MATHS

BOOKS - A N EXCEL PUBLICATION

SEQUENCES AND SERIES

Question Bank

1. Write the first 5 terms of each of the sequences whose n^{th} terms are given below

$a_n = n(n + 2)$

2. Write the first 5 terms of each of the sequences whose n^{th} terms are given below

$$a_n = \frac{n}{n+1}$$

3. Write the first 5 terms of the sequence whose n^{th} term is given below $a_n = 2^n$

4. Write the first 5 terms of each of the sequences whose n^{th} terms are given below

$$a_n = \frac{2n - 3}{6}$$

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5. Write the first 5 terms of each of the sequences whose n^{th} terms are given below

$$a_n = (-1)^{n-1} 5^{n+1}$$

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6. Write the first 5 terms of each of the sequences whose n^{th} terms are given below

$$a_n = \frac{n(n^2 + 5)}{4}$$

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7. Find a_{17} and a_{24} if $a_n = 4n - 3$

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8. Find a_7 if $a_n = \frac{n^2}{2^n}$

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9. find a_9 if $a_n = (-1)^{n-1} n^3$

10. Find a_{20} if $a_n = \dfrac{n(n-2)}{n+3}$

11. Find the first 5 terms of the sequence having the property $a_1 = 3, a_n = 3a_{n-1} + 2$ for all

$n > 1$. Also obtain the corresponding series

12. Write the first five terms of the sequence having the property $a_1 = -1 a_n = \dfrac{a_{n-1}}{n}, n \geq 2$ Also, obtain the corresponding series

13. Write the first five terms of the sequence having the property

$$a_1 = a_2 = 2, a_n = a_{n-1} - 1, n > 2.$$ Also, obtain the corresponding series.

14. The Fibonacci sequence is defined by

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

Find $\left(\dfrac{a_{n+1}}{a_n} \right)$ for n=1,2,3,4,5

15. The nth term of a sequence is given by $a_n = 2n + 7$. Prove that the. sequence is an A.P. Also find its common difference.

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

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

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

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

20. If the sum of p terms of an AP is the same as the sum of its q terms, show that the sum of its $(p+q)$ terms is zero.

21. How many terms of the sequence 54,51,48,

...be taken so that their sum is 513. Explain the

double answer.

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22. Find the sum of all integers between 50 and

500 which are divisible by 7:

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

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

25. If $\dfrac{b+c-a}{a}$, $\dfrac{c+a-b}{b}$, $\dfrac{a+b-c}{c}$ are in A.P, prove that $\dfrac{1}{a}$, $\dfrac{1}{b}$, $\dfrac{1}{c}$ are also A.P.s

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26. Find the sum of odd integers from 1 to 2001

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27. Find the sum of all natural numbers between 100 and 1000 which are multiple of 5.

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

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

30. If the mth terms of an AP is $\dfrac{1}{n}$ and the nth term is $\dfrac{1}{m}$, prove that the sum of the first mn terms is $\dfrac{1}{2}(mn + 1)$

31. If the sum of certain number of terms of the AP 25,22,19,.........is 116, then find the last term.

32. Find the sum of n terms of the AP, whose K^th term is $a_k = 5K + 1$.

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

34. The sums of n terms of two A.P.s are in the ratio (5n + 4): (9n + 6). Find the ratio of their 18th terms.

35. If the sum of p terms of an AP is the same as the sum of its q terms, show that the sum of its $(p + q)$ terms is zero.

36. The sum of the first p,q,r terms of an AP are a,b,c respectively, prove that

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

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

38. 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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39. Insert five numbers between 8 and 26 such that the resulting sequence is an AP.

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40. If $\dfrac{a^n + b^n}{a^{n-1} + b^{n-1}}$ is the A.M. between a and b, find the value of n

41. Between 1 and 31, m numbers have been inserted in such a way that the resulting sequence is an A.P. and the ratio of 7th and $(m-1)^{th}$ numbers in 5:9. Find the value of m.

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

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43. The difference between any two consecutive interior angles of a polygon is $5°$. If the smallest angle, is $120°$, find the number of sides of the polygon.

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44. The nth term of a sequence is given by $a_n = 4n + 7$ List the first 4 terms of the sequence

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45. The nth term of a sequence is given by $a_n = 4n + 7$ Is the sequence an A.P?. If yes, find the common difference of the A.P

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46. The nth term of a sequence is given by $a_n = 4n + 7$ Is the sequence an A.P?. If yes, find the common difference of the A.P

47. Consider a sequence whose sum to n terms is given by $S_n = 2n^2 + 4n$ Find a_n

48. Consider a sequence whose sum to n terms is given by $S_n = 2n^2 + 4n$ Is the sequence an A.P? If yes, find the common difference of the AP.

49. Find the nth term of the A.P 84, 80,76,......

50. If a_n is the nth term of an A.P whose first term is a and common difference is d, prove that $n = \dfrac{a_n - a}{d} + 1$

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51. Prove that the number of terms in the A.P. 3,6,9,....111 is 37

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52. Find the number of natural numbers between 1 and 100 which are divisible by 3.

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

54. Suppose that the 6th and 17th terms of an A.P. are 19 and 41 respectively Find the first term and the common difference of the A.P.

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

56. Suppose that the first and the 5th terms of an A.P. are-14 and 2 respectively Find the common difference of the A.P

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57. Suppose that the first and the 5th terms of an A.P. are-14 and 2 respectively If the sum of the terms of the A.P is 40, find the number of terms in the A.P.

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58. If a is the first term and d is the common difference of an A.P, what is its 25th term?

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59. If 10 times the 10th term of the A.P is equal to 15 times 15th term, show that the 25th term is 0

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60. Suppose that three numbers are in A.P. If the sum of the three numbers is 27, find the middle number

61. Suppose that three numbers are in A.P.if the sum of the three numbers is 27 and the product of the numbers is 648, find the numbers

62. Suppose that four numbers are in A.P. Let the four numbers be a-3d, a-d, a+d and a+3d If the sum of the numbers is 50, find a

63. Suppose that four numbers are in A.P. Let the four numbers be a-3d, a-d, a+d and a+3d If the sum of the numbers is 50 and greatest number is 4 times the least, find the numbers

64. Consider the A.P. 18,15,12.... Find the sum to n

terms of the A.P.

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65. Consider the A.P. 18,15,12.... How many terms

are needed to give the sum 45?

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66. Consider the equation 1+6+11 + 16 + ... +x= 148 If n is the number of terms in the sum, prove that $n = \dfrac{x+4}{5}$.

67. Consider the equation 1+6+11 + 16 + ... +x= 148 Prove that $x^2 + 5x - 1476 = 0$

68. Consider the equation 1+6+11 + 16 + ... +x= 148 Solve the given equation

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69. If S_1, S_2 and S_3 are respectively the sums of n, 2n and 3n terms of an A.P, whose first term is a and common difference d, then find S_1, S_2 and S_3

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70. If S_1, S_2 and S_3 are respectively the sums of n, 2n and 3n terms of an AP.Prove that $S_3 = 3(S_2 - S_1)$

71. Find the number of integers between 100 and 800 each of which on division by 16 leaves the remainder 7.

72. Find the number of integers between 100 and 800 each of which on division by 16 leaves the remainder 7.Find the sum of these integers.

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73. If x_1, x_2, x_3, x_4, x_5 and x_6 are the 6 terms between 3 and 24, find the common difference of the corresponding A.P.

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74. Insert 6 arithmetic means between 3 and 24.

75. Suppose that a, b, c are in A.P. Prove that 2b

= a + c

76. Suppose that a, b, c are in A.P. Prove that

$a^2(b+c), b^2(c+a), c^2(a+b)$ are in A.P.

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

78. Suppose a, b, c are in A.P. Prove that $\dfrac{ab + bc + ca}{bc}, \dfrac{ab + bc + ca}{ca}, \dfrac{ab + bc + ca}{ab}$ are in A.P.

79. Suppose a, b, c are in A.P.Prove that $a\left(\dfrac{1}{b} + \dfrac{1}{c}\right)$, $b\left(\dfrac{1}{c} + \dfrac{1}{a}\right)$, $c\left(\dfrac{1}{a} + \dfrac{1}{b}\right)$ are in A.P.

80. Suppose a^2, b^2, c^2 are in A.P. Prove that

$$2b^2 = a^2 + c^2$$

81. Suppose a^2, b^2, c^2 are in A.P. Prove that $\dfrac{a}{b+c}, \dfrac{b}{c+a}, \dfrac{c}{a+b}$ are also in A.P.S

82. Suppose $\dfrac{b+c}{a}, \dfrac{c+a}{b}, \dfrac{a+b}{c}$ are in A.P.Prove $\dfrac{1}{a}, \dfrac{1}{b}, \dfrac{1}{c}$ are also A.P.

83. Suppose $\dfrac{b+c}{a}, \dfrac{c+a}{b}, \dfrac{a+b}{c}$ are in A.P.Prove $\dfrac{1}{a}, \dfrac{1}{b}, \dfrac{1}{c}$ are also A.P.

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84. Suppose a, b, c are in A.P. Prove that

$$bc - a^2 + ab - c^2 = 2b^2 - \left(a^2 + c^2\right).$$ Hence,

Prove that $bc - a^2, ca - b^2, ab - c^2$ are in A.P.

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85. Suppose a, b, c are in A.P. Prove that

$$(a + 2b - c)(2b + c - a)(c + a - b) = 4abc$$

86. A farmer buys a used tractor for Rs. 12,000. He pays Rs. 6000 cash and agrees to pay the balance in 12 annual instalments of Rs. 500 plus 12% interest on the unpaid amount. Write the annual instalments as an A.P

87. A farmer buys a used tractor for Rs. 12,000. He pays Rs. 6000 cash and agrees to pay the balance in 12 annual instalments of Rs. 500 plus 12 % interest on the unpaid amount How mush will the tracter cost the farmer?

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88. Find the 10th term of the G.P. $-\dfrac{3}{4}, \dfrac{1}{2}, -\dfrac{1}{3}, \dfrac{2}{9}, \ldots\ldots$

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89. Which term of the progression 18, -12, 8,... is $\dfrac{512}{729}$?

90. The fourth, seventh and the last term of a G.P. are 10,80 and 2560 respectively. Find the first term and the number of terms in the G.P?

91. The first term of a G.P is 1. The sum of the third and fifth terms is 90. Find the common ratio of the G.P.

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92. Find sum of 5 + 55 + 555 + ... to n terms.

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93. If $x = 1 + a + a^2 + \ldots$ to ∞, where $|a| < 1$ and $y = 1 + b + b^2 + \ldots$ to ∞, where $|b| < 1$, prove that $1 + ab + a^2b^2 + \ldots$ to $\infty = \left(\dfrac{xy}{x + y - 1}\right)$

94. A square is drawn by joining the mid points of the sides of a square. A third square is drawn inside the second square in the same way and the process is continued infinitely. If the side of

the square is 10 cms, find the sum of the areas of all the squares so formed.

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95. Find the 20th and n^{th} terms of the G.P. $\dfrac{5}{2}, \dfrac{5}{4}, \dfrac{5}{8}, \cdots$

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96. Find the 12th term of a G.P. whose 8th term is 192 and the common ratio is 2.

97. The $5^th, 8^th$ and 11th terms of a GP are p, q

and s respectively. Prove that $q^2 = ps$.

98. The 4th term of a G.P. is square of its second

term and the first term is -3.Determine its 7th

term.

99. Which term of the following sequences

$2, 2\sqrt{2}, 4.$ . . .is 128?

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100. Which term of the following sequences

$\sqrt{3}, 3, 3\sqrt{3},$ …is 729?

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101. Which term of the following sequences

$$\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots is \frac{1}{19683}?$$

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102. Find the sum to 20 terms of

0.15,0.015,0.0015,..

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103. For what value of x, the numbers $-\dfrac{2}{7}, x. -\dfrac{7}{2}$ are in G.P ?

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104. Find the sum to n terms of the G.P. $\sqrt{7}, \sqrt{21}, 3\sqrt{7}...$

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105. Find the sum to n terms of the G.P.

$$1, \ -a, \ a^2, \ -a^3, \ ...(a \neq -1)$$

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106. Find the sum to n terms of the G.P.

$$x^3, x^5, x^7, \ldots(x \neq \pm 1)$$

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107. Evaluate $\sum\limits_{K=1}^{11} \left(2 + 3^K\right)$

108. The sum of the first three terms of a GP is $\dfrac{39}{10}$ and their product is 1. Find the common ratio and the terms.

109. How many terms of the G.P.$3, 3^2, 3^3, \ldots$ are needed to give the sum 120?

110. The sum of first three terms of a G.P. is 16 and the sum of the next three terms is 128. Determine the first term, the common ratio and the sum to n terms of the G.P.

111. Given.a G. P. with $a = 729$ and 7th term 64, determine S_7 ?

112. The sum of the first two terms of a GP Is -4 and the fifth term is 4 times the third term. Find the GP.

113. If the 4th, 10th and 16th terms of a G.P. are x,y and z respectively ,then prove that x,y,z are in G.P.P.

114. Find the sum to n terms of the sequence

8,88,888,8888...

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115. Find the sum of the products of the corresponding terms of the sequences 2,4,8,16,32 and $128, 32, 8, 2, \dfrac{1}{2}$

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116. Show that the products of the corresponding terms of the sequences $a, ar, ar^2, \ldots ar^{n-1}$ and A,AR,AR^2,....AR^(n-1)` form n G.P. and find the C.R.

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117. Find four numbers forming a G.P. in which the third term is greater than the first term by 9 and the second term is greater than the 4th by 18

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118. If the pth, q^{th} and r^{th} terms of a GP are a,b,c respectively, show that $a^{q-r}b^{r-p}c^{p-q} = 1$

119. If the first and the nth terms of a G.P. are a and b respectively and if p is the product of n terms, prove that $p^2 = (ab)^n$

120. Show that the ratio of the sum of first n terms of a G.P.to the sum of terms from $(n+1)^{th}$ to $(2n)^{th}$ term is $\dfrac{1}{r^n}$

121. If a,b,c and d are in G.P.show that

$$\left(a^2 + b^2 + c^2\right)\left(b^2 + c^2 + d^2\right) = (ab + bc + cd)^2$$

122. Insert two numbers between 3 and 81 so that the resulting sequence is a G.P.

123. Find the value of n so that $\dfrac{a^{n+1} + b^{n+1}}{a^n + b^n}$ may be the G. M. between a and b.

124. The sum of two numbers is 6 times their geometric mean, show that numbers are the ratio $\left(3 + 2\sqrt{2}\right) : \left(3 - 2\sqrt{2}\right)$

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125. If A and G be the A.M and G.M respectively between two positive numbers, prove that the numbers are $A \pm \sqrt{(A + G)(A - G)}$

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126. The number of bacteria in a certain culture doubles every hour.If there were 30 bacteria present in the culture originally, how many bacteria will be present at the end of 2nd hour, 4th hour and n^{th} hour`?

127. What will Rs. 500 amounts to in 10 years after its deposit in a bank which pays annual interest rate of 10% compounded annually.

128. If A.M and G. M of roots of a quadratic equation are 8 and 5, respectively, then obtain the quadratic equation.

129. Consider the G.P. 12,8 ,16/3,...What the common ratio of the G.P?

130. Consider the G.P. 12,8 ,16/3,...Prove that the 6th term of the G.P is $\dfrac{128}{81}$

131. Consider the G.P $2, 1, \dfrac{1}{2}, \dfrac{1}{4}$...Find its nth term

132. Consider the G.P $2, 1, \dfrac{1}{2}, \dfrac{1}{4}$...Which term of the given G.P is $\dfrac{1}{128}$

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133. Suppose that three numbers are in G.P if in addition the sum of the numbers is 65,and whose product is 3375. Find the numbers

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134. Suppose that three numbers are in G.P if in addition the sum of the numbers is 65,and whose product is 3375. Find the numbers

135. Suppose that three numbers are in G.P If the product of the numbers is 216, find the middle number

136. Suppose that three numbers are in G.P The product of three numbers be 216.If 2.8.6 are added to them, the results are in A.P. then find the numbers

137. Consider the G.p 3, 6, 12...Find its nth term and sum to n terms

138. Consider the G.p 3, 6, 12...If the sum to n terms is 381, find n

139. Suppose that a, ar, ar^2, ar^3, ar^4, ar^5 are the first 6 terms of a G.P Find the ratio of the sum of the first tree terms and the sum of first 6 terms

140. Suppose that $a, ar, ar^2, ar^3, ar^4, ar^5$ are the first 6 terms of a G.P If the ratio of the sum of first three terms and the sum of first 6 terms is 125:152 find the common ratio of the G.P

141. Suppose the sum of the geometric series $3 + 6 + 12 + ... + 1536$ is 3069 Assuming that the sum contains n terms prove that $r^{n-1} = 512$

142. Suppose the sum of the geometric series

$3 + 6 + 12 + ...+ 1536$ is 3069 Find the number

of terms in the series

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143. Find the sum of n terms of the series

$7 + 77 + 777 + ..$

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144. Find the sum of n terms of the series

$7 + 77 + 777 + $ ....

145. Consider an infinite G.P with first term a and common ratio $r - (- 1 < r < 1)$ If we take the squares of the trems of this G.P. what will be the resultant sequence?

146. Consider an infinite G.P with first term a and common ratio $r, (-1 < r < 1)$ If the sum of the given infinite G.P is 15 and the sum of squares of its terms is 45, find a and r

147. If $|a| < 1$ and $b = a + a^2 + a^3 +$ ...to ∞, can we write $b = \dfrac{a}{1-a}$?

148. If $b = a + a^2 + a^3 + \ldots . \infty$, lal < 1.Prove that $a = \dfrac{b}{1+b}$

149. Assume that 3.52 denotes 3.52222. If x=3.52, find 10x and 100x

150. Assume that 3.52 denotes 3.52222. Express this as a rational fraction.

151. Suppose $\dfrac{1}{a+b}, \dfrac{1}{2b}, \dfrac{1}{b+c}$ are three consecutive terms of an AP. Prove that

$$(a+b)(b+c) = b(a+2b+c)$$

152. Suppose $\dfrac{1}{a+b}, \dfrac{1}{2b}, \dfrac{1}{b+c}$ are three consecutive terms of an AP. Prove that a,b,c are the consecutive terms of a G.P.

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153. Suppose that a,b,c,d are in G.P with common ratio r Prove that $b+c = ar(1+r)$ and $b+d = ar\left(1+r^2\right)$

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154. Suppose that a,b,c,d are in G.P with common ratio r Prove that

$$(b + c)(b + d) = (c + a)(c + d)$$

155. A sum of Rs. 10,000 is invested at 8% p.a. compound interest? What is the total sum of the money at the end of 3 years?

156. A sum of Rs. 10,000 is invested at 8% p.a. compound interest? How long will it take for the total sum of money to be twice the amount invested?

157. An investment firm claims that you can double your money every year if you invest with them. Suppose you invest Rs. 100 Write the first five terms of the sequence associated with the claim starting with a = 100

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158. An investment firm claims that you can double your money every year if you invest with them. Suppose you invest Rs. 100 How much money would you have at the end of 9 years?

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159. An investment firm claims that you can double your money every year if you invest with

them. Suppose you invest Rs. 100 How much money would you have at the end of nth year?

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160. An investment firm claims that you can double your money every year if you invest with them. Suppose you invest Rs. 100 How many years would it take for you to have over Rs. 1,00,000

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161. Anil is entitled to a monthly payment which in each month is less by one tenth than it was a month before. Suppose he receives Rs. 5000 in the first month. Express-the sequence of monthly payments.as a G.P. Using it show that he cannot receive more than Rs. 50,000 in his life

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162. If A.M and G.M. of roots of a quaradratic equation are 8 and 5 respectively , then obtain

the quadratic equation.

163. Suppose a and b are two numbers whose A.M is A. Let G_1 and G_2 be two G.M.s between a and b. Prove that $\dfrac{G_1^2}{G_2} + \dfrac{G_2^2}{G_1} = 2A$

164. Suppose that a and b are two positive numbers so that their difference is 12. If their

A.M exceeds their G.M by 2, prove that

$$a + b - 2\sqrt{ab} = 4$$

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165. Suppose that a and b are two positive numbers so that their difference is 12and whose AM exceeds GM by 2. Prove that a = 16, b = 4

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166. Find the sum to n terms of the series.

$$1 \times 2 + 2 \times 3 + 3 \times 4 + 4 \times 5 + \text{............}$$

167. Find the sum to n terms of the series

$$1 \times 2 \times 3 + 2 \times 3 \times 4 + 3 \times 4 \times 5 + \text{.........}$$

168. Find the sum to n terms of the series

$$3 \times 1^2 + 5 \times 2^2 + 7 \times 3^2 + \ldots\ldots$$

169. Find the sum to n terms of this series.

$$\frac{1}{1 \times 2} + \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \ldots\ldots$$

170. Find the sum to of the series

$$5^2 + 6^2 + 7^2 + \ldots + 20^2$$

171. Find the sum to 'n' terms of the series

$$3 \times 8 + 6 \times 11 + 9 \times 14 + \ldots\ldots$$

172. Find the sum to n terms of the series

$$1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \ldots$$

173. Find the sum to n terms of the series whose n^{th} term is $n(n + 1)(n + 4)$

174. Find the sum to n terms of the series whose n^{th} term is $n^2 + 2^n$

175. Find the sum to n terms of the series whose n^{th} term is $(2n - 1)^2$

176. Match the following

A	$\sum\limits_{1}^{n} n$	$\sum\limits_{1}^{n} n^2$	$\sum\limits_{1}^{n} n^3$
B	$\dfrac{n^2(n+1)^2}{4}$	$\dfrac{n(n+1)}{2}$	$\dfrac{n(n+1)\,(2n+1)}{6}$

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177. Find the sum to n terms of the series whose n^{th} term is $2n^3 + 3n^2 - 1$

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178. Find the nth term of the series

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

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179. Find n^{th} term of the series

$1 + (1 + 2) + (1 + 2 + 3) + ...$ Find the sum

to n terms of the series

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180. What is the value of $\sum\limits_{1}^{n} 3^n$?

181. What is the value of $\sum\limits_{1}^{n} 3^n$?

182. Find the sum to n terms of the series whose n^{th} term is $n^3 - 3^n$

183. Find the nth term of series

$$1.2.5 + 2.3.6 + 3.4.7. + \ldots$$

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184. Find the sum to n terms of this series

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185. What is the sum of first n terms of an A.P. whose first term is 'a' and common difference is 'd'?

186. What is the nth term of an A.P. whose first term is 'a' and common difference is 'd'?

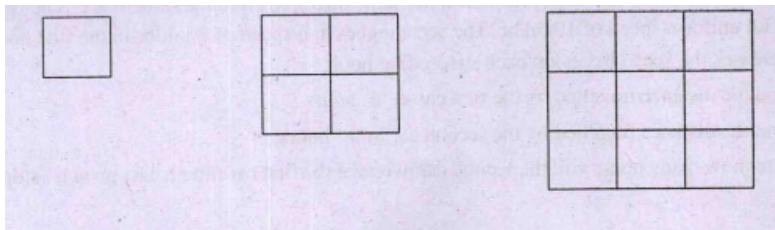**187.** The ratio of the sums of m and n terms of an A.P is $m^2 : n^2$. Show that the ratio of mth and n^{th} terms is $(2m - 1) : (2n - 1)$.

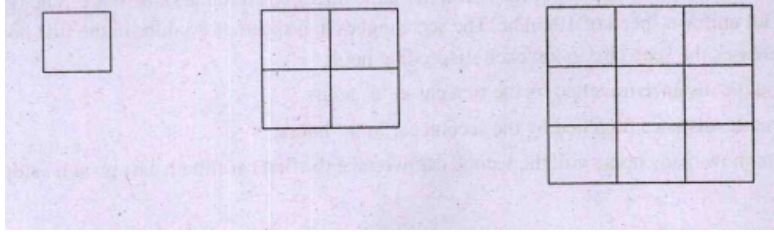**188.** A student builds square pattern with square bricks using the following sequence of steps.

The

number of bricks used in the Ist stage is 1,the number of additional bricks used in the 2nd stage is 3, the number of additional bricks used in the 3rd stage is 5 and son on .How many additional bricks does the student use in the 5th stage ?

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**189.** A student builds square pattern with square bricks using the following sequence of steps.

The number of bricks used in the Ist stage is 1,the number of additional bricks used in the 2nd stage is 3, the number of additional bricks used in the 3rd stage is 5 and son on .How many additional bricks does the student use in the 5th stage ?

190. A student builds square pattern with square bricks using the following sequence of steps.
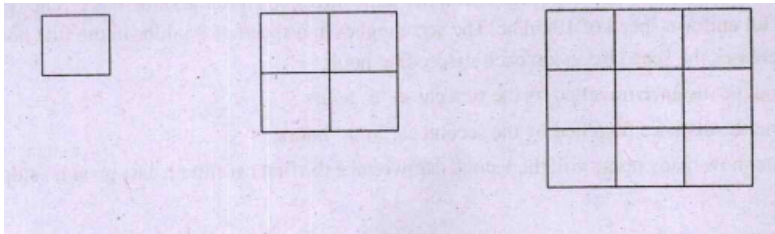
 The number of bricks used in the Ist stage is 1,the number of additional bricks used in the 2nd stage is 3, the number of additional bricks used in the 3rd stage is 5 and son on. Show that the number of bricks used upto n-stages is n^2.

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191. Suppose the digits of a positive integer, having three digits ,are in A.P.Can you assume the digits in hundreds place ,tens place as. $a - b, a$ and $a + b$? If the sum of the digits is 15, find a

192. Suppose the digits of a positive integer, having three digits ,are in A.P . And their sum is 15 .Can you assume the digits in hundreds place ,tens place as.$a - b, a$ and $a + b$? If in addition

the number obtained by reversing the digits is 594 less than the original number , find the three digit number.

193. Suppose two Cars start together in the same direction from the same place. The first goes with uniform speed of $10km/hr$. The second goes at a speed of $8km/hr$ in the first hour and increases the speed by $1/2km$ each succeeding hour.Find the distance travelled by the first car in 'n' hours.

194. Suppose two Cars start together in the same direction from the same place. The first goes with uniform speed of $10 km/hr$. The second goes at a speed of $8 km/hr$ in the first hour and increases the speed by $1/2 km$ each succeeding hour.Find the distance travelled by the second car in 'n' hours.

195. Suppose two Cars start together in the same direction from the same place. The first goes with uniform speed of $10km/hr$. The second goes at a speed of $8km/hr$ 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 go non-stop?

196. Consider the quadratic equation $(b - c)x^2 + (c - a)x + (a - b) = 0$ Find the discriminant of the quadratic equation .

197. fill in the blank by choosing the correct answer from the bracket .If a,b,c are in A.P.then $2b = \;....\; \left(\dfrac{a + c}{2}, \; a + c, \; ac, \; \dfrac{2ac}{a + c} \right)$

198. Consider the quadratic equation $(b - c)x^2 + (c - a)x + (a - b) = 0$ If a,b,c are in A.P. prove that the given quadratic equation has equal roots.

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199. Arun writes letter to 3 to his friends He asks each of them to copy the letter and mail to 3 different persons with the request that they continue the chain similarly . Assuming that the chain is not broken and that it costs re.1 to mail

one letter. Find the number of letters in the 2nd and 3rd set

200. Arun writes letter to 3 of his friends He asks each of them to copy the letter and mail to 3 different persons with the request that they continue the chain similarly . Assuming that the chain is not broken. Form the sequence of the number of letters mailed in different sets.

201. Arun writes letter to 3 of his friends He asks each of them to copy the letter and mail to 3 different persons with the request that they continue the chain similarly . Assuming that the chain is not broken .Find the number of letters in the 8th set.

202. Arun writes letter to 3 of his friends He asks each of them to copy the letter and mail to

3 different persons with the request that they continue the chain similarly . Assuming that the chain is not broken .Find the number of letters in the 8th set.

203. Arun writes letter to 3 to his friends He asks each of them to copy the letter and mail to 3 different persons with the request that they continue the chain similarly . Assuming that the chain is not broken and that it costs re.1 to mail

one letter. Find the cost if all the letters in the 8 sets are considered.

204. Height of a plant at a certain date is 1.6m. Suppose that the height is increased by 5 cms in the following year and the height is increased in each year by half of that in the preceding year. Find the increase in height in 2nd year and 3rd year.

205. Height of a plant at a certain date is 1.6m. Suppose that the height is increased by 5 cms in the following year and the height is increased in each year by half of that in the preceding year. Find the height of the plant at the end of n years.

206. Consider the series $5 + 11 + 19 + 29 + 41 + . .$ prove that the

difference of successive terms form an A.P. Find its nth term

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207. Show that the sum of $(m+n)^{th}$ and $(m-n)^{th}$ terms of an A.P . Is equal to twice the mth term.

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208. If the sum of three number in A.P. is 24 and their product is 440 ,find the numbers

209. If S_1, S_2 and S_3 are respectively the sums of n, 2n and 3n terms of an AP.Prove that $S_3 = 3(S_2 - S_1)$

210. Find the sum of multiple of 7 between 200 and 400.

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211. Find the sum of integers from 1 to 100 that are divisible by 2 or 5

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

213. If f is a function satisfying f(x+y)=f(x)f(y) for all $x, y \in N$ such that $f(1) = 3$ and $\sum_{x=1}^{n} f(x) = 120$, find the value of n.

214. The sum of some terms of a GP is 315 whose first term and the common ratio are 5 and 2 respectively. Find the last term and the number of terms.

215. The first term of a G.P. is 1. The sum of the third term and fifth term is 90. Find the C.R of the G.P

216. The sum of three numbers in G.P. is 56. If we subtract 1,7,21 from these numbers in that order. We obtain an A.P. Find the numbers.

217. A G.P. consists of an even number of terms. If the sum of all the terms is 5 times the sum of terms occupying of odd places, then find its common ratio.

218. The sum of the first 4 terms of an A.P. is 56. The sum of the last 4 terms is 112. If its first term is 11, then find the number of terms.

219. If $\dfrac{a+bx}{a-bx} = \dfrac{b+cx}{b-cx} = \dfrac{c+dx}{c-dx}(x \neq 0)$ then show that a,b,c and d are in G.P.

220. Let S be the sum P the product and R the sum of reciprocals of n terms in a G.P. Then prove that $P^2 R^n = S^n$

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221. The pth, q^{th} and r^{th} terms of an A.P. are a,b,c respectively. Show that

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

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222. If a $\left(\dfrac{1}{b} + \dfrac{1}{c} \right)$, $b\left(\dfrac{1}{c} + \dfrac{1}{a} \right)$, $c\left(\dfrac{1}{a} + \dfrac{1}{b} \right)$

are in A.P. prove that a,b,c are in A.P.

223. If a,b,c,d are in G.P. prove that

$(a^n + b^n)$, $(b^n + c^n)$, $(c^n + d^n)$ are in G.P.

224. If a and b are the roots of

$x^2 - 3x + p = 0$ and c,d are the roots of

$x^2 - 12x + q = 0$ where a,b,c,d form a G.P.

prove that $(q + p) : (q - p) = 17 : 15$.

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225. If a,b,c are in A.P. b,c,d are in G.P. and $\frac{1}{c}, \frac{1}{d}, \frac{1}{e}$ are in A.P. prove that a,c,e are in G.P.

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226. Find sum of 5 + 55 + 555 + ... to n terms.

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227. Find the sum of the following series upto n terms $0.6 + 0.66 + 0.666 + \ldots$

228. Find the 20th term of the series $2 \times 4 + 4 \times 6 + 6 \times 8 + \ldots$ to n terms

229. Find the sum of the 1st n terms of the series $3 + 7 + 13 + 21 + 31 + ...$

230. If $S_1. S_2. S_3$ are the sum of the first n natural numbers, their squares and their cubes respectively, show that $9S_2^2 = S_3(1 + 8S_1)$

231. Find the sum of the following series upto n terms $\dfrac{1^3}{1} + \dfrac{1^3 + 2^3}{1 + 3} + \dfrac{1^3 + 2^3 + 3^3}{1 + 3 + 5} + \dots$

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232. Show that

$$\dfrac{1 \times 2^2 + 2 \times 3^2 + \dots + n \times (n+1)^2}{1^2 \times 2 + 2^2 \times 3 + \dots + n^2(n+1)} = \dfrac{3n+5}{3n+1}$$

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233. A farmer buys a used tractor for Rs. 12,000. He pays Rs. 6000 cash and agrees to pay the balance in 12 annual instalments of Rs. 500 plus 12% interest on the unpaid amount How mush will the tracter cost the farmer?

234. Shamshad Ali buys a Scooter for Rs. 22000. He pays Rs. 4000 cash and agrees to pay the balance in annual instalment of Rs. 1000 plus

10 % interest on the unpaid amount. How much will the Scooter cost him?

235. A person writes a letter to four of his friends. He asks each one of them to copy the letter and mail to four different persons with instruction that they move the chain similarly. Assuming that the chain is not broken and that it costs 50 paise to mail one letter. Find the amount spent on the postage when the 8 set of letteris is mailed.

236. A man deposited Rs. 10000 in a bank at the rate of 5% simple interest annually. Find the amount in 15th year since he deposited the amount and also calculate the total amount after 20 years.

237. A manufacturer reckons that the value of a machine, which costs him Rs. 15625 , will

depreciate each year by 20%. Find the estimated value at the end.of 5 years.

238. 150 workers were engaged to finish a job in a certain number of days. 4 workers dropped out on second day 4 more workers dropped out on thrid day and so on. It took 8 more days to finish the work. Find the number of days in which the work was completed