



# 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  $S_n = \frac{n}{2} [a + \cancel{d}] \rightarrow a_n$

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

CBSE 2017

8, 16, 24, 32, ...

$$a = 8$$

$$d = 8$$

$$n = 15$$

$$S_{15} = \frac{15}{2} [2a + 14d]$$

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

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

$$= \frac{15}{2} \times \frac{64}{1}$$

$$= \boxed{960}$$

A 920

B 940

☒ C 960

D 980

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

CBSE 2012

110, 121, 132, 143, ..., 990

$$a=110, d=11$$

$$\text{Let, } a_n = 990$$

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

$$110 + (n-1)11 = 990$$

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

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

$$n-1=80$$

$$n=81$$

$$\Rightarrow a_{81} = 990$$

total terms = 81.

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

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

$$= \frac{81}{2} \times \frac{1100}{100}$$

$$= 44550$$

A 43,560

B 44,000

☒ C 44,550

D 45,100



#Q. Find the sum:

$$18 + 15\frac{1}{2} + 13 + \dots + \left(-49\frac{1}{2}\right) \rightarrow \text{last term.}$$

CBSE 2013

$$a = 18$$

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

$$a_3 - a_2 = 13 - 15\frac{1}{2} = 13 - \frac{31}{2} = \frac{26 - 31}{2} = -\frac{5}{2}$$

#Q. Statement-1 (A) : The sum of 20 terms of the A.P. 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.?

1 + 3 + 5 + 7 + 9 + ...

$$\begin{aligned} a &= 1 \\ d &= 2 \end{aligned}$$

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

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

$$= n^2$$

Sum of first 10 odd natural no. = 100  
 " " " 20 " " = 400



$S_n = n^2$  → 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 25<sup>th</sup> term.

CBSE 2012

$$S_{14} = 1505$$

$$\frac{14}{2} [2a + 13d] = 1505$$

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

$$2a + 13d = 215 \quad \text{①}$$

$$a = 10$$

$$20 + 13d = 215$$

$$13d = 195$$

$$d = \frac{195}{13}$$

$$d = 15$$

$$a_{25} = a + 24d$$

$$= 10 + 24(15)$$

$$= 370$$



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

CBSE 2013

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

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

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

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

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

$$a_m = 168$$

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

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

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

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

$$m-1 = 16$$

$$m = 17$$

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

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

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

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

$$a_1 = 8$$

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

$$S_2 = 26$$

$$d = a_2 - a_1$$

$$a_1 + a_2 = 26$$

$$d = 10$$

$$8 + a_2 = 26$$

$$a_2 = 18$$



#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.

CBSE 2013, 16

**A**  $S_n = n^2$

**B**  $S_n = 2n^2$

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

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

$$S_7 = 49$$

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

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

$$2a + 6d = 14$$

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

$$S_{17} = 289$$

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

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

$$2a + 16d = 34$$

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



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

$$-5d = -10$$

$$d=2$$

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

$$a+6=7$$

$$a=1$$

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

#S2BD #GPH



#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**  $n = 20, d = 2$

**B**  $n = 16, d = 8/3$

**C**  $n = 25, d = 40/25$

**D**  $n = 10, d = 4$

$a = S$   
last term =  $4S$   
 Sum = 400.

Let no. of terms =  $n$ .

$S_n = 400$   
 $a_n = 4S$

$a + (n-1)d = 4S$

$S + (16-1)d = 4S$

$S_n = \frac{n}{2} [a + l]$   
 $400 = \frac{n}{2} [S + 4S]$

$800 = n [5S]$

$16 = n$

$S + 15d = 4S$

$15d = 4S - S$

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

#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.

CBSE 2010, 14

$$a = 7$$

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

$$\text{Sum} = 420$$

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

$$S_n = 420$$

$$a_n = 49$$

$$\# S^2 \text{ BD}$$

$$\# 6 \text{ pu}$$



#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.

CBSE 2015

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

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

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

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

$$S_9 = 162$$

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

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

$$2a + 8d = 36$$

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

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

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

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

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



#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 28<sup>th</sup> term of this A.P.

CBSE 2014

$$S_7 = 63$$
$$\frac{7}{2}[2a + 6d] = 63$$
$$2a + 6d = \frac{63 \times 2}{7}$$

$$2a + 6d = 18 \quad (1)$$

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

63                      161

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

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

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

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

$$S_{14} = 224$$

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

$$2a + 13d = 32 \quad (2)$$

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

CBSE 2013

A 1080

☒ B ~~1140~~

C 1080

D 1200

$$a_n = 4n + 15$$

$$a_1 = 19$$

$$a_2 = 23$$

$$a_2 - a_1 = 4$$

$$d = 4$$

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

$$= 10 [38 + 76]$$

$$= 10 [114]$$

$$= 1140$$



#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**  $n = 39, S = 7100$

#GPH



#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  $n^{\text{th}}$  terms.

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

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

$$a_1 = 3$$

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

$$S_2 = 4$$

$$a_1 + a_2 = 4$$

$$3 + a_2 = 4$$

$$a_2 = 1$$

$$d = a_2 - a_1 = 1 - 3$$

$$d = -2$$

$$a_3 = a + 2d = 3 + 2(-2) = -1$$

$$a_{10} = a + 9d = 3 + 9(-2) = -15$$

$$a_n = a + (n-1)d = 3 + (n-1)(-2) = 3 - 2n + 2 = -2n + 5$$

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

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

$a_1$

$$S_2 = 4(2) - (2)^2 = 8 - 4 = 4$$

$$S_2 = 4$$

$$a_1 + a_2 = 4$$

$$3 + a_2 = 4$$

$$a_2 = 1$$

$$d = a_2 - a_1$$

$$= 1 - 3$$

$$d = -2$$



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

CBSE 2017

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

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

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

$$a-4d=0 \quad (1)$$

$$a=4d //$$

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

$$\frac{S_5}{S_{10}} = \frac{\frac{5}{2}[2a+4d]}{\frac{10}{2}[2a+9d]} = \frac{1}{2} \left[ \frac{2a+4d}{2a+9d} \right]$$

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

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

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



#01

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

$a = 2$   
 $d = 4$

let, no. of terms =  $n$ .

$\Rightarrow$   $a_n = x$   
 $S_n = 1800$

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

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

$S_n = 1800$

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

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

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

$4n^2 = 3600$

$n^2 = \frac{3600}{4}$

$n^2 = 900$

$n = \pm \sqrt{900}$

$n = 30$

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

$2 + (29)4 = x$

$118 = x$

Ans

HOT

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

$$\begin{aligned} a &= 1 \\ d &= 3 \end{aligned}$$

Let, no. of terms =  $n$ .

$$\begin{aligned} a_n &= x \\ S_n &= 287 \end{aligned}$$

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

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

$$S_n = 287$$

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

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

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

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

**A** 36

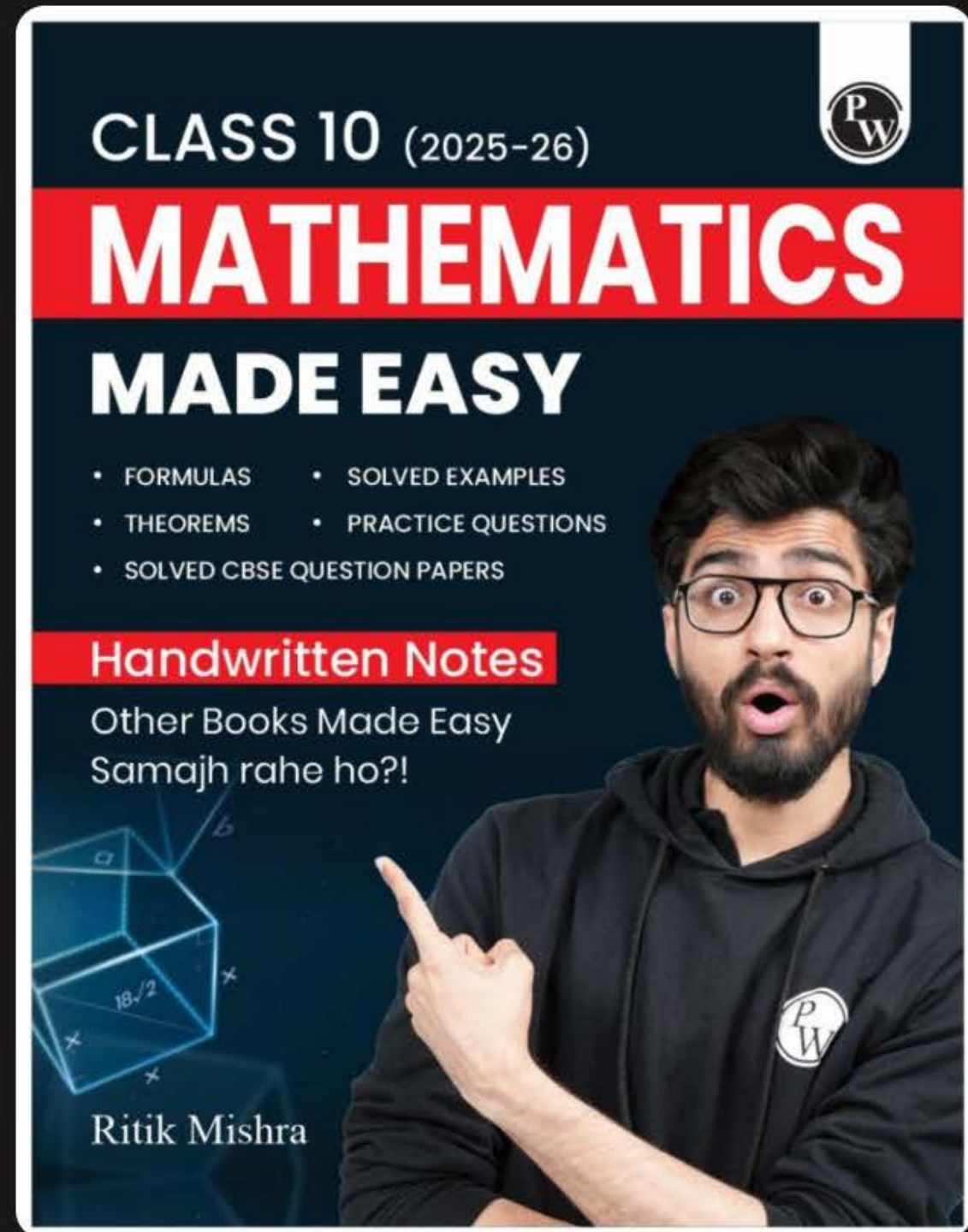
**B** 38

**C** 40

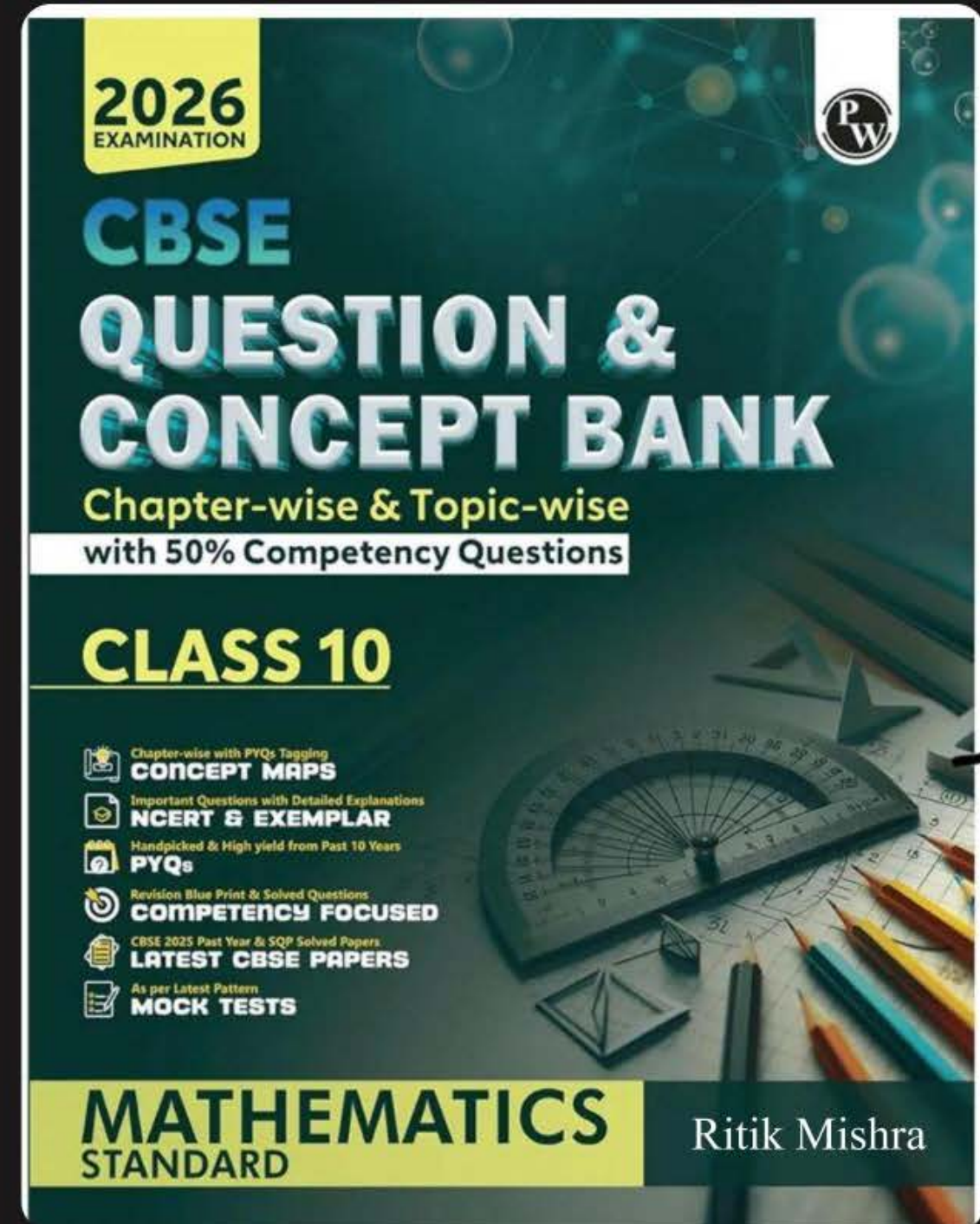
**D** 42



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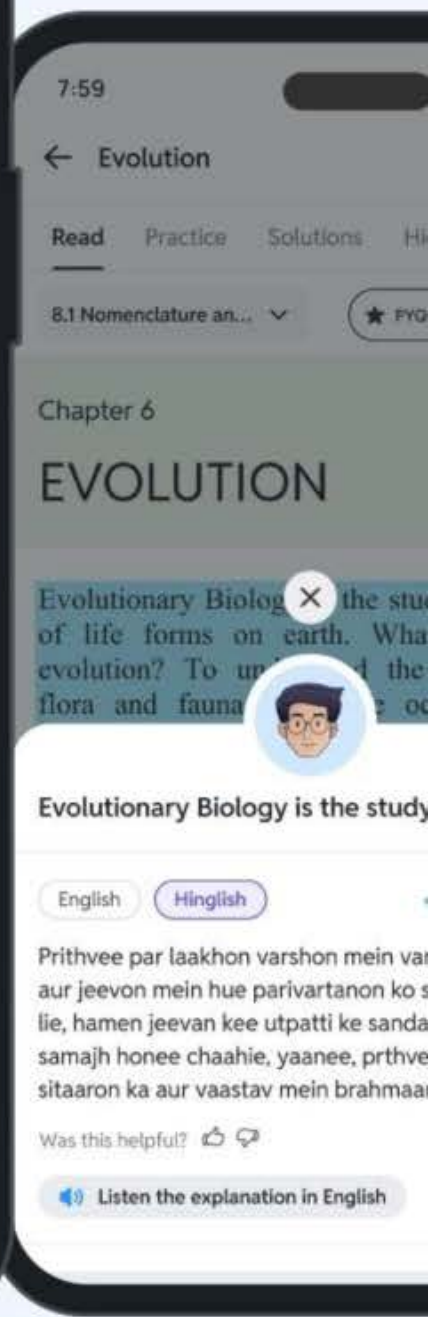
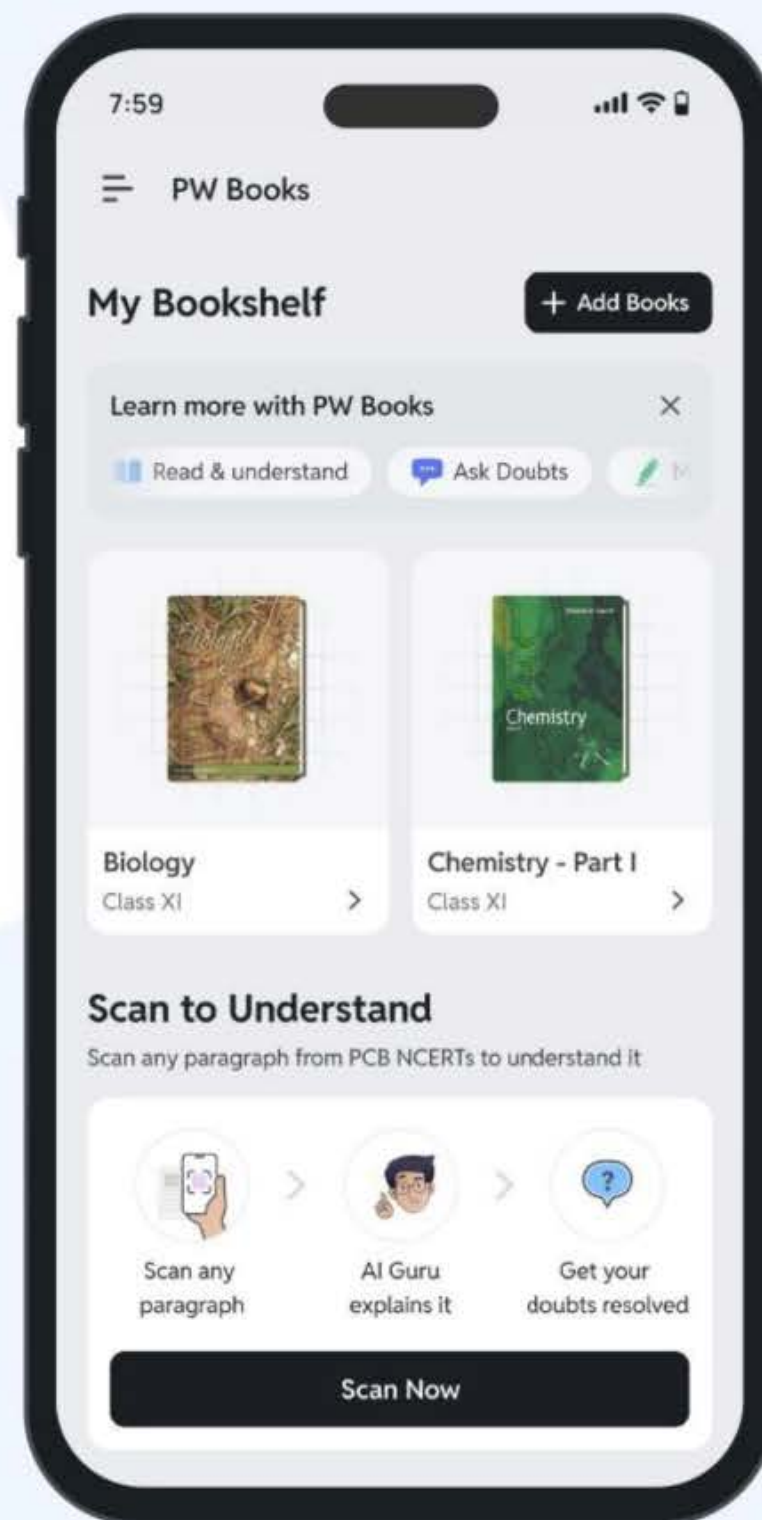
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# RITIK SIR

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