MATHS

BOOKS - OBJECTIVE RD SHARMA ENGLISH

SEQUENCES AND SERIES

Illustration

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

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

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

C. 1

D. 0

Answer: C

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

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

Answer: D

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

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

A. $\frac{1}{\sqrt{a_1}+\sqrt{a_n}}$

B. $\frac{1}{\sqrt{a_1}-\sqrt{a_n}}$

C. $\frac{n}{\sqrt{a_1}-\sqrt{a_n}}$

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

Answer: D

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

A. 1

B. 2

C. 0

D. none of these

Answer: C

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

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

B. 1

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

D. 0

Answer: D

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6. If a_n be the term of an A.P. and if $a_7 = 15$, then the value of the common difference that could makes $a_2 a_7 a_{12}$ greatest is:

A. 9

B. $9/4$

C. 0

D. 18

Answer: C

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7. 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. $\dfrac{\alpha - \beta}{100}$

B. $\beta - \alpha$

C. $\dfrac{\alpha - \beta}{200}$

D. $\alpha - \beta$

Answer: A

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8. The 10th common terms between the series $3 + 7 + 11 + \ldots\ldots$ And $1 + 6 + 11 + \ldots\ldots$ is

(i) 191

(ii) 193

(iii) 211

(iv) None of these

A. 191

B. 193

C. 211

D. none of these

Answer: A

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9. For any three positve real numbers a,b and c, $9\left(25a^{+}b^{2}\right)+25\left(c^{2}-3ac\right)=15b(3a+c)$ then

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

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

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

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

Answer: D

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

A. 21

B. 19

C. 20

D. 91

Answer: C

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11. Which of the following sequenes is an A.P. with common difference 3 ?

A. $a_n = 2n^2 + 3n, n \in N$

B. $a_n = 3n + 5$

C. $a_n = 3n^2 + 1$

D. $a_n = 2n^2 + 3$

Answer: B

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12. Let $a_1, a_2, a_3, \ldots a_n$ be an AP. then: $\frac{1}{a_1 a_n} + \frac{1}{a_2 a_{n-1}} + \frac{1}{a_3 a_{n-2}} + \ldots\ldots + \frac{1}{a_n a_1} =$

A. 2

B. $a_1 + a_n$

C. $2(a_1 + a_{n1})$

D. $\frac{n}{a_1 a_{n1}}$

Answer: D

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

A. $5/2$

B. $\log_2 5$

C. $\log_3 5$

D. $\log_5 3$

Answer: B

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14. If $\log_5 2, \log_5(2^x - 3)$ and $\log_5\left(\frac{17}{2} + 2^{x-1}\right)$ are in AP, then the value of x is

A. 0

B. -1

C. 3

D. none of these

Answer: C

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15. If $\log_{10} 2, \log_{10}(2^x - 1)$ and $\log_{10}(2^x + 3)$ are in A.P then the value of x is

A. more than two real x

B. no real x

C. exactly one real x

D. exactly two real x

Answer: C

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16. The least value of a for which $5^{1+x} + 5^{1-x}, a/2, 25^x + 25^{-x}$ are three consecutive terms of an A.P., is

A. 10

B. 5

C. 12

D. none of these

Answer: C

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17. let $f(x)$ be a polynomial function of second degree. If $f(1) = f(-1)$ and a_1, a_2, a_3 are in AP, then show that $f'(a_1), f'(a_2), f'(a_3)$ are in AP.

A. A.G.P

B. A.P.

C. G.P.

D. H.P.

Answer: B

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18. . If $1, \log_y x, \log_z y, \ -15\log_x z$ are in AP, then

A. $x = z^3$

B. $x = y^{-1}$

C. $y = z^{-3}$

D. $y = z^3$

Answer: D

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19. about to only mathematics

A. an even integer

B. an odd integer

C. the square of an integer

D. the cube of an integer

Answer: C

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20. Three number are in A.P, such that their sum is 18 and sum of there square is 158. The greatest among them is

A. 10

B. 11

C. 12

D. none of these

Answer: B

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

A. 3

B. 6

C. 4

D. 8

Answer: B

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

A. $2^{1/3}$

B. $2^{2/3}$

C. $2^{1/2}$

D. $2^{3/2}$

Answer: B

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23. 7^{th} term of an A.P. is 40. Then, the sum of first 13 terms is

A. 520

B. 53

C. 2080

D. 1040

Answer: A

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

A. 10

B. 12

C. 11

D. 13

Answer: C

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

A. P+Q

B. 2P+3Q

C. 2Q

D. Q

Answer: D

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26. 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. $\dfrac{l^2 - a^2}{2S - (l + a)}$

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

C. $\dfrac{l^2 + a^2}{2S + (l + a)}$

D. $\dfrac{l^2 + a^2}{2S - (l + a)}$

Answer: A

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

A. 4:1

B. 6:1

C. 8:1

D. 10:1

Answer: B

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28. Let the sequence $a_1, a_2, a_3, , a_n$ from an A.P. Then the value of $a12 - a22 + a32 - \quad + a2n - 12 - a2n2$ is $\frac{2n}{n-1}(a2n2 - a12)$ (b) $\frac{n}{2n-1}(a12 - a2n2)$ $\frac{n}{n+1}(a12 - a2n2)$ (d) $\frac{n}{n-1}(a12 + a2n2)$

A. $\frac{n}{2n+1}\left(a_1^2 + a_{2n}^2\right)$

B. $\frac{2n}{n+1}\left(a_{2n}^2 + a_1^2\right)$

C. $\frac{n}{n+1}\left(a_1^2 + a_{2n}^2\right)$

D. none of these

Answer: C

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29. If the first, second and the last terms of an A.P. are a,b,c respectively, then the sum of the A.P. is

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

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

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

D. none of these

Answer: C

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30. If a_1, a_2, a_3,........ are in A.P. such that $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225,$ then $a_1 + a_2 + a_3 + \ldots\ldots + a_{23} + a_{24}$ is equal to

A. 909

B. 75

C. 750

D. 900

Answer: D

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31. Let $a_1, a_2, a_3, ... a_n, ...$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. 153

B. 306

C. 612

D. 204

Answer: B

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32. Consider an A.P. with first term a and common difference d. Let S_k denote the sum of the first k terms. If $\frac{S_{kx}}{S_x}$ is independent of x, then

A. a=2d

B. a=d

C. 2a=d

D. none of these

Answer: C

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33. Consider an A.P. with first term 'a'. Let S_n denote the sum its terms. If $\frac{S_{kx}}{S_x}$ is independent of x, then $S_n =$

A. $n^2 a$

B. na

C. $2n^2 a$

D. $\left(n^2+n\right)a$

Answer: A

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34. The ratio of the sum of n terms of two A.P. s is $(7n+1):(4n+27)$.

Find the ratio of their mth terms.

A. (14n+6) : (8n-23)

B. (14n-6) : (8n+23)

C. 7n-1 : 4n-27

D. (8n+23) : (14n-6)

Answer: B

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

A. $16 : 7$

B. $7 : 16$

C. $74 : 169$

D. none of these

Answer: B

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36. If the ratio of n^{th} terms of two A.P.'s is $(2n + 8) : (5n - 3)$ then the ratio of the sum of their n terms is

A. (2n+18):(5n+1)

B. (5n-1):(2n+18)

C. (2n+18):(5n-1)

D. none of these

Answer: C

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37. If $a_1, a_2, a_3,$ be terms of an A.P. and $\frac{a_1 + a_2 + \ldots . + a_p}{a_1 + a_2 + \ldots . + a_q} = \frac{p^2}{q^2}, p \neq q, then \frac{a_6}{a_{21}}$ equals to (a).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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38. Suppose that all terms of an arithmetic progression (A.P) are natural numbers.If the reation of the sum of the first sece terms to the sum of the firest eleven terms is 6 : 11 and the seventh term lies in between 130 and 140, then the common difference of this A.P is

A. 5

B. 6

C. 8

D. 9

Answer: C

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

A. 125 minutes

B. 135 minutes

C. 24 mintutes

D. 34 minutes

Answer: D

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40. 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 service will be Rs. 11040 after how many months

A. 18 months

B. 19 months

C. 20 months

D. 21 months

Answer: D

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

A. 0

B. 1

C. -1

D. none of these

Answer: B

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42. The arithmetic mean between two numbers is A and the geometric mean is G. Then these numbers are:

A. S=nA

B. A=nS

C. A=S

D. none of these

Answer: A

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

A. 4^3

B. 4^5

C. 4^4

D. none of these

Answer: B

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44. If a, b, c are respectively the $p^{th}, q^{th} and r^{th}$ terms of a G.P. show that

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

A. 1

B. 0

C. -1

D. none of these

Answer: B

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

A. 13

B. 4

C. 5

D. 3

Answer: B

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46. Let $\{a_n\}$ bc a G.P. such that $\frac{a_4}{a_6}=\frac{1}{4}$ and $a_2+a_5=216$. Then $a_1=$

A. $12 \text{ or }, \frac{108}{7}$

B. 10

C. $7 \text{ or }, \frac{54}{7}$

D. none of these

Answer: A

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47. If a, b, c, d and p are distinct real numbers such that (1987, 2M) $(a^2 + b^2 + c^2)p^2 - 2(ab + bc + cd)P + (b^2 + c^2 + d^2) \geq 0, then a, b, c, d$ are in AP (b) are in GP are in HP (d) satisfy $ab = cd$

A. A.P

B. G.P

C. H.P

D. ab=cd

Answer: B

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48. In a G.P. of positive terms if any terms is equal to the sum of next tow terms, find the common ratio of the G.P.

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

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

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

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

Answer: A

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49. If every term of a G.P with positive terms is the sum of its two previous terms, then the common ratio of the G.P is

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

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

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

D. 1

Answer: B

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50. 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. 12

B. 4

C. -4

D. -12

Answer: D

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51. If a,b,c are in geometric progression and a,2b,3c are in arithmetic progression, then what is the common ratio r such that $0 < r < 1$?

A. $1/2$

B. $1/3$

C. $2/3$

D. none of these

Answer: B

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52. If $a_1, a_2, a_3 (a_1 > 0)$ are three successive terms of a GP with common ratio r, the value of r for which $a_3 > 4a_2 - 3a_1$ holds is given by

A. $1 < r < 3$

B. $-3 < r < -1$

C. $r > 3 \text{ or } r < 1$

D. none of these

Answer: C

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53. If the first and the n^{th}term of a GP are a and b, respectively, and if P is the product of n terms, prove that $P^2 = (ab)^n$.

A. ab

B. $(ab)^n$

C. $(ab)^{n/2}$

D. $(ab)^{2n}$

Answer: B

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54. If Three number form an increasin G.P. If the middle term is doubled , then the numbers are in A.P. The common ratio of the G.P. is

A. $2 - \sqrt{3}$

B. $2 + \sqrt{3}$

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

D. $3 + \sqrt{2}$

Answer: B

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

A. $2 - \sqrt{3}$

B. $2+\sqrt{3}$

C. $\sqrt{3}-2$

D. $3+\sqrt{2}$

Answer: B

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56. If the roots of the cubic equation $ax^3+bx^2+cx+d=0$ are in G.P then

A. $c^3a=b^3d$

B. $ca^2=bd^3$

C. $a^3b=c^3d$

D. $ab^3=cd^3$

Answer: A

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57. If $x, 2x+2, 3x+3$ are in $G.P.$, then the fourth term is

A. 27

B. -27

C. 13.5

D. -13.5

Answer: D

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58. If second third and sixth terms of an A.P. are consecutive terms o a G.P. write the common ratio of the G.P.

A. 1

B. -1

C. 3

D. -3

Answer: C

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59. If 5th, 8th, and 11th terms of a G.P. are $p, \ q \, and \, s$ respectively, prove that $q^2 = ps$.

A. $p^2 = q^2 + r^2$

B. $q^2 = pr$

C. $p^2 = qr$

D. pqr+pq+1=0

Answer: B

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60. There are 6 books on mathematics, 4 books on physics annd 5 books on chemistry in a book shop. The number of ways can a student purchase either a book on mathematics or a book on chemistry, is

A. 2

B. 4

C. 6

D. 8

Answer: B

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61. If the 2nd , 5th and 9th terms of a non-constant A.P are in G.P then the common ratio of this G.P is

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

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

C. 1

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

Answer: B

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62. If $a, \ b, \ c$ are in A.P. $b, \ c, \ d$ are in G.P. and $\frac{1}{c}, \frac{1}{d}, \frac{1}{e}$ are in A.P. prove that $a, \ c, \ e$ are in G.P.?

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

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

C. a,b,e are in G.P.

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

Answer: A

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63. Let a_1, a_2, a_3 .....be in A.P. and a_p, a_q, a_r be in G.P. Then $a_q : a_p$ is equal to :

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

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

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

D. none of thses

Answer: C

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64. A G.P. consists of 2n terms. If the sum of the terms occupying the odd places is S_1, and that of the terms in the even places is S_2, then $\frac{S_2}{S_1}$, is

A. independent of a

B. independent of r

C. independent of a and r

D. dependent on r

Answer: A:D

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

A. $a=\frac{4}{7}, r=\frac{3}{7}$

B. $a=2, r=\frac{3}{8}$

C. $a=\frac{3}{2}, r=\frac{1}{2}$

D. $a=3, r=\frac{1}{4}$

Answer: D

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66. If $a > 0$, then $\sum_{n=1}^{\infty}\left(\frac{a}{a+1}\right)^n$ equals

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

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

C. a+1

D. a

Answer: D

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67. If $|\alpha| < 1, |\beta| < 1$ $1-\alpha+\alpha^2-\alpha^3+\ldots\ldots \text{to } \infty = s_1$ $1-\beta+\beta^2-\beta^3+\ldots\ldots \text{to } \infty = s_2,$ then $1-\alpha\beta+\alpha^2\beta^2+\ldots\ldots \text{to } \infty$ equals

A. $s_1 s_2$

B. $\frac{s_1 s_2}{1+s_1 s_2}$

C. $\frac{s_1 s_2}{1-s_1-s_2+2s_1 s_2}$

D. $\frac{1}{1+s_1 s_2}$

Answer: C

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

A. 4

B. 5

C. 6

D. none of these

Answer: A

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69. If S is the sum to infinite terms of a G.P whose first term is 'a', then the sum of the first n terms is

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

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

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

D. none of these

Answer: B

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70. Let a_n be the nth term of a G.P. of positive numbers. Let $\sum_{n=1}^{100} a_{2n}=\alpha$ and $\sum_{n=1}^{100} a_{2n-1}=\beta$, such that $\alpha \neq \beta$, then the common ratio is

(a) α/β b. β/α c. $\sqrt{\alpha/\beta}$ d. $\sqrt{\beta/\alpha}$

A. α/β

B. β / α

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

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

Answer: A

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

A. $x < -10$

B. $-10 < x < 0$

C. $0 < x < 10$

D. $x > 0$

Answer: C

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72. If $-\pi/2 < x < \pi/2$, and the sum to infinite terms of the series $\cos x + \frac{2}{3}\cos x \sin^2 x + \frac{4}{9}\cos x \sin^4 x + \ldots$ if finite then

A. $x \in (-\pi/3, \pi/3)$

B. $x \in (-\pi/2, \pi/2)$

C. $x \in (-\pi/4, \pi/4)$

D. none of these

Answer: B

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

A. $[\pi/3]$

B. $[\pi/3, -2\pi/3]$

C. $[-\pi/3, -2\pi/3]$

D. $[\pi/3, 2\pi/3]$

Answer: D

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74. If $S = 1 + a + a^2 + a^3 + a^4 + \dots\dots\dots \to \infty$ then $a =$

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

B. $\dfrac{S}{1-S}$

C. $\dfrac{S-1}{S}$

D. $\dfrac{1-S}{S}$

Answer: C

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

A. $\log_{1-B}(1 - A)$

B. $\log_{\left(\frac{B-1}{B}\right)}\left(\frac{A-1}{A}\right)$

C. $\log_B A$

D. none of these

Answer: B

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76. For $0 < \theta < \frac{\pi}{2}$, if

$x = \sum_{n=0}^{\infty} \cos^{2n}\theta$, $y = \sum_{n=0}^{\infty} \sin^{2n}\phi$, $z = \sum_{n=0}^{\infty} \cos^{2n}\theta \sin^{2n}\phi$, then

A. xy=zx+zy+z

B. xy=zx+zy-z

C. xy+yz+zx=z

D. none of these

Answer: B

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77. If $x=\sum_{n=0}^{\infty} a^n, y=\sum_{n=0}^{\infty} b^n, z=\sum_{n=0}^{\infty} (ab)^n$, where $a, b<1$, then

A. xyz=x+y+z

B. xz+yz=xy+z

C. xy+yz=xz+y

D. xy+xz=yz+x

Answer: B

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78. If $|a| < 1 and |b| < 1,$ then the sum of the series $1 + (1+a)b + (1+a+a^2) + (1+a+a^2+a^3)b^3 + \ldots$ is $\dfrac{1}{(1-a)(1-b)}$ b. $\dfrac{1}{(1-a)(1-ab)}$ c. $\dfrac{1}{(1-b)(1-ab)}$ d. $\dfrac{1}{(1-a)(1-b)(1-ab)}$

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

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

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

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

Answer: C

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79. If $\dfrac{a^n + b^n}{a^{n-1} + b^{n-1}}$ is the GM between a and b, then the value of n is

A. 0

B. 1

C. $1/2$

D. none of these

Answer: C

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80. one AM ,a and two $GM's$,$p$and q be inserted between any two given numbers then show that $p^3 + q^3 = 2apq$

A. $\frac{2pq}{a}$

B. 2apq

C. $2ap^2q^2$

D. none of these

Answer: B

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81. If a is the A.M. of b and c and the two geometric means are G_1 and G_2, then prove that $G_1^3 + G_2^3$

A. 1

B. 2

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

D. 3

Answer: B

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82. 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. 2G

B. G

C. G^2

D. G^3

Answer: C

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

(i) $\frac{a+b}{ab}$

(ii) $\frac{a+b}{2}$

(iii) $\frac{a+}{a-b}$

(iv) None of these

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

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

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

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

Answer: C

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84. Let two humbers have arithmatic mean 9 and geometric mean 4. Then these numbers are roots of the equation :

A. $x^2 - 18x - 16 = 0$

B. $x^2 - 18x + 16 = 0$

C. $x^2 + 18x \quad 16 = 0$

D. $x^2 + 18x + 16 = 0$

Answer: B

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

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

B. $7+4\sqrt{3}:7-4\sqrt{3}$

C. $2:7+4\sqrt{3}$

D. $2:\sqrt{3}$

Answer: A

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86. If the first two terms of a H.P are 2/5 and 12 / 13 , respectively . Then find the largest term.

A. 5th term

B. 6th term

C. 4th term

D. 6th term

Answer: A

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87. If the first two terms of a H.P are 2/5 and 12 / 13 , respectively . Then find the largest term.

A. 6

B. 12

C. 5

D. 7

Answer: A

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

A. 22

B. 23

C. 24

D. 25

Answer: D

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89. If a,b,c, are in AP and $|a|, |b|, |c| < 1$ and $x = 1 + a + a^2 + \ldots\ldots + \infty, y = 1 + b + b^2 + \ldots\ldots + \infty, z = 1 + c +$

Then, x,y,z will be in

A. AP

B. GP

C. HP

D. none of these

Answer: C

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

A. AP

B. HP

C. GP

D. none of these

Answer: B

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91. If $\frac{1}{\sqrt{x-1}} + \frac{1}{\sqrt{y-1}} + \frac{1}{\sqrt{z-1}} > 0$ and $x, y, z,$ are in G.P., then $\left(\log x^2\right)^{-1}, (\log xz)^{-1}, \left(\log z^2\right)^{-1}$ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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

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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93. a1,a2,a3.....an are in H.P. $\frac{a_1}{a_2+a_3+\ldots+a_n}, \frac{a_2}{a_1+a_3+\ldots+a_n}, \frac{a_3}{a_1+a_2+a_4+\ldots+a_n}, \ldots,$ are in

A. A.P.

B. G.P.

C. H.P.

D. A.G.P.

Answer: C

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94. If $a_1, a_2, a_3, \ldots\ldots\ldots a_n$ are in HP, then the expression $a_1a_2+a_2a_3+\ldots\ldots+a_{n-1}a_n$ is equal to

A. $n(a_1 - a_n)$

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

C. na_1a_n

D. $(n-1)a_1a_n$

Answer: D

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95. If $x^2 + 9y^2 + 25z^2 = xyz\left(\frac{15}{x} + \frac{5}{y} + \frac{3}{z}\right)$, then $x, y, and z$ are in a. H.P. b. A.P. c. G.P. d. None of These

A. A.P.

B. G.P.

C. A.G.P.

D. H.P.

Answer: D

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

A. $a+b > c+d$

B. $a+c > b+d$

C. $a+d > b+c$

D. $b+c > a+d$

Answer: C

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

A. $ab > cd$

B. $ac > bd$

C. $ad > bc$

D. $bc > ad$

Answer: C

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98. (i) a , b, c are in H.P. , show that $\dfrac{b+a}{b-a}+\dfrac{b+c}{b-c}=2$

(ii) If a^2, b^2, c^2 are A.P. then b + c , c + a , a + b are in H.P. .

A. $a^n + c^n > b^n$

B. $a^n + c^n > 2b^n$

C. $a^n + b^n > 2c^n$

D. $b^n + c^n > 2a^n$

Answer: B

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99. If $a, a_1, a_2 - - - - a_{2n-1}, b$ are in $A.P$ and $a, b_1, b_2 - - - - - b_{2n-1}, b$ are in $G.P$ and $a, c_1, c_2 - - - - c_{2n-1}, b$ are in $H.P$ (which are non-zero and a,b are positive real numbers), then the roots of the equation $a_n x^2 - b_n x + c_n = 0$ are

A. $a_n^2 = b_n c_n$

B. $b_n^2 = c_n a_n$

C. $c_n^2 = a_n b_n$

D. none of these

Answer: B

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100. If the ratio of $H.M.$ and $G.M.$ between two numbers a and b is $4:5$, then find the ratio of the two number ?

A. $4:1$

B. $3:2$

C. $3:4$

D. $2:3$

Answer: A

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101. Let A_1, G_1, H_1denote the arithmetic, geometric and harmonic means respectively, of two distinct positive numbers. For $n > 2$, let A_{n-1}, G_{n-1} and H_{n-1} has arithmetic, geometric and harmonic means as $A_n, G_N, H_N,$ respectively.

A. $G_1 > G_2 > G_3 > \ldots$

B. $G_1 < G_2 < G_3 < \ldots$

C. $G_1 = G_2 = G_3 = \ldots$

D. $G_1 < G_3 < G_5 = \ldots \text{ and } G_2 > G_4 > G_6 > \ldots$

Answer: C

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102. In Illustration 6, which one of the following statement is correct ?

A. $A_1 > A_2 > A_3 > \ldots$

B. $A_1 < A_2 < A_3 \ldots$

C. $A_1 > A_3 > A_5 > \ldots \text{ and } A_2 < A_4 < A_6 <$

D. $A_1 < A_3 < A_5 < \ldots \text{ and } A_2 > A_4 > A_6 > \ldots$

Answer: A

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103. In Illustration 6, which one of the following statement is correct ?

A. $H_1 > H_2 > H_3 > \ldots.$

B. $H_1 < H_2 < H_3 < \ldots.$

C. $H_1 > H_3 > H_5 > \ldots. \text{ and } H_2 < H_4 < H_6 < \ldots.$

D. $H_1 < H_3 < H_5 < \ldots. \text{ and } H_2 > H_4 > H_6 > \ldots.$

Answer: B

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104. The sum to infinity of the series

$1 + 2\left(1 - \frac{1}{n}\right) + 3\left(1 - \frac{1}{n}\right)^2 + \ldots\ldots.,$ is (A)n^2 (B)$n(n+1)$ (C) $n\left(1 + \frac{1}{n}\right)^2$ (D)None of these

A. n^2

B. n(n+1)

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

D. none of these

Answer: A

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105. about to only mathematics

A. 1

B. 2

C. $3/2$

D. $5/2$

Answer: B

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106. If the sum to infinity of the series

$3+(3+d)\frac{1}{4}+(3+2d)\frac{1}{4^2}+\ldots\infty$ is $\frac{44}{9}$, then find d.

A. 9

B. 5

C. 1

D. none of these

Answer: A

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

A. 2

B. 3

C. 4

D. 6

Answer: B

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108. Evaluate $: 1 + 3x + 6x^2 + 10x^3 + \ldots\ldots$ upto infinite term, whre $|x| < 1$.

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

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

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

D. $\dfrac{1}{(1-x)^3}$

Answer: D

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109. The sum of first nine 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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110. The sum of the n terms of the series $1 + (1+3) + (1+3+5) + \ldots$ is

A. n^2

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

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

D. none of these

Answer: C

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111. Sum of n terms the series : $1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \ldots.$

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

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

C. $-n(n+1)$

D. none of these

Answer: A

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112. Sum of n terms the series : $1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \ldots.$

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

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

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

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

Answer: A

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113. Fill in the blanks The coefficient of x^{99} in the polynomial $(x - 10(x-2)(x-100) is\_ \_\_ \_ .$

A. 5050

B. 5000

C. -5050

D. -5000

Answer: C

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114. Let $f(1)=1$ and $f(n)=2\sum_{r=1}^{n-1} f(r)$. Then, $\sum_{n=1}^{m} f(n)$ is equal to

A. $\frac{7n(n+1)}{2}$

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

C. $\frac{7(n+1)}{2}$

D. 7n(n+1)

Answer: A

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115. Find the sum of all possible products of the first n natural numbers taken two by two.

A. $\frac{1}{24}n(n+1)(n-1)(3n+2)$

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

C. $\dfrac{n(n+1)(n-1)(2n+3)}{24}$

D. none of these

Answer: A

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116. if T_N denotes the nth term of the series 2+3+6+11+18+***, then t_{50} is

A. $49^2 - 1$

B. 49^2

C. $50^2 + 1$

D. $49^2 + 2$

Answer: D

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117. Find the value of the expression $\sum_{i=1}^{n}\sum_{j=1}^{i}\sum_{k=1}^{j}1$.

A. $\sum n$

B. $\sum n^2$

C. $\sum n^3$

D. none of these

Answer: D

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118. let S_n denote the sum of the cubes of the first n natureal numbers and S_n denote the sum of the fisrt n natural numbers , then $\sum_{r=1}^{n}\frac{S_r}{S_4}$ equals to

A. $\sum_{r=1}^{n} r$

B. $\frac{1}{3}\sum_{r=1}^{n+1} r$

C. $\left(\frac{n+2}{3}\right)\sum_{r=1}^{n} r$

D. none of these

Answer: C

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119. If the sum of first n terms of an A.P. is cn^2 then the sum of squares of these n terms is

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

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

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

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

Answer: C

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120. If the sum of the first terms of the series

$$\left(1\frac{3}{5}\right)^2 + \left(2\frac{2}{5}\right) + \left(3\frac{1}{5}\right)^2 + 4^2 + \left(4\frac{4}{5}\right) + \ldots . . is \frac{16}{5}m$$

then m is equal to

A. 102

B. 101

C. 100

D. 99

Answer: B

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121. The sum of series

$$\frac{1}{1.2} - \frac{1}{2.3} + \frac{1}{3.4} - \frac{1}{4.5} + \ldots \ldots \text{ is}$$

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

B. $1 - \dfrac{1}{n+1}$

C. $\dfrac{1}{n+1} - 1$

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

Answer: B

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122. Find the sum to n terms of the series: $\dfrac{1}{1.\,3} + \dfrac{1}{3.\,5} + \dfrac{1}{5.\,7} +$

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

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

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

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

Answer: C

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123. If $t_n = \frac{1}{4}(n+2)(n+3)f$ or $n = 1, 2, 3, ,$ then $\frac{1}{t_1} + \frac{1}{t_2} + \frac{1}{t_3} + + \frac{1}{t_{2003}} = \frac{4006}{3006}$ b. $\frac{3006}{3007}$ c. $\frac{4006}{3008}$ d. $\frac{4006}{3009}$

A. $\frac{4040}{6063}$

B. $\frac{4040}{6069}$

C. $\frac{8080}{6065}$

D. $\frac{8080}{6069}$

Answer: D

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124. Find the sum to n terms of the series: $\frac{3}{1^2.2^2} + \frac{5}{2^2.3^2} + \frac{7}{3^2.4^2} + \ldots\ldots$

A. 0

B. 2

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

D. 1

Answer: D

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Section I - Solved Mcqs

1. If $(\log)_2\left(5 \times 2^{1-x}+1\right)$, $\log_4\left(2^{1-x}+1\right)$ and 1 are in A.P., then x equals a. $\log_2 5$ b. $1-\log_5 2$ c. $\log_5 2$ d. none of these

A. $\log_2 5$

B. $1-\log_2 5$

C. $\log_5 2$

D. none of these

Answer: B

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2. If 1,$\log_9(3^{1-x}+2)$ and $\log_3(4.3^x-1)$ are A.P. then x is

A. $\log_4 3$

B. $\log_3 4$

C. $1-\log_3 4$

D. $\log_3 0.25$

Answer: C

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3. If $\sin\alpha, \sin^2\alpha, 1, \sin^4\alpha$ and $\sin^6\alpha$ are in A.P., where $-\pi < \alpha < \pi$, then α lies in the interval

A. $(-\pi/2, \pi/2)$

B. $(-\pi/3, \pi/3)$

C. $(-\pi/6, \pi/6)$

D. none of these

Answer: D

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4. 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 show that x=y=z and y≠0

A. x=y=z

B. xy=yz

C. $x^2 = yz$

D. $z^2 = xy$

Answer: A

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5. 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 show that x=y=z and y≠0

A. $x = y = z$ or $y \neq 1$

B. $x = 1/z$

C. x=y=z, but their common value is not necessarily zero

D. x=y=z=0

Answer: C

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6. If $\begin{vmatrix} a & b & a\alpha - b \\ b & c & b\alpha - c \\ 2 & 1 & 0 \end{vmatrix} = 0$, then

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

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7. Let a_1, a_2, a_3, a_4 and a_5 be such that a_1, a_2 and a_3 are in A.P., a_2, a_3 and a_4 are in G.P., and a_3, a_4 and a_5 are in H.P. Then, a_1, a_3 and a_5 are in

A. G.P.

B. A.P.

C. H.P.

D. none of these

Answer: A

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8. If the expression exp $\{1 + |\cos x| + \cos^2 x + |\cos^3 x| + \ldots . \infty) \log_e 4\}$ satisfies the equation $y^2 - 20y + 64 = 0$ for $0 < x < \pi$, then the set of value of x is

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

B. $\{\pi/2, \pi/2\}$

C. $\{\pi/2, 0, 2\pi/3\}$

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

Answer: D

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9. If the sides of a triangle are in GP and its largest angle is twice tha smallset then the common ratio r satisfies the inequality

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

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

C. $1 < r < 2$

D. none of these

Answer: B

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10. The first , second and the last terms of an A.P. are a, b, c respectively. Prove that the sum is $\frac{(a+c)(b+c)(c-2a)}{2(b-a)}$.

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

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

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

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

Answer: B

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

A. $3/5, 4/5$

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

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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12. If the lengths of the sides of a triangle are in A.P. and the greatest angle is double the smallest, then a ratio of lengths of the sides of this triangle is:

A. $3:4:5$

B. $4:5:6$

C. $5:6:7$

D. $7:8:9$

Answer: B

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13. If b-c, 2b-x and b-a are in H.P., then a-$\left(\frac{x}{2}\right)$, b-$\left(\frac{x}{2}\right)$ and c-$\left(\frac{x}{2}\right)$ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

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14. The sixth term of an AP is 2, and its common difference is greater than one. The value of the common difference of the progression so that the product of the first, fourth and fifth terms is greatest is

A. $8/5$

B. $2/3$

C. $5/8$

D. $3/2$

Answer: A

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15. If $ax^3 + bx^2 + cx + d$ is divisible by $ax^2 + c$, $thena, b, c, d$ are in a. A.P. b. G.P. c. H.P. d. none of these

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

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

A. $-nd$

B. a+2nd

C. a+nd

D. 2nd

Answer: C

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17. 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(n+1)

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

D. none of these

Answer: A

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18. The sum to 50 terms of the series

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

A. $\frac{6n}{n+1}$

B. $\frac{9n}{n+1}$

C. $\frac{12n}{n+1}$

D. $\frac{3n}{n+1}$

Answer: A

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19. The sum of n terms of the series $\frac{1}{\sqrt{1}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{5}}+\ldots$ is

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

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

C. $\sqrt{2n+1}-1$

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

Answer: D

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

A. $\pm\sqrt{2}$

B. $\pm 1/\sqrt{2}$

C. ± 2

D. none of these

Answer: A

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

A. 2

B. 3

C. 5

D. 6

Answer: D

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

A. 7

B. 8

C. 5

D. 6

Answer: B

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23. Let a, b, c be in an AP and a^2, b^2, c^2 be in GP. If a < b < c and $a+b+c=\frac{3}{2}$ then the value of a is

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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24. Let $S_k = \sum_{i=0}^{\infty} \frac{1}{(k+1)^t}$, then $\sum_{k=1}^{n} kS_k$ equal :

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

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

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

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

Answer: D

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25. If $(1+x)(1+x^2)(1+x^4)(1+x^{128})=\sum_{r=0}^{n} x^r$ then n is equal to

256 b. 255 c. 254 d. none of these

A. 255

B. 127

C. 63

D. none of these

Answer: A

Watch Video Solution

26. The largest value of the positive integer k for which n^k+1 divides $1+n+n^2+\ldots.+n^{127}$, is

A. 8

B. 16

C. 32

D. 64

Answer: D

Watch Video Solution

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

A. 2n-1

B. 2n+1

C. 4n+1

D. 2n+3

Answer: B

Watch Video Solution

28. Find the sum of $2n$ terms of the series whose every even term is $'a'$ times the term before it and every od term is $'c'$ times the term before it, the first term being unity.

A. $\dfrac{(1-a)(1-c^n a^n)}{1-ca}$

B. $\dfrac{(1-a)\left(1-c^{n-1}a^{n-1}\right)}{1-ca}$

C. $\dfrac{(1-a)\left(1-c^{n-2}a^{n-2}\right)}{1-ca}$

D. none of these

Answer: D

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29. 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. -12

C. 40

D. 53

Answer: D

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30. If $\sum_{r=1}^{n} T_r = \frac{n(n+1)(n+2)(n+3)}{8}$, then $\lim_{n \to \infty} \sum_{r=1}^{n} \frac{1}{T_r} =$

A. 1

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

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

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

Answer: B

Watch Video Solution

31. If $\sum_{r=1}^{n} r \frac{\sqrt{10}}{3} \sum_{r=1}^{n} r^2, \sum_{r=1}^{n} r^3$ are in G.P., then the value of n, is

A. 2

B. 3

C. 4

D. non-existent

Answer: C

Watch Video Solution

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

A. 6

B. 4

C. 5

D. none of these

Answer: C

Watch Video Solution

33. If $a_1, a_2, a_3, , a_{2n+1}$ are in A.P., then $\frac{a_{2n+1}-a_1}{a_{2n+1}+a_1}+\frac{a_{2n}-a_2}{a_{2n}+a_2}++\frac{a_{n+2}-a_n}{a_{n+2}+a_n}$ is equal to a. $\frac{n(n+1)}{2}\times\frac{a_2-a_1}{a_{n+1}}$ b. $\frac{n(n+1)}{2}$ c. $(n+1)(a_2-a_1)$ d. none of these

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

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

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

D. none of these

Answer: A

Watch Video Solution

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

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

B. 2nh

C. nh

D. $\frac{n}{h}$

Answer: A

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35. If $\frac{a_2 a_3}{a_1 a_4} = \frac{a_2 + a_3}{a_1 + a_4} = 3\left(\frac{a_2 - a_3}{a_1 - a_4}\right)$, then a_1, a_2, a_3, a_4 are in

A. AP

B. GP

C. HP

D. none of these

Answer: C

Watch Video Solution

36. If A, G & H are respectively the A.M., G.M. & H.M. of three positive numbers a, b, & c, then equation whose roots are a, b, & c is given by

A. $a^2 = AH$

B. A is an integer if $a < b < c < 4$

C. A=H iff a=b=c

D. $A > G > H, \quad \text{if} \quad a \neq b \neq c$

Answer: A

Watch Video Solution

37. If $a_r > 0, r \in N$ and $a_1 . a_2, ... a_{2n}$ are in A.P then

$$\frac{a_1 + a_2}{\sqrt{a_1} + \sqrt{a_2}} + \frac{a_2 + a_{2n-1}}{\sqrt{a_2} + \sqrt{a_3}} + \ldots . + \frac{a_n + a_{n+1}}{\sqrt{a_n} + \sqrt{a_{n+1}}} =$$

A. n-1

B. $\dfrac{n(a_1 + a_{2n})}{\sqrt{a_1} + \sqrt{a_{n+1}}}$

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

D. none of these

Answer: B

Watch Video Solution

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

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

Watch Video Solution

39. Let $\sum_{r=1}^{n} r^6 = f(n), \quad \text{then} \quad \sum_{n=1}^{n} (2r-1)^6$ is equal to

A. $f(n) - 64f\left(\frac{n+1}{2}\right)$ n is odd

B. $f(n) - 64f\left(\frac{n-1}{2}\right)$ n is odd

C. $f(n) - 64f\left(\frac{n}{2}\right)$, n is even

D. none of these

Answer: D

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40. There are (4n+1) terms in a certain sequence of which the first (2n+1) terms form an A.P of common difference 2 and the last (2n +1) terms are in G.P. of common ratio $1/2$. If the middle term of both A.P and G.P. are the same , then find the mid-term of this sequence.

A. $\dfrac{n \cdot 2^{n+1}}{2^n - 1}$

B. $\dfrac{n \cdot 2^{n+1}}{2^{2n} - 1}$

C. $n \cdot 2^n$

D. none of these

Answer: A

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41. If 3 arithmetic means, 3 geometric means and 3 harmonic means are inserted between 1 and 5, then the cubic equation whose roots are first A.M., second G.M. and third H.M. between 1 and 5, is

A. $x^3 - \left(\frac{9}{2} + \sqrt{5}\right)x^2 + \left(\frac{9\sqrt{5}}{2} + 5\right)x - 5\sqrt{5} = 0$

B. $x^3 + \left(\frac{9}{2} + \sqrt{5}\right)x^2 - \left(\frac{9\sqrt{5}}{2} + 5\right)x - 5\sqrt{5} = 0$

C. $x^3 + \left(\frac{9}{2} - \sqrt{5}\right)x^2 - \left(\frac{9\sqrt{5}}{2} - 5\right)x + 5\sqrt{5} = 0$

D. none of these

Answer: A

Watch Video Solution

42. If sum of x terms of a series is $S_x = \frac{1}{(2x+3)(2x+1)}$ whose r^{th} term is T_r. Then, $\sum_{r=1}^{n} \frac{1}{T_r}$ is equal to

A. $\frac{1}{4}\sum(2r+1)(2r-1)(2r+3)$

B. $-\frac{1}{4}\sum(2r+1)(2r-1)(2r+3)$

C. $\sum(2r+1)(2r-1)(2r+3)$

D. none of these

Answer: B

Watch Video Solution

43. If $f(n)=\sum_{r=1}^{n} r^4$, then the value of $\sum_{r=1}^{n} r(n-r)^3$ is equal to

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

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

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

D. none of these

Answer: B

Watch Video Solution

44. Number of G.P's having 5,9 and 11 as its three terms is equal to

A. exactly two

B. almost two

C. at least one

D. none of these

Answer: D

Watch Video Solution

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

A. 381

B. 471

C. 281

D. none of these

Answer: D

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46. If S_k denotes the sum of first k terms of a G.P. Then, $S_n, S_{2n} - S_n, S_{3n} - S_{2n}$ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

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

A. $-2, \ -1, 0, 1$

B. 0,1,2,3

C. $-1, 0, 1, 2$

D. none of these

Answer: C

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48. Let there be a GP whose first term is a and the common ratio is r. If A and H are the arithmetic mean and harmonic mean respectively for the first n terms of the G P, AH is equal to

A. a^2r^{n-1}

B. ar^n

C. a^2r^n

D. none of these

Answer: A

Watch Video Solution

49. - If $\log\left(5\frac{c}{a}\right)$, $\log\left(\frac{3b}{5c}\right)$ and $\log\left(\frac{a}{3b}\right)$ are in AP, where a, b, c are in GP, then a, b, c are the lengths ofsides of(A) an isosceles triangle(B) an equilateral triangle(D) none of these(C) a scalene triangle

A. an isosceles triangle

B. an equilateral triangle

C. a scalene triangle

D. none of these

Answer: D

Watch Video Solution

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

A. $|y| = 3z$ and $x = 3|y|$

B. $y = 3|z|$ and $|x| = 3y$

C. 2y=x+z

D. none of these

Answer: A

Watch Video Solution

51. In the sequence 1, 2, 2, 3, 3, 3, 4, 4,4,4,......, where n consecutive terms have the value n, the 150 term is

A. 17

B. 16

C. 18

D. none of these

Answer: A

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52. If the sequence $1, 2, 2, 4, 4, 4, 4, 8, 8, 8, 8, 8, 8, 8, 8, \ldots$where n consecutive terms has value n then 1025^th term is

A. 2^9

B. 2^{10}

C. 2^{11}

D. 2^8

Answer: B

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53. $\sum_{r=1}^{n} r^2 - \sum_{r=1}^{n}\sum_{r=1}^{n}$ is equal to

A. 0

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

C. $\frac{1}{2}\left\{\sum_{r=1}^{n} r^2 - \sum_{r=1}^{n} r\right\}$

D. none of these

Answer: C

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54. The sum of the products of 2n numbers $\pm 1, \pm 2, \pm 3, \ldots, n$ taking two at time is

A. $-\sum_{r=1}^{n} r$

B. $\sum_{r=1}^{n} r^2$

C. $-\sum_{r=1}^{n} r^2$

D. none of these

Answer: C

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55. If n is an odd integer greater than or equal to 1, the value of

$= n^3 - (n-1)^3 + (n-2)^3 - \ldots + (-1)^{n-1} 1^3$ is

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

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

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

D. none of these

Answer: A

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56. If $\sum_{k=1}^{n}\left(\sum_{m=1}^{k} m^2\right) = an^4 + bn^3 + cn^2 + dn + e$, then

A. $a = \dfrac{1}{12}$

B. $b = \dfrac{1}{6}$

C. $d = \dfrac{1}{4}$

D. e=0

Answer: A

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57. If a, b and c are three distinct real numbers in G.P. and a+b+c = xb, then x cannot be

A. $x < -1 \text{ or }, x > 3$

B. $x < -3 \text{ or }, x > 2$

C. $x < -4 \text{ or }, x > 3$

D. none of these

Answer: A

Watch Video Solution

58. Let $a_1 = 0$ and a_1, a_2, a_3 .... , a_n be real numbers such that $|a_i| = |a_{i-1} + 1|$ for all I then the A.M. Of the number a_1, a_2, a_3...., a_n has the value A where : (a) $A < -\frac{1}{2}$ (b) $A < -1$ (c) $A \geq -\frac{1}{2}$ (d) A=-2

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

B. $A < -1$

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

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

Answer: C

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59. If $a_1, a_2, a_3, \ldots, a_n$ are non-zero real numbers such that

$$\left(a_1^2 + a_2^2 + \ldots + a_{n-1}.^2\right)\left(a_2^2 + a_3^2 + \ldots + a_n^2\right) \leq \left(a_1a_2 + a_2a_3 + \ldots +\right.$$

are in

A. H.P.

B. G.P

C. A.P.

D. none of these

Answer: B

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60. Three successive terms of a G.P. will form the sides of a triangle if the common ratio r satisfies the inequality

A. $\frac{\sqrt{3}-1}{2} < r < \frac{\sqrt{3}+1}{2}$

B. $\frac{\sqrt{5}-1}{2} < r < \frac{\sqrt{5}+1}{2}$

C. $\frac{\sqrt{2}-1}{2} < r < \frac{\sqrt{2}+1}{2}$

D. none of these

Answer: B

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61. Find the sum of the following series to n terms

$5 + 7 + 13 + 31 + 85 +$

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

B. $8n + \frac{1}{2}(3^n - 1)$

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

D. none of these

Answer: A

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

A. 0

B. 1

C. -1

D. none of these

Answer: C

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63. If the sum of an infinite G.P. is equal to the maximum value of $f(x) = x^3 + 2x - 8$ in the interval [-1,4] and the sum of first two terms is 8. Then, the common ratio of the G.P. is

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

B. $\frac{\sqrt{3}}{8}$

C. $\sqrt{\frac{7}{8}}$

D. none of these

Answer: C

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

T_r is always

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

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

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

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

Answer: B

Watch Video Solution

65. Let V_r denotes the sum of the first r terms of an arithmetic progression whose first term is r and the common difference is $(2r-1)$.

Let $T_r = V_{r+1} - V_r - 2$ and $Q_r = T_{r+1} - T_r$ for $r = 1, 2, ...$

T_r is always

A. an odd number

B. an even number

C. a prime number

D. a composite number

Answer: D

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66. Let V_r denotes the sum of the first r terms of an arithmetic progression whose first term is r and the common difference is $(2r - 1)$.

Let $T_r = V_{r+1} - V_r - 2$ and $Q_r = T_{r+1} - T_r$ for $r = 1, 2, ...$

T_r is always

A. $Q_1, Q_2, Q_3, \ldots.$ are in A.P. with common difference 5

B. $Q_1, Q_2, Q_3, \ldots.$ are in A.P. with common difference 6

C. $Q_1, Q_2, Q_3, \ldots.$ are in A.P. with common difference 11

D. $Q_1 = Q_2 = Q_3 = \ldots.$

Answer: B

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67. about to only mathematics

A. 5

B. 6

C. 7

D. none of these

Answer: B

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68. if $(1+3+5+7+\ldots.(2p-1))+(1+3+5+\ldots+(2q-1))=1+3+5+\ldots+(2r-1),$ then least possible value of $p+q+r$(Given $p>5$) is:

A. 12

B. 24

C. 45

D. 54

Answer: B

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69. Let $S_k, k=1,2,,100,$ denotes thesum of the infinite geometric series whose first term s $\frac{k-1}{k!}$ and the common ratio is $\frac{1}{k}$, then the value of $\frac{100^2}{100!}+\sum_{k=2}^{100}\left(k^2-3k+1\right)S_k$ is ______.

A. 3

B. 6

C. 8

D. 9

Answer: A

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70. Let $a_1, a_2, a_3, , a_{11}$ be real numbers satisfying $a_1 = 15, 27 - 2a_2 > 0 and a_k = 2a_{k-1} - a_{k-2}$ for $k = 3, 4, , 11.$ If $\frac{a12 + a22 + \ldots + a112}{11} = 90,$ then the value of $\frac{a1 + a2 + \ + a11}{11}$ is equals to ______.

A. 1

B. 1

C. 2

D. 9

Answer: A

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71. Let $a_1, a_2, a_3, , a_{100}$ be an arithmetic progression with $a_1 = 3 and s_p = \sum_{i=1}^{p} a_i, 1 \leq p \leq 100.$ For any integer n with $1 \leq n \leq 20,$ let $m = 5n \cdot$ If $\frac{S_m}{S_n}$ does not depend on $n,$ then a_2 is________.

A. 9

B. 8

C. 7

D. 5

Answer: A

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72. The sum of the series $1+\frac{4}{3}+\frac{10}{9}+\frac{28}{27}+\ldots.$ upto n terms is

A. $n-\frac{1}{3}+\frac{1}{3.2^{n-1}}$

B. $\frac{7}{6}n+\frac{1}{6}+\frac{1}{3.2^{n-1}}$

C. $\frac{5}{3}n-\frac{7}{6}+\frac{1}{2.3^{n-1}}$

D. $n+\frac{1}{2}-\frac{1}{2.3^{n-1}}$

Answer: D

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

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

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

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

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

Answer: C

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

A. 1056 and 1332

B. 1056 and 1088

C. 1120 and 1332

D. 1332 and 1432

Answer: A

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75. If $(10)^9 + 2(11)^2(10)^7 + \ldots . + 10(11)^9 = k(10)^9$

A. 100

B. 110

C. $\dfrac{121}{10}$

D. $\dfrac{441}{100}$

Answer: A

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76. If $\dfrac{48}{2.3}+\dfrac{47}{3.4}+\dfrac{46}{4.5}+\ldots+\dfrac{2}{48.49}+\dfrac{1}{49.50}$
$=\dfrac{51}{2}+k\left(1+\dfrac{1}{2}+\dfrac{1}{3}+\ldots+\dfrac{1}{50}\right)$, then k equals

A. 2

B. -1

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

D. 1

Answer: B

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77. Let the harmonic mean of two positive real numbers a and b be 4, If q is a positive real number such that a, 5, q, b is an arithmetic progression, then the value(s) of |q -a| is (are)

A. 3,4

B. 2,5

C. 3,6

D. 6,9

Answer: B

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78. If m is the A.M of two distict 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 $(G_1)^4 + 2(G_2)^4 + (G_3)^4$ equals

A. $4lmn^2$

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

C. $4l^2mn$

D. $4lm^2n$

Answer: D

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

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

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

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

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

Answer: B

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80. 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 $\sum_{n=}^{10}$

is equal to

A. 330

B. 165

C. 190

D. 225

Answer: A

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Section II - Assertion Reason Type

1. Statement -1: If $a_1, a_2, a_3, \ldots\ldots, a_n, \ldots$ is an A.P. such that $a_1 + a_4 + a_7 + \ldots. + a_{16} = 147$, then $a_1 + a_6 + a_{11} + a_{16} = 98$

Statement -2: In an A.P., the sum of the terms equidistant from the beginning and the end is always same and is equal to the sum of first and last term.

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: A

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2. Suppose four distinct positive numbersa_1, a_2, a_3, a_4 are in GP. Let

$b_1 = a_1, b_2 = b_1 + a_2, b_3 = b_2 + a_3$ and $b_4 = b_3 + a_4$

Statement 1 The numbersb_1, b_2, b_3, b_4 are neither in AP nor in GP.

Statement 2 The numbers b_1, b_2, b_3, b_4 are in HP.

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: C

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3. Stament -1: If for any real $x, 2^{1+x}+2^{1-x}, \lambda$ and 3^x+3^{-x} are three equidistant terms of an A.P., then $\lambda \geq 3$.

Statement -2: $AM \geq GM$

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: A

Watch Video Solution

4. Let $a_1+a_2+a_3, \ldots, a_{n-1}, a_n$ be an A.P.

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

Statement -2 $a_k + a_{n-k+1} = a_1 + a_n$ for $k = 1, 2, 3, \ldots,$ n

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: A

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5. If three positive unequal quantities a, b, c be in HP, then prove that $a^n + c^n > 2b^n, n \in N.$

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: A

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6. Let a,b,c be positive real numbers in H.P.

Statement -1: $\frac{a+b}{2a-b}+\frac{c+b}{2c-b}\geq 4$

Statement-2: $\frac{a}{b}+\frac{b}{c}+\frac{c}{a}\geq 3$

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: B

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7. Statement -1: If $x > 1$, the sum to infinite series

$$1+3\left(1-\frac{1}{x}\right)+5\left(1-\frac{1}{x}\right)^2+7\left(1-\frac{1}{x}\right)^3+\ldots., \text{ is } 2x^2-x$$

Statement -2: If $0 < y < 1$, the sum of the series

$$1+3y+5y^2+7y^3+\ldots., \text{ is } \frac{1+y}{(1-y)^2}$$

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: A

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8. Statement -1: There exists no A.P. whose three terms are $\sqrt{3}, \sqrt{5} \text{ and } \sqrt{7}.$

Statement-2: If a_p, a_q and a_r are three distinct terms of an A.P., then $\frac{a_p - a_q}{a_p - q_r}$ is a rational number.

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: A

Watch Video Solution

9. Let $n \in N$ and k be an integer ≥ 0 such that

$S_k(n) = 1^k + 2^k + 3^k + \ldots + n^k$

Statement-1: $S_4(n) = \frac{n}{30}(n+1)(2n+1)\left(3n^2+3n+1\right)$

Statement -2:

$.^{k+1}C_1 S_k(n) + .^{k+1}C_2 S_{k-1}(n) + \ldots + .^{k+1}C_k S_1(n) + .^{k+1}C_{k+1} S_0(n)$

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: D

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10. Statement -1: $\frac{1^2}{1.3}+\frac{2^2}{3.5}+\frac{3^2}{5.7}+\ldots.+\frac{n^2}{(2n-1)(2n+1)}=\frac{n(n+1)}{2(2n+1)}$

Statement -2: $\frac{1}{1.3}+\frac{1}{3.5}+\frac{1}{5.7}+\ldots.+\frac{1}{(2n-1)(2n+1)}=\frac{1}{2n+1}$

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: C

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11. Let S_n denote the sum of n terms of the series

$1^2 + 3 \times 2^2 + 3^2 + 3 \times 4^2 + 5^2 + 3 \times 6^2 + 7^2 + \ldots.$

Statement -1: If n is odd, then $S_n = \dfrac{n(n+1)(4n-1)}{6}$

Statement -2: If n is even, then $S_n = \dfrac{n(n+1)(4n+5)}{6}$

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: A

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12. Statement -1: $1.3.5\ldots(2n-1) \le n^n$ for all $n \in N$ Statement -2: $GM \le AM$

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: A

Watch Video Solution

13. Let $a_1, a_2, a_3, \ldots, a_n$ be an A.P.

Statement -1 : $\dfrac{1}{a_1 a_n} + \dfrac{1}{a_2 a_{n-1}} + \dfrac{1}{a_3 a_{n-1}} + \ldots. + \dfrac{1}{a_n a_1}$
$= \dfrac{2}{a_1 + a_n}\left(\dfrac{1}{a_1} + \dfrac{1}{a_2} + \ldots. + \dfrac{1}{a_n}\right)$

Statement -2: $a_r + a_{n-r+1} = a_1 + a_n \text{ for } 1 \le r \le n$

A. Statement -1 is true, Statement -2 is True, Statement -2 is a correct explanation for Statement for Statement -1.

B. Statement -1 is true, Statement -2 is True, Statement -2 is not a correct explanation for Statement for Statement -1.

C. Statement -1 is true, Statement -2 is False.

D. Statement -1 is False, Statement -2 is True.

Answer: A

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Exercise

1. If p^{th}, q^{th} and r^{th} terms of G.P. are x, y, z respectively then write the value of $x^{q-r}y^{r-p}z^{p-q}$.

A. 0

B. 1

C. -1

D. 2

Answer: B

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2. If a,b,c are in AP, then $\frac{a}{bc}, \frac{1}{c}, \frac{2}{d}$ are in

A. A.P.

B. G.P.

C. H.P.

D. AGP

Answer: D

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3. If $x, y,$ and z are in G.P. and $x+3, y+3,$ and $z+3$ are in H.P., then

$y=2$ b. $y=3$ c. $y=1$ d. $y=0$

A. y=2

B. y=3

C. y=1

D. y=0

Answer: B

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4. If $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ are in A.P., then

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

B. a^2, b^2, c^2 are in A.P.

C. $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P.

D. none of these

Answer: B

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5. If a,b,c are in A.P. as well as in G.P. then

A. $a = b \neq c$

B. $a \neq b = c$

C. $a \neq b \neq c$

D. a=b=c

Answer: D

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6. The value of $2.\overline{357}$, is

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

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

C. $\frac{2355}{1111}$

D. $\frac{2354}{1111}$

Answer: B

Watch Video Solution

7. If $\frac{3+5+7+up \to nterms}{5+8+11+up \to 10terms} = 7$, then find the value of $n\cdot$

A. 35

B. 36

C. 37

D. 40

Answer: A

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8. If $x, 1, z$ are in AP and $x, 2, z$ are in GP, then $x, 4, z$ will be in

A. AP

B. G.P

C. H.P.

D. none of these

Answer: C

Watch Video Solution

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

A. 2

B. 4

C. 6

D. 8

Answer: A

Watch Video Solution

10. about to only mathematics

A. a=b=c

B. a+c=b

C. $a > b > c \text{ and } ac - b^2 = 0$

D. none of these

Answer: C

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11. If the sum of first two terms of an infinite G.P is 1 and every term is twice the sum of all the successive terms then its first term is

A. $1/3$

B. $2/3$

C. $3/4$

D. $1/4$

Answer: C

Watch Video Solution

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

A. $\log_b a = \log_a c$

B. $\log_c b = \log_a c$

C. $\log_b a = \log_c b$

D. none of these

Answer: C

Watch Video Solution

13. If the sum of an infinite G.P. be 3 and the sum of the squares of its term is also 3, then its first term and common ratio are

A. $3/2, 1/2$

B. $1/2, 3/2$

C. $1, 1/2$

D. none of these

Answer: A

Watch Video Solution

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

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

Watch Video Solution

15. If a,b,c are in HP, then $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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16. The sum of the first n terms of the series $1^2 + 2 \times 2^2 + 3^2 + 2 \times 4^2 + 5^2 + 2 \times 6^2 \ldots . . is \frac{n(n+1)^2}{2}$ when n is even .Then find the sum when n is odd.

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

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

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

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

Answer: B

Watch Video Solution

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

A. xyz

B. 0

C. 1

D. -1

Answer: C

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18. If

$x = 2 + a + a^2 + \infty, where|a| < 1andy = 1 + b + b^2 + \infty, where|b| < 1$

prove that: $1 + ab + a^2b^2 + \infty = \dfrac{xy}{x + y - 1}$

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

B. $\dfrac{x + y}{x - y}$

C. $\dfrac{x^2 + y^2}{x - y}$

D. $\dfrac{xy}{y + x + 1}$

Answer: A

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

A. A.P.

B. G.P

C. H.P.

D. none of these

Answer: A

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20. If $a, b, and c$ are in A.P. $p, q, and r$ are in H.P., and $ap, bq, and cr$ are in G.P., then $\frac{p}{r} + \frac{r}{p}$ is equal to a/c+c/a

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

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

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

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

Answer: B

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

A. 3000

B. 3010

C. 3150

D. 3050

Answer: D

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22. Find the sum of n terms of the sequence $\left(x+\frac{1}{x}\right)^2, \left(x^2+\frac{1}{x^2}\right)^2, \left(x^3+\frac{1}{x^3}\right)^2,$

A. $\left(\frac{x^{20}-1}{x^2-1}\right)\left(\frac{x^{22}+1}{x^{20}}\right)+20$

B. $\left(\frac{x^{18}-1}{x^2-1}\right)\left(\frac{x^{11}+1}{x^9}\right)+20$

C. $\left(\frac{x^{18}-1}{x^2-1}\right)\left(\frac{x^{11}-1}{x^9}\right)+20$

D. none of these

Answer: A

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23. The geometric mean between -9 and -16 is 12 b. -12 c. -13 d. none of these

A. 12

B. -12

C. -13

D. 13

Answer: B

Watch Video Solution

24. The sum of n terms of an A.P. is $3n^2 + 5$. The number of term which equals 159, is

A. 13

B. 21

C. 27

D. none of these

Answer: C

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25. If the pth, qth, and rth terms of an A.P. are in G.P., then the common ratio of the G.P. is $\frac{pr}{q^2}$ b. $\frac{r}{p}$ c. $\frac{q+r}{p+q}$ d. $\frac{q-r}{p-q}$

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

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

A. A.P.

B. H.P.

C. G.P.

D. none of these

Answer: C

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27. If S denotes the sum to infinity and S_n the sum of n terms of the series $1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+,$ such that $S-S_n<\frac{1}{1000},$ then the least value of n is 8 b. 9 c. 10 d. 11

A. 8

B. 9

C. 10

D. 11

Answer: D

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28. If x, y, z are distinct positive numbers, then prove that $(x+y)(y+z)(z+x) > 8xyz$.

A. $= 8xyz$

B. $> 8xyz$

C. $< 8xyz$

D. $> 6xyz$

Answer: B

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29. a, b, c are sides of a triangle and a, b, c are in GP If $\log a - \log 2b, \log 2b - \log 3c$ and $\log 3c - \log a$ are in AP then

A. acute angled

B. obtuse angled

C. right angled

D. none of these

Answer: B

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30. about to only mathematics

A. $1:2:3$

B. $1:3:5$

C. $2:3:4$

D. $1:2:4$

Answer: A

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31. If $x^a = x^{b/2}z^{b/2} = z^c$, then a,b,c are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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32. A G.P. consists of an even number of terms. If the sum of all the terms is 5 times the sum of terms occupying odd places, then find its common ratio.

A. 2

B. 3

C. 4

D. 5

Answer: C

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33. The interior angles of a polygon are in A.P. the smallest angle is 120^0 and the common difference is 5^0. Find the number of sides of the polygon.

A. 9 or 16

B. 9

C. 16

D. 13

Answer: B

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34. For what value of b, will the roots of the equation cos x=b, $-1 \leq g \leq 1$ when arranged in ascending order of their magnitudes, form an A.P. ?

A. -1

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

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

D. $1/2$

Answer: A

Watch Video Solution

35. about to only mathematics

A. a=b=c

B. $a \geq b \geq c$

C. a+c=b

D. a+c=2b

Answer: B

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

(ii) to infinity.

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

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

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

D. $\frac{8}{6}$

Answer: C

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37. about to only mathematics

A. 1012

B. 1201

C. 1212

D. 1210

Answer: D

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38. the determinant $\begin{vmatrix} a & b & a\alpha+b \\ b & c & b\alpha+c \\ a\alpha+b & b\alpha+c & 0 \end{vmatrix}=0$ is equal to zero if

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. α is a root of $ax^2 + bx + c = 0$

Answer: B

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39. Find the sum $1 + (1 + 2) + (1 + 2 + 2^2) + (1 + 2 + 2^2 + 2^3) + \ ....$

To n terms.

A. $2^{n+2} - n - 4$

B. $2(2^n - 1) - n$

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

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

Answer: A

Watch Video Solution

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

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

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

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

C. $\left(\frac{2}{b^2}-\frac{2}{ab}\right)$

D. all of these

Answer: D

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41. The 5th term of the series $\frac{10}{9}, \frac{1}{3}\sqrt{\frac{20}{3}}, \frac{2}{3}, \ldots$ is

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

B. 1

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

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

Answer: C

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

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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43. If d,e,f are G.P. and the two quadratic equations

$ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have a common root, then

A. $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in H.P.

B. $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in G.P.

C. dbf=aef+cde

D. $b^2 df = ace^2$

Answer: A

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44. The sum of n terms of the following series

$1 + (1 + x) + (1 + x + x^2) + \dots$ will be

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

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

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

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

Answer: C

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45. For a sequence $\{a_n\}$, $a_1 = 2$ and $\frac{a_{n+1}}{a_n} = \frac{1}{3}$, Then $\sum_{r=1}^{\infty} a_r$ is

A. $\frac{20}{2}\{4 + 19 \times 3\}$

B. $3\left(1 - \frac{1}{3^{20}}\right)$

C. $2\left(1 - 3^{20}\right)$

D. none of these

Answer: B

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46. In an arithmetic sequence $a_1, a_2, a_3, \ldots\ldots, a_n,$

$$\Delta = \begin{vmatrix} a_m & a_n & a_p \\ m & n & p \\ 1 & 1 & 1 \end{vmatrix}$$ equals

A. 1

B. -1

C. 0

D. mnp

Answer: C

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47. Prove that $\underset{\text{n digits}}{(666\ldots.6)^2} + \underset{\text{n digits}}{(888\ldots.8)} = \underset{\text{2n digits}}{4444\ldots..4}$

A. $\dfrac{4}{9}(10^n - 1)$

B. $\dfrac{4}{9}(10^{2n} - 1)$

C. $\dfrac{4}{9}(10^n - 1)^2$

D. none of these

Answer: B

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48. Thr ciefficient of x^{n-2} in the polynomial $(x-1)(x-2)(x-3)....(x-n)$, is

A. $\frac{1}{24}n(n+1)(n-1)(3n+2)$

B. $\frac{1}{24}n(n^2-1)(3n+2)$

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

D. none of these

Answer: B

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49. The sum of the series $1^2 + 1 + 2^2 + 2 + 3^2 + 3 + \ldots\ldots + n^2 + n$, is

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

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

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

D. $\dfrac{n(n+1)(n+2)(n+3)}{4}$

Answer: C

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

A. 0

B. n

C. 2n

D. 1

Answer: C

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51. If a,b,c be respectively the p^{th}, q^{th} and r^{th} terms of a H.P., then $\Delta = \begin{vmatrix} bc & ca & ab \\ p & q & r \\ 1 & 1 & 1 \end{vmatrix}$ equals

A. 1

B. 0

C. -1

D. pqr

Answer: B

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

A. -3

B. 0

C. 3

D. 1

Answer: B

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53. The cubes of the natural numbers are grouped as $1^3, (2^3, 3^3), (4^3, 5^3, 6^3), \ldots\ldots\ldots,$ the the sum of the number in the n^{th} group, is

A. $\frac{1}{8}n^3(n^2+1)(n^2+3)$

B. $\frac{1}{16}n^3(n^2+16)(n^2+12)$

C. $\frac{n^3}{12}(n^2+2)(n^2+4)$

D. none of these

Answer: C

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54. If $a \text{ and } b$ are the roots of $x^2 - 3x + p = 0 \text{ and } c, \; d$ are the roots $x^2 - 12x + q = 0$ where a, b, c, d form a G.P. Prove that $(q+p):(q-p) = 17:15.$

A. $8:7$

B. $11:10$

C. $17:15$

D. none of these

Answer: C

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

A. $S_3 = S_1 + S_2$

B. $S_3 = 2(S_1 + S_2)$

C. $S_3 = 3(S_2 - S_1)$

D. none of these

Answer: C

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56. If a, b, c, d, e, f are A.M.s between 2 and 12, then find the sum $a + b + c + d + e + f$.

A. 14

B. 42

C. 84

D. none of these

Answer: B

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57. If a, b, c are in G.P, then $\log_a x, \log_b x, \log_c x$ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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58. If x, y, z are in H.P then the value of expression $\log(x+z) + \log(x-2y+z) =$

A. log (x-z)

B. 2log(x-z)

C. 3log(x-z)

D. 4log(x-z)

Answer: B

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59. If a,b,c,d are in H.P., then ab+bc+cd is equal to

A. 3 ad

B. (a+b)(c+d)

C. 3ac

D. none of these

Answer: A

Watch Video Solution

60. 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. 25 i

C. 25(1+i)

D. 100 (1-i)

Answer: A

Watch Video Solution

61. (i) a , b, c are in H.P. , show that $\frac{b+a}{b-a}+\frac{b+c}{b-c}=2$

(ii) If a^2, b^2, c^2 are A.P. then b + c , c + a , a + b are in H.P. .

A. 1

B. 2

C. 3

D. 0

Answer: B

Watch Video Solution

62. If a,b,c are in H.P, then

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

B. $\frac{b-c}{c-a}=\frac{b}{a}$

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

D. $\frac{a-b}{b-c}=\frac{c}{a}$

Answer: A

Watch Video Solution

63. If a , b, c, be in A.P. , b, c,d in G.P. and c.d.e.in H.P., then prove that a , c, e will be in GP .

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

64. 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. $\frac{a-b}{b-c}=\frac{c}{a}$

Answer: C

Watch Video Solution

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

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

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

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

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

Answer: C

Watch Video Solution

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

A. 0

B. 2

C. pqr

D. $\frac{8xyz}{pqr}$

Answer: A

Watch Video Solution

67. If $S_n=\frac{1}{1^3}+\frac{1+2}{1^3+2^3}+\dots+\frac{1+2+3+\dots+n}{1^3+2^3+3^3+\dots+n^3}$ Then S_n is not greater than

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

B. 1

C. 2

D. 4

Answer: C

Watch Video Solution

68. If a,b and c are in A.P. a,x,b are in G.P. whereas b, y and c are also in G.P.

Show that : x^2, b^2, y^2 are in A.P.

A. H.P.

B. G.P.

C. A.P.

D. none of these

Answer: C

Watch Video Solution

69. If $\log(x+z)+\log(x-2y+z)=2\log(x-z), \quad \text{then} \quad x, y, z$ are in

A. H.P.

B. G.P.

C. A.P.

D. none of these

Answer: A

Watch Video Solution

70. If $\frac{1}{a}+\frac{1}{c}+\frac{1}{a-b}+\frac{1}{c-b}=0$, than prove that a, b, c are in HP, unless $b=a+c$.

A. H.P.

B. G.P.

C. A.P.

D. none of these

Answer: A

Watch Video Solution

71. If arithmetic mean of two positive numbers is A, their geometric mean is G and harmonic mean H, then H is equal to

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

B. $\frac{A^2}{G^2}$

C. $\frac{A}{G^2}$

D. $\frac{G}{A^2}$

Answer: A

Watch Video Solution

72. 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 $\frac{p}{x}$ is

a. $\frac{1}{3}$ b. 3 c. $\frac{1}{2}$ d. 2

A. $1/2$

B. 2

C. $1/4$

D. 4

Answer: B

Watch Video Solution

73. If a, b, c are in G.P, then $\log_a x, \log_b x, \log_c x$ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

Watch Video Solution

74. If the sum of series $1 + \frac{3}{x} + \frac{9}{x^2} + \frac{27}{x^3} + \ldots.$ to ∞ is a finite number, then

A. $x < 3$

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

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

D. $x > 3$

Answer: D

Watch Video Solution

75. If H be the H.M. between a and b, then the value of $\frac{H}{a} + \frac{H}{b}$ is

A. 2

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

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

D. none of these

Answer: A

Watch Video Solution

76. The sum of n terms of two arithmetic progressions are in the ratio 2n+3:6n+5, then the ratio of their 13th terms, is

A. $53:155$

B. $27:87$

C. $29:89$

D. $31:89$

Answer: A

Watch Video Solution

77. 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

Watch Video Solution

78. Show that $X^{\frac{1}{2}} \cdot X^{\frac{1}{4}} \cdot X^{\frac{1}{8}}$... Upto $\infty = X$

A. 0

B. 1

C. x

D. ∞

Answer: C

Watch Video Solution

79. If a,b,c be in arithmetic progession, then the value of (a+2b-c) (2b+c-a) (a+2b+c), is

A. 16 abc

B. 4 abc

C. 8 abc

D. 3 abc

Answer: A

Watch Video Solution

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

A. 3

B. $3/2$

C. $1/2$

D. $2/3$

Answer: B

Watch Video Solution

81. If $< a_n >$ and $< b_n >$ be two sequences given by $a_n = (x)^{\frac{1}{2^n}} + (y)^{\frac{1}{2^n}}$ and $b_n = (x)^{\frac{1}{2^n}} - (y)^{\frac{1}{2^n}}$ for all $n \in N$. Then, $a_1 a_2 a_3. \dots . a_n$ is equal to

A. x-y

B. $\dfrac{x+y}{b_n}$

C. $\dfrac{x-y}{b_n}$

D. $\dfrac{xy}{b_n}$

Answer: C

Watch Video Solution

82. The sum of the squares of three distinct real numbers which are in GP is S^2 , if their sum is αS, then

A. $1 < \alpha^2 < 3$

B. $\frac{1}{3} < \alpha^2 < 3$

C. $1 < \alpha < 3$

D. $\frac{1}{3} < \alpha < 3$

Answer: B

Watch Video Solution

83. If there be n quantities in G.P., whose common ratio is r and S_m denotes the sum of the first m terms, then the sum of their products, taken two by two, is

A. $S_m S_{m-1}$

B. $\dfrac{r}{r+1} S_m S_{m-1}$

C. $\dfrac{r}{r-1} S_m S_{m-1}$

D. $\dfrac{r+1}{r} S_m S_{m-1}$

Answer: B

Watch Video Solution

84. The value of $\sum_{r=1}^{n} \log\left(\dfrac{a^r}{b^{r-1}}\right)$, is

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

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

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

D. $\dfrac{n}{2}\log\left(\dfrac{a^{n+1}}{b^{n+1}}\right)$

Answer: C

Watch Video Solution

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

A. 10

B. 8

C. 9

D. none of these

Answer: B

Watch Video Solution

86. An A.P., and a H.P. have the same first and last terms and the same odd number of terms. The middle terms of the three series are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

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

A. c

B. b

C. a

D. none of these

Answer: B

Watch Video Solution

88. The maximum sum of the series $20 + 19\frac{1}{3} + 18\frac{2}{3} +$ is 310 b. 300 c. 0320 d. none of these

A. 310

B. 300

C. 320

D. none of these

Answer: A

Watch Video Solution

89. If $2(y - a)$ is the $H.M.$ between $y - x$ and $y - z$ then $x - a, y - a, z - a$ are in (i) A.P (ii) G.P (iii) H.P (iv) none of these

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

90. If the roots of the equation $x^3 - 12x^2 + 39x - 28 = 0$ are in AP, then their common difference is

A. ± 1

B. ± 2

C. ± 3

D. ± 4

Answer: C

Watch Video Solution

91. If the sum of the first n natural numbers is 1/5 times the sum of the their squares, the value of n is -

A. 5

B. 6

C. 7

D. 8

Answer: C

Watch Video Solution

92. $\log_3 2, \log_6 2, \log_{12} 2$ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

Watch Video Solution

93. The value of $9^{1/3} \times 9^{1/9} \times 9^{1/27} \times \ldots\ldots$ to ∞ is

A. 9

B. 1

C. 3

D. none of these

Answer: C

Watch Video Solution

94. The following consecutive terms $\frac{1}{1+\sqrt{x}}, \frac{1}{1-x}, \frac{1}{1-\sqrt{x}}$ of a series are in :

A. H.P.

B. G.P.

C. A.P.

D. A.P., G.P.

Answer: C

Watch Video Solution

95. The sum of all two digit odd numbers is

A. 2475

B. 2530

C. 4905

D. 5049

Answer: A

Watch Video Solution

96. If the sum of the series 2, 5, 8, 11, ... is 60100, then find the value of n.

A. 100

B. 200

C. 150

D. 250

Answer: B

Watch Video Solution

97. Given two numbers a and b. Let A denote the single A.M. and S denote the sum of n A.M.'s between a and b, then S/A depends on

A. n,a,b

B. n,b

C. n,a

D. n

Answer: D

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98. If $\sum_{r=1}^{n} r^4 = I(n), \quad \text{then} \quad \sum_{r=1}^{n} (2r-1)^4$ 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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99. 0.423 is equivalent to the fraction $\frac{94}{99}$ (b) $\frac{49}{99}$ (c) $\frac{491}{990}$ (d) $\frac{419}{990}$

A. $\frac{419}{999}$

B. $\frac{419}{990}$

C. $\frac{423}{1000}$

D. $\frac{409}{999}$

Answer: B

Watch Video Solution

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

A. a=b=c

B. 2 b=3 a+c

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

D. none of these

Answer: A

Watch Video Solution

101. The harmonic mean of two numbers is 4. Their arithmetic mean A and the geometric mean G satisfy the relation $2A + G^2 = 27.$ Find two numbers.

A. 6,3

B. 5,4

C. 5,-2.5

D. $-3, 1$

Answer: A

Watch Video Solution

102. The sixth term of an $A.P.$, $a_1, a_2, a_3, \ldots\ldots\ldots\ldots, a_n$ is 2. If the quantity $a_1 a_4 a_5$, is minimum then then the common difference of the $A.P.$

A. $x = 8/5$

B. $x = 5/4$

C. $x = 2/3$

D. $x = 4/5$

Answer: C

Watch Video Solution

103. If $\dfrac{x+y}{1-xy}, y, \dfrac{y+z}{1-yz}$ be in A.P., " then " $x, \dfrac{1}{y}, z$ will be in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

Watch Video Solution

104. If a , b, c, be in A.P. , b, c,d in G.P. and c.d.e.in H.P., then prove that a , c, e will be in GP .

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

105. Three non-zero real numbers from an A.P. and the squares of these numbers taken in same order from a G.P. Then, the number of all possible value of common ratio of the G.P. is

A. 1

B. 2

C. 3

D. none of these

Answer: C

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

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

107. The n^{th} term of the sequence 4,14,30,52,80,114, ..., is

A. $n^2 + n + 2$

B. $3n^2 + n$

C. $3n^2 - 5n + 2$

D. $(n + 1)^2$

Answer: B

Watch Video Solution

108. If $|x| < 1 and |y| < 1,$ find the sum of infinity of the following series:

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

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

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

C. $\dfrac{x}{1 - x} + \dfrac{y}{1 - y}$

D. $\dfrac{(x - y)(x + y - xy)}{1 - x - y + xy}$

Answer: A

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109. If S_1, S_2 and S_3 denote the sum of first $n_1 n_2$ and n_3 terms respectively of an A.P., then

$\dfrac{S_1}{n_1}(n_2 - n_3) + \dfrac{S_2}{n_2} + (n_3 - n_1) + \dfrac{S_3}{n_3}(n_1 - n_2)$=

A. 0

B. 1

C. $S_1 S_2 S_3$

D. $n_1 n_2 n_3$

Answer: A

Watch Video Solution

110. If $|a| < 1$ and $|b| < 1$, then the sum of the series $a(a+b) + a^2(a^2+b^2) + a^3(a^3+b^3) + \ldots . \infty$ is

A. $\dfrac{a}{1-a} + \dfrac{ab}{1-ab}$

B. $\dfrac{a^2}{1-a^2} + \dfrac{ab}{1-ab}$

C. $\dfrac{b}{1-b} + \dfrac{a}{1-a}$

D. $\dfrac{b^2}{1-b^2} + \dfrac{ab}{1-ab}$

Answer: B

Watch Video Solution

111. If $\log_x a, a^{x/2}, \log_b X$ are in G.P. then x is equal to

A. $\log_a(\log_b a)$

B. $\log_a(\log_e a) + \log_a(\log_e b)$

C. $-\log_a(\log_a b)$

D. $\log_1(\log_e b) - \log_a(\log_e a)$

Answer: A

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112. If a, b, c, d are in G.P., then prove that $(a^3+b^3)^{-1}, (b^3+c^3)^{-1}, (c^3+d^3)^{-1}$ are also in G.P.

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

113. If $0 < x < \frac{\pi}{2}$ exp $\left[\left(\sin^2 x + \sin^4 x + \sin^6 x + '.... + \infty\right)\log_e 2\right]$ satisfies the quadratic equation $x^2 - 9x + 8 = 0$, find the value of $\frac{\sin x - \cos x}{\sin x + \cos x}$.

A. 0

B. $2 + \sqrt{3}$

C. $2 - \sqrt{3}$

D. none of these

Answer: B

Watch Video Solution

114. The value of 0.2

A. 4

B. log 4

C. log 2

D. none of these

Answer: A

Watch Video Solution

115. If the sum of an infinitely decreasing G.P. is 3, and the sum of the squares of its terms is $9/2$, the sum of the cubes of the terms is

A. $\frac{105}{13}$

B. $\frac{108}{13}$

C. $\frac{729}{8}$

D. $\frac{128}{13}$

Answer: B

Watch Video Solution

116. If $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\ldots \text{ to } \infty=\frac{\pi^2}{6}, \text{ then } \frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots$ equals

A. $\pi^2/8$

B. $\pi^2/12$

C. $\pi^2/3$

D. $\pi^2/2$

Answer: A

Watch Video Solution

117. The value of $\left[(0.16)^{\log_{2.5}\left(\frac{1}{3}+\frac{1}{3^2}+\frac{1}{3^3}+\ldots+\infty\right)}\right]^{\frac{1}{2}}$ is a) 1 b) 2 c) 3 d) -1

A. 2

B. 3

C. 4

D. 1

Answer: C

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118. If the sum of the first n terms of series be $5n^2 + 2n$, then its second term is

A. $\frac{56}{15}$

B. $\frac{27}{14}$

C. 17

D. 16

Answer: C

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119. If $x, |x+1|, |x-1|$ are first three terms of an A.P., then the sum of its first 20 terms is

A. 360, 180

B. 180,350

C. 150, 100

D. 180, 150

Answer: B

Watch Video Solution

120. If $a_1, a_2, a_3, \ldots$ are in A.P. and $a_i > 0$ for each i, then $\sum_{i=1}^{n} \frac{n}{a_{i+1}^{\frac{2}{3}} + a_{i+1}^{\frac{1}{3}} a_i^{\frac{1}{3}} + a_i^{\frac{2}{3}}}$ is equal to (a) $\frac{n}{a_n^{2/3} + a_n^{1/3} + a_1^{2/3}}$ (b) $\frac{n(n+1)}{a_n^{2/3} + a_n^{1/3} + a_1^{2/3}}$ (c) $\frac{n(n-1)}{a_n^{2/3} + a_n^{1/3} \cdot a_1^{1/3} + a_1^{2/3}}$ (d) None of these

A. $\dfrac{n+1}{a_{n-1}^{2/3}+a_{n-1}^{1/3}a_1^{1/3}+a_1^{2/3}}$

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

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

D. $\dfrac{n+1}{a_{n+1}^{2/3}+a_{n+1}^{1/3}+a_1^{1/3}+a_1^{2/3}}$

Answer: C

Watch Video Solution

121. If $\dfrac{1}{b-a}+\dfrac{1}{b-c}=\dfrac{1}{a}+\dfrac{1}{c}$, then (A). $a, b, andc$ are in H.P. (B). $a, b, andc$ are in A.P. (C). $b=a+c$ (D). $3a=b+c$

A. G.P.

B. H.P.

C. A.P.

D. none of these

Answer: B

Watch Video Solution

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

$(ac+ab-bc)\dfrac{ab+bc-ac}{(abc)^2}$ is

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

B. $\dfrac{2}{bc}+\dfrac{1}{b^2}$

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

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

Answer: A

Watch Video Solution

123. If AM of the number 5^{1+x} and 5^{1-x} is 13 then the set of possible real values of x is -

A. $5, \dfrac{1}{5}$

B. {-1,1}

C. {0,1}

D. none of these

Answer: D

Watch Video Solution

124. If a, b, c are in A.P then $a+\frac{1}{bc}, b+\frac{1}{ca}, c+\frac{1}{ab}$ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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

A. -99^2

B. 1

C. -2500

D. none of these

Answer: C

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126. The coefficient of x^{15} in the product $(1-x)(1-2x)\left(1-2^2x\right)\left(1-2^3x\right)$ .... $\left(1-2^{15}x\right)$ is : (a) $2^{105}-2^{121}$ (b) $2^{121}-2^{105}$ (c) $2^{104}-2^{120}$ (d) $2^{108}-2^{110}$

A. $2^{105}-2^{121}$

B. $2^{121}-2^{105}$

C. $2^{120} - 2^{104}$

D. none of these

Answer: A

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127. If $S_n = \sum_{r=1}^{n} a_r = \frac{1}{6} n(2n^2 + 9n + 13)$, then $\sum_{r=1}^{n} \sqrt{a_r}$ equals

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

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

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

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

Answer: C

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128. If $\sum_{r=1}^{n} a_r = \frac{1}{6}n(n+1)(n+2)$ for all $n \geq 1$, then $\lim_{n \to \infty} \sum_{r=1}^{n} \frac{1}{a_r}$, is

A. 2

B. 3

C. $3/2$

D. 6

Answer: A

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129. Sum of n terms of the series $\frac{1}{1.2.3.4.} + \frac{1}{2.3.4.5} + \frac{1}{3.4.5.6} + ...$

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

B. $\frac{n^3+6n^2-3n}{6(n+2)(n+3)(n+4)}$

C. $\frac{15n^2+7n}{4n(n+1)(n+5)}$

D. $\frac{n^3+6n^2+11n}{(18n+1)(n+2)(n+3)}$

Answer: D

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Chapter Test

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

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

A. $\frac{4}{3}H_n - 1$

B. $\frac{4}{3}H_n + \frac{1}{n}$

C. $\frac{4}{3}H_n$

D. $\frac{4}{3}H_n + \frac{1}{n}$

Answer: D

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

A. 2^n-n-1

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

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

D. 2^n-1

Answer: C

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3. If A_1, A_2 are between two numbers, then $\frac{A_1+A_2}{H_1+H_2}$ is equal to

A. $\frac{H_1H_2}{G_1G_2}$

B. $\frac{G_1G_2}{H_1H_2}$

C. $\frac{H_1H_2}{A_1A_2}$

D. $\frac{G_1G_2}{A_1A_2}$

Answer: B

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

A. $n/2$

B. $-n/2$

C. $n/3$

D. $-n/3$

Answer: B

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5. Given that n arithmetic means are inserted between two sets of numbers a,2b, and 2a,b where a,b, $\in R$. Suppose further that m^{th} mean between these two sets of numbers are same, then the ratio a:b equals

A. $n-m+1:m$

B. $n-m+1:n$

C. $m:n-m+1$

D. $n:n-m+1$

Answer: C

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

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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8. If in an AP, $t_1 = \log_{10} a$, $t_{n+1} = \log_{10} b$ and $t_{2n+1} = \log_{10} c$ then a, b, c are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

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9. 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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10. If $4a^2 + 9b^2 + 16c^2 = 2(3ab + 6bc + 4ca)$, where a, b, c are non-zero numbers, then a,b,c are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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11. If S_n denotes the sum of n terms of an A.P. whose common difference is d and first term is a, find $S_n - 2S_{n-1} + S_{n-2}$

A. $d = S_n - S_{n-1} + S_{n-1}$

B. $d = S_n - 2S_{n-1} - S_{n-2}$

C. $d = S_n - 2S_{n-1} + S_{n-2}$

D. none of these

Answer: C

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12. The sides of a right angled triangle are in A.P., then they are in the ratio :

A. $2:3:4$

B. $3:4:5$

C. $4:5:6$

D. none of these

Answer: B

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13. Find the sum of all the 11 terms of an AP whose middle most term is $30.$

A. 320

B. 330

C. 340

D. 350

Answer: B

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14. The maximum sum of the series $20 + 19\frac{1}{3} + 18\frac{2}{3} +$ is 310 b. 300 c. 0320 d. none of these

A. 310

B. 290

C. 320

D. none of these

Answer: A

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15. If three numbers are in G.P., then the numbers obtained by adding the middle number to each of these numbers are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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16. If p, q, r are in A.P., show that the pth, qth and rth terms of any G.P. are in G.P.

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

17. Let a,b,c be three positive prime number. The progrrssion in which $\sqrt{a}, \sqrt{b}, \sqrt{c}$ can be three terms (not necessarily consecutive), is

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: D

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18. If $\frac{1}{b-a}+\frac{1}{b-c}=\frac{1}{a}+\frac{1}{c}$, then (A). $a, b, andc$ are in H.P. (B). $a, b, andc$ are in A.P. (C). $b=a+c$ (D). $3a=b+c$

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

B. $\frac{1}{a}+\frac{1}{c}$

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

D. none of these

Answer: B

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19. If three numbers are in H.P., then the numbers obtained by subtracting half of the middle number from each of them are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

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20. The first three of four given numbers are in G.P. and their last three are in A.P. with common difference 6. If first and fourth numbers are equal, then the first number is 2 b. 4 c. 6 d. 8

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

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21. In a G.P. of positive terms if any terms is equal to the sum of next tow terms, find the common ratio of the G.P.

A. -1

B. -3

C. -3

D. $-1/2$

Answer: C

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22. If a, b, c are in H.P and $ab + bc + ca = 15$ then $ca =$

A. ad

B. 2ad

C. 3ad

D. none of these

Answer: C

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23. If $\sum_{r=1}^{\infty} \frac{1}{(2r-1)^2} = \frac{\pi^2}{8}$, then $\sum_{r=1}^{\infty} \frac{1}{r^2}$ is equal to

A. $\frac{\pi^2}{24}$

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

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

D. none of these

Answer: C

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24. It is given that $\frac{1}{1^4}+\frac{1}{2^4}+\frac{1}{3^4}$ ... to $\infty=\frac{\pi^4}{90}$, then $\frac{1}{1^4}+\frac{1}{3^4}+\frac{1}{5^4}$ ....to ∞ is equal to :

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

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

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

D. none of these

Answer: A

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25. The minimum number of terms from the beginning of the series $20+22\frac{2}{3}+25\frac{1}{3}+\ldots.$, so that the sum may exceed 1568, is

A. 25

B. 27

C. 28

D. 29

Answer: D

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26. The sum of the series 1-3+5-7+9-11+ . . . . To n terms is

A. $-n, \quad \text{when n is even} \quad G373$

B. 2n, when n is even

C. `-n," when n is odd"

D. 2n, when n is odd

Answer: A

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27. If three positive unequal numbers a, b, c are in H.P., then

A. $a^{3/2} + c^{3/2} > 2b^{1/2}$

B. $a^5 + c^5 > 2b^5$

C. $a^2 + c^2 > 2b^3$

D. none of these

Answer: B

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28. 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. none of these

Answer: B

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29. $1^3 - 2^3 + 3^3 - 4^3 + \ldots\ldots. + 9^3$ is equal to

A. 425

B. -425

C. 475

D. -475

Answer: A

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30. 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. 5

B. $3/5$

C. $8/5$

D. $1/5$

Answer: B

Watch Video Solution

31. If 1,$\log_9\left(3^{1-x}+2\right)$ and $\log_3(4.3^x-1)$ are A.P. then x is

A. $\log_3 4$

B. $1-\log_4 3$

C. $1-\log_4 3$

D. $\log_4 3$

Answer: B

Watch Video Solution

32. Two sequences $< a_n >$ and $< b_n >$ are defined by $a_n = \log\left(\frac{5^{n+1}}{3^{n-1}}\right), b_n = \left\{\log\left(\frac{5}{3}\right)\right\}^n$, then

A. $< a_n >$ is an A.P. and $< b_n >$ is a G.P

B. $< a_n >$ and $< b_n >$ both are G.P.

C. $< a_n >$ and $< b_n >$ both are A.P.

D. $< a_n >$ is a G.P. and $< b_n >$ is neither an A.P. nor a G.P.

Answer: A

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33. The sum of the series

$$\frac{1}{\sqrt{1}+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\ldots\ldots+\frac{1}{\sqrt{n^2-1}+\sqrt{n^2}}$$

equals

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

B. $\frac{\sqrt{n}+1}{\sqrt{n}+\sqrt{n-1}}$

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

D. $n-1$

Answer: D

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34. Natural numbers are written as 1, (2,3), (4,5,6)..

Show that the sum of number in the nth group is $\frac{n}{2}(n+1)$.

A. 62525

B. 65255

C. 56255

D. 55625

Answer: A

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35. If the first term of an A.P. is 2 and common difference is 4, then the sum of its 40 terms is (a) 3200 (b) 1600 (c) 200 (d) 2800

A. 3200

B. 1600

C. 200

D. 2800

Answer: A

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36. If $1 + \frac{1+2}{2} + \frac{1+2+3}{3} + \overset{..}{\longrightarrow}$ n terms is S. Then, S is equal to $\frac{n(n+3)}{4}$ b. $\frac{n(n+2)}{4}$ c. $\frac{n(n+1)(n+2)}{6}$ d. n^2

A. $\frac{n(n+3)}{4}$

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

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

D. n^2

Answer: A

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37. The sum of 10 terms of the series $\sqrt{2}+\sqrt{6}+\sqrt{18}+\ddot{i}s$ $11(\sqrt{6}+\sqrt{2})$ b. $243(\sqrt{3}+1)$ c. $\frac{11}{\sqrt{3}-1}$ d. $242(\sqrt{3}-1)$

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

B. $243(\sqrt{3}+1)$

C. $\frac{121}{\sqrt{3}-1}$

D. $242(\sqrt{3}-1)$

Answer: B

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38. The $(m+n)th$ and $(m-n)th$ terms of a GP are p and q, respectively. Then, the mth term of the GP is

A. 0

B. pq

C. $\sqrt{pq}$

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

Answer: C

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39. The fourth, seventh and tenth terms of a G.P. are p,q,r respectively, then

A. $p^2 = q^2 + r^2$

B. $p^2 = qr$

C. $q^2 = pr$

D. $r^2 = p^2 + q^2$

Answer: B

Watch Video Solution

40. The sum of the integers from 1 to 100 which are not divisible by 3 or 5 is

A. 2489

B. 4735

C. 2632

D. 2317

Answer: C

Watch Video Solution

41. Let the harmonic mean and geometric mean of two positive numbers be in the ratio 4:5. Then the two numbers are in ratio

A. $1:1$

B. $2:1$

C. $3:1$

D. $4:1$

Answer: A

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42. The sum of the series

$1 + 2.2 + 3.2^2 + 4.2^3 + 5.2^4 + \ldots\ldots + 100.2^{99}$ is

A. 99×2^{100}

B. $99 \times 2^{100} + 1$

C. 100×2^{100}

D. none of these

Answer: B

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43. 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. $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P.

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

D. $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in G.P.

Answer: B

Watch Video Solution

44. If the m^{th}, n^{th} and p^{th} terms of an A.P. and G.P. be equal and be respectively x,y,z, then

A. $x^y y^z z^x = x^z y^x z^y$

B. $(x-y)^x (y-z)^x = (z-x)^z$

C. $(x-y)^z (y-z)^x = (z-x)^y$

D. none of these

Answer: A

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45. The 7th term of a H.P. is $\frac{1}{10}$ and 12 th term is $\frac{1}{25}$, find the 20th term of H.P.

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

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

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

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

Answer: D

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46. The length of side of a square is 'a' metre. A second square is formed by joining the middle points of this square. Then a third square is formed by joining the middle points of the sides of the second square and so on. Then, the sum of the areas of squares which carried upto infinity, is

A. a^2

B. $2a^2$

C. $3a^2$

D. $4a^2$

Answer: C

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

A. 2

B. 4

C. 6

D. 8

Answer: D

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48. If three positive real numbers a,b,c, $(c > a)$ are in H.P., then $\log(a+c)+\log(a-2b+c)$ is equal to

A. 2 log (c-b)

B. 2 log (a+c)

C. 2 log (c-a)

D. log a+log b+log c

Answer: B

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49. In an $A.P.$, the p^{th} term is $\frac{1}{q}$ and the q^{th} term is $\frac{1}{p}$. find the $(pq)^{th}$ term of the $A.P.$

A. $\frac{p+q}{pq}$

B. 0

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

D. 1

Answer: A

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

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

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

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

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

Answer: A

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51. If a,b,c are in H.P. , then

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

B. $\frac{1}{bc}, \frac{1}{ca}, \frac{1}{ab}$ are in H.P

C. ab,bc,ca are in H.P.

D. $\frac{a}{b}, \frac{b}{c}, \frac{c}{a}$ are in H.P.`

Answer: B

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52. 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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53. The positive interger n for which $2 \times 2^2 + 3 \times 2^3 + 4 \times 2^4 + \ldots. + n \times 2^4 = 2^{n+10}$ is

A. 510

B. 512

C. 513

D. 508

Answer: C

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54. If $1^2 + 2^2 + 3^2 + \quad + 2003^2 = (2003)(4007)(334)$and $(1)(2003) + (2)(2002) + (3)(2001) + \quad + (2003)(1) = (2003)(334)(x)$, then x is equal to a. 2005 b. 2004 c. 2003 d. 2001

A. 2005

B. 2004

C. 2003

D. 2001

Answer: A

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55. The sum to n terms of the series

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

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

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

C. 0

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

Answer: A

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

A. a^2+3nd^2

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

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

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

Answer: D

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

A. H_n+n

B. $2n-H_n$

C. $(n-1)+H_n$

D. H_n+2n

Answer: B

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

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

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

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

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

Answer: A

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59. If $a_n = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \ldots . + \frac{1}{2^n - 1}$, then

A. $a_{100} < 100$

B. $a_{100} > 100$

C. $a_{200} < 100$

D. none of these

Answer: A

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