

UPDAAN



2025

Arithmetic Progression

Mathematics

Lecture - 07

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Topics

to be covered

Application Based Questions

NCERT Miscellaneous Exercise Question



WORK HARD

DREAM BIG

NEVER GIVE UP !!



Topic : Application Based



#Q. A manufacturer of TV sets produced 600 units in the third year and 700 units in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find the production in [NCERT]

- (i) The first year — a
- (ii) The 10th year — a_{10}
- (iii) 7 years — S_7

Production in third year = 600 units.

" " Seventh " = 700 units

$a_1, a_2, a_3, a_4, \dots$

$$a_3 = 600$$

$$a_7 = 700$$

$$a + 2d = 600$$

$$a + 6d = 700$$

$a, d //$

#Q. In a flower bed there are 23 rose plants in the first row, twenty one in the second row, nineteenth in the third row and so on. There are five plants in the last row. How many rows are there in the flower bed? [NCERT]

23, 21, 19, 17, ... (5) → position.
 a_1, a_2, a_3, a_4

Let $a_n = S$.

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

$$23 + (n-1)(-2) = S$$

$$(n-1) \cdot 2 = -18$$

$$n-1=9$$

$$n=10$$

$$a_{10} = S$$

last term.

Total no. of rows = 10

Topic : Application Based



#Q. A contract on construction job specifies a penalty for delay of completion beyond a certain date as follows: ₹ 200 for the first day, ₹ 250 for the second day, ₹ 300 for the third day, etc., the penalty for each succeeding day being ₹ 50 more than for the preceding day. How much money the contractor has to pay as penalty, if he has delayed the work by 30 days?

200, 250, 300, 350 . . .

$$a = 200$$

$$d = 50$$

$$S_{30} = 16$$

Topic : Application Based



#Q. A sum of ₹ 700 is to be used to give seven cash prizes to students of a school for their overall academic performance. If each prize is ₹ 20 less than its preceding prize, find the value of each of the prizes.

let, Ist prize = x

IInd prize = $x - 20$

IIIrd prize = $x - 20 - 20 = x - 40$

⋮

$x, x - 20, x - 40, \dots$

This forms an A.P.

$a = x$

$d = x - 20 - x = -20$

$$S_7 = 700$$

$$\frac{7}{2} [2x + 6d] = 700 //$$

$$\frac{7}{2} [2a + 6d] = 200$$

$$2a + 6d = \frac{200 \times 2}{7}$$

$$2(x) + 6(-20) = 200$$

$$2x - 120 = 200$$

$$2x = 320$$

$$x = 160$$

6
60, 160, 140, 120,
100, 80, 60, 40

Ans,

25



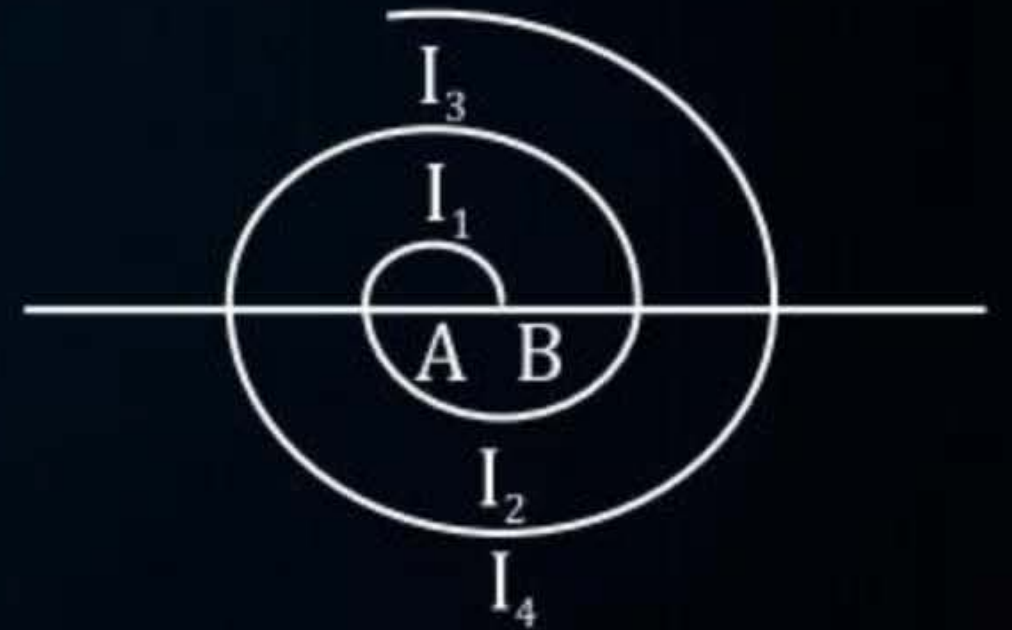
#Q. A spiral is made up of successive semicircles, with centres alternately at A and B, starting with centre at A of radii 0.5 cm, 1.0 cm, 1.5 cm, 2.0 cm,
As shown in figure. What is the total length of such a spiral made up of thirteen consecutive semicircles? (Take $\pi = 22/7$). [NCERT]

Sum of 13 semi-circles.

$$I_1 + I_2 + I_3 + \dots + I_{13}$$

$$\pi r_1 + \pi r_2 + \pi r_3 + \dots + \pi r_{13}$$

$$\pi [r_1 + r_2 + r_3 + \dots + r_{13}]$$



$$\frac{22}{7} [0.5 + 1.0 + 1.5 \dots \dots \dots]$$

$$\frac{22}{7} \times S_{13}$$

$$= \frac{22}{7} \times \frac{13}{2} [2a + 12d]$$

$$= \frac{22}{7} \times \frac{13}{2} [2(0.5) + 12(0.5)]$$

$$= \overset{11}{\cancel{\frac{22}{7}}} \times \frac{13}{\cancel{2}} \times \cancel{2} = \boxed{143\text{cm}} \text{ Ans,}$$



Topic : Application Based



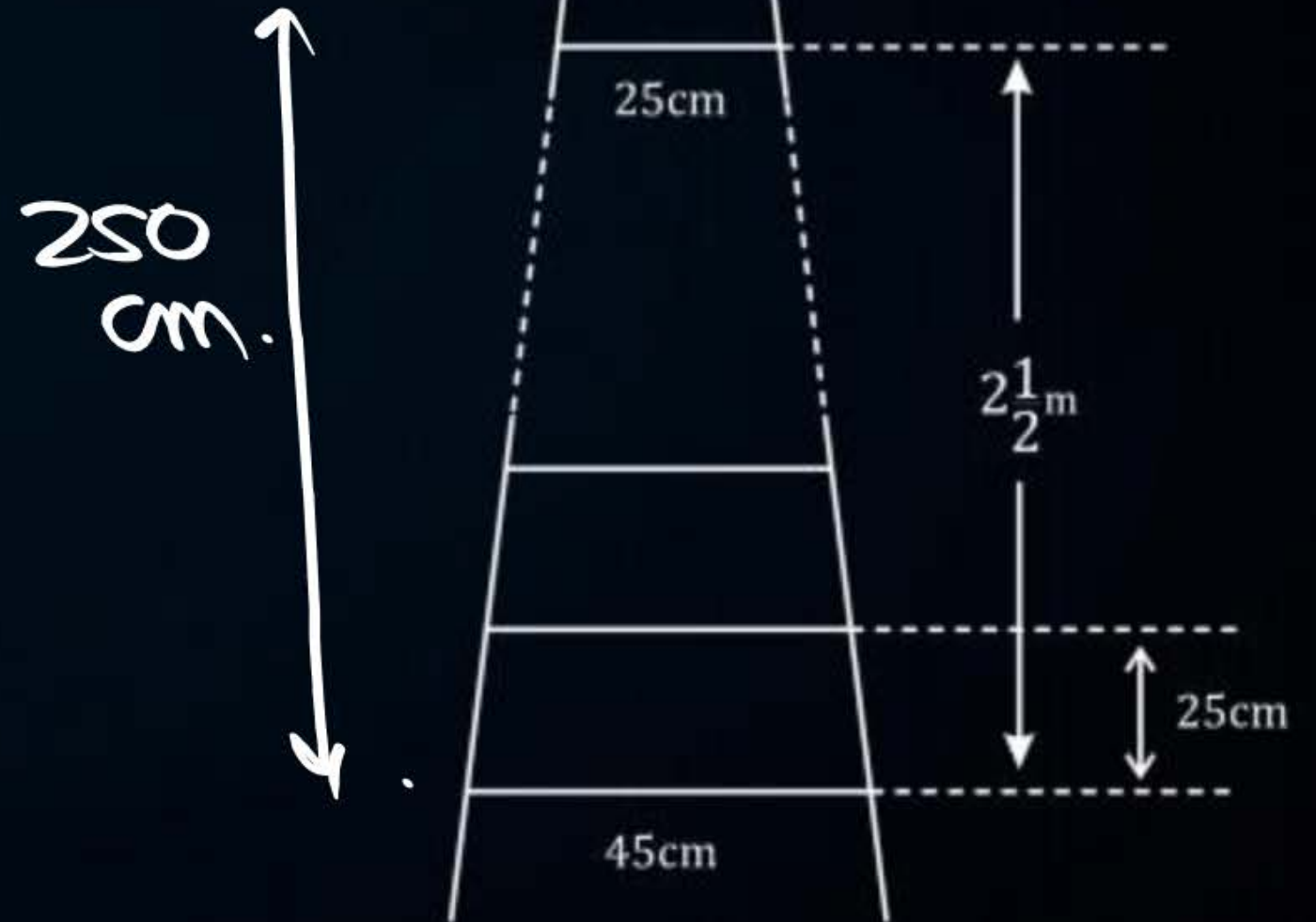
#Q. A ladder has rungs 25 cm apart. (see fig.). The rungs decrease uniformly in length from 45 cm at the bottom to 25 cm at the top. If the top and the bottom rungs are $2\frac{1}{2}$ m apart, what is the length of the wood required for the rungs?

Length of rungs is an A.P.

$$2\frac{1}{2} \text{ m} = \frac{5}{2} \text{ m}$$

$$= \frac{5}{2} \times 100 \text{ cm}$$

$$= 250 \text{ cm}$$



$$\text{no of rungs} = \frac{250}{25} + 1$$

$$= 10 + 1$$

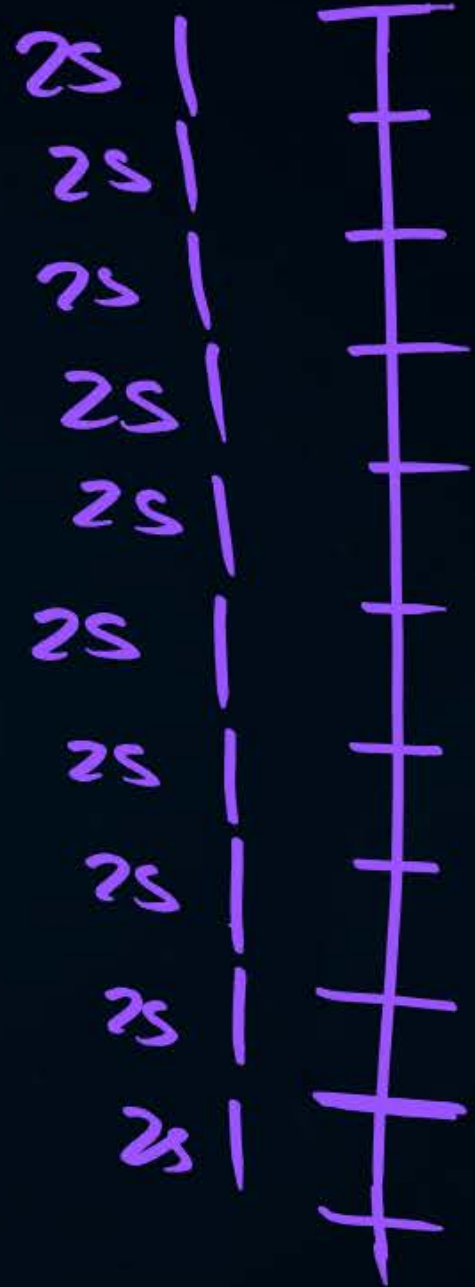
$$45, \text{---}, \text{---}, \text{---}, \text{---}, \dots = \textcircled{11}$$

Sum of length of 11 rungs.

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

$$S_{11} = \frac{11}{2} [45 + 25]$$

$$S_{11} = 385 \text{ cm}$$



250 cm

Topic : Application Based



#Q. In a potato race, a bucket is placed at the starting point, which is 5 m from the first potato, and the other potatoes are placed 3 m apart in a straight line. There are ten potatoes in the line (see Fig.).



A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops it in the bucket, runs back to pick up the next potato, runs to the bucket to drop it in, and she continues in the same way until all the potatoes are in the bucket. What is the total distance the competitor has to run?

10, 16, 22, 28, 34 - - - - - 510

#Q. The n^{th} term of an A.P., the sum of whose n terms is S_n , is

A $S_n + S_{n-1}$

B $S_n - S_{n-1}$

C $S_n + S_{n+1}$

D $S_n - S_{n+1}$

$$a_1 + a_2 + a_3 + \dots + a_{n-1} + a_n$$

$$a_{10} = S_{10} - S_9$$

$$a_{11} = S_{11} - S_{10}$$

$$a_{25} = S_{25} - S_{24}$$

$$a_n = S_n - S_{n-1}$$

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

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

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

#Q. The houses of a row are numbered consecutively from 1 to 49. Show that there is a value of x such that the sum of the numbers of the houses preceding the house numbered x is equal to the sum of the numbers of the houses following it. Find this value of x .

1, 2, 3, 4, 5, ..., $x-1$, x , $x+1$, ..., 49.

$$S_{x-1} = S_{49} - S_x$$

$$\frac{x-1}{2} [2a + (x-1-1)d] = \frac{49}{2} [2a + 48d] - \frac{x}{2} [2a + (x-1)d]$$

$$\frac{x-1}{2} [2 + x-2] = \frac{49}{2} [2 + 48] - \frac{x}{2} [2 + x-1]$$

$$\left(\frac{x-1}{2}\right)x = \frac{49 \times 50}{2} - \frac{x}{2}(x+1)$$

$$\frac{x}{2}(x-1) + \frac{x}{2}(x+1) = 49 \times 50$$

$$\frac{x}{2} [x-1 + x+1] = 49 \times 50$$

$$\frac{x \cancel{x-1} + x \cancel{x+1}}{2} = 49 \times 50$$

$$x^2 = 49 \times 50$$

$$x = \pm \sqrt{49 \times 50}$$

$$x = 7 \times 5$$

$$x = 35$$



$$1 + 2 + 3 + 4 + \dots + 34 + 35 + 36 + 37 + \dots + 49.$$



$=$



$$1+2+3+4+5+6+7+8+9+\dots+40$$

$$a=1$$

$$d=1$$

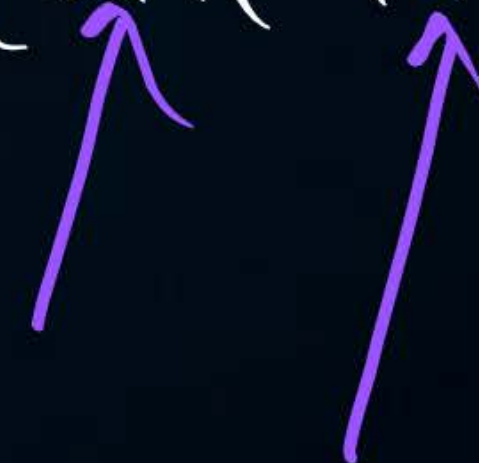
$$S_{40} = \frac{40}{2} [2a + 39d]$$



#Q. Find the sum of n terms of the series.

$$\left(4 - \frac{1}{n}\right) + \left(4 - \frac{2}{n}\right) + \left(4 - \frac{3}{n}\right) + \dots$$

H.W

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




Homework



DPPIs



THANK
YOU

