



MATHS

BOOKS - NDA PREVIOUS YEARS

SEQUENCE AND SERIES

Math

1. If the sum of first 10 terms of an arithmetic progression with first term p and common difference q , is 4 times the sum of the first 5 terms, then what is the ratio $p:q$?

A. 1:2

B. 1:4

C. 2:1

D. 4:1

Answer: A



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2. One of the roots of a quadratic equation with real coefficients is $\frac{1}{(2 - 3i)}$. Which of the following implications is/are true?

1. The second root of the equation will be $\frac{1}{(3 - 2i)}$.
2. The equation has no real root.
3. The equation is $13x^2 - 4x + 1 = 0$.

Which of the above is/are correct ?

A. 1 and 2 only

B. 3 only

C. 2 and 3 only

D. 1,2 and 3

Answer: C



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3. What is the sum of the first 50 terms of the series $(1 \times 3) + (3 \times 5) + (5 \times 7) + \dots\dots\dots ?$

A. 1,71,650

B. 26600

C. 26650

D. 26900

Answer: A



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4. If $x = 1 + \frac{y}{2} + \left(\frac{y}{2}\right)^2 + \left(\frac{y}{2}\right)^3 + \dots\dots$ where $|y| < 2$, what is $1/y$ equal to ?

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

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

C. $\frac{2x - 2}{x}$

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

Answer: C



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5. What is the product of first $2n + 1$ terms of a geometric progression ?

- A. The $(n + 1)$ th power of the n th term of the GP
- B. The $(2n + 1)$ th power of the n th term of the GP
- C. The $(2n + 1)$ th power of the $(n + 1)$ th term of the GP
- D. The n th power of the $(n + 1)$ th terms of the GP

Answer: C



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6. The following question consist of two statements, one labelled as the 'Assertion (A)' and the other as 'Reason (R)'. You are to examine these two statements carefully and select the answer. Assertion (A) : $1/8, \log_{a^2} a \rightarrow$ exponent should be to the base, $\log_a a^2$ are in GP but not AP.
Reason :(R) :x,y,z are in GP but not in AP.

- A. Both A and R are individually true and R is the correct explanation of A
- B. Both A and R are individually true but R is not the correct explanation A
- C. A is true but R is false
- D. A is false but R is true

Answer: A



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7. If $x + 1$, $4x + 1$, and $8x + 1$ are in geometric progression, then what is the non-trivial value of x ?

A. -1

B. 1

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

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

Answer: C



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8. The equation $(a^2 + b^2)x^2 - 2b(a + c)x + (b^2 + c^2) = 0$ has equal roots. Which one of the following is correct about a, b and c ?

A. They are in AP

B. They are in GP

C. They are in HP

D. They are neither in AP, nor in GP, nor in HP

Answer: B



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9. If p^{th} term of an AP is q , and its q^{th} term is p , then what is the common difference?

A. -1

B. 0

C. 2

D. 1

Answer: A



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

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

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

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

Answer: A



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11. For an AP with first term u and common difference v , the p^{th} term is $15uv$ more than the q^{th} term. Which one of the following is correct?

A. $p = q + 15v$

B. $p = q + 15u$

C. $p = q + 14v$

$$D. p = q + 14u$$

Answer: B



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12. If a , b and c are three positive numbers in an arithmetic progression, then:

A. $ac > b^2$

B. $b^2 > a + c$

C. $ab + bc \leq 2ac$

D. $ab + bc \geq 2ac$

Answer: D



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13. If $|x| < \frac{1}{2}$, what is the value of

$$1 + \left[\frac{x}{1-x} \right] + \left[\frac{n(n+1)}{2!} \right] \left[\frac{x}{1-x} \right]^2 + \dots + \infty?$$

A. $\left[\frac{1-x}{1-2x} \right]^n$

B. $(1-x)^n$

C. $\left[\frac{1-2x}{1-x} \right]^n$

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

Answer: A



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14. The sum of the first $(2p + 1)$ terms of an AP is $\{(p + 1) \cdot (2p + 1)\}$.

Which one of the following inferences can be drawn ?

A. The $(p + 1)^{th}$ term of the AP is $(2p + 1)$

B. The $(2p + 1)^{th}$ term of the AP is $(2p + 1)$

C. The $(2p + 1)^{th}$ term of the AP is $(p + 1)$

D. The $(p + 1)^{th}$ term of the AP is $(p + 1)$

Answer: D



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15. a, b, c are in G.P. with $1 < a < b < n$, and $n > 1$ is an integer. $\log_a n, \log_b n, \log_c n$ form a sequence. This sequence is which one of the following ?

- A. Harmonic progression
- B. Arithmetic progression
- C. Geometric progression
- D. None of these

Answer: A



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16. What is the sum of the series $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \dots$ equal to?

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

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

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

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

Answer: D



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17. If b_1, b_2, b_3 are three consecutive terms of an arithmetic progression with common difference $d > 0$, then what is the value of d for which

$$b_1 \frac{2}{3} = b_2 b_3 + b_1 d + 2?$$

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

B. 0

C. 1

D. 2

Answer: C



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18. If 1, x , y , z , 16 are in geometric progression, then what is the value of $x+y+z$?

A. 8

B. 12

C. 14

D. 16

Answer: C



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19. If the n th term of an arithmetic progression is $3n + 7$, then what is the sum of its first 50 terms ?

A. 3925

B. 4100

C. 4175

D. 8200

Answer: C



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20. If, for positive real numbers x, y, z , the numbers $x + y, 2y$ and $y + z$ are in harmonic progression, then which one of the following is correct ?

A. x, y, z are in geometric progression

B. x, y, z are in arithmetic progression

C. x, y, z are in harmonic progression

D. None of the above

Answer: A



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21. What is the sum of the series

$$1 + \frac{1}{8} + \frac{1.3}{8.16} + \frac{1.3.5}{8.16.24} + \dots \infty?$$

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

B. $2\sqrt{3}$

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

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

Answer: A



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22. What is the geometric mean of the ratio of corresponding terms of two series where G_1 and G_2 are geometric means of the two series ?

A. $\log G_1 - \log G_2$

B. $\log G_1 + \log G_2$

C. $\frac{G_1}{G_2}$

D. $G_1 G_2$

Answer: C



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23. If the points with the coordinates (a, ma) , $\{b, (m + 1)b\}$, $\{c, (m+2)c\}$ are collinear, then which one of the following is correct ?

A. a, b, c are in arithmetic progression for all m

B. a, b, c are in geometric progression for all m

C. a, b, c are in harmonic progression for all m

D. a, b, c are in arithmetic progression only for $m = 1$

Answer: C

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24. The following question consist of two statements, one labelled as the 'Assertion (A)' and the other as 'Reason (R)'. You are to examine these two statements carefully and select the answer.

Assertion (A) : $0.3 + 0.03 + 0.003 + \dots = \frac{1}{3}$.

Reason (R) : For each (+) ve integer n , let $a_n = a + nd$, a and d are real numbers. The, $a_1 + \dots + a_n = \frac{n}{2}[2a + (n + 1)d]$.

A. Both A and R are individually true and R is the correct explanation of A

B. Both A and R are individually true but R is not the correct explanation A

C. A is true but R is false

D. A is false but R is true

Answer: B



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25. Let the positive numbers a, b, c, d be in AP. Then abc, abd, acd, bcd are
(2001, 1M) not in AP/GP/HP (b) in AP in GP (d) in HP

A. are in AP

B. are in GP

C. are in HP

D. are in none of the above progressions

Answer: C



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26. Find the value of $9^{\frac{1}{3}}, 9^{\frac{1}{9}}, 9^{\frac{1}{27}} \dots$ up to ∞ .

A. 9

B. 3

C. $9^{1/3}$

D. 1

Answer: B



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27. If a, b, c, d are in harmonical progression such that $a > d$, then which one of the following is correct ?

A. $a + c = b + d$

B. $a + c > b + d$

C. $ac = bd$

D. $ab = cd$

Answer: B



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28. After paying 30 out of 40 installments of a debt of Rs. 3600, one third of the debt is unpaid. If the installments are forming an arithmetic series, then what is the first instalment ?

- A. Rs. 50
- B. Rs. 51
- C. Rs. 105
- D. Rs. 110

Answer: B



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29. The product of first nine terms of a GP is, in general, equal to which one of the following ?

- A. The 9th power of the 4th term
- B. The 4th power of the 9th term
- C. The 5th power of the 9th term
- D. The 9th power of the 5th term

Answer: D



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30. The difference between the n th term and $(n - 1)$ th term of a sequence is independent of n . Then the sequence follows which one of the following?

- A. AP
- B. GP

C. HP

D. None of these

Answer: A



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31. Which one of the following is correct?

If $\frac{1}{b-c} + \frac{1}{b-a} = \frac{1}{a} + \frac{1}{c}$, then a, b, c are in

A. AP

B. HP

C. GP

D. None of these

Answer: B



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32. What is the 15th term of the series 3, 7, 13, 21, 31, 43,?

A. 205

B. 225

C. 238

D. 241

Answer: D



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33. If the n th term of an arithmetic progression is $2n - 1$, then what is the sum upto n terms?

A. n^2

B. $n^2 - 1$

C. $n^2 + 1$

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

Answer: A



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34. If the three observations are 3, -6 and -6, then what is their harmonic mean?

A. 0

B. ∞

C. $-1/2$

D. -3

Answer: B



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35. Sum of first n natural numbers is given by $\frac{n(n+1)}{2}$. What is the geometric mean of the series $1, 2, 4, 8, \dots, 2^n$?

A. 2^n

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

C. $2^{1/2}$

D. 2^{n-1}

Answer: B



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36. If there are $(2n + 1)$ terms in A.P., then prove that the ratio of the sum of odd terms and the sum of even terms is $(n + 1) : n$.

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

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

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

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

Answer: C

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37. If the sum of 'n' terms of an arithmetic progression is $n^2 - 2n$, then what is the n^{th} term?

A. $3n - n^2$

B. $n2n - 3$

C. $2n + 3$

D. $2n - 5$

Answer: B

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38. If a , $2a + 2$, $3a + 3$ are in GP, then what is the fourth term of the GP?

A. -13.5

B. 13.5

C. -27

D. 27

Answer: A



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39. What is sum to the 100 terms of the series $9 + 99 + 999 + \dots$?

A. $\frac{10}{9}(10^{100} - 1) - 100$

B. $\frac{10}{9}(10^{99} - 1) - 100$

C. $100(100^{10} - 1)$

D. $\frac{9}{100}(10^{100} - 1)$

Answer: A



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40. If the AM and GM of two numbers are 5 and 4 respectively, then what is the HM of those numbers?

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

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

C. $\frac{9}{2}$

D. 9

Answer: B



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41. The harmonic mean of two numbers is 21.6. If one of the numbers is 27, then what is the other number?

A. 16.2

B. 17.3

C. 18

D. 20

Answer: C



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42. If the sum of the first two terms and the sum of the first four terms of a geometric progression with positive common ratio are 8 and 80 respectively, then what is the 6th term?

A. 88

B. 243

C. 486

D. 1458

Answer: C



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43. If $x > 1$ and $\log_2 x, \log_3 x, \log_x 16$ are in GP, then what is x equal to ?

A. 9

B. 8

C. 4

D. 2

Answer: A



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

A. $a + 2r$

B. ar^2

C. $a(r^5 - 1) / (r - 1)$

D. $a(r^5 - 1) / [5(r - 1)]$

Answer: D



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45. If $(1 + 3 + 5 + \dots + p) + (1 + 3 + 5 + \dots + q) = (1 + 3 + 5 + \dots + r)$

where each set of parentheses contains the sum of consecutive odd integers as shown, the smallest possible value of $p + q + r$ (where $p > 6$)

is 12 b. 21 c. 45 d. 54

A. 12

B. 21

C. 45

D. 54

Answer: B



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46. If x^2, y^2, z^2 are in AP, then $y + z, z + x, x + y$ are in

A. AP

B. HP

C. GP

D. None of these

Answer: A



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47. If $x, 2x + 2, 3x + 3$ are the first three terms of a GP, then what is its fourth term?

A. $-27/2$

B. $27/2$

C. $-33/2$

D. $33/2$

Answer: A



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48. Which term of the sequence $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \dots$ is the first negative term?

A. 27th

B. 28th

C. 29th

D. No such term exists

Answer: B



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49. If m th term of an AP is $1/n$ and its n th term is $1/m$, then show that its (mn) th term is 1

A. $1/(mn)$

B. m/n

C. n/m

D. 1

Answer: D



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50. The 59th term of an AP is 449 and the 449th term is 59. Which term is equal to 0 (zero)?

A. 501st term

B. 502nd term

C. 508th term

D. 509th term

Answer: C

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51. If the AM and HM of two numbers are 27 and 12 respectively, then what is their GM equal to ?

A. 12

B. 18

C. 24

D. 27

Answer: B

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

A. 6729

B. 8712

C. 8729

D. 9276

Answer: C



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53. Let a, b, c be in AP.

Consider the following statements:

1. $\frac{1}{ab}, \frac{1}{ca}$ and $\frac{1}{bc}$ are in AP.
2. $\frac{1}{\sqrt{b} + \sqrt{c}}, \frac{1}{\sqrt{c} + \sqrt{a}}$ and $\frac{1}{\sqrt{a} + \sqrt{b}}$ are in AP.

Which of the statements given above is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Answer: C



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54. If p times the p th term of an AP is q times the q th term, then what is the $(p + q)$ th term equal to ?

A. $p + q$

B. pq

C. 1

D. 0

Answer: D



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55. The geometric mean of three numbers was computed as 6. It was subsequently found that, in this computation, a number 8 was wrongly

read as 12. What is the correct geometric mean ?

A. 4

B. $\sqrt[3]{5}$

C. $2\sqrt[3]{18}$

D. None of these

Answer: C



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56. The arithmetic mean of two numbers exceeds their geometric mean by 2 and the geometric mean exceeds their harmonic mean by 1.6. What are the two numbers ?

A. 16,4

B. 81,9

C. 256, 16

D. 625,25

Answer: A



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57. The sum of an infinite geometric progression is 6, If the sum of the first two terms is $9/2$, then what is the first term?

A. 1

B. $5/2$

C. 3 or $3/2$

D. 9 or 3

Answer: D



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58. If the AM and GM between two number are in the ratio $m : n$, then what is the ratio between the two numbers?

A. $\frac{m + \sqrt{m^2 - n^2}}{m - \sqrt{m^2 - n^2}}$

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

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

D. $\frac{m^2 + n^2 - nm}{m^2 + n^2 + mn}$

Answer: A



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59. What is the geometric mean of the data 2, 4, 8, 16, 32 ?

A. 2

B. 4

C. 8

D. 16

Answer: C



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60. If A, B and C are in AP and $b : c = \sqrt{3} : \sqrt{2}$, then what is the value of $\sin C$?

A. 1

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

C. $\sqrt{3}$

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

Answer: D



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61. In a GP of positive terms, any term is equal to one-third of the sum of next two terms. What is the common ratio of the GP?

A. $\frac{\sqrt{13} + 1}{2}$

B. $\frac{\sqrt{13} - 1}{2}$

C. $\frac{\sqrt{13} + 1}{3}$

D. $\sqrt{13}$

Answer: B



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62. Which term of the G.P $\frac{1}{4}, -\frac{1}{2}, 1, \dots$ is -128

A. 9th

B. 10th

C. 11th

D. 12th

Answer: B



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63. If $\frac{1}{b-a} + \frac{1}{b-c} = \frac{1}{a} + \frac{1}{c}$, then a,b,c are in (A) AP (B) GP (C) HP (D)

NONE

A. AP

B. GP

C. HP

D. None of these

Answer: C



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64. What is the sum of $\sqrt{3} + \frac{1}{\sqrt{3}} + \frac{1}{3\sqrt{3}} + \dots$?

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

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

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

D. $\sqrt{3}$

Answer: B



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65. Which one of the following options is correct ?

A. $\sin^2 30^\circ, \sin^2 45^\circ, \sin^2 60^\circ$, are in GP

B. $\cos^2 30^\circ, \cos^2 45^\circ, \cos^2 60^\circ$ are in GP

C. $\cot^2 30^\circ, \cot^2 45^\circ, \cot^2 60^\circ$ are in GP

D. $\tan^2 30^\circ, \tan^2 45^\circ, \tan^2 60^\circ$ are in GP

Answer: D



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66. What is the 10th common term between the series $2 + 6 + 10 + \dots$ and $1 + 6 + 11 + \dots$?

- A. 180
- B. 186
- C. 196
- D. 206

Answer: B



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67. If the 10th term of a GP is 9 and 4th term is 4, then what is its 7th term?

- A. 6
- B. 14
- C. $27/14$

Answer: A



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68. If $\log_{10} 2$, $\log_{10}(2^x - 1)$, $\log_{10}(2^x + 3)$ are three consecutive terms of an AP, then which one of the following is correct?

A. $x = 0$

B. $x = 1$

C. $x = \log_2 5$

D. $x = \log_5 2$

Answer: C



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69. If $n!$, $3 \times (n!)$ and $(n + 1)!$ are in GP, then the value of n will be

A. 3

B. 4

C. 8

D. 10

Answer: C



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70. If a, b, c, d, e, f are in AP, then $(e - c)$ is equal to which one of the following?

A. $2(c - a)$

B. $2(d - c)$

C. $2(f - d)$

D. $(d - c)$

Answer: B



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71. What is the geometric mean of 10, 40 and 60 (approx)?

A. 10

B. 28

C. 29.6

D. 70

Answer: B



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72. If the arithmetic and geometric means of two numbers are 10, 8 respectively, then one number exceeds the other number by

- A. 8
- B. 10
- C. 12
- D. 16

Answer: C



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73. If the sequence $\{S_n\}$ is a geometric progression and $S_2 S_{11} = S_p S_8$, then what is the value of p ?

- A. 1
- B. 3
- C. 5
- D. cannot be determined

Answer: C

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74. If $1/4, 1/x, 1/10$ are in HP, then what is the value of x ?

A. 5

B. 6

C. 7

D. 8

Answer: C

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75. If p, q, r are in AP as well as G.P., then which one of the following is correct?

A. $p = q \neq r$

B. $p \neq q \neq r$

C. $p \neq q = r$

D. $p = q = r$

Answer: D



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76. The geometric mean and harmonic mean of two non negative observations are 10 and 8 respectively. Then what is the arithmetic mean of the observations equal to?

A. 4

B. 9

C. 12,5

D. 2

Answer: C



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77. What is the n th term of the sequence 1, 5, 9, 13, 17, ...?

A. $2n - 1$

B. $2n + 1$

C. $4n - 3$

D. None of the above

Answer: C



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78. What does the series

$$1 + 3^{-\frac{1}{2}} + 3 + \frac{1}{3\sqrt{3}} + \dots \text{ represents?}$$

A. AP

B. GP

C. HP

D. None of the above series

Answer: D



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79. What is the sum of the series $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \dots$ equal to?

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

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

C. 2

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

Answer: D



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80. Consider the following statements:

1. The sum of cubes of first 20 natural numbers is 44400.
2. The sum of squares of first 20 natural numbers is 2870.

Which of the above statement is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

Answer: B



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81. What is the sum of first eight terms of the series

$$1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \dots ?$$

A. $\frac{89}{128}$

B. $\frac{57}{384}$

C. $\frac{85}{128}$

D. None of the above

Answer: C



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82. The sum of first 10 terms and 20 terms of an AP are 120 and 440 respectively.

What is its first term ?

A. 2

B. 3

C. 4

D. 5

Answer: B



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83. The sum of first 10 terms and 20 terms of an AP are 120 and 440 respectively.

What is the common difference?

A. 1

B. 2

C. 3

D. 4

Answer: B



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84. What is the number of diagonals which can be drawn by joining the angular points of a polygon of 100 sides?

A. 4850

B. 4850

C. 5000

D. 10000

Answer: A



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85. The angles of a triangle are in AP and the least angle is 30° . What is the greatest angle (in radian)?

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

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

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

D. π

Answer: A

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86. What is the geometric mean of the sequence $1, 2, 4, 8, \dots, 2^n$

A. $2^{n/2}$

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

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

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

Answer: A

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87. If the numbers $-3, 4n - 2, 5n + 1$ are in AP, what is the value of n ?

A. 1

B. 2

C. 3

D. 4

Answer: A



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88. 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. 9, 5

C. 12, 7

D. 3, 1

Answer: A



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

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

A. HP

B. AP

C. GP

D. None of the above

Answer: A



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90. What is the value of $0.9 + 0.09 + 0.009 + \dots$ equal to?

A. 1

B. 1.01

C. 1.001

D. 1.1

Answer: A



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91. The sum of the first five terms and the sum of the first ten terms of an AP are same. Which one of the following is the correct statement ?

- A. The first term must be negative
- B. The common difference must be negative
- C. Either the first term or the common difference is negative but not both
- D. Both the first term and the common difference are negative

Answer: C



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92. - What is the 7th rank of sequence 0, 3, 8, 15, 24, ...?(a) 63(b) 48 (c) 35

A. 63

B. 48

C. 35

D. 33

Answer: B



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93. The sum of an infinite GP is x and the common ratio r is such that $|r| < 1$. If the first term of the GP is 2, then which one of the following is correct ?

A. $-1 < x < 1$

B. $-\infty < x < 1$

C. $1 < x < \infty$

D. None of these

Answer: C



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94. The sum of the series formed by the sequence $3, \sqrt{3}, 1, \dots$

upto infinity is :

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

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

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

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

Answer: A



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95. 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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96. Let S_n denote the sum of first n terms of an AP and $3S_n = S_{2n}$ What is $S_{3n} : S_n$ equal to? What is $S_{3n} : S_{2n}$ equal to?

A. 2 : 1

B. 3 : 1

C. 4 : 1

D. 5 : 1

Answer: A



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97. Let $f(x) = ax^2 + bx + c$ such that $f(1) = f(-1)$ and a, b, c , are in Arithmetic Progression.

What is the value of b ?

A. -1

B. 0

C. 1

D. Cannot be determined due to insufficient data

Answer: B



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98. Let $f(x) = ax^2 + bx + c$ such that $f(1) = f(-1)$ and a, b, c , are in Arithmetic Progression.

$f'(a), f'(b), f'(c)$ are

A. A.P.

B. GP.

C. H.P.

D. Arithmetico-geometric progression

Answer: A



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99. Let $f(x) = ax^2 + bx + c$ such that $f(1) = f(-1)$ and a, b, c , are in Arithmetic Progression.

$f''(a), f''(b), f''(c)$ are

A. in A.P. only

B. in GP. Only

C. in both A.P. and G.P.

D. neither in A.P. nor in G.P.

Answer: C



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100. Sum of the series $0.5 + 0.55 + 0.555 + \dots$ upto n terms is

A. $\frac{5}{9} \left[n - \frac{2}{9} \left(1 - \frac{1}{10^n} \right) \right]$

B. $\frac{1}{9} \left[5 - \frac{2}{9} \left(1 - \frac{1}{10^n} \right) \right]$

C. $\frac{1}{9} \left[n - \frac{5}{9} \left(1 - \frac{1}{10^n} \right) \right]$

D. $\frac{5}{9} \left[n - \frac{1}{9} \left(1 - \frac{1}{10^n} \right) \right]$

Answer: D



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101. The value of the infinite product $6^{\frac{1}{2}} \times 6^{\frac{2}{4}} \times 6^{\frac{3}{8}} \times 6^{\frac{4}{16}} \times \dots$

A. 6

B. 36

C. 216

D. ∞

Answer: B



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102. The n th term of an AP. is $\frac{3+n}{4}$, then the sum of first 105 terms is

A. 270

B. 735

C. 1409

D. 1470

Answer: D



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103. If p, q, r are in one geometric progression and a, b, c are in another geometric progression, then ap, bq, cr are in

- A. Arithmetic progression
- B. Geometric progression
- C. Harmonic progression
- D. None of the above

Answer: B



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104. What is the sum of n terms of the series

$$\sqrt{2} + \sqrt{8} + \sqrt{18} + \sqrt{32} + \dots$$

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

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

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

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

Answer: C



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105. Given that $a_n = \int_0^\pi \frac{\sin^2\{(n+1)x\}}{\sin 2x} dx$

Consider the following statements:

1. The sequence $\{a_{2n}\}$ is in AP with common difference zero.
2. The sequence $\{a_{2n+1}\}$ is in AP with common difference zero.

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

Answer: C



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106. Given that $a_n = \int_0^\pi \frac{\sin^2\{(n+1)x\}}{\sin 2x} dx$

What is $a_{n-1} - a_{n-4}$ equal to ?

- A. -1
- B. 0
- C. 1
- D. 2

Answer: B

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107. Given that $\log_x y, \log_z x, \log_y z$ are in GP, $xyz = 64$ and x^3, y^3, z^3 are in A.P.

Which one of the following is correct ?

x,y and z are

A. in AP only

B. in GP only

C. in both AP and GP

D. neither in AP nor in GP

Answer: C



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108. Given that $\log_x y, \log_z x, \log_y z$ are in GP, $xyz = 64$ and x^3, y^3, z^3 are in A.P.

Which one of the following is correct ?

xy, yz and zx are

A. in AP only

B. in GP only

C. in both AP and GP

D. neither in AP nor in GP

Answer: C



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109. If m is the geometric mean of

$$\left(\frac{y}{z}\right)^{\log(yz)}, \left(\frac{z}{x}\right)^{\log(zx)} \text{ and } \left(\frac{x}{y}\right)^{\log(xy)}$$

then what is the value of m ?

A. 1

B. 3

C. 6

D. 9

Answer: A



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110. How many geometric progressions are possible containing 27, 8 and 12 as three of its/their terms

- A. One
- B. Two
- C. Four
- D. Infinitely many

Answer: D



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111. Let a, x, y, z, b be in AP where $x+y+z=15$ Let a, p, q, r, b be in HP where

$p^{-1} + q^{-1} + r^{-1} = \frac{5}{3}$ What is the value of ab What is the value of xyz

What is the value of pqr

- A. 10
- B. 9

C. 8

D. 6

Answer: B



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112. Let a, x, y, z, b be in AP where $x+y+z=15$ Let a, p, q, r, b be in HP where

$$p^{-1} + q^{-1} + r^{-1} = \frac{5}{3}$$

What is the value of ab What is the value of xyz

What is the value of pqr

A. 120

B. 105

C. 90

D. Cannot be determined

Answer: B



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113. Let a, x, y, z, b be in AP where $x+y+z=15$. Let a, p, q, r, b be in HP where $p^{-1} + q^{-1} + r^{-1} = \frac{5}{3}$. What is the value of ab ? What is the value of xyz ?

What is the value of pqr ?

A. $35/243$

B. $81/35$

C. $243/35$

D. Cannot be determined

Answer: C



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114. 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. $9/5$

C. 2

D. $11/5$

Answer: A



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115. 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. -4

B. -6

C. -8

D. -10

Answer: B



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116. The interior angles of a polygon are in AP The smallest angle is 120 and the common difference is 5. Find the number of sides of the polygon.

A. One

B. Two

C. Three

D. Infinitely many

Answer: A



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117. The interior angles of a polygon are in AP The smallest angle is 120 and the common difference is 5. Find the number of sides of the polygon.

A. 160° only

B. 195° only

C. Either 160° or 195°

D. Nither 160 nor 195°

Answer: A



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118. If $x^{\ln\left[\frac{y}{z}\right]} \cdot y^{\ln[xz]^2} \cdot z^{\ln\left[\frac{x}{y}\right]} = y^{4\ln y}$ for any $x>1, y>1$ and $z>1$, then which one of the following is correct?

A. $\ln y$ is the GM of $\ln x, \ln x, \ln x$ and $\ln z$

B. $\ln y$ is the AM of $\ln x, \ln x, \ln x$ and $\ln z$

C. $\ln y$ is the HM of $\ln x, \ln x$ and $\ln z$

D. $\ln y$ is the AM of $\ln, \ln x, \ln z$ and $\ln z$

Answer: B



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119. What is the sum of the series

$0.3 + 0.33 + 0.333 + \dots$ n terms?

A. $\frac{1}{3} \left[n - \frac{1}{9} \left(1 - \frac{1}{10^n} \right) \right]$

B. $\frac{1}{3} \left[n - \frac{2}{9} \left(1 - \frac{1}{10^n} \right) \right]$

C. $\frac{1}{3} \left[n - \frac{1}{3} \left(1 - \frac{1}{10^n} \right) \right]$

D. $\frac{1}{3} \left[n - \frac{1}{9} \left(1 + \frac{1}{10^n} \right) \right]$

Answer: A



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120. If $(0, -3)$ and $(0, 3)$ are the two vertices of an equilateral triangle,

find the coordinates of its third vertex.

A. mn

B. $m + n$

C. $2(m + n)$

D. $-(m + n)$

Answer: D



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121. The sum of the roots of the equation $x^2 + bx + c = 0$ (where b and c are non-zero) is equal to the sum of the reciprocals of their squares.

Then $\frac{1}{c}, b, \frac{c}{b}$ are in

A. AP

B. GP

C. HP

D. None of the above

Answer: C



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122. The sum of the roots of the equation $ax^2 + x + c = 0$ (where a and c are non-zero) is equal to the sum of the reciprocals of their squares.

Then a, ca^2, c^2 are in

A. AP

B. GP

C. HP

D. None of the above

Answer: A



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123. The fifth term of an AP of n terms, whose sum is $n^2 - 2n$, is

A. 5

B. 7

C. 8

D. 15

Answer: B



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124. The sum of all 2 digit odd numbers is

A. 2475

B. 2530

C. 4905

D. 5049

Answer: A



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125. The sum of the first n terms of the series $\frac{1}{2} + \frac{3}{4} + \frac{7}{8} + \frac{15}{16} + \dots$ is equal to

A. $2^n - n - 1$

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

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

D. $2^n - 1$

Answer: C



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126. Let x, y, z be positive real numbers such that x, y, z are in GP and $\tan^{-1} y$ and $\tan^{-1} z$ are in AP. Then which one of the following is correct?

A. $x = y = z$

B. $xz = 1$

C. $x \neq y$ and $y = z$

D. $x = y$ and $y \neq z$

Answer: A



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127. 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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128. The value of the product $6^{\frac{1}{2}} \times 6^{\frac{1}{4}} \times 6^{\frac{1}{8}} \times 6^{\frac{1}{16}} \times \dots$ up to infinite terms is

A. 6

B. 36

C. 216

D. 512

Answer: A



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

A. 24 minutes

B. 34 minutes

C. 125 minutes

D. 135 minutes

Answer: B



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130. If $y = x + x^2 + x^3 + \dots$ up to infinite terms where $x < 1$, then which one of the following is correct?

A. $x = \frac{y}{1 + y}$

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

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

D. $x = \frac{1 - y}{y}$

Answer: A

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131. $\frac{1}{\log_3 e} + \frac{1}{\log_3 e^2} + \frac{1}{\log_3 e^4} + \dots =$

A. $\log_e 9$

B. 0

C. 1

D. $\log_e 3$

Answer: A

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132. If x_1 and x_2 are positive quantities, then the condition for the difference between the arithmetic mean and the geometric mean to be greater than 1 is

A. $x_1 + x_2 > 2\sqrt{x_1 x_2}$

B. $\sqrt{x_1} + \sqrt{\sqrt{x_2}} > \sqrt{2}$

C. $|\sqrt{x_1} + \sqrt{x_2}| > \sqrt{2}$

D. $x_1 + x_2 < 2(\sqrt{x_1x_2} + 1)$

Answer: C



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133. If the ratio of AM to GM of two positive numbers a and b is 5 : 3, then a : b is equal to

A. 3 : 5

B. 2 : 9

C. 9 : 1

D. 5 : 3

Answer: C



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134. If $x = 1 - y + y^2 - y^3 + \dots$ up to infinite terms, where $|y| < 1$, then which one of the following is correct?

A. $x = \frac{1}{1 + y}$

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

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

D. $x = \frac{y}{1 - y}$

Answer: A



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135. What is the sum of all two digit numbers which when divided by 3 leaves 2 as the remainder ?

(a)1565

(b)1585

(c)1635

(d)1655

A. 1565

B. 1585

C. 1635

D. 1655

Answer: C



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136. The third term of a GP is 3. What is the product of the first five terms?

A. 216

B. 226

C. 243

D. Cannot be determined due to insufficient data

Answer: C



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137. If $x, \frac{3}{2}, z$ are in AP, $x, 3, z$ are in GP, then which one of the following will be in HP?

A. $x, 6, z$

B. $x, 4, z$

C. $x, 2, z$

D. $x, 1, z$

Answer: A



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138. An infinite G.P has first term x and sum 5 then x belongs to ?

A. $x < -10$

B. $-10 < x < 0$

C. $0 < x < 10$

D. $x < 10$

Answer: C

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139. The sum of the series $3 - 1 + \frac{1}{3} - \frac{1}{9} + \dots$ is equal to

A. $\frac{20}{9}$

B. $\frac{9}{20}$

C. $\frac{9}{4}$

D. $\frac{4}{9}$

Answer: C

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

A. $(mn)^{-1}$

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

C. 1

D. 0

Answer: C



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141. If 2^{nd} term of GP is 2 and the sum of infinite terms is 8 find the first term

A. $8, 2, \frac{1}{2}, \frac{1}{8}, \dots$

B. $10, 2, \frac{2}{5}, \frac{2}{25}, \dots$

C. $4, 2, 1, \frac{1}{2}, \frac{1}{2^2}, \dots$

D. $6, 3, \frac{3}{2}, \frac{3}{4}, \dots$

Answer: C



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142. If a, b, c are in AP or GP or HP, then $\frac{a-b}{b-c}$ is equal to

A. $\frac{b}{a}$ or 1 or $\frac{b}{c}$

B. $\frac{c}{a}$ or $\frac{c}{b}$ or 1

C. 1 or $\frac{a}{b}$ or $\frac{a}{c}$

D. 1 or $\frac{a}{b}$ or $\frac{c}{a}$

Answer: C



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143. If $\sin \beta$ is the harmonic mean of $\sin \alpha$ and $\cos \alpha$, and $\sin \theta$ is the arithmetic mean of $\sin \alpha$ and $\cos \alpha$, then which of the following is/are correct?

1. $\sqrt{2} \sin\left(\alpha + \frac{\pi}{4}\right) \sin \beta = \sin 2\alpha$

2. $\sqrt{2} \sin \theta = \cos\left(\alpha - \frac{\pi}{4}\right)$

Select the correct answer using the code given below:

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Answer: C



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144. If $x_i > 0, y_i > 0 (i = 1, 2, 3, \dots, n)$ are the values of two variable X and Y with geometric mean P and Q respectively, then the geometric

mean of $\frac{X}{Y}$ is

A. $\frac{P}{Q}$

B. $\text{antilog}\left(\frac{P}{Q}\right)$

C. $n(\log P - \log Q)$

D. $n(\log P + \log Q)$

Answer: B



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145. What is the n^{th} term of the sequence 25, - 125, 625, - 3125, ...?

A. $(-5)^{2n-1}$

B. $(-1)^{2n}5^{n+1}$

C. $(-1)^{2n-1}5^{n+1}$

D. $(-1)^{n-1}5^{n+1}$

Answer: D



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146. The number 1, 5 and 25 can be three terms (not necessarily consecutive) of

- A. only one AP
- B. more than one but \hat{u} nite numbers of APs
- C. in \hat{u} nite number of APs
- D. \hat{u} nite number of GPs

Answer: C



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147. The sum of $(p + q)^{th}$ and $(p - q)^{th}$ terms of an AP is equal to

- A. $(2p)^{th}$ term
- B. $(2q)^{th}$ term

C. Twice the p^{th} term

D. Twice the q^{th} term

Answer: C



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148. What is the Fourth term of an AP of n terms whose sum is $n(n + 1)$?

A. 6

B. 8

C. 12

D. 20

Answer: B



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