MATHS

BOOKS - CENGAGE

PROGRESSION AND SERIES

Single correct Answer

1. If $3x^2 - 2ax + \left(a^2 + 2b^2 + 2c^2\right) = 2(ab + bc)$, then a, b, c can be in

A. $A. P.$

B. $G. P.$

C. $H. P.$

D. None of these

Answer: A

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2. If $x = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$, $y = \frac{1}{1^2} + \frac{3}{2^2} + \frac{1}{3^2} + \frac{3}{4^2} + \dots$ and $z = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$ then

A. x, y, z are in $A.\ P.$

B. $\frac{y}{6}, \frac{x}{3}, \frac{z}{2}$ are in $A.\ P.$

C. $\frac{y}{6}, \frac{x}{3}, \frac{z}{2}$ are in $A.\ P.$

D. $6y, 3x, 2z$ are in $H.\ P.$

Answer: B

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3. For $a, b, c \in R - \{0\}$, let $\frac{a+b}{1-ab}, b, \frac{b+c}{1-bc}$ are in $A.\ P.$ If α, β are the roots of the quadratic equation

$2acx^2 + 2abcx + (a+c) = 0$, then the value of $(1+\alpha)(1+\beta)$ is

A. 0

B. 1

C. -1

D. 2

Answer: B

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4. If $a_1, a_2, a_3, \ldots\ldots a_{87}, a_{88}, a_{89}$ are the arithmetic means between 1 and 89, then $\sum_{r=1}^{89} \log\left(\tan(a_r)^\circ\right)$ is equal to

A. 0

B. 1

C. $\log_2 3$

D. $\log 5$

Answer: A

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5. Let $a_1, a_2, \ldots.$ and $b_1, b_2, \ldots.$ be arithemetic progression such that $a_1 = 25, b_1 = 75$ and $a_{100} + b_{100} = 100$, then the sum of first hundred term of the progression $a_1 + b_1, a_2 + b_2$,.... is equal to

A. 1000

B. 100000

C. 10000

D. 24000

Answer: C

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6. The sum of 25 terms of an $A.P.$, whose all the terms are natural numbers, lies between 1900 and 2000 and its 9^{th} term is 55. Then the first term of the $A.P.$ is

A. 5

B. 6

C. 7

D. 8

Answer: C

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7. If the first, fifth and last terms of an $A.\ P.$ is l, m, p, respectively, and sum of the $A.\ P.$ is $\frac{(l+p)(4p+m-5l)}{k(m-l)}$ then k is

A. 2

B. 3

C. 4

D. 5

Answer: A

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8. If $a_1, a_2 a_3, \ldots., a_{15}$ are in $A.P$ and $a_1 + a_8 + a_{15} = 15$, then $a_2 + a_3 + a_8 + a_{13} + a_{14}$ is equal to

A. 25

B. 35

C. 10

D. 15

Answer: A

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9. If $a_1, a_2, a_3, \ldots$ are in A.P. and $a_i > 0$ for each i, then $\sum_{i=1}^{n} \frac{n}{a_{i+1}^{\frac{2}{3}} + a_{i+1}^{\frac{1}{3}} a_i^{\frac{1}{3}} + a_i^{\frac{2}{3}}}$ is equal to

A. $\frac{n}{a_n^{2/3} + a_n^{1/3} + a_1^{2/3}}$

B. $\dfrac{n+1}{a_n^{2/3}+a_n^{1/3}+a_1^{2/3}}$

C. $\dfrac{n-1}{a_n^{2/3}+a_n^{1/3}\cdot a_1^{1/3}+a_1^{2/3}}$

D. None of these

Answer: C

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10. Between the numbers 2 and 20, 8 means are inserted. Then their sum is

A. 88

B. 44

C. 176

D. None of these

Answer: A

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11. Let $a_1, a_2, a_3, \ldots, a_{4001}$ is an $A.P.$ such that $\frac{1}{a_1 a_2} + \frac{1}{a_2 a_3} + \ldots + \frac{1}{a_{4000} a_{4001}} = 10$

$a_2 + a_{400} = 50.$

Then $|a_1 - a_{4001}|$ is equal to

A. 20

B. 30

C. 40

D. None of these

Answer: B

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12. An $A.P.$ consist of even number of terms $2n$ having middle terms equal to 1 and 7 respectively. If n is the maximum value which satisfy $t_1 t_{2n} + 713 \geq 0$, then the value of the first term of the series is

A. 17

B. -15

C. 21

D. -23

Answer: D

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13. If the sum of the first 100 terms of an AP is -1 and the sum of even terms lying in first 100 terms is 1, then which of the following is not true ?

A. Common difference of the sequence is $\frac{3}{50}$

B. First term of the sequence is $\frac{-149}{50}$

C. 100^{th} term $=\frac{74}{25}$

D. None of these

Answer: D

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14. Given the sequence of numbers $x_1, x_2, x_3, x_4, \ldots, x_{2005}$, $\frac{x_1}{x_1+1} = \frac{x_2}{x_2+3} = \frac{x_3}{x_3+5} = \ldots = \frac{x_{2005}}{x_{2005}+4009}$, the nature of the sequence is

A. $A.\ P.$

B. $G.\ P.$

C. $H.\ P.$

D. None of these

Answer: A

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15. If $b-c,\ bx-cy,\ bx^2-cy^2\ (b, c \neq 0)$ are in $G.\ P$, then the value of $\left(\frac{bx+cy}{b+c}\right)\left(\frac{bx-cy}{b-c}\right)$ is

A. x^2

B. $-x^2$

C. $2y^2$

D. $3y^2$

Answer: A

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16. 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

A. 2

B. 3

C. 4

D. 5

Answer: C

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17. If a, b, c are real numbers forming an $A.P.$ and $3+a, 2+b, 3+c$ are in $G.P.$, then minimum value of ac is

A. -4

B. -6

C. 3

D. None of these

Answer: B

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18. a, b, c, d are in increasing $G.P.$ If the AM between a and b is 6 and the AM between c and d is 54, then the AM of a and b is

A. 15

B. 48

C. 44

D. 42

Answer: D

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19. The numbers a, b, c are in $A.P.$ and $a+b+c=60$. The numbers $(a-2), b, (c+3)$ are in $G.P.$ Then which of the following is not the possible value of $a^2+b^2+c^2$?

A. 1208

B. 1218

C. 1298

D. None of these

Answer: B

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20. a, b, c are positive integers formaing an incresing $G. P.$ and $b - a$ is a perfect cube and $\log_6 a + \log_6 b + \log_6 c = 6$, then $a + b + c =$

A. 100

B. 111

C. 122

D. 189

Answer: D

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21. The first three terms of a geometric sequence are x, y,z and these have the sum equal to 42. If the middle term y is multiplied by $5/4$, the numbers x, $\frac{5y}{4}$, z now form an arithmetic sequence. The largest possible value of x is

A. 6

B. 12

C. 24

D. 20

Answer: C

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22. If an infinite G.P. has 2nd term x and its sum is 4, then prove that $\xi n(-8, 1] - \{0\}$

A. $(0, 2]$

B. $(1, 8)$

C. $(-8, 1]$

D. none of these

Answer: C

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23. In a GP, the ratio of the sum of the first eleven terms of the sum of the last even terms is $1/8$ and the ratio of the sum of all the terms without the first nine to the sum of all terms without the last nine is 2. Then the number of terms in the GP is

A. 40

B. 38

C. 36

D. 34

Answer: B

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24. The number of ordered pairs (x, y) , where $x, y \in N$ for which $4, x, y$ are in $H.P.$, is equal to

A. 1

B. 2

C. 3

D. 4

Answer: C

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25. If $a + c, a + b, b + c$ are in $G.P$ and a, c, b are in $H.P.$ where a,b, $c > 0$, then the value of $\dfrac{a + b}{c}$ is

A. 3

B. 2

C. $\dfrac{3}{2}$

D. 4

Answer: B

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26. If a, b, c are in $H. P, b, c, d$ are in $G. P$ and c, d, e are in $A. P.$, then the value of e is

A. $\dfrac{ab^2}{(2a-b)^2}$

B. $\dfrac{a^2b}{(2a-b)^2}$

C. $\dfrac{a^2b^2}{(2a-b)^2}$

D. None of these

Answer: A

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27. If $x > 1, y > 1, z > 1$ are in $G. P.$, then $\log_{ex} e, \log_{ey} e$, $\log_{ez} e$ are in

A. $A. P.$

B. $H. P.$

C. $G. P.$

D. none of these

Answer: B

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28. If x, y, z are in $G. P. (x, y, z > 1)$, then $\frac{1}{2x + \log_e x}, \frac{1}{4x + \log_e y}, \frac{1}{6x + \log_{ez} z}$ are in

A. $A. P.$

B. $G. P.$

C. $H. P.$

D. none of these

Answer: C

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29. The arithmetic mean of two positive numbers is 6 and their geometric mean G and harmonic mean H satisfy the relation $G^2 + 3H = 48$. Then the product of the two numbers is

A. 24

B. 32

C. 48

D. 54

Answer: B

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30. If x, y, z be three numbers in $G.P.$ such that 4 is the $A.M.$ between x and y and 9 is the $H.M.$ between y and z, then y is

A. 4

B. 6

C. 8

D. 12

Answer: B

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31. If harmonic mean of $\frac{1}{2}, \frac{1}{2^2}, \frac{1}{2^3}, \ldots, \frac{1}{2^{10}}$ is $\frac{\lambda}{2^{10}-1}$, then $\lambda =$

A. 10.2^{10}

B. 5

C. 5.2^{10}

D. 10

Answer: B

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32. An aeroplane flys around squares whose all sides are of length 100 miles. If the aeroplane covers at a speed of $100 mph$ the first side, $200 mph$ the second side $300 mph$ the third side and $400 mph$ the fourth side. The average speed of aeroplane around the square is

A. $190 mph$

B. $195 mph$

C. $192 mph$

D. $200 mph$

Answer: C

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33. The sum of the series $1+\frac{9}{4}+\frac{36}{9}+\frac{100}{16}+\ldots$ infinite terms is

A. 446

B. 746

C. 546

D. 846

Answer: A

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34. The sum $2\times5+5\times9+8\times13+\ldots10$ terms is

A. 4500

B. 4555

C. 5454

D. None of these

Answer: B

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35. The sum of n terms of series $ab+(a+1)(b+1)+(a+2)(b+2)+\ldots+(a+(n-1)(b+(n-1))$ if $ab=\frac{1}{6}$ and $(1+b)=\frac{1}{3}$ is

A. $\frac{n}{6}(1-2n)^2$

B. $\frac{n}{6}\left(1+n-2n^2\right)$

C. $\frac{n}{6}\left(1-2n+2n^2\right)$

D. None of these

Answer: C

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36. $\sum_{i=1}^{\infty}\sum_{j=1}^{\infty}\sum_{k=1}^{\infty}\frac{1}{a^{i+j+k}}$ is equal to (where $|a|>1$)

A. $(a-1)^{-3}$

B. $\dfrac{3}{a-1}$

C. $\dfrac{3}{a^3-1}$

D. None of these

Answer: A

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37. The coefficient of x^{1274} in the expansion of $(x+1)(x-2)^2(x+3)^3(x-4)^4\ldots(x+49)^{49}(x-50)^{50}$ is

A. 1275

B. -1275

C. $-\sum_{i=1}^{50} i^2$

D. $-\sum_{i=1}^{50} i^2$

Answer: B

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38. If the positive integers are written in a triangular array as shown below,

then the row in which the number 2010 will be, is

A. 65

B. 61

C. 63

D. 65

Answer: C

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39. The value of $\sum_{i=1}^{n}\sum_{j=1}^{i}\sum_{k=1}^{j}$ =220, then the value of n equals

A. 11

B. 12

C. 10

D. 9

Answer: C

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40. The sum $\sum_{k=1}^{10} \sum_{\substack{j=1 \\ i \neq j \neq k}}^{10} \sum_{i=1}^{10} 1$ is equal to

A. 240

B. 720

C. 540

D. 1080

Answer: B

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41. The sum $\sum_{k=1}^{10} \sum_{\substack{j=1 \\ i<j<k}}^{10} \sum_{i=1}^{10} 1$ is equal to

A. 120

B. 240

C. 360

D. 720

Answer: A

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42. If the sum to infinty of the series , $1+4x+7x^2+10x^3+\ldots.$, is $\dfrac{35}{16}$, where $|x|<1$, then $'x'$ equals to

A. $19/7$

B. $1/5$

C. $1/4$

D. None of these

Answer: B

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43. The value of $\sum_{n=1}^{\infty}(-1)^{n+1}\left(\frac{n}{5^n}\right)$ equals

A. $\frac{5}{12}$

B. $\frac{5}{24}$

C. $\frac{5}{36}$

D. $\frac{5}{16}$

Answer: C

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44. Find the sum of the infinte series $\frac{1}{9}+\frac{1}{18}+\frac{1}{30}+\frac{1}{45}+\frac{1}{63}+\dots$

A. $\frac{1}{3}$

B. $\frac{1}{4}$

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

D. $\frac{2}{3}$

Answer: A

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45. If $\sum_{r=1}^{r=n} \frac{r^4 + r^2 + 1}{r^4 + r} = \frac{675}{26}$, then n equal to

A. 10

B. 15

C. 25

D. 30

Answer: C

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46. The sequence $\{x_k\}$ is defined by $x_{k+1} = x_k^2 + x_k$ and $x_1 = \frac{1}{2}$. Then $\left[\frac{1}{x_1+1} + \frac{1}{x_2+1} + \ldots + \frac{1}{x_{100}+1}\right]$ (where $[.]$ denotes the greatest integer function) is equal to

A. 0

B. 2

C. 4

D. 1

Answer: D

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47. The absolute value of the sum of first 20 terms of series, if $S_n = \frac{n+1}{2}$ and $\frac{T_{n-1}}{T_n} = \frac{1}{n^2} - 1$, where n is odd, given S_n and T_n denotes sum of first n terms and n^{th} terms of the series

A. 340

B. 430

C. 230

D. 320

Answer: B

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48. If

$S_n = (1^2 - 1 + 1)(1!) + (2^2 - 2 + 1)(2!) + ... + (n^2 - n + 1)(n!)$,

then $S_{50} =$

A. $52!$

B. $1 + 49 \times 5!$

C. $52! - 1$

D. $50 \times 51! - 1$

Answer: B

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49. If $S_n = \frac{1.2}{3!} + \frac{2.2^2}{4!} + \frac{3.2^2}{5!} + \dots +$ up to n terms, then sum of infinite terms is

A. $\frac{4}{\pi}$

B. $\frac{3}{e}$

C. $\frac{\pi}{r}$

D. 1

Answer: D

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50. There is a certain sequence of positive real numbers. Beginning from the third term, each term of the sequence is the sum of all the previous terms. The seventh term is equal to 1000 and the first term is equal to 1. The second term of this sequence is equal to

A. 246

B. $\frac{123}{2}$

C. $\frac{123}{4}$

D. 124

Answer: B

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51. The sequence $\{x_1, x_2, \ldots x_{50}\}$ has the property that for each k, x_k is k less than the sum of other 49 numbers. The value of $96x_{20}$ is

A. 300

B. 315

C. 1024

D. 0

Answer: B

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52. Let $a_0 = 0$ and $a_n = 3a_{n-1} + 1$ for $n \geq 1$. Then the remainder obtained dividing a_{2010} by 11 is

A. 0

B. 7

C. 3

D. 4

Answer: A

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53. Suppose a_1,a_2,a_3,....,a_{2012} are integers arranged on a cicle. Each number is equal to the average of its two adjacent numbers. If the sum of all even idexed numbers is 3018, what is the sum of all numbers ?

A. 0

B. 9054

C. 12072

D. 6036

Answer: D

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54. The sum of the series $\frac{9}{5^2 \cdot 2 \cdot 1} + \frac{13}{5^3 \cdot 3 \cdot 2} + \frac{17}{5^4 \cdot 4 \cdot 3} + \ldots$ upto infinity

A. 1

B. $\frac{9}{5}$

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

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

Answer: C

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Comprehension

1. The 1^{st} , 2^{nd} and 3^{rd} terms of an arithmetic series are a, b and a^2 where $'a'$ is negative. The 1^{st}, 2^{nd} and 3^{rd} terms of a geometric series are a, a^2 and b respectively.

The sum of infinite geometric series is

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

B. $\frac{-3}{2}$

C. $\frac{-1}{3}$

D. None of these

Answer: C

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2. The 1^{st} , 2^{nd} and 3^{rd} terms of an arithmetic series are a, b and a^2 where $'a'$ is negative. The 1^{st}, 2^{nd} and 3^{rd} terms of a geometric series are a, a^2 and b respectively.

The sum of the 40 terms of the arithmetic series is

A. $\frac{545}{2}$

B. 220

C. 250

D. $\frac{575}{2}$

Answer: A

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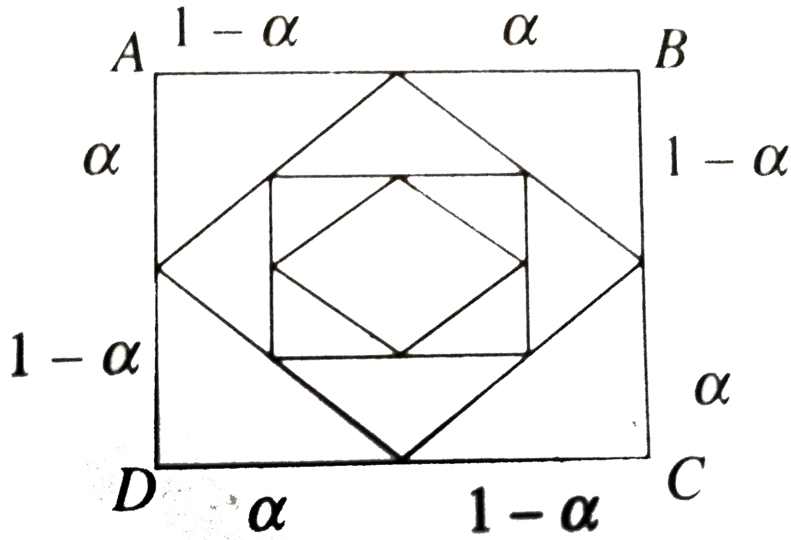
3.



Let $ABCD$ is a unit square and each side of the square is divided in the ratio $\alpha:(1-\alpha)(0<\alpha<1)$. These points are connected to obtain another square. The sides of new square are divided in the ratio $\alpha:(1-\alpha)$ and points are joined to obtain another square. The process is continued idefinitely. Let a_n denote the length of side and A_n the area of the n^{th} square

If$\alpha=\frac{1}{3}$, then the least value of n for which $A_n<\frac{1}{10}$ is

A. 4

B. 5

C. 6

D. 7

Answer: B

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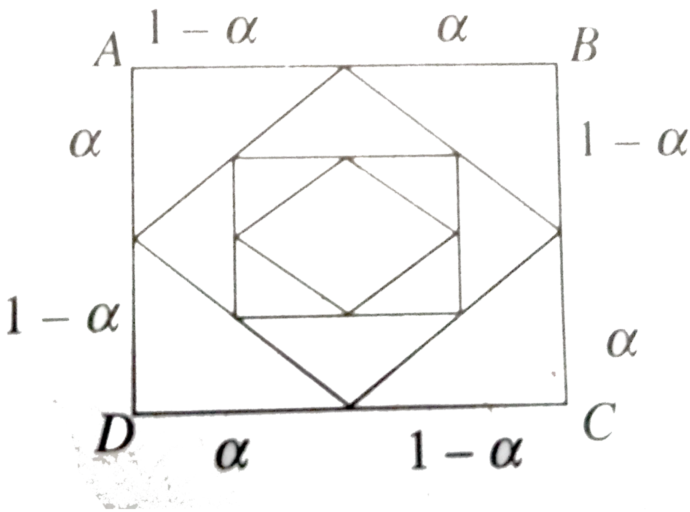
4. 

Let $ABCD$ is a unit square and each side of the square is divided in the ratio $\alpha : (1-\alpha)(0 < \alpha < 1)$. These points are connected to obtain another square. The sides of new square are divided in the ratio $\alpha : (1-\alpha)$ and points are joined to obtain another square. The process is continued idefinitely. Let a_n denote the length of side and A_n the area of the n^{th} square

The value of α for which $\sum_{n=1}^{\infty} A_n = \frac{8}{3}$ is/are

A. $\frac{1}{3}, \frac{2}{3}$

B. $\frac{1}{4}, \frac{3}{4}$

C. $\frac{1}{5}, \frac{4}{5}$

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

Answer: B

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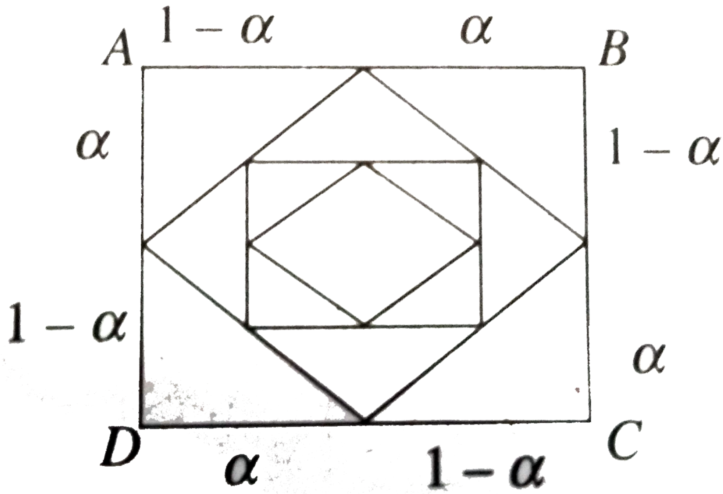
5.



Let $ABCD$ is a unit square and each side of the square is divided in the ratio $\alpha : (1-\alpha)(0<\alpha<1)$. These points are connected to obtain another square. The sides of new square are divided in the ratio $\alpha : (1-\alpha)$ and points are joined to obtain another square. The process is continued idefinitely. Let a_n denote the length of side and A_n the area of the n^{th} square

The value of α for which side of n^{th} square equal to the diagonal of $(n+1)^{th}$ square is

A. $\frac{1}{3}$

B. $\frac{1}{4}$

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

D. $\frac{1}{\sqrt{2}}$

Answer: C

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6. Let $f(n)$ denote the n^{th} terms of the seqence of $3, 6, 11, 18, 27, \ldots.$ and $g(n)$ denote the n^{th} terms of the seqence of $3, 7, 13, 21, \ldots.$ Let $F(n)$ and $G(n)$ denote the sum of n terms of the above sequences, respectively. Now answer the following:

$$\lim_{n \to \infty} \frac{f(n)}{g(n)} =$$

A. 0

B. 1

C. 2

D. ∞

Answer: B

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7. Let $f(n)$ denote the n^{th} terms of the seqence of $3, 6, 11, 18, 27, \ldots$. and $g(n)$ denote the n^{th} terms of the seqence of $3, 7, 13, 21, \ldots$. Let $F(n)$ and $G(n)$ denote the sum of n terms of the above sequences, respectively. Now answer the following:

$$\lim_{n \to \infty} \frac{f(n)}{g(n)} =$$

A. 2

B. 1

C. 0

D. ∞

Answer: B

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Multiple Correct Answer

1. If a,x, and b and b are in A.P .., a,y , and a,z,b are in H.P such that x=9z and $a > 0, b > 0$ then

A. $y^2 = xz$

B. $x > y > z$

C. $a = 9, b = 1$

D. $a = 1/4, b = 9/4$

Answer: A::B::C

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2. If A_1, A_2, A_3 , G_1, G_2, G_3 , and H_1, H_2, H_3 are the three arithmetic, geometric and harmonic means between two positive numbers a and $b(a > b)$, then which of the following is/are true ?

A. $2G_1G_3 = H_2(A_1 + A_3)$

B. $A_2H_2 = G_2^2$

C. $A_2G_2 = H_2^2$

D. $2G_1A_1 = H_1(A_1 + A_3)$

Answer: A::B

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3. Given that α, γ are roots of the equation $Ax^2 - 4x + 1 = 0$ and β, δ are roots of the equation $Bx^2 - 6x + 1 = 0$. If α, β, γ and δ are in $H.P.$, then

A. $A = 5$

B. $A = 3$

C. $B = 8$

D. $B = -8$

Answer: B

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4. If $\frac{1}{a}+\frac{1}{c}=\frac{1}{2b-a}+\frac{1}{2b-c}$, then

A. a, b, c are in $A.P.$

B. $a, \frac{b}{2}, c$ are in $A.P.$

C. $a, \frac{b}{2}, c$ are in $H.P.$

D. $a, 2b, c$ are in $H.P.$

Answer: A::D

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Examples

1. Write down the sequence whose nth term is $2^n/n$ and (ii) $\left[3+(-1)^n\right]/3^n$

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2. Find the sequence of the numbers defined by

$$a_n = \begin{cases} \frac{1}{n} & \text{when n is odd} \\ -\frac{1}{n} & \text{when n is even} \end{cases}$$

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3. Write the first three terms of the sequence defined by $a_1 2,\ a_{n+1} = \dfrac{2a_n + 3}{a_n + 2}$.

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

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5. A sequence of integers $a_1 + a_2 + \ + a_n$ satisfies $a_{n+2} = a_{n+1} - a_n f \text{ or } n \geq 1$. Suppose the sum of first 999 terms is 1003 and the sum of the first 1003 terms is -99. Find the sum of the first 2002 terms.

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

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

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8. In a certain AP, 5times the 5^{th} term is equal to 8 times the 8^{th} term. Its 13^{th} term is

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9. Find the term of the series $25, 22, \frac{3}{4}, 20\frac{1}{2}, 18\frac{1}{4}$ which is numerically the smallest.

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

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

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11. Consider two A.P. s: $S_1 : 2, 7, 12, 17, 500 terms$ $and S_1 : 1, 8, 15, 22, 300 terms$ Find the number of common term. Also find the last common term.

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

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13. If p,q and r ($p \neq q$) are terms (not necessarily consecutive) of an A.P., then prove that there exists a rational number k such that $\frac{r-q}{q-p}$=k. hence, prove that the numbers $\sqrt{2}, \sqrt{3}$ and $\sqrt{5}$ cannot be the terms of a single A.P. with non-zero common difference.

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14. If the terms of the A.P. $\sqrt{a-x}, \sqrt{x}, \sqrt{a+x}$ are all in integers, $wherea, x > 0$, then find the least composite value of a.

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

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16. If $a, b, c \in R+$ form an A.P., then prove that $a+1/(bc), b+1/(ac), c+1/(ab)$ are also in A.P.

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

(i) $a^2(b+c), b^2(c+a), c^2(a+b)$ ltbr gt(ii)

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

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

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

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19. 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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20. The digits of a positive integer, having three digits, are in A.P. and their sum is 15. The number obtained by reversing the digits is 594 less than the original number. Find the number.

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

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

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24. Find the number of terms in the series $20, 19\frac{1}{3}, 18\frac{2}{3}...$ the sum of which is 300. Explain the answer.

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25. Find the degree of the expression $(1+x)(1+x^6)(1+x^{11})(1+x^{101})$.

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26. Find the sum of first 24 terms of the A.P. $a_1, a_2, a_3, ,$ if it is know that $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225.$

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27. If S_1 is the sum of an AP of 'n' odd number of terms and S_2 be the sum of the terms of series in odd places of the same AP then $\frac{S_1}{S_2}$ =

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28. If the sequence $a_1, a_2, a_3, \ldots, a_n$ is an A.P., then prove that $a_1^2 - a_2^2 + a_3^2 - a_4^2 + \ldots + a_{2n-1}^2 - a_{2n}^2 = \frac{n}{2n-1}\left(a_1^2 - a_{2n}^2\right)$

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

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30. The sums of n terms of two arithmetic progressions are in the ratio 5n + 4 : 9n + 6. Find the ratio of their 18^{th} terms.

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31. If n arithmetic means are inserted between 2 and 38, then the sum of the resulting series is obtained as 200. Then find the value of n.

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32. The third term of a geometric progression is 4. Then find the product of the first five terms.

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

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

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36. If a, b, d and p are distinct non - zero real numbers such that $\left(a^2+b^2+c^2\right)p^2-2(ab+bc+cd)p+\left(b^2+c^2+d^2\right)\leq 0$ then n. Prove that a, b, c, d are in G. P and ad = bc

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37. Does there exist a geometric progression containing 27,8 and 12 as three of its term ? If it exists, then how many such progressions are possible ?

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38. In a sequence of $(4n+1)$ terms, the first $(2n+1)$ terms are n A.P. whose common difference is 2, and the last $(2n+1)$ terms are in G.P. whose common ratio is 0.5 if the middle terms of the A.P. and LG.P. are equal ,then the middle terms of the sequence is $\frac{n.2n+1}{2^{2n}-1}$ b. $\frac{n.2n+1}{2^{n}-1}$ c. $n.2^n$ d. none of these

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

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40. If $(p+q)th$ term of a G.P. is $aand$ its $(p-q)th$ term is $bwherea, b \in R^+$, then its pth term is $\sqrt{\frac{a^3}{b}}$ b. $\sqrt{\frac{b^3}{a}}$ c. $\sqrt{ab}$ d. none of these

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41. Find four numbers in G.P. whose sum is 85 and product is 4096.

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42. Three non zero numbers a, b, c are in A.P. Increasing a by 1 or increasing c by 2, the number become in G.P then b equals

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43. 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 GP.

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44. If G is the geometric mean of $x and y$ then prove that $\frac{1}{G^2 - x^2} + \frac{1}{G^2 - y^2} = \frac{1}{G^2}$

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45. Insert four G.M.s between 2 and 486.

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46. If A.M. and G.M. between two numbers is in the ratio $m:n$ then prove that the numbers are in the ratio $\left(m+\sqrt{m^2-n^2}\right):\sqrt{\left(m-m^2-n^2\right)}$.

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47. If a be one A.M and G_1 and G_2 be then geometric means between b and c then $G_1^3+G_2^3=$

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48. Determine the number of terms in G.P. `<>,ifa_1=3,a_n=96a n dS_n=189.`

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

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50. Find the sum to n terms of the sequence $(x + 1/x)^2, (x^2 + 1/x)^2, (x^3 + 1/x)^2, ,$

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51. The sum to n terms of the series $\frac{4}{3} + \frac{10}{9} + \frac{28}{27} + \ldots\ldots$ is

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52. Find the sum of the following series up to n terms:

(i) $5 + 55 + 555 + \ldots\ldots$ (ii) $.6 + .66. + .666 + \ldots\ldots\ldots\ldots$

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53. Find the sum $1 + (1 + 2) + \left(1 + 2 + 2^2\right) + \left(1 + 2 + 2^2 + 2^3\right) +$ ....

To n terms.

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54. If the sum of the n terms of a G.P. is $(3^n - 1)$, then find the sum of the series whose terms are reciprocal of the given G.P..

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55. The numbers 49,4489,444889,.... obtained by inserting 48 into the middle of the preceding numbers are square of integers. (a) true or (b) false. explain

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

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57. Using the sum of G.P., prove that $a^n + b^n (a, b \in N)$ is divisible by a+b for odd natural numbers n. Hence prove that $1^{99} + 2^{99} + \ldots .100^{99}$ is divisble by 10100

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58. Find the sum of the following series: $\left(\sqrt{2} - 1\right) + 1 + \left(\sqrt{2} - 1\right) + \infty$

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59. Sum of infinite number of terms in GP is 20 and sum of their square is 100. The common ratio of GP is

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60. If each term of an infinite G.P. is twice the sum of the terms following it, then find the common ratio of the G.P.

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61. If $|r| > 1, x = a + \frac{a}{r} + \frac{a}{r^2} + \dots\dots\dots \infty$, $y = b - \frac{b}{r} + \frac{b}{r^2} - \dots\dots\dots\infty$ and $z = c + \frac{c}{r^2} + \frac{c}{r^4} + \dots\dots\infty$, then the value of $\frac{xy}{z} =$

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62. After striking the floor, a certain ball rebounds (4/5)th of height from which it has fallen. Then the total distance that it travels before coming to rest, if it is gently dropped of a height of 120 m is $1260m$ b. $600m$ c. $1080m$ d. none of these

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63. If an infinite G.P. has 2nd term x and its sum is 4, then prove that $\xi n(-8, 1] - \{0\}$

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64. If the 20th term of a H.P. is 1 and the 30th term is -1/17, then find its largest term.

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65. If $\frac{a-x}{px}=\frac{a-y}{qy}=\frac{a-z}{r} andp, q, andr$ are in A.P., then prove that x, y, z are in H.P.

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66. If $a, b, candd$ are in H.P., then prove that $(b+c+d)/a, (c+d+a)/b, (d+a+b)/c$ and $(a+b+c)/d$, are in A.P.

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67. The mth term of a H.P is n and the nth term is m . Proves that its rth term is $mn/r\cdot$

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68. If $a > 1, b > 1 and c > 1$ are in G.P. then show that $\frac{1}{1 + (\log)_e a}, \frac{1}{1 + (\log)_e b}, and \frac{1}{1 + (\log)_e c}$ are in H.P.

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69. If $a, b, and c$ be in G.P. and $a + x, b + x, and c + x$ in H.P. then find the value of x (a,b,c are distinct numbers) .

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70. If first three terms of the sequence $1/16, a, b, c 1/16$ are in geometric series and last three terms are in harmonic series, then find the values of $a and b\cdot$

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71. if $(m+1)th, (n+1)th \text{ and } (r+1)th$ term of an AP are in GP.and m, n and r in HP. . find the ratio of first term of A.P to its common difference

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72. Insert four H.M.s between 2/3 and 2/13.

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73. If nine arithmetic means and nine harmonic means are inserted between 2 and 3 alternatively, then prove that $A + 6/H = 5$ (where A is any of the A.M.'s and H the corresponding H.M.).

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74. Let a, b be positive real numbers. If aA_1, A_2, b be are in arithmetic 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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75. The A.M. and H.M. between two numbers are 27 and 12, respectively, then find their G.M.

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76. If the A.M. between two numbers exceeds their G.M. by 2 and the GM. Exceeds their H.M. by 8/5, find the numbers.

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77. Find the sum

$$2017 + \frac{1}{4}\left(2016 + \frac{1}{4}\left(2015 + \ldots + \frac{1}{4}\left(2 + \frac{1}{4}(1)\right)..\right)\right)$$

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78. The sum of 50 terms of the series $1+2\left(1+\frac{1}{50}\right)+3\left(1+\frac{1}{50}\right)^2+$ is given by 2500 b. 2550 c. 2450 d. none of these

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79. Find the sum to ininity of the series $1-3x+5x^2+7x^3+\ldots..\infty$ when Ix| <1.

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80. The sum of the infinite series $1+\left(1+\frac{1}{5}\right)\left(\frac{1}{2}\right)+\left(1+\frac{1}{5}+\frac{1}{5^2}\right)\left(\frac{1}{2^2}\right)+\ldots$

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81. If the sum to infinity of the series $3+(3+d)\frac{1}{4}+(3+2d)\frac{1}{4^2}+\infty$ is $\frac{44}{9}$, then find ..

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82. Find the sum to infinity of the series $1^2+2^2+3^2+4^2+\infty\cdot$

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83. Find the sum $2\times5+5\times9+8\times13+11\times17+\ldots$ n terms.

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84. Find the sum of the series $1\times n+2(n-1)+3\times(n-2)+\ +(n-1)\times2+n\times1.$

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85. For and odd integer $n \geq 1, n^3 - (n-1)^3 + ...$

$+(-1)^{n-1}1^3$

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86. Find the sum of the following series up to n terms:

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

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

$1^3 + 3 \times 2^2 + 3^3 + 3 \times 4^2 + 5^3 + 3 \times 6^2 + when\ n$ is even n is odd

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88. If $\sum_{r=1}^{n} T_r = n(2n^2 + 9n + 13)$, then find the sum $\sum_{r=1}^{n} \sqrt{T_r}$.

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89. Find the sum to n terms of the series $3 + 15 + 35 + 63 +$

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90. Find the sum of the following series to n terms $5 + 7 + 13 + 31 + 85 +$

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91. Find the $\sum_{k=1}^{\infty} \sum_{n=1}^{\infty} \frac{k}{2^{n+k}}$.

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92. Find the sum of the products of the ten numbers $\pm 1, \pm 2, \pm 3, \pm 4, and \pm 5$ taking two at a time.

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93. Find the $\sum \sum_{0 \leq i < j \leq n} 1$.

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94. Let the terms $a_1, a_2, a_3, \ldots a_n$ be in G.P. with common ratio r. Let S_k denote the sum of first k terms of this G.P.. Prove that $S_{m-1} \times S_m = \frac{r+1}{r}$SigmaSigma_(i le itj le n)a_(i)a_(j)`

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95. Find the sum $1 + \frac{1}{1+2} + \frac{1}{1+2+3} + \ + \frac{1}{1+2+3+\ +n}$.

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96. Find the sum of the series:

$$\frac{1}{(1 \times 3)} + \frac{1}{(3 \times 5)} + \frac{1}{(5 \times 7)} + \ldots + \frac{1}{(2n-1)(2n+1)}$$

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97. Find the sum to n terms of the series $3/(1^2 \times 2^2) + 5/(2^2 \times 3^2) + 7/(3^2 \times 4^2) + \cdot$

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

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99. Find the sum $\Sigma_{r=1}^{n} \dfrac{r}{(r+1)!}$. Also, find the sum of infinite terms.

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100. Find the sum $\Sigma_{r=1}^{n} \frac{1}{r(r+1)(r+2)(r+3)}$

Also,find $\Sigma_{r=1}^{\infty} \frac{1}{r(r+1)(r+2)(r+3)}$

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101. Find the sum $\underset{r=1}{r}(r+1)(r+2)(r+3)$.

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102. Find the sum of the series $\sum_{r=11}^{99}\left(\frac{1}{r\sqrt{r+1}+(r+1)\sqrt{r}}\right)$

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103. Find the sum of the series

$\frac{1}{3^2+1}+\frac{1}{4^2+2}+\frac{1}{5^2+3}+\frac{1}{6^2+4}+\infty$

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104. Find the sum of first 100 terms of the series whose general term is given by $a_k = (k^2 + 1)k!$

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105. Find the sum of the series $\frac{2}{1 \times 3} + \frac{5}{2 \times 3} \times 2 + \frac{10}{3 \times 4} \times 2^2 + \frac{17}{4 \times 5} \times 2^3 + \to n$ terms.

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106. A long a road lie an odd number of stones placed at intervals of 10 meters. These stones have to be assembled around the middle stone. A person can carry only one stone ar a time. A man started the job with one of the end stones by carrying them in succession. In carrying all the stones, the man covered a total distance of 3 kilometers. Then the total number of stones is

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107. Prove that x=$\underbrace{1111, \ldots}_{91 \text{times}}$ is composite number.

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108. If a, b, c are distinct positive real numbers in G.P and $\log_c a, \log_b c, \log_a b$ are in A.P, then find the common difference of this A.P

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109. The values of xyz is $\frac{15}{2}$ or $\frac{18}{5}$ according as the series a, x, y, z, b is an AP or HP. Find the values of $a \& b$ assuming them to be positive integer.

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111. If $S_n = 1 + \frac{1}{2} + \frac{1}{3} + \ldots + \frac{1}{n}(n \in N)$, then prove that

$S_1 + S_2 + .. + S_{(n-1)} = (nS((n)) - n)$ or $(nS((n-1)) - n + 1)$

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112. The value of the expression

$1.(2-\omega).(2-\omega^2) + 2.(3-\omega)(3-\omega^2) + . + (n-1)(n-\omega)(n-\omega^2)$,

where omega is an imaginary cube root of unity, is.........

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113. Find the value of $\sum_{\substack{i=0 \\ (\in ej \neq k)}}^{\infty} \sum_{j=0}^{\infty} \sum_{k=0}^{\infty} \frac{1}{3^i 3^j 3^k}$.

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114. Find the sum $\sum_{j=1}^{10} \sum_{i=1}^{10} i \times 2^j$

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115. Coefficient of $x^{18} \in (1 + x + 2x^2 + 3x^3 + \quad + 18x^{18})^2$ equal to 995

b. 1005 c. 1235 d. none of these

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116. Let $a_1, a_2, \ldots\ldots\ldots a_n$ be real numbers such that

$\sqrt{a_1} + \sqrt{a_2 - 1} + \sqrt{a_3 - 2} + \quad + \sqrt{a_n - (n-1)} = \frac{1}{2}(a_1 + a_2 + \ldots\ldots +$

then find the value of $\sum_{i=1}^{100} a_i$

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117. A sequence of numbers $A_\cap = 1, 2, 3$ is defined as follows : $A_1 = \frac{1}{2}$ and for each $n \geq 2$, $A_n = \left(\frac{2n-3}{2n}\right)A_{n-1}$, then prove that $\sum_{k=1}^{n} A_k < 1, n \geq 1$

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118. If f:R $\rightarrow$ R is continous such that f(x)$-f\left(\frac{x}{2}\right) = \frac{4x^2}{3}$ for all ξnR and f(0)=0, find the value of $f\left(\frac{3}{2}\right)$.

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119. Find the value of $\frac{\Sigma_{r=1}^{n}\frac{1}{r}}{\Sigma_{r=1}^{n}\frac{k}{(2n-2k+1)(2n-k+1)}}$.

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120. Find the sum $\sum_{n=1}^{\infty} \frac{6^n}{(3^n - 2^n)(3^{n+1} - 2^{n+1})}$

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Exercise 5.1

1. Write the first five terms of each of the sequences and obtain the corresponding series:

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

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3. Let $\{a_n\}(n \geq 1)$ be a sequence such that $a_1 = 1, and 3a_{n+1} - 3a_n = 1 f$ or $al \ln \geq 1.$ Then find the value of a_{2002}.

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Exercise 5.2

1. If the p^{th} term if an A.P. is q and the term of an A.P is p then the r^{th} term is

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2. If x is a positive real number different from 1, then prove that the numbers $\frac{1}{1+\sqrt{x}}, \frac{1}{1-x}, \frac{1}{1-\sqrt{x}}, \ldots$ are in A.P. Also find their common difference.

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

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5. Divide 28 into four parts in an A.P. so that the ratio of the product of first and third with the product of second and fourth is 8:15.

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

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8. If a, b, c, d are distinct integers in A. P. Such that $d = a^2 + b^2 + c^2$, then a + b + c + d is

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9. 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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10. n arlithmetic 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 5.3

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

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2. Solve the equation $(x+1) + (x+4) + (x+7) + \quad + (x+28) = 155.$

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3. If the sum of the first ten terms of an $A.\,P$ is four times the sum of its first five terms, the ratio of the first term to the common difference is:

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4. Let sum of n, $2n$, $3n$, terms of an A.P are S_1, S_2, S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$.

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5. Let S_n denote the sum of first n terms of an A.P. If $S_{2n} = 3S_n$, then find the ratio S_{3n} / S_n.

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6. The ratio of the sum 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 $2m - 1 : 2n - 1$.

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7. Find the sum to n terms of the series $1^2 + 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \ldots$.

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8. The interior angles of a polygon are in arithmetic progression. The smallest angle is 120° and the common difference is 5° Find the number of sides of the polygon

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9. 150 workers were engaged to finish a piece of work in a certain number of days. Four workers dropped from the work on the second day. Four workers dropped on third day and so on. It took 8 more days to finish the work. Find the number of days in which the work was completed. [Let the no.of days to finish the work is 'r' then

$$150x = \frac{x+8}{2}[2 \times 150 + (x+8-1)(-4)]$$

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Exercise 5.4

1. The first and second term of a G.P. are x^{-4} and x^{n} respectively. If x^{52} is the 8^{th} term, then find the value of n.

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2. If a, b, c are respectively the $p^{th} q^{th}$ and r^{th} terms of a GP. Show that $(q-r)\log a+(r-p)\log b+(p-q)\log c=0.$

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3. If $p, q, andr$ are inA.P., show that the pth, qth, and rth terms of any G.P. are in G.P.

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4. If a, b, c, d are in G.P, prove that $(a^{n}+b^{n}), (b^{n}+c^{n}), (c^{n}+d^{n})$ are in G.P.

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5. Let T_r denote the rth term of a G.P. for $r = 1, 2, 3,$ If for some positive integers $m and n,$ we have $T_m = 1/n^2$ and $T_n = 1/m^2$, then find the value of $T_{m+n/2}$.

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

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8. If $x, y, and z$ are pth, qth, and rth terms, respectively, of an A.P. nd also of a G.P., then $x^{y-z}y^{z-x}z^{x-y}$ is equal to xyz b. 0 c. 1 d. none of these

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9. The product of the three numbers in G.P. is 125 and sum of their product taken in pairs is $\frac{175}{2}$. Find them.

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10. Find the product o three geometric means between 4 and 1/4.

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11. Find two numbers whose arithmetic mean is 34 and the geometric mean is 16.

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12. If the arithmetic means of two positive number a and b $(a > b)$ is twice their geometric mean, then find the ratio a: b

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13. Let a_1, a_2, a_3 ....and $b_1, b_2, b_3...$ be two geometric progressions with $a_1 = 2\sqrt{3}$ and $b_1 = \frac{52}{9}\sqrt{3}$ If $3a_{99}b_{99} = 104$ then find the value of $a_1b_1 + a_2b_2 + \ldots + a_nb_n$

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Exercise 5.5

1. 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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2. If the sum of n terms of a G.P. is $3\frac{3^{n+1}}{4^{2n}}$, then find the common ratio.

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3. $\underbrace{(666....6)}_{\text{n-digits}}^2+\underbrace{(888....8)}_{\text{n-digits}}$ is equal to

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4. Find the sum of n terms of series $(x+y)+(x^2+xy+y^2)+(x^3+x^2y+xy^2+y^3)+\ldots\ldots\ldots\ldots\ldots\ldots$

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5. Find the sum of n terms of the series 4/3 + 10/9+28/27+...

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6. If $p(x) = \left(1 + x^2 + x^4 + \ + x^{2n-2}\right) / \left(1 + x + x^2 + \ + x^{n-1}\right)$ is a polomial in x , then find possible value of n.

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7. Let $A_n = \left(\frac{3}{4}\right) - \left(\frac{3}{4}\right)^2 + \left(\frac{3}{4}\right)^3 + \dots + (-1)^{n-1}\left(\frac{3}{4}\right)^n$ and $B_n = 1 -$

n_0, so that B_ngtA_n Aangen_0`

View Text Solution

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

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9. Prove that $6^{1/2} \times 6^{1/4} \times 6^{1/8} \infty = 6.$

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10. The sum to n terms of series $1+\left(\frac{1}{2}+\frac{1}{2^2}\right)+1+\left(\frac{1}{2}+\frac{1}{2^2}+\frac{1}{2^3}+\frac{1}{2^4}\right)+$ is

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Exercise 5.6

1. The 8th and 14th term of a H.P. are 1/2 and 1/3, respectively. Find its 20th term. Also, find its general term.

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2. If the first two terms of a H.P. are $2/5$ and $12/23$ respectively. Then, largest term is

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3. If a, b, c are in G.P. and $a - b, c - a, andb - c$ are in H.P., then prove that $a + 4b + c$ is equal to 0.

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4. If x,y and z are in A.P ax,by and cz in G.P and a, b, c in H.P then prove that $\frac{x}{z} + \frac{z}{x} = \frac{a}{c} + \frac{c}{a}$

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5. If a,b,c and the d are in H.P then find the vlaue of $\frac{a^{-2} - d^{-2}}{b^{-2} - c^{-2}}$

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6. If $x = \Sigma_{n=0}^{\infty} a^n, y = \Sigma_{n=0}^{\infty} b^n, z = \Sigma_{n=0}^{\infty} c^n$ where a, b,and c are in A.P and $|a| < 1, |b| < 1$ and $|c|1$then prove that x,y and z are in H.P

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7. If $x, 1, and z$ are in A.P. and $x, 2, and z$ are in G.P., then prove that $x, and 4, z$ are in H.P.

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8. 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 $a and b$, 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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9. If the sum of the roots of the quadratic equation $ax^2 + bx + c = 0$ is equal to the sum of the squares of their reciprocals, then $\frac{a}{c}, \frac{b}{a}$ and $\frac{c}{b}$ are in

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10. The A.M. of two given positive numbers is 2. If the larger number is increased by 1, the G.M. of the numbers becomes equal to the A.M. of the given numbers. Then find the H.M.

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11. The harmonic mean between two numbers is 21/5, their A.M. $'A'$ and G.M. $'G'$ satisfy the relation $3A + G^2 = 36$. Then find the sum of square of numbers.

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Exercise 5.7

1. If $\alpha(\neq 1)$ is a nth root of unity then $S = 1 + 3\alpha + 5\alpha^2 + \ldots\ldots\ldots$ upto n terms is equal to

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2. Find the sum of n terms of the series $1+\frac{4}{5}+\frac{7}{5^2}+10+5^3+\cdot$

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3. Find the sum $\frac{3}{2}-\frac{5}{6}+\frac{7}{18}-\frac{9}{54}+\infty\cdot$

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4. Find the sum $\frac{1^2}{2}+\frac{3^2}{2^2}+\frac{5^2}{2^3}+\frac{7^2}{2^4}+\ldots.\infty$

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Exercise 5.8

1. Find the sum to n terms of the series $1\times2\times3+2\times3\times4+3\times4\times5+\cdot$

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2. Find the sum of the series $1^2 + 3^2 + 5^2 + \rightarrow n$ terms.

A. $\dfrac{n(2n-1)(2n+1)}{3}$

B. $\dfrac{n(2n+1)(2n+1)}{3}$

C. $\dfrac{n(2n-1)(2n-1)}{3}$

D. $\dfrac{n(2n+1)(2n-1)}{3}$

Answer: A

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3. Find the sum of the series $31^3 + 32^3 + \quad + 50^3$.

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4. Find the sum $1^2 + \left(1^2 + 2^2\right) + \left(1^2 + 2^2 + 3^2\right) +$ up to 22nd term.

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5. Find the sum of the first n terms of the series: 3+ 7 +13 +21 +31 +........

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6. Find the sum $11^2 - 1^2 + 12^2 - 2^2 + 13^2 - 3^2 + \ldots\ldots + 20^2 - 10^2$

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7. Find the sum $3 + 7 + 14 + 24 + 37 + \ldots.20$ terms

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8. Find the sum $\Sigma_{j=1}^{n}\Sigma_{i=1}^{n} I \times 3^{j}$

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9. If for sequence $< a_n >$ sum of n terms $S_n = 2n^2 + 3n$ then find the sum $\underset{1 \leq i < j \leq 10}{\Sigma\Sigma} a_i a_j$

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10. Find the value of $\underset{1 \leq i \leq j}{\Sigma\Sigma} \quad i \times \left(\frac{1}{2}\right)^j$

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Exercise 5.9

1. Find the sum of infinite series

$$\frac{1}{1 \times 3 \times 5} + \frac{1}{3 \times 5 \times 7} + \frac{1}{5 \times 7 \times 9} + \dots$$

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2. If $\Sigma_{r=1}^{n} T_r = \frac{n}{8}(n+1)(n+2)(n+3)$ then find $\Sigma_{r=1}^{n} \frac{1}{T_r}$

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3. Find the sum $\Sigma_{r=1}^{\infty} \frac{3n^2+1}{(n^2-1)^3}$

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4. Find the sum $\Sigma_{r=1}^{\infty} \frac{r}{r^4+\frac{1}{4}}$

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5. Find the sum

$$\frac{3}{1!+2!+3!}+\frac{4}{2!+3!+4!}+\ldots+\frac{1000}{998!+999!+1000!}$$

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6. Let

$$S = \frac{\sqrt{1}}{1+\sqrt{1}+\sqrt{2}} + \frac{\sqrt{2}}{1+\sqrt{2}+\sqrt{3}} + \frac{\sqrt{3}}{1+\sqrt{3}+\sqrt{4}} + \ldots + \frac{\sqrt{\cdot}}{1+\sqrt{n}+}$$

Then find the value of n.

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7. Find the sum $\frac{1 \times 2}{3!} + \frac{(2 \times 2)^2}{4!} + \frac{(3 \times 2)^3}{5!} + \ldots. + \frac{(20 \times 2)^{30}}{22!}$

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8. Find the sum $\Sigma_{r=1}^{\infty} \frac{r-2}{(r+2)(r+3)(r+4)}$

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9. Find the sum of the series

$1 + 2(1-x) + 3(1-x)(1-2x) + \; + n(1-x)(1-2x)(1-3x)[1-(n$

.

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Exercise (Single)

1. If a,b,c are in A.P., then $a^3+c^3-8b^3$ is equal to

A. 2 abc

B. 3abc

C. 4abc

D. $-6abc$

Answer: D

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2. If three positive real numbers a, b, c are in A.P and $abc=4$, then the minimum possible value of b is

A. $2^{1/3}$

B. $2^{2/3}$

C. $2^{1/2}$

D. $2^{3/2}$

Answer: B

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3. If $\log_2(5.2^x + 1), \log_4(2^{1-x} + 1)$ and 1 are in A.P,then x equals

A. $\log_2 5$

B. $1 - \log_5 2$

C. $\log_5 2$

D. $1 - \log_2 5$

Answer: D

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4. The largest term common to the sequences $1, 11, 21, 31, \rightarrow 100$ terms and $31, 36, 41, 46, \rightarrow 100$ terms is 381 b. 471 c. 281 d. none of these

A. 381

B. 471

C. 281

D. 521

Answer: D

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5. In any A.P. if sum of first six terms is 5 times the sum of next six terms then which term is zero?

A. 10 th

B. 11 th

C. 12 th

D. 13 th

Answer: B

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6. If the sides of a right angled triangle are in A.P then the sines of the acute angles are

A. $\frac{3}{5}, \frac{4}{5}$

B. $\frac{1}{\sqrt{3}}, \sqrt{\frac{2}{3}}$

C. $\frac{1}{2}, \frac{\sqrt{3}}{2}$

D. none of these

Answer: A

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7. If $a, \frac{1}{b}, and \frac{1}{p}, q, \frac{1}{r}$ from two arithmetic progressions of the common difference, then a, q, c are in A.P. if p, b, r are in A.P. b. $\frac{1}{p}, \frac{1}{b}, \frac{1}{r}$ are in A.P. c. p, b, r are in G.P. d. none of these

A. p,b,r are in A.P

B. $\frac{1}{p}, \frac{1}{b}, \frac{1}{r} are \in A.\ P$

C. p,b,r are in G.P

D. none of these

Answer: B

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8. Suppose that $F(n+1) = \frac{2f(n)+1}{2}$ for n = 1, 2, 3,.....and f(1)= 2 Then F(101) equals = ?

A. 50

B. 52

C. 54

D. none of these

Answer: B

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9. Consider an $A.P. a_1, a_2, a_3, \ldots.$ such that $a_3 + a_5 + a_8 = 11$ and $a_4 + a_2 = -2$ then the value of $a_1 + a_6 + a_7$ is.....

A. -8

B. 5

C. 7

D. 9

Answer: C

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10. If $a_1, a_2, a_3, \ldots.$ are in A.P., then a_p, a_q, q_r are in A.P. if p,q,r are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: A

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11. Let $\alpha, \beta \in R$. If α, β^2 are the roots of quadratic equation $x^2 - px + 1 = 0 and \alpha^2, \beta$ is the roots of quadratic equation $x^2 - qx + 8 = 0$, then the value of r if $\frac{r}{8}$ is the arithmetic mean of $p and q,$ is $\frac{83}{2}$ b. 83 c. $\frac{83}{8}$ d. $\frac{83}{4}$

A. $\frac{83}{2}$

B. 83

C. $\frac{83}{8}$

D. $\frac{83}{4}$

Answer: B

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12. If the sum of m terms of an A.P. is same as the sum of its n terms, then the sum of its (m+n) terms is

A. mn

B. $-mn$

C. 1/mn

D. 0

Answer: D

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13. If S_n denotes the sum of n terms of an A.P., $S_{n+3}-3S_{n+2}+3S_{n+1}-S_n=$

A. $2s_n$

B. S_{n+1}

C. $3S_n$

D. 0

Answer: D

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

A. $\frac{-a(p+q)p}{q+1}$

B. $\frac{a(q+q)p}{P+1}$

C. $\dfrac{-a(p+q)q}{p-1}$

D. none of these

Answer: C

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15. If S_n denotes the sum of first n terms of an A.P. and $\dfrac{S_{3n}-S_{n-1}}{S_{2n}-S_{2n-1}}=31$, then the value of n is 21 b. 15 c.16 d. 19

A. 21

B. 15

C. 16

D. 19

Answer: B

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16. The number of terms of an A.P. is even; the sum of the odd terms is 24, and of the even terms is 30, and the last term exceeds the first by 21/2 then the number of terms in the series is 8 b. 4 c. 6 d. 10

A. 8

B. 4

C. 6

D. 10

Answer: A

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17. The number of terms of an A.P. is even; the sum of the odd terms is 24, and of the even terms is 30, and the last term exceeds the first by 21/2 then the number of terms in the series is 8 b. 4 c. 6 d. 10

A. 8

B. 4

C. 6

D. 10

Answer: D

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18. Concentric circles of radii $1, 2, 3, \ldots, 100cm$ are drawn. The interior of the smallest circle is colored red and the angular regions are colored alternately green and red, so that no two adjacent regions are of the same color. Then, the total area of the green regions in sq. cm is equal to 1000π b. 5050π c. 4950π d. 5151π

A. 1000 π

B. 5050 π

C. 4950 π

D. 5151 π

Answer: B

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19. If $a_1, a_2, a_3 \ldots . a_{2n+1}$ are in A.P then

$$\frac{a_{2n+1} - a_1}{a_{2n+1} + a_1} + \frac{a_2 n - a_2}{a_{2n} + a_2} + \ldots . + \frac{a_{n+2} - a_n}{a_{n+2} + a_n}$$ is equal to

A. $\frac{n(n+1)}{2} \times \frac{a_2 - a_1}{a_{n+1}}$

B. $\frac{n(n+1)}{2}$

C. $(n+1)(a_2 - a_1)$

D. none of these

Answer: A

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20. If $a_1, a_2, \ldots \ldots, a_n$ are in A.P. with common differece $d \neq 0$, then

$(\sin d)[\sec a_1 \sec a_2 + \sec a_2 \sec a_3 + \ldots . + \sec a_{n-1} \sec a_n]$ is equal to

A. $\cos eca_n - \cos eca$

B. $\cot a_n - \cot a$

C. $\sec a_n - \sec a_1$

D. $\tan a_n - \tan a_1$

Answer: D

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21. ABC is a right-angled triangle in which $\angle B = 90^\circ$ and $BC = a$. If n points $L_1, L_2, \ldots, L_n$ on AB is divided in n+1 equal parts and $L_1M_1, L_2M_2, \ldots, L_nM_n$ are line segments paralllel to BC and $M_1, M_2, \ldots., M_n$ are on AC, then the sum of the lengths of $L_1M_1, L_2M_2, \ldots, L_nM_n$ is

A. $\dfrac{a(n+1)}{2}$

B. $\dfrac{a(n-1)}{2}$

C. $\dfrac{an}{2}$

D. none of these

Answer: C

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22. If a, b, c, d are in G.P, then $(b-c)^2+(c-a)^2+(d-b)^2$ is equal to `

A. $(a-d)^2$

B. $(ad)^2$

C. $(a+d)^2$

D. $(a/d)^2$

Answer: A

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23. Let $\{t_n\}$ be a sequence of integers in G.P. in which $t_4 : t_6 = 1 : 4 and t_2 + t_5 = 216.$. Then $t_1 is$ 12 b. 14 c. 16 d. none of these

A. 12

B. 14

C. 16

D. none of these

Answer: A

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24. if x , 2y and 3z are in AP where the distinct numbers x, yand z are in gp.

Then the common ratio of the GP is

A. 3

B. $\frac{1}{3}$

C. 2

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

Answer: B

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25. If a,b, and c are in A.P and b-a,c-b and a are in G.P then a:b:c is

A. $1:2:3$

B. $1:3:5$

C. $2:3:4$

D. $1:2:4$

Answer: A

Watch Video Solution

26. 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

A. $0 < r < \sqrt{2}$

B. $1 < r < \sqrt{2}$

C. $1 < r < 2$

D. none of these

Answer: B

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27. If x,y,z are in G.P and $a^x = b^y = c^z$,then

A. $\log_b a = \log_a c$

B. $\log_c b = \log_a c$

C. $\log_b a = \log_b$

D. none of these

Answer: C

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28. The number of terms common between the series 1+ 2 + 4 + 8..... to 100 terms and 1 + 4 + 7 + 10 +... to 100 terms is

A. 6

B. 4

C. 5

D. none of these

Answer: C

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29. If $a^2 + b^2, ab + bc, and b^2 + c^2$ are in G.P., then a, b, c are in a. A.P. b. G.P. c. H.P. d. none of these

A. A.P.

B. G.P

C. H.P

D. none of these

Answer: B

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30. In a G.P. the first, third, and fifth terms may be considered as the first, fourth, and sixteenth terms of an A.P. Then the fourth term of the A.P., knowing that its first term is 5, is 10 b. 12 c. 16 d. 20

A. 10

B. 12

C. 16

D. 20

Answer: D

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31. If the pth ,qth and rth terms of an AP are in G.P then the common ration of the GP is

A. $p\frac{r}{q^2}$

B. $\frac{r}{p}$

C. $\frac{q+r}{p+q}$

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

Answer: D

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32. If p^{th}, q^{th}, r^{th} and s^{th} terms of an A.P. are in G.P, then show that (p – q), (q – r), (r – s) are also in G.P.

A. A.P

B. G.P

C. H.P

D. none of these

Answer: B

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33. If $a, b, and c$ are in G.P. and $x, y,$ respectively, are the arithmetic means between $a, b, and b, c$, then the value of $\frac{a}{x} + \frac{c}{y}$ is 1 b. 2 c. $1/2$ d. none of these

A. 1

B. 2

C. $1/2$

D. none of these

Answer: B

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34. If $a, bandc$ are in A.P., and $pandp'$ are respectively, A.M. and G.M. between $aandbwhileq, q'$ are , respectively, the A.M. and G.M. between $bandc,$ then $p^2 + q^2 = p'^2 + q'^2$ b. $pq = p'q'$ c. $p^2 - q^2 = p'^2 - q'^2$ d. none of these

A. $p^2 + q^2 = P'^2 + q'^2$

B. $pq = p'q'$

C. $p^2 - q^2 = p'^2 - q'^2$

D. none of these

Answer: C

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35. If $(1+x)\left(1+x^2\right)\left(1+x^4\right)\ldots.\left(1+x^{128}\right)=\Sigma_{r=0}^{n} x^r$, then n is equal is

A. 256

B. 255

C. 254

D. none of these

Answer: B

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36. If $(1-p)\left(1+3x+9x^2+27x^3+81x^4+243x^5\right)=1-p^6 p\neq 1$,

then the value of $\dfrac{p}{\xi}s\ \dfrac{1}{3}$ b. 3 c. $\dfrac{1}{2}$ d. 2

A. $\dfrac{1}{3}$

B. 3

C. $\dfrac{1}{2}$

D. 2

Answer: B

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37. Consider the ten numbers $ar, ar^2, ar^3, , ar^{10}$. If their sum is 18 and the sum of their reciprocals is 6, then the product of these ten numbers is 81 b. 243 c. 343 d. 324

A. 81

B. 243

C. 343

D. 324

Answer: B

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38. If $x, y, and z$ are distinct prime numbers, then $x, y, and z$ may be in A.P. but not in G.P. $x, y, and z$ may be in G.P. but not in A.P. $x, y, and z$ can neither be in A.P. nor in G.P. none of these

A. x,y and z may be in A.P but not in G.P

B. x,y and z may be in G.P but not in A.P

C. x,y and z can neither be in

D. none of these

Answer: A

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39. Let $a = 1111(55 digits), b = 1 + 10 + 1 =^2 + + 10^4, c = 1 + 10^5 + 10^{10} + 10$

then $a = b + c$ b. $a = bc$ c. $b = ac$ d. $c = ab$

A. a+b+c

B. a=bc

C. b=ac

D. c=ab

Answer: B

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40. Let a_n be the n^{th} term of a G.P of positive integers. Let $\sum_{n=1}^{100} a_{2n} = \alpha$ and $\sum_{n=1}^{100} a_{2n+1} = \beta$ such that $\alpha \neq \beta$. Then the common ratio is

A. α / β

B. β / α

C. $\sqrt{\alpha / \beta}$

D. $\sqrt{\beta / \alpha}$

Answer: A

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41. The sum of 20 terms of a series of which every term is 2 times the term before it ,and every odd term is 3 times the term before it the first term being unity is

A. $\left(\frac{2}{7}\right)\left(6^{10}-1\right)$

B. $\left(\frac{3}{7}\right)\left(6^{10}-1\right)$

C. $\left(\frac{3}{5}\right)\left(6^{10}-1\right)$

D. none of these

Answer: C

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42. Let $a \in (0, 1)$ satisfies the equation $a^{2008} - 2a + 1 = 0values(s) \rightarrow S$ is 2010 b. 2009 c. 2008 d. 2

A. 2010

B. 2009

C. 2008

D. 2

Answer: A

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43. In a geometric series , the first term is a and common ratio is r. If S_n denotes the sum of the n terms and $U_n = \Sigma_{n=1}^{n} S_n$, then $rS_n + (1-r)U_n$ equals

A. 0

B. n

C. na

D. nar

Answer: C

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44. Let $S \subset (0, \pi)$ denote the set of values of x satisfying the equation $8^{1+|\cos x|+\cos^2 x+|\cos^{3x}| \to \infty} = 4^3$. Then, $S =$ $\{\pi/3\}$ b. $\{\pi/3, 2\pi/3\}$ c. $\{-\pi/3, 2\pi/3\}$ d. $\{\pi/3, 2\pi/3\}$

A. $\{\pi/3\}$

B. $\{\pi/6, 5\pi/6\}$

C. $\{\pi/3, 5\pi/6\}$

D. $\{\pi/3, 2\pi/3\}$

Answer: D

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45. If $||a| < 1\text{and } |b| < 1$ then the sum of the series $1 + (1+a)b + (1+a+a^2)b^2 + (1+a+a^2+a^3)b^3 + \ldots\ldots is$

A. $\dfrac{1}{(1-a)(1-b)}$

B. $\dfrac{1}{(1-a)(1-ab)}$

C. $\dfrac{1}{(1-b)(1-ab)}$

D. $\dfrac{1}{(1-a)(1-b)(1-ab)}$

Answer: C

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46. The value of $0.\ 2^{\log\sqrt{5}\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+}$ is 4 b. $\log 4$ c. $\log 2$ d. none of these

A. 4

B. log 4

C. log 2

D. none of these

Answer: A

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47. If $x = 9^{1/3} \times 9^{1/9} \times 9^{1/27} \times \ldots., y = 4^{1/3} \times -4^{1/9} \times 4^{1/27} x \ldots.,$ and $z = \Sigma_{r=1}^{\infty} (1+i)^{r}$ then arg (x+yz) is equal to

A. 0

B. $\pi - \tan^{-1}\left(\frac{\sqrt{2}}{3}\right)$

C. $-\tan^{-1}\left(\frac{\sqrt{2}}{3}\right)$

D. $-\tan^{-1}\left(\frac{2}{\sqrt{3}}\right)$

Answer: C

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48. The value of x that satisfies the relation $x = 1 - x + x^{2} - x^{3} + x^{4} - x^{5} + \ldots. \infty is$

A. $2\cos 36^{\circ}$

B. $2\cos 144^{\circ}$

C. $2\sin 18^\circ$

D. $2\cos 18^\circ$

Answer: C

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49. If S dentes the sum to infinity and S_n the sum of n terms of the series $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \ldots\ldots$, such that $S - S_n < \frac{1}{1000}$ then the least value of n is

A. 8

B. 9

C. 10

D. 11

Answer: D

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50. The first term of an infinite geometric series is 21. The seconds term and the sum of the series are both positive integers. The possible value(s) of the second term can be

A. 12

B. 14

C. 18

D. none of these

Answer: D

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51. The sum of an infinite G.P. is 57 and the sum of their cubes is 9747, then the common ratio of the G.P. is

A. $1/3$

B. $2/3$

C. $1/6$

D. none of these

Answer: B

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52. 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

A. $2S_{2p}$

B. 0

C. $\frac{1}{2}S_{2p}$

D. $-\frac{1}{2}S_{2p}$

Answer: A

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53. If the sum to infinity of the series $1 + 2r + 3r^2 + 4r^3 +$ is 9/4, then value of r is $1/2$ b. $1/3$ c. $1/4$ d. none of these

A. $1/2$

B. $1/3$

C. $1/4$

D. none of these

Answer: B

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54. Sum to infininty of the series $1 + \frac{4}{5} + \frac{7}{5^2} + \frac{10}{5^3} + \ldots\ldots$ is

A. $7/16$

B. $5/16$

C. $105/64$

D. $35/16$

Answer: D

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55. The sum of the series $0.4 + 0.004 + 0.00004 + \infty$ is

A. $\dfrac{200}{891}$

B. $\dfrac{2000}{9801}$

C. $\dfrac{1000}{9801}$

D. $\dfrac{2180}{9801}$

Answer: D

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56. The positive integer n for which $2 \times 2^2 \times + 3 \times 2^3 + 4 \times 2^4 + + n \times 2^n = 2^{n+10}$ is 510 b. 511 c. 512 d. 513

A. 510

B. 511

C. 512

D. 513

Answer: D

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57. If ω is a complex nth root of unity, then $ar \underset{r=1}{\overset{n}{+}} b\omega^{r-1}$ is equal to

A. $(n(n+1))a\frac{)}{a}$

B. $\frac{nb}{1-n}$

C. $\frac{na}{\omega - 1}$

D. none of these

Answer: C

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58. ABCD is a square of length $a, a \in N, a > 1$. Let $L_1, L_2, L_3,$ .... Be points on BC such that $BL_1 L_2 = L_2 L_3 = \ldots. = 1$ and $M_1, M_2 M_3 \ldots.$ be points on CD such that $CM_1 = M_1 M_2 = M_2 M_3 = \ldots .1$ Then $\Sigma_{n=1}^{a-1} \left(AL_n^2 + L_n M_n^2\right)$ is equal to

A. $\dfrac{1}{2}a(a-1)^2$

B. $\dfrac{1}{2}(a-1)(2a-1)(4a-1)$

C. $\dfrac{1}{2}a(a-1)^2$

D. none of these

Answer: C

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

A. $\frac{10}{39}$

B. $\frac{10}{21}$

C. $\frac{10}{23}$

D. none of these

Answer: A

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60. If $a_1, a_2, \ldots . a_n$ are in H.P then $\frac{a_1}{a_2+, a_3, \ldots, a_n}, \frac{a_2}{a_1+a_3+\ldots .+a_n}, \ldots, \frac{a_n}{a_1+a_2+\ldots .+a_{n-1}}$ are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: C

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61. If $a_1, a_2, a_3...a_n$ are in H.P and $f(k) = \left(\Sigma_{r=1}^{n} a_r\right) - a_k$ then $\frac{a_1}{f(1)}, \frac{a_2}{f(3)}, \dots, \frac{a_n}{f(n)}$ are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: C

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62. If $a, b, andc$ are in A.P. $p, q, andr$ are in H.P., and $ap, bq, andcr$ are in G.P., then $\frac{p}{r}+\frac{r}{p}$ is equal to $\frac{a}{c}-\frac{c}{a}$ b. $\frac{a}{c}+\frac{c}{a}$ c. $\frac{b}{q}+\frac{q}{b}$ d. $\frac{b}{q}-\frac{q}{b}$

A. A.P

B. G.P

C. G.P

D. none of these

Answer: D

View Text Solution

63. If $a, b, andc$ are in A.P. $p, q, andr$ are in H.P., and $ap, bq, andcr$ are in G.P., then $\frac{p}{r}+\frac{r}{p}$ is equal to $\frac{a}{c}-\frac{c}{a}$ b. $\frac{a}{c}+\frac{c}{a}$ c. $\frac{b}{q}+\frac{q}{b}$ d. $\frac{b}{q}-\frac{q}{b}$

A. $\frac{a}{c}-\frac{c}{a}$

B. $\frac{a}{c}+\frac{c}{a}$

C. $\frac{b}{q}+\frac{q}{b}$

D. $\frac{b}{q} - \frac{q}{b}$

Answer: B

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64. a,b,c,d $\in R^+$ such that a,b and c are in H.P and ap.bq, and cr are in G.P then $\frac{p}{r} + \frac{t}{p}$ is equal to

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65. If in a progression $a_1, a_2, a_3, et \cdot, (a_r - a_{r+1})$ bears a constant atio with $a_r \times a_{r+1}$, then the terms of the progression are in a. A.P b. G.P. c. H.P. d. none of these

A. A.P

B. G.P

C. H.P

D. none of these

Answer: C

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66. If a,b, and c are in G.P then a+b,2b and b+ c are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: C

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67. If a,x,b are in A.P.,a,y,b are in G.P. and a,z,b are in H.P. such that x=9z and $> 0, b > 0$, then

A. $|y| = 3z$

B. $x = 3|y|$

C. $2y = x + z$

D. none of these

Answer: B

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68. Let $n \in N, n > 25$. Let A, G, H deonote te arithmetic mean, geometric man, and harmonic mean of 25 and n. The least value of n for which $A, G, H \in \{25, 26, n\}$ is a. 49 b. 81 c.169 d. 225

A. 49

B. 81

C. 169

D. 225

Answer: D

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69. If A.M., G.M., and H.M. of the first and last terms of the series of $100, 101, 102, \ldots n-1, n$ are the terms of the series itself, then the value of `ni s(100

A. 200

B. 300

C. 400

D. 500

Answer: C

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70. If $H_1.,H_2,\ldots,H_{20}$ are 20 harmonic means between 2 and 3, then $\frac{H_1+2}{H_1-2}+\frac{H_{20}+3}{H_{20}-3}=$

A. 20

B. 21

C. 40

D. 38

Answer: C

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71. If the sum of n terms of an A.P is cn (n-1)where $c \neq 0$ then the sum of the squares of these terms is

A. $c^2n(n+1)^2$

B. $\frac{2}{3}c^2n(n-1)(2n-1)$

C. $\frac{2c^2}{3}n(n+1)(2n+1)$

D. none of these

Answer: B

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72. If

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

A. ab

B. $-nab$

C. $(n+1)ab$

D. nab

Answer: D

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73. The sum $1 + 3 + 7 + 15 + 31 + \ldots \to 100$ terms is $2^{100} - 102b$ b. $2^{99} - 101$ c. $2^{101} - 102$ d. none of these

A. $2^{100} - 102$

B. $2^{99} - 101$

C. $2^{101} - 102$

D. none of these

Answer: C

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74. Consider the sequence 1,2,2,4,4,4,8,8,8,8,8,8,8,8,... Then 1025th terms will be 2^{9} b. 2^{11} c. 2^{10} d. 2^{12}

A. 2^{9}

B. 2^{11}

C. 2^{10}

D. 2^{12}

Answer: C

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75. The value of $\Sigma_{i=1}^{n}\Sigma_{j=1}^{i}{}_{k=1}^{\ j}$ =220, then the value of n equals

A. 11

B. 12

C. 10

D. 9

Answer: C

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76. If

$1^2+2^2+3^2+\ +2003^2=(2003)(4007)(334) and (1)(2003)+(2)(2002)+$

equals 2005 b. 2004 c. 2003 d. 2001

A. 2005

B. 2004

C. 2003

D. 2001

Answer: A

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77. If t_n denotes the nth term of the series 2+3+6+11+18+..... Then t_{50} is

A. 49^2-1

B. 49^2

C. 50^2+1

D. $49^2 + 2$

Answer: D

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78. The sum of series $\Sigma_{r=0}^{r}(-1)^r(n+2r)^2$ (where n is even) is

A. $-n^2 + 2n$

B. $-4n^2 + 2n$

C. $-n^2 + 3n$

D. $-n^2 + 4n$

Answer: B

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79. If $\left(1^{2}-t_{1}\right)+\left(2^{2}-t_{2}\right)+\ldots .+\left(n^{2}-t_{n}\right)=\frac{n\left(n^{2}-1\right)}{3}$ then t_{n} is equal to

A. n^{2}

B. 2n

C. $n^{2}-2n$

D. none of these

Answer: D

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80. If $(1+3+5+\ \ +p)+(1+3+5+\ \ +q)=(1+3+5+\ \ +r)$ where each set of parentheses contains the sum of consecutive odd integers as shown, the smallest possible value of $p+q+r(where p>6)$ is 12 b. 21 c. 45 d. 54

A. 12

B. 21

C. 45

D. 54

Answer: B

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81. If $H_n = 1 + 12 + + \frac{1}{n}.$, then the value of $S_n = 1 + \frac{3}{2} + \frac{5}{3} + + \frac{99}{50}$ is $H_{50} + 50$ b. $100 - H_{50}$ c. $49 + H_{50}$ d. $H_{50} + 100$

A. $H_{50} + 50$

B. $100 - H_{50}$

C. $49 + H_{50}$

D. $H_{50} + 100$

Answer: B

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82. The sum to 50 terms of the series

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

A. $\frac{100}{17}$

B. $\frac{150}{17}$

C. $\frac{200}{51}$

D. $\frac{50}{17}$

Answer: A

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83. Let S=$\frac{4}{19}+\frac{44}{(19)^2}+\frac{444}{(19)^3}+\ldots\infty$ then find the value of S

A. $40/9$

B. $38/81$

C. $36/171$

D. none of these

Answer: B

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84. If $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + = \frac{\pi}{4}$, then value of $\frac{1}{1 \times 3} + \frac{1}{5 \times 7} + \frac{1}{9 \times 11} +$ is $\pi/8$ b. $\pi/6$ c. $\pi/4$ d. $\pi/36$

A. $\pi/8$

B. $\pi/6$

C. $\pi/4$

D. $\pi/36$

Answer: A

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85. If $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\rightarrow\infty=\frac{\pi^2}{6}, then \frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+$ equals $\pi^2/8$ b. $\pi^2/12$ c. $\pi^2/3$ d. $\pi^2/2$

A. $\pi^2/8$

B. $\pi^2/8$

C. $\pi/3$

D. $\pi^2/2$

Answer: A

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86. $\lim_{n\to\infty} \Sigma_{r=1}^{n} \frac{r}{1\times3\times5\times7\times9\times\ldots\times(2r+1)}$ is equal to

A. $\frac{1}{3}$

B. $\frac{3}{2}$

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

D. none of these

Answer: C

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87. The greatest interger by which $1 + \Sigma_{r=1}^{30} r \times r!$ is divisible is

A. composite number

B. odd number

C. divisible by 3

D. none of these

Answer: D

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88. If $\Sigma_{r=1}^{n} r^4 = I(n), \quad \text{then} \quad \Sigma\_(r=1)^n (2r-1)^4$ is equal to

A. $I(2n) - I(n)$

B. $I(2n) - 16I(n)$

C. $I(2n) - 8I(n)$

D. $I(2n) - 4I(n)$

Answer: B

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89. Value of $\left(1+\frac{1}{3}\right)\left(1+\frac{1}{3^2}\right)\left(1+\frac{1}{3^4}\right)\left(1+\frac{1}{3^8}\right)\infty$ is equal to 3 b. $\frac{6}{5}$ c. $\frac{3}{2}$ d. none of these

A. 3

B. $\frac{6}{5}$

C. $\frac{3}{2}$

D. none of these

Answer: C

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90. If $x_1, x_2..., x_{20}$ are in H.P and $x_1, 2, x_{20}$ are in G.P then $\Sigma_{r=1}^{19} x_r r_{x+1}$

A. 76

B. 80

C. 84

D. none of these

Answer: A

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91. Find the value of $\Sigma_{r=1}^{n}(a + r + ar)(-a)^r$ is equal to

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92. The sum of series $\dfrac{x}{1-x^2} + \dfrac{x^2}{1-x^4} + \dfrac{x^4}{1-x^8} +$ to infinite terms, if $|x| < 1$, is $\dfrac{x}{1-x}$ b. $\dfrac{1}{1-x}$ c. $\dfrac{1+x}{1-x}$ d. 1

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

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

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

D. 1

Answer: A

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93. The sum of 20 terms of the series whose rth term s given by k $T(n)=(-1)^n \frac{n^2+n+1}{n!}$ is $\frac{20}{19!}$ b. $\frac{21}{20!}-1$ c. $\frac{21}{20!}$ d. none of these

A. $\frac{20}{19!}$

B. $\frac{21}{20!}-1$

C. $\frac{21}{20!}$

D. none of these

Answer: B

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Exercise (Multiple & Comprehension)

1. For an increasing A.P. $a_1, a_2, \ldots . a_n$ if $a_1 + a_3 + a_5 = -12$ and $a_1 a_3 a_5 = 80$, then which of the following is/are true? a.$a_1 = -10$ b. $a_2 = -1$ c. $a_3 = -4$ d. $a_5 = +2$

A. $a_1 = -10$

B. $a_2 = -1$

C. $a_3 = -4$

D. $a_5 = +2$

Answer: A::C::D

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2. If the sum of n terms of an A.P. is given by $S_n = a + bn + cn^2, wherea, b, c$ are independent of $n, then \quad a = 0$ common difference of A.P. must be $2b$ common difference of A.P. must be $2c$ first term of A.P. is $b + c$

A. a=0

B. common ifferecnce of A.P must be 2 b

C. common difference of A.P must 2c

D. first term of A.P is b+c

Answer: A::C::D

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3. If a,b,c and d are four unequal positive numbers which are in A.P then

A. $\frac{1}{a} + \frac{1}{d} > \frac{1}{b} + \frac{1}{c}$

B. $\frac{1}{a} + \frac{1}{d} < \frac{1}{b} + \frac{1}{c}$

C. $\frac{1}{b}+\frac{1}{c}>\frac{4}{a+d}$

D. $\frac{1}{a}+\frac{1}{d}=\frac{1}{b}+\frac{1}{c}$

Answer: A::C

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4. Which of the following can be terms (not necessarily consecutive) of any A.P.? a. 1,6,19 b. $\sqrt{2}, \sqrt{50}, \sqrt{98}$ c. $\log 2, \log 16, \log 128$ d. $\sqrt{2}, \sqrt{3}, \sqrt{7}$

A. 1,6,19

B. $\sqrt{2}. \sqrt{50}, \sqrt{98}$

C. log 2,log 16 , log128

D. $\sqrt{2}, \sqrt{3}, \sqrt{7}$

Answer: A::B::C

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5. In a arithmetic progression whose first term is α and common difference is $\beta, \alpha, \beta \neq 0$ the ratio r of the sum of the first n terms to the sum of n terms succeeding them, does not depend on n. Then which of the following is /are correct ?

A. $\alpha : \beta = 2 : 1$

B. If α and β are roots of the equation $ax^2 + bx + c = 0$ then $2b^2 = 9ac$

C. The sum of infinite $G. P1 + r + r^2 + \ldots. Is3/2$

D. If $\alpha = 1$, then sum of 10 terms of A.P is 100

Answer: B::C::D

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6. If $a^2 + 2bc, b^2 + 2ca, c^2 + 2ab$ are in A.P. then :-

A. $(a - b)(c - a), (a - b)(b - c), (b - c)(c - a)$ are in A.P

B. b-c,c-a,a-b are in H.P

C. a+b,b+c,c+a are in H.P

D. a^2, b^2, c^2 are in H.P

Answer: A::B

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7. If sum of an indinite $G.\ Pp, 1, 1/p, 1/p^2$...=9/2.. Is then value of p is

A. 2

B. $3/2$

C. 3

D. $9/2$

Answer: B::C

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8. The terms of an infinitely decreasing G.P. in which all the terms are positive, the first term is 4, and the difference between the third and fifth terms is $32/81$, then $r = 1/3$ b. $r = 2\sqrt{2}/3$ c. $S_{\infty} = 6$ d. none of these

A. $r = 1/3$

B. $r = 2\sqrt{2}/3$

C. Sum of infinite terms is 6

D. none of these

Answer: A::B::C

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9. Let $a_1, a_2, a_3 \ldots \ldots, a_n$ be in G.P such that $3a_1 + 7a_2 + 3a_3 - 4a_5 = 0$

Then common ratio of G.P can be

A. 2

B. $\frac{3}{2}$

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

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

Answer: B::D

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10. If $p(x) = \frac{1 + x^2 + x^4 + \ + x}{1 + x + x^2 + \ + x^{n-1} \ \hat{} \ (2n-2)}$ is a polynomial in $x, the \cap$ can be 5 b. 10 c. 20 d. 17

A. 5

B. 10

C. 20

D. 17

Answer: A::D

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11. If $n > 1$, the value of the positive integer m for which $n^m + 1$ divides $a = 1 + n + n^2 + \ddot{+} n^{63}$ is/are 8 b. 16 c. 32 d. 64

A. 8

B. 16

C. 32

D. 64

Answer: A::B::C

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

A. $\frac{729}{16}$

B. 6

C. 0

D. 54

Answer: A::D

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13. If $1 + 2x + 3x^2 + 4x^3 + \ldots\ldots \infty \geq 4$ then

A. least value of x is 1/2

B. greatest value of x is 4/3

C. least value of x is 2/3

D. greatest value of x does not exist

Answer: A::D

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14. Let $S_1, S_2,$ be squares such that for each $n \geq 1,$ the length of a side of S_n equals the length of a diagonal of S_{n+1}. If the length of a side of

$S_1 is 10 cm,$ then for which of the following value of n is the area of S_n less than 1 sq. cm? a. 5 b. 7 c. 9 d. 10

A. 7

B. 8

C. 9

D. 10

Answer: B::C::D

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15. If a, b and c are in G.P and x and y, respectively , be arithmetic means between a,b and b,c then prove that $\frac{a}{x}+\frac{c}{y}=2$and $\frac{1}{x}+\frac{1}{y}=\frac{2}{b}$

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16. Consider a sequence $\{a_n\}$ with a_1=2 & $a_n = \frac{a_{n-1}^2}{a_{n-2}}$ for all $n \geq 3$ terms of the sequence being distinct .Given that a_2 and a_5 are positive integers and $a_5 \leq 162$, then the possible values (s) of a_5 can be

A. 162

B. 64

C. 32

D. 2

Answer: A::C

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17. The numbers 1, 4, 16 can be three terms (not necessarily consecutive) of a.no. A.P b.only one G.P c.infinite number of A.P's d.infinite nuber of G.P' s

A. no. A.P

B. only one G.P

C. infinite number of A.P's

D. infinite nuber of G.P' s

Answer: C::D

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18. The sum of an infinite geometric series is 162 and the sum of its first n terms is 160. If the inverse of its common ratio is an integer, then which of the following is not a possible first term? 108 b. 144 c. 160 d. none of these

A. 108

B. 120

C. 144

D. 160

Answer: A::C::D

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19. If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P and a,b -2c, are in G.P where a,b,c are non-zero then

A. $a^3 + b^3 + c^3 = 3abc$

B. $-2a, b, \ -2c$ are in A.P

C. $a^2, b^2, 4c^2$ are in G.P

D.

Answer: A::B::C::D

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20. Sum of an infinite G.P is 2 and sum of its two terms is 1.If its second terms is negative then which of the following is /are true ?

A. one of the possible values of the first terms is $(2-\sqrt{2})$

B. one of the possible vlaues of the first terms is $(2+\sqrt{2})$

C. one of the possible values of the common ratio is $(\sqrt{2}-1)$

D. one of the possible values of the common ratio is $\frac{1}{\sqrt{2}}$

Answer: A::B::D

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21. For $0 < \phi < \pi/2$, if $x = \Sigma_{n=0}^{\infty} \cos^{2n} \phi$, $y = \Sigma_{n=0}^{\infty} \sin^{2n} \phi$ and $z = \Sigma_{n=0}^{\infty} \cos^{2n} \phi then$

A. xyz=xz+y

B. xyz=xy +z

C. xyz = z+y+z

D. xyz =yz +x

Answer: B::C

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22. For the series,

$$S = 1 + \frac{1}{(1+3)}(1+2)^2 + \frac{1}{(1+3+5)}(1+2+3)^2 + \frac{1}{(1+3+5+7)}($$

+...

A. 7^{th} term is 16

B. 7^{th} term $is 18$

C. Sum of first 10 terms is $\frac{505}{4}$

D. Sum of first 10 terms is $\frac{405}{4}$

Answer: A::C

Watch Video Solution

23. If $\sum_{r=1}^{n} r(r+1)(2r+3) = an^4 + bn^3 + cn^2 + dn + e,$ then a. $a - b = d - c$ b. $e = 0$ c. $a, b - 2/3, c - 1$ are in A.P. d. $\frac{c}{a}$ is an integer

A. a-b=d-c

B. e=0

C. $a, b - 2/3, c - 1 \text{ are in } \in A.P$

D. $(b + d)/a$ is an integer

Answer: A::B::C::D

Watch Video Solution

24. If $S_n = 1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \ldots\ldots$,t h e n

A. $S_{40} = -820$

B. $S_{2n} > S_{2n+2}$

C. $S_{51} = 1326$

D. $S_{2n+1} > S_{2n-1}$

Answer: A::B::C::D

Watch Video Solution

25. $\frac{1}{\sqrt{2}+\sqrt{5}}+\frac{1}{\sqrt{5}+\sqrt{8}}+\frac{1}{\sqrt{8}+\sqrt{11}}+n$ terms is equal to a. $\frac{\left(\sqrt{3n+2}\right)-\sqrt{2}}{3}$ $b.$ $\frac{n}{\sqrt{2+3n}+\sqrt{2}}$ c.less than n d.less than $\sqrt{\frac{n}{3}}$

A. $\frac{\left(\sqrt{3n+2}\right)-\sqrt{2}}{3}$

B. $\frac{n}{\sqrt{2+3n}+\sqrt{2}}$

C. less than n

D. less than $\sqrt{\frac{n}{3}}$

Answer: A::B::C

Watch Video Solution

26. If $\vec{a}=\hat{i}+2\hat{j}+3\hat{k}$ and $\vec{b}=2\hat{i}+4\hat{j}-5\hat{k}$ represent two adjacent sides of a parallelogram, find unit vectors parallel to the diagonals of the parallelogram.

Watch Video Solution

27. Given that $x+y+z=15$ when a,x,y,z,b are in A.P and \`1/x+1/y+1/z=5/3 when a,x,y,z,b are in H.P .Then

A. G.M of a and b is 3

B. one possible value of a + 2b is 11

C. A.M of a and b is 6

D. greatest value of a-b is 8

Answer: A::B::D

View Text Solution

28. If a, b and c are in H.P., then the value of $\frac{(ac+ab-bc)(ab+bc-ac)}{(abc)^2}$ is

A. $\frac{(a+c)(3a-c)}{4a^2c^2}$

B. $\frac{2}{bc}-\frac{1}{b^2}$

C. $\dfrac{2}{bc} - \dfrac{1}{b^2}$

D. $\dfrac{(a-c)(3a+c)}{4a^2c^2}$

Answer: A::B

Watch Video Solution

29. If p,q and r are in A.P then which of the following is / are true ?

A. pth,qth and rth terms of A.P are in A.P

B. pth,qth,and rht terms of G.P are in G.P

C. pth , qth , and rht terms of H.P are in H.P

D. none of these

Answer: A::B::C

View Text Solution

30. If $x^2+9y^2+25z^2=xyz\left(\frac{15}{2}+\frac{5}{y}+\frac{3}{z}\right), then\ x, y, andz$ are in H.P. b. $\frac{1}{x}, \frac{1}{y}, \frac{1}{z}$ are in A.P. c. x, y, z are in G.P. d. $\frac{1}{a}+\frac{1}{d}=\frac{1}{b}=\frac{1}{c}$

A. x,y and z are in H.P

B. $\frac{1}{x}, \frac{1}{y}, \frac{1}{z}$ are in G.P

C. x,y,z are in G.P

D. $\frac{1}{x}, \frac{1}{y}, \frac{1}{z}$ are in G.P

Answer: A::C

View Text Solution

31. If $A_1, A_2, G_1, G_2, ; andH_1, H_2$ are two arithmetic, geometric and harmonic means respectively, between two quantities $aandb, thenab$ is equal to

A. $A_H \_ 2$

B. $A_2 H_1$

C. G_1G_2

D. none of these

Answer: A::B::C

Watch Video Solution

32. If $\frac{1}{b-a}+\frac{1}{b-c}=\frac{1}{a}+\frac{1}{c}$, then $a, b, andc$ are in H.P. $a, b, andc$ are in A.P. $b=a+c$ $3a=b+c$

A. a,b, and c are in H.P

B. a,b, and c are in A.P

C. b=a+c

D. 3a= b+c

Answer: A::B

View Text Solution

33. If a,b,c are three distinct numbers in G.P., b,c,a are in A.P and a,bc, abc, in H.P then the possible value of b is

A. $3+4\sqrt{2}$

B. $3-4\sqrt{2}$

C. $4+3\sqrt{2}$

D. $4-3\sqrt{2}$

Answer: C::D

View Text Solution

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 ?

A. $ax^2+bx+c=0$

B. $ax^2bx+c=0$

C. $a, b-\frac{c}{2}$ form a G.P

D. $a-b, \frac{c}{2}$ from a G.P

Answer: A::C

View Text Solution

35. If first and $(2n-1)^{th}$ terms of A.P., G.P. and H.P. are equal and their nth terms are a,b,c respectively, then

A. a=b=c

B. $a \geq be \geq c$

C. $a+b=c$

D. $ac-b^2=0$

Answer: B::D

View Text Solution

36. Let $E = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} +$ Then, a.$E < 3$ b. $E > 3/2$ c. $E > 2$ d. $E < 2$

A. $E < 3$

B. $E > 3/2$

C. $E > 2$

D. $E < 2$

Answer: A::B::D

Watch Video Solution

37. Sum of certain consecutive odd positive intergers is $57^2 - 13^2$

The least value of the an interger is

A. $a_1 = -10$

B. $a_2 = -1$

C. $a_3 = -4$

D. $a_5 = +2$

Answer: A::C::D

View Text Solution

38. Sum of certain consecutive odd positive intergers is $57^2 - 13^2$

The least value of the an interger is

A. a=0

B. common ifferecnce of A.P must be 2 b

C. common difference of A.P must 2c

D. first term of A.P is b+c

Answer: A::C::D

Watch Video Solution

39. Sum of certain consecutive odd positive intergers is $57^2 - 13^2$

The least value of the an interger is

A. $\frac{1}{a} + \frac{1}{d} > \frac{1}{b} + \frac{1}{c}$

B. $\frac{1}{a} + \frac{1}{d} < \frac{1}{b} + \frac{1}{c}$

C. $\frac{1}{b} + \frac{1}{c} > \frac{4}{a+d}$

D. $\frac{1}{a} + \frac{1}{d} = \frac{1}{b} + \frac{1}{c}$

Answer: A::C

View Text Solution

40. Consider three distinct real numbers a,b,c in a G.P with $a^2 + b^2 + c^2 = t^2$ and a+b+c =αt .The sum of the common ratio and its reciprocal is denoted by S.

Complete set of α^2 is

A. 1,6,19

B. $\sqrt{2}. \sqrt{50}, \sqrt{98}$

C. log 2,log 16 , log128

D. $\sqrt{2}, \sqrt{3}, \sqrt{7}$

Answer: A::B::C

View Text Solution

41. If a,b , c are distinct +ve real numbers and $a^2+b^2+c^2=1$ then $ab+bc+ca$ is

A. $\alpha:\beta=2:1$

B. If α and β are roots of the equation $ax^2+bx+c=0$ then $2b^2=9ac$

C. The sum of infinite $G.P1+r+r^2+\ldots.Is3/2$

D. If $\alpha=1$, then sum of 10 terms of A.P is 100

Answer: B::C::D

Watch Video Solution

42. If a,b and c also represent the sides of a triangle and a,b,c are in g.p then the complete set of $\alpha^2 = \frac{r^2+r+1}{r^2-r+1}$ is

A. $\left(\frac{1}{3}, 3\right)$

B. $(2, 3)$

C. $\left(\frac{1}{3}, 2\right)$

D. $\left(\frac{\sqrt{5+3}}{2}, 3\right)$

Answer: 4

Watch Video Solution

43. In a n increasing G.P. , the sum of the first and the last term is 66, the product of the second and the last but one is 128 and the sum of the terms is 126. How many terms are there in the progression?

A. 2

B. $3/2$

C. 3

D. $9/2$

Answer: B::C

Watch Video Solution

44. In a G.P the sum of the first and last terms is 66, the product of the second and the last but one is 128, and the sum of the terms is 126 . If an increasing G.P is considered , then the number of trems in G.P is

A. $r = 1/3$

B. $r = 2\sqrt{2}/3$

C. Sum of infinite terms is 6

D. none of these

Answer: A::B::C

Watch Video Solution

45. In a G.P the sum of the first and last terms is 66, the product of the second and the last but one is 128, and the sum of the terms is 126 . If an increasing G.P is considered , then the number of trems in G.P is

A. 2

B. $\frac{3}{2}$

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

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

Answer: B::D

Watch Video Solution

46. 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 product of all numbers is

A. 5

B. 10

C. 20

D. 17

Answer: A::D

Watch Video Solution

47. The sum of all four-digit numbers that can be formed by using the digits 2, 4, 6, 8 (when repetition of digits is not allowed) is a. 133320 b. 5333280 c. 53328 d. none of these

A. 8

B. 16

C. 32

D. 64

Answer: A::B::C

Watch Video Solution

48. The common difference of the divisible by

A. $\frac{729}{16}$

B. 6

C. 0

D. 54

Answer: A::D

View Text Solution

49. Consider the sequence in the form of group (1),(2,2)(3,3,3),(4,4,4,4),(5,5,5,5,5.....)

The 2000^{th} term of the sequence is not divisible by

A. least value of x is 1/2

B. greatest value of x is 4/3

C. least value of x is 2/3

D. greatest value of x does not exist

Answer: A::D

View Text Solution

50. Consider the sequence in the form of group (1),(2,2)(3,3,3),(4,4,4,4),(5,5,5,5,5.....)

The sum of first 2000 terms is

A. 7

B. 8

C. 9

D. 10

Answer: B::C::D

View Text Solution

51. Consider the sequence in the form of group (1),(2,2)(3,3,3),(4,4,4,4),

(5,5,5,5,5.....)

A. $\frac{a}{x}+\frac{c}{y}=2$

B. $\frac{a}{x}+\frac{c}{y}=\frac{c}{a}$

C. $\frac{1}{x}+\frac{1}{y}=\frac{2}{b}$

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

Answer: A::C

View Text Solution

52. There are two sets A and B each of which consists of three numbers in A.P.whose sum is 15 and where D and d are the common differences such that $D - d = 1. If \frac{p}{q} = \frac{7}{8}$, where p and q are the product of the numbers ,respectively, and $d > 0$ in the two sets .

The sum of the products of the numbers is set A taken two at at time is

A. 162

B. 64

C. 32

D. 2

Answer: A::C

Watch Video Solution

53. There are two sets A and B each of which consists of three numbers in A.P.whose sum is 15 and where D and d are the common differences such that $D - d = 1. If \frac{p}{q} = \frac{7}{8}$, where p and q are the product of the numbers ,respectively, and $d > 0$ in the two sets .

The sum of the products of the numbers is set A taken two at at time is

A. no. A.P

B. only one G.P

C. infinite number of A.P's

D. infinite nuber of G.P' s

Answer: C::D

Watch Video Solution

54. There are two sets M_1 and M_2 each of which consists of three numbers in arithmetic sequence whose sum is 15. Let d_1 and d_2 be the common differences such that $d_1 = 1 + d_2$ and $8p_1 = 7p_2$ where p_1 and p_2 are the product of the numbers respectively in M_1 and M_2. If $d_2 > 0$ then find the value of $\frac{p_2 - p_1}{d_1 + d_2}$

A. 108

B. 120

C. 144

D. 160

Answer: A::C::D

View Text Solution

55. Let $A_1, A_2, A_3, \ldots., A_m$ be the arithmetic means between -2 and 1027 and $G_1, G_2, G_3, \ldots., G_n$ be the gemetric means between 1 and 1024 .The product of gerometric means is 2^{45} and sum of arithmetic means is 1024×171

The value of $\Sigma_{r=1}^{n} G_r$ is

A. $a^3 + b^3 + c^3 = 3abc$

B. $-2a, b, \; -2c$ are in A.P

C. $a^2, b^2, 4c^2$ are in G.P

D.

Answer: A::B::C::D

View Text Solution

56. If the arithmetic means of two positive number a and b $(a > b)$ is twice their geometric mean, then find the ratio a: b

A. one of the possible values of the first terms is $(2-\sqrt{2})$

B. one of the possible vlaues of the first terms is $(2+\sqrt{2})$

C. one of the possible values of the common ratio is $(\sqrt{2}-1)$

D. one of the possible values of the common ratio is $\frac{1}{\sqrt{2}}$

Answer: A::B::D

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57. A box contains 2 blue marbles, 4 green marbles and 7 red marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be (i) blue (ii) Not blue?

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58. Two consecutive numbers from 1, 2, 3, ..., n are removed, then arithmetic mean of the remaining numbers is $\frac{105}{4}$ then $\frac{n}{10}$ must be equal to

A. $7^{th} \text{ term is } 16$

B. $7^{th} \text{ term } is 18$

C. Sum of first 10 terms is $\frac{505}{4}$

D. Sum of first 10 terms is $\frac{405}{4}$

Answer: A::C

View Text Solution

59. Two consecutive numbers from 1,2,3 ...., n are removed.The arithmetic mean of the remaining numbers is 105/4 .

The removed numbers

A. a-b=d-c

B. e=0

C. $a, b-2/3, c-1$ are in $\in A.P$

D. $(b+d)/a$ is an integer

Answer: A::B::C::D

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60. Two consecutive numbers from 1,2,3 ...., n are removed .The arithmetic mean of the remaining numbers is 105/4

The sum of all numbers

A. $S_{40} = -820$

B. $S_{2n} > S_{2n+2}$

C. $S_{51} = 1326$

D. $S_{2n+1} > S_{2n-1}$

Answer: A::B::C::D

View Text Solution

61. Two arithmetic progressions have the same numbers. The reatio of the last term of the first progression to the first term of the second progression is equal to the ratio of the last term of the second progression to the first term of first progression is equal to 4. The ratio of the sum of the n terms of the first progression to the sum of the n terms of teh first progression to the sum of the n terms of the second progerssion is equal to 2.

The ratio of their first term is

A. $\dfrac{\left(\sqrt{3n+2}\right) - \sqrt{2}}{3}$

B. $\frac{n}{\sqrt{2+3n}+\sqrt{2}}$

C. less than n

D. less than $\sqrt{\frac{n}{3}}$

Answer: A::B::C

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62. Two arithmetic progressions have the same numbers. The reatio of the last term of the first progression to the first term of the second progression is equal to the ratio of the last term of the second progression to the first term of first progression is equal to 4. The ratio of the sum of the n terms of the first progression to the sum of the n terms of teh first progression to the sum of the n terms of the second progerssion is equal to 2.

The ratio of their first term is

A. $6/5$

B. $7/2$

C. $9/5$

D. none of these

Answer: B

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63. Two arithmetic progressions have the same numbers. The reatio of the last term of the first progression to the first term of the second progression is equal to the ratio of the last term of the second progression to the first term of first progression is equal to 4. The ratio of the sum of the n terms of the first progression to the sum of the n terms of teh first progression to the sum of the n terms of the second progerssion is equal to 2.

The ratio of their first term is

A. G.M of a and b is 3

B. one possible value of a + 2b is 11

C. A.M of a and b is 6

D. greatest value of a-b is 8

Answer: A::B::D

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64. Find three numbers a, b,c between 2 & 18 such that; O their sum is 25 @ the numbers 2, a, b are consecutive terms of an AP & Q.3 the numbers b?c?18 are consecutive terms ofa GP

A. $\frac{(a+c)(3a-c)}{4a^2c^2}$

B. $\frac{2}{bc}-\frac{1}{b^2}$

C. $\frac{2}{bc}-\frac{1}{b^2}$

D. $\frac{(a-c)(3a+c)}{4a^2c^2}$

Answer: A::B

View Text Solution

65. Find three numbers a, b,c between 2 & 18 such that; O their sum is 25 @ the numbers 2, a, b are consecutive terms of an AP & Q.3 the numbers b?c?18 are consecutive terms ofa GP

A. pth,qth and rth terms of A.P are in A.P

B. pth,qth,and rht terms of G.P are in G.P

C. pth , qth , and rht terms of H.P are in H.P

D. none of these

Answer: A::B::C

View Text Solution

66. If a, b and c are roots of the equation $x^3 + qx^2 + rx + s = 0$ then the value of r is

A. x,y and z are in H.P

B. $\frac{1}{x}, \frac{1}{y}, \frac{1}{z}$ are in G.P

C. x,y,z are in G.P

D. $\frac{1}{x}, \frac{1}{y}, \frac{1}{z}$ are in G.P

Answer: A::C

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EXERCIESE (MULTIPLE CORRECT ANSWER TYPE)

1. If $\overrightarrow{a} = \hat{i} + 2\hat{j} + 3\hat{k}$ and $\overrightarrow{b} = 2\hat{i} + 4\hat{j} - 5\hat{k}$ represent two adjacent sides of a parallelogram, find unit vectors parallel to the diagonals of the parallelogram.

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2. Two arithmetic progressions have the same numbers. The reatio of the last term of the first progression to the first term of the second progression is equal to the ratio of the last term of the second progression to the first term of first progression is equal to 4. The ratio of the sum of the n terms of the first progression to the sum of the n terms of teh first progression to the sum of the n terms of the second progerssion is equal to 2.

The ratio of their first term is

A. last term = 210

B. first term = 191

C. sum = 4010

D. sum =4200

Answer: A::B::C

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EXERCIESE (MATRIX MATCH TYPE)

1. If α and β are roots of the equation $x^2 - 8x + p = 0$, then $\alpha^2 + \beta^2 = 40$, find the value of p.

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2. The area of a parallelogram whose adjacent sides are represented by the vectors $\overrightarrow{a} = 2\hat{i} + \hat{j} + 3\hat{k}$ and $\overrightarrow{b} = \hat{i} - \hat{j}$ is

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3. Find the area of a parallelogram whose adjacent sides are determined by the vectors $\overrightarrow{a} = 2\hat{i} - \hat{j} + 3\hat{k}$ and $\overrightarrow{b} = \hat{i} - 6\hat{j} + 4\hat{k}$ is

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Exercise (Numerical)

1. Let a, b, c, d be four distinct real numbers in A.P. Then half of the smallest positive valueof k satisfying

$a(a-b)+k(b-c)^2=(c-a)^3=2(a-x)+(b-d)^2+(c-d)^3$ is

________.

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2. Let fourth therm of an arithmetic progression be 6 and m^{th} term be 18. If A.P has intergal terms only then the numbers of such A.P s is

____

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3. The 5th and 8th terms of a geometric sequence of real numbers are 7! And 8! Respectively. If the sum to first n tems of the G.P. is 2205, then n equals______.

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4. Let $a_1, a_2, a_3, , a_{101}$ are in G.P. with $a_{101} = 25 and \sum_{i=1}^{201} a_1 = 625$. Then the value of $\sum_{i=1}^{201} \frac{1}{a_1}$ equals___________.

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5. Let $a, b > 0$, let $5a - b, 2a + b, a + 2b$ be in A.P. and $(b+1)^2, ab + 1, (a-1)^2$ are in G.P., then the value of $(a^{-1} + b^{-1})$ is _______.

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6. Let $a + ar_1 + ar12 + \quad + \infty anda + ar_2 + ar22 + \quad + \infty$ be two infinite series of positive numbers with the same first term. The sum of the first series is r_1 and the sum of the second series r_2. Then the value of $(r_1 + r_2)$ is _______.

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7. If he equation $x^3 + ax^2 + bx + 216 = 0$ has three real roots in G.P., then b/a has the value equal to ____.

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8. Let $a_n = 16, 4, 1, \ldots$ be a geometric sequence .Define P_n as the product of the first n terms. The value of $\Sigma_{n=1}^{\infty} n\sqrt{P}_n$ is ________.

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9. The terms a_1, a_2, a_3 from an arithmetic sequence whose sum s 18. The terms $a_1 + 1, a_2, a_3, \ + 2,$ in that order, form a geometric sequence. Then the absolute value of the sum of all possible common difference of the A.P. is _______.

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10. Let the sum of first three terms of G.P. with real terms be 13/12 and their product is -1. If the absolute value of the sum of their infinite terms is S, then the value of $7S$ is _____.

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11. The first term of an arithmetic progression is 1 and the sum of the first nine terms equal to 369. The first and the ninth term of a geometric progression coincide with the first and the ninth term of the arithmetic progression. Find the seventh term of the geometric progression.

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12. The digits in units's place of number $\dfrac{10^{2013}-1}{10^{33}-1}$ is.___________.

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13. The number of positive integral ordered pairs of (a, b) such that $6, a, b$ are in harmonic progression is ________.

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14. If the roots of $10x^3 - nx^2 - 54x - 27 = 0$ are in harmonic oprogresion, then n eqauls ________.

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15. Given a,b,c are in A.P.,b,c,d are in G.P and c,d,e are in H.P .If a=2 and e=18 , then the sum of all possible value of c is _______.

View Text Solution

16. Let S_k be sum of an indinite G.P whose first term is 'K' and commmon ratio is $\frac{1}{k+1}$. Then $\Sigma_{k=1}^{10} S_k$ is equal to ________.

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17. The value of the sum $\Sigma_{i=1}^{20} i\left(\frac{1}{i}+\frac{1}{i+1}+\frac{1}{i+2}+\ldots.+\frac{1}{20}\right)$ is ____________.

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18. The difference between the sum of the first k terms of the series $1^3+2^3+3^3+\ldots+n^3$ and the sum of the first k terms of $1+2+3+\ldots.+n$ is 1980 . The value of k is :

View Text Solution

19. The value of the $\Sigma_{n=0}^{\infty}\frac{2n+3}{3^n}$ is equal to _____.

Watch Video Solution

20. The sum of the infinite Arithmetico -Geometric progression3,4,4,... is

________.

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21. $\Sigma_{r=1}^{50}\frac{r^2}{r^2+(11-r)^2}$ is equal to _____.

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22. If $\Sigma_{r=1}^{50}\frac{r^2}{r^2+(11-r)^2}$, then the value of n is _________

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23. Let $<a_n>$ be an arithmetic sequence of 99 terms such that sum of its odd numbered terms is 1000 then the value of

$\Sigma_{r=1}^{50}(-1)^{\frac{r(r+1)}{2}}.\,a_{2r-1}$ is ________.

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24. Find the sum of series upto n terms $\left(\frac{2n+1}{2n-1}\right)+3\left(\frac{2n+1}{2n-1}\right)^2+5\left(\frac{2n+1}{2n-1}\right)^3+\dots$

Watch Video Solution

25. Let $S=\Sigma_{n=1}^{999}\frac{1}{(\sqrt{n}+\sqrt{n+1})(4\sqrt{n}+4\sqrt{n}+1)}$, then S equals ___________.

View Text Solution

26. Let S denote sum of the series $\frac{3}{2^3}+\frac{4}{2^4.3}+\frac{5}{2^6.3}+\frac{6}{2^7.5}+\infty$ Then the value of S^{-1} is __________.

View Text Solution

27. The sum $\frac{7}{2^2 \times 5^2} + \frac{13}{5^2 \times 8^2} + \frac{19}{8^2 \times 11^2} + \ldots 10$ terms is S, then the value of 1024(S) is ________.

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JEE Main Previous Year

1. The sum to infinity of the series $1 + \frac{2}{3} + \frac{6}{3^2} + \frac{10}{3^3} + \frac{14}{3^4} \ldots \ldots$ is (1) 2 (2) 3 (3) 4 (4) 6

A. 2

B. 3

C. 4

D. 6

Answer: B

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2. A person is to count 4500 currency notes. Let a_n, denote the number of notes he counts in the nth minute if $a_1 = a_2 = a_3 = \ldots\ldots\ldots = a_{10} = 150$ and $a_{10}, a_{11}, \ldots\ldots\ldots$are in an AP with common difference -2, then the time taken by him to count all notes is :- (1) 24 minutes 10 11 (2) 34 minutes (3) 125 minutes (4) 135 minutes

A. 135 min

B. 24 min

C. 34 min

D. 125 min

Answer: C

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3. A man saves Rs. 200 in each of the first three months of his service. In each of the subsequent months his saving increases by Rs, 40 more than the saving of immediately previous month. His total saving s from the start of service will be Rs. 11040 after

A. 21 months

B. 18 months

C. 19 months

D. 20 months

Answer: A

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4. Statement 1 :

The sum of the series 1+(1+2+4)+(4+6+9)+(9+12+16)+....+(361 +380 +400) is 8000

Statement 1:

$\Sigma_{k=1}^{n}\left(k^{3}-(k-1)^{3}\right)=n^{3}$, for any natural number n.

A. Statement 1 is fasle ,statement 2 is true

B. Statement 1 is true ,statement 2 is true , statement 2 is a correct explanation for statement 1.

C. Statement 1 is true, statements 2 is true statement 2 is not a correct explanation for statement 1

D. Statement 1 is true, statement 2 is false

Answer: B

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5. If 100 times the 100^{th} term of an AP with non zero common difference equals the 50 times its 50^{th} term, then the 150^{th} term of this AP is (1) 150 (2) 150 times its 50^{th} term (3) 150 (4) zero

A. -150

B. 150 times its 50 th term

C. 150

D. Zero

Answer: D

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6. The sum of first 20 terms of the sequence 0.7, 0.77, 0.777, .. , is (1) $\frac{7}{9}\left(99-10^{-20}\right)$ (2) $\frac{7}{81}\left(179+10^{-20}\right)$ (3) $\frac{7}{9}\left(99+10^{-20}\right)$ (3) $\frac{7}{81}\left(179-10^{-20}\right)$

A. $\frac{7}{81}(179-10)^{20}\Big)$

B. $\frac{7}{9}\left(99-10^{20}\right)$

C. $\frac{7}{81}\left(179+10^{-20}\right)$

D. $\frac{7}{9}\left(99+10^{-20}\right)$

Answer: C

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7. If $(10)^9 + 2(11)^1(10)^8 + 3(11)^2(10)^7 + ... + 10(11)^9 = k(10)^9$ then k is equal to

A. $\frac{121}{10}$

B. $\frac{441}{100}$

C. 100

D. 110

Answer: C

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8. If m is the A.M. of two distinct real numbers l and $n(l, n > 1)$ and G1, G2 and G3 are three geometric means between l and n, then $G14 + 2G24 + G34$ equals, (1) $4l^2$ mn (2) $4l^m$ ^ 2 mn (3) $4lmn^2$ (4) $4l^2m^2n^2$

A. $4l^2mn$

B. $4lm^2n$

C. $4lmn^2$

D. $4l^2m^n \hat{} 2$

Answer: B

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9. The sum of the first 9 terms of the series $\frac{1^3}{1}+\frac{1^3+2^3}{1+3}+\frac{1^3+2^3+3^3}{1+3+5}$ ..... is :

A. 71

B. 96

C. 142

D. 192

Answer: B

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10. If the 2nd , 5th and 9th terms of a non-constant A.P. are in G.P., then the common ratio of this G.P. is : (1) $\frac{8}{5}$ (2) $\frac{4}{3}$ (3) 1 (4) $\frac{7}{4}$

A. $\frac{4}{3}$

B. 1

C. $\frac{7}{4}$

D. $\frac{8}{5}$

Answer: A

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11. If the surm of the first ten terms of the series, $\left(1\frac{3}{5}\right)^2 + \left(2\frac{2}{5}\right)^2 + \left(3\frac{1}{5}\right)^2 + 4^2 + \left(4\frac{4}{5}\right)^2 + \ldots\ldots.$, is $\frac{16}{5}m$,then m is equal to

A. 101

B. 100

C. 99

D. 102

Answer: A

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12. For a positive integer n, if the quadratic equation, equation, $x(x+1)+(x+1)(x+2)+\ldots+(x+n-1)(x+n)=10n$ has two consective integral solutions, then n is equal to

A. 11

B. 12

C. 9

D. 10

Answer: A

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JEE Advanced Previous Year

1. For any three positive real numbers a, b and c, $9(25a^2+b^2)+25(c^2-3ac)=15b(3a+c)$ Then: (1) b, c and a are in G.P. (2) b, c and a are in A.P. (3) a, b and c are in A.P (4) a, b and c are in G.P

A. a,b and c are in G.P

B. b,c and a are in G.P

C. b,c and a are in A.P

D. a,b and c are in A.P

Answer: C

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2. Let $a, b, c \in R. If f(x) = ax^2 + bx + c$ is such that a +b+c =3 and $f(x+y) = f(x) + f(y) + xy, \forall x, y \in R, then \Sigma_{n=1}^{10} f(n)$ is equal to

A. 255

B. 330

C. 165

D. 190

Answer: B

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3. Let A be the sum of the first 20 terms and B be the sum of the first 40 terms of the series $1^2 + 2.2^2 + 3^2 + 2.4^2 + 5^2 + 2.6^2 + \ldots$ If $B - 2A = 100\lambda$ then λ is equal to (1) 232 (2) 248 (3) 464 (4)496

A. 496

B. 232

C. 248

D. 464

Answer: C

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4. Let $a_1, a_2, a_3 \ldots, a_{49}$ be in A.P . Such that $\Sigma_{k=0}^{12} a_{4k+1} = 416$ and $a_9 + a_{43} = 66$ .If $a_1^2 + a_2^2 + \ldots + a_{17}$ = 140 m then m is equal to

A. 33

B. 66

C. 68

D. 34

Answer: D

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5. Let $a_1, a_2, a_3, \ldots$ be a harmonic progression with $a_1 = 5$ and $a_{20} = 25$. The least positive integer n for which $a_n < 0$, is

A. 22

B. 23

C. 24

D. 25

Answer: D

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6. The value of $\Sigma_{k=1}^{13} \frac{1}{\sin\left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right)\sin\left(\frac{\pi}{4} + \frac{k\pi}{6}\right)} is$ equal to

A. $3 - \sqrt{3}$

B. $2(3 - \sqrt{3})$

C. $2(3 - \sqrt{3})$

D. $2(\sqrt{3} - 1))$

Answer: C

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7. Let $b_i > 1$ for i =1, 2,....,101. Suppose $\log_e b_1, \log_e b_2, \ldots., \log_e b_{101}$ are in Arithmetic Progression (A.P.) with the common difference $\log_e 2$. Suppose $a_1, a_2, \ldots, a_{101}$ are in A.P. such that $a_1 = b_1$ and $a_{51} = b_{51}$. If $t = b_1 + b_2 + \ldots.. + b_{51}$ and $s = a_1 + a_2 + \ldots. + a_{51}$ then

A. $s > t$ and $a_{101} > b_{101}$

B. $s > t$ and $a_{101} < b_{101}$

C. $s < t$ and $a_{101} > b_{101} > b_{101}$

D. $s < t$ and $a_{101} < b_{101}$

Answer: B

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8. $Let S_n = \Sigma_{k=1}^{4n}(-1)^{\frac{k(k+1)}{2}}k^2$.Then S_n can take value (s)

A. 1056

B. 1088

C. 1120

D. 1332

Answer: A::D

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9. Let $S_k, k = 1, 2, \ldots .100$ denote the sum of the infinite geometric series whose first term is $\dfrac{k-1}{K!}$ and the common ration is $\dfrac{1}{k}$ then the value of $\dfrac{(100)^2}{100!} + \Sigma_{k=1}^{100}$|(k^2-3k+1)S_k| is __________`

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10. Let a1,a2,a3 ...... a11 be real numbers satisfying $a_1 = 15, 27 - 2a_2 > 0$ and $a_k = 2a_{k-1} - a_{k-2}$ for $k = 3, 4, \ldots .11$ If $\frac{a1^2 + a2^2 \ldots\ldots a11^2}{11} = 90$ then find the value of $\frac{a_1 + a_2 \ldots. + a_{11}}{11}$

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11. Let $a_1, a_2, a_3, \ldots\ldots, a100$ be an arithmetic progression with $a_1 = 3$ and $S_p = \Sigma_{i=1}^{p} a_i, 1 \leq p \leq 100.$ For any integer n with $1 \leq n \leq 20, \leq tm = 5n.$ If $\frac{S_m}{S_n}$ does not depend on .n then a_2 is

________.

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12. A pack contains n cards numbered from 1 to n . Two consecutive numbered cards are removed from the pack and the sum of the numbers on the remaining cards is 1224. If the smaller of het numbers on the removed cards is $k,$ then $k - 20 =$ __________.

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13. Let a,b ,c be positive integers such that $\frac{b}{a}$ is an integer. If a,b,c are in GP and the arithmetic mean of a,b,c, is b+2 then the value of $\frac{a^2+a-14}{a+1}$ is

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14. about to only mathematics

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15. The sides of a right angled triangle are in arithmetic progression. If the triangle has area 24, then what is the length of its smallest side?

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16. Let X be the set consisting of the first 2018 terms of the arithmetic progression $1, 6, 11, \dots$ and Y be the set consisting of the first 2018 terms of the arithmetic progression $9, 16, 23, \dots$. Then, the number of elements in the set $X \cup Y$ is ____.

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ARCHIVES (MATRIX MATCH TYPE)

1. It is given that in a group of 4 students, the probability of 2 students not having the same birthday is 0.893. What is the probability that the 2 students have the same birthday?

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