



UDAAN



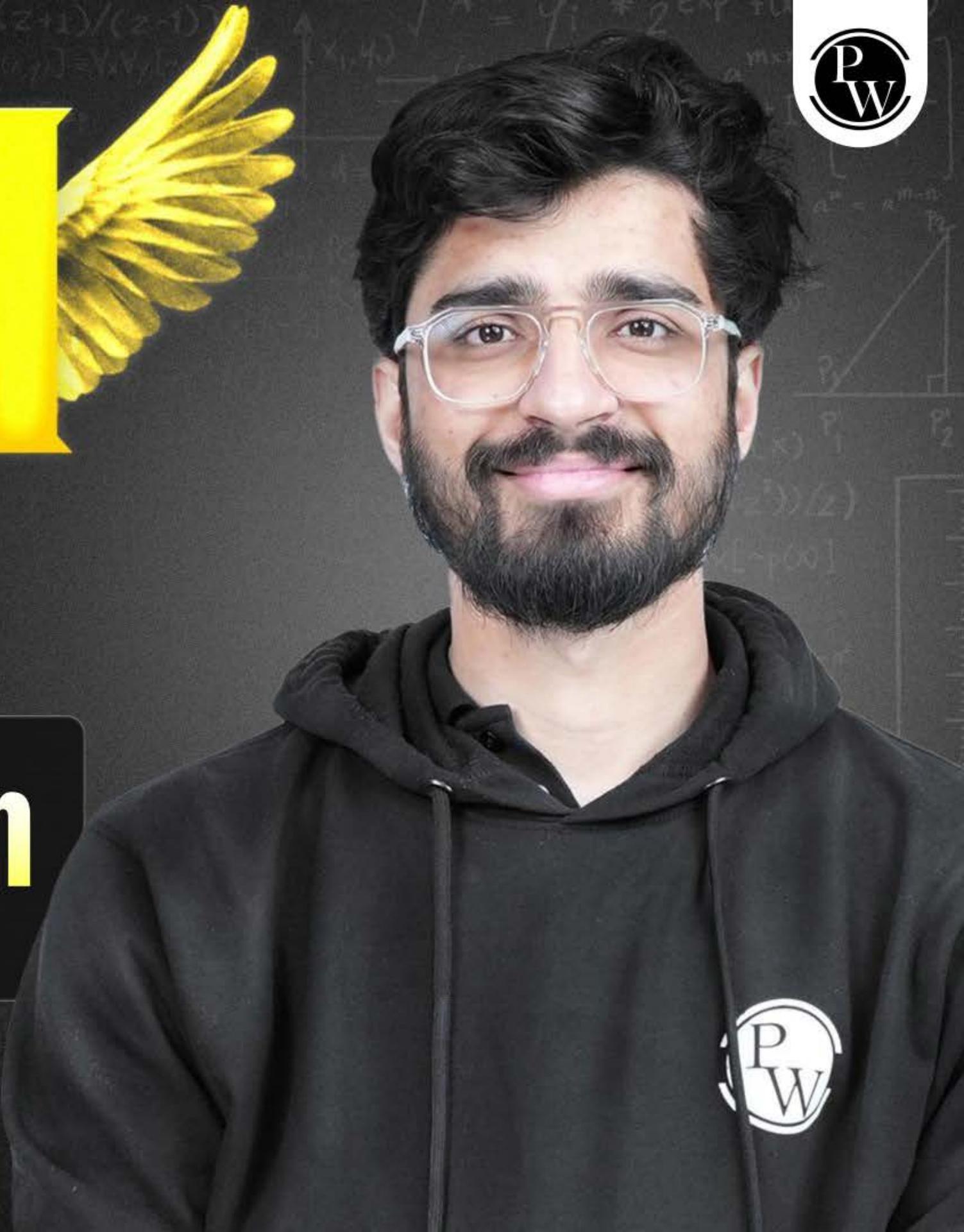
2026

Arithmetic Progression

MATHS

LECTURE-3

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Topics

to be covered ↑ 101.

A) 1 - 5 (sept)

221. B) 6 - 11 (sept)

301. C) 12 - 16 (sept)

361. D) After 16 (sept)

Questions

(Continued)

#Q. Determine the general term of an A.P. whose 7th term is -1 and 16th term 17.

$$\begin{aligned}a_n &= a + (n-1)d \\&= -13 + (n-1)2 \\&= -13 + 2n - 2 \\&= \boxed{2n-15} \\&\text{Ans}\end{aligned}$$

$$\begin{aligned}a_7 &= -1 \\a_{16} &= 17 \\a+6d &= -1 \\a+12 &= -1 \\a &= -13 \\a+6d &= -1 \\a+15d &= 17 \\-9d &= -18 \\d &= 2\end{aligned}$$

terms $(a_1, a_2, \dots) \rightarrow (a, d)$?

#Q. Find the arithmetic progression whose third term is 16 and seventh term exceeds its fifth term by 12.

$$a_3 = 16$$

$$a + 2d = 16 \quad (1)$$

$$a_7 - a_5 = 12 \quad (2)$$

$$(a + 6d) - (a + 4d) = 12$$

$$a + 6d - a - 4d = 12$$

$$2d = 12$$

$$d = 6$$

$$a + 2d = 16$$

$$a + 12 = 16$$

$$a = 4$$

$$\begin{aligned} A.P. &= a, a+d, a+2d, \dots \\ &= [4, 10, 16, 22, \dots] \end{aligned}$$

- #Q. The 17th term of an A.P. is 5 more than twice its 8th term. If the 11th term of the A.P. is 43, find the nth term.

$$a_{17} = 5 + 2(a_8)$$

$$a + 16d = 5 + 2(a + 7d)$$

$$a + 16d = 5 + 2a + 14d$$

$$\boxed{-a + 2d = 5} \quad \textcircled{1}$$

$$a_{11} = 43$$

$$\boxed{a + 10d = 43} \quad \textcircled{2}$$

$$-a + 2d = 5$$

$$\underline{a + 10d = 43}$$

$$12d = 48$$

$$\boxed{d = 4}$$

$$-a + 2d = 5$$

$$-a + 2(4) = 5$$

$$-a = -3$$

$$\boxed{a = 3}$$

CBSE 2012

$$\begin{aligned} a_n &= a + (n-1)d \\ &= 3 + (n-1)4 \\ &= 3 + 4n - 4 \\ \{ a_n &= 4n - 1 \end{aligned}$$

Ans,

#Q. Which term of the A.P. 3, 15, 27, 39, ... will be 120 more than its 21st term?

$$\begin{aligned} a &= 3 \\ d &= 12 \end{aligned}$$

CBSE 2009

Let, $a_n = 120 + a_{21}$

$$a + (n-1)d = 120 + a + 20d$$

$$3 + (n-1)12 = 120 + 3 + 20(12)$$

$$3 + 12n - 12 = 123 + 240$$

$$12n = 363 + 9$$

$$12n = 372$$

$$\begin{array}{r} 3 \\ 12 \\ \times 3 \\ \hline 36 \end{array}$$

$$n = \frac{372}{12}$$

$$\cancel{372}$$

$$n = 31$$

$$\text{Ans} = a_{31}$$

#Q. For what value of n , the n th terms of the arithmetic progressions $63, 65, 67, \dots$ and $3, 10, 17, \dots$ are equal?

CBSE 2008

$$63, 65, 67, \dots$$

$$a = 63$$

$$d = 2$$

$$\begin{aligned}a_n &= a + (n-1)d \\&= 63 + (n-1)2 \\&= 63 + 2n - 2\end{aligned}$$

$$a_n = 61 + 2n$$

$$3, 10, 17, \dots$$

$$a = 3$$

$$d = 7$$

$$\begin{aligned}a_n &= a + (n-1)d \\&= 3 + (n-1)7 \\&= 3 + 7n - 7\end{aligned}$$

$$a_n = 7n - 4$$

$$61 + 2n = 7n - 4$$

$$61 + 4 = 7n - 2n$$

$$\begin{array}{l} 6s = 5n \\ \text{---} \\ 13 = n \end{array} \quad \text{Ans}/$$

#Q. The sum of 4^{th} and 8^{th} terms of an A.P. is 24 and the sum of the 6^{th} and 10^{th} terms is 34. Find the first term and the common difference of the A.P.

$$a_4 + a_8 = 24$$

$$a+3d + a+7d = 24$$

$$\boxed{2a + 10d = 24} \quad 1$$

#6ph

$$a_6 + a_{10} = 34$$

$$a+5d + a+9d = 34$$

$$\boxed{2a + 14d = 34} \quad 2$$

#Q. The eighth term of an A.P. is half of its second term and the eleventh term exceeds one third of its fourth term by 1. Find the 15th term.

$$a_8 = \frac{1}{2}(a_2)$$

$$a_{11} - \frac{1}{3}(a_4) = 1$$

$$a+7d = \frac{1}{2}(a+d)$$

$$2a+14d = a+d$$

$$a+13d=0 \quad \textcircled{1}$$

$$(a+10d) - \frac{1}{3}(a+3d) = 1$$

$$a+10d - \frac{a}{3} - \frac{3d}{3} = 1$$

$$\frac{a+10d}{1} - \frac{a}{3} - \frac{d}{1} = 1$$

$$\frac{3a+30d-a-3d}{3} = 1$$

$$2a+27d=3 \quad \textcircled{2}$$

Kaan Cebt

$$2, 6, 10, 14, \text{M.T}, 18, 22, 26, 30, 34$$

$$2, 6, 10, 14, 18, 22, 26, 30$$

odd no.
of terms
↓
1.M.T

even no. of
terms
↓
2.M.T

n = no. of terms.

If n = odd.

$$\text{M.T} = \left(\frac{n+1}{2} \right)^{\text{th}}$$

If n = even.

$$\text{M.T} = \left(\frac{n}{2} \right)^{\text{th}}, \left(\frac{n}{2} + 1 \right)^{\text{th}}$$

Given no. of terms = 35
 n = odd.

$$\rightarrow 18^{\text{th}}$$

$$\rightarrow \frac{n+1}{2} = 18^{\text{th}}$$

Q no. of terms = 500.

How many M.T = 2

$$\text{M.T} = \left(\frac{n}{2}\right)^{\text{th}} , \left(\frac{n}{2} + 1\right)^{\text{th}}$$

$$= \boxed{250^{\text{th}}, 251^{\text{th}}}$$

a_{250}

a_{251}

#Q. Find the middle term of the A.P. 6, 13, 20, ..., 216.

$$\text{Let, } a_n = 216$$

$$\Rightarrow a_{31} = 216$$

$$a + (n-1)d = 216$$

$$6 + (n-1)7 = 216$$

$$(n-1)7 = 210$$

$$n-1 = \frac{210}{7}$$

$$n-1 = 30$$

$$\boxed{n=31}$$

last term.

$$\Rightarrow \boxed{\text{Total terms} = 31}$$

$\because n=31 = \text{odd}$

$$\therefore \text{M.T} = \left(\frac{n+1}{2} \right)^{\text{th}} = \boxed{16^{\text{th}}}$$

$$a_{16} = a + 15d$$

$$= 6 + 15(7) = 6 + 105 = \boxed{111} \text{ Ans.}$$

CBSE 2015

#Q. Find the middle term(s) of the A.P. 7, 13, 19, ..., 241.

$$\text{Let, } a_n = 241$$

$$a + (n-1)d = 241$$

$$7 + (n-1)6 = 241$$

$$(n-1)6 = 234$$

$$n-1 = \frac{234}{6}$$

$$n-1 = 39$$

$$n=40$$

$$\Rightarrow a_{40} = 241$$

$$\Rightarrow \text{total terms} = 40$$

$$\text{M.T} = \left(\frac{n}{2}\right)^{\text{th}}, \left(\frac{n}{2}+1\right)^{\text{th}}$$

$$= 20^{\text{th}}, 21^{\text{th}}$$

$$a_{20} = a + 19d = 7 + 19(6) = 121$$

$$a_{21} = a + 20d = 7 + 20(6) = 127$$

Ans,,

#Q. In the A.P. 1, 7, 13, 19, ..., 415, prove that the sum of the middle terms is equal to the sum of first and last terms.



#Q. Two arithmetic progressions have the same common difference. The difference between their 100th terms is 100, what is the difference between their 1000th terms?



$$a_{100} - a_{100}' = 100$$

$$(a + 99d) - (a' + 99d') = 100$$

$$\cancel{a + 99d} - \cancel{a'} - \cancel{99d} = 100$$

$$a - a' = 100$$

$$\begin{aligned} &= a_{1000} - a'_{1000'} \\ &= (a + 999d) - (a' + 999d') \\ &= a + \cancel{999d} - a' - \cancel{999d'} \\ &= a - a' \\ &= \boxed{100} \quad \text{Ans}/ \end{aligned}$$

तीर्पक

#Q. How many three digit numbers are divisible by 7?

105, 112, 119, 126..... 994.

This is an A.P.

$$a = 105$$

$$d = 7$$

Let, $a_n = 994$

$$a + (n-1)d = 994$$

$$105 + (n-1)7 = 994$$

$$(n-1)7 = 889$$

$$n-1 = \frac{889}{7}$$

$$n-1 = 127$$

$$n = 128$$

Total terms = 128

CBSE 2013

∴ there are 128 three digit nos divisible by 7.

#Q. How many multiples of 4 lie between 10 and 250?

12, 16, 20, ..., 248.

$\Rightarrow A.P$

$$\begin{aligned} a &= 12 \\ d &= 4 \end{aligned}$$

Let $a_n = 248$

$$a + (n-1)d = 248$$

$$12 + (n-1)4 = 248$$

$$(n-1)4 = 236$$

$$n-1 = \frac{236}{4}$$

$$n-1 = 59$$

$$n = 60$$

$$\Rightarrow a_{60} = 248$$

\therefore Total terms = 60

#Q. Find the number of all three digit natural numbers which are divisible by 9.

CBSE 2013

#GPK

#Q. Find the number of natural numbers between 101 and 999 which are divisible by both 2 and 5.

#6Ph

CBSE 2014

110, 120, 180, 990.

#Q. Find a, b and c if it is given that the numbers a, 7, b, 23, c are in A.P.

$$a, 7, b, 23, c$$

M.I

$$\begin{aligned} a_2 &= 7 \rightarrow a+d = 7 \\ a_4 &= 23 \rightarrow a+3d = 23 \end{aligned}$$

M.II

$$7-a = b-7 = 23-b = c-23$$

$$b-7 = 23-b$$

$$2b = 30$$

$$b = 15$$

#Q. The common difference of the A.P. $\frac{1}{2b}, \frac{1-6b}{2b}, \frac{1-12b}{2b}, \dots$ is:

$$d = a_2 - a_1$$

CBSE 2013

A 2b

B -2b

C 3

D -3

$$d = \frac{1-6b}{2b} - \frac{1}{2b}$$

$$= \frac{-6b - 1}{2b}$$

$$= -\frac{6b}{2b}$$

$$\boxed{d = -3}$$

#Q. If k , $2k - 1$ and $2k + 1$ are three consecutive terms of an A.P, the value of k is:

CBSE 2014

- A -2
- B 3
- C -3
- D 6

$$\begin{matrix} k, 2k-1, 2k+1 \\ a_1, a_2, a_3 \end{matrix}$$

★ $a_2 - a_1 = a_3 - a_2$

$$(2k-1) - k = (2k+1) - (k-1)$$

$$2k-1-k = 2k+1-k+1$$

$$k-1 = 2$$

$k=3$

Last question

#Q. The next term of the A.P. $\sqrt{7}, \sqrt{28}, \sqrt{63}, \dots$

- A $\sqrt{70}$
- B $\sqrt{84}$
- C $\sqrt{97}$
- D $\sqrt{112}$

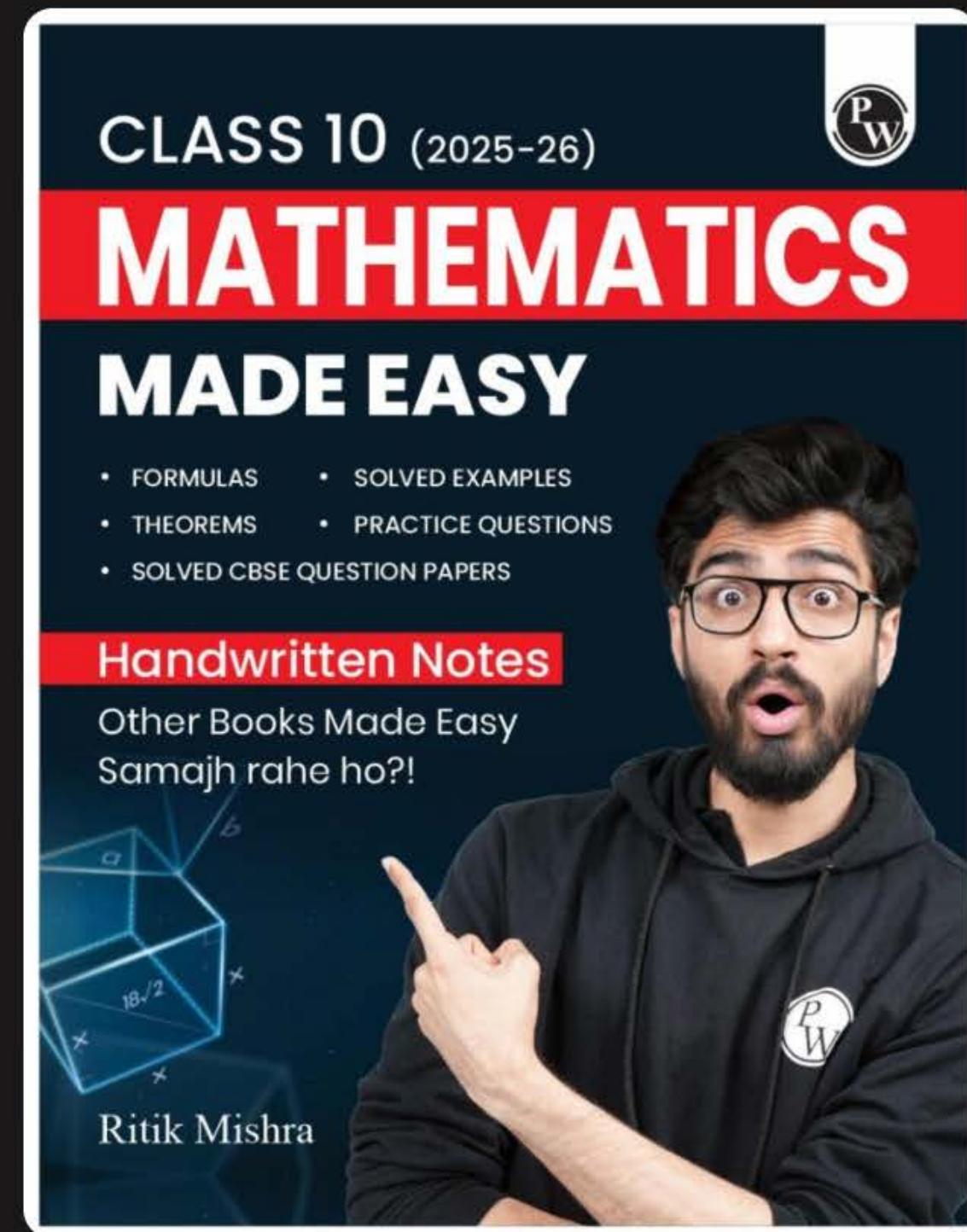
$$\begin{aligned}
 a &= \sqrt{7} \\
 d &= \sqrt{28} - \sqrt{7} \\
 &= \sqrt{2 \times 2 \times 7} - \sqrt{7} \\
 &= 2\sqrt{7} - \sqrt{7} \\
 &= \boxed{\sqrt{7}}
 \end{aligned}$$

$$\begin{aligned}
 a_4 &= a + 3d \\
 &= \sqrt{7} + 3(\sqrt{7}) \\
 &= \boxed{4\sqrt{7}}
 \end{aligned}$$

CBSE 2014

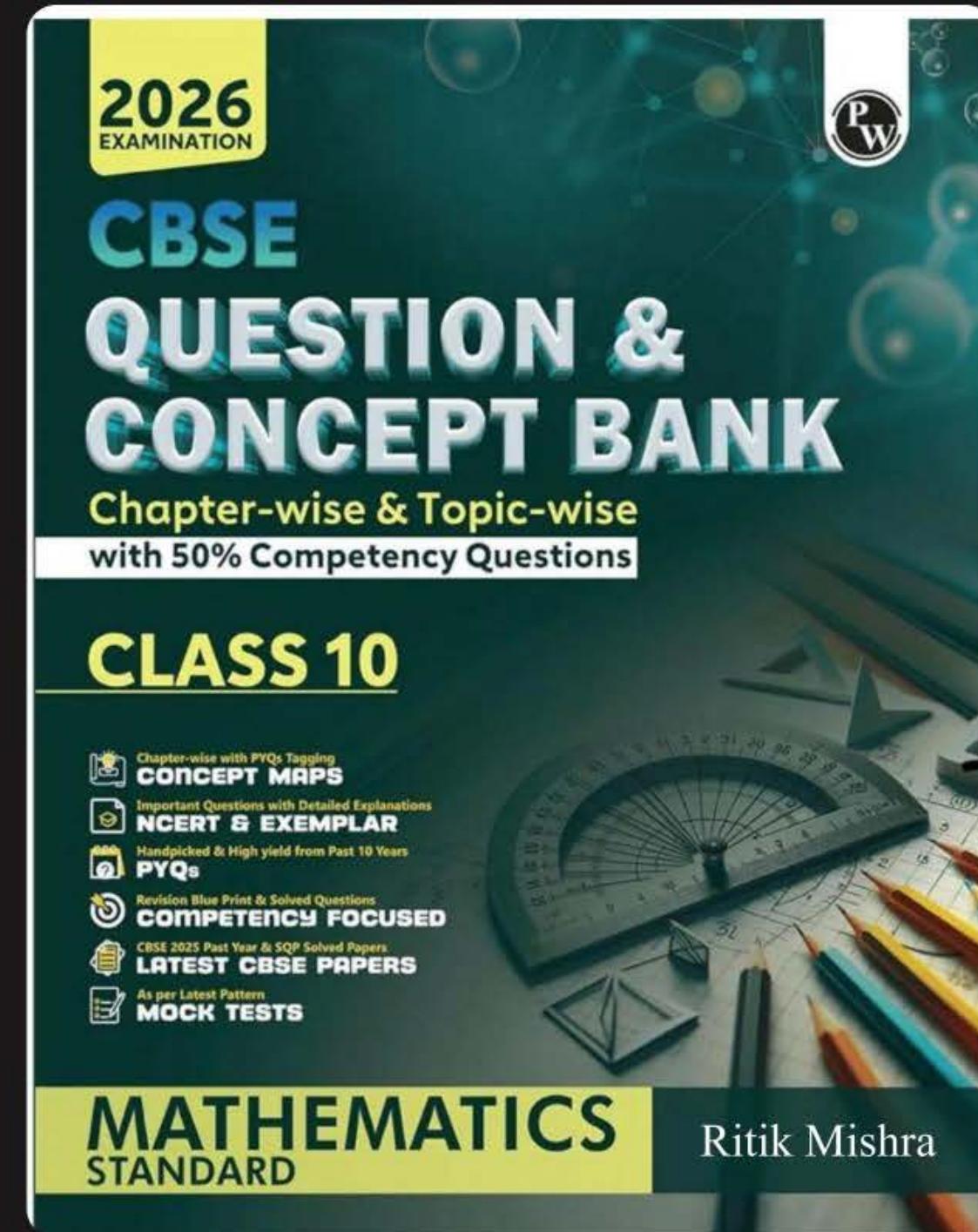
$$\begin{aligned}
 a_4 &= \sqrt[4]{4 \times 4 \times 7} \\
 &= \boxed{\sqrt[4]{112}}
 \end{aligned}$$

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Thank
You