

# MATHS

## BOOKS - KUMAR PRAKASHAN KENDRA MATHS (GUJRATI ENGLISH)

### ARITHMETIC PROGRESSION

**TEST YOUR SKILLS**

1. Find out  $a$  and  $d$  for each of the following

Aps:

$-12, -7, -2, 3, \dots$

**Answer:  $a = -12, d = 5$**



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2. Find out  $a$  and  $d$  for each of the following

Aps:

$\frac{3}{4}, 1, \frac{5}{4}, \frac{3}{2}$

**Answer:  $a = \frac{3}{4}, d = \frac{1}{4}$**



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3. Find out  $a$  and  $d$  for each of the following

Aps:

2.5, 1.5, 0.5,  $-0.5$  .....

**Answer:**  $a = 2.5, d = -1$



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4. Find out  $a$  and  $d$  for each of the following

Aps:

$2^3, 3^3, 46, \dots$

**Answer:**  $a = 2^3, d = 19$



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5. Which of the following lists of numbers does form an AP ?

4,10,16,22,.....

**Answer: yes**



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6. Which of the following lists of numbers does form an AP ?

5, 1, - 3, - 7, ..... .

**Answer: yes**



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7. Which of the following lists of numbers does form an AP ?

1, 1, 2, 3, 5, 8.....

**Answer: No**



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8. Which of the following lists of numbers does form an AP ?

5, - 5, 5, - 5.....

**Answer: No**



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9. Determine  $k$  so that  $k + 2$ ,  $4k - 6$  and  $3k - 2$  are three consecutive terms of an AP.

**Answer:  $k = 3$**



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10. Determine  $x$  so that  $x - 2$ ,  $4x - 1$  and  $5x + 2$  are three consecutive terms of an AP.

**Answer:  $x = 1$**



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11. For an AP, if  $\frac{a_4}{a_7} = \frac{2}{3}$ , find  $\frac{a_6}{a_8}$

Answer:  $\frac{4}{5}$



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12. A finite AP has 21 terms . The sum of 10th, 11th and 12th term is 129 and the sum of its last three terms is 237 . Find the AP.

Answer: 3, 7, 11, ....83



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**13.** Determine  $k$  so that  
 $k^2 + 4k + 8, 2k^2 + 3k + 6, 3k^2 + 4k + 4$   
, are three consecutive terms of an AP.

**Answer:  $k = 0$**



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**14.** Find the sum of two middle most terms of  
the AP  $-\frac{4}{3}, -1, -\frac{2}{3}, \dots, 4\frac{1}{3}$

**Answer: 3**



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**15.** The 26th , 11th and the last term of an AP are 0,3 and  $-\frac{1}{5}$  respectively. Find the common difference and the number of terms .

**Answer:**  $d = -\frac{1}{5}, 27$  terms



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**16.** How many three digit numbers are such that when divided by 7, leaves a remained 3 in each case ?

**Answer: 129**



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**17.** If the 9th term of an AP is zero, prove that its 29th term is twice its 19th term.



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**18.** Find the number of odd integers between 2 and 100 which are divisible by 3.

**Answer: 17**



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**19.** The sum of 5th and 7th terms of an AP is 52 and the 10th term is 46 . Find the common difference of the AP.

**Answer:  $d = 5$**



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**20.** Find the 20th term of the AP whose 3rd term is 7 and the 7 term exceeds three times the third term by 2. Also find its nth term  $a_n$  .

**Answer:  $a_{20} = 75, a_n = 4n - 5$**



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**21.** The first and the last term of an AP are 7 and 49 respectively. If the sum of all its terms is 420, find the common difference.

**Answer:  $d = 3$**



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**22.** Find :

Sum of those integers between 1 and 500 which are multiples of 2 as well as of 5.

**Answer: 12250**



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**23. Find :**

Sum of those integers from 1 to 500 which are multiples of 2 as well as of 5.

**Answer: 12750**



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**24. Find :**

Sum of those integers from 1 to 500 which are multiples of 2 or 5.

**Answer: 75250**



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**25.** The sum of first seven terms of an AP is 182. If its 4th and the 17th term are in the ratio 1:5, find the AP.

**Answer: 2,10,18,26,.....**



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**26.** If the sum of first  $n$  terms of an AP is  $\frac{1}{2}(3n^2 + 7n)$ , then find its  $n$ th term. Hence

write its 20th term.

**Answer:**  $a_n = 3n + 2, a_{20} = 62$



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**27.** If  $S_n$  denotes the sum of first  $n$  terms of an AP, prove that  $S_{12} = 3(S_8 - S_4)$



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**28.** The ratio of the sum of first  $n$  terms of two APs is  $(7n + 1) : (4n + 27)$ . Find the ratio of their

mth terms.

**Answer:**  $(14m - 6) : (8m + 23)$



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**29.** A man repays a loan of Rs 3250 by paying Rs 20 in the first month and then increase the payment by Rs 15 every month. How long will it take him to clear the loan?

**Answer: 20 months**



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**30.** If the 12th term of an AP is -13 and the sum of its first four terms is 24, what is the sum of its first 10 terms ?

**Answer: 0**



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**31.** Kartikay repays his total loan of Rs 1,18,000 by repaying every month. Starting with the first instalment of Rs 1000, if he increases the instalment by Rs 100 every month, what amount will be paid by him in the 30th instalment ? What amount does he still

have to pay after the 30th instalment ?

**Answer: Rs 3900, Rs 44,500**



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**32.** The 9th term of an AP is equal to 6 times the second term. If its 5th term is 22 find the AP.

**Answer: 2,7,12,17,.....**



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**33.** The sum of the first 7 terms of an AP is 63 and the sum of its next 7 terms is 161. Find the 28th term of this AP.

**Answer:**  $a = 3, d = 2; a_{28} = 57$



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**34.** Which term of the AP 75, 72, 69, ... is its first negative term ? If it is the  $n$ th term, find  $S_n$ .

**Answer:** 27th term ,  $S_{27} = 972$



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**35.** Three numbers in AP have the sum 18 and the sum of their squares is 180. Three those numbers in the increasing order.

**Answer: 0,6,12**



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**36.** Find four consecutive terms in AP whose sum is 20 and the sum of whose squares is 120.

**Answer: 2,4,8 or 8,6,4,2**



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**37.** Ramkali required Rs 2500 after 12 weeks to send her daughter to school. She saved Rs 100 in the first week and increased her weekly saving by Rs 20 every week. Find whether she will be able to send her daughter to school after 12 weeks. What value is generated in the above situation ?

**Answer: yes**



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**1.** In which of the following situations, does the list of numbers involved make an arithmetic progression , and why ?

The taxi fare after each km, when the fare is Rs 15 for the first km and Rs 8 for each additional km.

**Answer: the list of numbers forms an AP with  $a = 15$  and  $d = 8$**



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2. In which of the following situations, does the list of numbers involved make an arithmetic progression , and why ?

The amount of air present in a cylinder when a vacuum pump removes  $\frac{1}{4}$  of the air remaining in the cylinder at a time .

**Answer: Hence the list of numbers does not form an AP.**



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3. In which of the following situations, does the list of numbers involved make an arithmetic

progression , and why ?

The cost of digging a well after every for the first metre and rises by Rs 50 for each subsequent metre.

**Answer: the list of numbers forms an AP with  $a = 150$  and  $d = 50$**



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**4.** In which of the following situations, does the list of numbers involved make an arithmetic progression , and why ?

The amount of money in the account every

year, when Rs 10,000 is deposited at compound interest at 8% per annum.

**Answer: the list of numbers does not form an AP.**



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**5. Write first four terms of the AP. When the first term  $a$  and the common difference  $d$  are given as follows :**

$$a = 10, d = 10$$

**Answer: the required first four terms of the AP are 10,20 , 30 ,40.**



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6. Write first four terms of the AP. When the first term  $a$  and the common difference  $d$  are given as follows :

$$a = -2, d = 0$$

**Answer:** the required first four terms of the AP are  $-2, -2, -2, -2$ .



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7. Write first four terms of the AP. When the first term  $a$  and the common difference  $d$  are given as follows :

$$a = 4, d = -3$$

**Answer:** the required first four terms of the AP are **4,1,-2,-5**



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8. Write first four terms of the AP. When the first term  $a$  and the common difference  $d$  are given as follows :

$$a = -1, d = \frac{1}{2}$$

**Answer:** the required first four terms of the

**AP are**  $-1, \frac{-1}{2}, 0, \frac{1}{2}$



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**9.** Write first four terms of the AP. When the first term  $a$  and the common difference  $d$  are given as follows :

$$a = -1.25, d = -0.25$$

**Answer:** the required first four terms of the

**AP are**  $-1.25, -1.50, -1.75, -2.00$



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**10.** For the following Ap. Write the first term and the common difference :

3, 1, - 1, - 3, .....

**Answer:** - 2



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**11.** For the following AP. Write the first term and the common difference :

- 5, - 1, 3, 7, .....

**Answer:** - 5



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**12.** For the following AP. Write the first term and the common difference :

$$\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3}, \dots$$

**Answer:**  $\frac{4}{3}$



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**13.** For the following AP. Write the first term and the common difference :

$$0.6, 1.7, 2.8, 3.9, \dots$$

**Answer:** 1.1



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**14.** Which of the following are AP? If they form an AP find the common difference  $d$  and write three more terms.

2,4,8,16,.....

**Answer:** the given list of number does not form an AP



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**15.** Which of the following are AP? If they form an AP find the common difference  $d$  and write

three more terms.

$$2, \frac{5}{2}, 3, \frac{7}{2}, \dots$$

**Answer:**  $4, \frac{9}{2}$  and  $5$



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**16.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$$-1.2, -3.2, -5.2, -7.2, \dots$$

**Answer:**  $-9.2, -11.2$  and  $-13.2$



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**17.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$10, -6, -2, 2, \dots$

**Answer:** 6, 10 and 14



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**18.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$3, 3 + \sqrt{2}, 3 + 2\sqrt{2}, 3 + 3\sqrt{2}, \dots$

**Answer:**

$$3 + 4\sqrt{2}, 3 + 5\sqrt{2} \text{ and } 3 + 6\sqrt{2}$$



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**19.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$$0.2, 0.22, 0.222, 0.2222, \dots$$

**Answer:** the given list of number does not form an AP



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**20.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$0, -4, -8, -12, \dots$

**Answer:**  $-16, -20$  and  $-24$



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**21.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \dots$

**Answer:**  $-\frac{1}{2}, -\frac{1}{2}$  and  $-\frac{1}{2}$



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**22.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

1, 3, 9, 27

**Answer:** the given list of number does not form an AP



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**23.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$a, 2a, 3a, 4a \dots\dots$

**Answer:**  $5a, 6a$  and  $7a$



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**24.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$a, a^2, a^3, a^4 \dots\dots$

**Answer: the given list of unknown numbers does not form an AP.**



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**25.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$$\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32} \dots$$

**Answer:**  $\sqrt{5}, \sqrt{72}$  and  $\sqrt{98}$



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**26.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$$\sqrt{3}, \sqrt{6}, \sqrt{9}, \sqrt{12}$$

**Answer:** the given list of number does not form an AP



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**27.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$$1^2, 3^2, 5^2, 7^2, \dots$$

**Answer: the given list of number does not form an AP**



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**28.** Which of the following are Aps? If they form an AP find the common difference  $d$  and write three more terms.

$1^2, 5^2, 7^2, 7^3 \dots$

**Answer: 97, 121 and 145**



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## EXERCISE 5.2

1. Fill in the blanks in the following table , given that  $a$  is the first term ,  $d$  the common difference and  $a_n$  the  $n$ th term of the AP :

$a$	$d$	$n$	$a_n$
7	3	8	....

**Answer: 28**



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2. Fill in the blanks in the following table , given that  $a$  is the first term ,  $d$  the common

difference and  $a_n$  the  $n$ th term of the AP :

$a$	$d$	$n$	$a_n$
-18	2	10	....

**Answer: 2**



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**3.** Fill in the blanks in the following table , given that  $a$  is the first term ,  $d$  the common difference and  $a_n$  the  $n$ th term of the AP :

$a$	$d$	$n$	$a_n$
46	-3	18	....

**Answer: 46**



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4. Fill in the blanks in the following table , given that  $a$  is the first term ,  $d$  the common difference and  $a_n$  the  $n$ th term of the AP :

$$(a, d, n, a_n), \left( -18.9, 2.5, \underline{\quad}, 3.6 \right)$$

**Answer: 10**



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5. Fill in the blanks in the following table , given that  $a$  is the first term ,  $d$  the common difference and  $a_n$  the  $n$ th term of the AP :

$a$     $d$     $n$     $a_n$

3.5   0   105

**Answer: 3.5**



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**6.** Choose the correct choice in the following and justify :

30th term of the AP : 10 , 7,4,.....is

A. 97

B. 77

C.  $-77$

D.  $-87$

**Answer: C**



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7. Choose the correct choice in the following and justify :

11th term of the AP :  $-3, -\frac{1}{2}, 2, \dots$  is

A. 28

B. 22

C.  $-38$

D.  $-48\frac{1}{2}$

**Answer: B**



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**8.** In the following Aps, find the missing terms in the boxes .

$2 \square, 26$

**Answer: 14**



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9. In the following Aps, find the missing terms  
in the boxes .

$$\square, 13, \square 3$$

**Answer: 18 and 8**



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10. In the following Aps, find the missing terms  
in the boxes .

$$5 \square, \square, 9\frac{1}{2}$$

**Answer:  $6\frac{1}{2}$  and 8**



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**11.** In the following Aps, find the missing terms in the boxes .

$-4, \square, \square, \square, \square, 6$

**Answer:**  $-2, 0, 2$  and  $4$



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**12.** In the following Aps, find the missing terms in the boxes .

$\square, 38, \square, \square, \square, -22$

**Answer:**  $53, 23, 8$  and  $-7$



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

**Answer:** the 16th term of the AP 3, 8 , 13 ,  
18 ..... Is 78



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**14.** Find the number of terms in each of the  
following AP :

7,13,19,.....,205

**Answer:** 34 terms



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**15.** Find the number of terms in each of the following Aps :

$$18, 15\frac{1}{2}, 13, \dots\dots\dots, -47$$

**Answer: 27 terms**



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**16.** Check whether -150 is a term of the AP :

$$11, 8, 5, 2, \dots\dots$$

**Answer: cannot be**



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**17.** Find the 31st term of an AP whose 11th term is 38 and the 16th term is 73.

**Answer: 178**



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**18.** An AP consists of 50 terms of which 3rd term is 12 and the last term is 106. Find the 29th term.

**Answer: 64**



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**19.** If the 3rd and the 9th terms of an AP are 4 and -8 respectively , which term of this AP is zero?

**Answer: 5th term**



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**20.** The 17th term of an AP exceeds its 10th term by 7. Find common difference .

**Answer: 1**



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**21.** Which term of the AP : 3 , 15 , 27 , 39 will be 132 more than its 54th term?

**Answer: 65th term**



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**22.** Two APs have the same common difference. The difference between their 100th terms is 100 , what is the difference between their 1000th terms ?

**Answer: 100**



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**23.** How many three digit numbers are divisible by 7 ?

**Answer: 128 three digit numbers are divisible by 7.**



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**24.** How many multiples of 4 lie between 10 and 250 ?

**Answer: 60 multiples**



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**25.** For what value of  $n$  , are the  $n$ th terms of two Aps  $63 , 65 , 67 , \dots$  and  $3,10,17 , \dots$  equal ?

**Answer:  $n = 13$**



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**26.** Determine the AP whose third term is 16 and the 7th term exceeds the 5th term by 12 .

**Answer:  $4,10,16,22,\dots$**



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27. Find the 20th term from the last term of the AP : 3, 8, 13, .....253 .

**Answer: 158**



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28. The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44. Find the first three terms of the AP .

**Answer:  $-13, -8, -3$**



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**29.** Subha Rao started work in 1995 at an annual salary of Rs 5,000 and received an increment of Rs 200 each year . In which year did his income reach Rs 7.000 ?

**Answer: 11th year.**



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**30.** Ramkali saved Rs 5 in the first week of a year and then increased her weekly savings by Rs 1.75 . If the  $n$ th week. her weekly saving

becomes Rs 20.75 find  $n$ .

**Answer:**  $n = 10$



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### EXERCISE 5.3

**1.** Find the sum of following Aps.

2, 7, 12, ..... to 10 terms .

**Answer:** 245



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2. Find the sum of following Aps.

$-37, -33, -29, \dots$  , to 12 term

**Answer:  $-180$**



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3. Find the sum of following Aps.

$0.6, 1.7, 2.8, \dots$  , to 100 terms

**Answer: 5505**



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4. Find the sum of following Aps.

$$\frac{1}{15}, \frac{1}{12}, \frac{1}{10}, \dots \text{ to 11 terms.}$$

**Answer:**  $\frac{33}{20}$



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5. Find the sums sums given below :

$$7 + 10\frac{1}{2} + 14 + \dots + 84$$

**Answer:**  $1046\frac{1}{2}$



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6. Find the sums sums given below :

$$34 + 32 + 30 + \dots + 10$$

**Answer: 286**



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7. Find the sums sums given below :

$$(-5) + (-8) + (-11) + \dots + (-230)$$

**Answer: -8930**



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**8.** In an AP :

Given  $a = 5$  ,  $d = 3$  ,  $a_n = 50$ , find  $n$  and  $S_n$

**Answer:**  $n = 16$ ,  $S_{16} = 440$



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**9.** In an AP :

Give  $a = 7$  ,  $a_{13} = 35$  , find  $d$  and  $S_{13}$  .

**Answer:**  $d = \frac{7}{3}$ ,  $S_{13} = 273$



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**10.** In an AP :

Give  $a = 7$  ,  $a_{12} = 37$  ,  $d = 3$ , find  $a$  and  $S_{12}$  .

**Answer:**  $a = 4$ ,  $S_{12} = 246$



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**11.** In an AP :

Given  $a_3 = 15$ ,  $S_{10} = 125$ , find  $d$  and  $a_{10}$

**Answer:**  $d = -1$ ,  $a_{10} = 8$



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**12.** In an AP :

Given  $d = 5$ ,  $s_9 = 75$  find  $a$  and  $a_9$

**Answer:**  $a_9 = \frac{85}{3}$



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**13.** In an AP :

Given  $a = 2$ ,  $d = 8$ ,  $S_n = 90$  , find  $n$  and  $a_n$

.

**Answer:**  $n = 5$  ,  $a_5 = 34$



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**14.** In an AP :

Given  $a = 8$  ,  $a_n = 62$ ,  $S_n = 210$ , find  $n$  and  $d$  .

**Answer:**  $n = 6$ ,  $d = \frac{54}{5}$



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**15.** In an AP :

Given  $a_n = 4$ ,  $d = 2$ ,  $S_n = -14$  , find  $n$  and  $a$  .

**Answer:**  $n = 7$  ,  $a = -8$



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**16.** In an AP :

Given  $a = 3$  ,  $n = 8$  ,  $S_n = 192$  , find  $d$  .

**Answer:  $d = 6$**



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**17.** In an AP :

Given  $l = 28$  ,  $S_n = 144$ , and there are total 9 terms . Find  $a$ .

**Answer:  $a = 4$**



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**18.** How many terms of the AP , 9 , 17 , 25 .....must be taken to give a sum of 636 ?

**Answer: 12 terms**



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**19.** The first term of an AP is 5, the last term is 45 and the sum is 400. Find the number of terms and the common difference.

**Answer: the number of terms is and 16**

**common difference is  $\frac{8}{3}$**



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**20.** The first and the last terms of an AP are 17 and 350 respectively . If the common difference is 9, how many terms are there and what is their sum?

**Answer: there are 38 terms and their sum is 6973.**



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**21.** Find the sum of first 22 terms of an AP in which  $d = 7$  and 22nd term is 149.

**Answer: 1661**



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**22.** Find the sum of first 51 terms of an AP whose second and third terms are 14 and 18 respectively.

**Answer: 5610**



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**23.** If the sum of first 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of first  $n$  terms.

**Answer:**  $n^2$



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**24.** Show that  $a_1, a_2, \dots, a_n, \dots$  from an AP where  $a_n$  is defined as below:

$$(1)a_n = 3 + 4n \quad (2)a_n = 9 - 5n$$

Also find the sum of the first 15 terms in each case.

**Answer:**  $-465$



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**25.** If the sum of the first  $n$  terms of an AP is  $4n - n^2$ , what is the first term (that is  $S_1$ ) ?  
What is the sum of first two terms ? What is the second term ? Similarly . Find the 3rd, the 10th and the  $n$ th terms .

**Answer:**  $-2n + 5$



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**26.** Find the sum of the first 40 positive integers divisible by 6.

**Answer: 4920**



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**27.** Find the sum of the first 15 multiple of 8.

**Answer: 960**



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**28.** Find the sum of the odd numbers between 0 and 50 .

**Answer: 625**



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**29.** A contract on construction job specifies a penalty for delay of completion beyond a certain date as follows : Rs 200 for the first day . Rs 250 for the second day , Rs 300 for the third day , etc. the penalty for each succeeding day being Rs50 more than for the preceding day. How much money the contractor has to

pay as penalty , if the has delayed the work by 30 days?

**Answer: 27750**



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

**Answer: the values (in rupees) of those**

seven prizes are 16 , 140 , 120 , 100 , 80 , 60  
and 40



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**31.** In a school , students 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

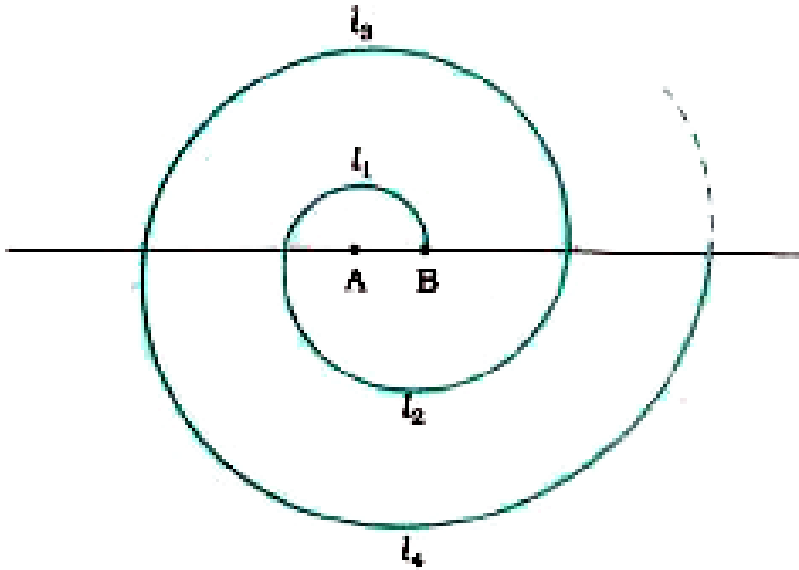
sections of each class. How many trees will be planted by the students ?

**Answer: 234 trees**



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**32.** 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 the given figure . What is the total length of such a spiral made up to thirteen consecutive semicircles ? (Take  $\pi = \frac{22}{7}$  )



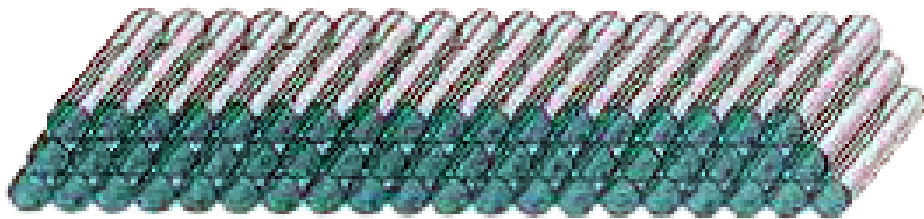
**Answer: 143**



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**33.** 200 logs are stacked in the following manner : 20 logs in the bottom row, 19 in the

next row 18 in the row next to it and so on (see the given figure ). In how many rows are the 200 logs placed and how many logs are in the top row?

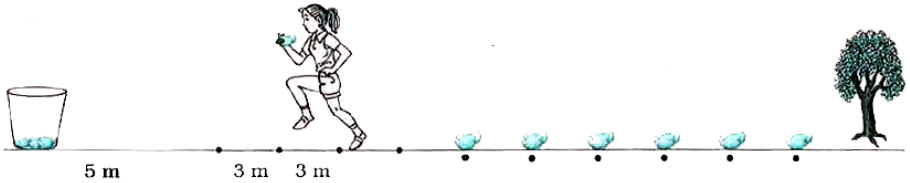


**Answer: 16 rows , 5 logs**

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**34.** 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 the given figure ).



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?

**Answer: 370 metres.**



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## EXERCISE 5.4

1. Which term of the AP 121, 117, 113, ..... is its first negative term ?

**Answer: 32 nd term.**



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2. The sum of the third and the seventh term of an AP is 6 and their product is 8. Find the sum

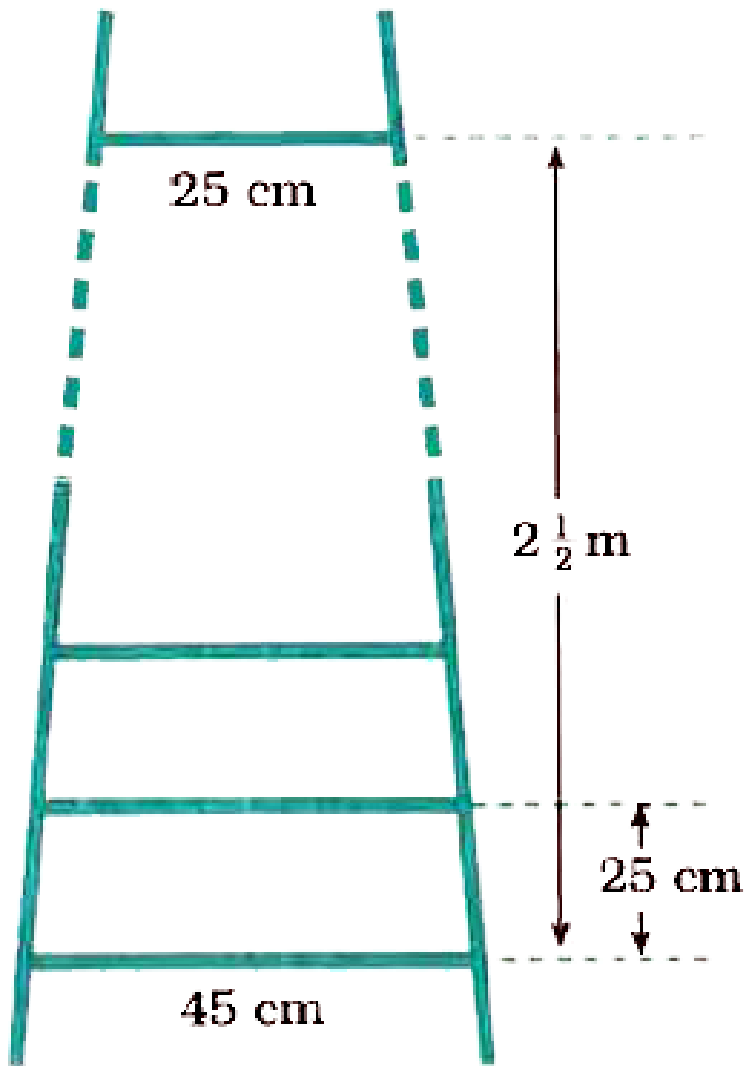
of first sixteen terms of the AP.

**Answer: 76 or 20**



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**3.** A ladder has rungs 25 cm apart. (see the given figure). 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?



**Answer: 385**



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4. 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  $x$ .

**Answer: 35**



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5. A small terrace at a football ground comprises of 15 steps each of which is 50 m

long and built of solid concrete. Each step has a rise of  $m \frac{1}{4}$  and a tread of  $\frac{1}{2} m$  (see the given figure). Calculate the total volume of concrete required to build the terrace.



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## PRACTICE THOROUGHLY

1. Find the sum of following AP:

$a+b, a-b, a-3b, \dots$  up to 22 terms

**Answer:  $22a - 440b$**



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2. Find the sum of following AP:

$(x - y)^2, (x^2 + y^2), (x + y)^2, \dots$  up to  $n$  terms

**Answer:**  $n \left\{ (x - y)^2 + (n - 1)xy \right\}$



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3. Find the sum of following AP:

$\frac{x - y}{x + y}, \frac{3x - 2y}{x + y}, \frac{5x - 3y}{x + y}, \dots$  up to 22

terms

**Answer:**  $\frac{n}{2(x + y)} \{n(2x - y) - y\}$



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4. How many terms of the AP 27, 24, 21, ... should be taken so that their sum is zero ?

**Answer: 19**



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5. Find the sum of all three digit numbers which are multiples of 11.

**Answer: 44550**



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6. In an AP, the sum of first ten terms is - 150 and the sum of its next ten terms is - 550. Find the AP.

**Answer:  $a = 3, d = - 4 ; 3 , -1, -5 , \dots$**



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7. Show that the sum of all odd integers between 1 and 1000 which are divisible by 3 is 83667.



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8. 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?

**Answer: 5 minutes**



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**9.** The sum of first  $n$  terms of three APs are  $S_1$ ,  $S_2$  and  $S_3$ . The first term of each AP is 5 and their common differences are 2, 4 and 6 respectively. Prove that  $S_1 + S_3 = 2S_2$ .



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**10.** The sum of first  $n$  terms of an AP is  $5n^2 + 3n$ . If its  $m$ th term is 168, find the value of  $m$ . Also find the 20th term of the AP.

**Answer:**  $m = 17, a_{20} = 198$



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**11.** Solve the equation :

$$(-4) + (-1) + 2 + 5 + \dots + x = 437$$

**Answer: 50**



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**12.** Fill in the blanks so as to make each of the following statements true :

If 7th and 13th terms of an AP are 34 and 64 respectively, then its 18th term is .....

**Answer: 89**



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**13.** Fill in the blanks so as to make each of the following statements true :

The first and the last term of an AP are 1 and 11. If the sum of all its terms is 36 , then the

number of terms is .....

**Answer: 6**



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**14.** Fill in the blanks so as to make each of the following statements true :

For any AP,  $S_n - 2S_{n-1} + S_{n-2} = \dots\dots\dots$

**Answer: d**



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**15.** Fill in the blanks so as to make each of the following statements true :

If the sum of first  $n$  terms of an AP is  $2n^2 + 5n$ , then its  $n$ th term is .....

**Answer:  $4n + 3$**



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**16.** Fill in the blanks so as to make each of the following statements true :

If  $\frac{1}{x+2}$ ,  $\frac{1}{x+3}$ ,  $\frac{1}{x+5}$  are in AP, then  $x =$

.....

**Answer: 1**



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17. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

The sum of the first  $n$  terms of the AP

$\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32} \dots$  is .....

A.  $\frac{n(n+1)}{2}$

B.  $2n(n+1)$

C.  $\frac{n(n+1)}{\sqrt{2}}$

D. 1

**Answer: A::B**



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**18.** Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

The sum of first  $n$  terms of two Aps are in the ratio  $5n + 4$  ,  $9n + 6$  . Then , the ratio of their 18th term is .....

A.  $\frac{179}{321}$

B.  $\frac{178}{321}$

C.  $\frac{175}{321}$

D.  $\frac{176}{321}$

**Answer: A::B::C**



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**19.** Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

The common difference of the AP

$\frac{1}{2q}, \frac{1 - 2q}{2q}, \frac{1 - 4q}{2q}, \dots$  is

A.  $-1$

B.  $1$

C.  $q$

D.  $2q$

**Answer: A**



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**20.** Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

If the  $n$ th term of AP is  $2n + 1$  , then the sum of first  $n$  terms of the AP is .....

A.  $n(n - 2)$

B.  $n(n + 2)$

C.  $n(n + 1)$

D.  $n(n - 1)$

**Answer: B**



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**OBJECTIVE QUESTIONS**

1. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

If  $k + 2$ ,  $4k - 6$ ,  $3k - 2$  are three consecutive terms of an AP, then  $k = \dots\dots\dots$

A. 1

B.  $-1$

C. 3

D.  $-3$

**Answer: C**



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2. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

The 10th term of the  $\sqrt{2}, \sqrt{8}, \sqrt{18}\dots\dots$  is

A.  $\sqrt{162}$

B.  $\sqrt{200}$

C.  $\sqrt{242}$

D.  $\sqrt{288}$

**Answer: B**



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## OBJECTIVE QUESTIONS

1. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

If the common difference of an AP is 5. then value of ,  $a_{18} - a_{13}$  is .....

A. 5

B. 20

C. 25

D. 30

**Answer: B**



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## OBJECTIVE QUESTIONS

1. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

The sum of first  $n$  terms of the AP  $a, 3a, 5a, \dots$  is .....

A.  $na$

B.  $(2n - 1)a$

C.  $n^2a$

D.  $n^2a^2$

**Answer: A::B**



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2. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

Two Aps have the same common difference,  
The difference between their millionth terms is  
111222333, then the difference between their  
100th terms is .....

A. (a) 111222333

B. (b) 333222111

C. (c) 222333111

D. (d) 333222111

**Answer: A::B::C**



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3. Answer each question by selecting the proper alternative from those given below each question so as to make each statement true :

If  $p$ th and  $r$ th terms of an AP are  $a, b$  and  $c$  respectively. then

$$a(q - r) + b(r - p) + c(p - q)$$

A. (a) 0

B. (b)  $a + b + c$

C. (c)  $p + q + r$

D. (d)  $pqr$



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4. Answer the following by a number or a word or a sentence :

The tenth term of the AP will exceed its fifth term by how much if the common difference is  $\frac{3}{2}$  ?

**Answer:**  $\frac{15}{2}$



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5. Answer the following by a number or a word or a sentence :

If  $k-2$ ,  $2k$  and  $2k + 7$  are three consecutive

terms of an AP, what is the value of k ?

**Answer: 5**



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**6.** Answer the following by a number or a word or a sentence :

Find the common difference of the AP

$$\sqrt{5}, \sqrt{20}, \sqrt{45} \dots$$

**Answer:  $\sqrt{3}$**



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7. Answer the following by a number or a word or a sentence :

Find the sum of all the 11 terms of a finite AP whose middle most term is 30.

**Answer: 330**



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8. Answer the following by a number or a word or a sentence :

In an AP, if  $S_n = 3n^2 + 5n$  and  $a_k = 164$ , find the value of k.

**Answer: 27**



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**9.** State whether each of the following statements is true or false :

For an AP, the first term can never be zero.



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**10.** State whether each of the following statements is true or false :

For an AP, the common difference can never be zero.



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**11.** State whether each of the following statements is true or false :

The sum of first  $n$  natural numbers is given by

$$\frac{n(n + 1)}{2}$$

**Answer: TURE**



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**12.** State whether each of the following statements is true or false :

For an AP, if  $S_n = 5n^2 - 3n$ , then

$$a_n = 10n - 8$$

**Answer: TURE**



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**13.** State whether each of the following statements is true or false :

For an AP for which the common difference is negative, it is possible that the sum of its first  $m$  terms and first  $n$  terms are equal.

**Answer: TURE**



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## TEXTUAL EXAMPLES

1. For the AP:  $\frac{3}{2}, \frac{1}{2}, -\frac{1}{2}, -\frac{3}{2}$  ....., write the first term  $a$  and common difference  $d$ .

**Answer:**  $-1$



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2. Which of the following list of number form an AP ? If they form an AP. Write the next two terms :

4,10,16,22,.....

**Answer: 28 and 34**



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**3.** Which of the following list of number form an AP ? If they form an AP. Write the next two terms :

1,-1,-3, -5, .....

**Answer:  $-7$  and  $-9$**



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4. Which of the following list of number form an AP ? If they form an AP. Write the next two terms :

$$-2, 2, -2, 2, -2$$

**Answer: the given list of number does not form an AP.**



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5. Which of the following list of number form an AP ? If they form an AP. Write the next two terms :

$$1, 1, 1, 2, 2, 2, 3, 3, 3, \dots$$

**Answer: the given list of number does not form an AP.**



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**6. Find the 10th term of the AP : 2 , 7, 12 .....**

**Answer: 47**



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**7. Which term of the AP : 21, 18, 15, ..... is - 81**

**? Also ,is any term 0 ? Give reason for your**

answer .

**Answer: the 35th term of the given AP is -  
81 .**



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**8. Determine the AP whose 3rd term is 5 and  
the 7th term is 9.**

**Answer: the required AP is 3, 4, 5 , 6 , 7 .....**



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**9.** Check whether 301 is a term of the list of number 5,11,17,23.....

**Answer: 301 is not a term of the given list of numbers.**



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**10.** How many two digit number are divisible by 3 ?

**Answer: there are 30 two digit number divisible by 3 .**



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**11.** Find the 11th term from the last term (towards the first term) of the : 10 , 7 , 4, ....., - 62 .

**Answer:** – 32



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**12.** A sum of Rs 1000 is invested at 8% simple interest per year. Calculate the interest at the end of each year. Do these interests form an AP. If so , find the interest at the end of 30 years making use of this fact.

**Answer: the interest at the end of 30 years will be Rs 2400**



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**13.** In a flower bed , there are 23 rose plants in the first row , 21 in the second , 19 in the third , and so on. There are 5 rose plants in the row. How many rows are there in the flower bed ?

**Answer: there are 10 rows in the flower bed.**



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**14.** Find the sum of the first 22 term of the AP :

8, 3, -2 .....

**Answer:** – 979



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**15.** If the sum of the first 14 terms of an AP is 1050 and its first term is 10 , find the 20th term

.

**Answer:** 200



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**16.** How many terms of the AP : 24 , 21, 18

..... Must be taken so that sum is 78 ?



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**17.** Find the sum of :

the first 1000 positive integers

**Answer: 500500**



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**18.** Find the sum of :

the first  $n$  positive integers

$$\text{Answer: } = \frac{n(n + 1)}{2}$$



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**19.** Find the sum of first 24 terms of the list of numbers whose  $n$ th term is given by

$$a_n = 3 + 2n .$$

**Answer: 672**



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**20.** A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by fixed number every year, find the production in the 1st year

**Answer: 550**



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**21.** A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production

increases uniformly by fixed number every year

, find

the production in the 10th year

**Answer: 775**



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**22.** A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by fixed number every year, find

the total production in first 7 years.

**Answer: 4375**



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## OTHER IMPORTANT EXAMPLES

1. If  $k + 1$ ,  $3k$  and  $4k + 2$  be any three consecutive terms of an AP. Find the value of  $k$ .

**Answer:  $k = 3$**



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2. Find out a and d for each of the following AP

:

1 , 4 , 7 , 10 , .....

**Answer: 3**



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3. Find our a and d for each of the following AP

:

5,  $5 + \sqrt{3}$ ,  $5 + 2\sqrt{3}$ ,  $+ 5 + 3\sqrt{3}$ , .....

**Answer:  $\sqrt{3}$**



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4. For the following AP. Find the common difference  $d$  and write the next three terms :

$$-1, \frac{1}{4}, \frac{3}{2} \dots\dots$$

**Answer:**  $\frac{21}{4}$



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5. Find the 10th term from the end of the AP

$$4, 9, 14, \dots\dots 254.$$

**Answer: 209**



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6. Find the common difference of the AP whose first term is  $\frac{1}{2}$  and the 8th term is  $\frac{17}{6}$ .

Also find its 4th term.

**Answer:**  $\frac{3}{2}$



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7. Which term of the AP 8, 14, 20, 26, ..... will be 72 more than its 41st term ?

**Answer:** the 53rd term of the will be 72 more than its 41st term.



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8. Which term of the AP , 45,41,37,33 it its first negative term ?

**Answer: the 13th term of the given AP is its first negative term.**



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9. If the  $p$ th term of an AP is  $\frac{1}{q}$  and the  $q$ th term is  $\frac{1}{p}$  , show that the sum of  $pq$  terms is

$$\frac{(pq + 1)}{2}.$$



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**10.** The ratio of sum of first  $n$  terms of two Aps is  $\frac{8n + 1}{7n + 3}$  for every positive integer  $n$ . Find the ratio of their 7th terms.

**Answer:**  $\frac{105}{94}$



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**11.** Show that the sum of an AP whose first term is  $a$ , the second term is  $b$  and the last term is  $c$  is equal to  $\frac{(a + c)(b + c - 2a)}{2(b - a)}$ .



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**12.** The sum of first  $p, q$  and  $r$  terms of an AP are  $a, b$  and  $c$  respectively. Show that

$$\frac{a}{p}(q - r) + \frac{b}{q}(r - p) + \frac{c}{r}(p - q) = 0$$



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13. For an AP,  $S_n = m$  and  $S_m = n$  .

Prove that  $S_{m+n} = -(m+n)$ . ( $m \neq n$ )



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