



UDAAN



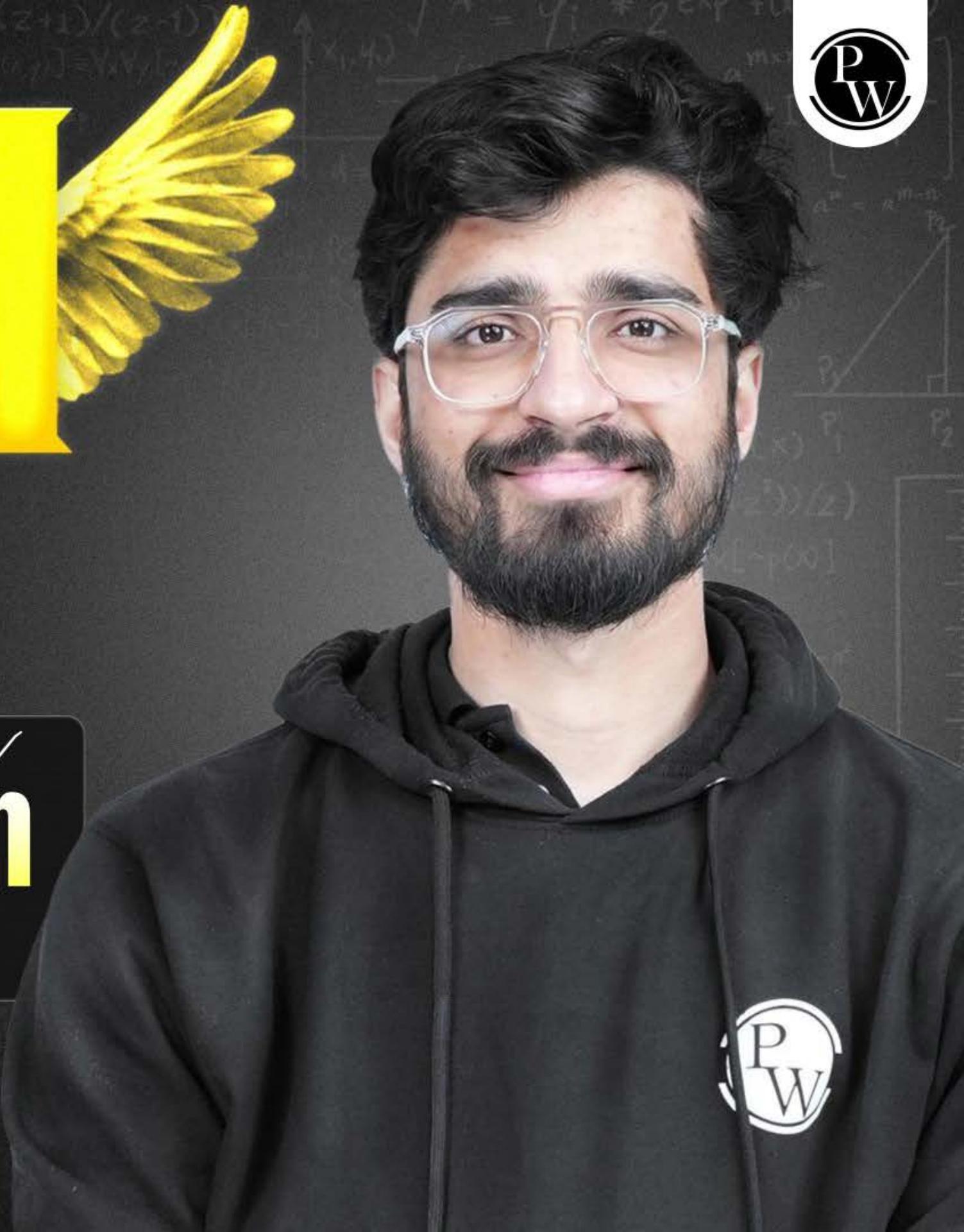
2026

Arithmetic Progression

MATHS

LECTURE-5

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Topics *to be covered*

A

Questions on sum of n terms

3

1

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

2

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

3

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

#Q. Find the sum of the first 15 multiples of 8.

CBSE 2017

8, 16, 24, 32, -----

$$a = 8$$

$$d = 8$$

$$n = 15.$$

$$= \frac{15}{2} [16 + 112]$$

$$= \frac{15}{2} \times 128$$

$$= 960$$

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

$$= \frac{15}{2} [16 + 14(8)]$$

A 920

B 940

C 960

D 980

#Q. Find the sum of all 3-digit natural numbers, which are multiples of 11.

110, 121, 132, 143. (990!)

CBSE 2012

- A 43,560
 - B 44,000
 - C 44,550
 - D 45,100

$$a=10, d=11.$$

$$a + (n-1)d = 990$$

$$|10 + (n-1)| = 990$$

$$(n-1) \cdot 11 = 880$$

$$n-1 = \frac{880}{11}$$

$$n - 1 = 80$$

$n = 81$

$$\Rightarrow a_8 = 990$$

total terms = 81.

$$S_n = \frac{n}{2} [a + l]$$

$$S_{81} = \frac{81}{2} [110 + 990]$$

$$= 81 \times 100$$

= Russo

#Q. Find the sum:

$$18 + 15\frac{1}{2} + 13 + \dots +$$

$$\left(-49\frac{1}{2} \right)$$

last term.

CBSE 2013

$$a = 18$$

$$d = a_2 - a_1 = 15\frac{1}{2} - 18 = \frac{21}{2} - 18 = \frac{31-36}{2} = -\frac{5}{2}$$

$$a_2 - a_1 = 13 - 15\frac{1}{2} = 13 - \frac{31}{2} = \frac{26-31}{2} = -\frac{5}{2}$$

- #Q. Statement-1 (A) : The sum of 20 terms of the A.R. 1, 3, 5, 7, ... is 400.
- Statement-2 (R) : The sum of first n odd natural numbers is n^2 .

- A** Statement-1 and Statement-2 are True; Statement-2 is a correct explanation for Statement-1.
- B** Statement-1 and Statement-2 are True; Statement-2 is not a correct explanation for Statement-1.
- C** Statement-1 is True, Statement-2 is False.
- D** Statement-1 is False, Statement-2 is True.

Q. The sum of first 'n' odd natural no. ?

$$\therefore 1+3+5+7+9 \dots \dots \dots$$

$$\begin{array}{l} a=1 \\ d=2 \end{array}$$

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

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

$$= \frac{n}{2} [\cancel{2} + 2n - \cancel{2}]$$

$$= \frac{n}{2} [2n]$$

$$= n^2$$

Sum of first 10 odd natural no. =

11 11 11 20 11 11 11 = 100 + 400

$$\cdot S_n = n^2$$

odd natural no.

$$S_{40} = (40)^2$$

$$S_{50} = (50)^2$$

$$S_{60} = (60)^2$$

#Q. Sum of the first 14 terms of an A.P. is 1505 and its first term is 10.
 Find its 25th term.

CBSE 2012

$$S_{14} = 1505$$

~~$$\frac{7}{2} [2a + 13d] = 1505$$~~

$$2a + 13d = \frac{1505}{7}$$

$$2a + 13d = 215 \quad \boxed{1}$$

$$a = 10.$$

$$20 + 12d = 215$$

$$12d = 195$$

$$d = \frac{195}{12}$$

$$d = 15$$

$$\begin{aligned} a_{25} &= a + 24d \\ &= 10 + 24(15) \\ &= 370 \end{aligned}$$

#Q. The sum of first n terms of an A.P. is $5n^2 + 3n$. If its m^{th} term is 168, find the value of m . Also, find the 20^{th} term of this A.P.

A $m = 15, a_{20} = 188$

B $m = 16, a_{20} = 192$

C ~~$m = 17, a_{20} = 198$~~

D $m = 18, a_{20} = 202$

$$S_n = 5n^2 + 3n$$

$$a_m = 168$$

$$a_{20} = ? , m = ?$$

$$a + (m-1)d = 168$$

$$8 + (m-1)10 = 168$$

$$(m-1)10 = 160$$

$$m-1 = 16$$

$$\text{m=17}$$

$$a_{20} = a + 19d$$

$$= 8 + 19(10) =$$

CBSE 2013

$$S_1 = 5(1)^2 + 3(1) = 8$$

$$S_1 = 5(1)^2 + 3(1) = 8$$

$$a_1 = 8$$

$$S_2 = 5(2)^2 + 3(2)$$

$$S_2 = 26 \quad d = a_2 - a_1$$

$$a_1 + a_2 = 26$$

$$8 + a_2 = 26$$

$$a_2 = 18$$

$$d = 10$$

#Q. If the sum of 7 terms of an A.P. is 49 and that of 17 terms is 289, find the sum of n terms.

~~A~~ $S_n = n^2$

~~B~~ $S_n = 2n^2$

~~C~~ $S_n = n(n + 1)$

~~D~~ $S_n = n(n - 1)$

$$S_7 = 49$$

$$\frac{7}{2} [2a + 6d] = 49$$

$$2a + 6d = \frac{49 \times 2}{7}$$

$$2a + 6d = 14$$

$$a + 3d = 7 \quad \boxed{1}$$

$$S_{17} = 289$$

$$\frac{17}{2} [2a + 16d] = 289$$

$$2a + 16d = \frac{289 \times 2}{17}$$

$$2a + 16d = 34$$

$$a + 8d = 17 \quad \boxed{2}$$

CBSE 2013, 16

$$\begin{array}{r} a + 3d = 7 \\ a + 8d = 17 \\ \hline \end{array}$$

$$-5d = -10$$

$$d = 2$$

$$a + 3(2) = 7$$

$$a + 6 = 7$$

$$a = 1$$

$$\begin{aligned} S_n &= \frac{n}{2} [2a + (n-1)d] \\ &= \frac{n}{2} [2 + (n-1)2] \\ &= \frac{n}{2} [2 + 2n - 2] \\ &= n^2 \end{aligned}$$

#Q. If the sum of first four terms of an A.P. is 40 and that of first 14 terms is 280.
Find the sum of its first n terms.

$$S_4 = 40$$

$$S_{14} = 280$$

$$S_n = ?$$

CBSE 2019

#Q. The first term of an A.P. is 5, the last term is 45 and the sum is 400. Find the number of terms and the common difference.

A $n = 20, d = 2$

$$a = 5$$

last term = 45

$$\text{Sum} = 400$$

B $n = 16, d = \frac{8}{3}$

Let no. of terms = n .

$$S_n = 400$$

$$a_n = 45$$

C $n = 25, d = \frac{40}{25}$

D $n = 10, d = 4$

$$S_n = \frac{n}{2} [a + l]$$

$$400 = \frac{n}{2} [5 + 45]$$

$$800 = n [50]$$

$$16 = n$$

$$a + (n-1)d = 45$$

$$5 + (n-1)d = 45$$

$$5 + 15d = 45$$

$$15d = 40$$

$$d = \frac{8}{3}$$

#Q. The first and the last terms of an A.P. are 7 and 49 respectively. If sum of all its terms is 420, find its common difference.

$$a = 7$$

$$\text{last term} = 49$$

$$\text{Sum} = 420$$

$$\text{let, no. of terms} = n$$

$$S_n = 420$$

$$a_n = 49$$

CBSE 2010, 14

#S²BD

#GPM

#Q. The sum of first 9 terms of an A.P. is 162. The ratio of its 6th term to its 13th term is 1:2. Find the first and 15th term of the A.P.

A $a = 6, T_{15} = 48$

B $a = 3, T_{15} = 45$

C $a = 12, T_{15} = 54$

D $a = 9, T_{15} = 60$

$$S_9 = 162$$

$$\frac{9}{2} [2a + 8d] = 162$$

$$2a + 8d = \cancel{162} \times \frac{2}{9}$$

$$2a + 8d = 36$$

$$a + 4d = 18 \quad \boxed{1}$$

$$\frac{a_6}{a_{13}} = \frac{1}{2}$$

$$\frac{a + 5d}{a + 12d} = \frac{1}{2}$$

$$2a + 10d = a + 12d$$

$$a - 2d = 0 \quad \boxed{2}$$

CBSE 2015

HOT



- #Q. The sum of the first 7 terms of an A.P. is 63 and the sum of its next 7 terms is 161. Find the 28th term of this A.P.

$$S_7 = 63$$

$$\frac{7}{2} [2a + 6d] = 63$$

$$2a + 6d = \frac{63 \times 2}{7}$$

$$2a + 6d = 18 \quad \textcircled{1}$$

CBSE 2014

$$a_1 + a_2 + \dots + a_7 + a_8 + a_9 + \dots + a_{13} + a_{14}$$

\downarrow
63

(61)

Sum of next 7 terms = $S_{14} - S_7$

$$S_{14} - S_7 = 161$$

$$S_{14} - 63 = 161$$

$$S_{14} = 161 + 63$$

$$S_{14} = 224$$

$$\frac{7}{2} [2a + 13d] = 224$$

$$2a + 13d = 32 \quad \textcircled{2}$$

#Q. The n^{th} term of an A.P. is given by $(4n + 15)$. Find the sum of first 20 terms of this A.P.

A 1080

B ~~1140~~

C 1080

D 1200

$$a_n = 4n + 15$$

$$a_1 = 19$$

$$a_2 = 23$$

$$a_2 - a_1 = 4$$

$$d = 4$$

$$S_{20} = \frac{20}{2} [2a + 19d]$$

$$= 10[38 + 76]$$

$$= 10[114]$$

$$= 1140$$

CBSE 2013

#Q. The first and the last term of an A.P. are 17 and 350 respectively. If the common difference is 9, how many terms are there and what is their sum?

- A** $n = 37, S = 6800$
- B** $n = 38, S = 6973$
- C** $n = 36, S = 7080$
- D** $n = 39, S = 7100$

HGPY

#Q. If the sum of the first n terms of an A.P. is $4n - n^2$, what is the first term? What is the sum of first two terms? What is the second term? Similarly, find the third, the tenth and the n^{th} terms.

$$S_n = 4n - n^2$$

$$S_1 = 4(1) - (1)^2 = 3$$

$$a_1 = 3$$

$$S_2 = 4(2) - (2)^2 = 4$$

$$S_2 = 4$$

$$\begin{aligned} d &= a_2 - a_1 \\ &= 1 - 3 \\ d &= -2 \end{aligned}$$

$$a_1 + a_2 = 4$$

$$3 + a_2 = 4$$

$$a_2 = 1$$

$$\begin{aligned} a_3 &= a + 2d = 3 + 2(-2) \\ &= -1 \end{aligned}$$

$$\begin{aligned} a_{10} &= a + 9d = 3 + 9(-2) \\ &= -15 \end{aligned}$$

$$\begin{aligned} a_n &= a + (n-1)d = 3 + (n-1)(-2) \\ &= 3 - 2n + 2 \\ &= 5 - 2n \end{aligned}$$

$$S_n = u_n - n^2$$

$$S_1 = 4(1) - (1)^2 = 4 - 1 = 3 \quad a_1$$
$$S_2 = 4(2) - (2)^2 = 8 - 4 = 4 \quad S_2 = 4$$
$$S_3$$
$$S_4$$
$$a_1 + a_2 = 4$$
$$3 + a_2 = 4$$
$$a_2 = 1$$

$$d = a_2 - a_1$$

$$d = -2$$

#Q. If the ratio of the 11th term of an A.P. to its 18th term is 2 : 3, find the ratio of the sum of first five terms to the sum of its first 10 terms.

$$\frac{a_{11}}{a_{18}} = \frac{2}{3}$$

$$\frac{a+10d}{a+17d} = \frac{2}{3}$$

$$3a + 30d = 2a + 34d$$

$$a - 4d = 0 \quad \text{Eqn 1}$$

$$a = 4d \quad \text{Eqn 2}$$

$$\frac{S_5}{S_{10}} = ?$$

$$\frac{S_5}{S_{10}} = \frac{\frac{1}{2} \left[2a + 4d \right]}{\frac{1}{2} \left[2a + 9d \right]} = \frac{1}{2} \left[\frac{2a + 4d}{2a + 9d} \right]$$

$$= \frac{1}{2} \left[\frac{2(4d) + 4d}{2(4d) + 9d} \right]$$

$$= \frac{1}{2} \times \frac{12d}{17d}$$

$$= \boxed{\frac{6}{17}} \quad \text{Ans}$$

CBSE 2017

~~HOT~~

$$Q \quad 2 + 6 + 10 + \dots + x = 1800, \quad x = ?$$

$$\begin{cases} a=2 \\ d=4 \end{cases}$$

Let, no. of terms = n.

$$\Rightarrow \begin{cases} a_n = x \\ S_n = 1800 \end{cases}$$

$$1. \quad a + (n-1)d = x$$

$$2. \quad 2 + (n-1)4 = x$$

$$S_n = 1800$$

$$\frac{n}{2} [2a + (n-1)d] = 1800$$

$$\frac{n}{2} [4 + (n-1)4] = 1800$$

$$n [4 + 4n - 4] = 1800 \times 2$$

$$4n^2 = 3600$$

$$n^2 = \cancel{3600}$$

$$n^2 = 900$$

$$n = \pm \sqrt{900}$$

$$n = 30$$

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

$$2 + (29)4 = x$$

$$118 = x$$

Ans.

HOT

#Q. Solve the equation: $1 + 4 + 7 + 10 + \dots + x = 287$.

$$a=1$$

$$d=3$$

Let, no. of terms = n .

$$a_n = x$$

$$S_n = 287$$

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

$$1 + (n-1)3 = x$$

$$S_n = 287$$

$$\frac{n}{2} [2 + (n-1)3] = 287$$

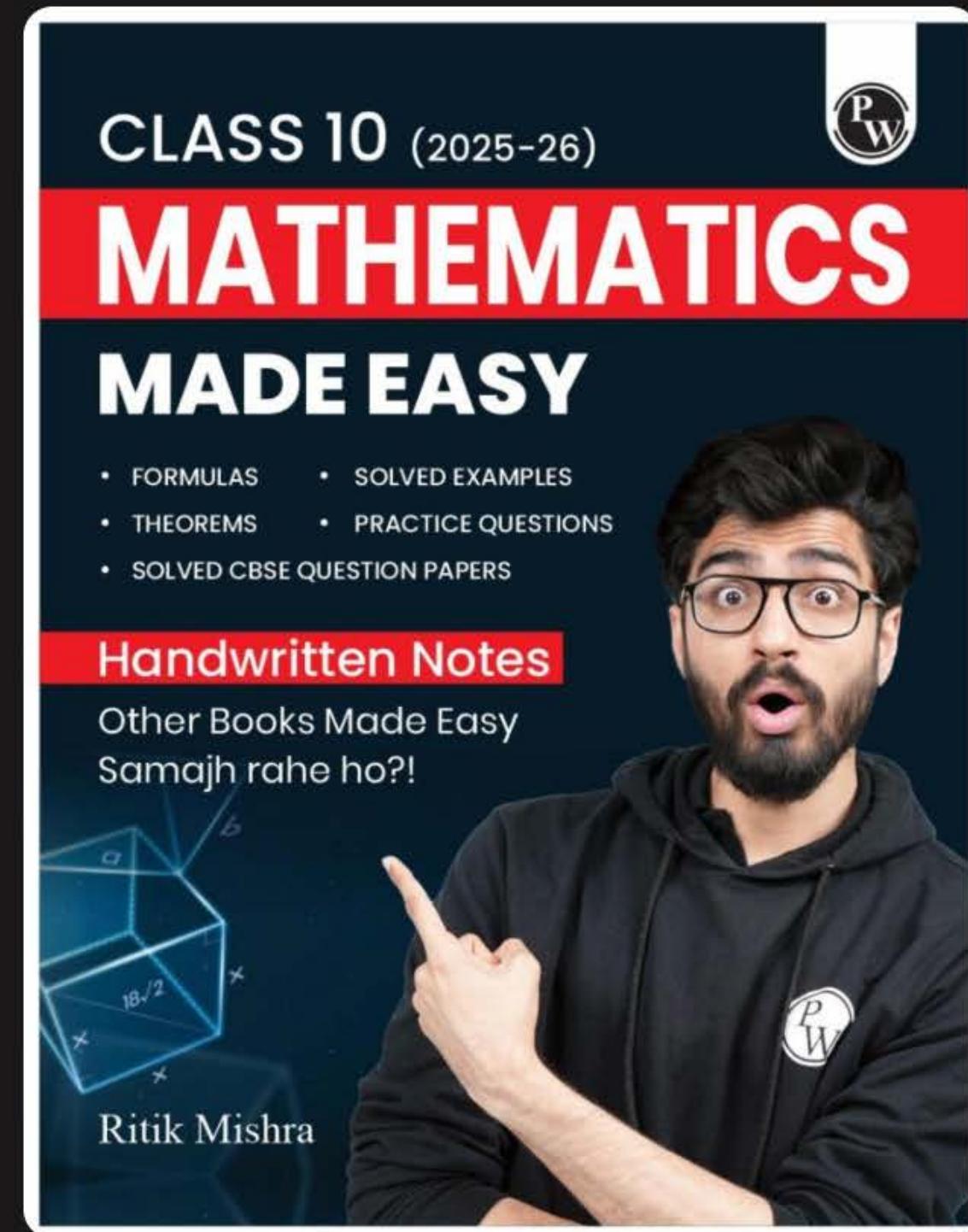
$$n[2 + 3n - 3] = 287 \times 2$$

$$n(3n-1) = 574$$

$$3n^2 - n - 574 = 0$$

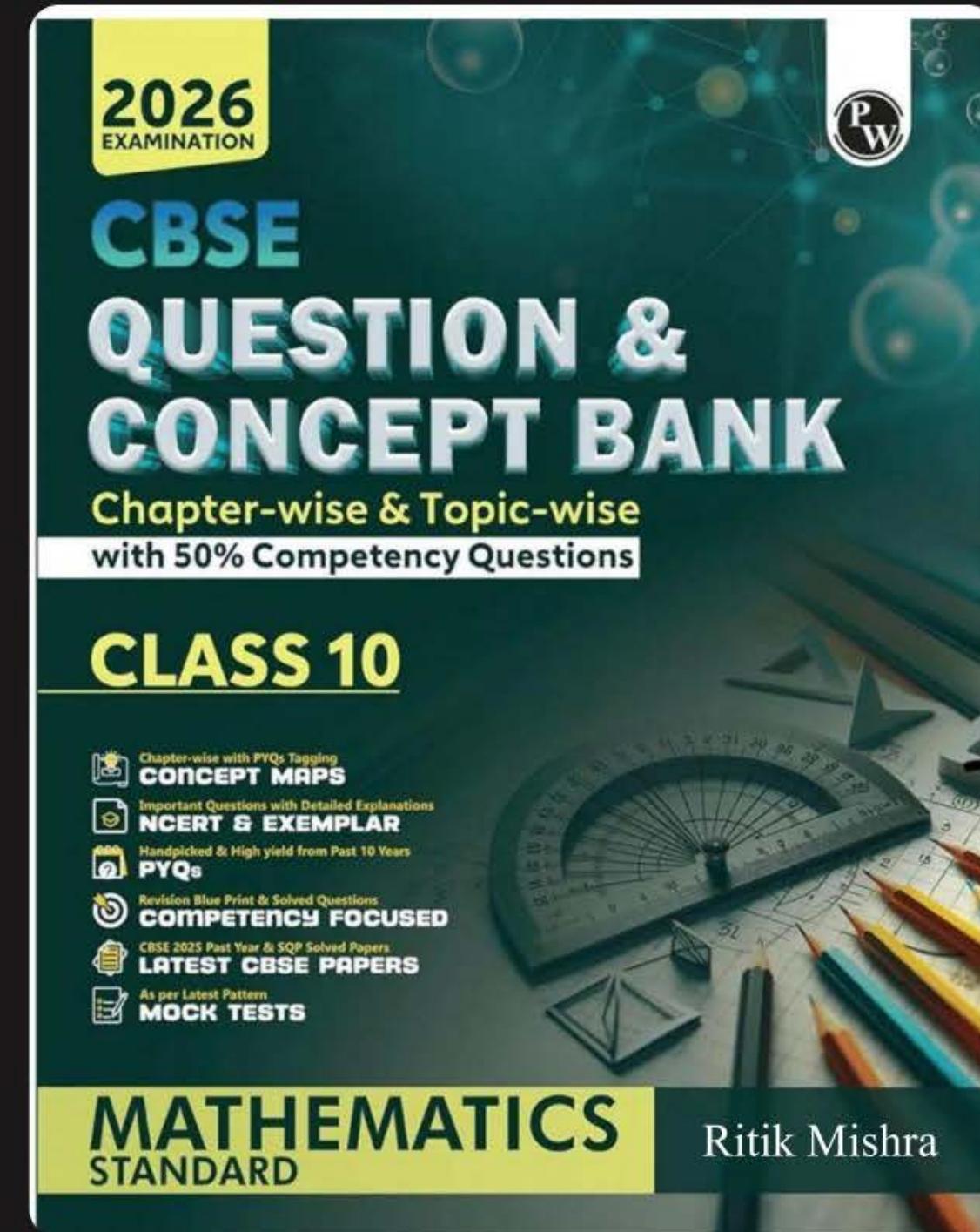
- A 36
- B 38
- C 40
- D 42

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