



MATHS

BOOKS - MTG IIT JEE FOUNDATION

ARITHMETIC PROGRESSIONS

Illustration

1. Write first five terms of a sequence where n^{th} term is defined by

$$a_n = n^2 + n.$$



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2. Identify which of the following sequence is an A.P .

1.2, 3.2, 5.2, 7.2,



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3. Identify which of the following sequence is an A.P .

5, 10, 15, 20.



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4. Identify which of the following sequence is an A.P .

$\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \dots$



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5. Identify which of the following sequence is an A.P .

5,5,5,5,5,.



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6. Write first three terms of the A.P .where first term and common difference is 7 and 9 respectively .

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7. Find how many terms are there in the A.P . 16 , 24, 32, 96

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8. How many 4 - digit numbers are there which is divisible by 21 ?

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9. If the n^{th} term of an A.P is $(5n - 2)$,find its first term

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10. If the n^{th} term of an A.P is $(5n - 2)$,find its Common difference

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11. If the n^{th} term of an A.P is $(5n - 2)$,find its 19^{th} term

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12. The 6^{th} term of an A.P is -10 and its 10^{th} term is -26 .Determine the 13^{th} term of the A.P .

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13. Find the 10^{th} term from the end of the A.P . $4, 9, 14, \dots, 254$.

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14. The sum of three numbers in A.P. is -3 , and their product is 8. Find the numbers.

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15. Find the AM between

(i) 13 and 19 (ii) $(a-b)$ and $(a+b)$

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16. Find the single arithmetic mean between: $(a - b)$ and $(a + b)$

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17. Find the sum of the first 20 terms of the A.P. $5, 8, 11, 14, \dots$

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18. If the sum of $n, 2n, 3n$ terms of an AP are S_1, S_2, S_3 respectively .

Prove that $S_3 = 3(S_2 - S_1)$



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19. If s_n the sum of first n terms of an A. P, is given by $s_n = 5n^2 + 3n$,

then find its n^{th} terms.



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20. If the sum of n terms of an AP is given by $S_n = (2n^2 + 3n)$ then find

its common difference.



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21. If the sum of n terms of an AP is given by $S_n = (2n^2 + 3n)$ then find

its common difference.



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Solved Examples

1. Show that the progression 11, 6, 1, -4, -9, is an AP. Find its first term and the common difference.

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2. What is 18th term of the sequence defined by $a_n = \frac{n(n-3)}{n+4}$

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3. If seven times the seventh term of an A.P is equal to eleven times its eleventh term , show that its eighteenth term is zero .

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4. If $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ is the AM between a and b. Then find the value of n.

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5. 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 last row. How many rows are there in the flower bed?

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6. Find the sum of first 24 terms of the list of numbers whose nth term is given by $a_n = 3 + 2n$

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7. The p^{th} , q^{th} and r^{th} terms of an A.P. are a, b, c, respectively. Show that $(q - r)a + (r - p)b + (p - q)c = 0$.

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8. In an A.P., the sum of first n terms is $\frac{3n^2}{2} + \frac{5n}{2}$. Find its 25th term.



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9. If a, b, c are in AP show that

(i) $\frac{1}{bc}, \frac{1}{ca}, \frac{1}{ab}$ are in AP.

(ii) $a\left(\frac{1}{b} + \frac{1}{c}\right), b\left(\frac{1}{c} + \frac{1}{a}\right), c\left(\frac{1}{a} + \frac{1}{b}\right)$ are in AP.



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10. If a, b, c are in A.P., prove that $a^2(b + c), b^2(c + a), c^2(a + b)$ are also in A.P.



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11. Find a_1, a_2, a_3 if the n^{th} term is given by $a_n = (n - 1)(n - 2)(3 + n)$

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12. Find a_3, a_5, a_8 if the n^{th} term is given by $a_n = (-1)^n n$

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13. If the n^{th} term of the A. P. 9, 7, 5, is same as the n^{th} term of the A. P. 15, 12, 9, find n.

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14. The 7th term of an A.P. is 32 and its 13th term is 62. Find the A.P.

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15. Find the term of the arithmetic progression 9,12,15,18, ... which is 39 more than its 36th term.

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16. The sum of three numbers in A.P. is 12 and the sum of their cubes is 288. Find the numbers.

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17. Find the value of x for which $(8x + 4)$, $(6x - 2)$ and $(2x + 7)$ are in A.P.

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18. Find the sum of all integers between 0 and 500 which are divisible by 7.

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19. If the sum of 7 terms of an A.P. is 49 and that of 17 terms is 289, find the sum of n terms.

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20. The first term of an A.P is 7 , the last term is 47 and the sum is 432 . Find the number of terms and the common difference .

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21. A man is employed to count Rs. 10710. He counts at the rate of Rs. 180 per minute for half an hour. After this he counts at the rate of Rs. 3 less every minute than the preceding minute. Find the time taken by him to count the entire amount.

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22. In an A.P., the first term is 22, n th term is -11 and the sum to first n terms is 66. Find n and d , the common difference.

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Ncert Section Exercise 5 1

1. In which of the following situations , does the list of numbers of 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 .

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

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



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

The cost of digging a well after every metre of dogging ,when it costs Rs 150 for the first metre and rises by Rs 50 for each subsequent metre .



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4. In which of the following situations , does the list of numbers of 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 .



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5. Write first three terms of the A.P ., when the first term is -1 and the common difference is 5.



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6. Write first three terms of the A.P ., when the first term is -3 and the common difference is 2.



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7. Write first three terms of the A.P ., when the first term is 11 and the common difference is -4.



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8. Write first four terms of the A.P ., when the first term a and the common difference d are given as follow :

$$a = -1, d = 1/2$$



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9. Write first four terms of the A.P., when the first term a and the common difference d are given as follow :

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

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10. For the following APs, write the first term and the common difference:

(i) $3, 1, 1, 3, \dots$

(ii) $5, 1, 3, 7, \dots$

(iii) $\frac{1}{3}, \dots, 5$

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11. For the following APs, write the first term and the common difference:

(i) $3, 1, 1, 3, \dots$

(ii) $5, 1, 3, 7, \dots$

(iii) $\frac{1}{3}, \dots, 5$

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12. For the following APs, write the first term and the common difference:

(i) $3, 1, 1, 3, \dots$

(ii) $5, 1, 3, 7, \dots$

(iii) $\frac{1}{3}, \dots, 5$



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13. For the following A.P's write the first term and the common difference

:

$6.6, 5.7, 4.8, 3.9, \dots$



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14. Write of the following are A.Ps ? If they form an A.P., find the common

difference and write three more terms .

$2, 4, 8, 16$



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15. Write of the following are A.P.s ? If they form an A.P., find the common difference and write three more terms .

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



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16. Write of the following are A.P.s ? If they form an A.P., find the common difference and write three more terms .

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



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17. Write of the following are A.P.s ? If they form an A.P., find the common difference and write three more terms .

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



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18. Write of the following are A.Ps ? If they form an A.P., find the common difference and write three more terms .

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



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19. Write of the following are A.Ps ? If they form an A.P., find the common difference and write three more terms .

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



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20. Write of the following are A.Ps ? If they form an A.P., find the common difference d and write three more terms .

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



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21. Write of the following are A.P.s ? If they form an A.P., find the common difference and write three more terms .

1,3,9,27



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22. Write of the following are A.P.s ? If they form an A.P., find the common difference and write three more terms .

a,2a,3a,4a



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23. Write of the following are A.P.s ? If they form an A.P., find the common difference and write three more terms .

a,2a,3a,4a



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24. Write of the following are A.P.s ? If they form an A.P., find the common difference and write three more terms .

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



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25. Write of the following are A.P.s ? If they form an A.P., find the common difference and write three more terms .

$$\sqrt{2}, \sqrt{3}, \sqrt{9}, \sqrt{12}, \dots$$



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26. Write of the following are A.P.s ? If they form an A.P., find the common difference and write three more terms .

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



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27. Write of the following are A.P.s ? If they form an A.P., find the common difference and write three more terms .

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



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28. Write of the following are A.P.s ? If they form an A.P., find the common difference and write three more terms .

$$1^2, 5^2, 7^2, 73, \dots$$



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Ncert Section 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:



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2. Choose the correct choice in the following and justify (i) 30th term of the AP: 10, 7, 4, ..., is (A) 97 (B) 77 (C) 77 (D) \ 87 (ii) 11th term of the $-3, -\frac{1}{2}, 2, \dots$, is (A) 28 (B) 22 (C) \ 38 (D) \ -48 1/

A. 97

B. 77

C. - 77

D. - 87

Answer:



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3. Choose the correct choice in the following and justify (i) 30th term of the AP: 10, 7, 4, ..., is (A) 97 (B) 77 (C) 77 (D) \ 87 (ii) 11th term of the $-3, -\frac{1}{2}, 2, \dots$, is (A) 28 (B) 22 (C) \ 38 (D) \ -48 1/

A. 28

B. 22

C. -38

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

Answer:

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4. In the following A.P.s , find the missing terms in the boxes :

2, , 26

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5. In the following A.P.s , find the missing terms in the boxes :

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

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6. In the following A.P.s , find the missing terms in the boxes :

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

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7. In the following A.Ps , find the missing terms in the boxes :

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

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8. In the following A.Ps , find the missing terms in the boxes :

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

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9. Which term of the A.P: 3,8,13,18. is 78 ?

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10. Find the number of terms in each of the following A.Ps : 7, 13, 19,

205



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11. Find the number of terms in each of the following A.Ps : 18, $15\frac{1}{2}$, 13, – 47

A. 27

B. 28

C. 29

D. 17

Answer: 27



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12. Check whether – 150 is a term of the A.P: 11, 8, 5, 2,

A. YES

B. NO

C.

D.

Answer: NO



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13. Find the 31^{st} term of an A.P. whose 11^{th} term is 38 and the 16^{th} term is 73.



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

A. 62

B. 64

C. 29

D. 94

Answer: The 29^{th} term is 64.



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15. If the 3^{rd} and the 9^{th} terms of an A.P. are 4 and -8 respectively ,which term of thi A.P. is zero ?



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16. The 17^{th} term of an A.p. exceeds its 10^{th} term by 7 . Find the common difference .

A. 0

B. 1

C. 2

D. None of these

Answer: The common difference is 1 .



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17. Which term of the A.P : 3, 15 , 27 , 39 will be 132 more than its 54^{th} term ?



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18. Two A.P .s have the same common difference . The difference between their 100^{th} term is 100, what is the difference between their 1000^{th} terms ?



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19. How many three -digit numbers are divisible by 7 ?

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

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21. For what value of n , are the n^{th} terms of two A.p.s : 63,65,67,.. . . . and 3,10,17,.. equal ?

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22. Determine the A.P. whose third term is 16 and the 7^{th} term exceeds the 5^{th} term by 12 .

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23. Find the 20^{th} term from the last term of the A.P.: 3,8,13,... . 253 .

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

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25. Subba Rao started work in 1995 at an annual salary of Rs 5000 and received an increment of Rs 200 each year. In which year did his income reach Rs 7000?

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26. Ramkali saved Rs 5 in the first week of a year and then increased her weekly savings by Rs 1.75. If in the n^{th} week, her weekly savings become Rs

20.75, find n .



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Ncert Section Exercise 5.3

1. Find the sum of the following A.P.s :

2, 7, 12, to 10 terms



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2. Find the sum of the following A.P.s :

$-37, -33, -29, \dots$ to 12 terms .



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3. Find the sum of the following A.P.s :

0.6, 1.7, 2.8, to 100 terms



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4. Find the sum of the following A.P.s :

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



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5. Find the sums given below :

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



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6. Find the sums given below :

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



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7. Find the sums given below :

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

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8. In an A.P:

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

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9. In an A.P:

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

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10. In an A.P:

given $a_{12} = 37$, $d = 3$, find a and S_{12}





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11. given: $a_3 = 15, S_{10} = 125$, find d and a_{10}



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12. given $d = 5, S_9 = 75$, find a and a_9 .



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13. In an A.P:

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



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14. In an A.P:

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





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15. In an A.P:

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



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16. In an A.P:

given $a = 3$, $n = 8$, $S = 192$, find d .



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17. In an A.P:

given $l = 28$, $S = 144$, and there are total 9 terms. Find a .



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

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

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

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21. Find the sum of first 22 terms of an A.P. in which $d = 7$ and 22^{nd} term is 149.

A. 1661

B. 1601

C. None of these

D. 1194

Answer: $S_{22} = 1661$



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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.



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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.

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24. Show that $a_1, a_2, \dots; a_n, \dots$ form an AP where a_n is defined as below : (i) $a_n = 3 + 4n$ (ii) $a_n = 9 - 5n$ Also find the sum of the first 15 terms in each case.

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25. Show that $a_1, a_2, \dots; a_n, \dots$ form an AP where a_n is defined as below : (i) $a_n = 3 + 4n$ (ii) $a_n = 9 - 5n$ Also find the sum of the first 15 terms in each case.

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26. 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.



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



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



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29. Find the sum of the odd numbers between 0 and 50.



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30. 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 Rs 50 more



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31. 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.



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32. 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.,



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33. 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 consec

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34. 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 Figure). In how many rows are the 200 logs placed and how many logs are in the top row?

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35. 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 Figure). A competitor starts from the bucket, pi

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Ncert Section Exercise 5 4

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

Find n for $a_n < 0$]

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

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3. A ladder has rungs 25 cm apart, (see 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?

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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.

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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 $\frac{1}{4}$ m and a tread of $\frac{1}{2}$ m (see figure). Calculate the total volume of concrete

required to build the terrace . [Hint : volume of concrete required to

$$\text{build the first step} = \frac{1}{4} \times \frac{1}{2} \times 50m^3]$$



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Exercise Multiple Choice Question Level 1

1. Find the sum to 200 terms of the series $1 + 4 + 6 + 5 + 11 + 6 + \dots$

A. 30210

B. 29800

C. 30200

D. None of these

Answer:



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2. What is the common difference of four terms in an A.P. such that the ratio of the product of the first and fourth terms to that of the second and third is 2:3 and the sum of all four terms is 20?

A. 3

B. 1

C. 4

D. 2

Answer:



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3. The first and last term of an A.P. are a and l respectively. If S is the sum of all the terms of the A.P. and the common difference is given by

$\frac{l^2 - a^2}{k - (l + a)}$, then $k =$ S (b) 2S (c) 3S (d) none of these

A. S

B. 2S

C. 3S

D. None of these

Answer:



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4. if $\frac{(b + c - a)}{a}$, $\frac{(c + a - b)}{b}$, $\frac{(a + b - c)}{c}$ are in AP, prove that $\frac{1}{a}$, $\frac{1}{b}$, $\frac{1}{c}$ are in AP.

A. a,b,c

B. a^2, b^2, c^2

C. $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$

D. None of these

Answer:



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5. v31

A. 197

B. 198

C. 199

D. 200

Answer:



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6. The 8^{th} term of an A.P is 17 and its 14^{th} term is 29 . The common difference of the A.P. is

A. 3

B. 2

C. 5

D. 4

Answer:



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7. If $2a + 3$, $(a + 2)$, $2a + 7$ are in A.P., then the value of a is

A. -3

B. -2

C. 3

D. 2

Answer:



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8. Which term of the A.P. $20, 17, 14, \dots$ is first negative term ?

A. 8^{th}

B. 6^{th}

C. 9^{th}

D. 7^{th}

Answer:



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9. The first ,second and last terms of an A.P. are repectively 4,7 and 31 .

How many terms are there in the given A.P.?

A. 10

B. 12

C. 8

D. 13

Answer:

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10. If the sum of first p terms of an A.P. is equal to the sum of the first q terms, then find the sum of the first $(p+q)$ terms.

A. 0

B. 1

C. 2

D. None of these

Answer:

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11. If the m^{th} term of an A.P. is $\frac{1}{n}$ and the n^{th} term is $\frac{1}{m}$, show that the sum of mn terms is $\frac{1}{2(mn + 1)}$ where $m \neq n$.

A. $mn + 1$

B. $\frac{mn + 1}{2}$

C. $\frac{mn - 1}{2}$

D. $\frac{mn - 1}{3}$

Answer:



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12. The sum of first n odd natural numbers is

A. n^2

B. $n + 1$

C. $2n + 1$

D. n

Answer:



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13. If $3x$, $x + 14$, $3x + 4$ are in A.P. , then the value of x is

A. 3

B. 4

C. 5

D. 6

Answer:



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14. Find the sum of first 30 terms of an A.P. whose second term is 2 and seventh term is 22.

A. 1585

B. 1680

C. 1685

D. None of these

Answer:



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15. The digits of a positive integer, having three digits, are in A.P. and their sum is 15. The number obtained by reversing the digits is 594 less than the original number. Find the number.

A. 594

B. 852

C. 849

D. 952

Answer:



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16. If four numbers in A.P. are such that their sum is 50 and the greatest number is 4 times the least, then the numbers are (a) 5, 10, 15, 20 (b) 4, 10, 16, 22 (c) 3, 7, 11, 15 (d) none of these

A. 5,10,15,20

B. 4,10,16,22

C. 2,6,10,14

D. None of these

Answer:



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17. If the first, second and last term of an A.P. are a , b and $2a$ respectively,

its sum is $\frac{ab}{2(b-a)}$ (b) $\frac{ab}{b-a}$ (c) $\frac{3ab}{2(b-a)}$ (d) none of these

A. $\frac{ab}{2(b-a)}$

B. $\frac{ab}{b-a}$

C. $\frac{3ab}{2(b-a)}$

D. None of these

Answer:



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

A. 60th

B. 65th

C. 75th

D. None of these

Answer:



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19. Sum of n terms of the series $\sqrt{2} + \sqrt{8} + \sqrt{18} + \sqrt{32} + \dots$ is $\frac{n(n+1)}{2}$ (b) $2n(n+1)$ (c) $\frac{n(n+1)}{\sqrt{2}}$ (d) 1

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

B. $2n(n+1)$

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

D. 1

Answer:



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20. In an A.P., if common difference $d = 3$, then $a_5 - a_7$ is equal to

A. 2

B. -2

C. 6

D. -6

Answer:



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21. The value of $a_{30} - a_{20}$ for the A.P. $-3, -1, 1, \dots$ is

A. 35

B. 30

C. 20

D. 25

Answer:



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22. The 4^{th} term of an A.P. is 14 and its 12^{th} term is 70 . What are first term and common difference ?

A. $7, -10$

B. $-7, 7$

C. $7, 7$

D. $10, 7$

Answer:

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23. If $3, 4 + p^2, 6 - p$ are in A.P. then p must be equal to

A. $\frac{1}{2}$

B. $\frac{2}{3}$

C. $\frac{1}{3}$

D. 1

Answer:

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24. The first and last terms of an A.P. are 1 and 11. If the sum of its terms is 36, then the number of terms will be (a) 5 (b) 6 (c) 7 (d) 8

A. 2

B. 10

C. 1

D. 6

Answer:



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25. The sum $(-6) + (0) + (6) + \dots$ Upto 13^{th} term =

A. 390

B. 1380

C. 378

D. 1830

Answer:



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26. If the second and seventh terms of an A.P. are 2 and 22 respectively.

Find the sum of first 35 terms:

A. 2210

B. 2310

C. 3420

D. 2140

Answer:



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

- A. 2 mins
- B. 3 mins
- C. 4 mins
- D. 5 mins

Answer:



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28. 25 trees are planted in a straight line 5 metre apart from each other. To water them the gardener must bring water for each tree separately from a well 10 metre from the first tree in line with the trees. The distance

he will move in order to water all the trees beginning with the first if he starts from the well is :

A. 3375 metres

B. 3380 metres

C. 3360 metres

D. 3370 metres

Answer:



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29. Two persons Anil and Happy joined D.W .Associates .Anil and Happy started with an intial salary of Rs 50000 and Rs 64000 respectively with annual increment of Rs 2500 and Rs 2000 each respectively .In which year will Anil start earning more salary than Happy ?

A. 28th

B. 29th

C. 30th

D. 27th

Answer:



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30. If a clock strikes once at one O'clock twice at two O'clock ,thrice at 3 O'clock and so on , and again once at one O'clock and so on , then how many times will the bell be struck in the course of 2 days ?

A. 156

B. 312

C. 78

D. 288

Answer: B



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31. The sum of all terms of an arithmetic progression having ten terms except for the first term is 99. Find the third term of the progression if the sum of the first term and the fifth term is equal to 10 .

A. 15

B. 5

C. 8

D. 10

Answer:



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32. A man is saves Rs 400 more each year than he did the year before . If he saves Rs 2000 in the first year then in how many years will his saving be Rs 97200 altogether ?

A. 19 years

B. 18 years

C. 15 years

D. 17 years

Answer:



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33. The sum of three terms of an A.P. is 21 and the product of the first and the third terms exceeds the second term by 6, find three terms .

A. 1,7,13

B. 1,6,14

C. 2,8,11

D. None of these

Answer:



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34. The angles of a quadrilateral are in A.P. whose common difference is 10° . Find the angles.

A. $80^\circ, 90^\circ, 100^\circ, 110^\circ$

B. $85^\circ, 95^\circ, 105^\circ, 115^\circ$

C. $75^\circ, 85^\circ, 95^\circ, 105^\circ$

D. None of these

Answer:



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35. Divide 56 into four parts which are in A.P. such that the ratio of product of extremes to the product of means is $5:6$.

A. 10,14,18,14

B. 14,16,18,8

C. 8,12,16,20

D. (a) and (c) both

Answer:



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Exercise Multiple Choice Question Level 2

1. The value of n for which the n^{th} terms of the A.P.s $2, 10, 18, \dots$ and $38, 40, 42, \dots$ are equal ,

A. 10

B. 12

C. 7

D. 14

Answer:





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2. If the sum of p terms of an A.P. is q and the sum of q terms is p , then the sum of the $p + q$ terms will be

A. 0

B. $p - q$

C. $p + q$

D. $-(p + q)$

Answer:



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3. S_n denote the sum of the first n terms of an A.P. If $S_{2n} = 3S_n$, then $S_{3n} : S_n$ is equal to

A. 3 : 2

B. 6 : 1

C. 8 : 3

D. 10 : 7

Answer:



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4. The number of terms of the A.P. 3,7,11,15, . . . to be taken so that their sum is 406 , is

A. 5

B. 10

C. 12

D. 14

Answer:



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5. The 9^{th} term of an A.P is 449 and 449^{th} term is 9 . The term which is equal to zero is .

A. 501^{th}

B. 502^{th}

C. 458^{th}

D. None of these

Answer:



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6. The production of TV in a factory increases uniformly by a fixed number every year .It produced 8000 TV's in 6^{th} year & 11300 in 9^{th} year , find the production in 8^{th} year .

A. 10500

B. 9800

C. 9700

D. 10200

Answer: 10200



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7. A sum of Rs 1000 is invested at 8 % simple interest per annum .Find the interest at the end of 30 years .

A. Rs 2500

B. Rs 2600

C. Rs 2400

D. Rs 2800

Answer:



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8. Number of students left in the school auditorium from the total strength of 1000 students when they leave the auditorium in batches of 25 form an A.P. Find the common difference.

A. 25

B. -25

C. 50

D. -50

Answer:



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

A. 1600

B. 1602

C. 1605

D. 1608

Answer: 1605



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10. If the seventh term of an A.P. is $\frac{1}{9}$ and its ninth term is $\frac{1}{7}$, find its 63^{rd} term .

A. 1

B. 2

C. 3

D. None of these

Answer: 1



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11. The sum of three consecutive terms of an A.P. is 21 and the sum of the squares of these terms is 165. Then product of the three terms is

- A. 210
- B. 140
- C. 56
- D. 280

Answer:



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12. x_1, x_2, x_3, \dots are in A.P. If

$x_1 + x_7 + x_{10} = -6$ and $x_3 + x_8 + x_{12} = -11$, then $x_3 + x_8 + x_{22}$

=

- A. -21

B. -15

C. -18

D. -31

Answer:



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13. In a garden bed , there are 33 rose plants in first row , 30 in the second , 27 in the third and so on . There are 3 rose plants in the last row . How many rows are there of rose plants ? Also , find the total number of rose plants in the garden .

A. 10200

B. 10150

C. 11140

D. 11198

Answer:



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14. A man starts repaying a loan with first monthly installment of Rs 1000. If he increases the installment by Rs 50 every month , what amount will he pay in the 30th installment ?

A. Rs 1450

B. Rs 2450

C. Rs 2050

D. Rs 2040

Answer:



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15. A contract on construction job specifies a penalty for delay of completion beyond a certain date as follow : Rs 500 for the first day , Rs 550 for the second day , Rs 600 for the third day , etc the penalty for each succeeding day being Rs 50 more than for the preceding day . How much money the contractor has to pay as penalty , if he has delayed the work by 50 days ?

A. Rs 37750

B. Rs 20750

C. Rs 86250

D. Rs 25570

Answer:



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Exercise Match The Following

1. Match the A.P. given in List - I with their common difference given in List

- II

List-I	List-II
(P) $1, \frac{3}{2}, 2, \frac{5}{2}, \dots$	(1) -4
(Q) $\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3}, \dots$	(2) 0.2
(R) $1.8, 2.0, 2.2, 2.4$	(3) $\frac{4}{3}$
(S) $0, -4, -8, -12$	(4) $\frac{1}{2}$



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2. Match the List - I with List - II.

List-I	List-II
(P) Sum of the first 20 terms of A.P. $-6, 0, 6, 12, \dots$ is	(1) 7500
(Q) Sum of the first 14 terms of an A.P. is 1050 and its first term is 10. Its 20 th term is	(2) 1020
(R) Sum of the A.P., $1, 3, 5, \dots, 199$ is	(3) 200

(S) Sum of all odd numbers
between 100 and 200 is

(4) 10000

(a) P-2, Q-4, R-3, S-1

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Exercise Assertion Reason Type

1. The n th term of a sequence is $3n - 2$ is the sequence an A.P.? If so, find its 10th term.

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false .

D. If assertion is false but reason is true .

Answer:



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2. Find the 7th term from the end of A.P. $3+5+7+\dots+75$.

- A. If both assertion and reason are true and reason is the correct explanation of assertion .
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false .
- D. If assertion is false but reason is true .

Answer:



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3. The n^{th} term of a pattern of numbers is $2n^2 + 1$.Is this pattern of numbers an A.P. ?

4. If a, b, c are in A.P., prove that the following are also in A.P.

$$\frac{1}{bc}, \frac{1}{ca}, \frac{1}{ab}, \quad \text{(ii)} \quad b + c, c + a, a + b \quad \text{(iii)}$$

$$a\left(\frac{1}{b} + \frac{1}{c}\right), b\left(\frac{1}{c} + \frac{1}{a}\right), c\left(\frac{1}{a} + \frac{1}{b}\right) \quad \text{(iv)}$$

$$a^2(b + c), b^2(c + a), c^2(a + b) \quad \text{(v)}$$

$$\left\{(c + c)^2 - a^2\right\}, \left\{(c + a)^2 - b^2\right\}, \left\{(a + b)^2 - c^2\right\} \quad \text{(vi)}$$

$$\frac{1}{\sqrt{b} + \sqrt{c}}, \frac{1}{\sqrt{c} + \sqrt{a}}, \frac{1}{\sqrt{a} + \sqrt{b}}$$

5. Assertion : The sum of the first 100 positive integers is 5550.

Reason: The sum of the first n natural numbers is $\frac{n(n + 1)}{2}$.

A. If both assertion and reason are true and reason is the correct explanation of assertion .

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false .

D. If assertion is false but reason is true .

Answer:



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Exercise Comprehension Type Passage I

1. Sum of first 15 multiples of 8 is

A. 840

B. 1020

C. 960

D. 920

Answer:



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2. Find the sum of the first 51 terms of the A.P.: whose second term is 2 and fourth term is 8.

A. 4170

B. 2970

C. 3720

D. 3774

Answer:



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3. Find the sum of first 10 terms of the A.P. $x - 8, x - 2, x + 4, \dots$

A. $10x + 210$

B. $10x + 190$

C. $5x + 190$

D. $5x + 210$

Answer:



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Exercise Comprehension Type Passage Ii

1. If the sum of n terms of an A.P. is given by $S_n = (3n^2 + 2n)$, find its n^{th} term.

A. $6n + 1$

B. $6n - 1$

C. $4n - 2$

D. $4n - 1$

Answer:



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2. If sum of n terms of an A.P. is $4n^2 + 7n$, find the 15^{th} term.

A. 123

B. 142

C. 153

D. 136

Answer:



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3. If sum of n terms of an A.P. is $n^2 + 13$, find its 13^{th} term.

A. 24

B. 12

C. 25

D. 13

Answer:



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Exercise Subjective Problems Very Short Answer Type

1. Determine the AP whose 3^{rd} term is 5 and the 7^{th} term is 9.



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2. Find the 11^{th} term from the last term (towards the first term) of the A.P.

: 10, 7, 4, ..., - 62.

A. 32

B. -32

C. None of the above

D. 45

Answer: -32



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3. If $4x$, $x + 12$, $5x + 3$ are in A.P., find the value of x .



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4. If the n^{th} term of an A.P. is $(2n + 1)$, find the sum of first n terms of the A.P.



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5. How many terms of the series $54, 51, 48, \dots$ be taken so that their sum is 513? Explain the double answer



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6. If $\frac{2}{3}$, k , $\frac{5k}{8}$ are n A.P., find the value of k

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7. The 6^{th} term of an A.P. is -10 and the 10^{th} term is -26 . Determine the 15^{th} term of the A.P.

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8. If the sum of n terms of a a sequence is quadraic expression it always represents an AP .

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9. How many multiples of 6 lies between 20 and 400 ?

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10. If a, b, c are in A.P., prove that $a^2 + c^2 - 2bc = 2a(b - c)$.

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Exercise Subjective Problems Short Answer Type

1. Which term of the A.P 6, 13, 20, 27, ... is 98 more than its 24^{th} term ?

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2. If the sum of n terms of an A.P. is $(pn + qn^2)$, where p and q are constants, find the common difference.

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3. For what value of n and the n^{th} terms of the following two A.Ps the same? 1, 7, 13, 19, (ii) 69, 68, 67,



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4. If m th term of an AP is $1/n$ and its n th term is $1/m$, then show that its (mn) th term is 1



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5. Divide 69 into three parts which are in A.P. and the product of the two smaller parts is 483.



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6. Find four numbers in A.P whose sum is 8 and the sum of whose squares is 196 .



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7. Prove that no matter what the real numbers a and b are, the sequence with n th term $a + nb$ is always an AP . What is the common difference?

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8. The fourth term of an A.P. is equal to 3 times the first term and seventh term exceeds twice the third term by 1. find the first term and the common difference.

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9. (i) If the sum of a certain number of terms of the A.P. 25,22,19,..... is 116, find the last term.

(ii) Find the sum of 32 terms of an A.P. whose third terms is 1 and the 6th term is -11.

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10. Vinod saves Rs 1600 during the first year , Rs 2100 in the second year , Rs 2600 in the third year .If he continues his savings in this pattern , in how many years will he save Rs 38500 ?



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Exercise Subjective Problems Long Answer Type

1. A gentleman buys every year Bank's certificates of value exceeding the last year's purchase by Rs. 25. After 20 years he finds that the total value of the certificates purchased by him is Rs. 7250. Find the value of the certificates bought by him:

(i) in the first year

(ii) in the 13 th year.



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2. Three positive integers a_1, a_2, a_3 are in A.P. , such that $a_1 + a_2 + a_3 = 33$ and $a_1 \times a_2 \times a_3 = 1155$. Find the integers a_1, a_2, a_3 .



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3. In an A.P., the first term is 2 and the sum of the first five terms is one-fourth of the next five terms. Show that 20th term is 112.



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4. Find the sum of all natural numbers less than 1000 which are neither divisible by 5 nor by 2.



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5. The sum of the first p, q, r terms of an A.P. are a, b, c respectively. Show

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

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Exercise Subjective Problems Integer Numerical Value Type

1. If sum of n terms in an A.P is $\left(\frac{5n^2}{2} + \frac{3n}{2}\right)$ then find its 20th term

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2. If $a, (2 + 5a)$ and $2(4a - 5)$ are in A.P. , find values of a .

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3. The sum of three numbers in AP is 21 and their product is 231. Find the numbers.



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4. (i) 10 times the 10th term and 15 times the 15th term of an A.P. are equal. Find the 25th term of this A.P .

(ii) 17 times the 17th term of an A.P. is equal to 18 times the 18th term. Find the 35th term of this progression.



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5. If the sum of first 24 terms of a sequence whose n^{th} term is given by

$$t_n = 3 + \frac{2n}{3} \text{ is } k, \text{ then what is the value of } k ?$$



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6. The 7^{th} term of an A.P. is 14 and its 13^{th} term is 50 . Find its common difference .



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7. The first and last term of an A.P. are a and l respectively. If S is the sum of all the terms of the A.P. and the common difference is given by $\frac{l^2 - a^2}{k - (l + a)}$, then $k =$ (a) S (b) $2S$ (c) $3S$ (d) none of these

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8. The 6th term from end of an A.P. having first term 17 and total terms 22 is 65. Find the common difference.

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9. 4. (a) Divide 20 into 4 parts which are in A.P. and such that. the product of the first and fourth is to the product of the second and third in the ratio 2:3.

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10. The 10th term of sequence $\sqrt{3}, \sqrt{12}, \sqrt{27} \dots$ is



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Olympiad Hots Corner

1. The 7th term of an A.P. is 5 times the first term and its 9th term exceeds twice the 4th term by 1. The first term of the A.P. is

A. 151

B. - 39

C. 3

D. - 124

Answer:



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2. In the arithmetic progression 7, 10, 13, ... how many terms will add up to a sum of 920 ?

A. 25

B. 16

C. 27

D. 23

Answer:



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3. 7. $\frac{1}{p+q}, \frac{1}{q+r}, \frac{1}{r+p}$ are in AP, then

A. p,q,r are in A.P.

B. q^2, p^2, r^2 are in A.P.

C. p^2, q^2, r^2 are in A.P.

D. q,p,r are in A.P.

Answer:



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4. If the p^{th} term of an A.P is q and q^{th} term is p , prove that its n^{th} term is $(p+q-n)$

A. $p + q - n$

B. $p + q + n$

C. $p - q - n$

D. $q - p - n$

Answer:



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5. In an A.P., $S_m = n$ and $S_n = m$ also $m > n$,find the sum of first $(m - n)$ terms .

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

B. $\frac{(m + n)(2m + n)}{m}$

C. $\frac{(m - n)(m + 2n)}{n}$

D. $\frac{(m - n)(2m + n)}{n}$

Answer:



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6. State 'T' for true and 'F' for false .

I. A sequence is an A.P ., if and only if the sum of its n terms is of the form

$An^2 + Bn$, where A and B are constants .

II. If $18, a, b, -3$ are in A.P., then $a + b = 15$.

III If a, c, b are in A.P., then $2c = a + b$.

IV .The n^{th} term from the end of an A.P. is the $(m - n + 1)^{th}$ term from

the beginning , where m terms are in A.P.

	I	II	III	IV
(a)	F	F	T	T
(b)	T	T	T	F
(c)	F	T	T	F
(d)	T	T	T	T



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7. If 9 times the 9^{th} term in an arithmetic progression is equal to 15 times the 15^{th} term in arithmetic progression , what is the 24^{th} term ?

- A. 0
- B. 9
- C. 15
- D. 23

Answer:



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8. If S_n denotes the sum of first n terms of an A.P., then

$\frac{S_{3n} - S_{n-1}}{S_{2n} - S_{n-1}}$ is equal to

A. $S_n - S_{n-1}$

B. nd

C. 0

D. $S_{3n} - S_n$

Answer:



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9. In an AP, it is given that $S_5 + S_7 = 167$ and $S_{10} = 235$, then find the AP, where S_n denotes the sum of its first n terms.

A. $1, 6, 11, 16, 21, \dots$

B. 1, 5, 9, 13, 17,

C. 2, 8, 14, 20, 26. . . .

D. 2, 5, 8, 11, 15. . . .

Answer:



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10. If the 10^{th} term of an AP is 52 and 17^{th} term is 20 more than its 13^{th} term. Find the AP.

A. 40, 45, 50,

B. 45, 50, 55,

C. 17, 22, 27,

D. 7, 12, 17,

Answer:



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11. Sum of the first 14 terms of an AP is 1505 and its first term is 10. Find its 25th term.

- A. 370
- B. 320
- C. 380
- D. 390

Answer:



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12. Which of the following options is incorrect ?

- A. The number of terms in the A.P. 3, 6, 9, 12, ... 111 is 37
- B. If the first three terms of an A.P are $x - 1$, $x + 1$ and $2x + 3$, then the value of x is 0.

C. The sum of first 'n' natural numbers is $\left[\frac{n(n+1)}{2} \right]^2$

D. None of these

Answer:

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13. In an A.P. the sum of the first ten terms is 210 and the difference between the first and the last term is 36. Find the first term in the A.P.

A. 2

B. 3

C. 4

D. 5

Answer: 3

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14. If $x \neq y$ and the sequences x, a_1, a_2, y and x, b_1, b_2, y each are in A.P.,

then $\frac{a_2 - a_1}{b_2 - b_1}$ is

A. $\frac{2}{3}$

B. $\frac{3}{2}$

C. 1

D. $\frac{3}{4}$

Answer:



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15. Show that the sum of an AP whose first term is a , the second term b

and the last term c , is equal to $\frac{(a + c)(b + c - 2a)}{2(b - a)}$.



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