SOLUTION KEY
S.K Solutionkey Educational Institute
*SSC *CBSE *ICSE *IIT
Navodhaya,polytechnic,Gurukula.
Above Raghavendra bakery,Thukkuguda,maheshwaram,Ph;9700320382

1) A sequence is an arrangement of numbers or objects in a definite order.

   For Example: 1, 8, 27, 64, 125 ... . .

   Above arrangement numbers are arranged in a definite order according to some rule.

2) If 'a' is the first term and 'd' the common difference of an AP, then the A.P. is

   a, a + d, a + **2**d, a + **3**d, a + **4**d. . . .

   For Example**:** If AP is 2, 4, 6, 8,... Then first term a=2 and d=2

   So, 2, 2+4, 2+2(2), 2+3(2), 2+4(2).....

3) A sequence $a_1, a_2, a_3, \ldots, a_n, \ldots$ is an AP, if $a_{n+1} - a_n$ is independent of n.

   For Example**:** If sequence is 2, 4, 6, 8, ... a_n, so if we take an=16 so an+1=18 so an+1−an=18−16=2 which is independent of n.

4) A sequence $a_1, a_2, a_3, \ldots, a_n, \ldots$ is an AP, if and only if it's n^{th} term a_n is a linear expression in n and a. In such a case the coefficient of n is the common difference.

   For Example**:** A sequence 1, 4, 9, 16, 25, ... is an AP. Suppose nth term $a_n = 81$ which is a linear expression in n. which is n^2.

5) The n^{th} term a_n, of an AP with first term 'a' and common difference 'd' is given by

   $\mathbf{a_n = a + (n - 1)d}$

   For Example**:** If want to find nth term $\mathbf{a_n}$ in example given in 4^{th}.

   a=2, d=2 then we can find 10^{th} term by putting n=10 in above equation. So 10^{th} term of sequence is $\mathbf{a_{10}}$=2+ (10−1)2=20

6) Let there be an A.P with first term 'a' and common difference d. if there are m terms in the AP, then nth term from the end = $(m - n + 1)^{th}$ term from the beginning $= \mathbf{a + (m - n)d}$

   Also, nth term from the end = Last term + (n − 1)(−d)

   = l − (n − 1)d , where 'l ' denotes the last term.

   For Example: Determine the 10^{th} term from the end of the A.P 4, 9, 14, ... ,

   254. l = 254, d = 5

   nth term from the end =l − (10 − 1)d = l − 9d= 254 − 9 × 5= 209

SOLUTION KEY
S.K Solutionkey Educational Institute
*SSC *CBSE *ICSE *IIT
Navodhaya,polytechnic,Gurukula.
Above Raghavendra bakery,Thukkuguda,maheshwaram,Ph;9700320382

7) Various terms is an AP can be chosen in the following manner.

No. of terms	Terms	Common difference
3	$a-d,\quad a,\quad a+d$	d
4	$a-3d,\quad a-d,\quad a+d,\quad a+3d$	2d
5	$a-2d,\quad a-d,\quad a,\quad a+d,\quad a+2d$	d
6	$a-5d,\quad a-3d,\quad a-d,\quad a+d,\quad a+3d,\quad a+5d$	2d

8) The sum to n terms of an A.P with first term 'a' and common difference 'd' is given by

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

Also, $S_n = \frac{n}{2}\{a + l\}$, where l is last term $= a + (n-1)d$

9) If the ratio of the sums of n terms of two AP's is given, then to find the ratio of their nth terms, we replace n by (2n-1) in the ratio of the sums of n terms.

For Example: The ratio of the sum of n terms of two AP's is $(7n + 1) : (4n + 27)$

Find the ration of their m^{th} terms.

Solution:

let a_1, a_2 be the 1^{st} terms and d_1, d_2 the common differences of the two given A.P's. then the sums of their n terms are given by,

$S_{n1} = \frac{n}{2}\{2a_1 + (n-1)d_1\}$ and $S_{n_2} = \frac{n}{2}\{2a_2 + (n-1)d_2\}$

$\frac{S_{n1}}{S_{n2}} = \frac{\frac{n}{2}\{2a + (n-1)d\}}{\frac{n}{2}\{2a + (n-1)d\}}$

$\frac{S_{n1}}{S_{n2}} = \frac{2a_1 + (n-1)d_1}{2a_2 + (n-1)d_2}$

It is given that $\frac{S_{n1}}{S_{n2}} = \frac{7n+1}{}$

S.K Solutionkey Educational Institute
*SSC *CBSE *ICSE *IIT
Navodhaya,polytechnic,Gurukula.
Above Raghavendra bakery,Thukkuguda,maheshwaram,Ph;9700320382

$4n + 27$

$$\frac{7n+1}{4n+27} = \frac{2a_1 + (n-1)d_1}{2a_2 + (n-1)d_2} \quad \ldots\ldots\ldots\ldots \text{(i)}$$

SOLUTION KEY
S.K Solutionkey Educational Institute
*SSC *CBSE *ICSE *IIT
Navodhaya,polytechnic,Gurukula.
Above Raghavendra bakery,Thukkuguda,maheshwaram,Ph;9700320382

To find ratio of the m^{th} terms of the two given AP's, we replace n by $(2m-1)$ in equation (i).

Therefore,

$$\frac{7(2m-1)+1}{4(2m-1)+27} = \frac{2a_1+((2m-1)-1)d_1}{2a_2+((2m-1)-1)d_2}$$

$$\frac{14m-6}{8m+23} = \frac{a_1+(m-1)d_1}{a_2} \quad + (m-1)d_2$$

Hence, the ratio of the m^{th} terms of the two AP's is $14m-68m+23$

So as per rule if we replace n by $(2m-1)$ we get ratio $(14m-6):(8m+23)$

10) A sequence is an AP if and only if the sum of its n terms is of the form An^2+Bn, where A, B are constants. In such a case the common difference is 2A.

For Example:

For the A.P

$S_n = pn + q^2n$

Now $S_1 = p \times 1 + q(1)^2$

$S_1 = p+q \Rightarrow T_1 = p+q$ and also $S_2 = p \times \mathbf{2} + q(\mathbf{2})^2$ S_2

$= 2p+4q$

We have $T_1 + T_2 = 2p+4q$

Or $T_2 = 2p+4q-T_1$

$T_2 = 2p+4q-(p+q) \Rightarrow p+3q$

Hence common difference $= T_2 - T_1$

$= p+\mathbf{3}q-(p+q) = \mathbf{2}q$

For Example: (i) 50, 46, 42, ... find the sum of first 10^{th} term

Solution:

Given, 50,46,42,.....

Here, first term a=50

Difference d=46−50=(−4)

And no of terms n=10

We know $S_n = n/\mathbf{2}[\mathbf{2}a+(n-\mathbf{1})d]$

$Sn = 10/2[2(50)+(10-1)(-4)] \Rightarrow 5[100+(9)(-4)]$

$S_n = 5[100-36] \Rightarrow 5 \times 64 \Rightarrow 320$

Hence, Sum of 10 terms is 320.

S.K Solutionkey Educational Institute *SSC *CBSE *ICSE *IIT
Navodhaya,polytechnic,Gurukula.
Above Raghavendra bakery,Thukkuguda,maheshwaram,Ph;9700320382

(ii) First term is 17 and last term is 350 and d=9 so find total sum and find how many terms are there.

Solution:

Given, first term, a=17, last term, an = 350 = l

And difference d = 9

We know, an=a+(n−1)d

350=17+(n−1)9

350=17+9n−9

9n=350−17+9⇒342

n=38

We know, sum of n terms

$S_n = n2(a + l)$

$S_{38} = 38/2[17 + 350] \Rightarrow 19 \times 367 \Rightarrow 6973$

Hence, number of terms is 38 and sum is 6973.

S.K Solutionkey Educational Institute
*SSC *CBSE *ICSE *IIT
Navodhaya,polytechnic,Gurukula.
Above Raghavendra bakery,Thukkuguda,maheshwaram,Ph;9700320382

1. How many terms of the A.P. 18,16, 14, be taken so that their sum is zero? **Ans :- 19**
2. The 4th term of an A.P. is zero. Prove that the 25th term of the A.P. is three times its 11th term.
3. If the ratio of sum of the first m and n terms of an A.P. is m2: n2, show that the ratio of its mth and nth terms is (2m -1): (2n -1).
4. The sums of first n terms of three A. Ps' are S1, S2 and S3. The first term of each is 5 and their common differences are 2,4 and 6 respectively. Prove that $S1 + S3 = 2S2$
5. A thief, after committing a theft, runs at a uniform speed of 50 m/minute. After 2 minutes, a policeman runs to catch him. He goes 60 m in first minute and increases his speed by 5 m/minute every succeeding minute. After how many minutes, the policeman will catch the thief? **Ans:- 5 min**
6. 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 proceding the house numbered X is equal to sum of the numbers of houses following X. **Ans:- 35**
7. Reshma wanted to save at least? 6,500 for sending her daughter to school next year (after 12 months). She saved? 450 in the first month and raised her savings by? 20 every next month. How much will she be able to save in next 12 months? Will she be able to send her daughter to the school next year? **Ans:- 6720**
8. Find the 60th term of the AP 8,10, 12, if it has a total of 60 terms and hence find the sum of its last 10 terms. **Ans:- 1170**
9. An arithmetic progression 5,12, 19, has 50 terms. Find its last term. Hence find the sum of its last 15 terms. **Ans:- 4485**
10. Find the middle term of the sequence formed by all numbers between 9 and 95, which leave a remainder 1 when divided by 3. Also find the sum of the numbers on both sides of the middle term separately. **Ans:- 1043**
11. Find the middle term of the sequence formed by all three-digit numbers which leave a

S.K Solutionkey Educational Institute
*SSC *CBSE *ICSE *IIT
Navodhaya,polytechnic,Gurukula.
Above Raghavendra bakery,Thukkuguda,maheshwaram,Ph;9700320382

remainder 5 when divided by 7. Also find the sum of all numbers on both sides of the middle term separately. **Ans:- 551, 49824**

12. If the seventh term of an AP is and its ninth term is, find its 63rd term. **Ans:- 1**

S.K Solutionkey Educational Institute
*SSC *CBSE *ICSE *IIT
Navodhaya,polytechnic,Gurukula.
Above Raghavendra bakery,Thukkuguda,maheshwaram,Ph;9700320382

13. The sum of the 2nd and the 7th terms of an AP is 30. If its 15th term is I less than twice its 8th term, find the AP. **Ans:-**

1,5,9,13

14. 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. **Ans:-**

171

15. In a school, students decided to plant trees in and around the school to reduce air pollution. It was decided that the number of trees, that each section of each class will plant, will be double of the class in which they are studying. If there are 1 to 12 classes in the school and each class has two sections, find how many trees were planted by the students. Which value is shown in this question? **Ans:-**

312

16. Find the number of terms of the AP: 18,15. 1/2, 13……. (-49. 1/2), and find the sum of all its terms. **Ans:-**

-441

17. Students of a school thought of planting trees in and around the school to reduce air pollution. It was decided that the number of trees, that each section of each class will plant, will be the same as the class, in which they are studying, e.g., a section of class I will plant 1 tree, a section of class II will plant 2 trees and so on till class XII. There are three sections of each class. Find the total number of trees planted by the students of the school. Pollution control is necessary for everybody's health. Suggest one more role of students in it.

Ans:234

18. Find the sum of all multiples of 7 lying between 500 and 900. **Ans:- 39900**

19. Sum of the first 20 terms of an A.P. is – 240, and its first term is 7. Find its 24th term. **Ans:- -39**

The sum of 4th and 8th terms of an A.P. is 24 and the sum of its 6th and 10th terms is 44. Find the sum of first ten terms of the A.P. **Ans:-**

95

Find nth term of – 15, -18, -21, **Ans 3(n+4]**

If 2p, p+10, 3p+2 are in AP then find p. **Ans p= 6**

20.If arithmetic mean between 3a and 2a-7 is a+4, then find a. **Ans a= 5**

21.The first term of an AP is -7 and the common difference 5, find its 18th term and the

SOLUTION KEY
S.K Solutionkey Educational Institute
*SSC *CBSE *ICSE *IIT
Navodhaya,polytechnic,Gurukula.
Above Raghavendra bakery,Thukkuguda,maheshwaram,Ph;9700320382

general term. **Ans: a18 =78n & an = 5n – 12**

22.If the nth term of an AP is (2n+1), find the sum of first n terms of the AP. **Ans:**Sn= n (n+2)