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MATHS

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PROGRESSION

Example

1. Examine whether the following sequences are in A.P. If it is so, determine its first term and

common difference.

$T_n = 4n + 3$

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2. Examine whether the following sequences are in A.P. If it is so, determine its first term and common difference.

$T_n = n^2 + 3$

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3. The fifth term of an A.P. Is $\frac{9x+8}{2}$ and nineth term is $\frac{17x+16}{2}$.Determine the AP. and its sixteenth term.

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4. The sum of three numbers in A.P. is 24 and the sum of their squares is 224. Find the number.

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5. If pth, qth and rth term of an A.P. be a,b,c then prove that.

$$a(q-r)+b(r-p)+c(p-q)=0$$

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6. If a,b,c are in A.P.,prove that -

$$a^3-8b^3+c^3+6abc=0$$

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

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

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9. Determine five arithmetic mean between 3 and 33.

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10. There are n AM.'s between 7 and 85 such that (n-3)th mean : nth mean = 11 : 24.Find n.

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11. Find the sum of -7-4-1 + 2.... to 20th term.

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12. Prove that the sum of n A.M.'s between any two numbers is equal to n times the A.M. of the two numbers.

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13. The first term and the last term of an A.P. are 2 and 29, respectively. If the sum of the series is 155, find the number of terms and common difference.

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14. If the sums of an A.P. upto pth, qth and rth terms are a, b and c respectively, prove that-

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

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15. Find the sum of first n terms of the series

1.3 + 2.5 + 3.7 + 4.9 +.....

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16. The nth term of a sequence is given by $\frac{2^{n+1}}{3^n}$. Prove that it is a geometric sequence. Also find the first term and common ratio of it.

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17. If fifth term of a G.P. is 16 and tenth term is $\frac{1}{2}$, find the G.P. Also find its fifteenth term.

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18. The sum of three consecutive number in G.P. is 26 and their product is 216. Find the numbers.

19. If 2, a, b, 8 are in A.P. and a, b, c are in G.P., find a, b, c.

20. a, b, c are in G.P. If x, y are A.M.'s between a, b and b, c respectively, prove that-

$\frac{a}{x}+\frac{c}{y}=2$ and $\frac{1}{x}+\frac{1}{y}=\frac{2}{b}$.

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21. If a,b,c,d are in G.P. then $\frac{1}{a^3+b^3}, \frac{1}{b^3+c^3}, \frac{1}{c^3+d^3}$ are also in G.P.

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22. Determine 3 G.M.,s between 2 and 162.

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23. If 'a' be the AM of b and c and p and q be the two G.M.,s between them, show that

$p^3 + q^3 = 2abc.$

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24. Find the sum to n term of the G.P

$\frac{1}{2} - \frac{1}{4} + \frac{1}{8} - \frac{1}{16} + \ldots\ldots$

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25. In a G.P the sum of first n terms is S,the product is P and the sum of the reciprocals of the terms is R.Show that $P^2 = \left(\frac{S}{R}\right)^n$.

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26. Find the sum of first n terms of the following

$4 + 44 + 444 + \ldots$.

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Exercise

1. Following are the nth terms of certain sequences. Determine first four terms in each case.

$T_n = 3n + 1$

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2. Following are the nth terms of certain sequences. Determine first four terms in each case.

$T_n = n^2 + n + 2$

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3. Following are the nth terms of certain sequences. Determine first four terms in each case.

$$T_n = \frac{n^2 + 2n}{2}$$

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4. Following are the nth terms of certain sequences. Determine first four terms in each case.

$$T_n = 1+(-1)^n$$

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5. Following are the nth terms of certain sequences. Determine first four terms in each case.

$$T_n = \frac{(1)^n}{2}$$

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6. Following are the nth terms of certain sequences. Determine first four terms in each

case.

$T_n = (2n)^2$

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7. Following are the nth terms of certain sequences. Determine first four terms in each case.

$T_n = \left(\frac{2}{3}\right)^{n-1}$

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8. Find the nth terms of the following sequences.

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

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9. Find the nth terms of the following sequences.

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

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10. Find the nth terms of the following sequences.

2,4,6,8,....

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11. Find the nth terms of the following sequences.

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

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12. Find the nth terms of the following sequences.

1,3,9,27,.....

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13. Find the nth terms of the following sequences.

$\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \ldots\ldots$

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14. the following are the nth term of certain sequence. Determine whether they are A.P. or not . If it is so find the first term and CD. $T_n = n^2 - 1$

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15. the following are the nth term of certain sequence. Determine whether they are A.P. or not . If it is so find the first term and CD. $T_n = 2n + 3$

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16. the following are the nth term of certain sequence. Determine whether they are A.P. or not . If it is so find the first term and CD. $T_n = 3n + 5$

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17. the following are the nth term of certain sequence. Determine whether they are A.P. or not . If it is so find the first term and CD. $T_n = n^2 + n + 2$

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18. the following are the nth term of certain sequence. Determine whether they are A.P. or not . If it is so find the first term and CD. $T_n = 3n - 1$

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19. The following are the nth terms of certain sequences. Determine whether they are A.P. or not. If it is so, find the first terms and common differences.

$T_n = 4n - 10$

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20. the following are the nth term of certain sequence. Determine whether they are A.P. or not . If it is so find the first term and CD.

$T_n = \frac{n^2 + 1}{2}$

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21. Determine the terms of the following A.P.'s as specified.

13th term of 7, 10, 13, ...

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22. Determine the terms of the following A.P.'s as specified.

100th term of 1, 3, 5, 7, ...

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23. Determine the terms of the following A.P.'s as specified.

25th term of 3.1, 1.7, ...

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24. Determine the terms of the following A.P.'s as specified.

nth term of $(a-3b), (a-b), (a+b)$

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25. Determine the terms of the following A.P.'s as specified.

(n+1)th term of $\frac{1}{n}, \frac{n+1}{n}, \frac{2n+1}{n}$

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26. Determine the terms of the following A.P.'s as specified.

17th term of -2,1,4,7,.....

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27. Determine the terms of the following A.P.'s as specified.

10th term of 408,404,400,.....

28. Determine the terms of the following A.P.'s as specified.

10th term of 2,0,-2,-4,.....

29. Determine the terms of the following A.P.'s as specified.

rth term of 20,18,16,.....

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30. The first term of an A.P. is 6 and common difference is 2, then determine the l5th team.

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31. The first term of an A.P. is 5 and the 11th term ,is 125 then determine the common difference.

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32. The fourth term and eighth term of an A.P. are 2 and 10 respectively. Determine the A.P. and its 11th term.

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33. The eighth term and 20th term of an A.P. are 22 and 46 respectively. Determine the first term, common difference and 17th term of it.

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34. the 7th term and 14 term of an A.P are - 9 and - 23 respectively. Determine the first term and common difference. which term of the A.P is -25

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35. The fifth and nineth term of an A.P. are 7 and 11 respectively. Determine the A.P. which term of the A.P. is 2 ?

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36. Which term of the A.P. $-3\frac{1}{3}, -3, -2\frac{2}{3}$, is zero?

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37. Can zero be a term of an A.P. whose eleventh term is 62 and 21th term is 32 ? (Hint : Taking the nth term to be zero, find n)

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38. The 4rth term and 15th term of an A.P is 22 and 66 respectively. Find the first term and the common difference.

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39. The sixth term and 16th term of an A.P. are — 30 and zero respectively. The sum of a particular term with 26th term is the 21th term of the A.P. Determine the term.

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40. If 5 times the fifth term of an A.P. .is equal to 8 times its eight term, show that 13th term is zero.

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

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42. In a certain A.P., the 24th term is twice the 10th term. Prove that 72th term is twice of 34th term.

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43. If the mth term and nth term of an A.P. are respectively n and m show that the (m + n)th term is zero and pth term is $m + n - p$.

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44. The pth term of an A.P. is q and qth term is p. Show that the nth term is $p + q - n$.

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45. The pth term of an A.P. is —q and qth term is -p. If the nth term is zero, find n.

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46. The sum of the first term and pth term of an A.P. is zero. Show that the $\left(\frac{p+1}{2}\right)$th term is zero.

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47. The sum of the pth and the qth term of an A.P. is equal to the sum of rth and sth term of it. Show that (p-r)th term and (s-q)th terms are equal

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48. If pth, qth and rth term of an A.P. are in A.P., show that p, q, r also are in A.P.

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49. If the qth term of an A.P. is twice the pth term and rth term is twice the qth term. Prove that $-2p + r = 3q$

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50. The sum of the pth and qth term of an A.P. is one, and rth term is one. Show that the pth term is $\frac{q - r}{p + q - 2r}$

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51. The pth term of an A.P. is twice the qth term. Again the sum of qth and rth term is 2. Prove that the pth term is $\frac{4(q-p)}{3q-2p-r}$

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52. The sum of three consecutive terms of an A.P. is 21 and their product is 315. Determine the numbers.

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53. The sum of three consecutive terms of an A.P. is 36 and their product is 1620. Determine the numbers.

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54. The sum of three consecutive terms of an A.P. is 54. If the product of the extremes is 275, determine the numbers.

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55. The sum of three numbers in A.P. is 12. If the sum of the squares is 56, then determine them.

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56. Three integers are in A.P. If the product of the first and last is 60 and their difference is 4, determine them.

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57. Divide 69 into three parts such that the parts may form as A.P. and the product of first two terms is 483.

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58. Divide 72 into three parts such that the parts may form,an AP. and the product of the smaller parts is 480.

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59. The product of three numbers in A.P. is 648. If the greatest is twice the least, then determine the numbers.

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60. The sum of the squares of three numbers in A.P. is 116. If the greatest is twice the least, then find the numbers.

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61. The sum of three numbers in A.P.is 30. If the product of the last two is three times the product of the first two then find the numbers.

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62. The sum of four numbers in A.P. is 20 and sum of their squares is 120. Find the numbers.

Hint : Assume them as $a-3d, a-d, a+d$ and $a+3d$.

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63. The sum of four numbers in A.P. is 40. If the sum of the product of first and last term and two middle term is 160, find the numbers

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64. If a, b, c are in A.P. then show that the terms given below are also in A.P.

$b + c, c + a, a + b$

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65. If a, b, c are in A.P. then show that the terms given below are also in A.P.

$b + c - a, c + a - b, a + b - c$

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66. If a, b, c are in A.P. then show that the terms given below are also in A.P.

$\frac{1}{bc}, \frac{1}{ca}, \frac{1}{ab}$

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67. If a, b, c are in A.P. then show that the terms given below are also in A.P.

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

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68. If a, b, c are in A.P. then show that the terms given below are also in A.P.

$$(b+c)^2-a^2, (c+a)^2-b^2, (a+b)^2-c^2.$$

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69. If a, b, c are in A.P. then show that the terms given below are also in A.P.

$a^2(b+c), b^2(c+a), c^2(a+b), \{ab+bc+ca \neq 0\}$

.

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70. If a^2, b^2, c^2 are in A.P., then the terms given below are also in A.P.

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

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71. If a^2, b^2, c^2 are in A.P., then the terms given below are also in A.P.

$$\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}.$$

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72. If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P. then $\frac{b+c}{a}, \frac{c+a}{b}, \frac{a+b}{c}$ are also in A.P.

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73. If $\frac{1}{a+b}, \frac{1}{b+c}, \frac{1}{c+a}$ are in A.P., then c^2, a^2, b^2 are in A.P.

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74. Insert three arithmetic mean between 2 and 14.

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75. Insert three A.M.'s between $3\frac{1}{4}$ and $1\frac{1}{4}$.

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76. Insert seven A.M.'s between 1 and 41.

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77. Insert five A.M.'s between 1.2 and 8.4.

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78. Determine four numbers between 7 and 4 such that these six numbers are six consecutive

terms of an A.P.

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79. Determine three quantities between x and 9x+ 4 such that these five numbers form an AP.

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80. Determine p A.M.'s between 1 and p^2.

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81. If $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ is the A.M. of a and b, then find n.

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82. If $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ is the A.M. of a and b, then find n.

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83. There are n A.M.'s between 5 and 35. If second mean : last mean = 1 : 4, then find n.

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84. There are n A.M.'s between 1 and 51 and fourth mean : seventh mean = 3 : 5, Determine n.

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85. There are p A.M.'s between 5 and 41 and third mean : (p-1)th mean = 2 : 5, find p.

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86. The product of two numbers is 16. The product of two A.M.'s between them is 24. Find the numbers.

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87. If $a_1, a_2, a_3 \ldots\ldots a_n$ are in AP, then prove that

$$\frac{1}{a_1 a_2} + \frac{1}{a_2 a_3} + \frac{1}{a_3 a_4} + \ldots\ldots + \frac{1}{a_{n-1} a_n} = \frac{n-1}{a_1 a_n}$$

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88. Find the sum of the following series up to the specified term

1 + 3 + 5 + 7..... upto 30th term.

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89. Find the sum of the following AP up to the specified term

2 + 6 + 10 + ...upto 50th term.

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90. Find the sum of the following AP up to the specified term

20+ 18+ 16..... Upto 12th term.

91. Find the sum of the following AP is up to the specified term

4+7+10..... Upto 112th term.

92. Find the sum of the following AP up to the specified term

$\frac{1}{2} + \frac{1}{3} + \frac{1}{6} +$ ..... upto 9th term.

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93. Find the sum of the following series up to the specified term

$\sqrt{2} + \sqrt{2}(1 - \sqrt{2}) + \sqrt{2}(1 - 2\sqrt{2})$.....upto 21 th term

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94. Find the sum of the following series up to the specified term

-8-3+2+.....upto 20th term.

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95. Find the sum of the following series up to the specified term

$\frac{x^2-1}{x}+x+\frac{x^2+1}{x}+$.....upto nth term.

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96. Find the sum of the following series up to the specified term

$(x-y)+(2x-3y)+(3x-5y)+$ ..... upto nth term.

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97. Find the sum of the following series up to the specified term

$\frac{n}{n}+\frac{n-1}{n}+\frac{n-2}{n}+$ .....upto nth term.

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98. Find the sum of the following series up to the specified term

$1 + 4 + 7 + \ldots\ldots + 37$

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99. Find the sum of the following series up to the specified term

$2+5+8+\ldots\ldots+152$

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100. Find the sum of the following series up to the specified term

1-3-7-.....-47

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101. By inserting eight A.M.'s between 2 and 29 prove that the sum of the eight A.M's is equal to eight times of A.M. of 2 and 29.

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102. Show that the sum of 500 A.M.'s between 2 and 3 is 1250.

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103. Prove that the ratio of the sum of m A.M.'s between any two numbers to the sum of n A.M's between the same numbers is equal to $\frac{m}{n}$.

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104. The sum of first n terms of an A.P series is $26n - 2n^2$. Find the fifth term.

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

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106. The first term and common difference of an A.P. are 3 and 2 respectively. Find the sum of first

fifteen terms.

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107. The fifth and ninth terms of an A.P. are respectively -15 and -13. Find the sum of first ten terms.

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108. The first term and common difference of an A.P. are respectively 4 and 2. If the sum up to n terms is 88, find n.

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109. The first term and common difference of an A.P. are respectively -2 and -4. If the sum upto n terms is —288, find n.

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110. The first term and last term of an A.P. are respectively 1 and 157. If the sum is 3160 find the number of terms.

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111. The first term and last term of an A.P. are 5 and 123 respectively. If the sum of the series is 3840, determine the number of terms and common difference.

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112. If the sum upto 21st term of an A.P. is 630, determine the 11th term.

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113. If 18th term of an A.P. is 52, determine the sum upto 35th term.

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114. In an A.P. if the ratio of the sum upto 10th term and the 10th term is 140 : 23, and the common difference is 2, then determine the first term.

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115. The seventh term of an A.P. is 20 and the sum of first twenty terms is 610. Find the tenth term and the sum of first fifteen terms.

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116. The sum of first ten terms of an A.P. is 120. The sum of next ten terms is 320. Find the first term and common difference.

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117. In an A.P. the ratio of 7th term to 11th term is 19 : 31 and the sum of these two terms is 20.Find the sum of first twenty terms.

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118. The sum of first nine terms of an A.P. is 171 and that of 24 terms is 996. Find the sum of first 16 terms.

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119. In an A.P. the nth term is p and the sum of first n terms is q. Show that the first term of the series is $\frac{2q - pn}{n}$.

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120. If $\{S_1, S_2, S_3\}$ denoted the sum of n terms of three series in A.P. the first term of each being the same and the respective common difference 1, 2 and 3, show that $\{S_1 + S_3 = 2S_2\}$.

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121. The sum of first n terms of an A.P. is m and that of first m terms is n. Prove that the sum of first m + n terms is $-(m+n)$.

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122. The ratio of sum of the first n terms of two series in A.P is $(3n+8):(7n+15)$. Prove that the ratio of their 12th terms is 7 : 16.

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123. In an A.P. the pth and qth terms are respectively a and b. Show that the sum of first p + q terms is $\frac{p+q}{2}\left\{(a+b)+\frac{a-b}{p-q}\right\}$.

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124. If the first terms, second term and the last term of an A.P. are respectively a,b and c.Prove that the sum of the series is $\frac{(a+c)(b+c-2a)}{2(b-a)}$.

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125. The sum of first n terms of an A.P. is S_n.If $S_n = n^2p$ and $S_m = m^2p(m \neq n)$.Show that $S_p = p^3$.

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126. The first term of an A.P. is a. If sum of first p terms is zero, prove that the sum of first (p + q) terms is $\frac{a(p+q)q}{1-p}$.

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127. The sum of first P terms of an A.P. is equal to that of the first Q terms. Prove that the sum of first (P+Q) terms is zero.

128. Find the sum of all odd numbers lying between 12 and 90.

129. Determine the sum of the numbers lying between 100 and 500 which are divisible by 11.

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130. Find the sum of all numbers lying between 1 and 100 which are divisible by 4 or 5.

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131. Determine the sum of the numbers lying between 100 and 200 which are not divisible by 3.

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132. Determine the sum of following series upto n terms.

$1.2 + 2.3 + 3.4 + ...$

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133. Determine the sum of following series upto n terms.

$1.1 + 2.3 + 3.5 + ...$

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134. Determine the sum of following series upto n terms.

$2.1 + 3.3 + 4.5 + ...$

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135. Determine the sum of following series upto n terms.

$3.8 + 6.11 + 9.14 + ...$

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136. Determine the sum of following series upto n terms.

$1.3 + 2.4 + 3.5 + ...$

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137. Determine the sum of following series upto n terms.

$1.3 + 5.7 + 9.11 + ...$

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138. Determine the sum of following series upto n terms.

$(3^2 - 2^2) + (5^2 - 4^2) + (7^2 - 6^2) + ...$

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139. Determine the sum of following series upto n terms.

$(1^2 - 2^2) + (3^2 - 4^2) + (5^2 - 6^2) + ...$

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140. Determine the sum of following series upto n terms.

$1.2^2 + 2.3^2 + 3.4^2 + ...$

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141. Determine the sum of following series upto n terms.

$1 + (1 + 2) + (1 + 2 + 3) + ...$

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142. Determine the sum of following series upto n terms.

$1 + (3 + 5) + (7 + 9 + 11) + ...$

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143. The following are the nth terms of certain sequences. Determine whether they are G.P. or not. If it is so find the first term and common ratio.

3^{n+2}.

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144. The following are the nth terms of certain sequences. Determine whether they are G.P. or not. If it is so find the first term and common ratio.

$3^n + 2.$

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145. The following are the nth terms of certain sequences. Determine whether they are G.P. or not. If it is so find the first term and common

ratio.

2^{8-n}.

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146. The following are the nth terms of certain sequences. Determine whether they are G.P. or not. If it is so find the first term and common ratio.

2^{n-1}.

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147. The following are the nth terms of certain sequences. Determine whether they are G.P. or not. If it is so find the first term and common ratio.

$(-2)^{n-3}$.

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148. The following are the nth terms of certain sequences. Determine whether they are G.P. or not. If it is so find the first term and common

ratio.

$3^{\frac{n}{2}}$.

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149. The following are the nth terms of certain sequences. Determine whether they are G.P. or not. If it is so find the first term and common ratio.

3.2^{n-1}.

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150. The following are the nth terms of certain sequences. Determine whether they are G.P. or not. If it is so find the first term and common ratio.

ak^{2n-1}.

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151. The following are the nth terms of certain sequences. Determine whether they are G.P. or not. If it is so find the first term and common

ratio.

$n^2 + n + 1.$

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152. Find the value of k, if each of the following three terms are in G.P.

$k - 1, 3k - 3, 8k - 2.$

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153. Find the value of k, if each of the following three terms are in G.P.

$3k + 1, 6k - 4, 3k - 2.$

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154. Find the value of k, if each of the following three terms are in G.P.

$3k, 3k + 3, 3k + 8.$

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155. Find the value of k, if each of the following three terms are in G.P.

$k + 1, 2k + 2, 5k - 2.$

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156. Find the value of k, if each of the following three terms are in G.P.

$3k - 7, 5k - 1, 14k + 2.$

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157. Find the terms of the following G.P. as specified.

5th and 8th terms of 1,3,9,27,...

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158. Find the terms of the following G.P. as specified.

6th and 10th terms of $\sqrt{3}, \frac{1}{\sqrt{3}}, \frac{1}{3\sqrt{3}}, \ldots\ldots$

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159. Find the terms of the following G.P. as specified.

4th and 9th terms of $1, -\frac{1}{2}, \frac{1}{4}, \ldots\ldots$

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160. Find the terms of the following G.P. as specified.

Eighth terms of $\left(\sqrt{2}+1\right), 1, \left(\sqrt{2}-1\right)$,.....

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161. Find the terms of the following G.P. as specified.

Fifth term of p^2, pq, q^2,.....

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162. Which term of 2, 4, 8, 16,..... is 2048 ?

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163. Which term of $\frac{1}{128}, \frac{1}{64}, \frac{1}{32}$,..... is 1?

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164. Which term of 9,3,1,.... Is $\frac{1}{243}$?

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165. Which term of 4,-8,16,-32,..... is 1024?

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166. The fourth and seventh terms of a G.P. are 1 and $\frac{1}{8}$ respectively. Determine the G.P. Also find its nineth term.

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167. The second and fifth term of a G.P. are 24 and 81 respectively. Find the first term and common

ratio.

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168. The fourth term of a G.P. is 4 and the product of second and fourth term is 1. Find its sixth term.

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169. The sum of second and third term of a G.P. is $-\frac{1}{9}$ and that of sixth and seventh term is $-\frac{16}{729}$ .Find its first term and common ratio.

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170. The fifth term of a G.P. is four times the third term. The sum of the first and second term is -4.Determine the G.P.

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171. The sum of the second and third term of a G.P. is 3 and that of fourth and fifth term is 12. Determine the first term.

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172. The third term of a G.P. is square of the first term. The fifth term is 64. Determine the first term and common ratio.

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173. The first term and common ratio of a G.P. are both positive. The product of first and second term is 9 and that of first and fourth term is 144. Find the third term.

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174. The first, fourth and thirteenth term of an A.P. are in G.P. If the first term of the A.P. is 3, find the A.P.

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175. In a G.P., the (p + q)th term is m and (p-q)th term is n. Find its pth term.

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176. The sum of three numbers in G.P. is 52 and their product is 1728.Find the numbers.

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177. The sum of three positive numbers in G.P. is 21. The sum of second and third term is twenty times the first term. Find the numbers.

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178. The sum of three numbers in G.P. is 26. If the product of first and third is six times the second term, Find the numbers.

179. The sum of three numbers in G.P. is 7. If sum of their squares is 21, Find the numbers.

180. The sum of three numbers in A.P. is 18. If 2, 4 and 11 are added to them respectively, the results are in G.P., find them.

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181. The sum of three numbers in A.P. is 15. If 1, 4 and 19 are added to them respectively, the results are in G.P., find them.

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182. The product of three numbers in G.P. is 512. If 8 be added to the first, and 6 to the second, then these two sums and the third term form an A.P., find the numbers.

183. The sum of three numbers in G.P. is 70. If the first and last term are multiplied by 4 and the middle term by 5, then they will be in A.P., find them.

184. Divide 42 in three parts which are in G.P. such that the square of the middle term is twice the greatest.

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185. If 1, 1, 3 and 9 be added respectively to four members in A.P. then a G.P. results. Find the numbers if their sum is 16.

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186. x and y are two positive integers such that 2,x, y are in A.P. and x, y, 9 are in G.P. then show that $-x = 4, y = 6.$

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187. The numbers $x, 8, y(x \neq y)$ are in G.P. and the numbers $x, y, -8$ are in A.P., then show that $x = 16, y = 4$

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188. If a, b, c are in A.P. and a,b, d are in G.P., prove that a, a-b, d-c are in G.P.

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189. If a,b,c are in G.P., show that $\frac{1}{a+b}, \frac{1}{2b}, \frac{1}{b+c}$ are in A.P.

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190. If a, b, c are in A.P. and a, b, c + 1 are in G.P. then prove that $4a = (a-c)^2$.

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191. If x,y,z are in G.P and p,q,r are in A.P then prove that $x^{q-r}y^{r-p}z^{p-q}=1$.

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192. If a,b,c are in G.P and $a^{\frac{1}{x}}=b^{\frac{1}{y}}=c^{\frac{1}{z}}$ then prove that x,y,z are in A.P.

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193. If x, y, z,w in are in G.P., prove that $\frac{xy - wz}{y^2 - z^2} = \frac{x + z}{y}$.

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194. The pth, qth and rth term of a G.P. are x, y, z respectively, then prove that- $x^{q-r} . y^{r-p} . z^{p-q} = 1$.

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195. If pth, qth and rth term of a G.P. are in G.P. then prove that p, q, r are in A.P.

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196. If pth, qth and rth term of an A.P. are in G.P., then show that common ratio of the G.P. is $\frac{q-r}{p-q}$.

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197. If a, b, c be the pth, qth and rth term of both an A.P. and G.P., then show that - $a^{b-c}.b^{c-a}.c^{a-b}=1.$

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198. If a, b, c, d are in G.P., show that each of the following three term are also in G.P.

$a+b, b+c, c+d.$

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199. If a,b,c,d are in G.P show that each of the following three term are also in G.P $a^2+b^2, b^2+c^2, c^2+d^2.$

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200. If a,b,c,d are in G.P show that each of the following three term are also in G.P $a^2-b^2, b^2-c^2, c^2-d^2.$

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201. If a,b,c,d are in G.P show that each of the following three term are also in G.P $(a-b)^2, (b-c)^2, (c-d)^2$.

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202. If a, b, c, d are in G.P., show that each of the following three term are also in G.P.

$a^3+b^3, b^3+c^3, c^3+d^3$.

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203. If a,b,c,d are in G.P show that each of the following three term are also in G.P $(a-b)^2, (b-c)^2, (c-d)^2$.

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204. If a,b,c,d are in G.P show that each of the following three term are also in G.P $a^2+b^2+c^2, ab+bc+cd, b^2+c^2+d^2$.

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205. Insert three G.M.'s between 1 and 256.

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206. Insert five G.M.'s between 8 and $\frac{1}{8}$.

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207. Insert five G.M.'s between 3 and 192.

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208. Insert four G.M.'s between $\frac{7}{4}$ and 56.

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209. If $\frac{1}{2}$, x, y, z, 128 are in G.P., then find x,y,z,

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210. Inserting three G.M.'s between $\frac{1}{9}$ and 9 verify that their product is equal to cube of G.M. of $\frac{1}{9}$ and 9.

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211. The A.M. and G.M. of two positive numbers are 25 and 24 respectively. Find them.

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212. The A.M. and G.M. of two positive numbers are 15 and 9 respectively. Find them.

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213. The A.M. of two integral numbers exceeds their G.M. by 2 and the ratio of the numbers is 1 : 4. Find them.

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214. The sum of two positive numbers is 13 and their G.M. is 6. Find them.

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215. The difference of two positive numbers is 64 and the difference of their A.M. and G.M. is 16. Find the numbers.

216. The sum of A.M. and G.M. of two positive numbers is 32 and the ratio of these two numbers is 1:9. Find them.

217. The sum of A.M. and G.M. of two positive numbers is 96 and the ratio of the two numbers is 1:9. Find them.

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218. The A.M. of two positive numbers is 26. If the sum of the two numbers exceeds the sum of their A.M. and G.M. by 2, find the numbers.

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219. The ratio of A.M. and G.M. of two positive numbers is 5:4. If the difference between them is 12, find the numbers

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220. The difference between the arithmetic mean and geometric mean of two positive numbers is 16. If the ratio of the numbers is 1:25 find the numbers

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221. If G.M. of a and b is $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$,then prove that $n=-\frac{1}{2}$.

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222. If G.M. of a and b is $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ then prove that $n=\frac{1}{2}$.

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223. If 'g' be the GM and p and q be the two A.M.'s between two given numbers, then show that

$g^2 = (2p— q)(2q - p).$

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224. If A be the A.M. of two given numbers and g_1 and g_2 be two G.M.'s between them,then show that- $2A = \frac{g_1^2}{g_2} + \frac{g_2^2}{g_1}.$

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225. a, b, c are in A.P. If x be the G.M. of a and b, and y be the G.M. of b and c, then prove that b^2 is

the A.M. of x_2 and y_2.

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226. Prove that the product of n G.M.'s between a and b is $(ab)^{\frac{n}{2}}$

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227. The A.M. of two positive numbers a and b is twice their G.M. Prove that - $a:b=2+\sqrt{3}:2-\sqrt{3}$.

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228. If A and G be the A.M. and G.M. of two numbers a and b and $A:G=m:n$,then prove that- $a:b=m+\sqrt{m^2-n^2}:m-\sqrt{m^2-n^2}$

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229. Find the sum of the following series

1 + 2 + 4..... to tenth term.

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230. Find the sum of the following series

1 + 3 + 9..... to tenth term

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231. Find the sum of the following series

128 + 64 + 32... to tenth term.

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232. Find the sum of the following series:

$1 - 3 + 9 - 27 + \ldots$ to the 9th term.

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233. Find the sum of the following series: $\frac{1}{\sqrt{2}} - 1 + \sqrt{2} \ldots$ to the 10th term.

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234. Find the sum of the following series

$1 + \frac{1}{3} + \frac{1}{3^2}$ ....to tenth term.

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235. Find the sum of the following series: $2+1+\frac{1}{2}+\frac{1}{2^2}\ldots$. to the nth term.

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236. Find the sum of the following series

$\frac{x+y}{x-y}+1+\frac{x-y}{x+y}+$.... to n th term.

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237. Find the sum of the following series

$(a-x)+\left(a^2-x^2\right)+\left(a^3-x^3\right)+$..... To n th

term.

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238. Find the number of terms if-

$1 + 2 + 4 +$ ....=32767

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239. Find the number of terms if-

$64 + 32 + 16 +$ ....=$127\left(\frac{1}{2}\right)$.

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240. Find the number of terms if-

$3 - 6 + 12 - 24 +$ ....=-1023.

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241. Find the sum of first n terms of the following

$1 + 11 + 111 + 1111 + \ldots$.

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242. Find the sum of first n terms of the following

$5 + 55 + 555 + \ldots$.

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243. Find the sum of first n terms of the following

$3 + 33 + 333 + \ldots . .$

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244. Find the sum of first n terms of the following

$.7 + .77 + .777 + \ldots . .$

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245. Find the sum of first n term of the following series

$4 + 0.4 + 0.44 + ...$

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246. Find the sum of first n term of the following series

$1 + (1 + 2) + \left(1 + 2 + 2^2\right) + ...$

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247. Find the sum of first n term of the following series

$1 + (1 + 3) + \left(1 + 3 + 3^2\right) + ...$

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248. If S_1, S_2 and S_3 be the sums of first n term ,of 2 n terms and of 3n terms of a G.P. respectively,then prove that-

$S_1^2 + S_2^2 = S_1(S_2 + S_3).$

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249. If S_1, S_2 and S_3 be the sums of first n term ,of 2 n terms and of 3n terms of a G.P. respectively,then prove that-

$S_1(S_3 - S_2) = (S_2 - S_1)^2$.

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