MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

ARITHMETIC PROGRESSIONS

Solved Examples And Exercises

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

A. 27

B. 28

C. 29

D. None of these

Answer: B

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2. Which term of the sequence $8-6i, 7-4i, 6-2i,$ is purely real ?

A. 4th

B. 5th

C. 6th

D. 7th

Answer: A

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3. Find the nth term of an A.P., the sum of whose first n terms is $3n^2+4n$

A. 6n

B. 6n+1

C. 6n-1

D. none of these

Answer: B

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4. Show that the sequence defined by $a_n = 2n^2 + 1$ is not an A.P.

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5. Show that the sequence $\log a, \log\left(\frac{a^2}{b}\right), \log\left(\frac{a^3}{b^2}\right), \log\left(\frac{a^4}{b^3}\right),$ forms an A.P.

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6. The nth term of a sequence is given by $a_n = 2n + 7$. Show that it is an A.P. Also, find its 7th term.

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7. Show that the sequence $\log a, \log(ab), \log\left(ab^2\right), \log\left(ab^3\right),$ is an A.P. Find its nth term.

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8. Which term of the sequence 72, 70, 68, 66,... is 40?

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9. Show that the sequence is an A.P. if its nth term is linear expression in n and in such a case the common difference is equal to the coefficient of n.

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10. The nth term of a sequence is given by $a_n = 2n + 7$. find its 7th term.

A. 14

B. 20

C. 21

D. 28

Answer: C

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11. The product of three numbers in A.P. is 224, and the largest number is 7 times the smallest. Find the numbers.

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12. The fourth power of common difference of an arithmetic progression with integer entries is added to the product of any four consecutive terms of it. Prove that the resulting sum is the square of an integer.

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13. 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, 4 , 7

C. 2, 8, 14

D. None of these

Answer: A

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14. The internal angles of quadrilateral are in A.P. and their common difference is 10°. Find them.

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

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

A. 740

B. 840

C. 920

D. 680

Answer: A

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17. 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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18. 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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19. If in an A.P. the sum of m terms is equal of 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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20. The first , second and the last terms of an A.P. are a, b, c respectively. Prove that the sum is $\frac{(a+c)(b+c-2a)}{2(b-a)}$.

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21. If $\frac{3+5+7+up \to nterms}{5+8+113up \to 10terms} = 7,$ then find the value of n.

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22. In a factory, 150 workers were engaged to finish a piece of work in a certain number of days. However, if 4 workers are dropped everyday, except the first day, it will take 8 more days to finish the work. Find the number of days in which the work was to be completed.

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23. Prove that the sum of n arithmetic means between two numbers in n times the single A.M. between them.

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24. If a, b, c are in A.P., then prove that: $(a-c)^2 = 4(b^2 - ac)$, $a^3 + 4b^3 + c^3 = 3b(a^2 + c^2)$

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25. If $a^2(b+c), b^2(c+a), c^2(a+b),$ are in A.P. show that either a, b, c are in A.P., or $ab + bc + ca = 0$.

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26. If n arithemetic means are inserted between 20 and 80 such tht the ratio of first mean to the last mean is $1:3,$ then find the value of n

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27. 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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28. A carpenter was hired to build 192 window frames. The first day he made five frames and each day thereafter he made two more frames than he made the day before. How many days did it take him to finish the job?

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29. In a potato race 20 potatoes are placed in a line at intervals of $4 meters$ with first potato $24 metres$ from the starting point. A constant

is required to bring the potatoes back to the starting place one at a time. How far would he run in bringing back all the potatoes?

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30. We know that the sum of the interior angles of a triangle is 180^0 . Show that the sums of the interior angles of polygons with $3, 4, 5, 6$ sides form an arithmetic progression. Find the sum of the interior angles of a 21 sided polygon.

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31. If S_1 be the sum of $(2n+1)$ term of an A.P. and S_2 be the sum of its odd terms then prove that $S_1 : S_2 = (2n+1) : (n+1)$.

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32. 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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33. If $\theta_1, \theta_2, \theta_3, , \theta_n$ are in AP, whose common difference is d , show that $\sec\theta_1 sec\theta_2 + sec\theta_2 \sec\theta_3 + ... + \sec\theta_{n-1}\sec\theta_n = \frac{tan\theta_n - tan\theta_1}{\sin d}$

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34. If $(m+1)$ term of an A.P. is twice the$(n+1)$ th term, prove that $(3m+1)$ th terms is twice the $(m+n+1)$ th term.

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35. If $a_1, a_2, a_3, , a_n$ are in A.P. with common difference $d(where d \neq 0)$, then the sum of series.

$\sin d(\cos eca_1 \cos eca_2 + \cos eca_2 \cos eca_3 + \ldots. + \cos eca_{n-1} \cos eca_n)$

is equal to $\cot a_1 - \cot a_n$

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36. If an A.P. is such that $\frac{a_4}{a_7} = \frac{2}{7}$, find $\frac{a_6}{a_8}$.

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

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38. Find the number of terms common to the two AP's 3,7,11,15.... 407 and 2, 9 ,16.....709.

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39. Show that in an A.P. the sum of the terms equidistant from the beginning and end is always same and equal to the sum of first and last terms.

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40. If $a_1, a_2, a_3, b, \ldots, a_n$ are an A.P. of non-zero terms, prove that $\frac{1}{a_1 a_2} + \frac{1}{a_2 a_3} + \ldots + \frac{1}{a_{n-1} a_n} =$

A. $\frac{n-1}{a_1 a_n}$.

B. $\frac{n+1}{a_1 a_n}$.

C. $\frac{1-n}{a_1 a_n}$.

D. $\frac{n}{a_1 a_n}$.

Answer: A

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41. If $a_1, a_2, a_3, , a_n$ are in A.P., where $a_i > 0$ for all i , show that

$$\frac{1}{\sqrt{a_1}+\sqrt{a_2}}+\frac{1}{\sqrt{a_2}+\sqrt{a_3}}+\ldots\ldots\ldots\ldots+\frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}}=\frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}$$

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42. The p^{th} term of an A.P. is a and q^{th} term is b Prove that the sum of its $(p+q)$ terms is $\frac{p+q}{2}\left\{a+b+\frac{a-b}{p-q}\right\}$.

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43. If S_1, S_2, S_3, S_m are the sums of n terms of m A.P. $'s$ whose first terms are $1, 2, 3, , m$ and common differences are $1, 3, 5, , (2m-1)$ respectively. Show that $S_1 + S_2, \ + S_m = \frac{mn}{2}(mn+1)$

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44. Let S_n be the sum of first n terms of an A.P. with non-zero common difference. Fine the ratio of first term and common difference if $\frac{S_{n_1 n_2}}{S_{n_1}}$ is independent of n_1.

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45. 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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46. 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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47. Show that $x^2 + xy + y^2, z^2 + xz + x^2, y^2 + yz + z^2,$ are consecutive terms of an A.P., if x, y and z are in A.P.

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48. If a, b, c are in A.P., prove that: i.$(a - c)^2 = 4(a - b)(b - c)$

ii.$a^2 + c^2 + 4ac = 2(ab + bc + ca)$

iii.$a^3 + c^3 + 6abc = 8b^3$

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49. Find the sum of all those integers between 100 and 800 each of which on division by 16 leaves the remainder 7.

A. 19668

B. 1966

C. 19999

D. None of these

Answer: A

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50. If the sum of m terms of an A.P. is equal to the sum of either the next n terms or the next p terms, then prove that $(m+n)\left(\frac{1}{m}-\frac{1}{p}\right)=(m+p)\left(\frac{1}{m}-\frac{1}{n}\right)$.

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51. Suppose $xandy$ are two real numbers such that the rth mean between $xand2y$ is equal to the rth mean between $2xandy$ when n arithmetic means are inserted between them in both the cases. Show that $\frac{n+1}{r}-\frac{y}{x}=1$.

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52. The sum of two numbers is $\frac{13}{6}$. An even number of arithmetic means are being inserted between them and sum exceeds their number by 1. find the number of means inserted.

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53. 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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54. If x, y, z are in A.P. and A_1 is the A.M. of x and y and A_2 is the A.M. of y and z , then prove that the A.M. of $A_1$and A_2 is y .

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55. 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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56. If $\frac{b+c-a}{a}, \frac{b+c-a}{b}, \frac{a+b-c}{c}$, are in A.P., prove that $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are also in A.P.

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57. If $(b-c)^2, (c-a)^2, (a-b)^2$ are in A.P., then prove that $\frac{1}{b-c}, \frac{1}{c-a}, \frac{1}{a-b}$ are also in A.P.

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58. If a, b, c are in A.P., prove that $\frac{1}{bc}, \frac{1}{ca}, \frac{1}{ab}$, is also in A.P.

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59. If a^2, b^2, c^2 are in A.P., then prove that the following are also in A.P. (i) $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ (ii) $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$

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

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61. Find an A.P. in which the sum of any number of terms is always three times the squared number of these terms.

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62. If $\log 2, \log(2^x - 1), \log(2^x + 3)$ are in A.P., write the value of x.

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63. The sums of first n terms of two A.P. $'s$ are in hte ratio $(7n + 2) : (n + 4)$. Find the ratio of their $5th$ terms.

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64. Give first 3 terms of the sequence defined by $a_n = \frac{n}{n^2 + 1}$.

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65. First term of a sequence is 1 and $(n + 1)th$ term is obtained by adding (n+1) to the nth. Find the sequence upto $6th$ term.

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66. 1,4,7,10,is an A.P. whose first term is 1 and the common difference is equal to $4-1=3$.Find the sum of 20 terms`

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67. 11, 7, 3, -1 is an A.P. whose first term is 11 and the common difference is equal to $7-11=4$.

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

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69. If the nth term a_n of a sequence is given by $a_n = n^2 - n + 1$ write down its first five terms.

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70. 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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71. Find the first four terms of the sequence defined by $a_1 = 3\ and\ a_n = 3a_{n-1} + 2$, for all $n.1$.

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72. Write the first five terms in each of the following sequence:

$a_1 = 1,\ a_n = a_{n-1} + 2,\ n > 1$

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73. Write the first five terms in each of the following sequence:

$a_1 = 1 = a_2,\ a_n = a_{n-1} + a_{n-2},\ n > 2$

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74. Write the first five terms in each of the following sequence:

$a_1 = a_2 = 2,\ a_n = a_{n-1} - 1,\ n > 1\,.$

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75. The Fibonacci sequence is defined by $a_1 = 1 = a_2,\ a_n = a_{n-1} + a_{n-2}$ for $n > 2.$ Find $\frac{a_{n+1}}{a_n}$ for

$n = 1, 2, 3, 4, 5.$

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76. Show that each of the following sequences is an A.P. Also, find the common difference and write 3 more terms in each case.

i. $3, \quad -1, \quad -5, \quad -9 \ldots\ldots$

ii. $-1, 1/4, 3/2, 11/4 \ldots\ldots$

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77. Show that each of the following sequences is an A.P. Also, find the common difference and write 3 more terms in each case.

i. $\sqrt{2}, \ 3\sqrt{2}, \ 5\sqrt{2}, \ 7\sqrt{2} \ldots\ldots$ ii. $9, 7, 5, 3 \ldots$

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78. The nth term of a sequence is given by $a_n = 2n^2 + n + 1$. Show that it is not an A.P.

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

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80. Which term of the sequence 4,9,14,19.... is 124?

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

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

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83. 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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84. If pth, qth, and rth terms of an A.P. are $a, b, c,$ respectively, then show that $(a-b)r+(b-c)p+(c-a)q=0$

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85. Show that the sum of $(m+n)^{th} and\ (m-n)^{th}$ term of an A.P. is equal to twice the m^{th} term.

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86. 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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87. 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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88. If the mth term of an A.P. be $1/n$ and nth term be $1/m$ then show that its (mn)th term is 1.

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89. Determine the number of terms in the terms in the A.P. 3,7,11...407. Also, find its 20th term from the end.

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

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91. Show that there is no A.P. which consists of only distinct prime numbers.

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92. In the arithmetic progressions 2,5,8,... upto 50 terms and 3,5,7,9... upto 60 terms, find how many terms are identical.

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93. Find: $10th$ term of the A.P. 1,4,7,10..

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94. Find: nth term of the A.P. 13,8,3,-2,...

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

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96. Evaluate $\left(\sqrt{3}+\sqrt{2}\right)^6-\left(\sqrt{3}-\sqrt{2}\right)^6.$

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97. If the sequence a_n is A.P., show that $a_{m+n}+a_{m-n}=2a_m.$

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

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99. Which term of the A.P. 84,80,76... is 0?

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

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101. Is 68 as term of the A.P. 7,10,13,...?

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

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103. Which term of the sequence $24, 23\frac{1}{4}, 22\frac{1}{2}, 21\frac{3}{4}$ is the first negative term?

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104. Which term of the sequence $12+8i, 11+6i, 10+4i, \ldots$ is (a) purely real and (b). purely imaginary?

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105. How many terms are there in the A.P. 7,10,13,...43?

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106. 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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107. The first term of an AP. is 5, the common difference is 3 and the last term is 80; find the number of terms.

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

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

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111. In 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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112. If the nth term of the A.P. 9,7,5,... is same as the nth term of the A.P. 15,12,9,.. find n.

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113. Find the 12th term from the end of the following arithmetic progression: 3,5,7,9.....201

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114. Find the 12th term from the end of the following arithmetic progression: 3,8,13.....253

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115. Find the 12th term from the end of the following arithmetic progression: 1,4,7,10.....88

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

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118. 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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119. The sum of 4th and 8th terms of an A.P. is 24 and the sum of the 6th and 10th terms is 44. Find the first term and the common difference of the A.P.

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120. The first and the last terms of an A.P. are $a \; and \; l$ respectively. Show that the sum of nth term from the beginning and nth term from the end is $a + l$.

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

A. 1,2,3

B. -4,-1,2

C. -4,0,1

D. none of these

Answer: B

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

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123. 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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124. 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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125. If the sum of three numbers in A.P. is 24 and their product is 440, find the numbers.

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126. Find the sum of 20 terms of the A.P. 1,4,7,10.....

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127. Find the sum of the series : $5 + 13 + 21 + \ + 181$.

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

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

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130. The sum of the first four terms of an A.P. is 56. The sum of the last four terms is 112. If its first term is 11, then find the number of terms.

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

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132. If the sum of n terms of an A.P. is $3n^2 + 5n$ and its mth term is 164, find the value of m.

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133. Find the sum of n terms of the sequence $(a_n), where a_n = 5 - 6n, n \in N$.

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134. 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 sumof mn terms is $\frac{1}{2}(mn+1)$ where $m \neq n$.

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135. 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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136. solve: $1+6+11+16+\ldots\ldots\ldots+x=148$

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137. 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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138. 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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139. The ratio of the sum of $mandn$ terms of an A.P. is $m^2:n^2\cdot$ Show that the ratio of the mth and nth terms is $(2m-1):(2n-1)\cdot$

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140. The interior angles of a polygon are in A.P. the smallest angle is 120° and the common difference is $5^\circ\cdot$ Find the number of sides of the

polygon.

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141. Prove that a sequence in an A.P., if the sum of its n terms is of the form $An^2 + Bn, where A, B$ are constants.

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142. If the first term of an A.P. is 2 and the sum of first five terms is equal to one fourth of the sum of the next five terms, find the sum of first 30 terms.

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143. The sum of n terms of two arithmetic progressions are in the ratio $(3n + 8) : (7n + 15)$. Find the ratio of their 12th terms.

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144. Let S_k be the sum of first k terms of an A.P. What must this progression be for the ratio $\frac{S_{kx}}{S_x}$ to be independent of x ?

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145. Find the sum of the following arithmetic progression: 50,46,42,... upto 10 terms.

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146. Find the sum of the following series : (i) $1, 3, 5, 7$...upto 12 terms.

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147. Find the sum of the following arithmetic progression: $3, \frac{9}{2}, 6, \frac{15}{2}, \ldots\ldots\ldots\ldots$ to 25 terms.

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148. Find the sum of the following arithmetic progression: 41,36,31,.....to 12 terms.

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149. Find the sum of the following arithmetic progression: $a+b,\ a-b,\ a-3b,\ \dot{\longrightarrow}$ 22 terms.

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150. Find the sum of the following arithmetic progression: $\frac{x-y}{x+y}, \frac{3x-2y}{x+y}, \frac{5x-3y}{x+y}, \ddot{\longrightarrow}$ n terms.

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151. Find the sum of the following series: $2 + 5 + 8 + \ldots . + 182$

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152. Find the sum of the following series: $101 + 99 + 97 + \ldots\ldots + 47$

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153. Find the sum of the following series: $(a-b)^2 + \left(a^2 + b^2\right) + (a+b)^2 + \ldots + \left[(a+b)^2 + 6ab\right]$

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154. Find the sum of first n natural numbers.

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155. Find the sum of all natural numbers between 1 and $100,$ which are divisible by 2 or 5

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156. Find the sum of the first n odd numbers

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157. Find the sum of all odd numbers between 100 and 200.

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

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

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160. Find the sum of all integers between 50 and 500 which are divisible by 7.

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

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

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163. Find the sum of the series :

$3 + 5 + 7 + 6 + 9 + 12 + 9 + 13 + 17 + \ldots. + 3n$ terms.

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164. Solve : $25 + 22 + 19 + 16 + \ldots + x = 115$

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165. Solve: $1 + 4 + 7 + 10 + \ + x = 590.$

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166. 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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167. The sum of first 7 terms of an A.P. is 10 and that of next 7 terms is 17. Find the progression.

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168. 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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169. 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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170. The number of terms of an A.P. is even, the sum of odd terms is 24, of the even terms is 30, and the last term exceeds the first by $10\frac{1}{2}$ find the number of terms and the series.

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171. If in an A.P, $S_n = n^2p$ and $S_m = m^2p$, then S_p is equal to

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172. 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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173. If the 5th and 12th terms of an A.P. are 30 and 65 respectively, what is the sum of first 20 terms?

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174. Find the sum of n terms of an A.P. whose kth terms is $5k + 1$.

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175. Sum of all two digit numbers which when divided by 4 yield unity as remainder is.

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176. If the sum of a certain number of terms of the AP $25, 22, 19\ldots$ is 116. Find the last term.

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177. How many terms of the A.P. $-6, \ -\frac{11}{2}, \ -5, \ldots$` are needed to give the sum -25?

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178. 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 20^{th} term is -112.

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179. If $S_n = nP + \frac{n(n-1)}{2}Q, where S_n$ denotes the sum of the first n terms of an A.P., then find the common difference.

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180. The sum of n terms of two arithmetic progressions are in the ratio $5n + 4 : 9n + 6$. Find the ratio of their 18th terms.

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

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182. If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P. prove that: $\frac{b+c}{a}, \frac{c+a}{b}, \frac{a+b}{c}$ are in A.P.

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183. If a,b,c are in A.P., then show that (i) $a^2(b+c), b^2(c+a), c^2(a+b)$ are also in A.P.

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184. If a, b, c are in A.P, then show that: $b+c-a, c+a-b, a+b-c$ are in A.P.

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185. If a, b, c are in A.P, then show that: $bc - a^2, ca - b^2, ab - c^2$ are in A.P.

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186. If $\frac{b+c}{a}, \frac{c+a}{b}, \frac{a+b}{c}$ are in $A.\ P.$ show that $\frac{1}{a}, \frac{1}{b}\frac{1}{c}$ are also in $A.\ P.\ (a+b+c \neq 0).$

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187. If $\frac{b+c}{a}, \frac{c+a}{b}, \frac{a+b}{c}$ are in A.P., prove that : $bc,\ ca,\ ab$ are in A.P.

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188. If $a\left(\frac{1}{b}+\frac{1}{c}\right), b\left(\frac{1}{c}+\frac{1}{a}\right), c\left(\frac{1}{a}+\frac{1}{b}\right)$ are in A.P. prove that a, b, c are in A.P.

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189. Insert 3 arithmetic means between 3 and 19.

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190. For what value of n, $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ is the arithmetic mean of a and b?

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191. Between 1 and 31 are inserted m arithmetic mean so that the ratio of the $(7)^{th}$ and $(m-1)^{th}$ means is 5:9. Find the value of m.

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192. if the A.M. between pth and qth terms of an A.P. be equal to the A.M. between rth and sth terms of the A.P., then show that $p+q=r+s$

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193. Find the A.M. between: 7 and 13

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194. Find the A.M. between: $12\ and\ -8$

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195. Find the A.M. between: $(x-y) and\ (x+y)$

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196. Insert 4 A.M.s between 4 and 19.

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197. Insert 7 A.M.s between 2 and 17.

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198. Insert six A.M.s between 15 and -13.

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199. There are n A.M.s between 3 and 17. The ratio of the last mean to the first mean is 3:1. Find the value of n.

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200. Insert AMs between 7 and 71 such that 5^{th} AM is 27. Also find the number of AMs

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201. If n A.Ms are inserted between two numbers, prove that the sum of the means equidistant from the beginning and the end is constant.

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202. Insert five numbers between 8 and 26 such that the resulting sequence is an A.P.

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203. 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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204. 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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205. 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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206. A manufacturer of radio sets produced 600 units in the third year and 700 units in the seventh year. Assuming that the product increases

uniformly by a fixed number every year, find i. the production in the first year ii. the total product in 7 years and iii. the product in the 10th year.

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207. 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 :

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208. 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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209. 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 of10 year, all percentages applying to the original cost?

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210. A farmer buys a used tractor for Rs. 12000. He pays Rs. 6000 cash and agrees to pay the balance in annual instalments of Rs. 500 plus 12% interest on the unpaid amount. How much the tractor cost him?

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211. Shamshad Ali buys a scooter for Rs. 22000. He pays Rs. 4000 cash and agrees to pay the balance in annual instalments of Rs. 1000 plus 10% interest on the unpaid amount. How much the scooter will cost him?

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212. the income of a person is Rs. 300,000 in the first year and he receivers in increase of Rs. 10000 to his income per year for the next 19 years. Find the total amount, he received in 20 years.

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213. A man starts repaying a loan as first instalment of Rs. 100. If he increases the instalments by Rs. 5 every month, what amount he will pay in the 30th instalment?

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214. A man accepts a position with an initial salary of Rs. 5200 per month. It is understood that the will receive an automatic increase of Rs. 320 in the very next month and each month thereafter. Find his salary for the tenth month What is his total earnings during the first year?

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215. In a cricket team tournament 16 teams participated. A sum of Rs 8000 is to be awarded among themselves as prize money. If the last place team is awarded Rs 275 in prize money and the award increases by the same amount for successive finishing places, how much amount will the first place team receive?

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216. A man saved Rs. 66000 in 20 years. In each succeeding year after the first year he saved Rs. 200 more than what he saved in the previous year. How much did he save in the first year?

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217. Write the common difference of an A.P. whose nth term is $xn + y$.

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218. Write the common difference of an A.P. the sum of whose first n terms is $\frac{P}{2}n^2 + Qn$

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219. If the sum of n terms of an A.P. is $2n^2 + 3n$ then write its nth term.

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220. If the sums of n terms of two arithmetic progressions are in the ratio $2n + 5 : 3n + 4,$ then write the ratio of their mth term.

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221. Find the sum of the first n odd numbers

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

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223. Write the value of n for which nth terms of the A.P.s 3,10,17. And 63,65,67. are equal.

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224. if mth term of an A.P. is $n\,and\,nth$ term is $m,$ then write its pth term.

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225. If the sums of n terms of two A.P.s are in ratio $(3n+2):(2n+3)$, find the ratio of their 12th terms.

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226. 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

Answer: C

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227. 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

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228. If the sum of n terms of an A.P. be $3n^2 - n$ and its common difference is 6, then its first term is

A. 2

B. 3

C. 1

D. 4

Answer: A

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229. Sum of all two digit numbers which when divided by 4 yield unity as remainder is.

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230. There are n A.M.s between 3 and 17. The ratio of the last mean to the first mean is 3:1. Find the value of n.

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231. If S_n denotes the sum of first n terms of an A.P. $<a_n>$ such that $\frac{S_m}{S_n} = \frac{m^2}{n^2}$, $then \frac{a_m}{a_n} =$ a. $\frac{2m+1}{2n+1}$ b. $\frac{2m-1}{2n-1}$ c. $\frac{m-1}{n-1}$ d. $\frac{m+1}{n+1}$

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232. 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. 8 c. 6 d. 7

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

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

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234. 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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235. If $a_1, a_2, a_3, , a_n$ are in A.P. with common difference $d(whered \neq 0)$, then the sum of series. $\sin d$ $d(\cos eca_1 \cos eca_2 + \cos eca_2 \cos eca_3 + = \cos eca_{n-1} \cos eca_n)$ is equal to$\cot a_1 - \cot a_n$.

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236. If the arithmetic progression whose common difference is nonzero the sum of first $3n$ terms is equal to the sum of next n terms. Then, find the ratio of the sum of the $2n$ terms to the sum of next $2n$ terms.

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237. 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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238. If n arithmetic means are inserted between 1 and 31 such that the ratio of the first mean and nth mean is 3:29 then the value of n is

a.10 b. 12 c. 13 d. 14

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239. 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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240. 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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241. If the sum of first n even natural numbers is equal to k times the sum of first n odd natural number then $k =$

a.$\frac{1}{n}$ b. $\frac{n-1}{n}$ c. $\frac{n+1}{2n}$ d. $\frac{n+1}{n}$

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242. If the first second and last term of an A.P. are $a, b, and\ 2a$ respectively then its sum is

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

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243. 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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244. If in an A.P, $S_n = n^2p$ and $S_m = m^2p$, then S_p is equal to

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245. If in an A.P., the pth term is $q\ and\ (p+q)^{th}$ term is zero then the q^{th} term is

a.$-p$ b. p c. $p+q$ d. $p-q$

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246. The 10th common term between the A.P.s 3,7,11,15, and 1,6,11,16,.. is

a.191 b. 193 c. 211 d. none of these

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247. If in an A.P. $S_n = n^2 q \, and \, S_m = m^2 q, \; where \; S_r$ denotes the sum of r terms of the A.P., then S_q equals

a.$\frac{q^3}{2}$ b. mnq c. q^3 d. $\left(m^2+n^2\right)q$

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248. Let S_n denote the sum of the first n tem of an A.P. If $S_{2n} = 3S_n$ then prove that $\frac{S_{3n}}{S_n} = 6.$

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