MATHS

BOOKS - VK GLOBAL PUBLICATION MATHS (HINGLISH)

ARITHMETIC PROGRESSIONS

Very Short Answer Questions

1. Which of the following can be the nth term of an AP ?

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

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2. Is 144 a term of the A.P. 3,7,11,.....? Justify your answer.

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3. The first term of an AP is p and its common difference is q. Find its 10th term.

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4. For what value of k: $2k$, $k+10$, $3k+2$ are in A.P

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

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

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7. For what value of p are $2p+1,\ 13,\ 5p-3$ are three consecutive terms of an A.P.?

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8. In an AP, if d = -4, n = 7 and a_n = 4, then a is equal to

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

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

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11. If 7 times the 7th term of an AP is equal to 11 times its 11th term, then its 18th term will be

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12. In an AP, if a = 1, a_n= 20 and S_n = 399, then n is equal to

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13. Find the 9th term from the ctowards the first term of the A.P. 5,9,13,....,185

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Short Answer Questions I

1. In which of the following situations, does the list of numbers involved make an arithmetic progression, and why? (i) The taxi fare after each km when the fare is Rs 15 for the first km and Rs 8 for each additional km. (ii) The amount of air

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

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

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

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

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6. The sum of the first n terms of an A.P. is $3n^2 + 6n$. Find the nth term of this A.P.

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7. How many terms of the sequence $18, 16, 14, \cdot$ should be taken so that their sum is zero?

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8. If the 4th term of an A.P. is zero, prove that the 25th term of the A.P. is three times its 11th term.

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9. The ratio of the sum of m and n terms of an A.P. is $m^2 : n^2$. Show that the ratio mth and nth term is (2m-1) : (2n-1).

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Short Answer Questions Ii

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

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2. Find the 31^{st} term of an AP whose 11^{th} term is 3 8 and the 16^{th} term is 73.

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

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4. If the 8th term of an A.P. is 31 and the 15th term is 16 more than the 11th term, find the A.P.

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5. Which term of the arithmetic progression $5, 15, 25, \cdot$ will be 130 more than its $31st$ term?

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6. Find the sums given below:

$7 + \frac{21}{2} + 14 + \ldots . + 84$

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

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

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

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10. The first term, common difference and last term of an A.P. are 12,6 and 252 respectively, Find the sum of all terms of this A.P.

11. 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.

12. 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.

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13. If the seventh term of an AP is 1/9 and its ninth term is 1/7, find its $(63)^{rd}$ term.

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14. The sum of 5th and 9th terms of an A.P. is 30. If its 25th term is three times its 8th term, find the A.P.

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15. 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.

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16. The ratio of the sum of n terms of two A.P. s is $(7n+1):(4n+27)$. Find the ratio of their mth terms.

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Long Answer Questions

1. 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.

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

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3. Divide 56 in four parts in A.P. such that the ratio of the product of their extremes (1st and 4th) to the product of means (2nd and 3rd) is 5:6.

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4. In a AP of 50 terms the sum of first 10 terms is 210 and the sum of last 15 terms is 2565. Then find the AP

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5. If S_n denotes the sum of the first n terms of an A.P., prove that $S_{30} = 3(S_{20} - S_{10})$.

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6. 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.

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7. 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 (Hint: $S_{x-1} = S_{49} - S_x$)

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Hots Higher Order Thingking Skills

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

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2. Find the sum of all two digit numbers which when divided by 4, yields 1 as remainder.

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3. The academic performance of students can be improved if parents are encouraged to

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

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5. If the sum of first m terms of an A.P. is the same as the sum of its first n terms, show that the sum of tis $(m+n)$ terms is zero.

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6. The ratio of the sum of m and n terms of an A.P. is $m^2 : n^2$. Show that the ratio mth and nth term is (2m-1) : (2n-1).

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7. 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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8. If a^2, b^2, c^2 are in A.P, show that: $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are in A.P.

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Proficiency Exercise Very Short Answer Questions

1. Find the common difference of an AP in which $a_{25} - a_{12} = -52$.

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2. If the common difference of an AP is -6 then find $a_{16} - a_{12}$

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3. If sum of n terms of an AP is $3n^2 + n$. Find its 10^{th} term.

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4. If $\frac{6}{5}$,a, 4 are in AP, find the value of a.

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5. The $9th$ term of an A.P. is 449 and 449th term is 9. The term which is equal to zero is $501th$ (b) $502th$ (c) $508th$ (d) none of these

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6. Find the common difference if n^{th} term of AP is 7-4n.

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7. If the sum of n terms of an AP is $2n^2 + 7n$, then which of its terms is 113?

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8. Find the sum of first 25 even natural numbers.

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9. Find the common difference of an AP whose n^{th} term is 6n + 2.

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10. Find the next term of the AP $\sqrt{3}, \sqrt{27}, \sqrt{75}$ .....

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

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12. For what value of k will the consecutive terms $2k+1, 3k+3$and $5k-1$ form an AP?

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Proficiency Exercise Short Answer Question I

1. The first term a = -5, the common difference d = $\frac{1}{2}$.Find the first four terms.

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2. The first term a = 3, the common difference d = -0.25. Find the n^{th} and 10^{th} term.

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3. If 2, a, $\frac{16}{3}$ forms an AP, find the value of a.

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4. For what values of 'k', k - 3, 26 + 1 and 4k + 3 are in AP?

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5. Find a, b and c such that the numbers a,1 ,b, 15, c are in AP.

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

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7. Without using the formula for the nth term, find which term of the AP : 5, 17, 29,41,.....will be 120 more than its 15 th term. Justify your answer.

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8. Write the value of $a_{25} - a_{15}$ for the AP 5, 9, 13, 17.....

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9. Write 7th term from the end of the AP: 7, 9, 11, 13,.....213.

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10. The nth term of an AP is 5n+ 2. Find the common difference.

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11. The general term of a sequence is given by $a_n = -4n + 15$. Is the sequence an $A\dot{P}$. ? If so, find its $15th$ term and the common difference.

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12. Write the sequence with nth terms:

$a_n = 3 + 4n$ (ii) $a_n = 5 + 2n$ $a_n = 6 - n$ (iv)

$a_n = 9 - 5n$

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13. Find the $6th$ term from the end of the $A\dot{P}$.

$17,\ 14,\ 11,\ ;\ -40$

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14. Which term of the A.P. $21, 42, 63, 84, \cdot$ is 420?

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15. Which term of the AP: 115, 110, 105,.....is its first negative term?

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16. If the sum of the first q terms of an AP is 2q + $3q^2$, what is its common difference?

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17. Find the common difference of an AP whose first term is 4, the last term is 49 and the sum of all its terms is 265.

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18. How many terms are there in the A.P. $-1, -\frac{5}{6}, -\frac{2}{3}, -\frac{1}{2}, , \frac{10}{3}$?

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19. In an A.P., the sum of first n terms is $\frac{3n^2}{2} + \frac{13}{2}n$. Find its $25th$ term.

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20. If the sequence `<>$isA.P.,showt^

a_(m+n)+a_(m-n)=2a_mdot\`

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21. Which of the following form an ap ? Justify your answer

0, 0, 1, 1, 2, 2, 3, 3 .....

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22. Which of the following form of an AP ? Justify Your answer.

(i) $-1, \ -1, \ -1, \ -1, \ldots$

(ii) $0, 2, 0, 2, \ldots$

(iii) $1, 1, 2, 2, 3, 3, \ldots$

(iv) $11, 22, 33, \ldots$

(v) $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots$

(vi) $2, 2^2, 2^3, 2^4$

(vii) $\sqrt{3}, \sqrt{12}, \sqrt{27}, \sqrt{48}, \ldots$

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23. Which of the following form an ap ? Justify your answer

$\sqrt{3}, \sqrt{12}, \sqrt{27}, \sqrt{48}$.....

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24. Is 0 a term of the AP 31, 28, 25, ...? Justify your answer.

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25. Is the sum of m terms of an AP always less than the sum of (m +1) terms? Give reason.

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26. Is it true to say that $a_n = 3n^2 + 5$ is the n^{th} term of an A.P. sequence? Justify your answer.

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27. For the AP $-3, -7, -11, \ldots$ can we find directly $a_{30} - a_{20}$ without actually finding a_{30} and a_{20} ? Give reason for your answer.

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

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29. The sum of the 2nd and the 7th terms of an AP is 30. If its 15th term is 1 less than twice its 8th term, find the AP.

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30. The sum of the first n terms of an A.P. is $4n^2 + 2n$. Find the nth term of this A.P.

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Proficiency Exercise Short Answer Question Ii

1. Find the 41st term of an AP whose 13th term is 79 and 26th term is 157.

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2. Which term of the AP $\frac{5}{6}, 1, 1\frac{1}{6}, 1\frac{1}{3}, \ldots$ is 3?

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3. Which term of the AP, 4, 9, 14, 19.....is 139?

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4. An AP consists of 37 terms. The sum of the three middle most terms is 225 and the sumj of the last three terms is 429. Find the AP.

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

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6. Determine the AP whose fifth term is 19 and the difference of the eighth term from the thirteenth term is 20.

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7. 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.

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8. The sum of 5th and 9th terms ofan AP is 72 and the sum of 7th and 12th terms is 97. Find the AP.

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9. Two AP's have the same common difference. The 1 st term of one of these is -5 and that of the other is 2. What is the difference between there (z) 5th term (ii) 12th term?

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10. How many multiples of 5 lie between 50 and 250?

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11. How many three-digit numbers are divisible by 9?

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12. 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)

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13. If m times the mth term of an AP is equal to n times its nth term, then show that (m + n)th term of an AP is zero.

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14. Is -156 a term of the AP 17, 14, 11, 8 ..... ?

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15. Find the number of terms of an AP whose first and last terms are 5 and 80 respectively and the common difference is 3.

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

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17. Which term of the A.P. 3,10,17, ... with be 84 more than its 13th term?

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18. If $9th$ term of an A.P. is zero, prove that its $29th$ term is double the $19th$ term.

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19. For what value of n, are the nth terms of two AP's : 15, 12, 9 ,.....and -15, -13, -11.... equal?

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20. The sum of the 6th and 9 th terms ofan AP is 101 and the sum of the 10th and 16th terms is 178. Find the first three terms of the AP.

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21. The $4th$ term of an A.P. is three times the first and the $7th$ term exceeds twice the third term by 1. Find the first term and the common difference.

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22. 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.

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23. If the sum of the first n terms of an AP is 4n - n^2, what is the 10th term and the nth term?

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24. If the nth term of an AP is (2n +1) then the sum of its first three terms is

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25. The sum of first six terms of an A.P. is 42. The ratio of its 10th term to 30th term is 1 : 3. Calculate the first and 13th term of the A.P.

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26. Find the sum of all three digit natural numbers, which are divisible by 7.

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27. Find the sum of the AP $3, \frac{9}{2}, 6, \frac{15}{2}$ ..... to 25 terms.

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28. How many terms are there in the A.P. whose first and fifth terms are -14 and 2 respectively and the sum of the terms is40?

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29. Solve the equation $-4+(-1)+2+\ldots+x=437.$

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30. 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 then sum?

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31. If 12th term of an A.P. is -13 and the sum of the first four terms is 4, what is the sum of first 10 terms ?

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32. Find the sum of the first 25 terms of an A.P. whose nth term is given by $a_n = 2 - 3n$.

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33. Yasmeen saves Rs. 32 during the first month, Rs. 36 in the second month and Rs. 40 in the third month. If she continues to save in this manner, in how many months will she save rS. 2000?

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34. Find the first term of an AP having 9 terms whose last term is 28 and sum of all the terms is 144

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

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36. Find the value of the middle most term(s) of the AP: -15, -1 1 ,..... 53.

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37. Find the sum:

$(i)\left(4-\frac{1}{n}\right)+\left(4-\frac{2}{n}\right)+\left(4-\frac{3}{n}\right)$+...up to n terms

(ii) $\frac{a-b}{a+b}+\frac{3a-2b}{a+b}+\frac{5a-3b}{a+b}$+.....to 20 terms

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38. Which term of the AP $-2, -7, -12, \ldots$ will be -77 ? Find the sum of this AP upto the term -77.

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39. Split 207 into three parts such that these are in AP and the product of the two smaller parts is 4623.

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Proficiency Exercise Long Answer Questions

1. Find the sum of the integers between 100 and 200 that are

(i) divisible by 9. (ii) not divisible by 9.

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2. Find the sum of the integers between 100 and 200 that are divisible by 3

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3. 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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4. Sum of the first p, q and r terms of an A.P are a, b and c, respectively.Prove that $\frac{a}{p}(q-r)+\frac{b}{q}(r-p)+\frac{c}{r}(p-q)=0$

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5. If the pth term of AP is $\frac{1}{q}$ and its q th term is $\frac{1}{p}$ show that sum of pq terms is $\frac{1}{2}(pq+1)$

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6. The sum of the first five terms of an AP is 55 and sum of the first ten terms of this AP is 235, find the sum of its first 20 terms.

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7. The ratio of the 11th term to the 18th term of an AP is $2:3$. Find the ratio of the 5th term to the 21st term and also the ratio of the sum of the first five terms to the sum of the first 21 terms.

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8. A sum of Rs 2700 is to be used to give eight cash prizes to students of a school for their overall academic performance. If each prize is

Rs 25 more than its preceding prize, find the value of each of the prizes.

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9. Three hundred sixty bricks are stacked in the following manner: 30 bricks in the bottom row, 29 in the next row, 28 in the row next to it and so on. In how many rows are the 360 bricks placed and how many bricks are there in the top row?

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10. Reshma repays her total loan of Rs 1,75,000 by paying every month starting with the first installment of Rs 1500. If she increases the installment by Rs 175 every month, what amount will be paid by her in the 21st instalment? What amount of loan does she still have to pay after the 21st instalment?


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11. The students of a shool decided to beautifly the school on the annual day by fixing colourful flags on the straight passage of the school. They have 27 flags to be fixed at intervals of every 2 m. The flags are stored at the position of the middle most flag. Ruchi was given the responsibility of placing the flags.

Ruchi kept her books where the flags wer stored. She could carry only one flag at a time. How much distance she did cover in completing this job and returning back to

collect her books ? What is the maximum distance she travelled carrying a flag ?

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12. A man saved Rs 200 during the first month, Rs 225 in the second month and in this way he increases his savings by Rs 25 every month. Find in what time his saving will be Rs 13325.

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13. A contract on construction job specifies a penalty for delay of completion beyond a certain days as follows: Rs. 180 for the first day, Rs. 200 for the second day, etc., the penalty for each succeeding day being Rs. 20 more than the preceding day. (i) How much money the contractor has to pay as penalty, if he has delayed the work by 15 days? (ii) For how many days has the contractor delayed the work if he paid Rs. 7400 as penalty?

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14. A manufacturer of wire produced 1400 m wire in the 5 th year and 1600 m in the 9th year. Assuming that the production increases uniformly by a fixed number every year, find

(i) the production in the 12th year.

(ii) in which year the production will be 1900 m?

(iii) the total production in 9 years.

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15. Find the middle term of the sequence formed by all three-digit numbers which leave a remainder 3, when divided by 4. Also find the sum of all numbers on both sides of the middle terms separately

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16. Find the sum of all the two digit numbers which are either multiples of 2 or 3.

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17. Ramkali required Rs 2500 after 12 weeks to send her daughter to school. She saved Rs100 in first week and increased her weekly savings 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?

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18. An arithmetic progression 5, 12, 19,..., has 50 terms. Find its last term. Hence find the sum of its last 15 terms

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19. Find the middle term of the sequence formed by all numbers between 9 and 95, which leave a remainder 1 when divided by 3. Also find the sum of the numbers on both sides of the middle term separately.

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20. The sums of n terms of three arithmetical progressions are $S_1, S_2 and S_3 \cdot$ The first term of each unityand the common differences are $1, 2 and 3$ respectively. Prove that $S_1 + S_3 = 2S_2 \cdot$

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21. If pth,qth and rth terms of an A.P. are a, b, c respectively, then show that (i) a(q-r)+b(r-

p)+c(p-q)=0

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Self Assessment Test

1. If the common difference of an AP is 3, then find the value of $a_{17} - a_{12}$

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2. If the 2nd term of an AP is 13 and 5th term is 25, what is its 7th term ?

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3. Find the sum of first five multiples of 7.

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4. The first and the last terms of an AP are 8 and 65 respectively. If the sum of all its terms

is 730, find its common difference.

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5. Is 0 a term of the AP 31, 28, 25, ...? Justify your answer.

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

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7. The sum of the first 7 terms of an AP is 182. If its 4th and 17th terms are in the ratio 1:5, find the AP.

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8. Show that $a_1, a_2, ..., a_n, \cdots$ 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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9. Solve the equation: $1 + 4 + 7 + 10 + \ldots + x = 287$

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10. Jaspal Singh repays his total loan of Rs. 118000 by paying every month starting with the first installment of Rs. 1000. If he increases the installment by Rs. 100 every month, what amount will be paid by him in the 30th

installment? What amount of loan does he still have to pay after the 30th installment?

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