MATHS

BOOKS - KC SINHA ENGLISH

PROGRESSIONS (AP GP) - FOR COMPETITION

Solved Examples

1. If $x^{18} = y^{21} z^{28}$, then $3 \log_y x, 3 \log_z y, 7 \log_x z$ are in

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2. Four different integers form an increasing A.P. One of these numbers is equal to the sum of the squares of the other three numbers. Then The smallest number is

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3. 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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4. The sums of n terms of two AP's are in the ratio $(3n - 13):(5n + 21)$. Find the ratio of their 24th terms.

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

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6. If $S_1, S_2, S_3 \ldots \ldots, S_{2n}$ are the sums of infinite geometric series whose first terms are respectively $1, 2, 3, \ldots \ldots, 2n$ and common ratio are respectively,

$\frac{1}{2}, \frac{1}{3}, \ldots \ldots \ldots, \frac{1}{2n+1}$, find the value of ,$S_1^2 + S_2^2 + \ldots \ldots + S_{2n-1}^2$.

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8. Find the natural number a for which $\sum_{k=1}^{n} f(a+k) = 16(2^n - 1)$, where the function f satisfies the relation $f(x+y) = f(x)f(y)$ for all natural number $x, yand, further, f(1) = 2$.

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9. If S_1, S_2, S_3 denote the sum of n terms of 3 arithmetic series whose first terms are unity and their common difference are in HP, prove that $n = \dfrac{2S_3S_1 - S_1S_2 - S_2S_3}{S_1 - 2S_2 + S_3}$.

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10. If $x_1, x_2, x_3 \ldots, x_n$ are in H.P. prove that $x_1x_2 + x_2x_3 + x_3x_4 + \ldots\ldots\ldots + x_{n-1}x_n = (n-1)x_1x_n$

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11. 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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12. If the $(m+1)th, (n+1)th, and(r+1)th$ terms of an A.P., are in G.P. and m, n, r are in H.P., then find the value of the ratio of the common difference to the first term of the A.P.

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13. If $y-z, 2(y-a), y-x$ are in H.P. prove that $x-a, y-a, z-a$ are in G.P.

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14. Find the coefficient of x^{99} and x^{98} in the polynomial $(x-1)(x-2)(x-3)\ldots\ldots\ldots.(x-100)$.

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15. Find the sum to n terms of the series: $\frac{1}{1+1^2+1^4}+\frac{2}{1+2^2+2^4}+\frac{3}{1+3^2+3^4}+$

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

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17. Sum to n terms the series $1+3+7+15+31+\ldots$

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18. $1+2.2+3.2^2+4.2^3+\ldots t_n$ is :

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19. If a, b, c, d, e, x are real and $(a^2+b^2+c^2+d^2)x^2-2(ab+bc+cd+de)x+(b^2+c^2+d^2+e^2) \leq 0$ then a,b,c,d,e are in (A) A.P. (B) G.P. (C) H.P. (D) none of these

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20. If S_n denote the sum of first n terms of an A.P. whose first term is $a and S_{nx} / S_x$ is independent of $x, then S_p =$ p^3 b. p^2a c. pa^2 d. a^3

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21. If rational numbers a,b,c be th pth, qth, rth terms respectively of an A.P. then roots of the equation $a(q-r)x^2+b(r-p)x+c(p-q)=0$ are necessarily (A) imaginary (B) rational (C) irrational (D) real and equal

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22. If $(r)_n$ denites the number $rrr....$(n digits), where $r = 1, 2, 3, \ldots\ldots, 9$ and $a = (6)_n, b = (8)_n, c = (4)_{2n},$ then

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23. If $a_1, a_2, a_3, \ldots$ are in $G.P.$, where $a_i \in C$ (where C satands for set of complex numbers) having r as common ratio such that $\sum_{k=1}^{n} a_{2k-1} \sum_{k=1}^{n} a_{2k+3} \neq 0$, then the number of possible values of r is

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24. If a_1, a_2, a_3, a_4 are in H.P. then $\dfrac{1}{a_1 a_4} \sum_{r=1}^{3} a_r a_{r+1}$ is a root of (A) $x^2 - 2x - 15 = 0$ (B) $x^2 + 2x + 15 = 0$ (C) $x^2 + 2x - 15 = 0$ (D) $x^2 - 2x + 15 = 0$

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25. If a and b are digits between 0 and 9 the the rational number represented by 0 $. ababab$ is (A) $\frac{10a+b}{99}$ (B) $\frac{9+b}{90}$ (C) $\frac{a+b}{99}$ (D) $\frac{(99ab+10a+b)}{990}$

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26. If $\frac{l+mx}{l-mx}=\frac{m+nx}{m-nx}=\frac{n+px}{n-px}, x\neq 0$. Then the number l,m,n and p are in (A) A.P. (B) G.P. (C) H.P. (D) none of these

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27. If $a_a, a_2, a_3, \ldots., a_n$ are in H.P. and $f(k)=\sum_{r=1}^{n} a_r - a_k$ then $\frac{a_1}{f(1)}, \frac{a_2}{f(2)}, \frac{a_3}{f(n)}$ are in :

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28. If $x = \sum_{n=0}^{\infty} a^n, y = \sum_{n=0}^{\infty} b^n, z = \sum_{n=0}^{\infty} c^n, wherera, b, andc$ are in A.P. and $|a| < , |b| < 1, and|c| < 1,$ then prove that $x, yandz$ are in H.P.

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29. If $a + b + c = 3$ and $a > 0, b > 0, c > 0$ then the greatest value of $a^2b^3c^2$ is

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30.

$$\frac{1^4}{1.3} + \frac{2^4}{3.5} + \frac{3^4}{5.7} + \dots\dots + \frac{n^4}{(2n-1)(2n+1)} = \frac{n(4n^2 + 6n + 5)}{48} + \frac{}{16}$$

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31. The sum of the sereis $1 + 2^2x + 3^2x^2 + 4^2x^3 + \dots . \infty where - 1 < x < 1 =$ (A)

$\frac{1+x}{((1-x))^3}$ (B) $\frac{x}{(1+x)^3}$ (C) $\frac{1-x^2}{(1+x)^3}$ (D) none of these

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32. For a positive integer n let $a(n)=1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\ldots.+\frac{1}{(2^n)-1}$. Then $a(100)\leq 100$ b. $a(100)>100$ c. $a(200)\leq 100$ d. $a(200)\leq 100$

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33. Let $\Delta(x)=\begin{vmatrix} x+a & x+b & x+a-c \\ x+b & x+c & x-1 \\ x+c & x+d & x-b+d \end{vmatrix}$ and $f_0^2\Delta(x)dx=-16,$ where a,b,c and d are in AP then the common difference of the AP is equal to

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34. If a,b,c are in A.P and a^2, b^2, c^2 are in H.P then which is of the following is /are possible ?

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35. Sum to n terms of the series

$\frac{1}{1.2.3.4}+\frac{1}{2.3.5.6}+\frac{1}{3.4.5.6}+.....$, is

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36. Find the sum of series $(3^3-2^3)+(5^3-4^3)+(7^3-6^3)+...\ n$ terms.

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37. Find a three digit number such that its digits are in increasing G.P. (from left to right) and the digits of the number obtained from it by subtracting 100 form an A.P.

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38. If $\log_3 2, \log_3(2^x - 5)$ and $\log_3\left(2^x - \frac{7}{2}\right)$ are in A.P., then x is equal to

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Exercise

1. If $a_1, a_2, a_3, , a_n$ are in A.P., where $a_i > 0$ for all i , show that $\frac{1}{\sqrt{a_1} + \sqrt{a_2}} + \frac{1}{\sqrt{a_2} + \sqrt{a_3}} + .. + \frac{1}{\sqrt{a_{n-1}} + \sqrt{a_n}} = \frac{n-1}{\sqrt{a_1} + \sqrt{a_n}}$.

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2. If $a_1, a_2, a_3, \ldots\ldots\ldots\ldots . a_n$ are in A.P. whose common difference is d, show tht $\sum_2^n \frac{\tan^{-1} d}{1 + a_{n-1} a_n} = \tan^{-1}\left(\frac{a_n - a_1}{1 + a_n a_1}\right)$

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3. If $a_1, a_2, a_3, \ldots\ldots. a_n, a_{n+1}, \ldots\ldots.$ be A.P. whose common difference is d and $S_1 = a_1 + a_2 + \ldots\ldots. + a_n, S_2 = a_{n+1} + \ldots\ldots\ldots. + a_{2n}, S_3 = a_{2n+1}$ etc show that $S_1, S_2, S_3, S_4\ldots\ldots\ldots.$ are in A.P. whose common difference is $n^2 d.$

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

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5. If $I_n = \int_0^{\pi} \frac{1 - \cos 2nx}{1 - \cos 2x} dx \text{ or } \int_0^{\pi} \frac{\sin^2 nx}{\sin^2 x} dx,$ show that $I_1, I_2, I_3\ldots\ldots\ldots.$ are inA.P.

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6. A cashier has to count a bundle of Rs. 12,000 one rupee notes. He counts at the rate of Rs. 150 per minute for an hour, at the end of which he begins to count at the rate of Rs. 2 less every minute then he did the previous minute. Find how long he will take to finish his task and explain the double answer.

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7. If a, b, c, d and p are different real numbers such that $(a^2+b^2+c^2)p^2-2(ab+bc+cd)p+(b^2+c^2+d^2)\leq 0,$ then show that a, b, c and d are in G.P.

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8. If $\log_x a, a^{x/2}$ and $\log_b x$ are in GP, then x is equal to

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10. Prove that the numbers 49, 4489, 444889, ... Obtained by inserting 48 into the middle of the preceding numbers are square of integers.

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11. Solve the following equations for x and y:

$$\log_{10} x + \log_{10} (x)^{\frac{1}{2}} + \log_{10} (x)^{\frac{1}{4}} + \dots . = y$$

$$\frac{1+3+5+\ldots+(2y-1)}{4+7+10+..+(3y+1)} = \frac{20}{7\log_{10} x}$$

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12. Find the values of $x \in (-\pi, \pi)$ which satisfy the equation

$$8^{1+|\cos x|+|\cos^2 x|+|\cos^3 x|+\dots)} = 4^3$$

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13. The sum oif the first ten terms of an A.P. is equal to 155, and the sum of the first two terms of a G.P. is 9. Find these progressionsif the first term of the A.P. equals the common ratio of the G.P. and the 1st term of G.P. equals the common difference of A.P.

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14. Find the sum of all the numbers of the form n^3 which lie between 100 and 10000.

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15. The sum to 50 terms of the series

$$\frac{3}{1^2} + \frac{5}{1^2+2^2} + \frac{7}{1^+2^2+3^2} + \dots. + \dots is$$

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16. Show that 1/(x+1)+2/(x^2+1)+4/x^4+1)+.....+2^n/(x^2^n+1)= /(x-1)-2^(n+1)/(x^2(n+1)$-1)$

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17. The sum of n terms of the series 5/1.2.1/3+7/2.3.1/3^2+9/3.4.1/3^3+11/4.5.1/3^4+..$is(A)$1+1/2^(n-1).1/3^n(B) 1+1/(n+1).1/3^n(C)1-1/(n+1).1/3^n(D)1+1/2n-1.1/3^n`

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18. If x and y are positive real numbers and m, n are any positive integers, then prove that $\frac{x^n y^m}{(1+x^{2n})(1+y^{2m})} < \frac{1}{4}$

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19. If the arthmetic mean of $(b-c)^2, (c-a)^2$ and $(a-b)^2$ is the same as that of $(b+c-2a)^2, (c+a-2b)^2$ and $(a+b-2c)^2$ show that $a=b=c$.

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20. If a, b, c are real numbers such that $3(a^2+b^2+c^2+1)=2(a+b+c+ab+bc+ca)$, than $a, b, c$are in

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21. If a, b, c, d are distinct integers in an A.P. such that $d=a^2+b^2+c^2$, then find the value of $a+b+c+ \cdot\cdot$

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22. If $a_n = \int_0^{\pi} \frac{\sin(2n-1)x}{\sin x} dx$. Then the number a_1, a_2, a_3 .... Are in

(A) A.P (B) G.P (C) H.P (D) none of these

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23. If a, b, c, d, e are in H.P., then $\frac{a}{b+c+d+e}, \frac{b}{a+c+d+e}, \frac{c}{a+b+d+e}, \frac{d}{a+b+c+e}, \frac{e}{a+b+c}$ are in (A) A.P. (B) G.P. (C) H.P. (D) none of these

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24. If a,b,c are proper fractiion are in H.P. and $x\sum_{n=1}^{\infty} a^n, y = \sum_{n=1}^{\infty} b^n, z = \sum_{n=1}^{\infty} c^n$ then x,y,z are in (A) A.P. (B) G.P. (C) H.P. (D) none of these

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25. If $S_1, S_2, S_3, \ldots\ldots\ldots\ldots S_n$ denote the sum of 1,2,3............n terms of an A.P. having first term a and $\frac{S_{kx}}{S_x}$ is independent of x then $S_1 + S_2 + S_3 + \ldots\ldots\ldots + S_n =$ (A) $\frac{n(n+1)(2n+1)a}{6}$ (B) $\hat{}\ (n+2)C_3a$ (C) $\hat{}\ (n+1)C_3a$ (D) none of these

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26. If a,b,c,d are rational and are in G.P. then the rooots of equation $(a-c)^2x^2 + (b-c)^2x + (b-x)^2 - (a-d)^2 =$ are necessarily (A) imaginary (B) irrational (C) rational (D) real and equal

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27. Sum of $\frac{1}{\sqrt{2}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{8}} + \frac{1}{\sqrt{8}+\sqrt{11}} + \frac{1}{\sqrt{11}+\sqrt{14}} + .. \to n$ terms= (A) $\frac{n}{\sqrt{3n+2}-\sqrt{2}}$ (B) $\frac{1}{3}(\sqrt{2}-\sqrt{3n+2}$ (C) $\frac{n}{\sqrt{3n+2}+\sqrt{2}}$

(D) none of these

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28. If a,b,c are p^{th}, q^{th} and r^{th} term of an AP and GP both, then the product of the roots of equation $a^b b^c c^a x^2 - abcx + a^c b^c c^a = 0$ is equal to :

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29. If a,b,c, be the pth, qth and rth terms respectivley of a G.P., then the equation $a^q b^r c^p x^2 + pqrx + a^r b^{-p} c^q = 0$ has (A) both roots zero (B) at least one root zero (C) no root zero (D) both roots unilty

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30. If $a = \underbrace{111....1}_{55\text{times}}$, $b = 1 + 10 + 10^2 + 10^3 + 10^4$ and $c = 1 + 10^5 + 10^{10} + .$

then prove that a=bc

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31. If a,b,c,d, x are real and the roots of equation $(a^2+b^2+c^2)x^2-2(ab+bc+cd)x+(b^2+c^2+d^2)=0$ are real and equal then a,b,c,d are in (A) A.P (B) G.P. (C) H.P. (D) none of these

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32. If an A.P., a G.P. and a H.P. have the same first term and same $(2n+1)$ th term and their $(n+1)^n$ terms are a,b,c respectively, then the radius of the circle. $x^2+y^2+2bx+2ky+ac=0$ is

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33. If $\sum_{r=1}^{n} t_r = \sum_{k=1}^{n}\sum_{j=1}^{k}\sum_{i=1}^{j} 2$, then $\sum_{r=1}^{n}\frac{1}{t_r}=$

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34. If the sum of n consecutive odd numbers is $25^2 - 11^2$, then

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35. If a,b,c,d are distinct positive then $\frac{a^n}{b^n} > \frac{c^n}{d^n}$ for all εN if a, b, c, d are in (A) A.P. (B) G.P. (C) H.P. (D) none of these

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36. If $a = \sum_{r=1}^{\infty} \left(\frac{1}{r}\right)^2, b = \sum_{r=1}^{\infty} \frac{1}{(2r-1)^2}, then \frac{a}{b} =$ (A) $\frac{5}{4}$ (B) $\frac{4}{5}$ (C) $\frac{3}{4}$ (D) none of these

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37. If $9A.M.'s$ and $9H.M's$ be inserted between 2 and 3 and A be any $A.M.$ and H be the corresponding $H.M.$, then $H(5-A)$

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38. If $a-b, ax-by, ax^2-by^2a, b\neq 0\big)$ are in G.P., then $x, y\dfrac{ax-by}{a-b}$ are in (A) A.P. only (B) G.P.only (C) A.P., G.P. (D) A.P., and G.P and H.P

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39. If the square of differences of three numbers be in A.P., then their differences re in (A) A.P. (B) G.P. (C) H.P. (D) none of these

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40. 1,3,9 can be terms of (A) an A.P.but not of a G.P (B) G.P. but not of an A.P. (C) A.P. and G.P both (D) neither A.P nor G.P

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41. If $t_r = 2^{\frac{r}{3}} + 2^{-\frac{r}{3}}, then \sum_{r=1}^{100} t_r^3 - 3\sum_{r=1}^{100} t_r + 1 =$ (A) $\frac{2^{101}+1}{2^{100}}$ (B) $\frac{2^{101}-1}{2^{100}}$ (C) $\frac{2^{201}+1}{2^{100}}$ (D) none of these

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42. If a,b,c in G.P. x,y be the A.M.\'s between a,b and b,c respectively then $\left(\frac{a}{x} + \frac{c}{y}\right)\left(\frac{b}{x} + \frac{b}{y}\right) =$ (A) 2 (B) -4 (C) 4 (D) none of these

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43. If positive numbers a, b, c are in H.P., then equation $x^2 - kx + 2b^{101} - a^{101} - c^{101} = 0(k \in R)$ has both roots positive both roots negative one positive and one negative root both roots imaginary

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44. The sum $\sum_{n=1}^{\infty} \tan^{-1}\left(\frac{4n}{n^4 - 2n^2 + 2}\right)$ is equal to

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45. If

$b_i = 1 - a_i, na = \sum_{i=1}^{n} a_i, nb = \sum_{i=1}^{n} b_i, then \sum_{i=1}^{n} a_i, b_i + \sum_{i=1}^{n} (a_i - a)^2 =$

ab b. nab c. $(n+1)ab$ d. nab

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46. If the sum of the series $\sum_{n=0}^{\infty} r^n, |r| < 1$ is s, then find the sum of the series $\sum_{n=0}^{\infty} r^{2n}$.

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47. Four numbers are such that the first three are in.A.P while the last three are in G.P. If the first number is 6 and common ratio of G.P. is $\frac{1}{2}$ the the number are (A) 6,8,4,2 (B) 6,10,14,7 (C) 6,9,12,6 (D) 6,4,2,1

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48. The sum of all two digit odd natural numbers in (A) 5049 (B) 2475 (C) 4905 (D) 2530

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49. The series . $\frac{2x}{x+3}+\left(\frac{2x}{x+3}\right)^2+\left(\frac{2x}{x+3}\right)^3+\ldots\infty$

have a definite sum when

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50. If $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ harmonic mean of $a\&b$ then n is

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51. The 15th term of the series $2\frac{1}{2}+1\frac{7}{13}+1\frac{1}{9}+\frac{20}{23}+..$ is

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52. Let a_1, a_2 ,.... , a_{10} be in A.P. and h_1, h_2 .... h_{10} be in H.P. If $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$, then $a_4 h_7$ is :

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53. If a, b, c, d are positive real umbers such that $a = b + c + d = 2, thenM = (a + b)(c + d)$ satisfies the relation $0 \leq M \leq 1 1 \leq M \leq 2 2 \leq M \leq 3 3 \leq M \leq 4$

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54. If $a = 1 + b + b^2 + b^3 + \ldots .. \rightarrow \infty where|b| < 1$ then roots of equation $ax^2 + x - ab = 0$ are (A) $-1, ab$ (B) $1, b$ (C) $-1, b$ (D) $-1, a$

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55. If the sum of the first $2n$ terms of the A.P. 2, 5, 8, ..., is equal to the sum of the first n terms of A.P. 57, 59, 61, ..., then n equals 10 b. 12 c. 11 d. 13

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56. If the pth term of an A.P. is q and the qth term isp, then find its rth term.

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57. If the numbers p,q,r are in A.P. then $m^{7p}, m^{7q}, m^{7r}(m > 0)$ are in (A) A.P. (B) G.P. (C) H.P. (D) none of these

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58. Find the sum $1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \ldots \text{ up to } 22^{nd}$ find the sum when n is odd .

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59. If $1^2 + 2^2 + 3^2 + n^2 = 1015$ then the value of n is equal to (A) 13 (B) 14 (C) 15 (D) none of these

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60. Sum of the first n terms of the series $\frac{1}{2} + \frac{3}{4} + \frac{7}{8} + \frac{15}{16} + \ldots\ldots\ldots$ is equals to (a).$2^n - n - 1$ (b). $1 - 2^{-n}$ (c). $n + 2^{-n} - 1$ (d). $2^n + 1$

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61. If the sum of the roots of the equation is equal to the sum of the squares of their reciprocals, then (A) a, b, c are in A.P. (B) a^2, b^2, c^2 are in G.P. (C) ab^2, bc^2, ca^2 are in A.P. (D) ab, bc, ca are G.P.

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62. The third term of a geometric progression is 4. Then the product of the first five terms is a.4^3 b. 4^5 c. 4^4 d. none of these

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63. If A_1, A_2 be two A.M. and G_1, G_2 be two G.K.s between $a and b$ then $\frac{A_1 + A_2}{G_1 G_2}$ is equal to $\frac{a+b}{2ab}$ b. $\frac{2ab}{a+b}$ c. $\frac{a+b}{ab}$ d. $\frac{a+b}{\sqrt{ab}}$

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64. If a, b, c, d are distinct positive numbers in A.P., then:

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65. $1 + \frac{3}{2} + \frac{5}{2^2} + \frac{7}{2^3} + \ldots\ldots\ldots \rightarrow \infty$ is equal to (A) 3 (B) 6 (C) 9 (D) 12

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66. STATEMENT-1 : If $a^x = b^y = c^z$, where x,y,z are unequal positive numbers and a, b,c are in G.P. , then

$x^3 + z^3 > 2y^3$ and

STATEMENT-2 : If a, b,c are in H,P, $a^3 + c^3 \geq 2b^3$, where a, b, c are positive real numbers .

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67. If G_1 and G_2 are two geometric means inserted between any two numbers and A is the arithmetic mean of two numbers, then the value of $\frac{G_1^2}{G_2} + \frac{G_2^2}{G_1}$ is:

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68. 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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69. In triangle ABC, medians AD and CE are drawn $AD = 5, \angle DAC = \pi/8,$ and $\angle ACE = \pi/4,$ then the area of the triangle ABC is equal to

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70. If $x \in \{1, 2, 3, \ldots, 9\}$ and $f_n(x) = xxx\ldots.x$ (n digits) , then $f_n^2(3) + f_n(2)$

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71. Let $S_n = \sum_{r=0}^{\infty} \frac{1}{n^r}$ and $\sum_{n=1}^{k} (n-1)S_n = 5050 then k =$ (A) 50 (B) 505 (C) 100 (D) 55

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72. Let $f: R \rightarrow R$ such that $f(x)$ is continuous and attains only rational value at all real x and f(3)=4. If a_1, a_2, a_3, a_4, a_5 are in H.P. then $\sum_{r=1}^{4} a_r a_{r+1} = (A) f(3).\ a_1 a_5$ (B) $f(3).\ a_4 a_5$ (C) $f(3).\ a_1 a_2$ (D) $f(3).\ a_1 a_3$

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73. If three successive terms of as G.P. with commonratio $r > 1$ form the sides of a triangle and [r] denotes the integral part of x the $[r] + [-r] =$ (A) 0 (B) 1 (C) -1 (D) none of these

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74. Let $a_n = \int_0^{\frac{\pi}{2}} \frac{1 - \cos 2nx dx}{1 - \cos 2x}$, then `a1, a2, a3 is in

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75. If a_1, a_2, a_3, a_n are in H.P. and $f(k) = \left(\sum_{r=1}^{n} a_r\right) - a_k, then$

$\frac{a_1}{f(1)}, \frac{a_2}{f(2)}, \frac{a_3}{f(3)}, , \frac{a_n}{f(n)},$ are in a. A.P b. G.P. c. H.P. d. none of these

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76. If the sides of a triangle are in G.P., and its largest angle is twice the smallest, then the common ratio r satisfies the inequality `0

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77. Find $\frac{5}{1.2}\frac{.1}{3} + \frac{7}{2.3}\frac{.1}{3^2} + \frac{9}{3.4}\frac{.1}{3^3} + \frac{11}{4.5}\frac{.1}{3^4} + \ldots\ldots\ldots\ldots \to n$ terms

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78. If $\frac{b+c}{a+d} = \frac{bc}{ad} = 3\left(\frac{b-c}{a-d}\right)$ then a,b,c,d are in (A) H.P. (B) G.P. (C) A.P. (D) none of these

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79. If $\log\left(\frac{2b}{3c}\right), \log\left(\frac{4c}{9a}\right)$ and $\log\left(\frac{8a}{27b}\right)$ are in A.P. where a, b, c and are in G.P. then a,b,c are the length of sides of (A) a scelene triangle (B) anisocsceles tirangel (C) an equilateral triangle (D) none of these

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80. If S_r denote the sum of first 'r' terms of a non constaint A.P. and $\frac{S_a}{a^2} = \frac{S_b}{b^2} = c,$ where a,b,c are distinct then $S_c =$

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81. If S_p denotes the sum of the series $1 + r^p + r^{2p} + \rightarrow \infty and s_p$ the sum of the series $1 - r^{2p} r^{3p} + \rightarrow \infty, |r| < 1, then S_p + s_p$ in term of S_{2p} is $2S_{2p}$ b. 0 c. $\frac{1}{2}S_{2p}$ d. $-\frac{1}{2}S_{2p}$

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82. If a,b and c are in AP, then the straight lines $ax + by + c = 0$ will always pass through.........

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83. The value of $10^3 + 11^3 + 12^3 + \ldots\ldots\ldots\ldots + 100^3$ is equal to (A) 25500475 (B) 25500000 (C) 25000000 (D) none of these

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84. If $a_n =$ the digit at units palce in the number o $1! + 2! + 3! + \ldots\ldots\ldots\ldots n!$ for $n \geq 4$ the $a_4, a_5, a_6, \ldots\ldots\ldots$ are in (A) A.P. only (B) G.P. only (C) A.P. and G.P. only (D) A.P., G.P. and H.P.

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85. Let a,b,c be positive real numers such that $bx^2 + \left(\sqrt{\left((a+c)^2 + 4b^2\right)}x + (a+c), \; = 0, \; \forall x \varepsilon R, then\right.$ a,b,c are in

(A) G.P. (B) A.P. (C) H.P. (D) none of these

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86. The coefficient of x^{49} in the product $(x-1)(x-3)(x-99) is$ a. -99^2 b. 1 c. -2500 d. none of these

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87. If $a, a_1, a_2, a_3, a_{2n}, b$ are in A.P. and $a, g_1, g_2, g_3, , g_{2n}, b$. are in G.P. and h s the H.M. of $aandb,$ then prove that $\frac{a_1 + a_{2n}}{g_1 g_{2n}} + \frac{a_2 + a_{2n-1}}{g_1 g_{2n-1}} + + \frac{a_n + a_{n+1}}{g_n g_{n+1}} = \frac{2n}{h}$

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88. Let α be the A.M. and β, γ be two G.M.\'s between two positive numbes then the value of $\frac{\beta^3 + \gamma^3}{\alpha\beta\gamma}$ is (A) 1 (B) 2 (C) 0 (D) 3

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89. If the sum of n positive number is 2n, then the product of these numbers is (A) $\leq 2^n$ (B) $\geq 2^n$ (C) divisible by 2^n (D) none of these

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90. Let p,q,r are positive real numbers, such that $27pqr \geq (p+q+r)^2$ and $3p+4p+5r=12,$ then $p^2+q^4+r^3=$

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91. Sum of the first n terms of an A.P. having positive terms is given by $S_n = (1+2T_n)(1-T_n)(where T_n$ is the nth term of the series). The value of T_2^2 is (A) $\frac{\sqrt{2}+1}{2\sqrt{2}}$ (B) $\frac{\sqrt{2}-1}{2\sqrt{2}}$ (C) $\frac{1}{2\sqrt{2}}$ (D) none of these

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92. Let a be the A.M. and b,c bet wo G.M\'s between two positive numbers. Then $b^3 + c^3$ is equal to (A) abc (B) $2abc$ (C) $3abc$ (D) $4abc$

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93. If $a > 0, b > 0, c > 0$ and the minimum value of $a^2(b+c) + b^2(c+a) + c^2(a+b)$ is kabc, then k is (A) 1 (B) 3 (C) 6 (D) 4

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94. If $(2+x)(2+x^2)(2+x^3)\ldots\ldots\ldots(2+x^{100}) = \sum_{r=0}^{n} k_r x^r, then$ n= (A) 2550 (B) 5050 (C) 2^8 (D) none of these

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95. Let $S_1, S_2, \ldots$.. be squares such that for each $n \geq 1$, the length of a side of S_n equals the lengh of a diagonal of S_{n+1}. If the length of a side of S_1 is 10 cm and the area of S_n less than 1 sq cm. Then, find the value of n.

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96. The next term of the G.P. $x, x^2 + 2, andx^3 + 10$ is $\frac{729}{16}$ b. 6 c. 0 d. 54

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97. If $\hat{\ } nC_4, {}^n C_5$ and $\hat{\ } nC_6$ are in A.P. then n is equal to (A) 11 (B) 14 (C) 12 (D) 9

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98. If a, b, c are in G.P. and x,y be the AM's between a,b and b,c respectively then (A) $\frac{1}{a}+\frac{1}{b}=\frac{x+y}{6}$ (B) $ax+cy=b$ (C) $\frac{a}{x}+\frac{c}{y}=2$ (D) $\frac{1}{x}+\frac{1}{y}=\frac{2}{b}$

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99. If $a_n=\int_0^{\pi}\frac{\sin(2n-1)x}{\sin x}dx$. Then the number a_1, a_2, a_3 .... Are in

(A) A.P (B) G.P (C) H.P (D) none of these

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100. If the first two terms of a progression are $\log_2 256$ and $\log_3 81$ respectively, then which of the following stastement (s) is (are) true: (A) if the third term is $2\log_6 1$ the the terms are in A.P. (B) if the third term is $\log_2 8,$ the the terms are in A.P. (C) if the third term is $\log_4 16$ the the terms are in G.P. (D) if the third term is $\frac{2}{3}\log_2 16$ the the terms are in H.P.

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102. The complex numbrs x and y such that $x, x+2y, 2x+y$ are n A.P. and $(y+1)^2, xy+5, (x+1)^2$ are in G.P. are (A) $x=3, y=1$ (B) $x=-1+2\sqrt{2}i, y=\frac{1}{3}(-1+2\sqrt{2}i)$ (C) $x=\sqrt{2}+i, y=3\sqrt{5}-\sqrt{2}i$ (D) `x=-1(1+2sqrt(2)i), y= - 1/3 (1+2sqrt(2)i)

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103. The values of x for which $\frac{1}{1+\sqrt{x}}, \frac{1}{1-x}, \frac{1}{1-\sqrt{x}}$ are in A.P. lie in the interval (A) $(0, \infty)$ (B) $(1, \infty)$ (C) $(0, 1)$ (D) none of these

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104. If the pth, qth and rth terms of an A. P. are in G.P., prove that the common ratio of the G.P. is

$$\frac{q-r}{p-q}.$$

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105. If A_1, A_2 be two A.M.\'s G_1, G_2 be the two G.M.\'s and H_1, H_2 be the two H.M.\'s between a and b then (A) $\frac{A_1+A_2}{G_1G_2}=\frac{a+b}{ab}$ (B) $\frac{H_1+H_2}{H_1H_2}=\frac{a+b}{ab}$ (C) $\frac{G_1G_2}{H_1H_2}=\frac{A_1+A_2}{H_1+H_2}(D)(A_1+A_2)\frac{H_1+H_2}{H_1H_2}=\frac{a+b}{a-b}$

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106. The sum of the first n terms of the series $1^2+2\times2^2+3^2+2\times4^2+5^2+2\times6^2.....is\frac{n(n+1)^2}{2}$ when n is even .Then find the sum when n is odd.

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107. Let T be the rth term of an A.P. whose first term is a and conmon difference is d. If for some positive integers $m, n,\ T_n = \frac{1}{m}, T_m = \frac{1}{n}$ then $(a - d)$ equals

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108. The geometric mean G of two positive numbers is 6. Their arithmetic mean A and harmonic mean H satisfy the equation $90A + 5H = 918$, then A may be equal to:

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109. Let $a_1, a_2, a_3 \ldots \ldots \ldots \ldots, a_n$ be positive numbers in G.P. For each n let A_n, G_n, H_n be respectively the arithmetic mean geometric mean and harmonic mean of $a_1, a_2, \ldots \ldots \ldots, a_n$ On the basis of above information answer the following question: A_k, G_k, H_k are in (A) A.P. (B) G.P. (C) H.P. (D) none of these

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111. Let S_n denote the sum of first n terms of a G.P. whose first term and common ratio are a and r respectively. On the basis of above information answer the following question: $S_1 + S_2 + S_3 + .. + S_n =$ (A) $\frac{na}{1-r} - \frac{ar(1-r^n)}{(1-r)^2}$ (B) $\frac{na}{1-r} - \frac{ar(1+r^n)}{(1+r)^2}$ (C) $\frac{na}{1-r} - \frac{a(1-r^n)}{(1-r)^2}$

(D) none of these

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112. Let S_n denote the sum of first n terms of a G.P. whose first term and common ratio are a and r respectively. On the basis of above information answer the following question: The sum of product of first n terms of the

G.P. taken two at a time in (A) $\frac{r+1}{r}S_nS_{n-1}$ (B) $\frac{r}{r+1}S_n^2$ (C) $\frac{r}{r+1}S_nS_{n-1}$ (D) none of these

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113. If sum of n termsof a sequende is S_n then its nth term $t_n = S_n - S_{n-1}$. This relation is vale for all $n > -1$ provided $S_0 = 0$. But if $S_{\neq}0$, then the relation is valid ony for $n \geq 2$ and in hat cast t_1 can be obtained by the relation$t_1 = S_1$. Also if nth term of a sequence $t_1 = S_n - S_{n-1}$ then sum of n term of the sequence can be obtained by putting $n = 1, 2, 3, . n$ and adding them. Thus $\sum_{n=1}^{n} t_n = S_n - S_0$. if $S_0 = 0, then \sum_{n=1}^{n} t_n = S_n$. On the basis of above information answer thefollowing questions: If the sum of n terms of a sequence is $10n^2 + 7n$ then the sequence is (A) an A.P. having common difference 20 (B) an A.P. having common difference 7 (C) an A.P. having common difference 27 (D) not an A.P.

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114. If sum of n termsof a sequende is S_n then its nth term $t_n = S_n - S_{n-1}$. This relation is vale for all $n > -1$ provided $S_0 = 0$. But if $S_{\neq}0$, then the relation is valid ony for $n \geq 2$ and in hat cast t_1 can be obtained by the relation$t_1 = S_1$. Also if nth term of a sequence $t_1 = S_n - S_{n-1}$ then sum of n term of the sequence can be obtained by putting $n = 1, 2, 3, . n$ and adding them. Thus $\sum_{n=1}^{n} t_n = S_n - S_0$. if $S_0 = 0, then \sum_{n=1}^{n} t_n = S_n$. On the basis of above information answer thefollowing questions: If the sum of n terms of a sequence $2n^2 + 3n + 5$ then the sequence is (A) an A.P. having common difference 4 (B) an A.P. having common difference 2 (C) an A.P. having common difference 3 (D) not an A.P.

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115. If sum of n termsof a sequende is S_n then its nth term $t_n = S_n - S_{n-1}$. This relation is vale for all $n > -1$ provided $S_0 = 0$. But if $S_{\neq}0$, then the relation is valid ony for $n \geq 2$ and in hat cast t_1 can be obtained by the relation$t_1 = S_1$. Also if nth term of a sequence

$t_1 = S_n - S_{n-1}$ then sum of n term of the sequence can be obtained by putting $n = 1, 2, 3, . n$ and adding them. Thus $\sum_{n=1}^{n} t_n = S_n - S_0$. if $S_0 = 0, then \sum_{n=1}^{n} t_n = S_n$. On the basis of above information answer thefollowing questions:If nth term of a sequence is $\frac{n}{1 + n^2 + n^4}$ then the sum of its first n terms is (A) $\frac{n^2 + n}{1 + n + n^2}$ (B) $\frac{n^2 - n}{1 + n + n^2}$ (C) $\frac{n^2 + n}{1 - n + n^2}$ (D) $\frac{n^2 + n}{2(1 + n + n^2)}$

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116. If $a, b, c,$ are positive real numbers, then prove that (2004, 4M) $\{(1 + a)(1 + b)(1 + c)\}^7 > 7^7 a^4 b^4 c^4$

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

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119. Sum of infinite terms of series $3+5.\ \frac{1}{4}+7.\ \frac{1}{4^2}+\ldots.$ is

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120. The largest term common to the sequence 1,11,21,31,....to 100 terms and 31,36,41,46,...... to 100 tetms is

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121. Assertion: $\left[\left(1+\frac{1}{10000}\right)^{10000}\right]=2$ where [.] is the greatest integer function. Reason: $2<\left(1+\frac{1}{n}\right)^{n}<2.5$ for all n εN (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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122. Assertion: If n is odd then the sum of n terms of the series $1^2 + 2 \times 2^2 + 3^2 + 2 \times 4^2 + 5^2 + 2 \times 6^2 + 7^2 + \dots is \frac{n^2(n+1)}{2}$. If n is even then the sum of n terms of the series. $1^2 + 2 \times 2^2 + 3^2 + 2 \times 4^2 + 5^2 + 2 \times 6^2 + \dots\dots is \frac{n(n+1)^2}{2}$ (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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123. Assertion: one root of equation $(a-d)^2x^2 - \left[(b-c)^2\right\}(c-a)^2x - (d-b)^2 = 0$ is necessarily 1. Reason: $(a-d)^2 = (b-c)^2 + (c-a)^2 + (d-b)^2$ (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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124. Assertion: x,y,z are in A.P., Reason: sum of an infinite G.P. having first term a and common ratio r is $\frac{a}{1-r} where -1 < r < 1$ (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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125. Assertion: $x-a, y-a, z-a$ are in G.P., Reason: If a,b,c are in H.P. then $a-\frac{b}{2}, b-\frac{b}{2}, c-\frac{b}{2}$ are in G.P. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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126. Assertion: I_1, I_2, I_3,......... are in A.P. Reason: $I_{n+2} + I_n - 2I_{n+1} = 0$

(A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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127. Assetion: $a_1, a_2, a_3, \ldots\ldots\ldots\ldots\ldots$ an are not in G.P. Reason: $a_{n+1} = a_n$ (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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128. Assertion: a^2, b^2, c^2 are in A.P., Reason: $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ are in A.P. (A) Both A and R are true and R is the correct explanation of A (B)

Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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129. Assertion: $\frac{S_1}{S_2}=\frac{n}{n+1}$, Reason: Numbers of odd termsof A.P. is $(n+1)$ and numbers of even terms is n. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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130. Let n_{th} term of the sequence be given by t_n=$\frac{(n+2)(n+3)}{4}$ Assertion: $\frac{1}{t_1}+\frac{1}{t_2}+\dots\dots\dots\dots+\frac{1}{t_{2009}}=\frac{2009}{1509}$, Reason: $\frac{1}{(n+2)(n+3)}=\frac{1}{n+2}-\frac{1}{n+3}$ (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not the correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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131. The real numbers x_1, x_2, x_3 satisfying the equation $x^3 - x^2 + bx + \gamma = 0$ are in A.P. Find the intervals in which β and γ lie.

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132. Let x be the arithmetic mean and y, z be tow geometric means between any two positive numbers. Then, prove that $\frac{y^3 + z^3}{xyz} = 2.$

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133. If $\cos(x - y)$, $\cos x$ and $\cos(x + y)$ are in HP, then $\cos x \sec\left(\frac{y}{2}\right) =$

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134. Let α and β be roots of the equation $X^2 - 2x + A = 0$ and let γ and δ be the roots of the equation $X^2 - 18x + B = 0$. If $\alpha < \beta < \gamma < \delta$ are in arithmetic progression then find the valus of A and B.

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135. Let T_r be the rth term of an A.P., for $r = 1, 2, 3,$ If for some positive integers $m, n,$ we have $T_m = \frac{1}{n} and T_n = \frac{1}{m}, then T_{mn}$ equals $\frac{1}{mn}$ b. $\frac{1}{m} + \frac{1}{n}$ c. 1 d. 0

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136. If $x > 1, y > 1, and z > 1$ are in G.P., then $\frac{1}{1 + \ln x}, \frac{1}{1 + lny} and \frac{1}{1 + lnz}$ are in a. $A\dot{P}.$ b. $H\dot{P}.$ c. $G\dot{P}.$ d. none of these

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137. If x_1, x_2, x_3 as well as y_1, y_2, y_3 are in GP with the same common ratio, then the points $(x_1, y_1), (x_2, y_2),$ and (x_3, y_3). (a)lie on a straight line (b)lie on an ellipse (c)lie on a circle (d) are the vertices of a triangle.

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138. The harmonic mean of the roots of the equation $(5+\sqrt{2})x^2-(4+\sqrt{5})x+8+2\sqrt{5}=0$ is 2 b. 4 c. 6 d. 8

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139. Let a_1, a_2 ,.... , a_{10} be in A.P. and h_1, h_2 .... h_{10} be in H.P. If $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$, then $a_4 h_7$ is :

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140. Let $S_1, S_2, \ldots.$ be squares such that for each $n \geq 1$, the length of a side of S_n equals the lengh of a diagonal of S_{n+1}. If the length of a side of S_1 is 10 cm and the area of S_n less than 1 sq cm. Then, find the value of n.

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141. If a, b, c, d are positive real umbers such that $a = b + c + d = 2, then M = (a + b)(c + d)$ satisfies the relation $0 \leq M \leq 1 1 \leq M \leq 2 2 \leq M \leq 3 3 \leq M \leq 4$

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142. Consider an infinite geometric series with first term a and common ratio r. If its sum is 4 and the second term is 3/4, then (a)$a = \frac{4}{7}, r = \frac{3}{7}$ (b). $a = 2, r = \frac{3}{8}$ (c). $a = \frac{3}{2}, r = \frac{1}{2}$ (d). $a = 3, r = \frac{1}{4}$

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144. Let $\alpha and \beta$ be the roots of $x^2 - x + p = 0 and \gamma and \delta$ be the root of $x^2 - 4x + q = 0.$ If $\alpha, \beta, and \gamma, \delta$ are in G.P., then the integral values of $p and q$, respectively, are $-2, -32$ b. $-2, 3$ c. $-6, 3$ d. $-6, -32$

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145. If the sum of the first $2n$ terms of the A.P. 2, 5, 8, ..., is equal to the sum of the first n terms of A.P. 57, 59, 61, ..., then n equals 10 b. 12 c. 11 d. 13

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146. Let the positive numbers $a, b, cadnd$ be in the A.P. Then $abc, abd, acd, andbcd$ are a. not in A.P. /G.P./H.P. b. in A.P. c. in G.P. d. in H.P.

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148. If $\sin^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4} - ..\right) + \cos^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4}\right) = \frac{\pi}{2}$ for

`0<|x|

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149. If $a_1, a_2, , a_n$ are positive real numbers whose product is a fixed number c, then the minimum value of $a_1 + a_2 + \, + a_{n-1} + 2a_n$ is $a_{n-1} + 2a_n$ is b. $(n+1)c^{1/n}$ $2nc^{1/n}$ $(n+1)(2c)^{1/n}$

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150. Suppose a,b,c are in A.P and a^2,b^2,$c^2$are in G.P if a

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151. Let a and b be positive real numbers. If a, A_1, A_2, b are in arthimatic progression, a G_1, G_2, b are in geometric progression and a, H_1, H_2,b are in harmonic progression, show that $\frac{G_1G_2}{H_1H_2} = \frac{A_1 + A_2}{H_1 + H_2} = \frac{(2a+b)(a+2b)}{9ab}$.

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152. If $\alpha \in \left(0, \frac{\pi}{2}\right), then \sqrt{x^2 + x} + \frac{\tan^2 \alpha}{\sqrt{x^2 + x}}$ is always greater than or equal to $2 \tan \alpha$ 1 $2 \sec^2 \alpha$

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153. If a, b, c are in A.P. and a^2, b^2, c^2 are in H.P., then prove that either $a = b = c$ or $a, b, c = \frac{c}{2}$ form a G.P.

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154. An infinite G.P. has first term as a and sum 5, then a belongs to a) $|a| < 10$ b) $-10 < a < 0$ c) $0 < a < 10$ d) $a > 10$

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155. If $a, b, c,$ are positive real numbers, then prove that (2004, 4M) $\{(1+a)(1+b)(1+c)\}^7 > 7^7 a^4 b^4 c^4$

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156. In the quadratic equation $ax^2 + bx + c = 0, \Delta = b^2 - 4ac$ and $\alpha + \beta, \alpha^2 + \beta^2, \alpha^3 + \beta^3,$ are in

G.P , where α, β are the roots of $ax^2 + bx + c,$ then (a) $\Delta \neq 0$ (b) $b\Delta = 0$ (c) $c\Delta = 0$ (d) $\Delta = 0$

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157. If $a_n = \frac{3}{4} - \left(\frac{3}{4}\right)^2 + \left(\frac{3}{4}\right)^3 + \ldots... + (-1)^{n-1}\left(\frac{3}{4}\right)^n$ and $b_n = 1 - a_n$ then find the least natural number n_0 such that $b_n > a_n \forall n \leq n_0$

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158. Let V_r denotes the sum of the first r terms of an arithmetic progression whose first term is r and the common difference is $(2r - 1)$. Let $T_r = V_{r+1} - V_r - 2$ and $Q_r = T_{r+1} - T_r$ for $r = 1, 2, \ldots.$

T_r is always

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159. Let V_r denotes the sum of the first r terms of an arithmetic progression whose first term is r and the common difference is $(2r-1)$. Let $T_r = V_{r+1} - V_r - 2$ and $Q_r = T_{r+1} - T_r$ for $r = 1, 2, \ldots$.

T_r is always

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160. Let $V(r)$ denote the sum of the first r terms of an arithmetic progression (AP) whose first term is r and the common difference is $(2r-1)$. LetT(r)=V(r+1)-V(r)-2 and Q(r) =T(r+1)-T(r) for r=1,2 $Whicho \ne ofthefollow \in gisac \text{ or } rectstatement?(A)$Q_1, Q_2, Q_3..............,$are \in A.P. withcommond \Leftrightarrow erence5(B)$Q_1, Q_2, Q_3..............,$are \in A.P. withcommond \Leftrightarrow erence6(C)$Q_1, Q_2, Q_3..............,$are \in A.P. withcommond \Leftrightarrow erence11(D)$Q_1=Q_2=Q_3`

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161. Let A_1, G_1, H_1 denote the arithmetic, geometric and harmonic means respectively, of two distinct positive numbers. For $n \geq 2$, let A_{n-1}, G_{n-1} and H_{n-1} has arithmetic,geometric and harmonic means as A_n, G_n, H_n respectively.

Which of the following statement is correct?

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162. Let A_1, G_1, H_1 denote the arithmetic, geometric and harmonic means respectively, of two distinct positive numbers. For $n \geq 2$, let A_{n-1}, G_{n-1} and H_{n-1} has arithmetic,geometric and harmonic means as A_n, G_n, H_n respectively.

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163. Let A_1, G_1, H_1 denote the arithmetic, geometric and harmonic means respectively, of two distinct positive numbers. For $n \geq 2$, let

A_{n-1}, G_{n-1} and H_{n-1} has arithmetic,geometric and harmonic means as A_n, G_n, H_n respectively.

Which of the following statement is correct?

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164. Assertion: The numbers b_1, b_2, b_3, b_4 are neither in A.P. nor in G.P. Reason: The numbers b_1, b_2, b_3, b_3 are in H.P. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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165. If the sum of first n terms of an AP is cn^2, then the sum of squares of these n terms is :

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