



UDAAN



2026

Arithmetic Progression

MATHS

LECTURE-3

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Topics

to be covered

10% ↗

A) 1-5 (sept)

22% ↖ B) 6-11 (sept)

30% ↖ C) 12-16 (sept)

36% ↖ D) After 16 (sept)

Questions

(Continued)

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

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

Ans

$$\begin{aligned}
 a + 6d &= -1 \\
 a + 12 &= -1 \\
 \boxed{a} &= -13
 \end{aligned}$$

$$\begin{aligned}
 a_7 &= -1 \\
 a_{16} &= 17
 \end{aligned}$$

$$\begin{aligned}
 a + 6d &= -1 \\
 a + 15d &= 17 \\
 \hline
 \end{aligned}$$

$$-9d = -18$$

$$\boxed{d = 2}$$

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.

$$a_3 = 16$$

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

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

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

$$\cancel{a} + 6d - \cancel{a} - 4d = 12$$

$$2d = 12$$

$$d = 6$$

$$a + 2d = 16$$

$$a + 12 = 16$$

$$a = 4$$

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

#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.

CBSE 2012

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

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

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

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

$$a_{11} = 43$$

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

$$-a + 2d = 5$$

$$a + 10d = 43$$

$$12d = 48$$

$$\boxed{d = 4}$$

$$-a + 2d = 5$$

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

$$-a = -3$$

$$\boxed{a = 3}$$

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

Ans,,

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

CBSE 2009

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

$$\begin{aligned} \text{Let, } a_n &= 120 + a_{21} \\ a + (n-1)d &= 120 + a + 20d \\ 3 + (n-1)12 &= 120 + 3 + 20(12) \\ 3 + 12n - 12 &= 123 + 240 \\ 12n &= 363 + 9 \\ 12n &= 372 \end{aligned}$$

$$\begin{array}{r} 31 \\ 12 \overline{) 372} \\ \underline{36} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

$$n = 31$$

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

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

CBSE 2008

63, 65, 67, ...

$$a = 63$$

$$d = 2$$

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

$$a_n = 61 + 2n$$

3, 10, 17, ...

$$a = 3$$

$$d = 7$$

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

$$a_n = 7n - 4$$

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

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

$$65 = 5n$$

$$13 = n$$

Ans //

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

$$a_4 + a_8 = 24$$

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

$$\boxed{2a + 10d = 24} \text{ (1)}$$

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

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

$$\boxed{2a + 14d = 34} \text{ (2)}$$

6th

#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.

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

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

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

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

$$a + 13d = 0 \quad \text{--- (1)}$$

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

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

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

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

$$2a + 27d = 3 \quad \text{--- (2)}$$

kaan Cept

2, 6, 10, 14, 18, 22, 26, 30, 34

M.T

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

odd no.
of terms

↓
1 M.T

even no. of
terms

↓
2 M.T

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

If $n = \text{odd}$.

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

If $n = \text{even}$.

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

$\therefore \text{no. of terms} = 35$
 $n = \text{odd}$

→ 1 M.T

→ $\frac{n+1}{2} = 18^{\text{th}}$

Q no. of terms = 500.

How many M.T = 2

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

$$= 250^{th}, 251^{th}$$

$$a_{250}$$

$$a_{251}$$

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

CBSE 2015

$$\begin{aligned} \text{Let, } a_n &= 216 \\ a + (n-1)d &= 216 \\ 6 + (n-1)7 &= 216 \\ (n-1)7 &= 210 \\ n-1 &= \frac{210}{7} \\ n-1 &= 30 \\ \boxed{n=31} \end{aligned}$$

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

↓
last term.

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

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

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

$$\begin{aligned} a_{16} &= a + 15d \\ &= 6 + 15(7) = 6 + 105 = \boxed{111} \text{ Ans.} \end{aligned}$$

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

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

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

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

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

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

$$n-1 = 39$$

$$\boxed{n=40}$$

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

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

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

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

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

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

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.

#GPK

#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?

d
a
a_{100}
a_{1000}

d
a'
a'_{100}
a'_{1000}

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

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

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

$$a - a' = 100$$

$$\begin{aligned}
 &= 01000 - 01000' \\
 &= (a + 999d) - (a' + 999d) \\
 &= a + \cancel{999d} - a' - \cancel{999d} \\
 &= a - a' \\
 &= \boxed{100} \text{ Ans} //
 \end{aligned}$$

11792

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

CBSE 2013

105, 112, 119, 126, 994.

This is an A.P.

$$a = 105$$

$$d = 7$$

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

$$n-1 = 127$$

$$n = 128$$

$$\text{Total terms} = 128$$

Let, $a_n = 994$

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

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

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

∴ there are 128 three digit no.s 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 $a_n = 248$

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

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

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

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

$$n-1 = 59$$

$$\boxed{n = 60}$$

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

$$\therefore \boxed{\text{Total terms} = 60}$$

#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.

CBSE 2014

#GPK

110, 120, 130 - - - - - 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:

CBSE 2013

$$d = a_2 - a_1$$

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

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

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

$$d = -3$$

A

$2b$

B

$-2b$

C

3

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

$$k, 2k-1, 2k+1$$

$$a_1, a_2, a_3$$



$$a_2 - a_1 = a_3 - a_2$$

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

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

$$k-1 = 2$$

$$k = 3$$

#last question

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

CBSE 2014

A $\sqrt{70}$

B $\sqrt{84}$

C $\sqrt{97}$

D $\sqrt{112}$

$$a = \sqrt{7}$$

$$d = \sqrt{28} - \sqrt{7}$$

$$= \sqrt{2 \times 2 \times 7} - \sqrt{7}$$

$$= 2\sqrt{7} - \sqrt{7}$$

$$= \boxed{\sqrt{7}}$$

$$a_4 = a + 3d$$

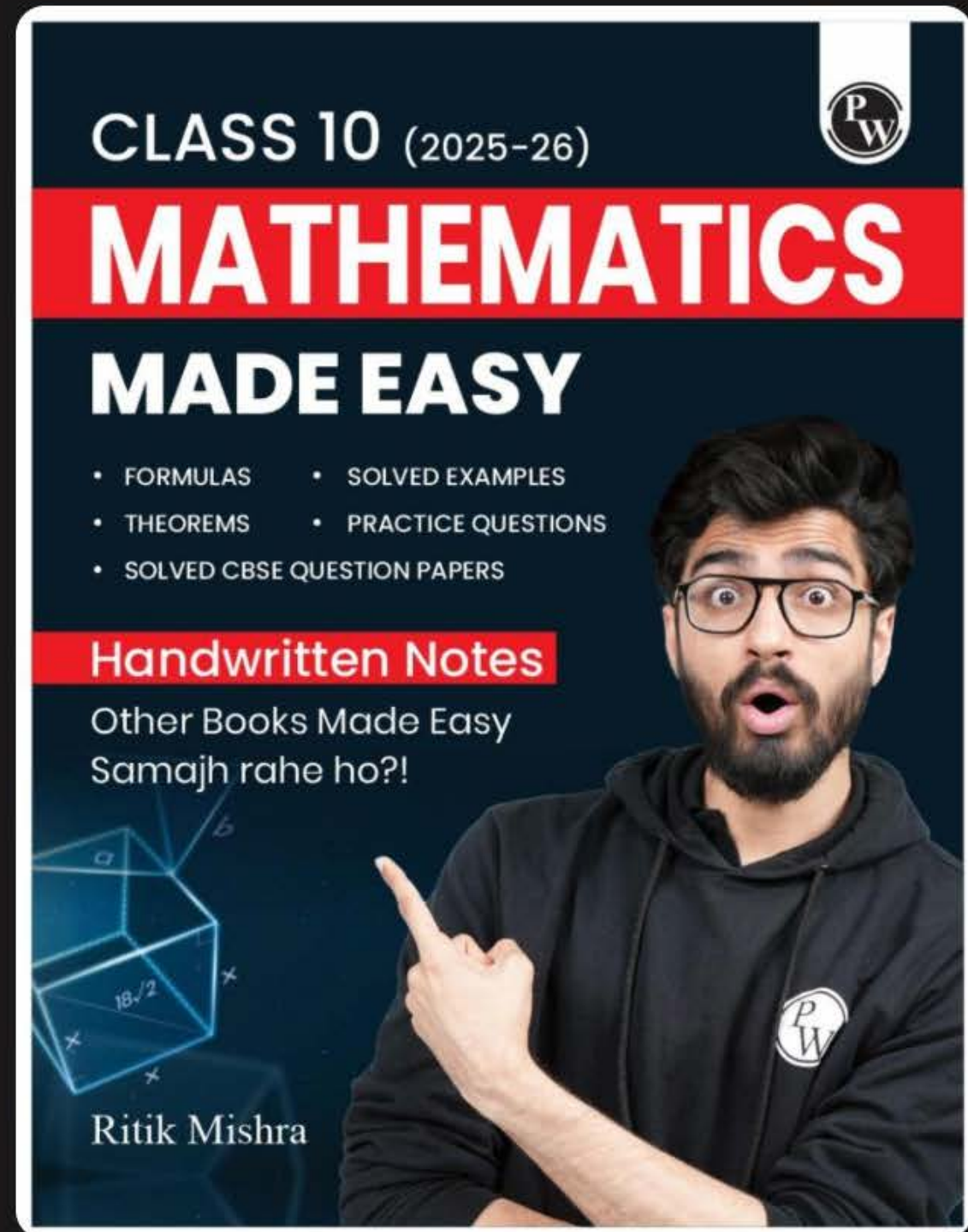
$$= \sqrt{7} + 3(\sqrt{7})$$

$$= \boxed{4\sqrt{7}}$$

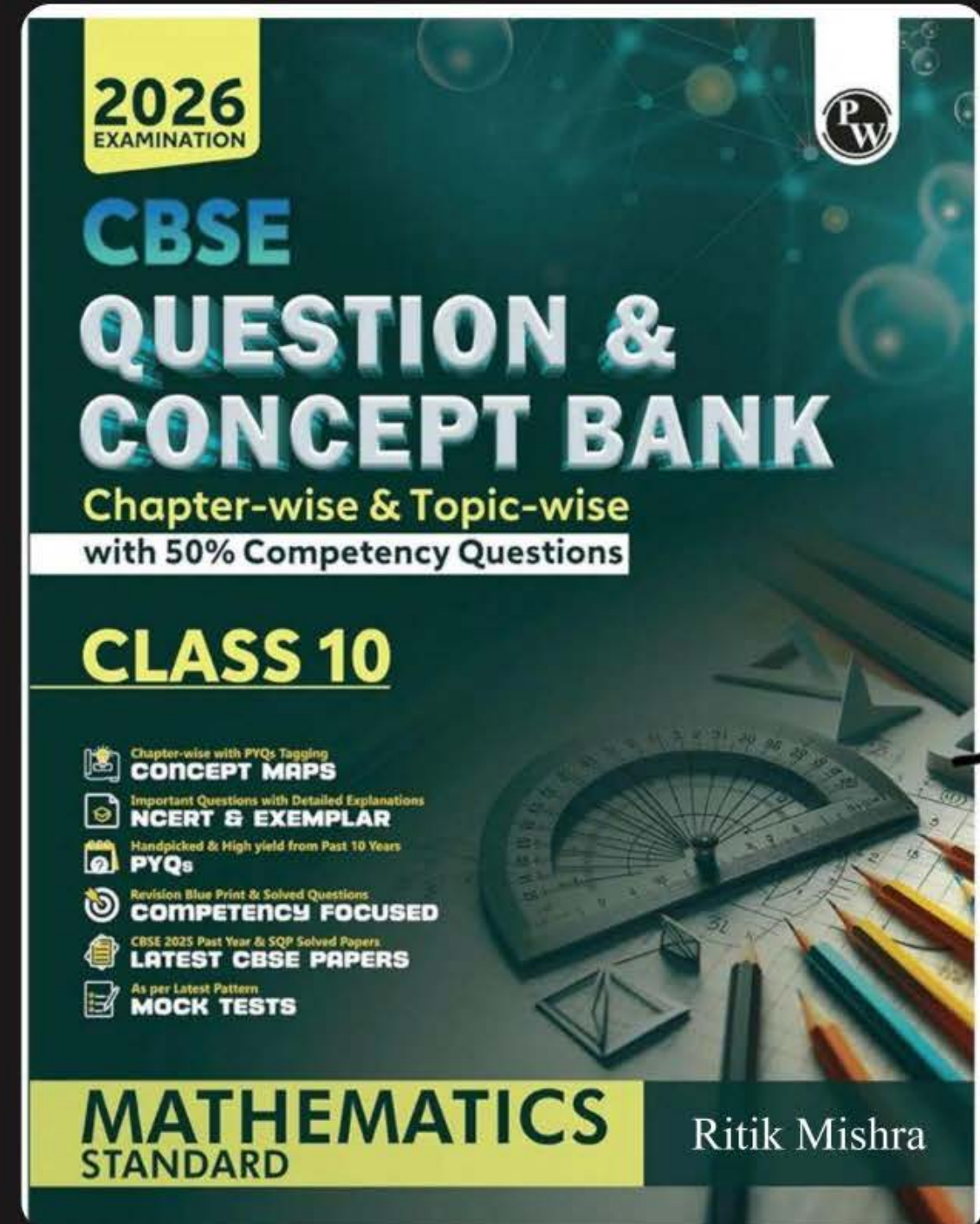
$$a_4 = \sqrt{4 \times 4 \times 7}$$

$$= \boxed{\sqrt{112}}$$

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