MATHS

BOOKS - NAGEEN PRAKASHAN ENGLISH

SEQUENCE AND SERIES

Solved Example

1. The nth term of a series is $3^n + 2n$; find the sum of first n terms of the series.

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2. The nth term of a progression is 2n+3. Show that it is an A.P. Also find is 10th term.

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

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5. Find the 25th term of the progression 6+10+14+....

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6. Which term of the A.P. 102+108+...is 210?

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7. Find the number of terms in the progression $8 + 12 + 16 + \ldots\ldots + 124.$

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8. Find the 7th term from the end of A.P. 3+5+7+...+75.

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9. Which term of the A.P. 90+87+84+...is zero ?

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10. The 5th and 13th terms of an A.P. are 5 and -3 respectively. Find the 20th term of the progression.

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

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12. The 5th term of an A.P. is three times the first term. Prove that its 7th term will be two times the 3rd term.

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

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14. Find the value of x, if 2+4+6+...+x=650.

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15. How many terms of the A.P. 22+26+30+... has the sum 400?

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16. The sum of 'n' terms of a progression is $\left(n^2+5n\right)$. Prove that it is arithmetic progression. Also find its common difference.

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17. If the sum of first m terms of an AP is the same as the sum of its first n terms, show that the sum of its first (m+n) terms is zero.

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18. The first term of an A.P. is a and the sum of first p terms is zero, show that the sum of its next q terms is $\frac{-a(p+q)q}{p-1}$.

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19. Find the sum of 'n' terms of an A.P. whose nth term is 2n+1.

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20. If the ratio of the sum of 'n' terms of two A.P's is (5n+4) : (9n+6), find the ratio of the 18th terms of these A.P.'s.

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21. How many terms of the A.P. 17+15+13+... has the sum 72? Explain the double answer.

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22. Find the arithmetic mean of 4 and 12.

A. 9

B. 8

C. 16

D. 10

Answer: B

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23. Find 7 arithmetic means between 6 and 46.

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24. n' arithmetic means are there between 4 and 36. If the ratio of 3rd and (n-2)th mean is 2:3, find the value of n.

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25. If $a = 8 \pm 0.08$ and $b = 6 \pm 0.06$, let x = a+ b, y = a-b, z=ab.

The correct order of % error in x, y and z is

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

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27. Find three numbers in A.P. whose sum is 12 and product is 48.

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28. The angles of a quadrilateral are in arithmetic progression and their common difference is 10°. Find the angles.

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29. If a, b, c are in A.P., prove that $a^3 + 4b^3 + c^3 = 3b(a^2 + c^2)$.

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30. If a, b, c are in A.P., prove that $a^2(b+c), b^2(c+a), c^2(a+b)$ are also in A.P.

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31.

If a^2, b^2, c^2 are in A.P., prove that $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ are also in A.P

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32. 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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33. The nth term of a progression is 2^n. Prove that it is G.P. Also find its common ratio.

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34. Find the 6th term of the progression 2, 6, 18,....

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35. Find the number of terms in the progression $4, 2, 1, \ldots, \frac{1}{128}$.

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36. Find the 4th term from the end in the progression 3,6,12,...,1536.

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37. The 4th and 7th terms of a G.P. are 18 and 486 respectively. Find the G.P.

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38. Find the sum of 10 terms of the progression : 2+4+8+...

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39. How many terms of the G.P. $\frac{2}{9} - \frac{1}{3} + \frac{1}{2} \ldots$ give the sum $\frac{55}{72}$?

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40. Evaluate $\Sigma_{n=1}^{6}(3 + 2^n)$.

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41. The nth term of a G.P. is $3 \cdot 2^n$. Find the sum of 8 terms of the G.P.

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42. Find the sum of n terms of the series $7 + 77 + 777 + \ldots$

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43. If S_1, $S_2 and S_3$ be respectively the sum of n, 2n and 3n terms of a G.P., prove that $S_1(S_3 - S_2) = S_1(S_2 - S_1)^2$

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44. Find the sum of n terms of the series

$(x + y) + (x^2 + xy + y^2) + (x^3 + x^2y + xy^2 + y^3) + \ldots$

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45. Find the sum to infinity of the series $2 + 1 + \frac{1}{2} + \ldots\infty$.

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46. The first term of a G.P. is 2 and each of its term is equal to sum of the succeding terms of the G.P. Find the G.P.

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47.

If $y = x + x^2 + x^3 + \ldots\infty$ and $|x| < 1$, then prove that $x = \frac{y}{1+y}$.

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48. Convert the recurrings decimal $3.5\dot{2}$ into a rational number.

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49. If the sum of n, 2n and infinite terms of G.P. are S_1, S_2 and S respectively, then prove that $S_1(S_1 - S) = S(S_1 - S_2)$.

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50. Find the geometric mean of 12 and 27.

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51. Find 3 geometric means between 10 and 160.

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52. If A is the arithmetic mean and p and q be two geometric means between two numbers a and b, then prove that :

$p^3 + q^3 = 2pq \quad \mathrm{A}$

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53. If a, b, c are in G.P., x and y are the A.M.'s of a, b and b, c respectively, then prove that:

$(i)\frac{a}{x}+\frac{c}{y}=2 \qquad (ii)\frac{1}{x}+\frac{1}{y}=\frac{2}{b}$

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54. If the A.M. of two numbers is twice their G.M., show that the numbers are in the ratio $\left(2+\sqrt{3}\right):\left(2-\sqrt{3}\right)$.

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55. Prove that the A.M. of two positive real numbers is greater than their G.M.

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56. The product of three numbers in G.P. is 64 and their sum is 14. Find the numbers.

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57. The product of three consecutive terms of a G.P. is 64. The sum of product of numbers taken in pair is 56. Find the numbers.

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58. The sum of 3 numbers in A.P. is 15. If we add 1, 4, 19 respectively, then the new numbers form a G.P. Find the numbers of the A.P.

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59. If a, b, c are in geometric progression, then prove that :

$$\frac{1}{a^2-b^2}+\frac{1}{b^2}=\frac{1}{b^2-c^2}$$

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60. If a, b, c ,d be in G.P. , show that

(i) $(b-c)^2+(c-a)^2+(d-b)^2=(a-d)^2$

(ii) $a^2+b^2+c^2, ab+bc+cd, b^2+c^2+d^2$ are in G.P.

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61. 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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62. If a, b, c, d are in A.P. and x, y, z are in G.P., then show that $x^{b-c}y^{c-a}z^{a-b}=1$.

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63. If the pth ,qth , rth and sth terms of an A.P are in G.P then p-q,q-r , r-s are in

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64. Find the sum of n terms of the series when nth terms is :

$(i) n^2 + n \quad (ii) n^2 + 2^n$

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65. Find the sum of n terms of the series $1^2 + 4^2 + 7^2 + ...$

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66. Find the sum of the series:

$1.n + 2.(n-1) + 3.(n-2) + \ + (n-1).2 + n.1.$

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67. Find the sum to n terms of the series : $5 + 11 + 19 + 29 + 41$:

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68. Sum of n terms of series $12 + 16 + 24 + 40 + \ldots.$ (A) $2(2^n - 1) + 8n$ (B) $2(2^n - 1) + 6n$ (C) $3(2^n - 1) + 8n$ (D) $4(2^n - 1) + 8n$

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69. Find the sum of n terms of the series 1+4+10+20+35+...

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Exercise 9 A

1. The nth term of a sequence is defined as follows. Find the first four terms: (i) $T_n = 3n + 1$ (ii) $T_n = n^2 + 5$

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2. The nth term of a sequence is $(3n - 7)$. Find its 20th term.

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3. 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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4. 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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Exercise 9 B

1. (a) The nth term of a progression is $(3n + 5)$. Prove that this progression is an arithmetic progression. Also find its 6th term. (b) The nth term of a progression is $(3 - 4n)$. Prove that this progression is an arithmetic progression. Also find its common difference. (c) The nth term of a progression is $\left(n^2 - n + 1\right)$. Prove that it is not an A.P.

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2. (a) Find the 10th term of the progression $1 + 3 + 5 + 7 + \ldots$ (b) Find the 7th term of the progression $80 + 77 + 74 + \ldots$ (c) Find the 22nd term of the progression $7\frac{3}{4} + 9\frac{1}{2} + 11\frac{1}{4} + \ldots$ (d) Find the nth term of the progression $-5 - 3 - 1 + 1 + \ldots$

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3. (a) Which term of the progression 4 + 8 + 12 + ... is 76 ?

(b) Which term of the progression 36 + 33 + 30 + ... is zero ?

(c) Which term of the progression $\frac{3}{4}+1+\frac{5}{4}+\ldots$ is 12?

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4. (a) Find the 16th term from the end of the progression 3 + 6 + 9 + ... + 99.

(b) Find the 10th term from the end of the progression 82 + 79 + 76 + ... + 4.

(c) Find the 10th term from the end of the progression 5 + 2 - 1 - 4 - ... - 34.

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5. (a) How many numbers of two digits are divisible by 3 ?

(b) How many numbers of three digits are divisible by 9 ?

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6. (a) Find the value of 'x if x + 1, 2x + 1 and x + 1 are in A.P. Also find the 4th term of this progression.

(b) If k + 3, 2k + 1, k + 7 are in A.P., then find this progression upto 5 terms.

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7. (a) The 3rd and 19th terms of an A.P. are 13 and 77 respectively. Find the A.P.

(b) The 5th and 8th terms of an A.P. are 56 and 95 respectively. Find the 25th term of this A.P.

(c) The pth and qth terms of an A.P. are q and p respectively. Prove that its (p + q)th term will be zero.

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8. Given that the (p+1)th term of an A.P. is twice the (q+1)th term, prove that the (3p+1)th term is twice the (p+q+1)th term.

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9. The 12th term of an A.P. is 14 more than the 5th term. The sum of these terms is 36. Find the A.P.

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10. (a) Is 303, a term of the progression 5, 10, 15, ... ?

(b) Is 38, a term of the progression-18,-14,-10, ...?

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11. Prove that the sum of nth term from the beginning and nth term from the end of an A.P. is· constant.

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12. In an A.P., prove that : $T_{m+n} + T_{m-n} = 2 \cdot T_m$

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13. (i) 10 times the 10th term and 15 times the 15th term of an A.P. are equal. Find the 25th term of this A.P .

(ii) 17 times the 17th term of an A.P. is equal to 18 times the 18th term. Find the 35th term of this progression.

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14. Which term of the A.P. (16-6i,)(15-4i), (14-2 i), ... is a :

(a) pure real number ?

(b) pure imaginary number ?

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15. (a) Which term of the progression $10, 9\frac{1}{3}, 8\frac{2}{3}, ...$is the first negative term ?

(b) Which term of the progression $4, 3\frac{5}{7}, 3\frac{3}{7}$, ...is the first negative term ?

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16. Each of two arithmetic progressions 2, 4, 6, ... and 3, 6, 9, ... are taken upto 200 terms. How many terms are common in these two progressions ?

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17. If $a_1, a_2, \ldots . a_n$ are in arthimatic progression, where $a_i > 0$ for all I, then show that

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

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

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Exercise 9 C

1. Find the sum of 50 terms of the A.P. 1 + 4 + 7 + ...

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2. (i) Find the sum of first 200 even natural numbers.

(ii) Find the sum of all numbers lying between 201 and 424 which are divisible by 5.

(iii) Find the sum of all numbers from 1 to 200 which are divisible by either 2 or 3.

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3. (a) Find the value of x if 1 + 6 + 11 + ... + x = 189.

(b) Find the value of x if 3 + 6 + 9 + ... + 96 = x.

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4. (a) How many terms of the A.P. 6 + 10 + 14 + ... has the sum 880 ? (b) How many terms of the A.P. 3 + 9 + 15 + ... has the sum 7500 ?

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5. (a) The sum of 'n' terms of a progression is n(n + 1). Prove that it is an A..P. Also find its 10th term. (b) The sum of 'n' terms of a progression is $\left(3n^2 - 5n\right)$. Prove that it is an A.P. (c) If the sum of n terms of a series is $\left(5n^2 + 3n\right)$ then find its first five terms.

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6. The sum of 5 and 15 terms of an A.P. are equal. Find the sum of 20 terms of this A.P.

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7. The sum of 20 and 28 terms of an A.P. are equal. Find the sum of 48 terms of this A.P.

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8. In an A,P if the pth term is $\frac{1}{q}$ and q^{th} terms is $\frac{1}{p}$. Prove that the sum of first pq term is $\frac{1}{2}$ (pq+1) where, $(p \neq q)$

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9. The sum of15 terms of an A.P. is zero and its 4th term is 12. Find its 14th term.

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10. The common difference, last term and sum of terms of an A.P. are 4, 31, and 136 respectively. Find the number of terms.

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11. If $(0, -3) and (0, 3)$ are the two vertices of an equilateral triangle, find the coordinates of its third vertex.

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12. 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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13. In an A.P., if $T_1 + T_5 + T_{10} + T_{15} + T_{20} + T_{24} = 225$, find the sum of its 24 terms.

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14. The nth term of an A.P. is (5n-1). Find the sum of its 'n' terms.

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15. The sum of 8 terms of an A.P. is 64 and sum of 17 terms is 289. Find the sum of its 'n' terms.

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16. The ratio of sums ofn terms of two A.P'.s is (2n + 1) : (2n - 1). Prove that the ratio of their 12th terms will be 47 : 45.

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17. The ratio of sums of n terms of two A.P'. is (7n + 1) : (4n + 27). Find the ratio of their 11th terms.

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18. If the ratio of the sum of m terms and n terms of an A.P. be $m^2 : n^2$, prove that the ratio of its mth and nth terms is $(2m - 1) : (2n - 1)$.

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19. How many terms of the progression 54 + 51 + 48 +... has the sum 513 ? Explain the double answer.

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20. The pth and qth terms of an A.P. are x and y respectively. Prove that the sum of (p + q) terms is.

$$\frac{p+q}{2}\left[x+y+\frac{x-y}{p-q}\right].$$

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21. Show that the sum of an A.P. whose first term is a, the second term is b and the last term is c, is equal to `((a+c)(b+c−2a))/(2(b−a))

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22. If the first term of an A.P. is 100 and sum of its first 6 terms is 5 times the sum of next 6 terms, then find the common difference of the A.P.

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23. The first term, last term and common difference of an A.P are respectively a, l and 1. Prove that the sum of this A.P. is $\frac{1}{2}(a+b)(1-a+b)$.

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

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25. If S_n denotes the sum of n terms of an A.P. with common difference d, then

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26. The sums of n terms of three arithmetical progressions are S_1, S_2 and S_3. The first term of each unityand the common differences are 1, 2 and 3

respectively. Prove that $S_1 + S_3 = 2S_2$.

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Exercise 9 D

1. Find the arithmetic mean of the following numbers : (a) 6 and 26 (b) -2 and 18

(c) (x-y) and (x+y)

(d) $(x+y)^3$ and $(x-y)^3$

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2. Find 4 arithmetic means between -5 and 15.

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3. Find 6 arithmetic means between 8 and 29.

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4. Find 4 arithmetic means between 3 and 18.

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5. There are 'n' A.M.'s between 2 and 41. The ratio of 4th and (n - 1)th mean is 2 : 5, find the value of n.

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

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

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

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9. 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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10. If eleven A.M. s are inserted between 28 and 10, then find the number of integral A.M. s.

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11. n arithmetic means are inserted between x and 2y and then between 2x and y. If the rth means in each case be equal, then find the ratio x/y.

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Exercise 9 E

1. The sum of the first three terms of an $A.P.$ is 9 and the sum of their squares is 35. The sum to first n terms of the series can be

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2. Find three numbers in A.P. whose sum is 21 and the product of last two numbers is 63.

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3. Find three numbers in A.P. whose sum is 12 and product is 60.

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4. Find three numbers in A.P. whose sum is 9 and sum of whose cubes is 99.

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5. The internal angles of a triangle are in A.P. . If the smallest angle is 45°, find the remaining angles.

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6. Find 4 numbers in A.P. whose sum is 4 and sum of whose squares is 84.

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7. Find 4 numbers in A.P. such that the sum of first and fourth number is 14 and the product of second and third number is 45.

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

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10. If a, b, c are in A.P., then prove that :

(i)$ab + bc = 2b^2$

(ii) $(a - c)^2 = 4(b^2 - ac)$

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

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11. If a, b, c are in A.P., then prove that :

(i) $b+c, c+a, a+b$ are also in A.P.

(ii) $\frac{1}{bc}, \frac{1}{ca}, \frac{1}{ab}$ are also in A.P.

(iii) $\frac{a(b+c)}{bc}, \frac{b(c+a)}{ca}, \frac{c(a+b)}{ab}$ are also in A.P.

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12. If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are also in A.P. then prove that : (i) $\frac{(b+c)}{a}, \frac{(c+a)}{b}, \frac{(a+b)}{c}$ are also in A.P. (ii) $\frac{(b+c-a)}{a}, \frac{(c+a-b)}{b}, \frac{(a+b-c)}{c}$ are also in A.P.

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13. If $a^2+2bc, b^2+2ac, c^2+2ab$ are in A.P ., show that

(a) $\frac{1}{b-c}, \frac{1}{c-a}, \frac{1}{a-b}$ are in A.P .

(b) Prove that the sum to n terms of the series $11 + 103 + 1005 + \ldots. = \frac{10}{9}(10^n - 1) + n(2).$

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14. 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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15. If a, b, c are in A.P., then prove that the following are also in A.P.

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

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Exercise 9 F

1. The nth term of a progression is 3^{n+1}. Show that it is a G.P. Also find its 5th term.

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2. Find the 7th term of the G.P. 4 ,-8 , 16, ...

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3. Find the 9th term of the G. P. 2, 1, $\frac{1}{2}$,....

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4. Find the 8th term of the G.P. $\sqrt{3}, \frac{1}{\sqrt{3}}, \frac{1}{3\sqrt{3}}, ...$

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5. Find the number of terms in the G.P. 1, 2, 4, 8, ... 4096.

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6. Find the number of terms in the G.P. 1, - 3, 9, ... - 2187.

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7. Find the 5th term from the end of the G .P. $\frac{1}{512}, \frac{1}{256}, \frac{1}{128}, \ldots 256.$

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8. Find the 4th term from the end of the G .P. $\frac{5}{2}, \frac{15}{8}, \frac{45}{32}, \ldots \frac{10935}{32768}.$

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9. Which term of the progression $\sqrt{3}, 3, 3\sqrt{3} \ldots$ is 729 ?

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10. Which term of the G.P., 2, 8, 32, . . . up to n terms in 131072?

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11. If the nth terms of the progression 5, 10, 20, ... and progression 1280, 640, 320,... are equal, then find the value of n.

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12. The 3rd, 7th and 11th terms of a G.P. are x, y and z respectively, then prove that $y^2 = xz$.

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13. The 3rd and 6th terms of a G.P. are 40 and 320, then find the progression.

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14. Find the G.P. whose 2nd and 5th terms are $-\frac{3}{2}$ and $\frac{81}{16}$ respectively.

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15. in a G.P (p+q)th term = m and (p-q) th term = n , then find its p th term

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16. Find the G.P. whose 2nd term is 12 and 6th term is 27 times the 3rd term.

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17. The first term of a G.P. is -3. If the 4th term of this G.P. is the square of the 2nd term, then find its 7th term.

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18. The 4th, 7th and last terms of a G.P. are 10,80 and 2560 respectively. Find the number of terms of the G.P.

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19. Find the 4 terms in G .P. in which 3rd term is 9 more than the first term and 2nd term is 18 more than the 4th term.

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20. 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.

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21. In a G.P. it is given that $T_{p-1} + T_{p+1} = 3T_p$. Prove that its common ratio is an irrational number.

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22. If k, k + 1 and k + 3 are in G.P. then find the value of k.

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23. The product of 3rd and 8th terms of a G.P. is 243 and its 4th term is 3. Find its 7th term.

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Exercise 9 G

1. Find the sum of 6 terms of the series 2+6+18+.....

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2. Find the sum of 7 terms of the series $\frac{16}{27} - \frac{8}{9} + \frac{4}{3} - ....$

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3. Find the sum of 10 terms of the series $1 + \sqrt{3} + 3 + \ldots.$

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4. Find the sum of 7 terms of the series 2+0.2+0.02+....

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5. How many terms of the series 1+2+4+.... Has the sum 511 ?

A. 7

B. 8

C. 9

D. 10

Answer: C

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6. How many terms of the series $\frac{2}{3} - 1 + \frac{3}{2}$... has the sum $\frac{463}{96}$?

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7. $Evaluate \Sigma_{n=1}^{11}(2 + 3^n)$

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8. The nth term of a G.P. is $3 \cdot (-2)^n$. Find the sum of its 7 terms.

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9. The common ratio, last term and sum of n terms of a G.P. are 2, 128 and 255 respectively. Find the value of n.

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10. Find the sum of n terms of the series $(x+y)+\left(x^2+2y\right)+\left(x^3+3y\right)+\ldots$

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11. Find the sum of 20 terms of the series $\left(x+\frac{1}{2}\right)+\left(3x-\frac{1}{6}\right)+\left(5x+\frac{1}{18}\right)+....$

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12. The ratio of the sum of first three terms to the sum of first six terms is 125 : 152. Find the common ratio of G.P.

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13. Find the sum of n terms of the series :

5+55+555+...

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14. The sum of first three terms of a G.P. is $\frac{1}{8}$ of the sum of the next three terms. Find the common ratio of G.P.

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15. Prove that the sum of n terms of the reciprocals of the terms of the series $a, ar, ar^2, \ldots$ is $\frac{1-r^n}{a(1-r)r^{n-1}}$

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

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17. The number of terms of a G.P. are even. If the sum of all terms of the series is 5 times the sum of all terms at odd positions, then find the common ratio.

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Exercise 9 H

1. Find the sum of infinite term of the following series : $16 + 8 + 4 \ldots \infty$

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2. Check if the sequence is an AP 1,3,9,27,....

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3. The sum to infinity of a G.P. is 15 and the sum of squares of its terms is 45. Find the G.P

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4. The sum to infinity of a G.P. is 3 and the sum of squares of its terms is also 3. Find the G.P.

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5. The sum of first two terms of an infinite G.P. is 5 and each term is three times the sum of the succeeding terms. Find the G.P.

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6. If $x = 2 + a + a^2 + \infty, where |a| < 1 and y = 1 + b + b^2 + \infty, where |b| < 1$ prove that: $1 + ab + a^2b^2 + \infty = \frac{xy}{x + y - 1}$

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7. Convert the following recurring decimals into rational numbers :

(i) $0.\dot{4}\dot{3}\dot{7}$ (ii) $1.\dot{7}\dot{2}\dot{3}$

(iii) $0.\dot{2}\dot{3}\dot{1}$ (iv) $0.4\dot{5}\dot{6}$

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8.

If $x = a + \frac{a}{r} + \frac{a}{r^2} + ...\infty, y = b - \frac{b}{r} + \frac{b}{r^2} - ...\infty$, and $z = c + \frac{c}{r^2} +$

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9. If $S_1, S_2, S_3, ..., S_p$ are the sums of infinite geometric series whose first terms are 1, 2, 3..... p and whose common ratios are $\frac{1}{2}, \frac{1}{3}, ... \frac{1}{p+1}$ respectively, prove that

$S_1 + S_2 + S_3 + ... + S_p = \frac{1}{2}p(p+3)$.

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Exercise 9 I

1. Find the G.M. of the following numbers :

(i) $\frac{1}{3}$ and $\frac{1}{27}$ (ii) x^2 and y^2

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2. Insert 3 geometric means between 4 and $\frac{1}{4}$.

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3. Insert 6 geometric means between 27 and $\frac{1}{81}$.

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4. (i) Insert 4 geometric means between 256 and -8.

(ii) Insert 4 geometric means between 3 and 96.

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5. G is the geometric mean and p and q are two arithmetic means between two numbers a and b, prove that :

$G^2 = (2p - q)(2q - p)$

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6. The A.M of two numbers is 17 and their G.M. is 8. Find the numbers.

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7. The ratio of the A.M. and G.M. of two positive numbers a and b, is m : n. Show that a : b = $\left(m+\sqrt{m^2-n^2}\right):\left(m-\sqrt{m^2-n^2}\right)$.

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8. If A and G are the arithmetic and geometric means respectively of two numbers then prove that the numbers are $\left(A+\sqrt{A^2-G^2}\right)$ and $\left(A-\sqrt{A^2-G^2}\right)$

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9. Find the value of n so that $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ may be the geometric mean between $aandb$.

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Exercise 9 J

1. Find three numbers in G.P. whose sum is 19 and product is 216.

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2. Find three consecutive numbers in G.P. whose sum is 28 and product is 512.

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3. The sum of 3 numbers in a G.P. is 19 and the sum of their squares is 133. Find the numbers.

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4. The product of three consecutive numbers in G.P. is 27 and the sum of the products of numbers taken in pair is 39. Find the numbers.

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5. The sum of three consecutive numbers in a G.P. is 56. If we subtract 1, 7, 21 respectively from these numbers, the new numbers form an A.P. Find the numbers.

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6. The sum of three numbers in G.P. is 14. If one is added to the first and second numbers and 1 is subtracted from the third, the new numbers are in ;A.P. The smallest of them is a. 2 b. 4 c. 6 d. 10

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7. Four numbers are in G.P. The sum of first two numbers is 4 and the sum of last two numbers is 36. Find the numbers.

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8. Three numbers are in G.P. Their sum is 14. If we multiply the first and third numbers by 4 and 2nd number by 5, the new numbers form an A.P. Find the numbers.

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9. If a, b, c are in GP, prove that a^ 2 b^ 2 c ^ 2 (1/ a ^ 3 +1/ b ^ 3 +1/ c ^ 3)=a ^ 3 +b^ 3 +c^ 3 .

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10. If a, b, c and d are in G.P. show that (a ^ 2 +b ^ 2 +c^ 2)(b^ 2 +c^ 2 +d^ 2)=(ab+bc+cd)^ 2

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

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12. 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., then prove that a, c, e are in G.P.

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13. If a, b, c are in A.P. and a, x, b, y, c are in G.P., then prove that b^2 is the arithmatic mean of x^2 and y^2.

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14. a, b, c are positive real numbers forming a G.P. ILf $ax^2 + 2bx + c = 0 and d dx^2 + 2ex + f = 0$ have a common root, then prove that $d/a, e/b, f/c$ are in A.P.

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15. If a, b are the roots of equation $x^2 - 3x + p = 0$ and c, d are the roots of $x^2 - 12x + q = 0$ and a, b, c, d are in G.P., then prove that :

p : q =1 : 16

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16. If $-\frac{2}{7}, x, -\frac{7}{2}$ are in G.P. Find the value of x.

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Exercise 9 K

1. Find the sum of the n terms of the series whose nth term are given below : (i) $3n^2 + 2n$ (ii) $2n^3 + 4n + 1$

(iii) $2^n + 3^n$ (iv) $3^n + n^3$

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2. Find the sum of the series:

$(2^2 + 4^2 + 6^2 + 8^2 + \ldots \text{to n terms})$

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3. Find the sum of the series : $5^2 + 6^2 + 7^2 + \ldots + 20^2$.

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4. Find the sum o the following series to n terms:

$$\frac{1^3}{1}+\frac{1^3}{1+3}+\frac{1^3+2^3+3^3}{1+3+5}+$$

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5. If an = 2n, then find the first five terms of the series.

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6. Find the sum of n terms and sum to infinity of the following series :

$$\frac{1}{2\cdot 4}+\frac{1}{4\cdot 6}+\frac{1}{6\cdot 8}+\cdots$$

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7. Evaluate 3×3^ 1/2 ×3^ 1/4 ×3^ 1/8 × ...to ∞

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Exercise 9 L

1. In the arithmetic mean of a and b is $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ then n= ?

A. 0

B. 1

C. -1

D. None of these

Answer: B

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2. If the geometric mean of a and b is $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ then n = ?

A. $-\frac{1}{2}$

B. $\frac{1}{2}$

C. 1

D. None of these

Answer: A

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3. The sum of the squares of first 50 natural numbers is :

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4. The mth term of an A.P. is $\frac{1}{n}$ and nth term is $\frac{1}{m}$. Its (mn)th term is :

A. mn

B. $\frac{1}{mn}$

C. 1

D. None of these

Answer: C

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5. First negative term of the series $4, 3\frac{5}{7}, 3\frac{3}{7}, \ldots$ is :

A. 15

B. 16

C. 17

D. None of these

Answer: B

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6. The sum of n terms of an A.P. is $\left(n^2 + 5n\right)$. Its common difference is :

A. 1

B. 4

C. 2

D. None of these

Answer: C

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7. If n arithmetic means are inserted between 7 and 71 such that 5^{th} A.M. is 27 then $n = ?$

A. 10

B. 11

C. 12

D. None of these

Answer: D

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8. No. of terms in the series $4, 2, 1, \ldots, \frac{1}{128}$ is :

A. 10

B. 12

C. 14

D. None of these

Answer: A

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9. How many terms are needed of the series $\frac{2}{9} - \frac{1}{3} + \frac{1}{2} - \ldots$ to give the sum $\frac{55}{72}$?

A. 8

B. 7

C. 5

D. 4

Answer: C

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10. The ratio of the sum of first three terms is to that of first 6 terms of a G.P. is 1:12. Find the common ratio.

A. $\frac{3}{5}$

B. $\frac{2}{5}$

C. $\frac{1}{5}$

D. 2

Answer: A

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Exercise 9 M

1. If $1, \log_y x, \log_z y, -15\log_x z$ are in A.P. then the correct statement is :

A. $z^3 = x$

B. $x^3 = z$

C. $z^3 = y$

D. None of these

Answer: A

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2. The first term, second term and middle term of an A.P. are a, b and c respectively. The sum of this A.P. is :

A. $\frac{2b(c-a)}{b-a}$

B. $\frac{2a(a-b)}{b-c}$

C. $\frac{2c(c-a)}{b-a}$

D. None of these

Answer: d

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3. Find the number of common terms to the two sequences 17,21,25,...,417 and 16,21,26,...,466.

A. 19

B. 20

C. 21

D. None of these

Answer: B

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4. The sum of the series $a-(a+d)+(a+2d)-(a+3d)+\ldots$ up to $(2n+1)$ terms is: a. $-nd$. b. $a+2nd$. c. $a+nd$. d. $2nd$

A. a+3nd

B. 3a+nd

C. 2a+3nd

D. a+nd

Answer: D

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5. If a, b, c are in A.P. as well as in G.P. then correct statement is :

A. $a = b = c$

B. $a \neq b \neq c$

C. $a = b \neq c$

D. None of these

Answer: A

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6. 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.

A. A.P.

B. G.P.

C. miscellaneous

D. None of these

Answer: A

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7. If $x = 1 + a + a^2 + ...\infty, a < 1$ and $y = 1 + b + b^2 + ...\infty, b < 1,$ then $1 + ab + a^2b^2 + ...\infty$:

A. $\frac{x + y + xy}{x + y - 1}$

B. $\frac{x + y}{x + y - 1}$

C. $\frac{xy}{x + y - 1}$

D. None of these

Answer: C

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8. If a, b, c are three distinct numbers a, b, c are in A.P. and

b-a, c -a , a are in G.P. , then $a:b:c$ is equal to

A. $1:3:5$

B. $1:2:3$

C. $1:4:7$

D. None of these

Answer: B

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9. If x ∈ R and the numbers $\left(5^{1-x}+5^{x+1}, \frac{a}{2}, \left(25^{x}+25^{-}x\right)\right)$ form an A. P. then a must lie in the interval ..... .

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

A. $7:16$

B. $16:7$

C. $7:9$

D. None of these

Answer: A

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Exercise 9 1

1. Write the first five terms of each of the sequences in Questions 1 to 6 whose nth terms are :

$a_n = n(n+2)$

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2. Write the first five terms of each of the sequences in Questions 1 to 6 whose nth terms are :

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

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3. Write the first five terms of each of the sequences whose nth terms are :

$a_n = 2^n$

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4. Write the first five terms of each of the sequences in Questions 1 to 6 whose nth terms are :

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

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5. Write the first five terms of each of the sequences in Questions 1 to 6 whose nth terms are :

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

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6. Write the first five terms of each of the sequences in Questions 1 to 6 whose nth terms are :

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

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7. Find the indicated terms in each of the sequences in Questions 7 to 10 whose nth term are :

$a_n = 4n - 3, a_{17}, a_{24}$

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8. Find the indicated terms in each of the sequences in Questions 7 to 10 whose nth term are :

$a_n = \frac{n^2}{2^n}, a_7$

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9. Find the indicated terms in each of the sequences in Questions 7 to 10 whose nth term are :

$a_n = (-1)^{n-1} n^3, a_9$

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10. Find the indicated terms of the sequence whose n^{th}terms are : $a_n = \frac{n(n-2)}{n+3}; a_{20}$

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11. Write the first five terms of the sequence and obtain the corresponding series : $a_1 = 3, a_n = 3a_{n-1} + 2$for all $n > 1$

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12. Write the first five terms of the sequence and obtain the corresponding series : $a_1 = -1, a_n = \frac{a_{n-1}}{n}, n \geq 2$

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13. Write the first five terms of the following sequence amd obtain the corresponding series.

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

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14. The fibonacci sequence is defined by $a_1 = 1 = a_2, a_n = a_{n-1} + a_{n-2}, n > 2$. Find $\frac{a_{n+1}}{a_n}$ for $n = 1, 2, 3, 4, 5$.

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Exercise 9 2

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

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2. Find the sum of all natural numbers lying between 100 and 1000, which are multiples of 5.

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3. 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.

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

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5. In an A,P if the pth term is $\frac{1}{q}$ and q^{th} terms is $\frac{1}{p}$. Prove that the sum of first pq term is $\frac{1}{2}$ (pq+1) where, $(p \neq q)$

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

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7. Find the sum to n terms of the A.P., whose kth term is 5k+1.

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8. 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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9. 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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10. If the sum of first p terms of an A.P. is equal to the sum of the first q terms, then find the sum of the first (p+q) terms.

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

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

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

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

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16. 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 7^{th} and $(m-1)^{th}$ numbers is 5 : 9. Find the value of m.

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17. A mail starts repaying a loan as first instalment of Rs. 100. If he increases the instalment by Rs 5 every month, what amount he will pay in the 30^{th} instalment?

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

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Exercise 9 3

1. Find the 20th and nth term of the G.P. $\frac{5}{2}, \frac{5}{4}, \frac{5}{8}, \ldots$

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

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3. The 5^{th}, 8^{th} and 11^{th} terms of a G.P. are p, q and s, respectively. Show that $q^2 = ps$.

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4. The 4^{th} term of a G.P. is square of its second term, and the first term is 3. Determine its 7^{th} term.

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5. Which term of the following sequences:(a) $2, 2\sqrt{2}, 4, \ldots$ is 128? (b) $\sqrt{3}, 3, 3\sqrt{3}, \ldots$ is 729?(c) $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots$ is $\frac{1}{19683}$?

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6. For what value of x, the number $-\frac{2}{7}, x, -\frac{2}{7}$ are in G.P.?

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7. Find the sum to indicated number of terms in each of the geometric progressions : 0.15, 0.015, 0.0015, . . . , 20 terms.

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8. Find the sum to indicated number of terms in each of the geometric progressions : $\sqrt{7}, \sqrt{21}, 73, \ldots$ n terms.

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9. Find the sum to indicated number of terms in each of the geometric progressions : $1, -a, a^2 - a^3, \vdots n$terms $(\text{ if } a \neq -1)$

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10. Find the sum to indicated number of terms in each of the geometric progressions in Questions 7 to 10 :

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

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11. Evaluate $\Sigma_{k=1}^{11}\left(2+3^k\right)$

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12. The sum of first three terms of a G.P. is $\frac{39}{10}$ and their product is 1. Find the common ratio and the terms.

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

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14. The sum of first three terms of a G.P. is 16 and the sum of the next three terms is 128. Find the sum of n terms of the G.P.

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

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16. Find a G.P. for which sum of the first two terms is $-4$and the fifth term is 4 times the third term.

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17. If the 4^{th}, 10^{th} and 16^{th} terms of a G.P. are x, y and z, respectively. Prove that x, y, z are in G.P.

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18. Find the sum to n terms of the sequence 8,88,888,8888,.....

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

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20. Show that the products of the corresponding terms of the sequence $a, ar, ar^2, \ldots ar^{n-1}$ and $A, AR, AR^2, \ldots AR^{n-1}$ from a G.P. and find the common ratio.

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21. Find four numbers forming a geometric progression in which the third term is greater than the first terms by 9, and second term is greater than the 4th by 18.

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

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

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24. 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 $\frac{1}{r^n}$. 9873740001

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25. If a, b, c and d are in G.P. show that $\left(a^2+b^2+c^2\right)\left(b^2+c^2+d^2\right)=(ab+bc+cd)^2$.

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26. Insert two number between 3 and 81 so that the resulting sequence is G.P.

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

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

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

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30. 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 nth hour?

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

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

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Exercise 9 4

1. Find the sum to n terms of the series $1 \times 2 + 2 \times 3 + 3 \times 4 + 4 \times 5 + \ldots\ldots$

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2. Find the sum to n terms of the series : $1 \times 2 \times 3 + 2 \times 3 \times 4 + 3 \times 4 \times 5 + \vdots$

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3. Find the sum of the following series to n term: $3 \times 1^2 + 5 \times 2^2 + 7 \times 3^2 +$

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4. Find the sum of n terms of the series: $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + + \frac{1}{nn+1}$

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5. Find the sum to n terms of the series :$5^2 + 6^2 + 7^2 + + \vdots 20^2$

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6. Sum the series $3.\ 8 + 6.\ 11 + 9.\ 14 +$ to n terms.

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7. Find the sum to n terms of the series : $1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \vdots$

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8. Find the sum to n terms of the series, whose n^{th}terms is given by : $n(n+1)(n+4)$

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9. Find the sum to n terms of the series, whose n^{th}terms is given by : $n^2 + 2^n$

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10. Find the sum to n terms of the series, whose n^{th}terms is given by : $(2n-1)^2$

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Miscellaneous Exercise

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

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2. The sum of three numbers in A.P. is 27, and their product is 504, find them.

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3. Let the sum of n, 2n, 3n terms of an A.P. be S_1, $S_2$and S_3, respectively, show that $S_3 = 3(S_2 - S_1)$.

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4. Find the sum of all numbers between 200 and 400 which are divisible by 7.

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

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

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

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8. The sum of some terms of G. P. is 315 whose first term and the common ratio are 5 and 2, respectively. Find the last term and the number of terms.

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9. 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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10. The sum of three numbers m GP is 56. If we subtract 1.7,21 from these numbers in that order, we obtain an arithmetic progression. Find the numbers.

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11. 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 odd places, then find its common ratio.

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

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14. LetS be the sum, P the product, and R the sum of reciprocals of n terms in a G.P. Prove that $P^2R^n=S^n$.

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15. The p^{th}, $q^{th}$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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16. 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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17. If a, b, c, d are in G.P., prove that $(a^n + b^n), (b^n + c^n), (c^n + a^n)$ are in G.P.

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18. If a and b are the roots of $x^2 - 3x + p = 0$ and c, d are roots of $x^2 - 12x + q = 0$, where a, b, c, d form a GP. Prove that $(q + p) : (q - p) = 17 : 15.$

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19. The ratio of the A.M. and G.M. of two positive numbers a and b, is m : n. Show that a : b = $\left(m + \sqrt{m^2 - n^2}\right) : \left(m - \sqrt{m^2 - n^2}\right)$.

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20. 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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21. Find the sum of the following series up to n terms: (i) $5 + 55 + 555 + \cdots$ (ii) $.6 + .66 + .666 + \cdots$

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22. Find the 20th term and the sum of 20 terms of the series: $2 \times 4 + 4 \times 6 + 6 \times 8 + \cdot$

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23. Find the sum of first n terms of the following series: $3 + 7 + 13 + 21 + 31 + \cdot$

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

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25. Find the sum o the following series to n terms: $\frac{1^3}{1} + \frac{1^3}{1+3} + \frac{1^3+2^3+3^3}{1+3+5} +$

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26. Show that $\frac{1 \times 2^2 + 2 \times 3^2 + \vdots + n \times (n+1)^2}{1^2 \times 2 + 2^2 \times 3 + \vdots + n^2 \times (n+1)} = \frac{3n+5}{3n+1}$.

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

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28. Shamshad Ali buys a scooter for Rs. 2200. 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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29. 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 spend on the postage when 8th set of letter is mailed.

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

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31. 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.

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32. 150 workers were engaged to finish a piece of work in a certain number of days. Four workers dropped the second day, four more workers dropped the third day and so on. It takes 8 more days to finish the work now. Find the number of days in which the work was completed.

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