MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

ARITHMETIC PROGRESSIONS

Others

1. Find the middle term of the A.P. 213, 205, 197, ..., 37.

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2. If in an A.P. the sum of m terms is equal to n and the sum of n terms is equal to m then prove that the sum of $(m+n)$ terms is $-(m+n)$

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

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4. Find the 0 where the AP is 40,37,...

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5. Find whether 0 (zero) is a term of the AP 40, 37, 34, 31, ...

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6. If $\frac{1}{x+2}, \frac{1}{x+3}, \frac{1}{x+5}$ are in A.P. Then, $x =$

A. 5

B. 3

C. 2

D. 1

Answer: D

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

A. 99

B. 89

C. 109

D. 119

Answer: B

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8. The sum of first 6 terms of an arithmetic progression is 42. The ratio of its 10th term to its 30th term is $1:3$. Calculate the first and 13th term of an AP.

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9. Find the sum of first 20 terms of an A.P., in which 3rd term is 7 and 7th term is two more than thrice of its 3rd term.

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10. The sum of 5th and 9th terms of AP is 30. If its 25th term is three times it 8th term, find the AP.

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11. 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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12. 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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13. 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} term.

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14. Find the sum of all natural numbers between 250 and 1000 which are exactly divisible by 3.

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15. The sum of the first p, q, r terms of an A.P. are a, b, c respectively. Show that $\frac{a}{p}(q-r)+\frac{b}{q}(r-p)+\frac{c}{r}(p-q)=0$

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16. If m times the m^{th} term of an A.P. is equal to n times its n^{th} term, show that the $(m+n)^{th}$ term of the A.P. is zero.

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

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18. 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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19. For the following arithmetic progressions write the first term and common difference $\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3}$, (ii) $0.6, 1.7, 2.8, 3.9, \ldots$

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20. Is 184 a term of the sequence 3,7,11, ... ?

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21. If the 10th term of an A.Pis 52 and 17th term is 20 more than the 13th term, find the A.P.

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22. 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.

A. 15, 19, 23, 27.....

B. 3 , 7 , 11 , 15 .....

C. 7 , 11 , 15,19 .....

D. 11 , 15, 19, 23 .....

Answer: B

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23. Write the first five terms of each of the following sequences whose n th terms are: $a_n = 3n + 2$ (ii) $a_n = \frac{n-2}{3}$ $a_n = 3^n$ (iv) $a_n = \frac{3n-2}{5}$ $a_n = (-1)^n.2^n$ (vi) $a_n = \frac{n(n-2)}{2}$ (vii)$a_n = n^2 - n + 1$ (viii) $a_n = 2n^2 - 3n + 1$ (ix)$a_n = \frac{2n-3}{6}$

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24. Let a sequence be defined by $a_1 = 1, a_2 = 1$ and $a_n = a_{n-1} + a_{n-2}$ for all $n > 2,$ Find $\frac{a_{n+1}}{a_n}$ for $n = 1, 2, 3, 4.$

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25. Find the next five terms of each of the following sequences given by:

$(1) a_1 = 1, a_n = a_{n-1} + 2, n \geq 2$

$(2) a_1 = a_2 = 2, a_n = a_{n-1} - 3, n > 2$

$(3) a_1 = -1, a_n = \frac{a_{n-1}}{n}, n \geq 2$ $(4) a_1 = 4, a_n = 4a_{n-1} + 3, n > 1$

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26. Find the indicated terms in each of the following sequences whose nth terms are: $a_n = 5_n - 4; a_{12}$ and a_{15} $a_n = \frac{3n-2}{4n+5}; a_7$ and a_8 $a_n = n(n-1); a_5$ and a_8 $a_n = (n-1)(2-n)(3+n); a_1, a_2, a_3$ $a_n = (-1)^{\cap}; a_3, a_5, a_8$

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27. Write the first five terms of the sequence defined by $a_n = (-1)^{n-1}.2^n$

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

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29. Let sequence by defined by $a_1 = 3$, $a_n = 3a_{n-1} + 1$ for all $n > 1$

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30. A sequence is defined by $a_n = n^3 - 6n^2 + 11n - 6$. Show that the first three terms of the sequence are zero and all other terms are positive.

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31. Which term of the arithmetic progression 8,14,20,26, ... will be 72 more than its 41st term?

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

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33. 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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34. Two A.P's have the same common difference. The difference between their 100th terms is 111222333. What is the difference between their Millionth terms?

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35. Find the 8th term from the end of the A.P. 7,10,13, ..., 184

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

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37. If $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ is the A.M. between a and b. Then, find the value of n

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38. Find the number of integers between 50 and 500 which are divisible by 7.

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39. 150 workers were engaged to finish a piece of work in a certain number of days. Four workers dropped the second day, four more workers dropped the third day and so on. It takes 8 more days to finish the work now. Find the number of days in which the work was completed.

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40. How many numbers of two digits are divisible by 7?

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41. Along a road lie an odd number of stones placed at intervals of 10 metres. These stones have to be assembled around the middle stone. A person can carry only one stone at a time. A man carried the job with one of the end stones by carrying them in succession. In carrying all the stones he covered a distance of 3 km. Find the number of stones.

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42. Divide 32 into four parts which are in A.P. such that the product of extremes is to the product of means is 7:15.

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

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44. Ramkali would need Rs. 1800 for admission fee and books etc., for her daughter to start going to school from next year. She saved Rs. 50 in the first month of this year and increased her monthly saving by Rs. 20. After a year, how much money will she save? Will she be able to fulfil her dream of sending her daughter to school?

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45. 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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46. Two cars start together in the same direction from the same place. The first goes with uniform speed of 10 km/h. The second goes at a speed of 8 km/h in the first hour and increases the speed by $\frac{1}{2}$ km/h in each succeeding hour. After how many hours will the second car overtake the first car if both cars go non-stop?

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47. 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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48. If $(m+1)^{th}$ term of an A.P. is twice the $(n+1)^{th}$ term, prove that $(3m+1)^{th}$ term is twice the $(m+n+1)^{th}$ term.

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49. 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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50. The sum of the first p, q, r terms of an A.P. are a, b, c respectively. Show that $\frac{a}{p}(q-r)+\frac{b}{q}(r-p)+\frac{c}{r}(p-q)=0$

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51. The ratio of the sum of n terms of two A.Ps is $(7n+1):(4n+27)$. Find the ratio of their m^{th} terms.

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52. If there are $(2n+1)$ terms in A.P. , then prove that the ratio of the sum of odd terms and the sum of even terms is $(n+1):n$

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53. Raghav buys a shop of Rs. 1,20,000. He pays half of the amount in cash and agrees to pay the balance in 12 annual instalments of Rs. 5000 each.

If the rate of interest is 12% and the pays with the instalment the interest due on the unpaid amount, find the total cost of the shop.

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54. Which term of the A.P. 3,15,27, 39, ... will be 120 more than its 21st term?

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55. The 17th term of an A.P. is 5 more than twice its 8th term. If the 11th term of the A.P. is 43, find the n^{th} term.

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

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57. Find the four numbers in A.P. whose sum is 20 and the sum of whose squares is 120.

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

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60. Consider the A.P. $2, 5, 8, 11, \ldots\ldots . , 302$. Show that twice of the middle term of the above A.P. is equal to the sum of its first and last term.

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61. For what value of n the n^{th} terms of the following two A.Ps the same?

(i)$1, 7, 13, 19, . .$ (ii) $69, 68, 67 \ldots,$

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62. How many terms are there in the sequence $3, 6, 9, 12, \ldots\ldots\ldots 111?$

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63. Find the middle term of the A.P. $6, 13, 20, \ldots\ldots 216.$

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64. Show that the sequence 9,12,15,18,... is an A.P. Find its 16th term and the general term.

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65. Which term of the sequence $-1, 3, 7, 11, \ldots is$ 95 ?`

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66. Write the sequence with nth terms: (i)$a_n = 3 + 4n$ (ii) $a_n = 5 + 2n$ (iii)$a_n = 6 - n$ (iv) $a_n = 9 - 5n$

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67. Then n^{th} term of an A.P. is $6n + 2$. Find the common difference.

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68. Show that the sequence defined by $a_n = 5n - 7$ is an A.P., find its common difference.

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69. Show that the sequence defined by $a_n = 3n^2 - 5$ is not an A.P.

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70. Find the 10th term from the end of the A.P. 8,10,12, ... 126.

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71. The 19th term of an A.P. is equal to three times its 9th term.If its $9th$ term is 19, find the A.P.

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72. If the 5th term of an A.P. is 31 and 25th term is 140 more than the 5th term, find the A.P.

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73. 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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74. Find the number of all three digit natural numbers which are divisible by 9.

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75. 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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76. The 24th term of an A.P. is twice its 10th term. Show that its 72th term is 4 times its 15th term.

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77. If $2x, x+10, 3x+2$ are in A.P., find the value of x.

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78. If the numbers a, b, c, d, e form an A.P. , then find the value of $a-4b+6c-4d+e$.

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79. The 9th term of an A.P. is equal to 6 times its second term. If its 5th term is 22, find the A.P.

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80. The sum of 5th and 9th term of an A.P. is 72 and the sum of 7th and 12th terms is 97 . Find that

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81. The sum of 4th and 8th terms of an A.P. is 24 and the sum of 6th and 10th terms is 44. Find the A.P.

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82. Write an $A\dot{P}$ having 4 as the first term and -3 as the comon difference.

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83. Write the first three terms in each of the sequence defined by the following: $a_n = 3n + 2$ (ii) $a_n = n^2 + 1$

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

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85. Show that the sequence defined by $a_n = 4n + 5$ is an $A\dot{P}$. Also, find its common difference.

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86. Show that the sequence defined by $a_n = 2n^2 + 1$ is not an $A\dot{P}$.

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87. Show that a sequence is an $A\dot{P}$ if its nth term is a linear expression in n and in such a case the common difference is equal to the coefficient of n .

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88. The nth term of a sequence is $3n - 2$. Is the sequence an $A\dot{P}$ If so, find its $10th$ term.

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89. Write an $A\dot{P}$ whose first term is 10 and common difference is 3.

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90. Write an $A\dot{P}$ whose first term and common difference are -1.25 and -0.25 respectively.

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91. Number of students left in the school auditorium from the total strength of 1000 students when they leave the auditorium in batches of 25. Will the sequence form an $A\dot{P}$. ?

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92. The amount of money in the account every year, when Rs 10000 is deposited at compound interest at 8 % per annum.

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93. Find the common difference and write the next three terms of the $A\dot{P}$. $3, \ -2, \ -7, \ -12,$

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94. For the following arithmetic progressions write the first term a and the common difference d : $-5, \ -1, \ 3, \ 7, \ \cdot$ (ii) $\frac{1}{5}, \frac{3}{5}, \frac{5}{5}, \frac{7}{5}, \cdot$

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95. For the following arithmetic progressions write the first term a and the common difference d : $0.3, \ 0.55, \ 0.80, \ 1.05, \ \cdot$ (ii) $-1.1, \ -3.1, \ -5.1, \ -7.1, \ \cdot$

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96. Write the arithmetic progression when first term a and common difference d are as follows: $a = 4, \ d = 3$ (ii) $a = -1, \ d = \frac{1}{2}$ (iii) $a = -1.5, \ d = -0.5$

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97. The cost of digging a well for the first metre is Rs 150 and rises by Rs 20 for each succeeding metre. Will the sequence form an $A.P.$?

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98. The amount of air present in the cylinder when a vacuum pump removes each time $\frac{1}{4}$ of the air remaining in the cylinder. Will the sequence form an $A.P.$?

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99. 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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100. Find the common difference and write the next four terms of each of the following arithmetic progressions: $1, -2, -5, -8,$ (ii) $0, -3, -6, -9,$

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101. Find the common difference and write the next four terms of each of the following arithmetic progressions: $-1, \frac{1}{4}, \frac{3}{2},$ (ii) $-1, -\frac{5}{6}, -\frac{2}{3}, \cdot$

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102. Prove that no matter what the real numbers a and b are, the sequence with nth term $a + nb$ is always an $A\dot{P}$. What is the common difference?

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103. Find out which of the following sequences are arithmetic progressions. For those which are arithmetic progressions, find out the common difference. $3, 6, 12, 24,$ (ii) $0, -4, -8, -12, ..$ (iii) $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8},$

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104. Find out which of the following sequences are arithmetic progressions. For those which are arithmetic progressions, find out the common difference. $12, 2, -8, -18, \ldots$ (ii) $3, 3, 3, 3, ..$ (iii) $p, p+90, p+180, p+270,$ where $p = (999)^{999}$

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105. Find out which of the following sequences are arithmetic progressions. For those which are arithmetic progressions, find out the common difference. $1.0, 1.7, 2.4, 3.1, .$ (ii) $-225, -425, -625, -825, ..$ (iii) $10, 10+2^5, 10+2^6, 10+2^7$

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106. Find out which of the following sequences are arithmetic progressions. For those which are arithmetic progressions, find out the common difference. (i) $a+b,\ (a+1)+b,\ (a+1)+(b+1),\ (a+2)+(b+1),\ (a+2)+(b+$

(ii) $1^2,\ 3^2,\ 5^2,\ 7^2,\ \ldots$ (iii) $1^2,\ 5^2,\ 7^2,\ 73,$

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107. Find the common difference of the A.P. and write the next two terms:

$51,\ 59,\ 67,\ 75,\ \cdot$ (ii) $75,\ 67,\ 59,\ 51,\ \cdot\cdot$ (iii) $1.8,\ 2.0,\ 2.2,\ 2.4,\ \cdot$

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108. Find the common difference of the A.P. and write the next two terms:

$0,\ \frac{1}{4},\ \frac{1}{2},\ \frac{3}{4},$ (ii) $119,\ 136,\ 153,\ 170,$

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109. Find the $6th$ term from the end of the $A\dot{P}\cdot 17,\ 14,\ 11,\ ;\ -40$

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110. Find the $12th,\ 24th$ and nth term of the A.P. given by $9,\ 13,\ 17,\ 21,\ 25,$

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111. The first term of an A.P. is -7 and the common difference 5. Find its $18th$ term and the general term.

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112. Determine the $10th$ term from the end of the A.P. $4,\ 9,\ 14,\ ;\ 254$.

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113. Which term of the sequence $4,\ 9,\ 14,\ 19,\ .$ is 124?

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114. Find the middle term(s) of the A.P. $7,\ 13,\ 19,\ ;\ 241$.

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115. In the A.P. $1,\ 7,\ 13,\ 19,\ ;\ 415$ prove that the sum of the middle terms is equal to the sum of first and last terms.

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

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117. Which term of the sequence $20,\ 19\frac{1}{4},\ 18\frac{1}{2},\ 17\frac{3}{4},\ .$ is the first negative term?

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118. The $10th$ term of an A.P. is 52 and $16th$ term is 82. Find the $32nd$ term and the general term.

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119. Determine the general term of an A.P. whose $7th$ term is -1 and $16th$ term 17.

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120. If five times the fifth term of an A.P. is equal to 8 times its eighth term, show that its $13th$ term is zero.

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121. Which term of the A.P. $3, 15, 27, 39,$ will be 132 more than its $54th$ term?

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122. Two A.P.s have the same common difference. The first term of one of these is 3, and that of the other is 8. What is the difference between their (a) $2nd$ terms? (b) $4th$ terms? (c) $10th$ terms? (d) $30th$ terms?

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123. A sum of Rs 1000 is invested at 8% simple interest per annum. Calculate the interest at the end of $1, 2, 3, \ldots$ years. Is the sequence of interests an A.P.? Find the interest at the end of 30 years.

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124. In a flower bed there are 23 rose plants in the first row, twenty one in the second row, nineteen in the third row and so on. There are five plants in the last row. How many rows are there in the flower bed?

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125. Suba Rao started work in 1995 at an annual salary of Rs 5000 and received a Rs 200 raise each year. In what year did his annual salary will reach Rs 7000?

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126. Jasleen saved Rs 5 in the first week of the year and then increased her weekly savings by Rs 1.75 each week. In what week will her weekly savings be Rs 20.75?

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127. Find $10th$ term of the A.P. $1, \ 4, \ 7, \ 10, \ ..$

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128. Find: 18th term of the A.P. $\sqrt{2}, \ 3\sqrt{2}, \ 5\sqrt{2}..$

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129. Find nth term of the A.P. $13, \ 8, \ 3, \ -2, \ .$

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130. Find $10th$ term of the A.P. $-40,\ -15,\ 10,\ 35,$

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131. Find $8th$ term of the A.P. $117,\ 104,\ 91,\ 78,$

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132. Find $11th$ term of the A.P. $10.0,\ 10.5,\ 11.0,\ 11.5,$ ..

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133. Find $9th$ term of the A.P. $\frac{3}{4}, \frac{5}{4}, \frac{7}{4}, \frac{9}{4},$ ..

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134. Which term of the A.P. 3,8,13... is 248?

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135. Which term of the A.P. $84,\ 80,\ 76,\ ..$ is 0?

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136. Which term of the A.P. 4,9,14... is 254?

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

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138. Which term of the AP : 121, 117, 113, . . ., is its first negative term? [Hint : Find n for $a_n < 0$]

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139. Is 68 a term of the A.P. $7,\ 10,\ 13,\ ?$

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140. Is 302 a term of the A.P. 3,8,13,...?

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141. Is -150 a term of the A.P. $11,\ 8,\ 5,\ 2,\ ?$

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142. How many terms are there in the A.P? $7,\ 10,\ 13,\ 43.$ (ii) $-1,\ -\frac{5}{6},\ -\frac{2}{3},\ -\frac{1}{2},\ ;\ \frac{10}{3}.$ (iii) $7,\ 13,\ 19,\ ;\ 205$. (iv) $18,\ 15\frac{1}{2},\ 13,\ ;\ -47.$

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143. The first term of an A.P. is 5, the common difference is 3 and the last term is 80; find the number of terms.

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144. The 6th and 17th terms of an A.P. are 19 and 41 respectively, find the 40th term.

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

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146. If 10 times the $10th$ term of an A.P. is equal to 15 times the $15th$ term, show that $25th$ term of the A.P. is zero.

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147. The $10th$ and $18th$ terms of an A.P. are 41 and 73 respectively. Find $26th$ term.

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148. In a certain A.P. the $24th$ term is twice the $10th$ term. Prove that the $72nd$ term is twice the $34th$ term.

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

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150. Find the $12th$ term from the end of the following arithmetic progressions: $3,\ 5,\ 7,\ 9,\ \cdot\cdot 201$ (ii) $3,\ 8,\ 13,\ ;\cdot\ 253$ (iii) $1,\ 4,\ 7,\ 10,\ ;\cdot\ 88$

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151. 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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152. Find the second term and nth term of an A.P. whose $6th$ term is 12 and the $8th$ term is 22.

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153. How many numbers of two digit are divisible by 3?

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154. An A.P. consists of 60 terms. If the first and the last terms be 7 and 125 respectively, find 32nd term.

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155. The sum of 4th and 8th terms of an A.P. is 24 and the sum of the 6th and 10th terms is 34. Find the first term and the common difference of the A.P.

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156. The first term of an A.P. is 5 and its $100th$ term is -292. Find the $50th$ term of this A.P.

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157. Find $a_{30} - a_{20}$ for the A.P. $-9, -14, -19, -24, \cdot$ (ii) $a, a+d, a+2d, a+3d, \cdot\cdot$

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158. Write the expression $a_n - a_k$ for the A.P. $a, a+d, a+2d, \cdot\cdot$ Hence, find the common difference of the A.P. for which $11th$ term is 5 and $13th$ term is 79

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159. Write the expression $a_n - a_k$ for the A.P. $a, a+d, a+2d, \cdot\cdot$ Hence, find the common difference of the A.P. for which $a_{10} - a_5 = 200$

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160. Write the expression $a_n - a_k$ for the A.P. $a, a+d, a+2d, \cdot\cdot$ Hence, find the common difference of the A.P. for which $20th$ term is 10 more

than the $18th$ term.

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161. Find n if the given value of x is the nth term of the given A.P.

$25,\ 50,\ 75,\ 100,\ \ldots\ldots;\ x = 1000$ (ii)

$-1,\ -3,\ -5,\ -7,\ ;\ x = -151$

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162. Find n if the given value of x is the nth term of the given A.P.

$(i) 5\frac{1}{2},\ 11,\ 16\frac{1}{2},\ 22,\ ;\ x = 550$ (ii) $1,\ \frac{21}{11},\ \frac{31}{11},\ \frac{41}{11},\ ;\ x = \frac{171}{11}$

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163. If an A.P. consists of n terms with first term a and n^{th} term l then show that the sum of the m^{th} term from the beginning and the m^{th} term from the end is $(a + l)$.

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

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

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166. Two APs have the same common difference. The difference between their 100^{th} terms is 100, what is the difference between their 1000^{th} terms?

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167. For what value of n, are the with terms of two APs: 63, 65, 67, . . . and 3, 10, 17, . . . equal?

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

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169. How many three digit numbers are divisible by 7?

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170. Three numbers are in A.P. If the sum of these numbers be 27 and the product 648, find the numbers.

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171. Find the four numbers in A.P., whose sum is 50 and in which the greatest number is 4 times the least.

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

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173. If $x+1,\ 3x$ and $4x+2$ are in A.P., find the value of x .

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174. Show that $(a-b)^2,\ \left(a^2+b^2\right)$ and $(a+b)^2$ are in A.P.

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175. Find the sum of 20 terms of the AP 1, 4, 7, 10,....

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176. Find the sum of first n natural numbers.

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177. Find the sum of all odd integers between 2 and 100 divisible by 3

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178. 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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179. Find the number of terms in the series $20, 19\frac{1}{3}, 18\frac{2}{3}\ldots$ the sum of which is 300. Explain the answer.

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180. The sum of n, 2n, 3n terms of an A.P. are S_1, S_2, S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$

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

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182. 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 its $(m+n)$ terms is zero.

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183. The ratio of the sums of m and n terms of an A.P. is $m^2 : n^2$ .Show that the ratio of m^{th} and n^{th} term is $(2m - 1) : (2n - 1)$.

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184. 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 a fixed number every year, find : (i) the production in the 1st year (ii) the production in the 10th year (iii) the total production in first 7 years

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185. 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 than for the preceding day. How much money the contractor has to pay as penalty, if he has delayed the work by 30 days?

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186. A sum of Rs 280 is to be used to award four prizes. If each prize after the first is Rs 20 less than its preceding prize, find the value of each of the prizes.

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187. 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?

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188. 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 may rows are the 200 logs placed and how many logs are in the top row?

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189. 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.

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190. A man repays a loan of $Rs.3250$ by paying $Rs.20$ in the first month and then increases the payment by $Rs.15$ every month. How lon will it take him to clear the loan?

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191. 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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192. 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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193. 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 ter

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194. 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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195. 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, 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? [Hint : To pick up the first potato and the second potato, the total distance (in metres) rim by a competitor is 2 x 5 + 2 x (5 + 3)]

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196. Find the sum of the following arithmetic progressions: (i) $50,\ 46,\ 42,\ldots$ to 10 terms (ii) $1,\ 3,\ 5,\ 7,\ldots$ to 12 terms (iii) $3,\ 9/2,\ 6,\ 15/2,\ldots$ to 25 terms

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197. Find the sum of the following arithmetic progressions: $(i) 41,\ 36,\ 31,\ \cdot$ to 12 terms (ii) $a+b,\ a-b,\ a-3b,$ to 22 terms (iii) $(x-y)^2,\ \left(x^2+y^2\right),\ (x+y)^2,\ ;$ to n terms

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198. Find the sum of the following arithmetic progressions: (i) $\frac{x-y}{x+y}, \frac{3x-2y}{x+y}, \frac{5x-3y}{x+y}, \cdot$ to n terms (ii) $-26, \ -24, \ -22,$ to 36 terms.

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199. Find the sum to n term of the A.P. $5, \ 2, \ -1, \ -4, \ -7, \ ;$

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200. Find the sum of n terms of an A.P. whose nth terms is given by $a_n = 5 - 6n$.

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201. If the sum of a certain number of terms of the A.P. 25, 22, 19.... is 116. Find the last term.

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

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203. 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 is 40?

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204. How many terms of the A.P. $9, 17, 25, \cdot$ must be taken so that their sum is 636?

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205. How many terms of the A.P. 63, 60, 57, ... must be taken so that their sum is 693?

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206. 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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207. The third term of an A.P. is 7 and the seventh term exceeds three times the third term by 2. Find the first term, the common difference and the sum of first 20 terms.

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208. The first term of an A.P.is 2 and the last term is 50. the sum of all these terms are 442. Find the common difference.

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209. If 12th term of an A.P. is -13 and the sum of the first four terms is 24, what is the sum of first 10 terms ?

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210. Find the sum of first 22 terms of an AP in which d=l and 22nd term is 149.

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211. Find the sum of all natural numbers between 1 and 100, which are divisible by 3.

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212. Find the sum of first n odd natural numbers.

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213. Find the sum of all odd numbers between (i) 0 and 50 (ii) 100 and 200.

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

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215. Find the sum of all integers between 84 and 719, which are multiples of 5.

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

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217. Find the sum of all even integers between 101 and 999.

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218. Find the sum of all integers between 100 and 550, which are divisible by 9.

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219. In an A.P., if the first term is 22, the common difference is -4 and the sum to n terms is 64, find n .

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220. In an A.P., if the $5th$ and $12th$ terms are 30 and 65 respectively, what is the sum of first 20 terms?

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221. Find the sum of the first 11 terms of the A.P.: $2,\ 6,\ 10,\ 14,\ ..$

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222. Find the sum of the first 13 terms of the A.P: $-6,\ 0,\ 6,\ 12,$ .....

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

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

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225. Find the sum of the first 40 positive integers divisible by (a) 3 (b) 5 (c) 6.

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226. Find the sum of all 3 – digit natural numbers, which are divisible by 13.

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227. Find the sum of all 3 – digit natural numbers, which are multiples of 11.

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228. Find the sum: $2+4+6+\ldots.+200$ (ii) $3+11+19+\ldots..+803$ $(iii)(-5)+(-8)+(-11)+\ldots..+(-230)$

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229. Find the sum: $(i)1+3+5+7+\ldots.+199$ $(ii)7+10\frac{1}{2}+14+\ldots.+84$ $(iii)34+32+30+\ldots.+10$

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230. Find the sum: $25+28+31+\cdot+100$ (ii) $18+15\frac{1}{2}+13+\dot{+}\left(-49\frac{1}{2}\right)$

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231. Find the sum of the first 15 terms of each of the following sequences having nth term as $(i)a_n = 3 + 4n$ (ii) $b_n = 5 + 2n$

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232. Find the sum of the first 15 terms of each of the following sequences having nth term as $(i)x_n = 6 - n\ (ii)y_n = 9 - 5n$

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233. Find the sum of firsts 20 terms of the sequence whose nth term is $a_n = An + B$.

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234. 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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235. Find the sum of the first 25 terms of an A.P. whose nth term is given by $a_n = 7 - 3n$.

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

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237. 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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238. In an A.P. first term is 5, last term is 45 and sum = 400 . Find the no. of terms and common difference of A.P.

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239. 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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240. Let there be an A.P. with first term $'a'$, common difference $'d'$. If a_n denotes its nth term and S_n the sum of first n terms, find n and S_n , if $a = 5,\ \ d = 3$ and $a_n = 50$

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241. Let there be an A.P. with first term $'a'$, common difference $'d'$. If a_n denotes its nth term and S_n the sum of first n terms, find n and a, if $a_n = 4,\ \ d = 2$ and $S_n = -14$.

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242. Let there be an A.P. with first term $'a'$, common difference $'d'$. If a_n denotes its nth term and S_n the sum of first n terms, find d, if $a = 3,\ \ n = 8$ and $S_n = 192$.

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243. Let there be an A.P. with first term $'a'$, common difference $'d'$. If a_n denotes its nth term and S_n the sum of first n terms, find a, if $a_n = 28,\ \ S_n = 144$ and $n = 9$.

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244. Let there be an A.P. with first term $'a'$, common difference $'d'$. If a_n denotes its nth term and S_n the sum of first n terms, find n and d, if $a = 8,\ \ a_n = 62$ and $S_n = 210$.

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245. Let there be an A.P. with first term $'a'$, common difference $'d'$. If a_n denotes its nth term and S_n the sum of first n terms, find n and a_n, if $a = 2,\ \ d = 8$ and $S_n = 90$.

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246. A man saved Rs. 16500 in ten years. In each year after the first he saved Rs. 100 more than be did in the receding year. How many did he save in the first year?

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247. A man saves Rs. 32 during the first year, Rs. 36 in the second year and in this way he increases his savings by Rs. 4 every year. Find in what time his saving will be Rs. 200.

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248. A man arranges to pay a debt of Rs 3600 in 40 monthly installments which are in AP When 30 installments are paid he dies leaving one third of the debt unpaid Find the value of the first installment

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249. There are 25 trees at equal distances of 5 metres in a line with a well, the distance of the well from the nearest tree being 10 metres. A gardener waters all the trees separately starting from the well and he returns to the well after watering each tree to get water for the next. Find the total distance the gardener will cover in order to water all the trees.

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250. 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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251. A piece of equipment cost a certain factory Rs. 600,000. If it depreciates in value, 15% the first, 13.5% the next year, 12% the third year, and so on . What will be its value at the end of 10 years, all percentages applying to the original cost?

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252. 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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253. In $A.\ P.$, the first term is 8, n^{th} term is 33 and sum to first n terms is 123. Find n and d, the common diffirence.

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254. 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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255. 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 nth terms.

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256. 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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257. In an A.P., the first term is 2, the last term is 29 and sum of the terms is 155. Find the common difference of the A.P.

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

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260. The sum of first n terms of an A.P. is $5n^2 + 3n$ If its mth term is 168, (i) Find the value of m (ii) Find the 20th term of this AP

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261. The sum of first q terms of an A.P. is $63q - 3q^2$. If its pth term is -60 , find the value of p . Also, find the $11th$ term of this A.P.

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262. The sum of first m terms of an A.P. is $4m^2 - m$. If its nth term is 107, find the value of n . Also, find the $21st$ term of this A.P.

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263. In the $A.\ P.$ nth term of an $A.\ P.$ is given by $(-4n+15)$. Find the sum of first 20 terms of $A.\ P.$

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264. Find the number of terms of the A.P. $-12,\ -9,\ -6,\ ;\ 12$. If 1 is added to each term of this A.P., then find the sum of all terms of the A.P. thus obtained.

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265. The sum of first n terms of an A.P. is $3n^2+4n$. Find the $25th$ term of this A.P.

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266. The sum of first seven terms of an A.P is 182. If its 4^{th} term and 17^{th} term are in the ratio 1:5 then Find the A.P

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

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268. 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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269. 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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270. The sum of first n terms of an A.P. is $5n - n^2$. Find the nth term of this A.P.

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271. 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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272. If the $10th$ term of an A.P. is 21 and the sum of its first ten terms is 120, find its nth term.

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273. 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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274. If S_n denotes the sum of first n terms of an A.P., prove that $S_{12} = 3(S_8 - S_4)$.

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275. If the sum of the first n terms of an A.P. is $\frac{1}{2}\left(3n^2 + 7n\right)$, then find its nth term. Hence write its 20th term.

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276. The sum of first 9 terms of an A.P. is 162. The ratio of its 6th term to its 13th term is $1:2$. Find the first and $15th$ term of the A.P.

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277. Define an arithmetic progression.

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278. Write the common difference of an A.P. whose nth term is $a_n = 3n + 7$.

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279. Which term of the sequence $114, 109, 104,$ is the first negative term?

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280. Write the value of $a_{30} - a_{10}$ for the A.P. $4, 9, 14, 19, \cdot$

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281. Write $5th$ term from the end of the A.P. $3,\ 5,\ 7,\ 9,\ ;\ 201$.

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282. Write the value of x for which $2x,\ x+10$ and $3x+2$ are in A.P.

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283. Write the nth term of an A.P. the sum of whose n terms is S_n .

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284. Write the sum of first n odd natural numbers.

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285. Write the sum of first n even natural numbers.

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286. If the sum of n terms of an A.P. is $S_n = 3n^2 + 5n$. Write its common difference.

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287. Write the expression for the common difference of an A.P. whose first term is a and nth term is b .

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288. First the term of an A.P is p and its common difference is q. Find its $10th$ term

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

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290. If $\frac{4}{5},\ a,\ 2$ are three consecutive terms of an A.P., then find the value of a .

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291. If the sum of first p terms of an AP is ap^2+bp find the common difference

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292. If 7th and 13th terms of an A.P. be 34 and 64 respectively, then its 18th term is

(a) 87 (b) 88 (c) 89 (d) 90

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

(a) 0

(b) $p-q$

(c) $p+q$

(d) $(p+q)$

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294. The sum of n terms of an AP is $3n^2+n$ and its common difference is 6,then find its first term.

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295. 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

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296. If the sum of n terms of an A.P., is $3n^2 + 5n$ then which of its terms is 164?

a.$26th$ b. $27th$ c. $28th$ d. none of these

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297. If the sum of n terms of an A.P. is $2n^2 + 5n$, then its nth term is

(a)$4n - 3$

(b) $3n - 4$

(c) $4n + 3$

(d) $3n + 4$

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298. If the sum of three consecutive terms of an increasing A.P. is 51 and the product of the first and third of these terms is 273, then the third term is

(a) 13

(b) 9

(c) 21

(d) 17

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299. 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

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300. Let S_n denote the sum of n terms of an AP whose first term is a. If common difference d is given by $d = Sn - kS_{n-1} + S_{n-2}$, then k is :

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301. 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

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302. If S_1 is the sum of an AP of 'n' odd number of terms and S_2 be the sum of the terms of series in odd places of the same AP then $\frac{S_1}{S_2}$ =

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303. If in an A.P., $S_n = n^2 p$ and $S_m = m^2 p$, where S_r denotes the sum of r terms of the A.P., then S_p is equal to $\frac{1}{2}p^3$ (b) $mn\,p$ (c) p^3 (d) $(m+n)p^2$

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304. Let S_n denotes the sum of the first of n terms of A.P. and $S_{2n} = 3S_n$. then the ratio $S_{3n} : S_n$ is equal to

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305. in an AP, $S_p = q$, $S_q = p$ and S_r denotes the sum of the first r terms. Then $S_{p+q} =$

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306. If S_r denotes the sum of the first r terms of an A.P. Then, $S_{3n} : (S_{2n} - S_n)$ is n (b) $3n$ (c) 3 (d) none of these

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307. If the first term of an A.P. is 2 and common difference is 4, then the sum of its 40 terms is (a) 3200 (b) 1600 (c) 200 (d) 2800

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308. The number of terms of the A.P. $3, 7, 11, 15, ..$ to be taken so that the sum is 406 is (a) 5 (b) 10 (c) 12 (d) 14

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

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310. 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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311. The nth term of an A.P., the sum of whose n terms is S_n , is $(a) S_n + S_{n-1}$ (b) $S_n - S_{n-1}$ (c) $S_n + S_{n+1}$ (d) $S_n - S_{n+1}$

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312. The common difference of an A.P., the sum of whose n terms is S_n , is $(a) S_n - 2S_{n-1} + S_{n-2}$ (b) $S_n - 2S_{n-1} - S_{n-2}$ (c) $S_n - S_{n-2}$ (d) $S_n - S_{n-1}$

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313. If the sums of n terms of two arithmetic progressions are in the ratio $\frac{3n+5}{5n+7}$, then their nth terms are in the ratio $\frac{3n-1}{5n-1}$ (b) $\frac{3n+1}{5n+1}$ (c) $\frac{5n+1}{3n+1}$ (d) $\frac{5n-1}{3n-1}$

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314. If S_n denote the sum of n terms of an A.P. with first term a and common difference d such that $\frac{S_x}{S_{kx}}$ is independent of x, then (a) $d=a$ (b) $d=2a$ (c) $a=2d$ (d) $d=-a$

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315. If the first term of an A.P. is a and nth term is b, then its common difference is

A. $\frac{b-a}{n+1}$

B. $\frac{b-a}{n-1}$

C. $\frac{b-a}{n}$

D. $\frac{b+a}{n-1}$

Answer: B

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316. The sum of first n odd natural numbers is $2n-1$ (b) $2n+1$ (c) n^2 (d) n^2-1

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317. Two A.P.'s have the same common difference. The first term of one of these is 8 and that of the other is 3. The difference between their 30th terms is (a) 11 (b) 3 (c) 8 (d) 5

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318. If $18,\ a,\ b,\ -3$ are in A.P., the $a+b=$ (a) 19 (b) 7 (c) 11 (d) 15

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319. If $\frac{5+9+13+\overset{..}{\longrightarrow} n\,terms}{7+9+11+\overset{..}{\longrightarrow}(n+1)terms}=\frac{17}{16}$, then $n=$ (a) 8 (b) 7 (c) 10 (d) 11

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320. The sum of n terms of an A.P. is $3n^2+5n$, then 164 is its (a) 24th term (b) 27th term (c) 26th term (d) 25th term

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321. If the n^{th} term of an A.P. is $2n+1$, then the sum of first n terms of the A.P. is $n(n-2)$ (b) $n(n+2)$ (c) $n(n+1)$ (d) $n(n-1)$

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322. If $18th$ and $11th$ term of an A.P. are in the ratio $3:2$, then its $21st$ and $5th$ terms are in the ratio $3:2$ (b) $3:1$ (c) $1:3$ (d) $2:3$

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323. The sum of first 20 odd natural numbers is (a) 100 (b) 210 (c) 400 (d) 420

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324. The common difference of the A.P. is $\frac{1}{2q}, \frac{1-2q}{2q}, \frac{1-4q}{2q}, \cdot$ is (a)-1(b)1(c)q(d)2q`

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325. The common difference of the A.P. $\frac{1}{3}, \frac{1-3b}{3}, \frac{1-6b}{3}, \cdot$ is (a)$\frac{1}{3}$ (b) $-\frac{1}{3}$ (c) $-b$ (d) b

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326. The common difference of the A.P. $\frac{1}{2b}, \frac{1-6b}{2b}, \frac{1-12b}{2b}, \ldots$ is

(a)$2b$ (b) $-2b$ (c) 3 (d) -3

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327. If k, $2k-1$ and $2k+1$ are three consecutive terms of an A.P., the value of k is

A. -2

B. 3

C. -3

D. 6

Answer: B

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328. The next term of the AP $\sqrt{7}, \sqrt{28}, \sqrt{63}$,... is

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329. The first three terms of an A.P. respectively are $3y-1,\ 3y+5$ and $5y+1$. Then, y

equals

(a) -3 (b) 4 (c) 5 (d) 2

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