MATHS

BOOKS - DISHA PUBLICATION MATHS (HINGLISH)

SEQUENCES AND SERIES

Jee Main 5 Years At A Glance

1. Let $a_1, a_2, a_3 \ldots a_{49}$ be in AP such that $\sum_{k=0}^{12}(a_4 k+1)=416$ and $a_9+a_{43}=66$ If $a_1^2+a_2^2+\ldots+a_{17}^2=140m$ then m is equal to (1) 66 (2) 68 (3) 34 (4) 33

A. 68

B. 34

C. 33

D. 66

Answer: B

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2. 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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3. Let $\frac{1}{x_1}, \frac{1}{x_2}, \frac{1}{x_3}$....$(x_i \neq 0$ for i = 1,2,....n)be in A.P.such that $x_1 = 4$ 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. 3

B. $\frac{13}{8}$

C. $\frac{13}{4}$

D. $\frac{1}{8}$

Answer: C

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4. 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. $38 + \frac{1}{2^{20}}$

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

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

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

Answer: D

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

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

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

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

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

Answer: C

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

A. 255

B. 330

C. 165

D. 190

Answer: B

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7. 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. $\frac{\sqrt{6}}{2}$

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

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

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

Answer: D

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8. 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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9. 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. 1

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

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

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

Answer: D

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10. 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. 100

B. 99

C. 102

D. 101

Answer: D

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11. Let x, y, z be positive real numbers such that $x + y + z = 12$ and $x^3y^4z^5 = (0.1)(600)^3$. Then $x^3 + y^3 + z^3$ is

A. 342

B. 216

C. 258

D. 270

Answer: B

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12. For $x \in R, x \neq -1$, if $(1+x)^{2016} = \sum_{i=0}^{2016} a_i x^i$, then a_{17} is equal to :

A. $\frac{2017!}{17!2000!}$

B. $\frac{2016!}{17!1999!}$

C. $\frac{2016!}{16!}$

D. $\frac{2017!}{2000!}$

Answer: A

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13. If m is the AM of two distinct real numbers l and n $(l, n > 1)$ and G_1, G_2 and G_3 are three geometric means between l and n, then $G_1^4, 2G_2^4, G_3^4$ equals

A. $4lmn^2$

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

C. $4l^2mn$

D. $4lm^2n$

Answer: D

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14. 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. 142

B. 192

C. 71

D. 96

Answer: D

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

A. 7770

B. 7785

C. 7775

D. 7780

Answer: D

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16. Let α and β be the roots of equation $px^2+qx+r=0, p\neq 0$.If p, q, r are in A.P. and $\frac{1}{\alpha}+\frac{1}{\beta}=4$, then the value of $|\alpha-\beta|$ is :

A. $\frac{\sqrt{34}}{9}$

B. $\frac{2\sqrt{13}}{9}$

C. $\frac{\sqrt{61}}{9}$

D. $\frac{2\sqrt{17}}{9}$

Answer: B

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17. Three positive numbers from an increasing G.P. If the middle term in this G.P. is doubled, the new numbers are in A.P. Then the common ratio of the G.P. is (1) $\sqrt{2}+\sqrt{3}$ (2) $3+\sqrt{2}$ (3) $2-\sqrt{3}$ (4) $2+\sqrt{3}$

A. $2-\sqrt{3}$

B. $2+\sqrt{3}$

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

D. $3+\sqrt{2}$

Answer: B

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18. If $(10)^9 + 2(11)^1(10)^8 + 3(11)^2(10)^7 + \dots\dots\dots. + 10(11)^9 = k(10)^9$

, then k is equal to :

A. 100

B. 110

C. (121)/(10)

D. (441)/(100)

Answer: A

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19. 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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20. Sum of first 20 terms of $\frac{3}{1^2}+\frac{5}{1^2+2^2}+\frac{7}{1^2+2^2+3^2}+...$ upto 20 terms is :

A. 120

B. 180

C. 240

D. 60

Answer: A

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Exercise 1 Concept Builder

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

A. 11

B. 12

C. 13

D. 15

Answer: C

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2. The value of $\sum_{r=0}^{n}(a+r+ar)(-a)^{r}$ is equal to $(-1)^{n}\left[(n+1)a^{n+1}-a\right]$ b. $(-1)^{n}(n+1)a^{n+1}$ c. $(-1)^{n}\frac{(n+2)a^{n+1}}{2}$ d. $(-1)^{n}\frac{na^{n}}{2}$

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

B. $(-1)^n(n+1)a^{n+1}$

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

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

Answer: B

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3. $\sum_{r=1}^{n} r.r!$ is equal to

A. $n!-1$

B. $(n-1)!-1$

C. $(n+1)!-1$

D. None of these

Answer: C

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4. If $S = \frac{2^2 - 1}{2} + \frac{3^2 - 2}{6} + \frac{4^2 - 3}{12} + \ldots\ldots$ (up to 10 terms), then value of S is equal to -

A. $\frac{123}{11}$

B. $\frac{10}{11}$

C. $\frac{13}{11}$

D. $\frac{120}{11}$

Answer: D

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5. For what value of x, will the roots of the equation $kx^2 - 5x + 6 = 0$ be in the ratio of $2 : 3$?

A. -1

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

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

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

Answer: A

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6. 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. $\beta - \alpha$

C. $\frac{\alpha - \beta}{2}$

D. None of these

Answer: D

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7. The 10th common term between the series 3+7+11+ . . . And 1+6+11+ . . . ., is

A. 191

B. 193

C. 211

D. None of these

Answer: A

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

A. P^3

B. P^2a

C. Pa^2

D. a^3

Answer: B

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9. If the angles $A < B < C$ of a triangle are in A.P, then

A. $c^2 = a^2 + b^2 + ab$

B. $b^2 = a^2 + c^2 - ac$

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

D. None of these

Answer: B

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

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

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

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

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

Answer: D

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11. If $\frac{5 + 9 + 13 + \ldots. \rightarrow nterms}{7 + 9 + 11 + \ldots. \rightarrow (n+1) terms} = \frac{17}{16}$, then $n =$

A. 7

B. 12

C. 8

D. None of these

Answer: A

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

A. 5

B. 3

C. $\log_3 2$

D. $\log_2 5$

Answer: D

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13. If $a_1, a_{,} a_3 ... a_n$ are in A.P then prove that $a_1^2 - a_2^2 + a_3^2 - a_4^2 + ... a_{2k-1}^2 - a_{2k}^2 = \left(\frac{k}{2k-1}\right)\left(a_1^2 - a_{2k}^2\right)$

A. $\frac{k-1}{k+1}$

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

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

D. None of these

Answer: B

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14. If cos x = b.For what b do the roots of the equation form an A.P.?

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

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

C. (-1)

D. None of these

Answer: C

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15. 25 trees are planted in a straight line 5 metre apart from each other. To water them the gardener must bring water for each tree separately from a well 10 metre from the first tree in line with the trees. The distance he will move in order to water all the trees beginning with the first if he starts from the well is :

A. 3550m

B. 3434 m

C. 3370 m

D. 3200 m

Answer: C

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16. If $a_1, a_2, a_3, \ldots\ldots., a_n$,.... are in A.P. such that $a_4 - a_7 + a_{10} = m$, 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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17. If $a_1, a_2, a_3, \ldots, a_{n+1}$ are in A.P. , then $\frac{1}{a_1 a_2} + \frac{1}{a_2 a_3} \ldots. + \frac{1}{a_n a_{n+1}}$ is

A. $\frac{n-1}{a_1 a_{n+1}}$

B. $\frac{1}{a_1 a_{n+1}}$

C. $\dfrac{n+1}{a_1 a_{n+1}}$

D. $\dfrac{n}{a_1 a_{n+1}}$

Answer: D

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18. At what values of parameter a are there values of x such that the numbers: $\left(5^{1+x}+5^{1-x}\right), \dfrac{a}{2}, \left(25^{x}+25^{-x}\right)$ form an$A.P.$?

A. $a<12$

B. $a \leq 12$

C. $a \geq 12$

D. None of these

Answer: D

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

B. 1

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

D. 0

Answer: D

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

A. 19

B. 20

C. 21

D. 91

Answer: B

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21. The sum of the series $\frac{2}{3}+\frac{8}{9}+\frac{26}{27}+\frac{80}{81}+$ to n terms is $n-\frac{1}{2}\left(3^{-n}-1\right)$ (b) $n-\frac{1}{2}\left(1-3^{-n}\right)$ (c) $n+\frac{1}{2}\left(3^{n}-1\right)$ (d) $n-\frac{1}{2}\left(3^{n}-1\right)$

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

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

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

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

Answer: B

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22. If $\frac{1}{\sqrt{b}+\sqrt{c}}, \frac{1}{\sqrt{c}+\sqrt{a}}, \frac{1}{\sqrt{a}+\sqrt{b}}$ are in $A.P.$, then $9^{ax+1}, 9^{bx+1}, 9^{cx+1}, x \neq 0$ are in

A. GP.

B. GP.only if $x < 0$

C. GP. Only if $x > 0$

D. None of these

Answer: D

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23. 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. xz + yz + z = xy

B. xz + yz + xy = Z

C. xz + yz - z = xy

D. None of these

Answer: A

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24. If first and eighttth terms of a G.P. are x^{-4} and x^{52} and its second term is x^t then t is equal to

A. -13

B. 4

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

D. 3

Answer: B

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25. Find the sum to n terms of the sequence :

(i) $\left(a+\frac{1}{x}\right)^2, \left(x^2+\frac{1}{x^2}\right)^2, \left(x^3+\frac{1}{x^3}\right)^2$, ... to n terms

(ii) $(x+y), (x^2+xy+y^2), (x^3+x^2y+xy^2+y^3)$, ... to n terms

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

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

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

D. None of these

Answer: A

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

A. $x \leq -1$ or $x \geq 3$

B. $x < -1$ or $x > 3$

C. $x \leq -1$ or $x > 3$

D. $x < -3$ or $x > 2$

Answer: B

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27. If S.P and R are the sum, product and sum of the reciprocals of n terms of an increasing G.P respectively and $S^n = R^n . P^k$, then k is equal to

A. 1

B. 2

C. 3

D. None of these

Answer: B

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28. x and y are positive number.Let g and a be G.M. And AM of these numbers.Also let G be G.M of x + 1 and y + 1.If G and g are roots of equation $x^2 - 5x + 6 = 0$, then

A. $x = 2, y = \frac{3}{4}$

B. $x = \frac{3}{4}, y = 12$

C. $x = \frac{5}{2}, y = \frac{8}{5}$

D. x = y = 2

Answer: D

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29. Suppose x and y are real numbers such that $-1 < x < y < 1$ Let G be the sum of the geometric series whose first term is x and whose common ratio is y, and let G' be the sum of the geomateric series whose first term is y and common ratio is x. If G = G' then the value of (x + y) is

A. 1

B. -1

C. 2

D. -2

Answer: A

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30. The first two terms of a geometric progression add up to 12. The sum of the third and the fourth terms is 48. If the terms of the geometric progression are alternately positive and negative, then the first term is (1) 4 (2) 12 (3) 12 (4) 4

A. -4

B. -12

C. 12

D. 4

Answer: B

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31. An infinite GP has first term x and sum 5, then x belongs to (2004, 1M)

$x < -10$ (b) `-10 10`

A. $x < -10$

B. $-10 < x < 0$

C. $0 < x < 10$

D. $x > 10$

Answer: C

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32. (i) The value of $x + y + z$ is 15. If a, x, y, z, b are in AP while the value of $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ is $\frac{5}{3}$. If a, x, y, z b are in HP, then find a and b

(ii) If x,y,z are in HP, then show that

$\log\,(x+z)+\log(x+z-2y)=2\log(x-z).$

A. 2 and 8

B. 1 and 9

C. 3 and 7

D. None of these

Answer: B

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33. Given that α, γ are roots of the equation $Ax^2-4x+1=0, and\beta, \delta$ the roots of the equation of $Bx^2-6x+1=0,$ such that $\alpha, \beta, \gamma, and\delta$ are in H.P., then a.$A=3$ b. $A=4$ $B=2$ d. $B=8$

A. A = 3, B =8

B. $A=\,-3, B=8$

C. $A=3, B=\,-8$

D. None of these

Answer: A

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34. If $x_1, x_2, x_3 \ldots\ldots\ldots\ldots\ldots . x_n$ are in H.P.then $x_1x_2 + x_2x_3 + \ldots\ldots + x_{n-1}x_n$=

A. $(n+1)x_1x_n$

B. $(n-1)x_1x_n$

C. nx_1x_n

D. $(n^2-1)x_1x_n$

Answer: B

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35. If the harmonic mean between a and b be H, then the value of $\frac{1}{H-a}+\frac{1}{H-b}$ is-

A. $a+b$

B. ab

C. $\frac{1}{a}+\frac{1}{b}$

D. $\frac{1}{a}-\frac{1}{b}$

Answer: C

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36. The sum of $0.\ 2+0004+0.\ 00006+0.\ 0000008+\ldots$ to ∞ is $\frac{200}{891}$ b. $\frac{2000}{9801}$ c. $\frac{1000}{9801}$ d. none of these

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

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

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

D. None of these

Answer: B

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37. If the p^{th}, q^{th} and r^{th} terms of a H.P. are a,b,c respectively, then prove that $\frac{q-r}{a}+\frac{r-p}{b}+\frac{p-q}{c}=0$

A. 0

B. ap + bq + cr

C. $\frac{a}{p}+\frac{b}{q}+\frac{c}{r}$

D. None of these

Answer: A

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38. If a,b,c are three distinct positive real numbers which are in H.P., then $\frac{3a+2b}{2a-b}+\frac{3c+2b}{2c-b}$ is

A. Greater than or equal to 10

B. Less than or equal to 10

C. Only equal to 10

D. None of these

Answer: D

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39. If a,b,c are in H.P., then the value of

$\left(\frac{1}{b}+\frac{1}{c}-\frac{1}{a}\right)\left(\frac{1}{c}+\frac{1}{a}-\frac{1}{b}\right)$ is

A. $\frac{2}{bc}+\frac{1}{b^2}$

B. $\frac{3}{c^2}+\frac{2}{ca}$

C. $\frac{3}{b^2}-\frac{2}{ab}$

D. None of these

Answer: C

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40. If the 7^{th} term of a H.P is $\frac{1}{10}$ and the 12^{th} term is $\frac{1}{25}$, then the 20^{th} term is

A. $\frac{1}{37}$

B. $\frac{1}{41}$

C. $\frac{1}{45}$

D. $\frac{1}{49}$

Answer: D

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41. If $\frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \ldots + \infty = \frac{\pi^4}{90}$, then $\frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \ldots + \infty =$

A. $\frac{\pi^4}{96}$

B. $\frac{\pi^4}{45}$

C. $\frac{89}{90}\pi^4$

D. None of these

Answer: A

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42. If x, y and z are $pth, > h$ and rth terms respectively of an $A.P$ and also of a $G.P.$ then $x^{y-z} \cdot y^{z-x} \cdot z^{x-y}$ is equal to

A. 0

B. 1

C. 2

D. None of these

Answer: B

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43. The AM, HM and GM between two number are $\frac{144}{15}$, 15 and 12, but not necessarily in this order then, HM, GM and AM respectively are

A. $\frac{144}{15}, 12, 15$

B. $\frac{144}{15}, 15, 12$

C. $15, 12, \frac{144}{15}$

D. $12, 15, \frac{144}{15}$

Answer: A

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

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

A. A.P

B. GP.

C. H.P.

D. None of these

Answer: C

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45. If the p^{th}, q^{th} and r^{th} terms of a GP. Are again in G.P., then which one of the following is correct?

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

B. p.q.r are in GP.

C. p,q,r are in H.P.

D. p,q,r are neither in A.P. Nor in G.P. Nor in H.P.

Answer: A

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46. If $x > 0, \dfrac{x^n}{1 + x + x^2 + \dots + x^{2n}}$ is

A. $\leq \dfrac{1}{2n+1}$

B. $< \dfrac{2}{2n+1}$

C. $\geq \dfrac{1}{2n+1}$

D. $> \dfrac{2}{2n+1}$

Answer: A

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

A. $\frac{3^{10}.2^4}{7^7}$

B. $\frac{3^9.2^4}{7^7}$

C. $\frac{3^8.2^4}{7^7}$

D. None of these

Answer: A

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48. If $\frac{1}{b-a}+\frac{1}{b-c}=\frac{1}{a}+\frac{1}{c}$, then a,b,c are in (A) AP (B) GP (C) HP (D) NONE

A. A.P.

B. GP.

C. H.P.

D. In G.P.and H.P both

Answer: C

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49. If x, y, z are real and $4x^2+9y^2+16z^2-6xy-12yz-8zx=0, thenx, y, z$ are in a. A.P. b. G.P. c. H.P. d. none of these

A. A.P.

B. GP.

C. H.P.

D. None of these

Answer: C

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50. If A and G be the AM and GM between two positive no.'s ; then the numbers are $A \pm \sqrt{A^2 - G^2}$

A. $A \pm (A^2 - G^2)$

B. $\sqrt{A} \pm \sqrt{A^2 - G^2}$

C. $A + \sqrt{(A+G)(A-G)}$

D. $A \pm \dfrac{\sqrt{(A+G)(A-G)}}{2}$

Answer: C

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51. Consider the sequence of numbers 121, 12321, 1234321,... Each term in the sequence is

A. a prime number

B. square of an odd number

C. divisible by 11

D. form a GP.

Answer: B

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52. The sum of $i-2-3i+4$ up to 100 terms, where $i=\sqrt{-1}$ is $50(1-i)$ b. $25i$ c. $25(1+i)$ d. $100(1-i)$

A. $50(1-i)$

B. $25i$

C. $25(1+i)$

D. $100(1-i)$

Answer: A

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53. In a geometric progression with first term a and common ratio r, what is the arithmetic mean of first five terms?

A. $a+2r$

B. ar^2

C. $a\frac{r^5-1}{5(r-1)}$

D. $a\frac{r^4-1}{5(r-1)}$

Answer: C

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

A. $\frac{3}{16}$

B. $\frac{35}{8}$

C. $\frac{35}{4}$

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

Answer: D

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

A. $\frac{19}{7}$

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

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

D. None of these

Answer: B

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56. 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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57. The sum of the infinite series

$\frac{1}{2}\left(\frac{1}{3}+\frac{1}{4}\right)-\frac{1}{4}\left(\frac{1}{3^2}+\frac{1}{4^2}\right)+\frac{1}{6}\left(\frac{1}{3^3}+\frac{1}{4^3}\right)$- ....is equal to

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

B. $\frac{\log(3)}{5}$

C. $\frac{\log(5)}{3}$

D. $\frac{1}{2}\log\left(\frac{5}{3}\right)$

Answer: D

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

A. 11300

B. 11200

C. 12100

D. 12300

Answer: C

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59. Let $H_n = 1 + \frac{1}{2} + \frac{1}{3} + \ldots\ldots + \frac{1}{n}$, then the sum to n terms of the series

$\frac{1^2}{1^3} + \frac{1^2}{1^3} + \frac{2^2}{2^3} + \frac{1^2 + 2^2 + 3^2}{1^3 + 2^3 + 3^3} + \ldots$, is

A. 12

B. 7

C. 9

D. None of these

Answer: A

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60. 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. $a(100) < 200$

B. $a(100) > 100$

C. $a(200) \leq 100$

D. $a(200) > 100$

Answer: D

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Exercise 2 Concept Applicator

1. If $a_1, a_2, \ldots.., a_n$ are in A.P. with common difference $d \neq 0$, then the sum of the series sin $d[\sec a_1 \sec a_{n-1} \sec a_n]$ is

A. sin d

B. cos d

C. cosec d

D. sin d cos d

Answer: C

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2. If $1, \log_9(3^{1-x}+2), \log_3(4\cdot 3^x-1)$ 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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3. In the coefficients of rth, $(r+1)th, and(r+2)th$ terms in the binomial expansion of $(1+y)^m$ are in A.P., then prove that $m^2-m(4r+1)+4r^2-2=0.$

A. $m^2-m(4r-1)+4r^2-2=0$

B. $m^2 - m(4r+1) + 4r^2 + 2 = 0$

C. $m^2 - m(4r+1) + 4r^2 - 2 = 0$

D. $m^2 - m(4r-1) + 4r^2 + 2 = 0$

Answer: C

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4. The minimum value of $\frac{x^4 + y^4 + z^2}{xyz}$ for positive real numbers x, y, z is $\sqrt{2}\ 2\sqrt{2}\ 4\sqrt{2}\ 8\sqrt{2}$

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $4\sqrt{2}$

D. $8\sqrt{2}$

Answer: B

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5. If every even term of a series is a times the term before it and every odd term is c times the before it, the first term being unity, then the sum to 2n terms is

A. $\left((1-c^n)\frac{1-a^n}{1-ac}\right.$

B. $\frac{(1+a)(1-c^n a^n)}{1-ac}$

C. $\frac{(1+c^n)(1+a^n)}{1-ac}$

D. $\frac{(1+a)(1+c^n a^n)}{1+ac}$

Answer: B

Watch Video Solution

6. If $y = 3^{x-1} + 3^{-x-1}$ (where, x is real), then the leastvalue of y is

A. 2

B. 6

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

D. None of these

Answer: C

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7. Let $a_1, a_2, a_3, \dots a_n$ be an AP. Prove that: $\frac{1}{a_1 a_n} + \frac{1}{a_2 a_{n-1}} + \frac{1}{a_3 a_{n-2}} + \dots\dots + \frac{1}{a_n a_1} =$

A. $\frac{2}{a_1 + a_n}$

B. $\frac{n}{a_1 + a_n}$

C. $\frac{1}{a_1 + a_n}$

D. $\frac{n-1}{a_1 + a_n}$

Answer: A

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

1000π b. 5050π c. 4950π d. 5151π

A. 1000π

B. 5050π

C. 4950π

D. 5151π

Answer: B

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9. If $\log_e 5, \log_e(5^x - 1)$ and $\log_e\left(5^x - \frac{11}{5}\right)$ are in A.P then the values of x are

A. $\log_5 4 \text{ and } \log_5 3$

B. $\log_3 4$ and $\log_4 3$

C. $\log_3 4$ and $\log_3 5$

D. $\log_5 6$ and $\log_5 7$

Answer: A

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10. If a, b, c are the sides of a triangle, then the minimum value of $\frac{a}{b+c-a}+\frac{b}{c+a-b}+\frac{c}{a+b-c}$ is equal to 3 6 9 12

A. 3

B. 6

C. 9

D. 12

Answer: A

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11. The value of $\frac{1}{2!}+\frac{2}{3!}+\ldots+\frac{999}{1000!}$ is equal to

A. $\frac{1000!-1}{1000!}$

B. $\frac{1000!+1}{1000!}$

C. $\frac{999!-1}{999!}$

D. $\frac{999!+1}{999!}$

Answer: A

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12. If a,b,c are in H.P.then which one of the following is true

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

B. $\frac{ac}{a+c}=b$

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

D. None of these

Answer: D

View Text Solution

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

A. 1

B. 2

C. 3

D. 4

Answer: C

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14. The odd value of n for which `704 + 1/2 (704) + 1/4 (704) + ... upto n terms = 1984 - 1/2 (1984) + 1/4 (1984) - .... upto n terms is :

A. 4

B. 5

C. 6

D. 7

Answer: B

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

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

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

B. 3

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

D. 2

Answer: B

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16. The harmonic mean of $\frac{a}{1-ab}$ and $\frac{a}{1+ab}$ is :

A. a

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

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

D. $\frac{a}{1+a^2b^2}$

Answer: A

View Text Solution

17. The sum of the infinite series $\frac{2^2}{2!}+\frac{2^4}{4!}+\frac{2^6}{6!}+...$ Is equal to

A. $\frac{e^2+1}{2e}$

B. $\frac{e^4+1}{2e^2}$

C. $\frac{(e^2-1)^2}{2e^2}$

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

Answer: C

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18. If a,b,c re in H.Pthen which one of the following is true

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

B. $\frac{ac}{a+c}=b$

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

D. None of these

Answer: D

View Text Solution

19. ABC is a right angled triangle in which $\angle B = 90^\circ$ and BC=a. If n points $L_1, L_2, \ldots\ldots.., L_n$ on AB are such that AB is divided in $n+1$ equal parts and $L_1M_1, L_2M_2, \ldots\ldots, L_nM_n$ are line segments parallel to BC and $M_1, M_2, M_3, \ldots\ldots, M_n$ are on AC, the sum of the lenghts of $L_1M_1, L_2M_2, \ldots\ldots, L_nM_n$ is

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

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

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

D. None of these

Answer: C

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20. If $S_1, S_2, S_3, \ldots, S_n$ are the sums of infinite geometric series, whose first terms are 1, 2, 3,.., n and whose common rations are

$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots, \frac{1}{n+1}$ respectively, then find the values of $S_1^2 + S_2^2 + S_3^2 + \dots + S_{2n-1}^2$.

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

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

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

D. None of these

Answer: A

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21. If a is the A.M. of $bandc$ and the two geometric mean are $G_1 and G_2$, then prove that $G13 + G23 = 2ab \cdot$

A. abc

B. 4abc

C. 2abc

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

Answer: C

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

A. $p^2 + q^2 = p^{'2} + q^{'2}$

B. $pq = p'q'$

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

D. None of these

Answer: C

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23. The AM, HM and GM between two numbers are (144)/(15), 15 and 12, but not necessarily in this order then, HM, GM and AM respectively are :

A. $\frac{144}{15}, 12, 15$

B. $\frac{144}{15}, 15, 12$

C. $15, 12, \frac{144}{15}$

D. $12, 15, \frac{144}{15}$

Answer: A

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24. If the arithmetic geometric and harmonic menas between two positive real numbers be A, G and H, then

A. $A^2 = GH$

B. $H^2 = AG$

C. $G = AH$

D. $G^2 = AH$

Answer: D

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25. 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 $\dfrac{2\cos x}{\sin x + 2\cos x}, \left(0 < x < \dfrac{\pi}{2}\right)$ is

A. $\left[\dfrac{71}{150}, \dfrac{61}{99}\right]$

B. $\left[\dfrac{71}{140}, \dfrac{61}{79}\right]$

C. $\left[\dfrac{71}{190}, \dfrac{61}{130}\right]$

D. None of these

Answer: A

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26. If $L_1 = (2.02 \pm 0.01)m$ and $L_2 = (1.02 \pm 0.01)m$ then $L_1 + 2L_2$ is (in m)

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

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

C. $\frac{1}{2}(a-1)(2a-1)(4a-1)$

D. None of these

Answer: B

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27. $\sum_{k=1}^{n} k\left(1+\frac{1}{n}\right)^{k-1}$ =

A. $n(n-1)$

B. $n(n+1)$

C. n^2

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

Answer: C

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

A. 0

B. 2

C. 4

D. 1

Answer: D

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29. If $|x| < 1$,then the sum of the series $1 + 2x + 3x^2 + 4x^2 + \ldots . \infty$ will be

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

B. $\dfrac{1}{1+x}$

C. $\dfrac{1}{1+x^2}$

D. $\dfrac{1}{(1-x)^2}$

Answer: D

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30. 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 $\dfrac{n(n+1)^2}{2}$ when n is even . when n is odd , the sum is

A. $\left[\dfrac{n(n+1)}{2}\right]^2$

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

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

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

Answer: B

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