

13

We can get the AP as
8, 16, 24, ... 120.

$$a=8, d=8, a_n=120, n=15$$

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

$$S_n = \frac{15}{2} [16 + 14 \times 8]$$

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

$$S_n = 960$$

$$\therefore S_n = 960$$

14) The sum of odd no.'s between 0 and 50 can be represented by A.P. as

1, 3, 5, ..., 49

Here, $a=1$, $d = \frac{a_2 - a_1}{3 - 1} = \frac{3 - 1}{2} = 2$, $a_n = 49$, $n =$

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

$$49 = 1 + (n-1)2$$

$$49 - 1 = (n-1)2$$

$$\frac{48}{2} = n - 1 \Rightarrow n = \frac{48 + 2}{2}$$

$$n = \frac{50}{2}$$

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

$$49 = 1 + (n-1)2$$

$$\frac{48}{2} = (n-1)$$

$$n = 24 + 1$$

$$\therefore n = 25$$

$$S_n = \frac{n}{2} (a + l)$$

$$S_n = \frac{25}{2} (1 + 49)$$

$$S_n = \frac{25}{2} \times 50$$

$$S_n = 25 \times 25, \text{ which is}$$

$$\therefore S_n = 625$$

(15) The penalty for delay in completion of the construction work = ₹200 for 1st day.

The penalty given by construction workers due to delay in 2nd day = ₹250

The penalty given for construction work due to day in 3rd day = ₹300.

The penalty in each succeeding day is more than the preceding day by = ₹50

The amount of money paid for delaying 30 days =

A/Q

Here, $a = 200$, $d = 50$, $n = 30$, $S_n = ?$

$$S_{30} = \frac{30}{2} [2 \times 200 + (30 - 1) 50]$$

$$S_{30} = 15 [400 + (29 \times 50)]$$

$$S_{30} = 15 [400 + 1450] \Rightarrow S_{30} = 15 \times 1850$$

$$S_{30} = 15 \times 1850 = ₹27,750$$

So, the sum of amount paid by the workers for delaying of 30 days is = ₹27,750.

(16) The sum of amount of money for prizes (Sn) = ₹ 700.

The no. of cash prizes to be given to students (n) = 7

Each prize is 20 less than the preceding, so here $d = (-20)$

The value of each prizes =

Given that, $S_7 = 700$

$$\Rightarrow \frac{7}{2} [2a + (7-1)d] = 700$$

$$\Rightarrow [2a + (6)(-20)] = 100$$

$$\Rightarrow a + 3(-20) = 100$$

$$\Rightarrow a - 60 = 100$$

$$\Rightarrow a = 160$$

So, the AP is - 160, 140, 120, 100, 80, 60, 40.

Therefore the value of each of prizes was - ₹ 160, ₹ 140, ₹ 120, ₹ 100, ₹ 80, ₹ 60, ₹ 40.

(17) It can be observed that the number of trees planted by the students is in a A.P.

1, 2, 3, 4, 5, ... 12.

$$a = 1, d = 2 - 1 = 1, S_n = ?, n = 12$$

We know that,

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

$$S_{12} = \frac{12}{2} [2(1) + (12-1)(1)]$$

$$S_{12} = 6(2+11)$$

$$\textcircled{6} S_{12} = 6(13)$$

$$\therefore S_{12} = 78$$

Therefore, no. of trees planted by 1 section of the classes = 78.

No. of trees planted by 3 sections of the classes = $3 \times 78 = 234$.

Therefore, ~~no.~~ 234 trees will be planted by the students.

(18) Semi-perimeter of circle = πr
 $l_1 = \pi (0.5) = \frac{\pi}{2} \text{ cm}$

$$l_2 = \pi (1) = \pi \text{ cm}$$

$$l_3 = \pi (1.5) = \frac{3\pi}{2} \text{ cm}$$

So, AP - $\frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi, \dots$

$$a = \frac{\pi}{2}, d = \pi - \frac{\pi}{2} = \frac{\pi}{2}, n = 13, S_{13} = ?$$

We know that,

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

$$S_{13} = \frac{13}{2} \left[2 \left(\frac{\pi}{2} \right) + (13-1) \left(\frac{\pi}{2} \right) \right]$$

$$= \frac{13}{2} \left[\pi + \frac{12\pi}{2} \right]$$

$$= \left(\frac{13}{2} \right) (7\pi)$$

$$= \frac{91\pi}{2} = \frac{91 \times 22}{2 \times 7} = 13 \times 11 = 143$$

Therefore, the length of such spiral of thirteen consecutive semi-circles will be 143 cm.

(19)

It can be observed that the no. of logs in rows are in an A.P.

$$20, 19, 18, \dots$$

$$a_1 = 20, d = (-1), S_n = ?$$

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

$$\Rightarrow 200 = \frac{n}{2} [2(20) + (n-1)(-1)]$$

$$\Rightarrow 400 = n(40 - n + 1)$$

$$\Rightarrow 400 = n(41 - n)$$

$$\Rightarrow 400 = 41n - n^2 \Rightarrow n^2 - 41n + 400 = 0$$

$$\Rightarrow n^2 - 16n - 25 + 400 = 0$$

$$\Rightarrow n(n-16) - 25(n-16) = 0$$

$$\Rightarrow (n-16)(n-25) = 0$$

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

$$a_{16} = 30 + (16-1)d$$

$$a_{16} = 20 - 15$$

$$a_{16} = 5$$

Similarly,

$$a_{25} = 30 + (25-1)d$$

$$a_{25} = 20 - 24$$

$$a_{25} = 1 - 4$$

Therefore, 200 logs can be placed in 16 rows and the number of logs in the 16th row is 5.

20 The distance of potatoes are as follows:-
5, 8, 11, 14, ...

It can be observed that these distances are in A.P.

$$a = 5, \quad d = 8 - 5 = 3$$

~~$$d = 8 - 5 = 3$$~~

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

$$S_{10} = \frac{10}{2} [2(5) + (10-1)3] = 5[10 + 27]$$

$$S_{10} = 5(10 + 27) = 5(37) = 185$$

∴ Therefore, total distance that the competitor will run = 2×185
= 370 m.