MATHEMATICS

Important Questions

Multiple Choice questions-

1. The n^{th} term of an A.P. is given by an = 3 + 4n. The common difference is

(a) 7

(b) 3

(c) 4

(d) 1

2. If p, q, r and s are in A.P. then r – q is

(a) s – p

(b) s – q

(c) s – r

(d) none of these

3. If the sum of three numbers in an A.P. is 9 and their product is 24, then numbers are

(a) 2, 4, 6

(b) 1, 5, 3

(c) 2, 8, 4

(d) 2, 3, 4

4. The $(n – 1)^{th}$ term of an A.P. is given by 7,12,17, 22,… is

(a) 5n + 2

(b) 5n + 3

(c) 5n – 5

(d) 5n – 3

5. The n^{th} term of an A.P. 5, 2, -1, -4, -7 … is

(a) 2n + 5

(b) $2n - 5$

(c) $8 - 3n$

(d) $3n - 8$

6. The 10th term from the end of the A.P. -5, -10, -15,…, -1000 is

(a) -955

(b) -945

(c) -950

(d) -965

7. Find the sum of 12 terms of an A.P. whose nth term is given by $a_n = 3n + 4$

(a) 262

(b) 272

(c) 282

(d) 292

8. The sum of all two digit odd numbers is

(a) 2575

(b) 2475

(c) 2524

(d) 2425

9. The sum of first n odd natural numbers is

(a) $2n^2$

(b) $2n + 1$

(c) $2n - 1$

(d) n^2

10. The number of multiples lie between n and n^2 which are divisible by n is

(a) n + 1

(b) n

(c) n – 1

(d) n – 2

Very Short Questions:

1. Which of the following can be the n^{th} term of a_n AP?

$4n + 3, 3n^2 + 5, n^2 + 1$ give reason.

2. Is 144 a term of the AP: 3, 7, 11, …? Justify your answer.

3. The first term of a_n AP is p and its common difference is q. Find its 10^{th} term.

4. For what value of k: 2k, k + 10 and 3k + 2 are in AP?

5. If $a_n = 5 - 11n$, find the common difference.

6. If n^{th} term of an AP is $\frac{3+n}{4}$ find its 8^{th} term.

7. For what value of p are 2p + 1, 13, 5p – 3, three consecutive terms of AP?

8. In a_n AP, if d = -4, n = 7, a, = 4 then find a.

9. Find the 25^{th} term of the AP: $-5, \frac{-5}{2}, 0, \frac{-5}{2}$

10. Find the common difference of an AP in which $a_{18} - a_{14} = 32$.

Short Questions :

1. In which of the following situations, does the list of numbers involved to make an AP? If yes, give a reason.

(i) The cost of digging a well after every meter of digging, when it costs 150 for the first meter and rises by 50 for each subsequent meter.

(ii) The amount of money in the account every year, when 10,000 is deposited at simple interest at 8% per annum.

2. Find the 20^{th} term from the last term of the AP: 3, 8, 13, …, 253.

3. If the sum of the first p terms of an AP is $ap^2 + bp$, find its common difference.

4. The first and the last terms of an AP are 5 and 45 respectively. If the sum of all its terms is 400, find its common difference.

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

6. Which term of the AP: 3, 8, 13, 18, … , is 78?

7. Find the 31^{st} term of an AP whose 11^{th} term is 38 and the 16^{th} term is 73.

8. An AP consists of 50 terms of which 3^{rd} term is 12 and the last term is 106. Find the 29^{th} term.

9. If the 8^{th} term of an AP is 31 and the 15^{th} term is 16 more than the 11^{th} term, find the AP.

10. Which term of the arithmetic progression 5, 15, 25, …. will be 130 more than its 31^{st} term?

Long Questions :

1. The sum of the 4^{th} and 8^{th} term of an AP is 24 and the sum of the 6^{th} and 10^{th} term is 44. Find the first three terms of the AP.

2. The sum of the first n terms of an AP is given by $s_n = 3n^2 - 4n$. Determine the AP and the 12^{th} term.

3. Divide 56 into four parts which are in AP such that the ratio of product of extremes to the product of means is 5 : 6.

4. In an AP of 50 terms, the sum of first 10 terms is 210 and the sum of its last 15 terms is 2565. Find the AP.

5. If s, denotes the sum of the first n terms of an AP, prove that $s_{30} = 3 (s_{20} - s_{10})$.

6. A thief runs with a uniform speed of 100 m/minute. After one minute a policeman runs after the thief to catch him. He goes with a speed of 100 m/minute in the first minute and increases his speed by 10 m/minute every succeeding minute. After how many minutes the policeman will catch the thief?

7. The houses in a row are numbered consecutively from 1 to 49. show that there exists a value of X such that sum of numbers of houses preceeding the house numbered X is equal to sum of the numbers of houses following X. Find value of X.

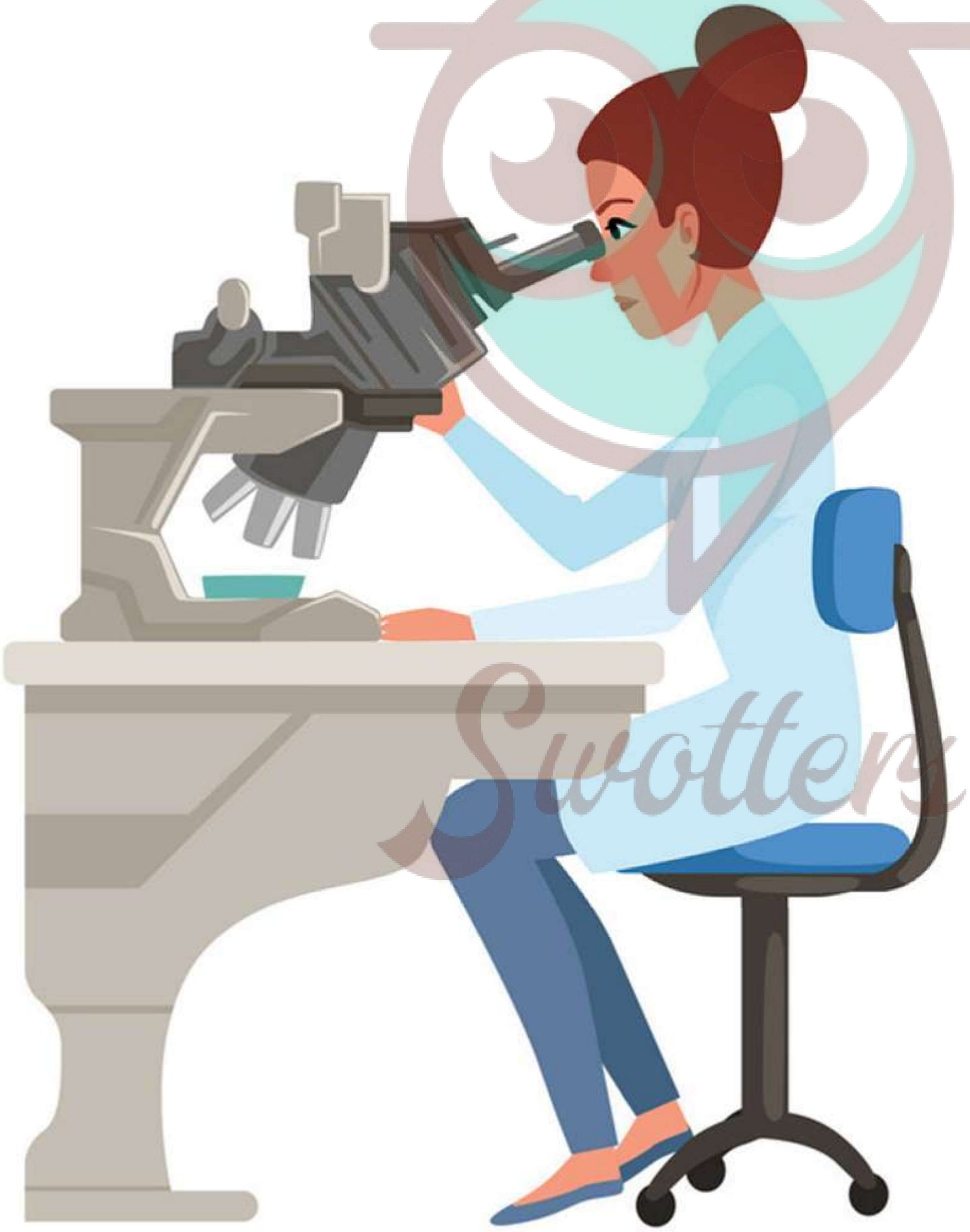
8. If the ratio of the 11^{th} term of an AP to its 18^{th} term is 2:3, find the ratio of the sum of the first five terms to the sum of its first 10 terms.

9. Find the sum of the first 15 multiples of 8.

10. Find the sum of all two digit natural numbers which when divided by 3 yield 1 as remainder.

Case Study Questions:

1. In a pathology lab, a culture test has been conducted. In the test, the number of bacteria taken into consideration in various samples is all 3-digit numbers that are divisible by 7, taken in order.



On the basis of above information, answer the following questions

i. How many bacteria are considered in the fifth sample?

a. 126
b. 140
c. 133
d. 149

ii. How many samples should be taken into consideration?

a. 129
b. 128
c. 130
d. 127

iii. Find the total number of bacteria in the first 10 samples.

a. 1365
b. 1335
c. 1302
d. 1540

iv. How many bacteria are there in the 7^{th} sample from the last?

a. 952
b. 945
c. 959
d. 966

v. The number of bacteria in 50^{th} sample is?

a. 546
b. 553
c. 448
d. 496

2. In a class the teacher asks every student to write an example of A.P. Two friends Geeta and Madhuri write their progressions as -5, -2, 1, 4,..... and 187, 184, 181, ... respectively. Now, the teacher asks various students of the class the following questions on these two progressions. Help students to find the answers of the questions.

i. Find the 34th term of the progression written by Madhuri.

a. 86
b. 88
c. -99
d. 190

ii. Find the sum of common difference of the two progressions.

a. 6
b. -6
c. 1
d. 0

iii. Find the 19th tenn of the progression written by Geeta.

a. 49
b. 59
c. 52
d. 62

iv. Find the sum of first 10 terms of the progression written by Geeta.

a. 85
b. 95

c. 110
d. 200

v. Which term of the two progressions will have the same value?

a. 31
b. 33
c. 32
d. 30

Assertion Reason Questions-

1. **Directions:** In the following questions, A statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as.

a. Both A and R are true and R is the correct explanation for A.

b. Both A and R are true and R is the correct explanation for A.

c. A is true but R is false.

d. A is false but R is true.

Assertion: 184 is the 50^{th} term of the sequence 3, 7, 11, ………..

Reason: The nth term of A.P. is given by $a_n = a + (n – 1)d$

2. **Directions:** In the following questions, A statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as.

a. Both A and R are true and R is the correct explanation for A.

b. Both A and R are true and R is the correct explanation for A.

c. A is true but R is false.

d. A is false but R is true.

Assertion: The nth term of A.P. is given by $a_n = a + (n – 1)d$

Reason: Common difference of the A.P. a, a + d, a + 2d, …….., is given by d = 2^{nd} term – 1^{st} term.

Answer Key-

Multiple Choice questions-

1. (b) -10
2. (c) 4
3. (c) s – r
4. (d) 2, 3, 4
5. (d) 5n – 3
6. (c) 8 – 3n
7. (a) -955
8. (a) 262
9. (b) 2475
10. (d) n^2
11. (d) n – 2

Very Short Answer :

1. 4n + 3 because n^{th} term of an AP can only be a linear relation in n as $a_n = a + (n - 1)d$.

2. No, because here a = 3 a_n odd number and d = 4 which is even. so, sum of odd and even mus be odd whereas 144 is an even number.

3. 210 = a + 9d = p + 99.

4. Given numbers are in AP

   ∴ (k + 10) – 2k = (3k + 2) – (k + 10)

   ⇒ -k + 10 = 2k – 8 or 3k = 18 or k = 6.

5. We have $a_n = 5 - 11n$

   Let d be the common difference

   $d = a_{n+1} - an$

   = 5 – 11(n + 1) – (5 – 11n)

= 5 – 11n – 11 -5 + 11n = -11

6.

$$a_n = \frac{3+n}{4}; \qquad \text{So,} \quad a_8 = \frac{3+8}{4} = \frac{11}{4}$$

7. since 20 + 1, 13, 5p – 3 are in AP.

∴ second term – First term = Third term – second term

⇒ 13 – (2p + 1) = 5p – 3 – 13

⇒ 13 – 2p – 1 = 5p – 16

⇒ 12 – 2p = 5p – 16

⇒ -7p = – 28

⇒ p = 4

8. We know, an = a + (n – 1)d

Putting the values given, we get

⇒ 4 = a + (7 – 1)(-4) or a = 4 + 24

⇒ a = 28

9. Here, a = -5, b = $\frac{-5}{2}$ – (-5) = $\frac{5}{2}$

We know,

a_{25} = a + (25 – 1)d

= (-5) + 24 $\left(\frac{5}{2}\right)$ = -5 + 60 = 55

10. Given, $a_{18} - a_{14}$ = 32

⇒ (a + 17d) – (a + 13d) = 32

⇒ 17d – 13d = 32 or d = $\frac{32}{4}$

Short Answer :

1. (i) The numbers involved are 150, 200, 250, 300, …

Here 200 -150 = 250 – 200 = 300 – 250 and so on

∴ It forms a_n AP with a = 150, d = 50

(ii) The numbers involved are 10,800, 11,600, 12,400, …

which forms an AP with a = 10,800 and d = 800.

2. We have, last term = 1 = 253

And, common difference d = 2nd term – 1st term = 8 – 3 = 5

Therefore, 20th term from end = 1 -(20 – 1) × d = 253 – 19 × 5 = 253 – 95 = 158.

3. $a_p = s_p - s_{p-1} = (ap^2 + bp) - [a(p-1)^2 + b(p-1)]$

$= ap^2 + bp - (ap^2 + a - 2ap + bp - b)$

$= ap^2 + bp - ap^2 - a + 2ap - bp + b = 2ap + b - a$.

$= a_1 = 2a + b - a = a + b$ and $a_2 = 4a + b - a = 3a + b$

$\Rightarrow d = a_2 - a_1 = (3a + b) - (a + b) = 2a$

4. Let the first term be ‘a’ and common difference be ‘d’.

Given, a = 5, $T_n = 45$, $s_n = 400$.

Tn = a + (m – 1)d

$\Rightarrow 45 = 5 + (m - 1)d$

$\Rightarrow (n - 1)\, d = 40$ ………(i)

$s_n = \frac{n}{2}(a + T_n)$

$\Rightarrow 400 = \frac{n}{2}(5 + 45)$

$\Rightarrow n = 2 \times 8 = 16$ substituting the value of n in (i)

$\Rightarrow (16 - 1)d = 40$

$\Rightarrow d = \frac{40}{15} = \frac{8}{3}$

5. Natural numbers between 101 and 999 divisible by both 2 and 5 are 110, 120, … 990.

so, a1 = 110, d = 10, $a_n = 990$

We know, $a_n = a_1 + (n - 1)d$

$990 = 110 + (n - 1)\ 10$

$(n - 1) = \frac{990-11}{10}$

$\Rightarrow n = 88 + 1 = 89$

6. Let a_n be the required term and we have given AP

3, 8, 13, 18, ...

Here, $a = 3$, $d = 8 - 3 = 5$ and $a_n = 78$

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

$\Rightarrow 78 = 3 + (n - 1)\ 5$

$\Rightarrow 78 - 3 = (n - 1) \times 5$

$\Rightarrow 75 = (n - 1) \times 5$

$\Rightarrow \frac{75}{5} = n - 1$

$\Rightarrow 15 = n - 1$

$\Rightarrow n = 15 + 1 = 16$

Hence, 16^{th} term of given AP is 78.

7. Let the first term be a and common difference be d.

Now, we have

$a_{11} = 38 \Rightarrow a + (11 - 1)d = 38$

$\Rightarrow a + 10d = 38$ ...(i)

and $a_{16} = 73 \Rightarrow a + (16 - 1)d = 73$

$\Rightarrow a + 15d = 73$ ...(ii)

Now subtracting (ii) from (i), we have

Now, $a + 10d = 38$

$\underline{-a \ {}^{-}+ 15d \ {}^{-}= 73}$

$-5d = -35$ or $5d = 35$

$\therefore \quad d = \frac{35}{5} = 7$

Putting the value of d in equation (i), we have

$a + 10 \times 7 = 38$

$\Rightarrow a + 70 = 38$

$\Rightarrow a = 38 - 70$

$\Rightarrow a = -32$

We have, $a = -32$ and $d = 7$

Therefore, $a_{31} = a + (31 - 1)d$

$\Rightarrow a_{31} = a + 30d$

$\Rightarrow (-32) + 30 \times 7$

$\Rightarrow -32 + 210$

$= a_{31} = 178$

8. Let a be the first term and d be the common difference.

since, given AP consists of 50 terms, so n = 50

$a_3 = 12$

$\Rightarrow a + 2d = 12$ ...(i)

Also, $a_{50} = 106$

$\Rightarrow a + 490 = 106$ ... (ii)

subtracting (i) from (ii), we have

$47d = 94$

$\Rightarrow d = \frac{94}{47} = 2$

Putting the value of d in equation (i), we have

$a + 2 \times 2 = 12$

$\Rightarrow a = 12 - 4 = 8$

Here, $a = 8$, $d = 2$

∴ 29th term is given by

$a_{29} = a + (29 – 1)d = 8 + 28 \times 2$

$\Rightarrow a_{29} = 8 + 56$

$\Rightarrow a_{29} = 64$

9. Let a be the first term and d be the common difference of the AP.

We have, $a_8 = 31$ and $a15 = 16 + a_{11}$

$\Rightarrow a + 7d = 31$ and $a + 14d = 16 + a + 10d$

$\Rightarrow a + 7d = 31$ and $4d = 16$

$\Rightarrow a + 7d = 31$ and $d = 4$

$\Rightarrow a + 7 \times 4 = 31$

$\Rightarrow a + 28 = 31$

$\Rightarrow a = 3$

Hence, the AP is a, a + d, a + 2d, a + 3d.....

i.e., 3, 7, 11, 15, 19, …

10. We have, a = 5 and d = 10

$\therefore a_{31} = a + 30d = 5 + 30 \times 10 = 305$

Let nth term of the given AP be 130 more than its 31^{st} term. Then,

$a_n = 130 + a_{31}$

$\therefore a + (n – 1)d = 130 + 305$

$\Rightarrow 5 + 10(n – 1) = 435$

$\Rightarrow 10(n – 1) = 430$

$\Rightarrow n – 1 = 43$

$\Rightarrow n = 44$

Hence, 44^{th} term of the given AP is 130 more than its 31^{st} term.

Long Answer :

1. We have, $a_4 + a_8 = 24$

$\Rightarrow a + (4 - 1)d + a + (8 - 1) d = 24$

$\Rightarrow 2a + 3d + 7d = 24$

$\Rightarrow 2a + 10d = 24$

$\Rightarrow 2(a + 5d) = 24$

$\therefore a + 5d = 12$

and, $a_6 + a_{10} = 44$

$\Rightarrow a + (6 - 1)d + a + (10 - 1) d = 44$

$\Rightarrow 2a + 5d + 9d = 44$

$\Rightarrow 2a + 14d = 44$

$\Rightarrow a + 7d = 22$

subtracting (i) from (ii), we have

$2d = 10$

$$\therefore d = \frac{10}{2} = 5$$

Putting the value of d in equation (i), we have

$a + 5 \times 5 = 12$

$\Rightarrow a = 12 - 25 = -13$

Here, $a = -13$, $d = 5$

Hence, first three terms are

$-13, -13, + 5, -13 + 2 \times 5$ i.e., $-13, -8, -3$

2. We have, $s_n = 3n^2 - 4n$ ...(i)

Replacing n by $(n - 1)$, we get

$s_{n-1} = 3(n - 1)^2 - 4(n - 1)$ ....(ii)

We know, .

$a_n = s_n - s_{n-1} = \{3n^2 - 4n\} - \{3(n-1)^2 - 4(n-1)\}$.

$= \{3n^2 - 4n\} - \{3n^2 + 3 - 6n - 4n + 4\}$

$= 3n^2 - 4n - 3n^2 - 3 + 6n + 4n - 4 = 6n - 7$

so, nth term an = 6n – 7

To get the AP, substituting n = 1, 2, 3... respectively in (iii), we get

$a_1 = 6 \times 1 - 7 = -1$,

$a_2 = 6 \times 2 - 7 = 5$

$a_3 = 6 \times 3 - 7 = 11$,...

Hence, AP is – 1,5, 1:1, ...

Also, to get 12th term, substituting n = 12 in (iii), we get

$a_{12} = 6 \times 12 - 7 = 72 - 7 = 65$

3. Let the four parts be a – 3d, a-d, a + d, a + 3d.

Given, (a – 3d) + (a – d) + (a + d) + (a + 3d) = 56

$\Rightarrow \quad 4a = 56 \quad \text{or} \quad a = 14$

Also, $\dfrac{(a-3d)(a+3d)}{(a-d)(a+d)} = \dfrac{5}{6}$

$\Rightarrow \quad \dfrac{a^2 - 9d^2}{a^2 - d^2} = \dfrac{5}{6} \quad \Rightarrow \quad 6(196 - 9d^2) = 5(196 - d^2) \qquad [\because a = 14]$

$\Rightarrow \quad 6 \times 196 - 54d^2 = 5 \times 196 - 5d^2$

$\Rightarrow \quad 49d^2 = 6 \times 196 - 5 \times 196 = 196$

$\Rightarrow \quad d^2 = 4 \quad \text{or} \quad d = \pm 2$

$\therefore$ Required parts are $14 - 3\times2,\ 14 - 2,\ 14+2,\ 14 + 3\times2$

or $14 - 3(-2),\ 14 + 2,\ 14 - 2,\ 14 + 3(-2)$

i.e., 8, 12, 16, 20

4. Let 'a' be the first term and 'd be the common difference.

*n*th term of AP is $a_n = a + (n-1)d$

and sum of AP is $S_n = \dfrac{n}{2}[2a + (n-1)d]$

Sum of first 10 terms $= 210 = \frac{10}{2}[2a + 9d]$

$\Rightarrow \quad 42 = 2a + 9d \quad \Rightarrow \quad 2a + 9d = 42$ ...(*i*)

15th term from the last $= (50 - 15 + 1)^{th} = 36^{th}$ term

$\Rightarrow \quad a_{36} = a + 35d$

Sum of last 15 terms $= 2565 = \frac{15}{2}[2a_{36} + (15 - 1)d]$

$\Rightarrow \quad 2565 = \frac{15}{2}[2(a + 35d) + 14d]$

$\Rightarrow \quad 2565 = 15[a + 35d + 7d]$

$\Rightarrow \quad a + 42d = 171$ ...(*ii*)

(*i*) – 2 × (*ii*), we get

$9d - 84d = 42 - 342 \quad \Rightarrow \quad 75d = 300$

$\Rightarrow \quad d = \frac{300}{75} = 4$

Putting the value of *d* in (*ii*)

$42 \times 4 + a = 171 \quad \Rightarrow \quad a = 171 - 168$

$\Rightarrow \quad a = 3$

$\Rightarrow \quad a_{50} = a + 49d = 3 + 49 \times 4 = 199$

So, the AP formed is 3, 7, 11, 15, ... and 199.

5.

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

$S_{30} = \frac{30}{2}[2a + 29d] \quad \Rightarrow \quad S_{30} = 30a + 435d$ ...(*i*)

$\Rightarrow \quad S_{20} = \frac{20}{2}[2a + 19d] \quad \Rightarrow \quad S_{20} = 20a + 190d$

$S_{10} = \frac{10}{2}[2a + 9d] \quad \Rightarrow \quad S_{10} = 10a + 45d$

$3(S_{20} - S_{10}) = 3[20a + 190d - 10a - 45d]$

$= 3[10a + 145d] = 30a + 435d = S_{30}$ [From (*i*)]

Hence, $S_{30} = 3(S_{20} - S_{10})$ Hence proved.

6. Let total time be n minutes

Total distance covered by thief = 100 n metres

Total distance covered by policeman = 100 + 110 + 120 + … + (n – 1) terms

$\therefore$ 100m = $\frac{n-1}{2}$ [100(2) + (n – 2)10]

⇒ 200n = (n – 1)(180 + 10n)

⇒ 102– 30n – 180 = 0

⇒ n2 – 3n – 18 = 0

⇒ (n-6) (n + 3) = 0

⇒ n = 6

Policeman took (n – 1) = (6 – 1) = 5 minutes to catch the thief.

7. The numbers of houses are 1, 2, 3, 4……….49.

The numbers of the houses are in AP, where a = 1 and d = 1

sum of n terms of an AP = $\frac{n}{2}$[2a + (n – 1)d]

Let X^{th} number house be the required house.

sum of number of houses preceding X^{th} house is equal to sx-1 i.e.,

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

$$S_{X-1} = \frac{X-1}{2}(2 + X - 2) \quad \Rightarrow \quad S_{X-1} = \frac{X(X-1)}{2}$$

Sum of numbers of houses following X^{th} house is equal to $S_{49} - S_X$

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

$$= \frac{49}{2}(2 + 48) - \frac{X}{2}(2 + X - 1) = \frac{49}{2}(50) - \frac{X}{2}(X + 1)$$

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

Now, we are given that

Sum of number of houses before X is equal to sum of number of houses after X.

i.e., $S_{X-1} = S_{49} - S_X$

$$\Rightarrow \quad \frac{X(X-1)}{2} = 25(49) - X\frac{(X+1)}{2} \quad \Rightarrow \quad \frac{X^2}{2} - \frac{X}{2} = 1225 - \frac{X^2}{2} - \frac{X}{2}$$

$\Rightarrow \quad X^2 = 1225 \qquad \Rightarrow \quad X = \sqrt{1225}$

$\Rightarrow \quad X = \pm 35$

since number of houses is positive integer,

∴ X = 35

8.

Given, $\frac{a_{11}}{a_{18}} = \frac{a+10d}{a+17d} = \frac{2}{3}$ [Using formula $a_n = a + (n-1)d$]

$\Rightarrow \quad 3a + 30d = 2a + 34d$

$\Rightarrow \quad a = 4d \qquad \ldots(i)$

$$\frac{S_5}{S_{10}} = \frac{\frac{5}{2}(2a+4d)}{5(2a+9d)} \qquad \left[\text{Using formula } S_n = \frac{n}{2}[2a+(n-1)d]\right]$$

$$= \frac{8d+4d}{2(8d+9d)} \qquad [\because a = 4d]$$

$$= \frac{12d}{34d} = \frac{6}{17}$$

Hence $S_5 : S_{10} = 6 : 17$.

9. The first 15 multiples of 8 are

8, 16, 24, … 120

Clearly, these numbers are in AP with first term a = 8 and common difference, d = 16 – 8 = 8

Thus, $S_{15} = \frac{15}{2}[2 \times 8 + (15-1) \times 8]$

$$= \frac{15}{2}[16 + 14 \times 8] = \frac{15}{2}[16 + 112] = \frac{15}{2} \times 128 = 15 \times 64 = 960$$

10. Two digit natural numbers which when divided by 3 yield 1 as remainder are:

10, 13, 16, 19, …, 97, which forms an AP.

with a = 10, d = 3, an = 97

an = 97 = a + (n – 1) d = 97

or 10 + (n – 1)3 = 97

⇒ (n – 1) = $\frac{87}{3}$ = 29

⇒ n = 30

Now, s_{30} = [2 × 10 + 29 × 3) = 15(20 + 87) = 15 × 107 = 1605

Case Study Answers:

1. Answer :

Here the smallest 3-digit number divisible by 7 is 105. So, the number of bacteria taken into consideration is 105, 112, 119, ... 994 So, first term (a) = 105, d = 7 and last term = 994.

i. (c) 133

Solution:

t_5 = a + 4d = 105 + 28 = 133

ii. (b) 128

Solution:

Let n samples be taken under consideration

∵ Last term = 994

⇒ a + (n - d)d = 994

⇒ 105 + (n - 1)7 = 994

⇒ n = 128

iii. (a) 1365

Solution:

Total number of bacteria in first 10 samples

$$= S_{10} = \frac{10}{2}[2(105) + 9(7)] = 1365$$

iv. (a) 952

Solution:

t_7 from end = (128 - 7 + 1) term from beginning = 122^{th} term = 105 + 121(7) = 952

v. (c) 448

Solution:

t_{50} = 105 + 49 × 7 = 448

2. Answer :

Geeta's A.P. is -5, -2, 1, 4, ... Here, first term (a_1) = -5 and conunon difference (d_1) = -2 + 5 = 3 Similar
Madhuri's A.P. is 187, 184, 181, ... Here first term (a_2) = 187 and common difference (d_2) = 184 - 187 =

i. (b) 88

Solution:

$t_{34} = a_2 + 33d_2 = 187 + 33(-3) = 88$

ii. (d) 0

Solution:

Required sum = 3 + (-3) = 0

iii. (a) 49

Solution:

$t_{19} = a_1 + 18d_1 = (-5) + 18(3) = 49$

iv. (a) 85

Solution:

$$S_{10} = \frac{n}{2}[2a_1 + (n\text{-}1)d_1] = \frac{10}{2}[2(-5) + 9(3)] = 85$$

v. (b) 33

Solution:

Let n^{th} terms of the two A.P s be equal.

$\because -5 + (n - 1)3 = 187 + (n - 1)(-3)$

$\Rightarrow 6(n - 1) = 192$

$\Rightarrow n = 33$

Assertion Reason Answer-

1. (a)Both A and R are true and R is the correct explanation for A.
2. (d) A is false but R is true.