MATHS

BOOKS - MCGROW HILL EDUCATION MATHS (HINGLISH)

PROGRESSIONS

SOLVED EXAMPLES CONCEPT -BASED (SINGLE CORRECT ANSWER TYPE QUESTIONS)

1. Suppose $a_1, a_2 \ldots$ are in A.P. If $a_8 : a_5 = 3 : 2,$ then $a_{17} : a_{23}$ is :

A. $1 : 2$

B. $3 : 4$

C. $4 : 11$

D. $8 : 11$

Answer: B

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2. If 7th term of an A.P. is 9 and 9th term of the A.P. is 7, then 20th term of the A.P. is

A. -2

B. -3

C. -4

D. -6

Answer: C

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3. Suppose mth term of an A.P. is 1/n and nth term of the A.P. is 1/m. If rth term of the A.P. is 1, then r is equal to

A. mn

B. m+n

C. m-n

D. m+n-1

Answer: A

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4. The number of terms of the A.P. 1,4,7,... that must be taken to obtain a sum of 715 is

A. 24

B. 23

C. 22

D. 21

Answer: C

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5. If sum of first 20 terms of an A.P. is equal to sum of first 30 terms of the A.P. then sum of the first 50 terms of the A.P. is

A. -1

B. 0

C. 10

D. 25

Answer: B

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6. If for every $n \in N$, sum to n terms of an A.P. is $5n^2 + 7n$ then is 10th term is

A. $7/2$

B. 570

C. 102

D. 52

Answer: C

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

A. 3

B. 2

C. 5

D. -5

Answer: A

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8. The digits of a three digit number N are in A.P. If sum of the digit is 15 and the number obtained by re-versing the digits of the number is 594 less than the original number, then $\frac{1000}{N-252}$ is equal to

A. $5/6$

B. $5/3$

C. 0.06

D. 0.03

Answer: B

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9. If sum of four numbers in A.P. is 28 and product of two middle terms is 45, then product of the first and last terms is

A. 11

B. 13

C. 15

D. 17

Answer: B

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10. There are n A.M.s between 3 and 17. The ratio of the last mean to the first mean is 3:1. Find the value of n.

A. 4

B. 5

C. 6

D. 8

Answer: C

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11. Suppose $a, b, c > 0$ and $p \in R$. if $(a^2 + b^2)p^2 - 2(ab + bc)p + (b^2 + c^2) = 0$ then a,b,c are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: B

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12. Suppose (m+n)th term of a G.P. is p and (m-n)th term is q, then its nth is

A. $\sqrt{pq}$

B. $p\left(\frac{q}{p}\right)^{m/n}$

C. $p\left(\frac{q}{p}\right)^{m/2n}$

D. $\sqrt{\frac{p}{q}}$

Answer: C

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13. How many terms of the GP $3, \frac{3}{2}, \frac{3}{4}, \ldots\ldots$ are needed to give sum $\frac{3069}{512}$?

A. 9

B. 10

C. 11

D. 12

Answer: B

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14. Sum to 25 terms of the series 0.5+0.55 +0.555+...is :

A. $\frac{5}{81}\left(224-10^{-25}\right)$

B. $\frac{5}{9}\left(224-10^{-25}\right)$

C. $\frac{5}{81}\left(224-10^{-24}\right)$

D. none of these

Answer: A

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15. The sum of three numbers which are consecutive terms of an A.P. is 21. If the second number is reduced by 1 and the third is increased by 1 we obtain three consecutive terms of a G.P. Find the numbers.

A. 2

B. 3

C. 4

D. 7

Answer: A

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SOLVED EXAMPLES LEVEL -1 (SINGLE CORRECT ANSWER TYPE QUESTIONS)

1. If one geometric mean G and two arithmetic means $A_1 and A_2$ be inserted between two given quantities, prove that $G^2 = (2A_1 - A_2)(2A_2 - A_1)$.

A. 0

B. 1

C. -1.5

D. -2.5

Answer: B

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2. If sum of the infinite G.P. $p+1+\frac{1}{p}+\frac{1}{p^2}+\ldots(p>2)$ is 49/6, then sum of the 3rd term and the 4th term of the G.P. is

A. $\frac{8}{49}$

B. $\frac{1}{7}$

C. $\frac{6}{7}$

D. $\frac{23}{49}$

Answer: A

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3. It $a_1, a_2, a_3 \ldots\ldots$ terms of this A.P., such that $a_4 - a_7 + a_{10}$, then the sum of first 13 terms of this A.P is

A. 10 m

B. 12 m

C. 13 m

D. 15 m

Answer: C

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4. If $(20)^{19} + 2(21)(20)^{18} + 3(21)^2(20)^{17} + \ldots + 20(21)^{19} = k(20)^{19}$ then k is equal to

A. 400

B. 100

C. 441

D. 420

Answer: A

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5. Three positive numbers form an increasing GP. If the middle term in this GP is doubled, then new numbers are in AP. Then, the common ratio of the GP is

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

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

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

D. $2\sqrt{2} + \sqrt{3}$

Answer: A

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6. Suppose m arithmeti means are inserted between 1 and 31. If the ratio of the second mean to the mth mean is 1:4, then m is equal to

A. 7

B. 9

C. 11

D. 15

Answer: B

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7. In a geometric progression the ratio of the sum of the first 5 terms to the sum of their reciprocals is 49 and sum of the first and the third term is 35. The fifth term of the G.P. is

A. 7

B. $7/2$

C. $7/4$

D. $7/8$

Answer: C

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8. If the r^{th} term of a series is $1 + x + x^2 + \ldots\ldots + x^{r-1}$, then the sum of the first n terms is

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

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

C. $\frac{(x+1)x - x^{n+1} - n}{(1-x)^2}$

D. $\frac{n - (n+1)x - x^{n+1}}{(1-x)^2}$

Answer: B

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9. Let m be a positive integer, then $S = \sum_{k=1}^{m} k\left(\frac{1}{k} + \frac{1}{k+1} + \frac{1}{k+2} + \ldots + \frac{1}{m}\right)$ is equal to:

A. $\frac{1}{4}m(m+2)$

B. $\frac{1}{4}m(m+3)$

C. $\frac{1}{4}m(m+4)$

D. $\frac{1}{4}m(m+6)$

Answer: B

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10. Let $f(n)=\left[\frac{1}{5}+\frac{3n}{100}\right]n,$ where [x] denotes the greatest integer less thena or equal to x. Then $\sum_{n=1}^{61} f(n)$

A. 2013

B. 1869

C. 1947

D. 1661

Answer: D

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11. Find the sum of the series: $1^2 - 2^2 + 3^2 - 4^2 + \ldots . - 2008^2 + 2009^2$

.

A. 2019045

B. 1005004

C. 2000506

D. none of these

Answer: A

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12. The odd value of n for which $704 + \frac{1}{2}(704)$+... upto n terms = $1984 - \frac{1}{2}(1984) + \frac{1}{4}(1984)$ -... up to n terms is :

A. 5

B. 3

C. 4

D. 10

Answer: A

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13. 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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14. Sum of the series $S = 1 + \frac{1}{2}(1+2) + \frac{1}{3}(1+2+3) + \frac{1}{4}(1+2+3+4) + \ldots\ldots\ldots$ upto 20 terms is

A. 110

B. 111

C. 115

D. 116

Answer: C

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15. If $1^2 + 2^2 + 3^2 + \ldots + 2009^2 = (2009)(4019)(335)$ and $(1)(2009) + (2)(2008$ then x equals

A. 2011

B. 2009

C. 2008

D. 2007

Answer: A

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16. If x > 0, and $\log_2 + \log_2\left(\sqrt{x}\right) + \log_2\left(4\sqrt{x}\right) + \log_2\left(8\sqrt{x}\right) + \log_2\left(16\sqrt{x}\right) + \ldots\ldots = 4$ then x =

A. 2

B. 3

C. 4

D. 5

Answer: C

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17. 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 $p+q+r(wherep>6)$ is 12 b. 21 c. 45 d. 54

A. 12

B. 21

C. 45

D. 54

Answer: B

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18. Let $a_1, a_2, , a_{10}$ be in A.P. and h_1, h_2, h_{10} be in H.P. If $a_1=h_1=2anda_{10}=h_{10}=3, thena_4h_7$ is 2 b. 3 c. 5 d. 6

A. 2

B. 3

C. 5

D. 6

Answer: D

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19. If a, b, c are in A.P.and a^2, b^2, c^2 are in G.P.such that $a < b < c$ and $a + b + c = \frac{3}{2}$ then $a =$

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

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

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

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

Answer: D

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20. 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 $S_1 is 10cm,$ 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

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21. Let T_r be the rth term of an AP, for r=1,2,... If for some positive integers m and n, we have $T_m = \frac{1}{n}$ and $T_n = \frac{1}{m},$ the T_{m+n} equals

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

B. $\frac{1}{m}+\frac{1}{n}$

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

D. 0

Answer: B

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

A. a=4/7,r=3/7

B. a=2,r=3/8

C. a=3/2, r=1/2

D. a=3, r=1/4

Answer: D

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23. If the sum of the first 2n terms of the $A.\ P. 2, 5, 8, \ldots,$ is equal to the sum of the first n terms of the $A.\ P. 57, 59, 61, \ldots,$ then n equals

A. 10

B. 12

C. 11

D. 13

Answer: C

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24. For a positive integer n let $a(n) = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{(2^n) - 1}$.

Then $a(100) \leq 100$ b. $a(100) > 100$ c. $a(200) \leq 100$ d. $a(200) \leq 100$

A. $a(100) < 100$

B. $a(100) > 100$

C. $a(200) < 100$

D. none of these

Answer: A

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25. 17. If $x > 1, y > 1, z > 1$ are in G.P, then $\frac{1}{1+\ln x}, \frac{1}{1+\ln y}, \frac{1}{1+\ln z}$ are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: C

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

A. 2

B. 3

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

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

Answer: A

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27. If $\frac{1}{1^3}+\frac{1+2}{1^3+2^3}+\frac{1+2+3}{1^3+2^3+3^3}+\ldots\ldots$ n terms then $\lim_{n\to\infty}[S_n]$

A. $\frac{n}{n+1}$

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

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

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

Answer: C

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28. Let $\sum_{r=1}^{n} r^4 = f(n), \quad \text{then} \quad \sum_{r=1}^{n} (2r-1)^4$ is equal to

A. $f(2n) - 16f(n)$

B. $f(2n) - 7f(n)$

C. $f(2n-1) - 8f(n)$

D. none of these

Answer: A

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29. The sum of n terms of the series $1^2 + 2.2^2 + 3^2 + 2.4^2 + 5^2 + 2.6^2 + \ldots$ is $\frac{n(n+1)^2}{2}$ when n is even . when n is odd , the sum is

A. $n^2(3n+1)/4$

B. $n^2(n+1)/2$

C. $n^3(n-1)/2$

D. none of these

Answer: B

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30. If the first and (2n + 1)th terms of an A.P. , G.P. and H.P. are equal and their (n + 1)th terms are a, b and c respectively, then

A. $a > b > c$

B. $ac = b^2$

C. $a + b = c$

D. none of these

Answer: B

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31. If $a_{n+1} = \frac{1}{1 - a_n}$ for $n \geq 1$ and $a_3 = a_1$, then $(a_{2022})^{2022}$ equals

A. -1

B. 1

C. 0

D. none of these

Answer: B

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32. If $f(x+y)=f(xy)\,\forall x, y\varepsilon R,$ and $f(2013)=2013,$ then f(-2013) equals

A. 2013

B. 0

C. -2013

D. none of these

Answer: A

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33. If $\sum_{r=1}^{n} T_r = \frac{n(n+1)(n+2)(n+3)}{12}$ where T_r denotes the rth term of the series. Find $\lim_{n\to\infty} \sum_{r=1}^{n} \frac{1}{T_r}$.

A. $\frac{2n}{n+1}$

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

C. $\frac{4n}{n+1}$

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

Answer: C

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34. The sum to n terms of the series $\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\frac{15}{16}+\ldots..isgivenby$

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

B. $\frac{n+1}{2^{n+1}}$

C. $n+1-\frac{1}{2^n}$

D. $n-1+\frac{1}{2^n}$

Answer: D

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35. let $0 < \phi < \frac{\pi}{2}$, $x = \sum_{n=0}^{\infty} \cos^{2n}\phi$, $y = \sum_{n=0}^{\infty} \sin^{2n}\phi$ and $z = \sum_{n=0}^{\infty} \cos^{2n}\phi \sin^{2n}\phi$

A. $xyz = xz + y$

B. $xyz = xz + z$

C. $xyz = x + y + z$

D. $xyz = yz + z$

Answer: C

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36. The sum to n terms of the series $\frac{1}{\sqrt{7}+\sqrt{10}} + \frac{1}{\sqrt{10}+\sqrt{13}} + \frac{1}{\sqrt{13}+\sqrt{16}} + \ldots$is

A. $\frac{1}{3}\left(\sqrt{7+3n} - \sqrt{7}\right)$

B. $\frac{\sqrt{4+3n}-2}{3}$

C. $\frac{1}{3}\left(\sqrt{10+3n}-\sqrt{10}\right)$

D. none of these

Answer: A

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37. If $S_n = \Sigma_{r=1}^{n} t_r = \frac{1}{6}n\left(2n^2+9n+13\right)$, then $\Sigma_{r=1}^{n}\sqrt{t_r}$ is equal to

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

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

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

D. $\frac{1}{2}n(n+5)$

Answer: C

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38. The interior angles of a convex polygon are in A.P. If the smallest angle is 100° and the common difference is 4°, then the number of sides is

A. 5

B. 7

C. 36

D. 44

Answer: A

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

A. 5

B. 7

C. 11

D. none of these

Answer: A

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

A. $\frac{\pi^2}{4}$

B. $\frac{\pi^2}{6}$

C. $\frac{\pi^2}{8}$

D. $\frac{\pi^2}{12}$

Answer: C

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41. If the sides of a right-angled triangle are in A.P., then the sines of the acute angles are $\frac{3}{5}, \frac{4}{5}$ b. $\frac{1}{\sqrt{3}}, \sqrt{\frac{2}{3}}$ c. $\frac{1}{2}, \frac{\sqrt{3}}{2}$ d. none of these

A. $3/5, 4/5$

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

C. $\sqrt{\frac{\sqrt{5}-1}{2}}, \sqrt{\frac{\sqrt{5}+1}{2}}$

D. $\sqrt{\frac{\sqrt{3}-1}{2}}, \sqrt{\frac{\sqrt{3}+1}{2}}$

Answer: A

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42. If $\exp\left(\sin^2 x + \sin^4 x + \sin^6 x \ldots\ldots \text{. upto } \infty\right)\log_e 2$ satisfies the equation $x^2 - 17x + 16 = 0$ then the value of $\frac{2\cos x}{\sin x + 2\cos x}, \left(0 < x < \frac{\pi}{2}\right)$ is

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

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

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

D. none of these

Answer: A

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43. Let $fx)$ be a polynomial function of second degree. If $f(1) = f(-1)$ and a, b,c are in A.P, the $f'(a), f'(b)$ and $f'(c)$ are in

A. G.P

B. H.P

C. A.G.P

D. A.P

Answer: D

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44. If exp $\{(\tan^2 x - \tan^4 x + \tan^8 x - \tan^6 x \ldots.)\log_e 16\}$, $0 < x < \pi/4$, satisfies the quadratic equation $x^2 - 3x + 2 = 0$, then value of $\cos^2 x + \cos^4 x$ is

A. $4/5$

B. $21/16$

C. $17/11$

D. $19/31$

Answer: B

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45. 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. $\frac{\pi}{8}$

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

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

D. $\frac{\pi}{34}$

Answer: A

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46. For eR let [x] denote the greatest integer $\leq x$. Largest natural number n for which $E = \left[\frac{\pi}{2}\right] + \left[\frac{1}{100} + \frac{\pi}{2}\right] + \left[\frac{2}{100} + \frac{\pi}{2}\right] + \left[\frac{n}{100} + \frac{\pi}{2}\right] < 43,$ is

A. 41

B. 42

C. 43

D. 97

Answer: A

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47. If the ratio of sum to n terms of two A.P's is (5n+7): (3n+2), then the ratio of their 17th terms is

A. $172:99$

B. $172:101$

C. $175:99$

D. $175:101$

Answer: B

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48. If $H_1.\ H_2 \ldots .\ , H_n$ are n harmonic means between a and b$(\neq a)$, then the value of $\frac{H_1+a}{H_1-a}+\frac{H_n+b}{H_n-b}$=

A. n+1

B. n-1

C. 2n

D. 2n+3

Answer: C

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49. If three positive real numbers , b, c are in A.P. sich that $abc = 4$, then the minimum value of b is $2^{1/3}$ b. $2^{2/3}$ c. $2^{1/2}$ d. $2^{3/23}$

A. $2^{3/2}$

B. $2^{2/3}$

C. $2^{1/3}$

D. $2^{5/2}$

Answer: B

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50. For $0 < x < \pi$ the values of x which satisfy then relation $9^{1+|\cos x|+|\cos^2 x|+|\cos^3 x|+\cdots}$ upto $\infty = 3^4$ are given by

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

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

C. $\frac{\pi}{4}, \frac{3\pi}{4}$

D. $(\pi), (3), \frac{\pi}{4}$

Answer: A

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51. The sum upto (2n+1) terms of the series $a^2 - (a+d)^2 + (a+2d)^2 - (a+3d)^2 + \ldots$ is

A. $a^2 + 3nd^2$

B. $a^2 + 2nad + n(n-1)d^2$

C. $a^2 + 3nad + n(n-1)d^2$

D. $(a+nd)^2+n(n+1)d^2$

Answer: D

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52. Value of $(0.36)^{\log_{0.25}\left(\frac{1}{3}+\frac{1}{3^2}+\frac{1}{3^3}+\ldots.\infty\right)}=$

A. 0.9

B. 0.8

C. 0.6

D. 0.25

Answer: C

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53. The sum of the series $1+2\left(1+\frac{1}{n}\right)+3\left(1+\frac{1}{n}\right)^2+\ldots.\infty$ is given by

A. n^2

B. $(n+1)^2$

C. $n(n+1)$

D. none of these

Answer: A

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54. If a, b, c are distinct real numbers such that a, b, c are in A.P. and a^2, b^2, c^2 are in H. P , then

A. $a=b=c$

B. $2b=3a+c$

C. $b^2=\sqrt{ac/8}$

D. none of these

Answer: A

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55. If $0 < \theta, \phi < \frac{\pi}{2}$ and $x = \sum_{n=0}^{\infty} \sin^{2n}\theta, y = \sum_{n=0}^{\infty} \cos^{2n}\phi$ and $z = \sum_{n=0}^{\infty} \cos^{n}(\theta+\phi)\cos^{n}(\theta-\phi)$, then

A. $xyz + 1 = yz - zx$

B. $xyz - 1 = yz + zx$

C. $xyz - xy = yz - zx$

D. $xyz + 1 = yz + zx$

Answer: C

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56. If a,b,c are in H.P. then $a-\frac{b}{2}, \frac{b}{2}, c-\frac{b}{2}$ are in

A. A.P

B. G.P

C. A.G.P

D. H.P

Answer: B

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57. Sum to n terms of the series $\frac{1}{(1+x)(1+2x)}+\frac{1}{(1+2x)(1+3x)}+\frac{1}{(1+3x)(1+4x)}+\ldots\ldots\ldots$

A. $\frac{nx}{(1+x)(1+nx)}$

B. $\frac{n}{(1+x)[1+(1+n1)x]}$

C. $\frac{x}{(1+x)(1+(n-1)x)}$

D. none of these

Answer: B

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58. If $a_1, a_2, \ldots a_n$ are in H.P then the expression $a_1a_2 + a_2a_3 + \ldots. + a_{n-1}a_n$ is equal to

A. $(n-1)a_1a_n$

B. $n(a_1 - a_n)$

C. $(n-1)(a_1 - a_n)$

D. na_1a_n

Answer: A

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59. if the sum of the series $2 + \frac{5}{x} + \frac{25}{x^2} + \frac{125}{x^3} + \ldots\ldots\ldots$ Is finite then

A. $|x| > 5$

B. $-5 < x < 5$

C. $|x| < 5/2$

D. $|x| > 5/2$

Answer: A

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60. in a geometric progression consisting of positive terms, each term equals the sum of the next two terms. Then the common ratio of this progression equals-

A. $\frac{1}{2}(1 - \sqrt{5})$

B. $\frac{1}{2}\sqrt{5}$

C. $\sqrt{5}$

D. $\frac{1}{2}(\sqrt{5}-1)$

Answer: D

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

A. A.P

B. G.P

C. H.P

D. none of these

Answer: C

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62. If $\log_3 2, \log_3(2^x - 5)$ and $\log_3\left(2^x - \frac{7}{2}\right)$ are in $A.P.$, determine the value of x.

A. 7

B. 3

C. 4,5

D. 8

Answer: B

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63. Sum of the series $\sum_{r=1}^{n} r \log\left(\frac{r+1}{r}\right)$ is

A. $\log \frac{(n+1)^n}{n!}$

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

C. $n!\log(n+1)$

D. none of these

Answer: A

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64. 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 $\frac{G_1G_2}{H_1H_2} = \frac{A_1 + A_2}{H_1 + H_2} = \frac{(2a + b)(a + 2b)}{9ab}$

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

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

C. 1

D. 2

Answer: C

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65. Sum of the series $S_n = (n)(n) + (n-1)(n+1) + (n-2)(n+2) + \ldots + 1(2n-1)$ is

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

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

C. n^3

D. none of these

Answer: D

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66. Suppose for each $n \in N, 1^4 + 2^4 + 3^4 + \ldots. + n^4 = an^5 + bn^4 + cn^3 + dn^2 + en + f,$ then value of b is

A. $1/5$

B. $1/2$

C. $1/3$

D. 1

Answer: B

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67. Value of $S = 2012 + \frac{1}{3}\left(2011 + \frac{1}{3}\left(2010 + \frac{1}{3}\left(2009 + \frac{1}{3}\left(2 + \frac{1}{3}(1)\right)....\right)\right)\right)$ is

A. 3018

B. 3017.5

C. $3017.5 - \frac{1}{4}\left(\frac{1}{3}\right)^{2011}$

D. $3018 - \frac{1}{4}\left(\frac{1}{3}\right)^{2011}$

Answer: C

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68. Suppose a,b,c are positive real numbers satisfying the system of equations

$\left(a^2+ab+b^2\right)\left(b^2+bc+c^2\right)\left(c^2+ca+a^2\right)=abc$ and $\left(a^4+a^2b^2+b^4\right)\left(b$

then

A. $a=b=c=1/3$

B. $abc=1$

C. $\frac{1}{3}(a+b+c)=(abc)^{1/2}$

D. a,b,c are in G.P.

Answer: A

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69. Suppose a,b,c are distinct positive real numbers such that a,2b,3c are in A.P. and a,b,c are in G.P. The common ratio of G.P. is

A. 2

B. $1/2$

C. $1/3$

D. 3

Answer: C

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70. Let S_n denote the sum of the cubes of the first n natural numbers and s_n denote the sum of the first n natural numbers. Then $\sum_{r=1}^{n} \frac{S_r}{s_r}$ is equal to

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

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

C. $\frac{1}{6}n(n+1)(n+2)$

D. $\frac{1}{4}n^2(n+1)^2$

Answer: C

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71. $1+\frac{2}{3}+\frac{6}{3^2}+\frac{10}{3^3}+\frac{14}{3^4}+$

A. 4

B. 6

C. 2

D. 3

Answer: D

Watch Video Solution

72. Simplify

$$P=\frac{1}{2\sqrt{1}+\sqrt{2}}+\frac{1}{3\sqrt{2}+2\sqrt{3}}+\ldots.+\frac{1}{100\sqrt{99}+99\sqrt{100}}$$

A. $1/10$

B. $3/10$

C. $9/10$

D. $1/2$

Answer: C

Watch Video Solution

73. $\sqrt{2\sqrt{2\sqrt{2\sqrt{2....}}}} =$

A. 0

B. 1

C. 2

D. none of these

Answer: A

Watch Video Solution

74. Let $[x]$ denote the greatest integer less than or equal to x, what is the value of $[\sqrt{1}] + [\sqrt{2}] + [\sqrt{3}] + \ldots\ldots\ldots\ldots + [\sqrt{2004}]$

A. 59000

B. 58750

C. 59730

D. 65138

Answer: C

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75. A person is to cout 4500 currency notes. Let a_n denotes the number of notes he counts in the nth minute. If $a_1 = a_2 = \ldots\ldots\ldots = a_{10} = 150$ and $a_{10}, a_{11}, \ldots\ldots,$ are in AP with common difference -2, then the time taken by him to count all notes is

A. 125 minutes

B. 135 minutes

C. 24 minutes

D. 34 minutes

Answer: D

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76. 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 from the start of swrvice will be Rs. 11040 after

A. 21 months

B. 18 months

C. 19 months

D. 20 months

Answer: A

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77. Let a_n be the n^{th} term of an A.P. If $\sum_{r=1}^{100} a_{2r} = \alpha \& \sum_{r=1}^{100} a_{2r-1} = \beta,$ then the common difference of the A.P. is $\alpha - \beta$ (b) $\beta - \alpha$ $\frac{\alpha - \beta}{2}$ (d) None of these

A. $\alpha - \beta$

B. $\frac{1}{100}(\alpha - \beta)$

C. $\beta - \alpha$

D. $\frac{1}{200}(\alpha - \beta)$

Answer: B

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78. If m times the mth term of an A.P. with non-zero common difference equals n times the nth term of the A.P., where $m \neq n$, then (m+n)th term of this A.P. is

A. (m+n) times mth term

B. zero

C. m+n

D. $-(m+n)$

Answer: B

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79. If $a_1, a_2, a_3, \ldots\ldots$ be in 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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80. A species has an initial population 4^{10}. At the end of first day, the population increases by 50%. At the end of second day, it decreases by the same percentage. Days for the population to reach 3^{10} is

A. 10

B. 20

C. 50

D. 100

Answer: B

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

A. $3n^2$

B. $2n^2$

C. $6n - 2n^2$

D. n^2

Answer: D

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82. The series of natural numbers is divided into groups $:(1);(2,3,4);(5,6,7,8,9)\ldots$ and so on. The sum of numbers in the n^{th} group is

A. $2\left(n^2 - n + 1\right)$

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

C. $n^2 + n$

D. $n^2 - n + 2$

Answer: A

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83. In a arithmetic progression of 16 distinct terms with $a_1 = 16$, the sum is equal to square of the last term. The common difference of the A.P. is

A. $8/15$

B. $-4/5$

C. $-8/5$

D. $-8/15$

Answer: C

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SOLVED EXAMPLES LEVEL -2 (SINGLE CORRECT ANSWER TYPE QUESTIONS)

1. If $(1-y)\left(1+2x+4x^2+8x^3+16x^4+32x^5\right)=\left(1-y^6\right)$ then $\frac{y}{x}=$

A. $1/2$

B. 2

C. $1/4$

D. 4

Answer: B

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2. If $\frac{22}{7}$ and π appear as two distinct terms of an A.P., then common difference of the A.P. must be

A. an integer

B. a rational number

C. an irrational number

D. 0

Answer: C

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3. Let $a_m = \underbrace{111\ldots1}_{\text{m times}}$, then which of the following is a prime number ?

A. a_4

B. a_5

C. a_{91}

D. a_{100}

Answer: B

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4. Let $I_n = \int_0^{\pi/4} \tan^n x dx$. Then $I_2 + I_4, I_3 + I_5, I_4 + I_6, I_5 + I_7, \ldots$ are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: C

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5. 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. $\frac{b}{q}-\frac{a}{p}$

Answer: A

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6. Sum to n terms of the series $\frac{1}{1\cdot 2\cdot 3\cdot 4}+\frac{1}{2\cdot 3\cdot 4\cdot 5}+\frac{1}{3\cdot 4\cdot 5\cdot 6}+\ldots$ is

A. $\frac{1}{24}-\frac{1}{n}$

B. $\frac{1}{18}-\frac{1}{3(n+1)(n+2)(n+3)}$

C. $\frac{1}{2^n}-\frac{1}{n^2}$

D. $\frac{1}{18}-\frac{1}{3(n+3)(n+4)}$

Answer: B

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7. Sum to n terms of the series $\frac{1}{5!}+\frac{1}{6!}+\frac{2!}{7!}+\frac{3!}{8!}+\ldots\ldots$ is

A. $\frac{2}{5!}-\frac{1}{(n+1)!}$

B. $\frac{1}{4}\left(\frac{1}{4!}-\frac{n!}{(n+4)!}\right)$

C. $\frac{1}{4}\left(\frac{1}{3!}-\frac{3!}{(n+2)!}\right)$

D. none of these

Answer: B

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8. The n^{th} term of the series $\frac{1^3}{1}+\frac{1^3+2^3}{1+3}+\frac{1^3+2^3+3^3}{1+3+5}+\ldots$ will be

A. $\frac{n}{24}\left(n^2+9n+13\right)$

B. $\frac{n}{24}\left(2n^2+7n+15\right)$

C. $\frac{n}{24}\left(2n^2+9n+13\right)$

D. $\frac{n}{24}\left(n^2+11n+11\right)$

Answer: C

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9. sum of the series $\sum_{r=1}^{n} \frac{r}{r+1!} is$

A. $1 - \frac{1}{n!}$

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

C. $2 - \frac{1}{(n+1)!}$

D. none of these

Answer: B

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10. Sum to n terms of the series $\frac{1}{1.2.3} + \frac{3}{2.3.4} + \frac{5}{3.4.5} + \frac{7}{4.5.6} + \ldots$ is

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

B. $\frac{n(3n+1)}{4(n+1)(n+2)}$

C. $\frac{1}{6}-\frac{5}{(n+1)(n+4)}$

D. none of these

Answer: B

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11. If $\frac{48}{2.3}+\frac{47}{3.4}+\frac{46}{4.5}+\ldots+\frac{2}{48.29}+\frac{1}{49.50}$ $=\frac{51}{2}+k\left(1+\frac{1}{2}+\frac{1}{3}+\ldots+\frac{1}{50}\right)$, then k equals

A. 2

B. -1

C. $-1/2$

D. 1

Answer: B

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12. Suppose $k \in N$. In the Cartesian plane, suppose the line L_k whose equation is y+x+k(k+1) meets the parabola $y = x^2$ at two points A_k and B_k, Let L_k = length of the segment A_kB_k and $T_k =$ area of ΔOA_kB_k, then $\sum_{k=1}^{n} \frac{T_k}{L_k}$ is equal to

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

B. $\frac{1}{6\sqrt{2}} n^2(n+1)$

C. $\frac{1}{6\sqrt{2}} n(n+1)(2n+1)$

D. $\frac{1}{6\sqrt{2}} n(n+1)(n+2)$

Answer: D

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SOLVED EXAMPLES LEVEL (Numerical Answer Type Questions)

1. Refer to the statement of Example 110, and let S_k denote the area bounded by L_k and $y = x^2$, then $3\sum_{k=1}^{\infty} S_k / \left(T_k^2\right)$ is equal to

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

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3. If $x > 0$ and $\log_3(x) + \log_3\left(x^{1/3}\right) + \log_3\left(x^{1/9}\right) + \log_3\left(x^{1/27}\right) + \ldots = 6$, then x=

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4. If a_1, a_2, a_3, a_4 are in HP, then $\frac{1}{a_1 a_4}\sum_{r=1}^{3} a_r a_{r+1}$ is root of :

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5. Let $s_n = 1 + \frac{1}{3} + \frac{1}{3^2} + \ldots + \frac{1}{3^{n-1}}$. The least value of $n \in N$ such that $\frac{3}{2} - S_n < \frac{1}{400}$ is

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6. Let a_n be the nth term of a G.P. of positive real numbers. If $\sum_{n=1}^{200} a_{2n} = 4$ and $\sum_{n=1}^{200} a_{2n-1} = 5$, then the common ratio of the G.P. is

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7. Let [x] = greatest integer $\leq x$. Suppose roots of the quadratic equation $x^2 + 2(b-3)x + 9 = 0$ lie between -6 and 1. Suppose $\frac{1}{2}, \frac{1}{h_1}, \frac{1}{h_2}, \ldots, \frac{1}{h_{20}}, \frac{1}{[b]}$ are in A.P. and $2, a_1, a_2, \ldots, a_{20}$,[b] are also in A.P., then $a_3 h_{18} =$

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8. three number a, b, c are in GP such that : (i) $a+b+c=70$ (ii) $4a, 5b, 4c$ are in AP if $G = \max\{a, b, c\}$ and $L = \min\{a, b, c\}$ than $\left[\frac{G}{L}\right]$ is equal is :

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9. Suppose $a_1, a_2, \ldots a_n$ are positive real numbers which are in A.P. If

$$\frac{1}{a_1 a_n} + \frac{1}{a_2 a_{n-1}} + \ldots + \frac{1}{a_n a_1} = \frac{\lambda}{a_1 + a_n}\left(\frac{1}{a_1} + \frac{1}{a_2} + \ldots + \frac{1}{a_n}\right) \quad (1)$$

then λ =

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10. Suppose α, γ are roots of the equation $ax^2 - 4x + 1 = 0$ and β, δ be the roots of the equation $bx^2 - 6x + 1 = 0$. If $\frac{1}{\alpha}, \frac{1}{\beta}, \frac{1}{\gamma}, \frac{1}{\delta}$ are in A.P., then a+b =

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11. Let a_n is a positive term of a GP and $\sum_{n=1}^{100} a_{2n+1} = 200$, $\sum_{n=1}^{100} a_{2n} = 200$,

find `sum_(n=1)^200 a_(2n) =?

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12. Suppose $a_1, a_2, \ldots$ are real numbers such that

$$\sqrt{a_1} + \sqrt{a_2 - 1} + \sqrt{a_3 - 2} + \ldots + \sqrt{a_n - (n-1)}$$
$$= \frac{1}{2}(a_1 + a_2 + \ldots + a_n) - \frac{1}{4}n(n-3) \quad (1)$$

$\forall n \in N$, then a_{18}=

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13. Let $S = \sum_{n=1}^{\infty} \frac{5^n 7^n}{(7^n - 5^n)(7^{n+1} - 5^{n+1})}$ then S=

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14. Let $S = \sum_{k=1}^{\infty} \frac{k(10)^k + 2^{k+1}5^k}{5^k 2^{2k+1}(k+1)}$, then S=

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15. Consider an A.P. $a_1, a_2, a_n,$ and the G.P. $b_1, b_2, , b_n,$ such that $a_1 = b_1 = 1, a_9 = b_9$ and $\sum_{r=1}^{9} a_r = 369,$ then $b_6 = 27$ (b) $b_7 = 27$ $b_8 = 81$ (d) $b_9 = 81$

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16. Suppose $a_1, a_2, \ldots a_{201} > 0$ and are in G.P. If $a_{101} = 36$ and $\sum_{n=1}^{201} a_n = 216$ then $3\sum_{n=1}^{201} \frac{1}{a_n} =$

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17. Let P_n denote the product of first n terms of the G.P. 16, 4, 1, 1/4,...., then $\sum_{n=1}^{\infty} (P_n)^{1/n}$=

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18. Suppose

$x, y \in N$ and $\log_5(x) + \log_5\left(x^{1/2}\right) + \log_5\left(x^{1/4}\right) + \ldots. = y \quad (1)$

$$\frac{1+3+5+\ldots.+(2y-1)}{4+7+10+\ldots+(3y+1)} = \frac{20}{7\log_5(x)} \quad (2)$$

then $\log_{10}(y) + \log_5(x) =$

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19. The coefficient of the quadratic equation $ax^2 + (a+d)x + (a+2d) = 0$ are consecutive terms of a positively valued, increasing arithmetic sequence. Then the least integral value of d/a such that the equation has real solutions is _____.

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20. Suppose $1 < a < \sqrt{e}$ and $\log_e a^2 + \left(\log_e a^2\right)^2 + \left(\log_e a^2\right)^3 + \ldots.$

$= 3\left[\log_e a + (\log_e a)^2 + (\log_e a)^3 + \ldots\right] \quad (1)$

then $\log_e\left(a^3\right) =$

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21. For k=2,3,..., let S_k denote the sum of the infinite G.P. whose first term is $k^2 + k - 2$ and common ratio is $\frac{1}{k}$, then $\sum_{k=1}^{\infty} \frac{S_k}{2^k} =$

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EXERCISES CONCEPT-BASED (Single Correct Answer Type Questions)

1. Let $a_n = \left[\log\left(\frac{7}{5}\right)\right]^n$ and $b_n = \log_5(a_n)\ \forall n \in N$. Then $b_1, b_2, b_3, \ldots$ are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: A

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2. If a, b, c are three distinct real numbers in G.P. and $a+b+c=xb$, then prove that either $x\langle -1$ or $x\rangle 3$.

A. $x > 3$

B. $x > 4$

C. $x > \sqrt{5}$

D. $x > \sqrt{3}+\sqrt{5}$

Answer: A

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3. If for each $n \in N$, $S_n = nA + \frac{1}{2}n(n+1)B$ is sum of the first n terms of an A.P., the common difference of the A.P. is

A. A+B

B. A+2B

C. B

D. B/2

Answer: C

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4. An A.P. consists of 2n terms. If two middle terms are $\alpha - \beta$ and $\alpha + \beta$, then sum of the 2n terms of the A.P. is

A. $2n\alpha$

B. $2n\beta$

C. $2n(\alpha + \beta)$

D. $2n(\alpha - \beta)$

Answer: A

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5. For what value of n, the nth terms of the arithmetic progressions 63, 65, 67, ... and 3, 10, 17,... are equal?

A. 71

B. 37

C. 11

D. 13

Answer: D

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6. Suppose $a, c \in Q$ and $b \in R - Q$, then which one of the following can be true?

A. a, b+2, c are in A.P

B. a, b+1,c are in G.P.

C. a, b-3, c are in H.P.

D. a, b-2, c are in A.P.

Answer: B

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7. Suppose $a, b, c > 0, x, y, z > 1$ and a, b, c are in G.P. If $a^{\log x} = b^{\log y} = c^{\log z}$, then

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

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

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

D. none of these

Answer: D

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

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

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

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

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

Answer: C

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9. In a set of four numbers, the first three are in GP & the last three are in AP, with common difference 6. If the first number is the same as the fourth, find the four numbers.

A. 18

B. 21

C. 24

D. 27

Answer: B

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10. Suppose A.M. of two positive numbers be 7 and G.M. between them be 5. The A.M. between their squares is

A. 57

B. 73

C. 78

D. 37

Answer: B

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11. Sum of an infinite G.P. is 2 and sum of their cubes is 24, then 5th term of the G.P. is

A. $3/16$

B. $3/8$

C. $-3/8$

D. $-3/16$

Answer: A

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12. Suppose a, b are two positive numbers. The product of three arithmetic means inserted between a, b is 15/2 and product of three arithmetic means inserted between 1/a and 1/b is 5/18. Then ab is equal to:

A. 9

B. 6

C. 3

D. 1

Answer: C

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13. if $\frac{a+b}{1-ab}, b, \frac{b+c}{1-bc}$ are in AP then $a, \frac{1}{b}, c$ are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: A

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14. The sum of the infinite series $\frac{5}{17}+\frac{55}{(17)^2}+\frac{555}{(17)^3}+\ldots..$ is

A. $\frac{1}{17}$

B. $\frac{85}{112}$

C. $\frac{85}{324}$

D. $\frac{19}{289}$

Answer: B

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15. Sum of the series $\sum_{r=1}^{2016}(-1)^r(a+rd)$ is

A. a + 2016d

B. 2015d

C. 0

D. 1008d

Answer: D

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EXERCISES LEVEL-1 (Single Correct Answer Type Questions)

1. If $5a - b, 2a + b, a + 2b$ are in A.P. and $(a-1)^2, (ab+1), (b+1)^2$ are in G.P., $a \neq 0$, then a is equal to

A. $2, \ -1/4$

B. $-2, \ -1/4$

C. $-2, 1/4$

D. $2, 1/4$

Answer: C

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2. $\frac{1}{a}+\frac{1}{c}+\frac{1}{a-b}+\frac{1}{c-b}=0$ and $b \neq a+c,$ then a, b, c are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: C

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3. In an A.P, the first term is 1 and sum of the first p terms is 0, then sum of the first (p + q) terms is

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

B. $\frac{q}{1-p}$

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

D. $\frac{2(p+q)}{1-p}$

Answer: A

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4. If both the A.M. between m and n and G.M. between two distinct positive numbers a and b are equal to $\frac{ma+nb}{m+n}$, then n is equal to

A. $\frac{a\sqrt{b}}{\sqrt{a}+\sqrt{b}}$

B. $\frac{2a\sqrt{b}}{\sqrt{a}+\sqrt{b}}$

C. $\frac{\sqrt{ab}}{\sqrt{a}+\sqrt{b}}$

D. $\frac{1}{\sqrt{a}+\sqrt{b}}$

Answer: B

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5. Product of two positive integers a and b is 192. Let 8 = hef (a, b) and I = lem (a, b). If the ratio of A.M. between g and I to the H.M. between g and l

is $\frac{169}{48}$, then smaller of a,b is

A. 8,24

B. 12,16

C. 4,12

D. 6,24

Answer: C

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6. The least positive integer n such that $1-\frac{2}{3}-\frac{2}{3^2}-\ldots\ldots\ldots-\frac{2}{3^{n-1}}<\frac{1}{100}$ is

A. 4

B. 5

C. 6

D. 7

Answer: D

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7. Let the positive numbers a, b, c, d be in AP. Then abc, abd, acd, bcd are

(2001, 1M) not in AP/GP/HP (b) in AP in GP (d) in HP

A. Not in A.P/G.P/H.P.

B. in A.P.

C. in G.P.

D. in H.P.

Answer: D

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8. Find the harmonic mean of the roots of the equation $\left(5+\sqrt{2}\right)x^2-\left(4+\sqrt{5}\right)x+\left(8+2\sqrt{5}\right)=0$

A. 2

B. 4

C. 6

D. 8

Answer: B

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9. If $\cos(x-y), \cos x$ and $\cos(x+y)$ are in H.P., then $\left|\cos x \frac{\sec(y)}{2}\right|$ equals

A. $\pm\sqrt{2}$

B. $\pm\sqrt{3}$

C. $\pm\sqrt{2}$

D. ± 1

Answer: A

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10. Let $S_n = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \ldots\ldots + \frac{1}{2^n - 1}$. Then

A. $a(200) > 100$

B. $a(100) > 100$

C. $a(50) < 25$

D. none of these

Answer: A

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

A. $38/81$

B. $4/19$

C. $36/171$

D. none of these

Answer: A

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

A. H.P.

B. G.P.

C. A.P.

D. none of these

Answer: C

Watch Video Solution

13. If a,b,c,d are in GP and $a^x = b^x = c^z = d^u$, then x, y, z, u are in

A. A.P

B. G.P.

C. H.P

D. none of these

Answer: C

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14. If $a, b, c, dandp$ are distinct real numbers such that $(a^2 + b^2 + c^2)p^2 - 2(ab + bc + cd)p + (b^2 + c^2 + d^2) \leq 0,$ then prove that a, b, c, d are in G.P.

A. A.P

B. G.P.

C. H.P

D. none of these

Answer: B

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15. If a,b,c are in A.P., then 2^{ax+1}, 2^{bx+1}, 2^{cx+1}, $x \in R$, are in

A. A.P

B. G.P. and when $x > 0$

C. G.P. only when $x < 0$

D. G.P. for all x

Answer: D

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16. The rational number, which equals the number $2.\overline{357}$ with recurring decimal is:

A. $\frac{2355}{1001}$

B. $\frac{2370}{999}$

C. $\frac{2355}{999}$

D. $\frac{2359}{991}$

Answer: C

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17. The sum to infinity of the series

$1+\frac{4}{5}+\frac{7}{5^2}+\frac{10}{5^3}+\ldots,$ is

A. $\frac{16}{35}$

B. $\frac{11}{8}$

C. $\frac{35}{16}$

D. $\frac{17}{6}$

Answer: C

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18. If the sum of n terms of an A.P. is $3n^2 + 5n$ and its mth term is 164, find the value of m.

A. 25

B. 26

C. 27

D. 28

Answer: C

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

A. $A/2$

B. A

C. 2A

D. none of these

Answer: C

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20. If A_1, A_2 be two A.M.'s and G_1, G_2 be two G.M.,s between a and b, then $\frac{A_1 + A_2}{G_1 G_2}$ is equal to

A. $\frac{ab}{a+b}$

B. $\frac{2ab}{a+b}$

C. $\frac{a+b}{2ab}$

D. $\frac{a+b}{ab}$

Answer: D

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21. The first and last term of an A.P. are a and l respectively. If S be the sum of all the terms of the A.P., them the common difference is

A. $\frac{l^2-a^2}{s-(l+a)}$

B. $\frac{l^2-a^2}{2s-(1+a)}$

C. $\frac{l^2+a^2}{2s-(1+a)}$

D. $\frac{l^2+a^2}{s-(l-a)}$

Answer: B

Watch Video Solution

22. The value of $2^{\frac{1}{4}}.4^{\frac{1}{8}}.8^{\frac{1}{16}}, , , , , , , \infty$ is equal to.

A. 2

B. $3/2$

C. 1

D. $1/2$

Answer: A

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23. . The sum of an infinite number of terms of a G.P. is 20, and the sum of their squares is 100, then the first term of the G.P. is

A. 5

B. $8/5$

C. $3/5$

D. 8

Answer: D

Watch Video Solution

24. The eighth term of a geometric progression is 128 and common ratio is 2. The product of the first five terms is

A. 4^6

B. 4^5

C. 4^3

D. 4^8

Answer: B

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25. l, m,n are the p^{th}, q^{th} and r^{th} term of a G.P. all positive, then $\begin{vmatrix} \log l & p & 1 \\ \log m & q & 1 \\ \log n & r & 1 \end{vmatrix}$ equals :

A. pqr

B. p+q+r

C. p+q+r+pqr

D. 0

Answer: D

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26. If $a_1, a_2, a_3,$ be terms of an A.P. if $\frac{a_1 + a_2 + + a_p}{a_1 + a_2 + + a_q} = \frac{p^2}{q^2}, p \neq q, then \frac{a_6}{a_{21}}$ equals 41/11 b. 7/2 c. 2/7 d. 11/41

A. $\frac{11}{41}$

B. $\frac{41}{11}$

C. $\frac{7}{2}$

D. $\frac{2}{7}$

Answer: A

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27. The sum of 10 terms of the series $\sqrt{2}+\sqrt{6}+\sqrt{18}+\ldots$ is

A. $121\left(\sqrt{6}+\sqrt{2}\right)$

B. $\frac{121}{2}\left(\sqrt{3}+1\right)$

C. $243\left(\sqrt{3}+1\right)$

D. $243\left(\sqrt{3}-1\right)$

Answer: A

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

A. 15

B. 14

C. 13

D. 16

Answer: B

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29. Sum of series $1^2 + \left(1^2 + 2^2\right) + \left(1^2 + 2^2 + 3^2\right) + \ldots.$ upto 22 terms is

A. 23276

B. 22736

C. 22738

D. 227152

Answer: A

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30. If a, b, c are in A.P and a^2, b^2, c^2 are in H.P then

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

B. $a + b = c$

C. $a = b + c$

D. a,b,c are in G.P.

Answer: A

Watch Video Solution

31. The mth term of an $A.P.$ is n and nth term is m. Then rth term of it is

A. m + n -r

B. m+n+r

C. m-n +r

D. r-(m +n)

Answer: A

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32. If a,b, c are in G.P., then the equations $ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have common root if $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in

A. A.P

B. G.P.

C. H.P

D. none of these

Answer: A

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33. If $\log_{10} 2, \log_{10}(2^x - 1)$ and $\log_{10}(2^x + 3)$ are three consecutive terms of an A.P, then the value of x is

A. $x = 0$

B. $x = 1$

C. $x = \frac{1}{2}\log_{10} 2$

D. $x = \frac{1}{2}\log_2 5$

Answer: D

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34. Suppose $\frac{1}{2}x, lx, +1l, lx-1l, 1l$ are in A.P., then sum to 10 terms of the A.P. is

A. 54

B. 36

C. 28

D. none of these

Answer: D

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35. Let the harmonic mean and geometric mean of two positive numbers be in the ratio 4:5. Then the two numbers are in ratio..... (1992, 2M)

A. $4:1$

B. $3:1$

C. $2:1$

D. $1:3$

Answer: A

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

A. 445

B. 446

C. 447

D. 448

Answer: B

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37. If $\log(a+c)+\log(a+c-2b)=2\log(a-c)$ then

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

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

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

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

Answer: C

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38. The sum of intergers from 1 to 100 that are divisible by 2 or 5 is -

A. 3050

B. 3150

C. 3250

D. 3350

Answer: A

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39. The common difference d of the A.P. in which $T_7 = 9$ and $T_1T_2T_7$ is least is

A. $33/2$

B. $5/4$

C. $33/20$

D. $7/3$

Answer: C

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40. The numbers $3^{2\sin 2\alpha - 1}$, 14 and $3^{4 - 2\sin 2\alpha}$ form first three terms of A.P., its fifth term is

A. 25

B. 40

C. 53

D. -12

Answer: C

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41. Sum of first 'n' terms of the series $\frac{3}{2}+\frac{5}{4}+\frac{9}{8}+\frac{17}{16}+\ldots$

A. $n+1-2^n$

B. $1+2^{-n}$

C. 2^n-1

D. 2^n-n+1

Answer: A

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42. The sum of n terms of the series $1^2 + 2.2^2 + 3^2 + 2.4^2 + 5^2 + 2.6^2 + \ldots.$ is $\frac{n(n+1)^2}{2}$ when n is even . when n is odd , the sum is

A. $n(n-1)^2/2$

B. $n^2(n+1)/2$

C. $n(n+2)/3$

D. $n(n+3)/2$

Answer: B

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43. Find the sum series: $\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{13}\right) + \ldots \to \infty$

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

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

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

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

Answer: A

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44. FInd the sum of infinite terms of the series $\frac{1}{1.2.3}+\frac{1}{2.3.4}+\frac{1}{3.4.5}\ldots\ldots$

A. $\frac{116}{465}$

B. $\frac{495}{1984}$

C. $\frac{435}{791}$

D. $\frac{485}{791}$

Answer: B

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45. If $n!$, $3n!$ and $(n-1)!$ are in G.P then $n!$, $5n!$ and $(n+1)!$ are in

A. A.P

B. G.P.

C. H.P

D. none of these

Answer: A

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46. If $S_n = 81 + 54 + 36 + 24 + ..$ upto n terms, then value of $x = \frac{S_n - 4S_{n-1} + 6S_{n-2} - 4S_{n-3} + S_{n-4}}{S_{n-1} - 4S_{n-2} + 6S_{n-3} - 4S_{n-4} + S_{n-5}}$ is equal

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

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

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

D. 2

Answer: A

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47. The sum of first 'n' terms of the series $1^2 + (1)(2) + 3^2 + (3)(4) + 5^2 + (5)(6) + 7^2 + \ldots\ldots$ when n is odd is

A. $\frac{1}{12}(n+1)\left(4n^2 - n + 3\right)$

B. $\frac{1}{12}n\left(4n^2 + 3n - 4\right)$

C. $\frac{1}{6}(n+1)\left(4n^2 - n + 5\right)$

D. none of these

Answer: A

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48. If

$$L = \lim_{n \to \infty} \left(1 + 3^{-1}\right)\left(1 + 3^{-2}\right) + \left(1 + 3^{-4}\right) + \left(1 + 3^{-8}\right) \ldots \left(1 + 3^{-2^n}\right)$$

, then

A. $L = \frac{2}{3}$

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

C. $L = 1$

D. $L = 2$

Answer: B

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49. If $a_1, a_2, a_3, \ldots\ldots a_n$, are 'n', distinct odd natural numbers, not divisible by any prime number greater than 5, then $\frac{1}{a_1} + \frac{1}{a_2} + \frac{1}{a_3} + \ldots\ldots + \frac{1}{a_n}$ is less than $(a)\frac{15}{8}(b)\frac{17}{8}(c)\frac{19}{8}(d)\frac{21}{8}$

A. 2

B. 1

C. $1/2$

D. none of these

Answer: A

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50. Coefficient of x^{99} in the expansion of (x-1) (x-3)(x-5)..(x-1999) is

A. -100

B. -1000

C. -10000

D. -100000

Answer: C

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51. Find the sum to n terms of the series $1+(1+2)+(1+2+3)+.....$

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

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

C. $\frac{1}{4}n(n+1)(2n+1)$

D. $\frac{1}{6}n(n+1)(n+2)$

Answer: D

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52. If $x=\sum_{n=0}^{\infty}a^n, y=\sum_{n=0}^{\infty}b^n, 0<a<b<1,$ and $z=\sum_{n=0}^{\infty}\left(\frac{a}{b}\right)^n$, then

A. x+ yz =x (y +z)

B. xyz = x+y+z

C. xy +z=y (y + z)

D. none of these

Answer: A

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53. If the sum of an infinite decreasing G.P. is 3 and sum of the cubes of its terms is 108/13, then common ratio is given by

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

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

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

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

Answer: C

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54. The sum of the series $S = \sum_{r=1}^{n} \log\left(\frac{a^{r+1}}{b^{r-1}}\right)$ is

A. $\frac{n}{2}\log\left(\frac{a^{n-1}}{b^n}\right)$

B. $\frac{n}{2}\log\left(\frac{a^{n+3}}{b^{n-1}}\right)$

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

D. none of these

Answer: B

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55. If the fifth term of a G.P. is 2, then write the product of its 9 terms.

A. 256

B. 512

C. 1024

D. 204

Answer: B

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56. If s is the sum to infnity of a G.P, whose first term is a, then the sum of the first n terms of the G.P. is

A. $s\left[1-\left(1-\frac{a}{s}\right)^n\right]$

B. $s\left(1-\frac{a}{s}\right)^n$

C. $a\left[1-\left(1-\frac{a}{s}\right)^n\right]$

D. $\frac{a}{s}\left[1-\left(1-\frac{a}{s}\right)^n\right]$

Answer: A

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57. For a sequence $< a_n >$, $a_1 = 5$ and $\frac{a_{r+1}}{a_r} = \frac{1}{2} \forall r$, then $\sum_{n=1}^{\infty} a_{2n-1}$ is

A. $20/7$

B. $20/5$

C. $20/3$

D. 20

Answer: C

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58. If the H.M.of two numbers is to their GM. is $12:13$ then the numbers are in the ratio

A. $1:2$

B. $2:3$

C. $3:5$

D. $4:9$

Answer: D

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59. The H.M. between two numbers is 16/5, their A.M. is A and G.M. is G. If $2A + G^2 = 26$ then the numbers are

A. 6,8

B. 4,8

C. 2,8

D. 1,8

Answer: C

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60. If $a_r = a + (r-1)d$ is rth term of an A.P., then $a_n^2 - 2a_{n-1}^2 + a_{n-2}^2$ is independent of

A. n

B. d

C. a

D. a and n both

Answer: D

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61. If $A = 1 + r^2 + r^{2a} + \ldots\infty = a$ and $B = 1 + r^b + r^{2b} + \ldots\infty = b$ then $\frac{a}{b}$ is equal to

A. $\frac{\log(1+A)}{\log(1+B)}$

B. $\frac{\log(A-1)}{\log(B-1)}$

C. $\log_B A$

D. none of these

Answer: D

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62. Suppose $a_1 = 45, a_2 = 41$ and $a_k = 2a_{k-1} - a_{k-2} \forall k \geq 3$, then, value of

$S = \frac{1}{12}\left[a_1^2 - a_2^2 + a_3^2 - a_4^2 + \ldots + a_{11}^2 - a_{12}^2\right]$ is

A. 89

B. 90

C. 91

D. 92

Answer: D

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63. Suppose $P(x) = 1 - x + x^2 - x^3 + \ldots + x^{2012}$ is expressed as a polynomial in y, as $Q(y) = a_0 + a_1 y + \ldots + a_{2012} y^{2012}$ where $y = x - 2$, then $\sum_{i=0}^{2012} a_i$ equals

A. $\frac{1}{4}\left(3^{2013}+1\right)$

B. $\frac{1}{3}\left(3^{2013}-1\right)$

C. 0

D. 1

Answer: A

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64. The sum of first 26 terms of an A.P. $a_1, a_2, a_3, . .$ if $a_2 + a_6 + a_9 + a_{18} + a_{21} + a_{25} = 165$, is

A. 705

B. 715

C. 725

D. 735

Answer: B

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65. In the sum of first n terms of an A.P. is cn^2, then the sum of squares of these n terms is

A. $\frac{n\left(4n^2-1\right)c^2}{6}$

B. $\frac{n\left(4n^2+1\right)c^2}{3}$

C. $\frac{n\left(4n^2-1\right)c^2}{3}$

D. $\frac{n\left(4n^2+1\right)c^2}{6}$

Answer: C

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EXERCISES LEVEL-2 (Single Correct Answer Type Questions)

1. The rth term of the series $2\left(\frac{1}{2}\right)+1\left(\frac{7}{13}\right)+1\left(\frac{1}{9}\right)+\frac{20}{23}+\ldots\ldots$ is

A. $\frac{15}{5n+3}$

B. $\frac{20}{5n+4}$

C. $\frac{20}{5n+3}$

D. $\frac{20}{5n+2}$

Answer: C

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2. H.M. between $\frac{1}{28}$ and $\frac{1}{10}$ is

A. $\frac{1}{19}$

B. $\frac{1}{18}$

C. $\frac{1}{17}$

D. $\frac{1}{16}$

Answer: A

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3. If $a\left(\frac{1}{b}+\frac{1}{c}\right), b\left(\frac{1}{c}+\frac{1}{a}\right), c\left(\frac{1}{a}+\frac{1}{b}\right)$ are in A.P. prove that a, b, c are in A.P.

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

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

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

D. none of these

Answer: A

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4. If $a_1, a_2, a_3, \ldots a_n$ are in A.P with common difference d then find the sum of the following series

$\sin d(\cos eca_1 \cos eca_2 + \cos eca_2 \cos eca_3 + \ldots. \cos eca_{n-1} \cos eca_n)$

A. $\sec a_1 - \sec a_n$

B. $\cos eca_1 - \cos eca_n$

C. $\cot a_1 - \cot a_n$

D. $\tan a_1 - \tan a_n$

Answer: C

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5. If $H_n = 1 + \frac{1}{2} + \frac{1}{3} + ... + \frac{1}{n}$, then value of $1 + \frac{3}{2} + \frac{5}{3} + ... + \frac{2n-1}{n}$ is

A. $H_n + n$

B. $2n - H_n$

C. $n - 1 + H_n$

D. $H_n + 2n$

Answer: B

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6. If a, b, c are in H.P., then prove that $\frac{a}{b+c-a}, \frac{b}{a+b-c}, \frac{c}{a+b-c}$ are in H.P.

A. A.P

B. G.P.

C. H.P

D. A.G.P

Answer: C

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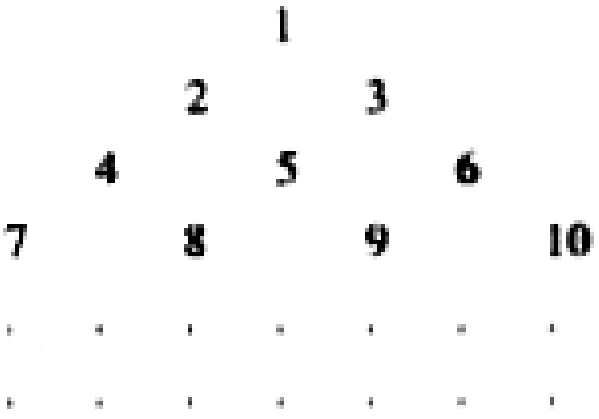
7. Sum of all the terms in the nth row of the triangle



is

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

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

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

D. $n^2(n+1)$

Answer: B

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8. Let α and β be two positive real numbers. Suppose A_1, A_2 are two arithmetic means; G_1, G_2 are tow geometrie means and H_1H_2 are two harmonic means between α and β, then

A. $\frac{2(a^2+b^2)+5ab}{9b}$

B. $\frac{a^2+b^2}{9ab}+5$

C. $\frac{a^2+b^2+5(a+b)}{9ab}$

D. $\frac{a^2+b^2+7(a+b)}{3(a+b)ab}$

Answer: A

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9. Let $a(n)=1-\frac{1}{2}+\frac{1}{3}+\ldots+(-1)^{n-1}\frac{1}{n}$, then $\frac{1}{n+1}+\frac{1}{n+2}+\ldots+$ is equal to

A. $a(2n)$

B. $a(2n) - a(n)$

C. $a(3n) - a(2n)$

D. none of these

Answer: A

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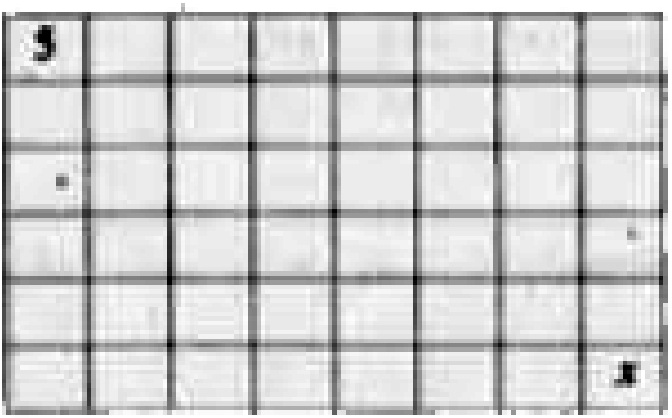
10. In Fig. 8.3 each square is filled with the arithmetic mean of the numbers in the boxes sharing a side with it. If the first square is filled with 5, then value of x is



A. 5

B. 0

C. -5

D. cannot be determined.

Answer: A

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11. Let a,b, and c be three real numbers satistying $[a, b, c]\begin{bmatrix} 1 & 9 & 7 \\ 8 & 2 & 7 \\ 7 & 3 & 7 \end{bmatrix} = [0, 0, 0]$Let b=6, with a and c satisfying (E). If alpha and beta are the roots of the quadratic equation $ax^2 + bx + c = 0 then \sum_{n=0}^{\infty} \left(\frac{1}{\alpha} + \frac{1}{\beta}\right)^n$ is (A) 6 (B) 7 (C) $\frac{6}{7}$ (D) oo

A. 6

B. 7

C. $6/7$

D. ∞

Answer: B

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EXERCISES (Numerical Answer Type Questions)

1. Let $S = \sum_{r=1}^{\infty} \frac{r}{r^4 + 4}$, then 2S=

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2. Let $A_1, A_2, \ldots, A_{75}$ be 75 arithmetic means inserted between two distinct numbers a and b, then

$\frac{b + A_{75}}{b - A_{75}} + \frac{a + A_1}{a - A_1}$=

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3. Suppose $\frac{1}{a_1}, \frac{1}{a_2}, \ldots, \frac{1}{a_{201}}$ is in A.P., then $\sum_{k=1}^{200}(-1)^k\left(\frac{a_k + a_{k+1}}{a_k - a_{k+1}}\right) =$

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4. Let $S = (0.7)^{\log_{0.49}\left(\frac{1}{8} + \frac{1}{8^2} + \frac{1}{8^3} + \ldots\right)}$,

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5. Suppose $a, b > 0$. Let $a, A_1, A_2, \ldots, A_{25}$, b be in A.P., a $G_1, G_2, \ldots, G_{25}$, b are in G.P. and $\frac{1}{a}, \frac{1}{H}, \frac{1}{b}$

$$\left[1 + 2H\left(\frac{A_1 + A_{25}}{G_1 G_{25}} + \frac{A_2 + A_{24}}{G_2 G_{24}} + \ldots + \frac{A_{12} A_{13}}{G_{12} G_{13}}\right)\right]^{1/2} =$$

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6. Suppose $\sum_{r=1}^{\infty} t_r = 3^n - 1 \forall n \in N$ then $\sum_{r=1}^{\infty} \frac{1}{t_r} =$

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7. If the sum to n terms of the series $\frac{3}{(1^2)(2^2)} + \frac{5}{(2^2)(3^2)} + \frac{7}{(3^2)(4^2)} + \ldots$ is $\frac{288}{289}$, then n =

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8. Let S = Sum of the series $\frac{1}{4^2+2} + \frac{1}{5^2+3} + \frac{1}{6^2+4} + \frac{1}{7^2+5} + \ldots$

then 180 S=

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9. Let

$S = \frac{1}{1\times3\times5} + \frac{1}{3\times5\times7} + \frac{1}{5\times7\times9} + \frac{1}{7\times9\times11} + \ldots$ upto ∞

then 3S=

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10. Let a = coefficient of x^{20} in $\left(1+x+2x^2+3x^3+\ldots+20x^{20}\right)^2$, then $\frac{1}{137}a =$

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11. Let $\sum_{r=1}^{n}\sum_{j=1}^{r}\sum_{k=1}^{j}1 = 364$, then n =

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12. Sum of the series $2.5+\frac{1}{2}+\frac{1}{3}+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{3^3}+\ldots$ is

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13. Suppose $a, b, c > 0$. If $\frac{2}{a+b}, \frac{1}{b}, \frac{2}{b+c}$ are in A.P., then $\frac{b^2}{4ac} =$

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14. Suppose $a, b, c > 1$ and $n \in N, n \geq 2$. If $\log_a(n), \log_b(n), \log_c(n)$ are in A.P., then $\log_a b + \log_c b$=

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15. Given sum of first n terms of an A.P. is $2n + 3n^2$. rel then Another A.P. is formed with the same first term and double the common difference. Let Sn) denote the 98. sum to n terms of new A.P., then S(10)=

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16. Suppose $a, b, c \neq R$ and satisfy

(i) $2 < a, b, c < 18$ (ii) $a + b + c = 25$

(iii) 2,a, b are in A.P. (iv) b,c, 18 are in G.P. then $\frac{1}{11}\left(c^2 - a^2 - b^2\right) =$

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17. If sum of the series $\frac{1}{x+1}+\frac{1}{x(x+2)}+\frac{1}{x(x+1)(x+3)}+\ldots+\frac{1}{x(x+1)\ldots(x+99)(x+1}$ is $\frac{2}{3}$, then x is equal to

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18. If sum of the series $\sum_{j=0}^{\infty}\sum_{k=0}^{\infty}\left(\frac{1}{5^j}\right)\left(\frac{1}{5^k}\right)$ is S then 12S=

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19. Suppose $k \neq N$ is fixed then sum of the series $\frac{1}{k^2}\sum_{\substack{n=1 \\ n\neq k}}^{\infty}\frac{1}{n^2-k^2}$ is

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Questions from Previous Years. AIEEE/JEE Main Papers

1. If the fifth term of a G.P. is 2, then write the product of its 9 terms.

A. 256

B. 512

C. 1024

D. 2048

Answer: B

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2. The value of $2^{\frac{1}{4}}.4^{\frac{1}{8}}.8^{\frac{1}{16}}, , , , , , , \infty$ is equal to.

A. 1

B. 2

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

D. 4

Answer: B

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3. If $1, \log_9\left(3^{1-x}+2\right), \log_3(4\cdot 3^x-1)$ are in A.P then x equals to

A. $\log_3 4$

B. $1-\log_3 4$

C. $1-\log_4 3$

D. $\log_4 3$

Answer: B

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4. $1^3-2^3+3^3-4^3+\ldots\ldots.+9^3$ is equal to

A. 425

B. -425

C. 475

D. -475

Answer: A

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5. The sum of integers from 1 to 100 that are divisible by 2 or 5 is

A. 3000

B. 3050

C. 3600

D. 3250

Answer: B

Watch Video Solution

6. The sum of infinite number of terms in G.P. is 20 and the sum of their squares is 100. Then find the common ratio of G.P.

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

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

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

D. $\frac{4}{5}$

Answer: C

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7. Let $fx)$ be a polynomial function of second degree. If $f(1) = f(-1)$ and a, b,c are in A.P, the $f'(a), f'(b)$ and $f'(c)$ are in

A. G.P.

B. H.P.

C. A.G.P.

D. A.P.

Answer: D

Watch Video Solution

8. Let T_r be the r^{th} term of an A.P whose first term is a and common difference is d IF for some integer m,n, $T_m = \frac{1}{n}$ and $T_n = \frac{1}{m}$ then $a - d =$

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

B. 1

C. 0

D. $\frac{1}{m} + \frac{1}{n}$

Answer: C

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9. The sum of n terms of the series $1^2 + 2.2^2 + 3^2 + 2.4^2 + 5^2 + 2.6^2 + \ldots$ is $\frac{n(n+1)^2}{2}$ when n is even . when n is odd , the sum is

A. $\frac{1}{4}n(n+1)^2$

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

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

D. $\frac{1}{4}n^2(n+1)^2$

Answer: B

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

A. A.P.

B. G.P.

C. H.P.

D. A.G.P.

Answer: C

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11. If the expression in powers of x of the function $\frac{1}{(1-ax)(1-bx)}$ is $a_0 + a_1x + a_2x^2 + a_3x^3 + \ldots$ then a_n is

A. $\frac{b^{n+1} - a^{n+1}}{b-a}$

B. $\frac{b^n - a^n}{b-a}$

C. $\frac{a^n - b^n}{b-a}$

D. $\frac{a^{n+1} - b^{n+1}}{b-a}$

Answer: A

Watch Video Solution

12. Let $a_1, a_2, a_3 \ldots \ldots \ldots$ be term os an A.P. if $\frac{a_1 + a_2 + \ldots. + a_p}{a_1 + a_2 + \ldots \ldots \ldots + a_q} = \frac{p^2}{q^2} p \neq q then a_6 a_{21}$ euqals (A) 41/11 (B) 43283 (C) 43138 (D) 15281

A. $\frac{11}{41}$

B. $\frac{41}{11}$

C. $\frac{7}{2}$

D. $\frac{2}{7}$

Answer: A

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13. If $a_1, a_2, \ldots \ldots \ldots a_n$ are in H.P, then the expression $a_1 a_2 + a_2 + a_3 + \ldots + a_{n-1} a_n$ is equal to (A) $n(a_1 - a_n)$ (B) $(n-1)(a_1 - a_n)$ (C) $n a_1 a_n$ (D) $(n-1) a_1 a_n$

A. $(n-1)a_1a_n$

B. $n(a_1-a_n)$

C. $(n-1)(a_1-a_n)$

D. na_1a_n

Answer: A

Watch Video Solution

14. In a geometric progression consisting of positive terms, each term equals the sum of the next two terms. Then the common ratio of this progression equals (1) $\frac{1}{2}\left(1-\sqrt{5}\right)$ (2) $\frac{1}{2}\sqrt{5}$ (3) $\sqrt{5}$ (4) $\frac{1}{2}\left(\sqrt{5}-1\right)$

A. $\frac{1}{2}\left(1-\sqrt{5}\right)$

B. $\frac{1}{2}\sqrt{5}$

C. $\sqrt{5}$

D. $\frac{1}{2}\left(\sqrt{5}+1\right)$

Answer: D

Watch Video Solution

15. $1+\frac{2}{3}+\frac{6}{3^2}+\frac{10}{3^3}+\frac{14}{3^4}+$

A. 4

B. 6

C. 2

D. 3

Answer: D

Watch Video Solution

16. 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. 125 minutes

B. 135 minutes

C. 24 minutes

D. 34 minutes

Answer: D

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17. 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 from the start of swrvice will be Rs. 11040 after

A. 21 months

B. 18 months

C. 19 months

D. 20 months

Answer: A

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18. Let a_n be the nth term of an AP, if $\sum_{r=1}^{100} a_{2r} = \alpha$ and $\sum_{r=1}^{100} a_{2r-1} = \beta$, then the common difference of the AP is

A. $\alpha - \beta$

B. $\frac{1}{100}(\alpha - \beta)$

C. $\beta - \alpha$

D. $\frac{1}{200}(\alpha - \beta)$

Answer: B

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19. If 100 times the 100th term of an AP with non-zero common difference equals the 50 times its 50th term, then the 150th term of this AP is

A. 150 time its 50^{th} term

B. 150

C. zero

D. -150

Answer: C

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20. If x, y, z are in A.P. and $\tan^{-1} x, \tan^{-1} y$ and $\tan^{-1} z$ are also in A.P. then

A. 2x=3y=6z

B. 6x=3y=2z

C. 6x=4y=3z

D. x=y=z

Answer: D

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21. The sum of first 20 terms of the sequence 0.7, 0.77, 0.777..... is

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

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

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

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

Answer: B

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22. Given sum of the first n terms of an A.P is $2n + 3n^2$. Another A.P. is formed with the same first term and double of the common difference, the sum of n terms

A. $n + 4n^2$

B. $6n^2 - n$

C. $n^2 + 4n$

D. $3n + 2n^2$

Answer: B

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23. the sum $\frac{3}{1^2} + \frac{5}{1^2 + 2^2} + \frac{7}{1^2 + 2^2 + 3^2} + \ldots\ldots$ upto 11 terms

A. $\frac{7}{2}$

B. $\frac{11}{4}$

C. $\frac{11}{2}$

D. $\frac{60}{11}$

Answer: C

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24. Given a sequence of 4 numbers, first three of which are in G.P. and the last three are in arcommon difference six. If first and last terms of this sequence are equal, then the last term is (A) 8(B) 16(C) 2 .(D) 4

A. 16

B. 8

C. 4

D. 2

Answer: B

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25. The value of $1^2 + 3^2 + 5^2 + \ldots + 25^2$ is (A) 1728 (B) 1456 (C) 2925 (D) none

A. 2925

B. 1469

C. 1728

D. 1456

Answer: A

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26. Let $a_1, a_2, a_3 \ldots\ldots\ldots$ be term os an A.P. if $\frac{a_1 + a_2 + \ldots. + a_p}{a_1 + a_2 + \ldots\ldots\ldots + a_q} = \frac{p^2}{q^2} p \neq qthena_6 a_{21}$ euqals (A) 41/11 (B) 43283 (C) 43138 (D) 15281

A. $\frac{41}{11}$

B. $\frac{121}{1681}$

C. $\frac{11}{41}$

D. $\frac{121}{1861}$

Answer: C

Watch Video Solution

27. The sum of the series $(2)^2 + 2(4)^2 + 3(6)^2 + \ldots.$ upto 10 terms is

A. 11300

B. 11200

C. 12100

D. 12300

Answer: C

Watch Video Solution

28. If

$S = \tan^{-1}\left(\frac{1}{n^2+n+1}\right) + \tan^{-1}\left(\frac{1}{n^2+3n+3}\right) + \ldots + \tan^{-1}\left(\frac{}{1+(}\right.$

then tan S is equal to(A)20/(401+20n)(B)n/(n^2+20n+1)(C)n(401+20n)

(D)20/(n^2+n-1)`

A. $\frac{20}{401+20n}$

B. $\frac{n}{n^2+20n+1}$

C. $\frac{20}{n^2+20n+1}$

D. $\frac{n}{401+20n}$

Answer: C

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29. If $a_1, a_2, a_3, \ldots, a_n \ldots$ are in A.P. such that $a_4 - a_7 + a_{10} = m$, then sum of the first 13 terms of the A.P.is

A. 10 m

B. 12 m

C. 13 m

D. 15 m

Answer: C

Watch Video Solution

30. Three positive numbers form an increasing GP. If the middle term in this GP is doubled, then new numbers are in AP. Then, the common ratio of the GP is

A. $3+\sqrt{2}$

B. $2-\sqrt{3}$

C. $2+\sqrt{3}$

D. $\sqrt{2}+\sqrt{3}$

Answer: C

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31. If $(10)^9 + 2(11)^1(10)^8 + 3(11)^2(10)^7 + \cdot\cdot + 10(11)^9 = k(10)^9$, then k is equal to (1) $\frac{121}{10}$ (2) $\frac{441}{100}$ (3) 100 (4) 110

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

B. 100

C. 110

D. $\frac{221}{10}$

Answer: B

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32. Given an $A.P.$ whose terms are all positive integers. The sum of its first nine terms is greater than 200 and less than 220. If the second term in it is 12, then its 4^th term is:

A. 8

B. 16

C. 20

D. 24

Answer: C

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33. If the sum $\frac{3}{1^2} + \frac{5}{1^2+2^2} + \frac{7}{1^2+2^2+3^2} + \ldots +$ upto 20 terms is equal to $\frac{k}{21}$, then k is equal to

A. 120

B. 180

C. 240

D. 60

Answer: A

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34. In a geometric progression, if the ratio of the sum of first 5 terms to the sum of their reciprocals is 49, and the sum of the first and the third term is 35. Then the first term of this geometric progression is

A. 7

B. 21

C. 28

D. 42

Answer: C

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35. The sum of the first 20 terms common between the series 3 +7+11+15+... and 1+6+11 +16+... is A) 4020 B) 4220 C)4200 D) 4000

A. 4000

B. 4020

C. 4200

D. 4220

Answer: B

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36. Let G be the geometric mean of two positive numbers a and b, and M be the arithmetic mean of $\frac{1}{a}$ and $\frac{1}{b}$ if $\left(\frac{1}{M}\right) : G$ is $4:5$, then $a:b$ can be

A. $1:4$

B. $1:2$

C. $2:3$

D. $3:4$

Answer: A

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37. The least positive integer n such that $1-\frac{2}{3}-\frac{2}{3^2}-\ldots\ldots\ldots\ldots-\frac{2}{3^{n-1}}<\frac{1}{100}$ is

A. 4

B. 5

C. 6

D. 7

Answer: D

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38. Number of terms of an AP is even. The sum of odd terms is 24 an that of even terms is 30. The last term exceeds the first term by $10\frac{1}{2}$. Find the number of terms.

A. 4

B. 8

C. 12

D. 16

Answer: B

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39. where f (n) = $\left[\frac{1}{3}+\frac{3n}{100}\right]$ n, where [n] denotes the greatest integer less than or equal to n. Then $\sum_{n=1}^{56}\int(n)$ is equal to :

A. 56

B. 689

C. 1287

D. 1399

Answer: D

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40. 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. $4l^2m^2n^2$

Answer: B

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

A. 71

B. 96

C. 142

D. 192

Answer: B

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42. The value of $\sum_{r=16}^{30}(r+2)(r-3)$ is equal to :

A. 7785

B. 7780

C. 7775

D. 7770

Answer: B

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43. The sum of the 3rd and the 4th terms of a G.P. is 60 and the product of its first three terms is 1000. If the first term of this G.P. is positive, then its 7th term is

A. 7290

B. 320

C. 640

D. 2430

Answer: B

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44. If $\sum_{n=1}^{5} \frac{1}{n(n+1)(n+2)(n+3)} = \frac{k}{3}$, then k is equal to :-

A. $\frac{55}{336}$

B. $\frac{17}{105}$

C. $\frac{1}{6}$

D. $\frac{19}{112}$

Answer: A

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45. If the 2^{nd}, 56^{th} and 9^{th} terms of a non-constant A. P. are in G.P, then the common ratio of this G. P. is

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

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

C. 1

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

Answer: B

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46. If the sum 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: (1) 102 (2) 101 (3) 100 (4) 99

A. 102

B. 101

C. 100

D. 99

Answer: B

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47. Let $a_1, a_2, a_3, \ldots. a_n, \ldots\ldots\ldots$be in A.P. If $a_3+a_7+a_{11}+a_{15}=72,$ then the sum of itsfirst 17 terms is equal to :

A. 306

B. 204

C. 153

D. 612

Answer: A

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48. For any three positive real numbers a, b and c, $9\left(25a^2+b^2\right)+25\left(c^2-3ac\right)=15b(3a+c)$ 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,c are in G.P.

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

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

D. b,c,a are in G.P.

Answer: C

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

A. 255

B. 330

C. 165

D. 190

Answer: B

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50. If the arithmetic mean of two numbers a and b,$a > b > 0$, is five times their geometric mean, then $\frac{a+b}{a-b}$ is equal to:

A. $\frac{1}{2}\sqrt{6}$

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

C. $\frac{7}{12}\sqrt{3}$

D. $\frac{5}{12}\sqrt{6}$

Answer: D

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51. If the sum of the first n terms of the series $\sqrt{3}+\sqrt{75}+\sqrt{243}+\sqrt{507}+\ldots.$ is $435\sqrt{3}$, then n equals.

A. 18

B. 15

C. 13

D. 29

Answer: B

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52.

$$S_n = \frac{1}{1^3} + \frac{1+2}{1^3+2^3} + \frac{1+2+3}{1^3+2^3+3^3} + \ldots\ldots\ldots + \frac{1+2+\ldots\ldots+n}{1^3+2^3+\ldots\ldots+n^3}.100$$

then n is equal to :

A. 199

B. 99

C. 200

D. 19

Answer: A

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53. in three positive numbers a, b and c are in A.P. such that abc = 8, then the minimum possible value of b is

A. 2

B. $4^{1/3}$

C. $42^{/3}$

D. 4

Answer: A

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

A. 68

B. 34

C. 66

D. 33

Answer: B

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55. 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. 248

B. 464

C. 496

D. 232

Answer: A

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56. If $x_1, x_2 \ldots\ldots x_n$ & $\frac{1}{h_1}, \frac{1}{h_2} \ldots . \frac{1}{h_n}$ are two such that $x_3 = h_2 = 8$ & $x_8 = h_7 = 20$ then $x_5 h_{10}$ is

A. 3200

B. 1600

C. 2650

D. 2560

Answer: D

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57. If a, b, c are in A.P.and a^2, b^2, c^2 are in G.P.such that $a < b < c$ and $a + b + c = \frac{3}{2}$ then $a =$

A. $\frac{1}{4} - \frac{1}{\sqrt{2}}$

B. $\frac{1}{4} - \frac{1}{3\sqrt{2}}$

C. $\frac{1}{4} - \frac{1}{4\sqrt{2}}$

D. $\frac{1}{4} - \frac{1}{2\sqrt{2}}$

Answer: D

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58. Let Let $\frac{1}{x_1}, \frac{1}{x_2} \ldots \frac{1}{x_n} (x_i \neq 0 \text{ for } i = 1, 2, \ldots n)$ in A.P. Such that $x_1 = 3$ and $x_{21} = 20$. If n is the least positive integer for which $x_n > 50$ then $\sum_{i=1}^{n} \left(\frac{1}{x_i} \right)$ is equal to:

A. $1/8$

B. 3

C. $13/8$

D. $13/4$

Answer: D

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59. The sum of the first 20 terms of the series $1+\frac{3}{2}+\frac{7}{4}+\frac{15}{8}+\frac{31}{16}+\ldots$ is:

A. $38+\frac{1}{2^{19}}$

B. $38+\frac{1}{20^{20}}$

C. $39+\frac{1}{2^{20}}$

D. $39+\frac{1}{2^{19}}$

Answer: A

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60. If b is the first term of an infinite G.P. Whose sum is five, then b lies in the interval:

A. $[10, \infty)$

B. $(-\infty, -10]$

C. $(-10, 0)$

D. (0,10)

Answer: D

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61. Let

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

n_0, so that B_ngtA_n Aangen_0`

A. 11

B. 9

C. 7

D. 5

Answer: C

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62. If the sum of the first 15 terms of the series $\left(\frac{3}{4}\right)^3 + \left(1\frac{1}{2}\right)^3 + \left(2\frac{1}{4}\right)^3 + 3^3 + \left(3\frac{3}{4}\right)^3 + \ldots$ is equal to 225k, then k is equal to

A. 9

B. 27

C. 108

D. 54

Answer: B

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63. If a, b and c be three distinct real number in G.P. and $a + b + c = xb$, then x cannot be

A. -2

B. -3

C. 4

D. 2

Answer: D

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64. Let $a_1, a_2, \ldots, a_{30}$ be an AP, $S = \sum_{i=1}^{30} a_i$ and $T = \sum_{i=1}^{15} a_{2i-1}$ If $a_5 = 27$ and $S - 2T = 75$ then a_{10} is equal to (a) 57 (b) 42 (c) 52 (4) 47

A. 52

B. 57

C. 47

D. 42

Answer: A

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65. The sum of series

$$1+6+\frac{9\left(1^2+2^2+3^2\right)}{7}+\frac{12\left(1^2+2^2+3^2+4^2\right)}{9}+\frac{15\left(1^2+2^2+\ldots+5\right.}{11}$$

up to 15 terms is

A. 7520

B. 7510

C. 7830

D. 7820

Answer: D

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66. Let a, b and c be the 7th, 11th and 13th terms respectively of a non-constant AP. If these are also the three consecutive terms of a GP, then $\frac{a}{c}$ is equal to

A. 2

B. $1/2$

C. $7/13$

D. 4

Answer: D

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67. If 5, 5r and $5r^2$ are the lengths of the sides of a triangle, then r cannot be equal to

A. $3/4$

B. $5/4$

C. $7/4$

D. $3/2$

Answer: C

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68. The sum of all two digit positive numbers which when divided by 7 yield 2 or 5 as remainder is

A. 1256

B. 1465

C. 1365

D. 1356

Answer: D

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69. The sum of an infinite geometric series with positive terms is 3 and the sums of the cubes of its terms is $\frac{27}{19}$. Then the common ratio of this series is

A. $4/9$

B. $2/9$

C. $2/3$

D. $1/3$

Answer: C

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70. Let $a_1, a_2, \quad \ldots a_{10}$ be a G.P. If $\frac{a_3}{a_1} = 25, \quad \text{then} \quad \frac{a_9}{a_5}$ equals

A. $2\left(5^2\right)$

B. $4\left(5^2\right)$

C. 5^4

D. 5^3

Answer: C

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71. Let $S_k = \frac{1+2+3+\ldots+k}{k}$. If $S_1^2 + s_2^2 + \ldots + S_{10}^2 = \frac{5}{12}A$, then A is equal to

A. 303

B. 156

C. 283

D. 301

Answer: A

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72. The product of three consecutive terms of a G.P. is 512. If 4 is added to each of the first and the second of these terms, the three terms now form an A.P. Then the sum of the original three terms of the given G.P. is

A. 36

B. 32

C. 28

D. 24

Answer: C

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73. Let $S_n = 1 + q + q^2 + ? + q^n$ and $T_n = 1 + \left(\frac{q+1}{2}\right) + \left(\frac{q+1}{2}\right)^2 + ? + \left(\frac{q+1}{2}\right)^n$ If $\alpha T_{100} = {}^{101}C_1 + {}^{101}C_2 x S_1 + {}^{101}C_{101} x S_{100}$, then the value of α is equal to (A) 2^{99} (B) 2^{101} (C) 2^{100} (D) -2^{100}

A. 2^{99}

B. 2^{101}

C. 2^{100}

D. -2^{100}

Answer: C

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74. If 19^{th} term of a non-zero A.P. is zero, then (49^{th} term) : (29^{th} term) is

A. $4:1$

B. $1:3$

C. $3:1$

D. $2:1$

Answer: C

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75. The sum of all natural numbers 'n' such that $100 < n < 200$ and $HCF(91, n) > 1$ is

A. 3303

B. 3121

C. 3203

D. 3221

Answer: B

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76. The sum $\sum_{k=1}^{20} k\frac{1}{2^k}$ is equal to

A. $2-\frac{11}{2^{19}}$

B. $1-\frac{11}{2^{20}}$

C. $2-\frac{3}{2^{17}}$

D. $2-\frac{21}{2^{20}}$

Answer: A

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77. Let $\sum_{k=1}^{10} f(a+k) = 16\left(2^{10}-1\right)$, where the function f satisfies $f(x+y) = f(x)f(y)$ for all natural numbers x, y and f(1) = 2. Then, the natural number 'a' is

A. 2

B. 3

C. 16

D. 4

Answer: B

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78. Let the sum of the first n terms of a non-constant A.P., $a_1, a_2, a_3, \ldots$ be $50n + \frac{n(n-7)}{2}A$, where A is a constant. If d is the common difference of this A.P., then the ordered pair (d, a_{50}) is equal to

A. (A,50+46A)

B. (A,50+45A)

C. (50,50+46A)

D. (50,50+45A)

Answer: A

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79. Some identical balls are arranged in rows to form an equilateral triangle. The first row consists of one ball, the second row consists of row balls and so on. If 99 more identical balls are added to the total number of balls used in forming the equilateral triangle, then all these balls can be arranged in a square whose each side contains exactly 2 balls less than the number of balls each side of the triangle contains. Then, the number of balls used to form the equilateral triangle is

A. 157

B. 262

C. 225

D. 190

Answer: D

Watch Video Solution

80. The sum of the the series 1+2x3+3x5+4x7+.... Upto 11^{th} term is

A. 942

B. 892

C. 946

D. 960

Answer: C

Watch Video Solution

81. If the sum and product of the first three terms in an AP are 33 and 1155, respectively, then a value of its 11th term is

A. -25

B. -35

C. -36

D. 25

Answer: A

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82. Let $S = 3 + \frac{5(a^3 + 2^3)}{1^2 + 2^2} + \frac{7(1^3 + 2^3 + 3^3)}{1^2 + 2^2 + 3^2} + \ldots$ then the sum up to 10 terms is

A. 660

B. 680

C. 600

D. 620

Answer: A

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83. Let $a_1, a_2, a_3, \ldots$ be in A.P. With $a_6 = 2$. Then the common difference of the A.P. Which maximises the product $a_1 a_4 a_5$ is :

A. $3/2$

B. $6/5$

C. $8/5$

D. $2/3$

Answer: C

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84. Let a, b and c be in GP with common ratio, r where $a \neq 0$ and $0 < r \leq \frac{1}{2}$. If 3a, 7b and 15 c are the first three terms of an AP, then the 4th term of this AP is

A. a

B. $\frac{7}{3}a$

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

D. 5a

Answer: A

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85. value of $1 + \frac{1^3 + 2^3}{1+2} + \frac{1^3 + 2^3 + 3^3}{1+2+3} + \ldots\ldots + \frac{1^3 + 2^3 + \ldots . 15^3}{1+2+\ldots+15} - \frac{1}{2}(1+2+.$ is

A. 620

B. 1240

C. 1880

D. 660

Answer: A

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86. Let S_n denote the sum of the first n terms of an AP. If $S_4 = 16$ and $S_6 = -48$, then S_{10} is equal to

A. -320

B. -380

C. -410

D. -260

Answer: A

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87. If $a_1, a_2, a_3,...$ are in AP such that $a_1 + a_7 + a_{16} = 40$, then the sum of the first 15 terms of this AP is

A. 120

B. 150

C. 280

D. 200

Answer: D

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Questions from Previous Years. B-Architecture Entrance Examination Papers

1. If first three terms of the sequence $1/16, a, b, c1/16$ are in geometric series and last three terms are in harmonic series, then find the values of $aandb$.

A. $\frac{1}{12}, \frac{4}{9}$

B. $\frac{4}{7}, \frac{3}{4}$

C. $\frac{1}{9}, \frac{1}{12}$

D. $-\frac{1}{4}, 1$

Answer: D

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2. If a,x,b are in H.P. And a,y,z,b are in G.P.,then the value of $\frac{yz}{x(y^3+z^3)}$ is

A. ab

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

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

D. $2ab$

Answer: B

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3. Let $x = 1 + a + a^2 + ...$and $y = 1 + b + b^2 + ...$, where $|a| < 1$and $|b| < 1$. Prove that $1 + ab + a^2b^2 + ... = \frac{xy}{x + y - 1}$

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

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

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

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

Answer: D

Watch Video Solution

4. If three distinct positive numbers a,b,c are in A.P. Such that abc=4,then value of b is always

A. greater than $(2)^{2/3}$

B. less than $(2)^{2/3}$

C. equal to $(2)^{2/3}$

D. equal to $(2)^{3/2}$

Answer: A

View Text Solution

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

A. 100

B. 105

C. 110

D. 115

Answer: D

Watch Video Solution

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

A. 8729

B. 7511

C. 6328

D. 5712

Answer: A

Watch Video Solution

7. Let a,b and c be distinct real numbers. If a,b,c are in geometric progression and a+b+c=xb, then x lies in the set

A. (1,3)

B. $(-1, 0) \cup (1, 2)$

C. $(-\infty, -1) \cup (3, \infty)$

D. (0,1)

Answer: C

View Text Solution

8. If the sum of first n terms of two A.P.'s are in the ratio 3n+8 : 7n+15, then the ratio of 12th term is

A. $8:7$

B. $7:16$

C. $74:169$

D. $13:47$

Answer: B

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9. A tree, in each year grows 5 cm less than it grew in the previous year. If it grew half a metre in the first year,then the height of the tree (in metres) when it ceases to grow,is

A. 3.00

B. 2.75

C. 2.50

D. 2.00

Answer: B

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10. If $\frac{48}{2.3}+\frac{47}{3.4}+\frac{46}{4.5}+\ldots+\frac{2}{48.29}+\frac{1}{49.50}$ $=\frac{51}{2}+k\left(1+\frac{1}{2}+\frac{1}{3}+\ldots+\frac{1}{50}\right)$, then k equals

A. -1

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

C. 1

D. 2

Answer: A

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11. If $\log_{10} 2, \log_{10}(2^x - 1)$ and $\log_{10}(2^x + 3)$ are three consecutive terms of an A.P, then the value of x is

A. no real x

B. exactly one real x

C. exactly two real x

D. more than two real x

Answer: B

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12. If a, b, c are in $H.P, b, c, d$ are in $G.P$, and c, d, e are in $A.P$, then $\frac{ab^2}{(2a-b)^2}$ is equal to

A. c

B. $\sqrt{de}$

C. e

D. d

Answer: C

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13. If $\sum_{k=1}^{n} \phi(k) = \frac{2_n}{n+1}, then \sum_{k=1}^{10} \frac{1}{\phi(k)}$ is equal to

A. $\frac{11}{20}$

B. 220

C. $\frac{55}{18}$

D. 110

Answer: B

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14. Let a,b,c,d and e be distinct positive numbers. If a,b,c and $\frac{1}{c}, \frac{1}{d}, \frac{1}{e}$ both are in A.P. And b,c,d are in G.P.then

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

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

C. a,c,e are in A.P

D. a,c,e are in G.P.

Answer: D

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15. If the sum of first 15 terms of the series 3+7+14+24+37+... Is 15k, then k is equle to

A. 126

B. 122

C. 81

D. 119

Answer: B

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16. Let a_1, a_2, a_3, a_4, a_5 be a G.P. Of positive real numbers such that A.M. Of a_2 and a_4 is 117 and G.M. Of a_2 and a_4 is 108. Then A.M. Of a_1 and a_5 is :

A. 145.5

B. 108

C. 117

D. 144.5

Answer: A

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17. In an ordered set of four numbers, the first 3 are A.P. And the last three are in G.P. Whose common ratio is $7/4$. If the product of the first and fourth of these numbers is 49, then the product of the second and third of these is :

A. 60

B. 112

C. 128

D. 144

Answer: B

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18. If $e^{\left(\sin^2 x+\sin^4 x+\sin^6 x+\ldots \text{ upto}\infty\right) In2}$ satisfies the equation $y^2-5y+4=0$, then $\frac{\sin x}{\cos x-\sin x}$ is equal to

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

B. $-\left(\sqrt{2}+1\right)$

C. $\sqrt{2}-1$

D. $2+\sqrt{2}$

Answer: A

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19. For distinct positive numbers a,b and c, if a^2, b^2, c^2 are in A.P. Then which of the following triplets is also in A.P.

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

B. $\frac{1}{b-c}, \frac{1}{c-a}, \frac{1}{a-b}$

C. $\frac{1}{b-c}, \frac{1}{a-b}, \frac{1}{c-a}$

D. $\frac{1}{b-2c}, \frac{1}{c-2a}, \frac{1}{a+2b}$

Answer: A

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20. If three real numbers a,b,c all greater than one, are in a geometrical progression such that $\frac{\log_e a}{x} = \frac{\log_e b}{2y} = \frac{\log_e c}{3z}$, where x,y,z are non-zero real number,then

A. 2y=x+3z

B. 4y=x+3z

C. 2y=x+z

D. y=x+z

Answer: B

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21. The sum first 19 terms of the series $1^2 + 2(2^2) + 3^2 + 2(4^2) + 5^2 + \ldots$ is :

A. 4200

B. 4410

C. 3800

D. 3610

Answer: D

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22. In an increasing geometric series, the sum of the first and the sixth term is 66 and the product of the second and fifth term is 128. Then the sum of the first 6 terms of the series is:

A. 127

B. 129

C. 126

D. 128

Answer: C

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23. $1+\frac{2}{3}+\frac{6}{3^2}+\frac{10}{3^3}+\frac{14}{3^4}+$

A. 4

B. 5

C. 6

D. $9/2$

Answer: B

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24. An A.P. Having odd number of terms has its first, second and middle terms as -12,-7 and 38 respectively, then the sum of this A.P is

A. 896

B. 798

C. 756

D. 710

Answer: B

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25. If $S_n = \sum_{r=1}^{n} T_r = n(n+1)(n+2)(n+3)$ then $\sum_{r=1}^{10} \frac{1}{T_r}$ is equal to

A. $\frac{75}{1056}$

B. $\frac{58}{528}$

C. $\frac{65}{528}$

D. $\frac{65}{1056}$

Answer: D

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