-1+p-q-1} = mn$ or $a^2r^{2p-2} = mn$

or $(ar^{p-1})1 = mn$ or $ar^{p-1} = 4mn$

$t_p = \sqrt{mn}$

Question 16.

The sum of the series: 0.5 + 0.55 + 0.555 + ... to n terms is:

$(a)\ \frac{5n}{9}+\frac{5}{9}[1-(0.1)^n]$

$(b)\ \frac{5n}{9}-\frac{5}{81}[1-(0.1)^n]$

$(c)\ \frac{5n}{9}+\frac{5}{81}[1-(0\,1)^n]$

$(d)\ \frac{5n}{9}+\frac{5}{81}[1+(0.1)^n]$

Answer:

(b)

Tricks: Go by choices

Put directly n = 2 That should be equal to

0.5+ 0.55 = 1.05

For (b) $\frac{5\times2}{9} - \frac{5}{18}$ [1 – $(0.1)^2$] = 1.05

(b) is correct

Question 17.

A contractor who fails to complete a building in a certain specified time is compelled to forfeit ₹ 200 for the first day of extra time required and thereafter forfeited amount is increased by ₹ 25 for every day. If he loses ₹ 9,450, for how many days did he over-run the contract time ? [1 Mark, Nov. 2007]

(a) 19 days

(b) 21 days

(c) 23 days

(d) 25 days

Answer:

(b) Tricks:- Series is

S = 200 + 225 + 250 + ... to n days

= ₹ 9450

$\frac{n}{2}$ [2 × 200 + (n – 1) × 25] = 9450

Go by choices ; we get

(b) For n = 21

S = $\frac{21}{2}$[400 + (21 – 1) × 25] = ₹ 9450

(b) is correct

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Question 18.

The first, second and seventh term of an AP. are in G.P. and the common difference is 2, the 2nd term of A.P. is :

(a) 5/2

(b) 2

(c) 3/2

(d) 1/2

Answer:

(a) is correct

Let t_1 = a and c.d = d = 2(given)

t_2 = a + 2; t_1 = a + (7 – 1) × 2 = a + 12

From Question

a ; a+2 ; a + 12 are in GP

or $(a + 2)^2 = a(a + 12)$

or $a^2 + 4a + 4 = a^2 + 12a$.

or 12a – 4a = 4

or 8a = 4

a = 4/8 = 1/2

∴ $t_2 = a + 2 = \frac{1}{2} + 2 = \frac{5}{2}$

Question 19.

A man employed in a company is promised a salary of ₹ 3,000 every month for the first year and an increment of ₹ 1,000 in his monthly salary every succeeding year. How much does the man earn from the company in 20 years? [1 Mark, Feb. 2008]

(a) ₹ 30,00,000

(b) ₹ 27,50,000

(c) ₹ 19,10,000

(d) ₹ 7,90,000

Answer:

(a); Series is

S = 3000 × 12 + 4000 × 12 + 5000 × 12 + ... to 20 yrs

= 12000 [3 + 4 + 5 + ... to 20 terms in AP]

= 12000 × $\frac{20}{2}$[2 × 3 + (20 – 1) × 1]

= ₹ 30,00,000

(a) is correct.

Question 20.

If a, b, c are in A.P. and x, y, z are in G.P., then the value of $X^{(b-c)}$. $y^{(c-a)}$. $z^{(a-b)}$ is: [1 Mark, Feb. 2008]

(a) 1

(b) 0

(c) b(c – a)

(d) None

Answer:

(a) is correct

Tricks: a, b, c are in AP

Let a = 1,b = 2 & c = 3 in AP

x, y, z are GP.

Let x = 1 ; y = 2 and z = 4 are in GP

$x^{(b-c)}$. $y^{(c-a)}$. $z^{(a-b)}$

= 1^{2-3}. 2^{3-1}. 4^{1-2}

= $1.2^2.4^{-1}$ = 4 × $\frac{1}{4}$ = 1

(a) is correct

Question 21.

Insert 4 A.M.'s between 3 and 18 : [1 Mark, June 2008]

(a) 12, 15, 9, 6

(b) 6, 9, 12, 15

(c) 9, 6, 12, 15

(d) 15, 12, 9, 6

Answer:

(b)

Only 6, 9, 12, 15 are in AP and 3, 6, 9, 12, 15, 18 makes an AP

(b) is correct

Question 22.

If x' = 1 + $\frac{1}{3} + \frac{1}{3^2}$ + ... ∞

y = 1 + $\frac{1}{4} + \frac{1}{4^2}$ + ... ∞. [1 Mark, June 2008]

Find xy.

(a) 2

(b) 1

(c) 8/9

(d) 1/2

Answer:

(a)

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

$$y = \frac{1}{1 - 1/4} = \frac{4}{3}$$

$$\therefore xy = \frac{3}{2} \cdot \frac{4}{3} = 2$$

(a) is correct

Question 23.

On 1 st January every year a person buys National Saving Certificates of value exceeding that of his last year's purchase by ₹ 100. After 10 years, he finds that the total value of the certificates purchased by him is ₹ 54,500. Find the value of certificates purchased by him in the first year :

(a) ₹ 6,000

(b) ₹ 4,000

(c) ₹ 5,000

(d) ₹ 5,500

Answer:

(c) Let 1st yr amount = a and common difference = d = ₹ 100

No. of yrs = n = 10

$\frac{10}{2}$ [2a + (10 -1) x 100] = 54,500

or 5 [2a + 900] = 54,500

or 2a + 900= 10,900

or 2a= 10900 – 900 = ₹ 1000

a = ₹ 5000

(c) is correct

Question 24.

Find three numbers in G.P. such that their sum is 21, and the sum of their squares is 189 : [1 Mark, June 2008]

(a) 5, 7, 9

(b) 3, 7, 11

(c) 3, 6, 12

(d) 4, 8, 9

Answer:

(c) Tricks Go by choices

(c) Only 3,6, 12 in the given options are in GP

Their sum = 3 + 6+12 = 21 and sum of their squares

$3^2 + 6^2 + 12^2 = 189$

Satisfy the given conditions

(c) is correct

Question 25.

Find the ninth term of the series : [1 Mark, Dec. 2008]

√2, 5√2, 9√2,

(a) 25√2

(b) 3√2

(c) 33√2

(d) 52√2

Answer:

(c) Given sequence in AP

t_1 = a = √2; and c.d = d = 4√2

t_9 = a + (9 – 1)d = √2 + 8 x 4√2

= 33√2

(c) is correct

Question 26.

The sum of how many terms of the sequence 256, 128, 64, ... is 511. [1 Mark, Dec. 2008]

(a) 8

(b) 9

(c) 7

(d) None of these

Answer:

(b) Tricks S = 256 + 128 + 64 + ... 10 terms is in GP = 511

$$\frac{256\left[1-\left(\frac{1}{2}\right)^{n}\right]}{1-\frac{1}{2}}=511$$

$$256\left[1-\left(\frac{1}{2}\right)^{n}\right]=511\times\frac{1}{2}$$

Then Go by choices

n = 9 satisfies it

$$\text{L.H.S } 256\left[1-\left(\frac{1}{2}\right)^{9}\right]$$

$$=256\left[1-\left(\frac{1}{5/2}\right)^{9}\right]=256\times\frac{511}{512}=\frac{511}{2}$$

Question 27.

(x + 1), 3x, (4x + 2) are in A.P. Find the value of x. [1 Mark, Dec. 2008]

(a) 2

(b) 3

(c) 4

(d) 5

Answer:

(b)

x + 1 ; 3x ; 4x + 2 are in AP

3x × 2 = x + 1 + 4x + 2

or 6x = 5x + 3

x = 3

(b) is correct

Tricks:- GBC

Question 28.

Find two numbers whose A.M is 10 and G.M. is 8. [1 Mark, Dec. 2008]

(a) [10, 10]

(b) [16, 4]

(c) [18, 2]

(d) [14, 6]

Answer:

Tricks Go by choices

For (b) A.M = $\frac{16+4}{2}$ = 10

and GM = $\sqrt{16 \times 4}$ = 8

(b) satisfies all given conditions

(b) is correct

Question 29.

Σn^2 defines:

(a) $\frac{n(n+1)(2n+1)}{6}$

(b) $\frac{n(n+1)}{2}$

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

(d) None of these

Answer:

(a) $\Sigma n^2 = 1^2 + 2^2 + 3^2 + \ldots\ldots\ldots\ldots$

= $\frac{n(n+1)(2n+1)}{6}$ [It is Formula]

(a) is correct.

Question 30.

The sum of terms of an infinite GP is 15. And the sum of the squares of the term is 45.

Find the common ratio.

(a) 312

(b) 1

(c) -2/3

(d) 2/3

Answer:

(d) Let t_1 = a and cr. = r

$s = a + ar + ar^2 + \ldots\ldots\ldots$ to $\infty = 15$

$\therefore \frac{a}{1-a} = 15 \therefore a = 15(1 - r)$

and $a^2 + a^2r^2 + a^2rA + \ldots\ldots\ldots$ to $\infty = 45$

or $a^2 = 45(1 - r^2)$

or $\{15(1 - r)\}^2 = 45(1 - r)(1 + r)$

or $225(1 - r)^2 = 45 (1 - r)(1 + r)$

or $5(1 - r) = 1 + r$

or 5 – 5r = 1 + r

or 6r = 4 :-r = 2/3

(d) is correct

Question 31.

If in an A.P., tn represents nth term. If $t_7 : t_{10} = 5 : 1$ then $t_8 : t_n$ = [1 Mark, June 2009]

(a) 13: 16

(b) 17: 23

(c) 14: 17

(d) 15: 19

Answer:

(b) Let x is common in the ratio

t1 = 5x and tlQ = 7x

a + 6d = 5x and a + 9d = 7x

Where a 1st term and d = common difference

a + 9d – (a + 6d) = 7x – 5x

or 3d = 2x

∴ d = $\frac{2}{3}$x

$$\frac{256\left[1-\left(\frac{1}{2}\right)^n\right]}{1-\frac{1}{2}}=511$$

$$256\left[1-\left(\frac{1}{2}\right)^n\right]=511\times\frac{1}{2}$$

Then Go by choices

$n = 9$ satisfies it

$$\text{L.H.S } 256\left[1-\left(\frac{1}{2}\right)^9\right]$$

$$=256\left[1-\left(\frac{1}{5/2}\right)^9\right]=256\times\frac{511}{512}=\frac{511}{2}$$

= 17:23

(b) is correct

Question 32.

The sum of an A P, whose first term is -4 and last term is 146 is 7171 .Find the value of n.

[1 Mark, June 2009]

(a) 99

(b) 100

(c) 101

(d) 102

Answer:

(c) $\frac{n}{2}$ (a + l)

$\frac{n}{2}$(-4 + 146) = 7171

$\frac{n}{2}$(142) = 7171

or 71n = 7171 = n = 101

(c) is correct

Question 33.

Find the sum to infinity of the following series: 1 – 1 + 1 – 1 + 1 – 1 + ... ∞. [1 Mark, Dec. 2009]

(a) 1

(b) ∞

(c) 1/2

(d) Does not exist

Answer:

(c) S = 1 – 1 + 1 – 1 + 1 – 1 + ... ∞ (GP)

= $\frac{1}{1-(-1)} = \frac{1}{1+1} = \frac{1}{2}$

(c) is correct

Question 34.

If a_1, a_2, a_3 represent first, second and third term of an A.P respectively, the first term is 2 and (a_1 + a_2)a_3 is minimum,then the common difference is equal to: [1 Mark, June 2010]

(a) 5/2

(b) -5/2

(c) 2/5

(d) -2/5

Answer:

(b) Given a, = 2

Let c.d = x

∴ a_2 = 2 + x and a_3 = 2 + 2x

The Function is $(a_1 + a_2)a_3$

$= (2 + 2 + x)(2 + 2x)$

$= (4 + x)(2 + 2x)$

$= 8 + 8x + 2x + 2x^2$

$= 2x^2 + 10x + 8$ (a Quadratic Function)

Formula;

$ax^2 + bx + c$ is minimum when

$a > 0$ i.e. + ve at $x = -b/2a$

$= \frac{-10}{2\times2} = \frac{-5}{2}$

(b) is correct

Question 35.

Divide 144 into three parts which are in AP. and such that the largest is twice the smallest, the smallest of three numbers will be : [1 Mark, June 2010]

(a) 48

(b) 36

(c) 13

(d) 32

Answer:

(d) Let $t_1 = a$ and $cd = d$

$a + a + d + a + 2d = 144$

or $3a + 3d = 144$

or $3(a + d) = 144$

$a + d = \frac{144}{3} = 48$

$a + d = 48$

Largest = 2 × Smallest

$a + 2d = 2a$

$2d = a$

$d = a/2$

From (1)

$a + \frac{a}{2} = 48$

or $\frac{3}{2}a = 48$

$a = 48 \times \frac{2}{3}$

$a = 32$

(d) is correct

Tricks: GBC

Question 36.

Sum of series 1 + $\frac{4}{5} + \frac{7}{5^2} + \frac{10}{5^3}$ + ... ∞. [1 Mark, June 2010]

(a) 15/36

(b) 35/36

(c) 35/16

(d) 15/16

Answer:

$$(c)\ S=1+\frac{4}{5}+\frac{7}{5^2}+\frac{10}{5^3}+.....\text{to}\infty \quad \text{_____} (1)$$

$$\frac{1}{5}S=\frac{1}{5}+\frac{4}{5^2}+\frac{7}{5^3}+.....\text{to}\infty \quad \text{_____} (2)$$

(1) - (2); we get

$$S-\frac{1}{5}S=1+\frac{3}{5}+\frac{3}{5^2}+\frac{3}{5^3}+.....\text{to}\ \infty$$

$$\frac{4}{5}S=1+\frac{\frac{3}{5}}{1-1/5}=1+\frac{3}{5}\times\frac{5}{4}$$

$$\frac{4}{5}S=1+\frac{3}{4}$$

$$\frac{4}{5}S=\frac{7}{4};\quad \therefore S=\frac{35}{16}$$

(c) is correct

Question 37.

If G be geometric mean between a & b, then the value of $\frac{1}{G^2-a^2} + \frac{1}{G^2-b^2}$ is equal to: [1 Mark, Dec. 2010]

(a) G

(b) $3G^2$

(c) $1/G^2$

(d) $2/G^2$

Answer:

(c) Tricks: 1, 2, 4 are in GP

∴ 2 is the GM of 1 & 4

∴ a = 1; b = 4 and G = 2

$$\therefore \frac{1}{G^2-a^2}+\frac{1}{G^2-b^2}=\frac{1}{4-1}+\frac{1}{4-16}=\frac{1}{3}-\frac{1}{12}$$

$$=\frac{4-1}{12}=\frac{3}{12}=\frac{1}{4}$$ GSTGuntur.com

Then Go by choices

For $(a)\ \ G^2=2^2=4\neq\frac{1}{4}$

$(c)\ \frac{1}{G^2}=\frac{1}{2^2}=\frac{1}{4}$

$\therefore$ (c) is correct

Question 38.

If the sum of n terms of an A.P. is $2n^2 + n$. What is the difference between its 10th term & 1st term: [1 Mark, June 2011]

(a) 207

(b) 36

(c) 90

(d) 63

Answer:

(b) $S_n = 2n^2 + n$

$\therefore t_1 = s_1 = 2 \times 1^2 + 1 = 3$

$s_2 = 2\ 2^2 + 2 = 10$

$\therefore d = s_2 – 2s_1 = 10 – 2 \times 3 = 4$

$\therefore t_{10} – t_1 = a + 9d – a = 9d = 9 \times 4$

$= 36$

∴ (b) is correct

Question 39.

Find the product of $243.243^2.243^{\frac{1}{6}}.243^{\frac{1}{36}}$ ..... to ∞

(a) 1024

(b) 27

(c) 729

(d) 246

Answer:

(c) is correct

$P = (243).(243)^{\frac{1}{6}}.(243)^{\frac{1}{36}}$ ..... to ∞

= $243\frac{1}{1-1/6}$ = $243^{6/5}$ = $(3^5)^{6/5}$

= 3^6 = 729

Question 40.

Insert two arithmetic means between 68 and 260. [1 Mark, June 2011]

(a) 132, 196

(b) 130, 194

(c) 70, 258

(d) None

Answer:

(a) Trick I

$A_1 + A_2 + A_3 + \ldots\ldots\ldots\ldots + A_n$ = n × AM of a&b

= n

$132 + 196 = 2\left(\frac{68+260}{2}\right)$

328 = 328 (True)

Trick II

Go by choices

For (a) 68, 132, 196, 260 marks an AP

(a) is correct

Question 41.

Geometric mean of p, p^2, p^3 ..... p^n will be

(a) p^{n+1}

(b) $p^{\left(\frac{1+n}{2}\right)}$

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

(d) None of the above

Answer:

(b)

GM = $(p.p^2.p^3 \ldots\ldots\ldots\ldots p^n)^{1/n}$

= $(p^{1+2+3+\ldots\ldots\ldots+n})^{1/n}$

= $[p^{\frac{n(n+1)}{2}}]$ = $p^{(n+1/2)}$

Tricks Put n = 3

GM = $(p.p^2.p^3)^{1/3}$ = p^2

For (a) GM = $p^{3+1} \neq p^2$

(b) GM = $p^{\frac{1+3}{2}} = p^2$

(b) is correct.

Question 42.

Find the number whose arithmetic mean is 12.5 and geometric mean is 10. [1 Mark, Dec. 2011]

(a) 20 and 5

(b) 10 and 5

(c) 5 and 4

(d) None of these

Answer:

(a) is correct

Tricks Go by choices

For (a) AM = $\frac{20+5}{2}$ = 12.5

and GM = $\sqrt{20 \times 5}$ = 10

20 & 5 satisfy both given condition in qts.

(a) is correct.

Question 43.

If sum 3 arithmetic mean between "a" and 22 is 42, then "a"= _____. [1 Mark, Dec. 2011]

(a) 14

(b) 11

(c) 10

(d) 6

Answer:

(d) is correct

Tricks It A_1; A_2; A_3; .....; A_n are "n" AMS between a and b

$A_1 + A_2 + A_3 + \ldots\ldots\ldots\ldots + A_n$

= n.(AM of a and b)

$\therefore 3\left(\frac{a+22}{2}\right) = 42$

$\therefore$ a = 6

Question 44.

If each month ₹ 100 increases in any sum then find out the total sum after 10 months, if the sum of first month is ₹ 2,000. [1 Mark, Dec. 2011]

(a) ₹ 24,500

(b) ₹ 24,000

(c) ₹ 50,000

(d) ₹ 60,000

Answer:

(a) Sum = $\frac{10}{2}$[2 × 2000 + (10 – 1).100]

= ₹ 24,500.

Question 45.

If 5th term of a G.P. is $\sqrt[3]{3}$, then the product of first nine terms is: [1 Mark, Dec. 2011]

(a) 8

(b) 27

(c) 243

(d) 9

Answer:

(b);

t_5 = a.r4 = $\sqrt[3]{3}$ = 31/3

Product of 1 st 9 terms

= a. ar, ar^2 ..... ar^8

= $a^9.r^{1+2+3+.....+8}$

= $(ar^4)^9$ = $(3>3)^9$ = 3^3 = 27

Question 46.

The sum of the third and ninth term of an A.P. is 8. Find the sum of the first 11 terms of the progression. [1 Mark, Dec. 2011]

(a) 44

(b) 22

(c) 19

(d) 11

Answer:

(a) is correct

∵ $t_3 + t_9 = 8$

a + 2d + a + 8d

or 2a + 10d = 8

∴ S_{11} = $\frac{11}{2}$[2a + (11 – 1)d]

= $\frac{11}{2}$ [2a + 10d] = $\frac{11}{2}$ × 8 = 44

Question 47.

8th term of an A.P is 15, then sum of its 15 terms is: [1 Mark, June 2012]

(a) 15

(b) 0

(c) 225

(d) 225/2

Answer:

(c) is correct to

$t_8 = a + 7d = 15$

$S_{15} = \frac{15}{2}[2a + (15-1)d] = \frac{15}{2} \times 2(a + 7d)$

$= 15 \times 15 = 225$

Question 48.

Find the sum of the infinite terms

2, $\frac{4}{y}, \frac{8}{y^2}, \frac{16}{y^3}$, ... If y > 2. [1 Mark, June 2012]

(a) $\frac{2y}{y-2}$

(b) $\frac{4y}{y-2}$

(c) $\frac{3y}{y-2}$

(d) None of these

Answer:

(a) is correct

$s = \frac{a}{1-r} = \frac{2}{1-\frac{2}{y}} = \frac{2y}{y-2}$

Question 49.

The 4th term of an A.P. is three times the first and the 7th term exceeds twice the third term by 1. Find the first term 'a' and common difference 'd'. [1 Mark, June 2012]

(a) a = 3, d = 2

(b) a = 4, d = 3

(c) a = 5, d = 4

(d) a = 6, d = 5

Answer:

(a) is correct

$t_4 = 3t \Rightarrow a + 3d = 3a$

$2a = 3d; a = \frac{3\,d}{2}$

$\because t_7 = 2t_3 + 1$

or $a + 6d = 2(a + 2d) + 1$

or $a + 6d = 2a + 4d + 1$

or 2d – a = 1

or 2d – $\frac{3}{2}$ d = 1 ⇒ $\frac{d}{2}$ = 1

d = 2

and a = $\frac{3}{2}$ × 2 = 3

Tricks: Go by choices.

Question 50.

In an A.P., if common difference is 2, Sum of n terms is 49,7th term is 13 then n = _____.

[1 Mark, Dec. 2012]

(a) 0

(b) 5

(c) 7

(d) 13

Answer:

(c) is correct.

t_7 = a + 6 × 2 = 13 ∴ a = 1

s_n = $\frac{n}{2}$[2 × 1 + (n – 1).2] = 49

or $\frac{n}{2}$ .2[1 + n – 1] = 49

or n^2 = 49 ∴ n = 7

Question 51.

The first term of a G.P. where second term is 2 and sum of infinite term is 8 will be: [1 Mark, Dec. 2012]

(a) 6

(b) 3

(c) 4

(d) 1

Answer:

(c) is correct

t_2 = ar = 2 ⇒ r = $\frac{2}{a}$

S_∞ = $\frac{a}{1-r}$ = 8

or a = 8 (1 – r)

or a^2 = 8(a – 2)

or a^2 – 8a + 16 = 0

or $(a – 4)^2$ = 0 ⇒ a = 4

Tricks Go by choices

For (c) 4r = 2 ∴ r = $\frac{1}{2}$

S = $\frac{9}{1-r} = \frac{4}{1-1/2}$ = 8 (Which is correct)

(c) is correct

Question 52.

If the sum of n terms of an A.P be $2n^2 + 5n$, then its 'nth' term is: [1 Mark, Dec. 2012]

(a) 4n – 2

(b) 3n – 4

(c) 4n + 3

(d) 3n + 4

Answer:

(c) is correct

$S_1 = 2n^2 + 5n$

$S_1 = t_1 = 2 \times 1^2 + 5 \times 1 = 7 = a$

$d = S_2 - 2S_1$

$= 2 \times 2^2 + 5 \times 2 - 2 \times 7 = 4$

$t_n = a + (n - 1)d = 7 + (n - 1)4 = 4n + 3$

Tricks Go by choices

For (a) $S_1 = t_1 = 4 \times 1 - 2 = 2 \neq 7$

(c) $t_1 = 4 \times 1 + 3 = 7$

$t_2 = 4 \times 2 + 3 = 11$

$S_2 = t_1 + t_2 = 7 + 11 = 18$

and $S_2 = 2 \times 22 + 5 \times 2 = 18$

(c) Satisfies it (c) is correct.

Question 53.

In an A.P. if $s_n = 3n^2 - n$ and its common difference is 6 then first term is: [1 Mark, June 2013]

(a) 2

(b) 3

(c) 4

(d) 6

Answer:

(a) is correct.

$s_n = 3n^2 - n$

$s_1 = 3 \times 1^2 - 1 = 2 = t_1$

1 st term = 2

Question 54.

In an A.P if the sum of 4th & 12th term is 8 then sum of first 15 term is: [1 Mark, June 2013]

(a) 60

(b) 120

(c) 110

(d) 150

Answer:

(a) is correct.

Given, $t_4 + t_n = 8$

or a + 3d + 1 + 11d = 8

or 2a + 14d = 8

$\therefore S_{15}$ = y[2a + (15 – 1)d]

= $\frac{15}{2}$ × 8 = 60

(a) is correct

Question 55.

There are 'n' AMs between 7 & 71 and 5th AM is 27 then 'n' = [1 Mark, June 2013]

(a) 15

(b) 16

(c) 17

(d) 18

Answer:

(a) is correct.

c.d = $\frac{b-a}{n+1}$ (Tricks)

= $\frac{71-7}{n+1} = \frac{64}{n+1}$

As = a + 5d (Tricks)

= 7 + 5 x $\frac{64}{n+1}$ = 27

or $\frac{64}{n+1}$ = 20

or 20n + 20 = 320

or 20n = 300

$\therefore$ n =15

$\therefore$ (a) is correct

Question 56.

In a G.P the 6th term is 729 and the common ratio is 3 then is: [1 Mark, June 2013]

(a) 2

(b) 3

(c) 4

(d) 7

Answer:

(b) is correct.

t_1 = a; cr = r = 3

t_6 = 729

or $a.r^5$ = 729

or $a \times 3^5 = 36$

a = 3

Question 57.

An AP has 13 terms whose sum is 143.The third term is 5, then first term is: [1 Mark, Dec. 2013]

(a) 4

(b) 7

(c) 9

(d) 2

Answer:

(d) is correct

$\therefore t_3$ = a + 2d = 5 .....(1)

2d = 5 – a

$s_{13} = \frac{13}{2}[2a + (13 - 1)d] = 143$

or 2a+ 12d = $\frac{143 \times 2}{13}$ = 22 or a + 6d = 11

or a + 3 × 2d = 11

or a + 3 (5 – a) =11

or a + 15 – 3a = 11

or 4 = 2a

∴ a = 2

Tricks Go by choices

[Solve mentally by calculator]

Question 58.

G.M of a, b, c, d is 3 then G.M of — is

(a) $\frac{1}{3}$

(b) 3

(c) $\frac{1}{81}$

(d) 81

Answer:

(a) is correct

G = 3 = $(abcd)^{1/4}$ .....(1)

New GM = $\left(\frac{1}{a} \cdot \frac{1}{b} \cdot \frac{1}{c} \cdot \frac{1}{d}\right)^{1/4} = \frac{1}{3}$

Tricks: GM of a, b, c, d = 3

GM of their reciprocals = $\frac{1}{3}$

Question 59.

The value of $1^3 + 2^3 + 3^3 + \ldots\ldots\ldots + m^3$ is equal to: [1 Mark, June 2014]

(a) $\left[\frac{m(m+1)}{2}\right]^3$

(b) $\frac{m(m+1)(2m+1)}{6}$

(c) $\left[\frac{m(m+1)}{2}\right]^2$

(d) None

Answer:

(c) is correct

Formula = $\left\{\frac{m(m+1)}{2}\right\}^2$

Question 60.

The sum of the infinite GP 1 + + …….. ∞ is equal to: [1 Mark, June 2014]

(a) 1.95

(b) 1.5

(c) 1.75

(d) None

Answer:

(b) is correct

$S_\infty = \frac{a}{1-r} = \frac{1}{1-\frac{1}{3}} = \frac{3}{2}$ = 1.5

Question 61.

The sum of m terms of the series is 1 + 11 + 111 + ……. is equal to: [1 Mark, June 2014 June 2015]

(a) $\frac{1}{81}[10^{m+1} – 9m – 1o]$

(b) $\frac{1}{2}[10^{m+1} – 9m – 1o]$

(c) $[10^{m+1} – 9m – 10]$

(d) None of these

Answer:

(a) is correct

Tricks Go by choices

For (a) put m = 1 ; we get

$5 = \frac{1}{81}[10^{1+1} - 9 \times 1 - 10] = 1$ = 1st term

Put m = 2; $S = \frac{1}{81}[192 + 1 - 9 \times 2 - 10] = 12$

= 1 + 11 = Sum of 1st 2 terms

So; (a) is correct.

Question 62.

If the sum of first 'n' terms of an A.P is 6n2 + 6n, then the fourth term of the series: [1 Mark, Dec. 2014]

(a) 120

(b) 72

(c) 48

(d) 24

Answer:

(c) is correct

S = Sum of 1 st n terms of as AP.

$= 6n^2 + 6n$

$a = t_1 = s_1 = 6 \times 1^2 + 6 \times 1 = 12$

$S_2 = 6 \times 2^2 + 6 \times 2 = 36$

$c,d = d = s_2 - 2s_1 = 36 - 2 \times 12 = 12$

$t_4 = a + (4 - 1)d = 12 + 3 \times 12 = 48$

Question 63.

If $S_n = n^2p$ and $S_m = m^2p$; (m ^ n) is the sum of A.P., then S_p = [1 Mark, Dec. 2014]

(a) p^2

(b) p^3

(c) $2p^3$

(d) p^4

Answer:

(b) is correct

$\because s_2 = n^2p$

$s_m = m^2p$

$\therefore s_p = p .p = p$

Question 64.

If x, y,z are the terms in G.P then the terms $x^2 + y^2$, xy + yz, $y^2 + z^2$ are in: [1 Mark, Dec. 2014]

(a) A.P

(b) G.P

(c) H.P

(d) None of these

Answer:

(b) is correct

∵ x; y; z are inG.P

Tricks:- Let x = 1; y = 2; z = 4 make a G.P

$x^2 + y^2 = 1^2 + 2^2 = 5$

xy + yz = 1 × 2 + 2 × 4 = 10

$y^2 + z^2 = 2^2 + 4^2 = 20$

$x^2 + y^2$; xy + yz; $y^2 + z^2$ =

5, 10, 20 ..... clearly are in G.P.

Question 65.

Let S be the sum, P be the product and R be the sum of reciprocals of n terms of a G.P then P^2R^n. [1 Mark, June 2015]

(a) S^{2n}

(b) S^{-n}

(c) S^n

(d) S^{-2n}

Answer:

Let n = 3

Let S = 1+ 2 + 4 ..... a GP. = 7

Tricks:- P = 1 × 2 × 4 = 8

R = $\frac{1}{1} + \frac{1}{2} + \frac{1}{4} = \frac{4+2+1}{4} = \frac{7}{4}$

Let n = 3

$P^2R^n = P^2R^3 = 8^2 \times \left(\frac{7}{4}\right)^3 = 64 \times \frac{349}{64} = 7$

$= s^3$

$= s^n$

∴ (c) is correct.

Question 66.

The sum of n terms of an AP is $3n^2 + 5n$, which last term is 164.

Answer:

(b) is correct

$S_n = 3n^2 + 5n$

$a = t_1 = S_1 = 3 \times 1^2 + 5 \times 1 = 8$

$S_2 = 3 \times 2^2 + 5 \times 2 = 22$

$d = S_2 - 2S_1$

$= 22 - 2 \times 8 = 6$

$n = \frac{t_n - a}{d} + 1 = \frac{164-8}{6} + 1 = 27$

Question 67.

Three No's a,b,c are in A.P find a – b + c. [1 Mark, Dec. 2015]

(a) a

(b) -b

(c) b

(d) c

Answer:

(c) is correct

let a = 1; b = 2; c = 3 makes an A.P.

∴ a – b + c = 1 – 2 + 3 = 2 = b.

Question 68.

Find the numbers whose GM is 5 and AM is 7.5: [1 Mark, Dec. 2015]

(a) 12 and 13

(b) 13.09 and 1.91

(c) 14 and 11

(d) 17 and 19

Answer:

(b) is correct

Tricks: Go by choices

GM = $\sqrt{13.09 \times 1.51}$ = 5 (approx)

AM = $\frac{13.09+1.91}{2}$ = 7.5

Question 69.

If $\frac{1}{b+c} + \frac{1}{c+a} + \frac{1}{a+b}$ are in Arithmetic Progression then a^2, b^2, c^2 are in _____. [1 Mark, June 2016]

(a) Arithmetic Progression

(b) Geometric Progression

(c) Both A.P & GP

(d) None of these

Answer:

(a)

Tricks: a^2, b^2, c^2 are in AP.

a = 1, b = 5, c = 7 Make it in A.P

let

$$\therefore \frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b} \text{ in AP}$$

$$\frac{1}{5+7}, \frac{1}{7+1}, \frac{1}{1+5}$$

$$\left[\frac{1}{12}, \frac{1}{8}, \frac{1}{6}\right] \times 24$$

2, 3, 4 is also in A.P

∴ Our Assumption is correct.

Question 70.

The Sum of n terms of the series If log(x) + $\log\left(\frac{x^2}{y}\right)$ + $\log\left(\frac{x^3}{y^2}\right)$ + ... is: [1 Mark, June 2016]

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

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

$$(c)\ \frac{n}{2}\left[n\log\left(\frac{x}{y}\right)-\log xy\right]$$

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

Answer:

(d) is correct.

Tricks: Go by Choices

Put n = 1, 2 Then

(d) Should be equal to first term i.e log x

∴ Option (d)

= $\frac{1}{2}$[1.log$\frac{x}{y}$ + log xy]

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

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

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

if n = 2

then option (d) should be equal to log x + log $\frac{x^2}{y}$ = log$\frac{x^3}{y}$

Option (d)

Question 71.

A G.P (Geometric Progression) consists of 2n terms. If the sum of the terms occupying the odd places is S_1 and that of the terms in even places is S_2. The common ratio of the progression is: [1 Mark, June 2016]

(a) n

(b) 2 S_1

(c) $\frac{S_2}{S_1}$

(d) $\frac{S_1}{S_2}$

Answer:

(c) Tricks

let S = 1 + 2 + 4 + 8 + 16 + ... to 2n terms

S_1 = 1 + 4 + 16 + ... ton terms

S_2 = 2 + 8 + 32 + ... ton terms

for n = 1

S_1 = 1; S_2 = 2

c.r. = $\frac{S_2}{S_1} = \frac{2}{1}$ = 2 (True)

for n = 2

c.r. = $\frac{2+8}{1+4}$ = 2 (Also True)

(c) is correct.

Question 72.

2.353535 ..... = 2.35 [1 Mark, Dec. 2016]

(a) $\frac{233}{99}$

(b) $\frac{234}{99}$

(c) $\frac{232}{99}$

(d) None

Answer:

(a) is correct

tricks: Go by choices [Use calculator]

Question 73.

The number of terms of the series needed for the sum of the series 50 + 45 + 40 + ... becomes zero. [1 Mark, Dec. 2016]

(a) 22

(b) 21

(c) 20

(d) None

Answer:

(b) is correct.

Tricks : Go by choices

Let (b) is correct.

$S_{21} = \frac{21}{2}[2 \times 50 + (21 - 1) \times (-5)] = 0$

So, (b) is correct.

Question 74.

A person received the salary for the 1st year is ₹ 5,00,000 per year and he received an increment of ₹ 15,000 per year then the sum of the salary he taken in 10 years. [1 Mark, Dec. 2016]

(a) ₹ 56,75,000

(b) ₹ 72,75,000

(c) ₹ 63,75,000

(d) None of these

Answer:

(a) is correct.

$S_{10} = \frac{10}{2}[2 \times 5{,}00{,}000 + (10 - 1) \times 15000]$

= ₹ 56,75,000.

Question 75.

If a, -3, b, 5, c are in A.P then the value of c is: [1 Mark, June 2017]

(a) -7

(b) 1

(c) 9

(d) 13

Answer:

a, -3 ; b ; 5, are in AP.

So, b = $\frac{-3+5}{2}$ [b is A.M of -3 & 5]

b = 1

Similarly;

5 = $\frac{-3+5}{2}$ b + c = 10

or c = 10 – b = 10 – 1 = 9

(c) is correct

Question 76.

The sum of n terms of the series 1 + (1 + 3) + (1 + 3 + 5) +… . [1 Mark, June 2017]

(a) $\frac{n(n+1)(2n+1)}{6}$

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

(c) $\frac{n(n+1)(n+2)}{6}$

(d) None

Answer:

Tricks Go by Choices

For (a) put n = 1 ⇒ It should be equal

$\frac{1(1+1)(2\times1+1)}{6}$ = 1 (True)

If n = 2 Then it should be equal to sum of 1st 2 term

So; $\frac{2(2+1)(2\times2+1)}{6}$ = 1 + (1 + 3)

or $\frac{30}{6}$ = 5 (True)

Option (a) is correct.

Question 77.

The sum of first 20 terms of a G.P is 1025 times the sum of first 10 terms then the common ratio is _____

(a) 2

(b) 2√2

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

(d) √2

Answer:

Given

S_{20} = 1025. S_{10}

$\frac{a\left(r^{20}-1\right)}{r-1}$ = 1025. $\frac{a\left(r^{10}-1\right)}{r-1}$

or; r^{20} – 1 = 1025 (r^{10} – 1)

or; $(r^{10})^2$ – 1^2 = 1025 (r^{10} – 1)

or; $(r^{10} + 1)(r^{10} – 1) = 1025 (r^{10} – 1)$

or ; $r^{10} + 1 = 1025$

or; r = 2

Option (a) is correct.

Question 78.

Find the sum of all natural numbers between 100 and 1000 which are divisible by 11 is :

[1 Mark, Dec. 2017]

(a) 44,550

(b) 66,770

(c) 55,440

(d) 33,440

Answer:

(a)

Series

S = 110 + 121 + 132 + ... + 990

n = $\frac{l-a}{d}$ + 1 = $\frac{990-110}{11}$ + 1 = 81

S = $\frac{n}{2}$(a + l) = $\frac{81}{2}$(110 + 990) = 44,550

Question 79.

If pth, qth, rth terms of a GP. be a, b, c respectively, then (q – r) log a + (r – p) log b + (p – q) log c = [1 Mark, June 2018]

(a) 0

(b) 1

(c) 2

(d) None

Answer:

(a)

Tricks It is in cyclic order.

Question 80.

If a, b, c, d are in GP then $(b – c)^2 + (c – a)^2 + (d – b)^2$ = ? [1 Mark, June 2018]

(a) $(a – b)^2$

(b) $(a – d)^2$

(c) $(c – d)^2$

(d) 0

Answer:

(b)

a, b, c, d → in GP

let a = 1; b = 2; c = 4; d = 8 in G.P.

$\therefore (b - c)^2 + (c - a)^2 + (d - b)^2$

$= (2 - 4)^2 + (4 - 1)^2 + (8 - 2)^2$

$= 4 + 9 + 36 = 49 = 7^2$

GBC

For (b) $(a - d)^2 = (1 - 8)^2 = 72 = 49$.

(b) is correct.

Question 81.

If the n th term of a series, $a_n = 3^n - 2^n$ then S_n = ? [1 Mark, June 2018]

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

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

(c) $\frac{3}{2}(3^n - 1) - n(n + 1)$

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

Answer:

(c)

$\because a_n = 3^n - 2^n$

$a_1 = 3^1 - 2^1 = 1$

$a_2 = 3^2 - 2^2 = 5$

$s_2 = a_1 + a_2 = 1 + 5 = 6$

Tricks Go by choices (GBC) for (c) let '

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

$$s_1 = \frac{3}{2}\left(3^1 - 1\right) - 1\left(1 + 1\right) = \frac{3}{2}\,2 - 2 = 1 = a_1 \text{ (True)}$$

$$\text{Now } s_2 = \frac{3}{2}\left(3^2 - 1\right) - 2\left(2 + 1\right)$$

$$= \frac{3}{2} \times 8 - 6 = 12 - 6 = 6 = a_1 + a_2 \text{ (True)}$$

(c) is correct.

Question 82.

The sum to m terms of the series 1 + 11_111 + ... upto m terms, is equal to : [1 Mark, May 2018]

(a) $\frac{1}{81}(10^{m+1} – 9m – 10)$

(b) $\frac{1}{27}(10^{m+1} – 9m – 10)$

(c) $10^{m+1} – 9m – 10$

(d) None of these

Answer:

(a)

Tricks :-GBC

If m = 1 ⇒ S_1 = Sum of 1st 1 term = 1

If m = 2 ⇒ S_2 = Sum of 1st 2 term = 1 + 11 = 12

Note:- Check only for m = 1 and m = 2

(a) If m = 1

$S_1 = \frac{1}{81}(10^{1+1} – 9 \times 1 – 10) = \frac{1}{81}(100 – 9 – 10) = 1$

(a) If m = 2

$S_2 = \frac{1}{81}[10^{2+1} – 9 \times 2 – 10] = 12$

So; Option (a) is true for m = 1 & m = 2.

So; (a) is correct.

Question 83.

A person pays Rs. 975 in monthly instalments, each instalment is less than former by Rs. 5. The amount of 1st instalment is ₹ 100. In what time will be entire amount be paid? [1 Mark, May 2018]

(a) 26 months

(b) 15 months

(c) Both (a) & (b)

(d) 18 months

Answer:

(b)

Tricks:- Go by choices (GBC)

Series

S = 100 + 95 90 + ... to n months (let)

= 975.

1st check for n = 15 months

$S = \frac{15}{2}[2 \times 100 + (15 – 1) – (-5)]$

If loan is paid of f in n = 15 months, then no need of other instalments. So (b) is correct.

Question 84.

If the sum of n terms of an AP is (3n2-n) and its common difference is 6, then its first term

is : [1 Mark, May 2018]

(a) 3

(b) 2

(c) 4

(d) 1

Answer:

(b)

$S_n = 3n^2 – n$

Tricks

$\because t_1 = S_1 = 3 \times 1^2 – 1 = 2$ = sum of 1st 1 term.

Question 85.

Insert two arithmetic means between 68 and 260. [1 Mark, May 2018]

(a) 132, 196

(b) 130, 194

(c) 70,258

(d) None

Answer:

(a)

Tricks:

Go by choices

(a) 68; 132; 196; 260 areinAP.

Hence ; 132 ; 196 are A.Ms. b/w 68 and 260.

Hence (a) is correct.

Question 86.

If the pth term of an A.P. is ‘q’ and the qth term is ‘p’, then its rth term is: [1 Mark, Nov. 2018]

(a) p + q + r

(b) p + q – r

(c) p – q – r

(d) p + q

Answer:

(b)

c.d = $\frac{q-p}{p-q} = \frac{(p-q)}{p-q} = 1$

$t_r = t_p + (r – p)d$

= q + (r – p)(-1)

= q + p – r

Question 87.

The 3rd term of a GP. is $\frac{2}{3}$ and the 6th term is $\frac{2}{81}$, then the 1st term is

(a) 2

(b) 6

(d) 9

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

Answer:

(b)

$$t_3 = ar^2 = \frac{2}{3}\ ;\ t_6 = ar^5 = \frac{2}{81}$$

$$\text{or } ar^2 \cdot r^3 = \frac{2}{81}$$

$$\text{or } \frac{2}{3}r^3 = \frac{2}{81} \Rightarrow r^3 = \left(\frac{1}{3}\right)^3$$

$$\because ar^2 = \frac{2}{3}$$

$$\text{or } a \cdot \left(\frac{1}{3}\right)^2 = \frac{2}{3}$$

$$\text{or } a = 6$$

Question 88.

The sum of the series -8, -6, -4,...n terms is 52. The number of terms n is

(a) 10

(b) 11

(c) 13

(d) 12

Answer:(c)

Series S = -8 -6 -4 ..... to n terms

first term = -8 ; c.d = d = 2

Tricks Go by choices (Use calculator)

option (c) $S_{13} = \frac{13}{2}[2 \times (-8) + (13 - 1) \times 2] = 52$

Question 89.

The value of K, for which the terms 7K + 3, 4K – 5, 2K + 10 are in A.P., is: [1 Mark, Nov. 2018]

(a) -13

(b) -23

(c) 13

(d) 23

Answer:

(b)

Formula 2A = a + b

∴ 2(4k – 5) = 7k + 3 + 2k + 10

or 8k – 10 = 9k + 13

or k = -23

Question 90.

The ratio of sum of n terms of the two AP's is (n + 1) then the ratio of their m terms is: [1 Mark, June 2019]

(a) (m + 1):2m

(b) (m + 1): (m – 1)

(c) (2m – 1):(m + 1)

(d) m:(m – 1)

Answer:

Given that

$\frac{S_n^1}{S_n^{11}} = \frac{n+1}{n-1}$

Tricks

To find the ratio of rth term ; put n = 2r – 1

Put n = 2m – 1

Ratio of mth term

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

= $\frac{2m}{(2m-2)} = \frac{m}{m-1}$

(d) is correct.

Question 91.

In a G.P. if the fourth term is '3 ' then the product of first seven terms is: [1 Mark, June 2019]

(a) 35

(b) 37

(c) 36

(d) 38

Answer:

(b)

Tricks:-

Product of 1st (2r – 1) terms of a G.P = $(t_r)^{2r-1}$

∴ t_4= 3

So, Product of 1st 2 × 4 – 1 = 7 terms

= $(t_r)^{2\times4-1} = 3^7$

(b) is correct

Details:

∵ Product of 1st 7 terms

= a.ar.ar^2.ar^3 ..... ar^6

= a^7. $r^{1+2+3+....+6}$

= $a^7.r^{\frac{6}{2}(6+1)} = a^7.r^{21}$

= $a^7.r^{21}$

= $(ar^3)^7 = 3^7$

Question 92.

If 2 + 6 + 10 + 14 + 18 + ... + x = 882 then the value of x. [1 Mark, June 2019]

(a) 78

(b) 80

(c) 82

(d) 86

Answer:

(c)

S = 2 + 6+10 + 14 ..... + x (to n terms)

= 882

∴ $\frac{n}{2}$[2 + x] = 882 .....(1)

where x =Last term

Last term = x = 2 + (n – 1) × 4

x = 4n – 2

or 4n = x + 2

or n = $\frac{x+2}{4}$

∴ From (1); we get

$\frac{(x+2)}{4\times2}$(x + 2) = 882

or $(x + 2)^2 = 8 \times 882 = 84^2$

$x + 2 = 84$

$\Rightarrow x = 82$

Tricks:

Let $t_n = x$

or $2 + (n - 1)4 = x$

or $4n - 2 = x$

or $n = \frac{x+2}{4}$

For GBC

(c) If $x = 82 \Rightarrow n = \frac{82+2}{4} = 21$

$\therefore S = \frac{n}{2}(a + l) = \frac{21}{2}(2 + x)$

$= \frac{21}{2}(2 + 82) = 882$

$\therefore$ (c) is correct

Question 93.

If $y = 1 + x + x^2 + \ldots\ldots \infty$ then x = [1 Mark, June 2019]

(a) $\frac{y-1}{y}$

(b) $\frac{y+1}{y}$

(c) $\frac{y}{y+1}$

(d) $\frac{y}{y-1}$

Answer:

(a)

$y = 1 + x + x^2 + \ldots\ldots \infty$ are in G.P

$\therefore y = \frac{1}{1-x}$ Where c.r = x

or $1 - x = \frac{1}{y}$

or $x = 1 - \frac{1}{y} = \frac{y-1}{y}$

$[S_\infty = \frac{a}{1-r}]$

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