NDA 1 2025

LIVE

MATHS

SEQUENCE & SERIES

CLASS 3

NAVJYOTI SIR

Crack
EXAMS

15 Nov 2024 Live Classes Schedule

9:00AM	15 NOVEMBER 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

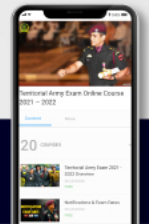
9:30AM	COMPLETE PSYCHOLOGICAL TESTS	ANURADHA MA'AM

NDA 1 2025 LIVE CLASSES

1:00PM	CHEMISTRY MCQ - CLASS 8	SHIVANGI MA'AM
4:00PM	MATHS - SEQUENCE & SERIES - CLASS 3	NAVJYOTI SIR
5:30PM	ENGLISH - SENTENCE COMPLETION - CLASS 2	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

1:00PM	CHEMISTRY MCQ - CLASS 8	SHIVANGI MA'AM
5:30PM	ENGLISH - SENTENCE COMPLETION - CLASS 2	ANURADHA MA'AM
7:00PM	MATHS - MENSURATION 3D - CLASS 3	NAVJYOTI SIR



Q) If $ln(a+c), ln(a-c), ln(a-2b+c)$ are in A.P., then

(a) a, b, c are in A.P. (b) a^2, b^2, c^2 are in A.P.

(c) a, b, c are in G.P. (d) a, b, c are in H.P.

$$2\ln(a-c) = \ln(a+c) + \ln(a-2b+c)$$

$\Rightarrow$ $a+c$, $a-c$ and $a-2b+c$ are in GP,

$$(a-c)^2 = (a+c)(a-2b+c)$$

$$a^2 - 2ac + c^2 = a^2 - 2ab + ac + ca - 2bc + c^2$$

$$-2ac = -2ab + 2ac - 2bc$$

$$4ac = 2ab + 2bc$$

$$2ac = ab + bc$$

$$b = \frac{2ac}{a+c}$$

a, b, c are in HP

Q) If $ln(a+c), ln(a-c), ln(a-2b+c)$ are in A.P., then

(a) a, b, c are in A.P.

(b) a^2, b^2, c^2 are in A.P.

(c) a, b, c are in G.P.

(d) a, b, c are in H.P.

Ans: (d)

Q) Consider an infinite geometric series with first term a and common ratio r. If its sum is 4 and the second term is 3/4, then

(a) $a = \frac{4}{7}, r = \frac{3}{7}$

(b) $a = 2, r = \frac{3}{8}$

(c) $a = \frac{3}{2}, r = \frac{1}{2}$

(d) $a = 3, r = \frac{1}{4}$ ✓ ✓

a , r

$\left(S_\infty = \frac{a}{1-r} \right) = 4$

$(a = 4 - 4r)$

$ar^{2-1} = \frac{3}{4}$

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

$(4 - 4r)r = \frac{3}{4}$

$4r - 4r^2 - \frac{3}{4} = 0$

$4r^2 - 4r + \frac{3}{4} = 0$

$16r^2 - 16r + 3 = 0$

$16r^2 - 12r - 4r + 3 = 0$

$4r(4r-3) - 1(4r-3) = 0$

$(4r-3)(4r-1) = 0$

$$(4r-1)(4r-3) = 0$$

$r = \frac{1}{4}$; $\frac{1}{3}$

options

$a = 4(1-r)$

$a = 3$

Q) Consider an infinite geometric series with first term a and common ratio r. If its sum is 4 and the second term is 3/4, then

(a) $a = \frac{4}{7}, r = \frac{3}{7}$

(b) $a = 2, r = \frac{3}{8}$

(c) $a = \frac{3}{2}, r = \frac{1}{2}$

(d) $a = 3, r = \frac{1}{4}$

Ans: (d)

Q) If the sum of the first $2n$ terms of the A.P. 2, 5, 8, …, is equal to the sum of the first n terms of the A.P. 57, 59, 61, …, then n equals

(a) 10 (b) 12 (c) 11 (d) 13

$a = 2$, $d = 3$

$a = 57$; $d = 2$

$$\frac{2n}{2}\left(2\times 2 + (2n-1)3\right) = \frac{n}{2}\left(2\times 57 + (n-1)2\right)$$

$$n\left(4 + 6n - 3\right) = \frac{n}{2}\left(114 + 2n - 2\right)$$

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

$$6n + 1 = n + 56$$

$$5n = 55 \Rightarrow n = 11$$

Q) If the sum of the first $2n$ terms of the A.P. 2, 5, 8, …, is equal to the sum of the first n terms of the A.P. 57, 59, 61, …, then n equals

(a) 10 (b) 12 (c) 11 (d) 13

Ans: (c)

Q) If a, b, c are in geometric progression and a, 2b, 3c are in arithmetic progression, then what is the common ratio r such that $0 < r < 1$?

(a) $\frac{1}{3}$ ✓

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

(c) $\frac{1}{4}$

(d) $\frac{1}{8}$

a, b, c

a, ar, ar^2

$2(2b) = a + 3c$

$4b = a + 3c$

$4(ar) = a + 3(ar^2)$

$4ar = a + 3ar^2$

$r^2(3a) - (4a)r + a = 0$

$$r = \frac{4a \pm \sqrt{16a^2 - 4 \times 3a \times (a)}}{2 \times 3a}$$

$$r = \frac{4a \pm \sqrt{4a^2}}{6a} \Rightarrow$$

$r = 1$; $r = \frac{2a}{6a} = \frac{1}{3}$ ✓

Q) If a, b, c are in geometric progression and a, 2b, 3c are in arithmetic progression, then what is the common ratio r such that $0 < r < 1$?

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

(c) $\frac{1}{4}$ (d) $\frac{1}{8}$

Ans: (a)

Q) For an AP with first term u and common difference v, the p^{th} term is 15 uv more than the q^{th} term. Which one of the following is correct ?

(a) $p = q + 15v$ (b) $p = q + 15u$

(c) $p = q + 14v$ (d) $p = q + 14u$

$a_n = a + (n-1)d$

$a_p = u + (p-1)v$

$u + (p-1)v = 15uv + u + (q-1)v$

$pv - qv = 15uv$

$p - q = 15u$

$p = q + 15u$

Q) For an AP with first term u and common difference v, the p^{th} term is 15 uv more than the q^{th} term. Which one of the following is correct ?

(a) $p = q + 15\,v$ (b) $p = q + 15\,u$

(c) $p = q + 14\,v$ (d) $p = q + 14\,u$

Ans: (b)

Q) What is the sum of the first 50 terms of the series

$(1 \times 3) + (3 \times 5) + (5 \times 7) + \ldots.$?

(a) 1,71,650 ✓ (b) 26,600

(c) 26,650 (d) 26,900

$a_n = (2n-1)(2n+1) = (2n)^2 - (1)^2 = 4n^2 - 1$

$S_n = \sum a_n = \sum 4n^2 - 1$

$= 4\sum n^2 - \sum 1$

$= 4 \dfrac{n(n+1)(2n+1)}{6} - n$

$S_{50} = \dfrac{\cancel{4}^{2} \times 50 \times \cancel{51}^{17} \times 101}{\cancel{6}} - 50$

$= 1700 \times 101 - 50$

$= 170000 + 1700 - 50$

$= 171700 - 50 = 171650$

Q) What is the sum of the first 50 terms of the series

$(1 \times 3) + (3 \times 5) + (5 \times 7) + \ldots . ?$

(a) 1,71,650
(b) 26,600
(c) 26,650
(d) 26,900

Ans: (a)

Q) What is the value of $9^{1/3} \cdot 9^{1/9} \cdot 9^{1/27} \ldots\ldots \infty$?

(a) 9 (b) 3

(c) $9^{1/3}$ (d) 1

$9^{\frac{1}{3}} \cdot 9^{\frac{1}{9}} \cdot 9^{\frac{1}{27}} \ldots \infty$

$9^{\frac{1}{3}+\frac{1}{9}+\frac{1}{27}+\ldots\infty}$

$a = \frac{1}{3}$; $r = \frac{\frac{1}{9}}{\frac{1}{3}} = \frac{1}{3}$

As $r < 1$,

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

$= \frac{1}{2}$

$9^{\frac{1}{2}} = 3$

Q) What is the value of $9^{1/3} . 9^{1/19} . 9^{1/27} \ldots\ldots \infty$?

(a) 9
(b) 3
(c) $9^{1/3}$
(d) 1

Ans: (b)

PYQ – 2024 - II

The roots of the quadratic equation

$$a^2(b^2 - c^2)x^2 + b^2(c^2 - a^2)x + c^2(a^2 - b^2) = 0$$

are equal ($a^2 \neq b^2 \neq c^2$).

Which one of the following statements is correct?

(a) a^2, b^2, c^2 are in AP.

(b) a^2, b^2, c^2 are in GP.

(c) a^2, b^2, c^2 are in HP. ✓

(d) a^2, b^2, c^2 are neither in AP nor in GP nor in HP.

$A = a^2(b^2-c^2)$ $B = b^2(c^2-a^2)$

$C = c^2(a^2-b^2)$

roots are equal,

Discriminant $= 0$

$B^2 - 4AC = 0$

$$\left[b^2(c^2-a^2)\right]^2 - 4a^2(b^2-c^2)c^2(a^2-b^2) = 0$$

$$\left[b^2(c^2-a^2)\right]^2 - 4a^2(b^2-c^2)c^2(a^2-b^2) = 0$$

$$b^4(c^4+a^4-2a^2c^2) - 4a^2c^2(b^2a^2-b^4-c^2a^2+c^2b^2) = 0$$

$$b^4c^4 + b^4a^4 - 2a^2b^4c^2 - 4a^4b^2c^2 + 4a^2b^4c^2 + 4a^4c^4 - 4a^2c^4b^2 = 0$$

$$b^4c^4 + b^4a^4 + 2a^2b^4c^2 - 4a^4b^2c^2 + 4a^4c^4 - 4a^2c^4b^2 = 0$$

$$(b^2c^2 + b^2a^2 - 2a^2c^2)^2 = 0$$

$$(a+b+c)^2 = a^2+b^2+c^2+2ab+2bc+2ca$$

$$(b^2c^2 + b^2a^2 - 2a^2c^2)^2 = 0$$

$$b^2c^2 + b^2a^2 - 2a^2c^2 = 0$$

$$b^2c^2 + b^2a^2 = 2a^2c^2$$

$$\frac{b^2c^2 + b^2a^2}{a^2b^2c^2} = \frac{2a^2c^2}{a^2b^2c^2}$$

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

(OR)

$$\frac{b^2c^2 + b^2a^2}{a^2c^2} = 2$$

$$\frac{b^2}{a^2} + \frac{b^2}{c^2} = 2$$

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

$$b^2 = \frac{2a^2c^2}{a^2+c^2}$$

a^2, b^2, c^2 are in HP

PYQ – 2024 - II

The roots of the quadratic equation

$$a^2(b^2 - c^2)x^2 + b^2(c^2 - a^2)x + c^2(a^2 - b^2) = 0$$

are equal ($a^2 \neq b^2 \neq c^2$).

Which one of the following is a root of the equation?

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

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

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

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

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

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

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

PYQ – 2024 - II

The product of 5 consecutive terms of an AP is 229635. The first, second and fifth terms are in GP.

What is the common difference?

(a) 3

(b) 4

(c) 5

(d) 6

$a-2d$ ① $\quad a-d$ ② $\quad a$ $\quad a+d$ $\quad a+2d$ ⑤

$(a-d)^2 = (a-2d)(a+2d)$

$a^2 - 2ad + d^2 = a^2 - 4d^2$

$5d^2 = 2ad$

$5d^2 - 2ad = 0$

$d(5d-2a) = 0$

$d = 0$ — rejected

$d = \frac{2a}{5} \Rightarrow a = \frac{5d}{2}$

$$a = \frac{5d}{2}$$

$$(a-2d)\left(a-d\right)\left(a\right)\left(a+d\right)\left(a+2d\right) = 229635$$

$$\frac{d}{2} \times \frac{3d}{2} \times \frac{5d}{2} \times \frac{7d}{2} \times \frac{9d}{2} = \frac{25515}{229635}$$ ~~3645~~ ~~729~~ 243

$$\frac{d^5}{2^5} = 3^5 \Rightarrow d^5 = (2\times 3)^5$$

$$d = 6$$

The product of 5 consecutive terms of an AP is 229635. The first, second and fifth terms are in GP.

PYQ – 2024 - II

What is the sum of all five terms?

(a) 60

(b) 65

(c) 75 ✓

(d) 80

$$\frac{d}{2} + \frac{3d}{2} + \frac{5d}{2} + \frac{7d}{2} + \frac{9d}{2}$$

$$\frac{25d}{2} = 25 \times \frac{6}{2} = 75$$

Sum of 'n' odd numbers $= n^2$

Q) After paying 30 out of 40 installments of a debt of Rs. 3600, one third of the debt is unpaid. If the installments are forming an arithmetic series, then what is the first instalment?

(a) Rs 50
(b) Rs 51
(c) Rs 105
(d) Rs 110

Q) After paying 30 out of 40 installments of a debt of Rs. 3600, one third of the debt is unpaid. If the installments are forming an arithmetic series, then what is the first instalment?

(a) Rs 50
(b) Rs 51
(c) Rs 105
(d) Rs 110

Ans: (b)

Q) If the sum of 'n' terms of an arithmetic progression is $n^2 - 2n$, then what is the n^{th} term?

(a) $3n - n^2$ (b) $2n - 3$

(c) $2n + 3$ (d) $2n - 5$

Q) If the sum of 'n' terms of an arithmetic progression is $n^2 - 2n$, then what is the n^{th} term?

(a) $3n - n^2$ (b) $2n - 3$

(c) $2n + 3$ (d) $2n - 5$

Ans: (b)

Q) What is sum to the 100 terms of the series
$9+99+999+\ldots?$

(a) $\frac{10}{9}\left(10^{100}-1\right)-100$ (b) $\frac{10}{9}\left(10^{99}-1\right)-100$

(c) $100\,(100^{10}-1)$ (d) $\frac{9}{100}\left(10^{100}-1\right)$

Q) What is sum to the 100 terms of the series
$9+99+999+\ldots?$

(a) $\frac{10}{9}\left(10^{100}-1\right)-100$ (b) $\frac{10}{9}\left(10^{99}-1\right)-100$

(c) $100\,(100^{10}-1)$ (d) $\frac{9}{100}\left(10^{100}-1\right)$

Ans: (a)

Q) If the sum of the first two terms and the sum of the first four terms of a geometric progression with positive common ratio are 8 and 80 respectively, then what is the 6th term?

(a) 88
(b) 243
(c) 486
(d) 1458

Q) If the sum of the first two terms and the sum of the first four terms of a geometric progression with positive common ratio are 8 and 80 respectively, then what is the 6th term?

(a) 88
(b) 243
(c) 486
(d) 1458

Ans: (c)

Q) If x^2, y^2, z^2 are in AP, then $y+z, z+x, x+y$ are in

(a) AP
(b) HP
(c) GP
(d) None of these

Q) If x^2, y^2, z^2 are in AP, then $y+z, z+x, x+y$ are in

(a) AP (b) HP

(c) GP (d) None of these

Ans: (a)

Q) What is the value of $1 - 2 + 3 - 4 + 5 - \ldots\ldots + 101$?

(a) 51
(b) 55
(c) 110
(d) 111

Q) What is the value of $1 - 2 + 3 - 4 + 5 - \ldots\ldots + 101$?

(a) 51
(b) 55
(c) 110
(d) 111

Ans: (a)

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