MATHS

BOOKS - DHANPAT RAI & CO MATHS (HINGLISH)

SEQUENCES AND SERIES

Illustration

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

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

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

C. 1

D. 0

Answer: C

Watch Video Solution

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

Watch Video Solution

3. If $a_1, a_2, a_3, , a_n$ are in A.P., where $a_i > 0$ for all i , then

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

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

Watch Video Solution

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

A. 1

B. 2

C. 0

D. none of these

Answer: C

Watch Video Solution

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

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

B. 1

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

D. 0

Answer: D

Watch Video Solution

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

Watch Video Solution

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

A. $\frac{\alpha - \beta}{100}$

B. $\beta - \alpha$

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

D. $\alpha - \beta$

Answer: A

Watch Video Solution

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

A. 191

B. 193

C. 211

D. none of these

Answer: A

Watch Video Solution

9. For any three positive real numbers a, b and c, $9(25a^2 + b^2) + 25(c^2 - 3ac) = 15b(3a + c)$ 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

Watch Video Solution

10. Number of terms common to the two sequences $17, 21, 25, \ldots\ldots\ldots\ldots, 417$ and $16, 21, 26, \ldots\ldots\ldots., 466$ is

A. 21

B. 19

C. 20

D. 91

Answer: C

Watch Video Solution

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

Watch Video Solution

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

A. 2

B. $a_1 + a_n$

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

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

Answer: D

Watch Video Solution

13. If $\log 2, \log(2^x - 1)$ and $\log(2^x + 3)$ 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

Watch Video Solution

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

Watch Video Solution

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

A. more than two real x

B. no real x

C. exactly one real x

D. exactly two real x

Answer: C

Watch Video Solution

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

Watch Video Solution

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

A. A.G.P

B. A.P.

C. G.P.

D. H.P.

Answer: B

Watch Video Solution

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

Watch Video Solution

19. The fourth power of common difference of an arithmetic progression with integer entries is added to the product of any four consecutive terms of it. the resulting sum is

A. an even integer

B. an odd integer

C. the square of an integer

D. the cube of an integer

Answer: C

Watch Video Solution

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

Watch Video Solution

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

A. 3

B. 6

C. 4

D. 8

Answer: B

Watch Video Solution

22. If three positive real numbers a,b,c are in AP such that abc=4, then the minimum value of b is

A. $2^{1/3}$

B. $2^{2/3}$

C. $2^{1/2}$

D. $2^{3/2}$

Answer: B

Watch Video Solution

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

Watch Video Solution

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

A. 10

B. 12

C. 11

D. 13

Answer: C

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

28. Let the sequence $a_1, a_2, a_3, , a_n$ from an A.P. Then the value of $a12 - a22 + a32 - \ + a2n - 12 - a2n2$ 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

Watch Video Solution

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

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

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

D. none of these

Answer: C

Watch Video Solution

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

A. 909

B. 75

C. 750

D. 900

Answer: D

Watch Video Solution

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

A. 153

B. 306

C. 612

D. 204

Answer: B

Watch Video Solution

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

Watch Video Solution

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. $(n^2 + n)a$

Answer: A

Watch Video Solution

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

Find the ratio of their nth terms.

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

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

C. 7n-1 : 4n-27

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

Answer: B

Watch Video Solution

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

A. $16:7$

B. $7:16$

C. $74 : 169$

D. none of these

Answer: B

Watch Video Solution

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

Watch Video Solution

37. let $a_1, a_2, a_3, \ldots\ldots\ldots.$, be an AP such that $\frac{a_1 + a_2 + a_3 + \ldots\ldots\ldots. + a_p}{a_1 + a_2 + a_3 + \ldots\ldots\ldots. + a_q} = \frac{p^3}{q^3}, (p \neq q)$ then find $\frac{a_6}{a_{21}} = ?$

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

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

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

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

Answer: D

Watch Video Solution

38. Suppose that all the terms of an arithmetic progression (A.P.) are natural numbers. If the ratio of the sum of the first seven terms to the sum of the first 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

Watch Video Solution

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

Watch Video Solution

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 :

A. 18 months

B. 19 months

C. 20 months

D. 21 months

Answer: D

Watch Video Solution

41. If $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ is the AM between a and b, then the value of n is

A. 0

B. 1

C. -1

D. none of these

Answer: B

Watch Video Solution

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

Watch Video Solution

43. The third term of a geometric progression is 4. The product of the first five terms is

A. 4^3

B. 4^5

C. 4^4

D. none of these

Answer: B

Watch Video Solution

44. If a, b, c are respectively the $p^{th}, q^{th} and r^{th}$ terms of a G.P. then $(q-r)\log a + (r-p)\log b + (p-q)\log c = .$

A. 1

B. 0

C. -1

D. none of these

Answer: B

Watch Video Solution

45. The first and second terms of a GP are x^{-4} and x^{n} respectively. If x^{52} is the eighth terms of the same progression, then n is equal to

A. 13

B. 4

C. 5

D. 3

Answer: B

Watch Video Solution

46. Let $\{a_n\}$ be 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

Watch Video Solution

47. If a, b, c, d and p are distinct real numbers such that

$(a^2 + b^2 + c^2)p^2 - 2(ab + bc + cd)p + (b^2 + c^2 + d^2) \geq 0$, then a, b, c, d are in

A. A.P

B. G.P

C. H.P

D. ab=cd

Answer: B

Watch Video Solution

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

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

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

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

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

Answer: A

Watch Video Solution

49. Every term of a G.P. is positive and also every term is the sum of 2 preceding. 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

Watch Video Solution

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

A. 12

B. 4

C. -4

D. -12

Answer: D

Watch Video Solution

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

Watch Video Solution

52. If a_1, a_2, a_3 are 3 positive consecutive terms of a GP with common ratio r .Then all the values of r for which the inequality $a_3 > 4a_2 - 3a_1$, is satisfied

A. $1 < r < 3$

B. $-3 < r < -1$

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

D. none of these

Answer: C

Watch Video Solution

53. If the first and the nth terms of a G.P., are $a and b$, respectively, and if P is hte product of the first n terms prove that $P^2 = (ab)^n$.

A. ab

B. $(ab)^n$

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

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

Answer: B

Watch Video Solution

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

A. $2-\sqrt{3}$

B. $2+\sqrt{3}$

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

D. $3+\sqrt{2}$

Answer: B

Watch Video Solution

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

A. $2-\sqrt{3}$

B. $2+\sqrt{3}$

C. $\sqrt{3}-2$

D. $3+\sqrt{2}$

Answer: B

Watch Video Solution

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

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

B. $ca^2 = bd^3$

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

D. $ab^3 = cd^3$

Answer: A

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

59. The fourth, seventh and tenth terms of a G.P. are p,q,r respectively, then

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

B. $q^2 = pr$

C. $p^2 = qr$

D. pqr+pq+1=0

Answer: B

Watch Video Solution

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

A. 2

B. 4

C. 6

D. 8

Answer: B

Watch Video Solution

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

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

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

C. 1

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

Answer: B

Watch Video Solution

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

Watch Video Solution

63. Let $a_1, a_2, a_3...$ be in A.P. and a_p, a_q, a_r be in G.P. then value of $\frac{a_q}{a_p}$ is

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

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

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

D. none of thses

Answer: C

Watch Video Solution

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: D

Watch Video Solution

65. Consider an infinite geometric series with first term a and common ratio r if the sum is 4 and the second term is $\frac{3}{4}$ then find a & r.

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

Watch Video Solution

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

Watch Video Solution

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. $\dfrac{s_1 s_2}{1 + s_1 s_2}$

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

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

Answer: C

Watch Video Solution

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

A. 4

B. 5

C. 6

D. none of these

Answer: A

Watch Video Solution

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

Watch Video Solution

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

A. α / β

B. β / α

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

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

Answer: A

Watch Video Solution

71. 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. $x > 0$

Answer: C

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

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

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

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

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

Answer: C

Watch Video Solution

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

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

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

C. $\log_B A$

D. none of these

Answer: B

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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 $\frac{1}{(1-a)(1-b)}$ b. $\frac{1}{(1-a)(1-ab)}$ c. $\frac{1}{(1-b)(1-ab)}$ d. $\frac{1}{(1-a)(1-b)(1-ab)}$

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

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

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

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

Answer: C

Watch Video Solution

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

Watch Video Solution

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. $\dfrac{2pq}{a}$

B. 2apq

C. $2ap^2q^2$

D. none of these

Answer: B

Watch Video Solution

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

A. 1

B. 2

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

D. 3

Answer: B

Watch Video Solution

82. If one geometric mean G and two arithmetic means A_1 and A_2 are inserted between two given quantities, then

$(2A_1 - A_2)(2A_2 - A_1) =$

A. 2G

B. G

C. G^2

D. G^3

Answer: C

Watch Video Solution

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

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

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

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

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

Answer: C

Watch Video Solution

84. Let two numbers have A.M.=9 and G.M. =4 Then these numbers are the roots of the quadratic 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

Watch Video Solution

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

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

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

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

D. $2:\sqrt{3}$

Answer: A

Watch Video Solution

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

A. 5th term

B. 6th term

C. 4th term

D. 6th term

Answer: A

Watch Video Solution

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

A. 6

B. 12

C. 5

D. 7

Answer: A

Watch Video Solution

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

A. 22

B. 23

C. 24

D. 25

Answer: D

Watch Video Solution

89. Let a,b,c be in A.P. and $|a| < 1, |b| < 1|c| < 1.$ if $x = 1 + a + a^2 + \dots$ to $\infty, y = 1 + b + b^2$, then x,y,z are in

A. AP

B. GP

C. HP

D. none of these

Answer: C

Watch Video Solution

90. If $x > 1, y > 1, z > 1$ are in G.P. then $\frac{1}{a + Inx}, \frac{1}{1 + Iny}, \frac{1}{1 + Inz}$ are in (A) A.P. (B) H.P. (C) G.P. (D) none of these

A. AP

B. HP

C. GP

D. none of these

Answer: B

Watch Video Solution

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

Watch Video Solution

92. Let the positive numebrs a,b,c,d be in A.P. Then abc, abd, acd, bcd are

A. not in A.P./G.P./H.P.

B. in A.P.

C. in G.P.

D. in H.P.

Answer: D

Watch Video Solution

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

Watch Video Solution

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

A. $n(a_1 - a_n)$

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

C. na_1a_n

D. $(n-1)a_1a_n$

Answer: D

Watch Video Solution

95. If $x^2+9y^2+25z^2=xyz\left(\frac{15}{x}+\frac{5}{y}+\frac{3}{z}\right)$ then x,y,z in

A. A.P.

B. G.P.

C. A.G.P.

D. H.P.

Answer: D

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

98. If a, b, c are in H.P. , then $\frac{b+a}{b-a} + \frac{b+c}{b-c}$ =

A. 0

B. 1

C. 2

D. 3

Answer: C

Watch Video Solution

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 $a_nx^2 - b_nx \mid c_n = 0$ are

A. $a_n^2 = b_nc_n$

B. $b_n^2 = c_na_n$

C. $c_n^2 = a_nb_n$

D. none of these

Answer: B

Watch Video Solution

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

Watch Video Solution

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. $G_1 < G_3 < G_5 = \ldots$ and $G_2 > G_4 > G_6 > \ldots$

Answer: C

Watch Video Solution

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

View Text Solution

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

View Text Solution

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

Answer: A

Watch Video Solution

105. Find the value of :: $2^{\frac{1}{4}}.4^{\frac{1}{8}}, 8^{\frac{1}{16}}. 16^{\frac{1}{32}}........\infty$.

A. 1

B. 2

C. $3/2$

D. $5/2$

Answer: B

Watch Video Solution

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

A. 9

B. 5

C. 1

D. none of these

Answer: A

Watch Video Solution

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

(1) 2 (2) 3 (3) 4 (4) 6

A. 2

B. 3

C. 4

D. 6

Answer: B

Watch Video Solution

108. find sum of $1 + 3x + 6x^2 + 10x^3 + 15x^4 + - - - - - - - \infty$ where $|x| < 1, x \neq 0$

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

Watch Video Solution

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

A. 142

B. 192

C. 71

D. 96

Answer: D

Watch Video Solution

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

Watch Video Solution

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

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

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

C. $-n(n+1)$

D. none of these

Answer: A

Watch Video Solution

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

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

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

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

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

Answer: A

Watch Video Solution

113. The coefficient of x^{99} in $(x-1)(x-2)\ldots.(x-100)$ is

A. 5050

B. 5000

C. -5050

D. -5000

Answer: C

Watch Video Solution

114. If $f:R \rightarrow R$ satisfies f(x+y)=f(x)+f(y) for all x,y $\in$ R and f(1)=7, then $\sum_{r=1}^{n} f(r)$, is

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

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

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

D. 7n(n+1)

Answer: A

Watch Video Solution

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

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

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

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

D. none of these

Answer: A

Watch Video Solution

116. Find the 50th term of the series $2 + 3 + 6 + 11 + 18 + \ldots .$

A. $49^2 - 1$

B. 49^2

C. $50^2 + 1$

D. $49^2 + 2$

Answer: D

Watch Video Solution

117. The value of $\sum_{i=1}^{n} \sum_{j=1}^{i} \sum_{k=1}^{j} 1$ is

A. $\sum n$

B. $\sum n^2$

C. $\sum n^3$

D. none of these

Answer: D

Watch Video Solution

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

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

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

Watch Video Solution

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

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

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

Watch Video Solution

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

A. 102

B. 101

C. 100

D. 99

Answer: B

Watch Video Solution

121. The sum of the series $\frac{1}{1.2} - \frac{1}{2.3} + \frac{1}{3.4} - \frac{1}{4.5} + \dots$ is

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

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

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

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

Answer: B

Watch Video Solution

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

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

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

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

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

Answer: C

Watch Video Solution

123. If $t_n=\frac{1}{4}(n+2)(n+3)$ for $n=1,2,3,\ldots.$ then $\frac{1}{t_1}+\frac{1}{t_2}+\frac{1}{t_3}+\ldots.+\frac{1}{t_{2003}}=$

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

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

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

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

Answer: D

Watch Video Solution

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

A. 0

B. 2

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

D. 1

Answer: D

Watch Video Solution

Section I - Solved Mcqs

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

A. $\log_2 5$

B. $1 - \log_2 5$

C. $\log_5 2$

D. none of these

Answer: B

Watch Video Solution

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

A. $\log_4 3$

B. $\log_3 4$

C. $1 - \log_3 4$

D. $\log_3 0.25$

Answer: C

Watch Video Solution

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

Watch Video Solution

4. If $\tan^{-1}x, \tan^{-1}y$ and $\tan^{-1}z$ are in A.P. then find the algebraic relation between x,y and z. If x, y, z are also in A.P. then show that $x = y = z$ and $y \neq 0$

A. x=y=z

B. xy=yz

C. $x^2 = yz$

D. $z^2 = xy$

Answer: A

Watch Video Solution

5. If $\tan^{-1}x, \tan^{-1}y$ and $\tan^{-1}z$ are in A.P. then find the algebraic relation between x,y and z. If x, y, z are also in A.P. then show that $x = y = z$ and $y \neq 0$

A. $x = y = z \text{ or } y \neq 1$

B. $x = 1/z$

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

D. x=y=z=0

Answer: C

Watch Video Solution

6. If $\begin{vmatrix} a & b & a\alpha - b \\ b & c & b\alpha - c \\ 2 & 1 & 0 \end{vmatrix} = 0 \text{ and } \alpha \neq 1/2$, then a,b,c are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

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

A. G.P.

B. A.P.

C. H.P.

D. none of these

Answer: A

Watch Video Solution

8. If the expression exp $\{1+|\cos x|+\cos^2 x+\left|\cos^3 x\right|+\ldots.\infty)\log_e 4\}$ 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

Watch Video Solution

9. If the sides of a triangle are in G.P., and its largest angle is twice the smallest, then the common ratio r satisfies the inequality `0

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

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

C. $1 < r < 2$

D. none of these

Answer: B

Watch Video Solution

10. The first, second and middle terms of an AP are a, b, c respectively. Their sum is

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

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

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

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

Answer: B

Watch Video Solution

11. If the sides of a 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. $\sqrt{\dfrac{\sqrt{5}-1}{2}}, \sqrt{\dfrac{\sqrt{5}+1}{2}}$

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

Answer: A

Watch Video Solution

12. If the lengths of the sides of a triangle are in AP 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

Watch Video Solution

13. If b-c, 2b-x and b-a are in H.P., then a-(x/2), b-(x/2) and c-(x/2) are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

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

Watch Video Solution

15. If $ax^3 + bx^2 + cx + d$ is divisible by $ax^2 + c$, then a, b, c, d are in (a) AP (b) GP (c) HP

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

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

A. $-nd$

B. a+2nd

C. a+nd

D. 2nd

Answer: C

Watch Video Solution

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

A. n^2

B. n(n+1)

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

D. none of these

Answer: A

Watch Video Solution

18. The sum to n terms of the series $\frac{3}{1^2} + \frac{5}{1^2 + 2^2} + \frac{7}{1^2 + 2^2 + 3^2} \pm - - - - - -$ is

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

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

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

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

Answer: A

Watch Video Solution

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

Watch Video Solution

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

A. $\pm\sqrt{2}$

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

C. ± 2

D. none of these

Answer: A

Watch Video Solution

21. Let $a_1, a_2, \ldots, a_{10}$ be in A.P. and $h_1, h_2, \ldots, h_{10}$ 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

Watch Video Solution

22. Let $S_1, S_2,$ be squares such that for each $n \geq 1,$ the length of a side of S_n equals the length of a diagonal of $S_{n+1}.$ If the length of a side of $S_1 is 10 cm,$ then for which of the following value of n is the area of S_n less than 1 sq. cm? a. 5 b. 7 c. 9 d. 10

A. 7

B. 8

C. 5

D. 6

Answer: B

Watch Video Solution

23. Suppose a,b,c are in A.P and a^2, b^2, c^2 are in G.P. 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

Watch Video Solution

24. Let $S_k = \lim_{n \to \infty} \sum_{i=0}^{n} \frac{1}{(k+1)^i}$. Then $\sum_{k=1}^{n} kS_k$ equals

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

Watch Video Solution

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

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., then $\frac{S_{3n} - S_{n-1}}{S_{2n} - S_{n-1}}$ is equal to

A. 2n-1

B. 2n+1

C. 4n+1

D. 2n+3

Answer: B

Watch Video Solution

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

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

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

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

D. none of these

Answer: D

Watch Video Solution

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

Watch Video Solution

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 the series 1+ 2 + 4 + 8..... to 100 terms and 1 + 4 + 7 + 10 +... to 100 terms is

A. 6

B. 4

C. 5

D. none of these

Answer: C

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 $\frac{n(n+1)}{2} \times \frac{a_2 - a_1}{a_{n+1}}$ 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 $a, a_1, a_2, a_3, \ldots\ldots\ldots, a_{2n}, b$ are in $A.P.$ and $a, g_1, g_2, \ldots\ldots\ldots\ldots g_{2n}, b$ are in $G.P.$ and h is $H.M.$ of a, b then $\dfrac{a_1 + a_{2n}}{g_1 \cdot g_{2n}} + \dfrac{a_2 + a_{2n-1}}{g_2 \cdot g_{2n-1}} + \ldots\ldots\ldots\ldots + \dfrac{a_n + a_{n+1}}{g_n \cdot g_{n+1}}$ is equal

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

B. 2nh

C. nh

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

Answer: A

Watch Video Solution

35. If $\frac{a_2a_3}{a_1a_4} = \frac{a_2 + a_3}{a_1 + a_4} = 3\left(\frac{a_2 - a_3}{a_1 - a_4}\right)$, 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 $\frac{a_1 + a_2}{\sqrt{a_1} + \sqrt{a_2}} + \frac{a_2 + a_{2n-1}}{\sqrt{a_2} + \sqrt{a_3}} + ... + \frac{a_n + a_{n+1}}{\sqrt{a_n} + \sqrt{a_{n+1}}} =$

A. n-1

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

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

D. none of these

Answer: B

Watch Video Solution

38. If $a_1, a_2, a_3, \ldots, a_n$ are in H.P. and

$f(k) = \sum_{r=1}^{n} (a_r - a_k)$, then $\frac{a_1}{f(1)}, \frac{a_2}{f(2)}, \ldots, \frac{a_n}{f(n)}$, 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

Watch Video Solution

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

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

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

C. $n\cdot 2^n$

D. none of these

Answer: A

Watch Video Solution

Watch Video Solution

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 sequences $1, 11, 21, 31, \rightarrow 100$ terms and $31, 36, 41, 46, \rightarrow 100$ terms is 381 b. 471 c. 281 d. none of these

A. 381

B. 471

C. 281

D. none of these

Answer: D

Watch Video Solution

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

Watch Video Solution

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 mean respectively for the first n terms of the G P, A. H 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. $|y| = 3z \text{ and } x = 3|y|$

B. $y = 3|z| \text{ and } |x| = 3y$

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

Watch Video Solution

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 $1025^t h$ term is

A. 2^9

B. 2^{10}

C. 2^{11}

D. 2^8

Answer: B

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

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

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

Watch Video Solution

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

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

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

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

D. e=0

Answer: A

Watch Video Solution

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

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

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 $a_1, a_2, a_3, \ldots, a_n$ be real numbers such that $|a_i| = |a_{i-1} + 1|$ for all i then the A.M. of the numbers $a_1, a_2, a_3, \ldots, a_n$ has the value A where

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

B. $A < -1$

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

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

Answer: C

Watch Video Solution

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

Watch Video Solution

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

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

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

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

D. none of these

Answer: B

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

D. none of these

Answer: C

Watch Video Solution

64. Let V_r denote the sum of the first' ' terms of an arithmetic progression (A.P.) 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 $r = 1, 2, \ldots\ldots.$ The sum $V_1 + V_2 + \ldots\ldots + V_n$ is

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

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

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

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

Answer: B

Watch Video Solution

65. Let V_r denote the sum of the first r terms of an arithmetic progression (AP) 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=1,2T_r` is always (A) an odd number (B) an even number (C) a prime number (D) a composite num,ber

A. an odd number

B. an even number

C. a prime number

D. a composite number

Answer: D

Watch Video Solution

66. Let V_r denote the sum of the first r terms of an arithmetic progression (AP) 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=1,2T_r` is always (A) an odd number (B) an even number (C) a prime number (D) a composite num,ber

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

Watch Video Solution

67. If $a_n = \frac{3}{4} - \left(\frac{3}{4}\right)^2 + \left(\frac{3}{4}\right)^3 + \ldots(- 1)^{n-1}\left(\frac{3}{4}\right)^n$ and $b_n = 1 - a_n$, then find the minimum natural number n, such that $b_n > a_n$

A. 5

B. 6

C. 7

D. none of these

Answer: B

Watch Video Solution

68. if

$(1 + 3 + 5 + 7 + \ldots . (2p - 1)) + (1 + 3 + 5 + \ldots + (2q - 1)) = 1 + 3 + 5$

then least possible value of $p + q + r$(Given $p > 5$) is:

A. 12

B. 21

C. 45

D. 54

Answer: B

Watch Video Solution

69. Let $S_k, k = 1, 2, \ldots, 100$, denote the sum of the infinite geometric series whose first term is $\frac{k-1}{k!}$ and the common ratio $\frac{1}{k}$. Then the value of $\frac{100^2}{100!} + \sum_{k=1}^{100} \left|\left(k^2 - 3k + 1\right) S_k\right|$, is

A. 3

B. 6

C. 8

D. 9

Answer: A

Watch Video Solution

70. Le $a_1, a_2, a_3, , a_{11}$ be real numbers satisfying $a_2 = 15, 27 - 2a_2 > 0 and a_k = 2a_{k-1} - a_{k-2}$ for $k = 3, 4, , 11.$ If

$\frac{a12 + a22 + ... + a112}{11} = 90,$ then the value of $\frac{a1 + a2 + \quad + a11}{11}$ is equals to ______.

A. 1

B. 1

C. 2

D. 9

Answer: A

Watch Video Solution

71. Let $a_1, a_2, a_3, \ldots, a_{100}$ be an arithmetic progression with $a_1 = 3$ and $S_p = \sum_{i=1}^{p} a_i, a \leq p \leq 100.$ For any integer n with $1 \leq n \leq 20$, let $m = 5n.$ 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

Watch Video Solution

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

Watch Video Solution

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

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

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

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

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

Answer: C

Watch Video Solution

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

A. 1056 and 1332

B. 1056 and 1088

C. 1120 and 1332

D. 1332 and 1432

Answer: A

Watch Video Solution

75. If $(10)^9 + 2(11)^1(10)^8 + 3(11)^2(10)^7 + \ldots\ldots\ldots. + 10(11)^9 = k(10)^9$,

then k is equal to :

A. 100

B. 110

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

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

Answer: A

Watch Video Solution

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

A. 2

B. -1

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

D. 1

Answer: B

Watch Video Solution

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

Watch Video Solution

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

A. $4lmn^2$

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

C. $4l^2mn$

D. $4lm^2n$

Answer: D

Watch Video Solution

79. Let $b_1 > 1$ for $i = 1, 2, \ldots\ldots, 101$. Suppose $\log_e b_1, \log_e b_{10}$ are in Arithmetic progression $(A.P.)$ with the common difference $\log_e 2$. suppose $a_1, a_2 \ldots\ldots\ldots a_{101}$ are in A.P. such $a_1 = b_1$ and $a_{51} = b_{51}$. If $t = b_1 + b_2 + \ldots\ldots + b_{51}$ and $s = a_1 + a_2 + \ldots\ldots + a_{51}$ 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

Watch Video Solution

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

A. 330

B. 165

C. 190

D. 225

Answer: A

Watch Video Solution

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 $a_1 + a_6 + a_{11} = 98$

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

Watch Video Solution

2. Suppose four distinct positive numbers a_1, a_2, a_3, a_4 are in G.P. Let $b_1 = a_1 + , a_b = b_1 + a_2, b_3 = b_2 + a_3 \text{ and } b_4 = b_3 + a_4.$

Statement -1 : The numbers b_1, b_2, b_3, b_4 are neither in A.P. nor in G.P.

Statement -2: The numbers b_1, b_2, b_3, b_4 are in H.P.

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

Watch Video Solution

3. Stament -1: If for any real x, $2^{1+x} + 2^{1-x}$, λ 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 $a_k + a_{n-k+1} = a_1 + a_n \quad \text{for} \quad k = 1, 2, 3, \ldots,$ 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

Watch Video Solution

5. Statement -1: If a,b,c are distinct real numbers in H.P, then $a^n + c^n > 2b^n$ for all $n \in N$.

Statement -2: $AM > GM > HM$

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

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

Watch Video Solution

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

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

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

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

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

Watch Video Solution

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

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

Watch Video Solution

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

Watch Video Solution

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

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

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

Watch Video Solution

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

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 : $\frac{1}{a_1a_n}+\frac{1}{a_2a_{n-1}}+\frac{1}{a_3a_{n-1}}+\ldots.+\frac{1}{a_na_1}$
$=\frac{2}{a_1+a_n}\left(\frac{1}{a_1}+\frac{1}{a_2}+\ldots.+\frac{1}{a_n}\right)$

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

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

Watch Video Solution

Exercise

1. If $p^{th}, \ q^{th} and \ r^{th}$ terms of a 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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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 $\frac{3+5+7+\ldots.+\text{n terms}}{5+8+11+\ldots.+10\text{ terms}}=7$, then the value of n, is

A. 35

B. 36

C. 37

D. 40

Answer: A

Watch Video Solution

8. If x,1,z are in A.P. and x,2,z are in G.P., then x,4,z are in

A. AP

B. G.P

C. H.P.

D. none of these

Answer: C

Watch Video Solution

9. Sum of three numbers in G.P. be 14. If one is added to first and second 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. 8

Answer: A

Watch Video Solution

10. If first and $(2n-1)^t h$ terms of an AP, GP. and HP. are equal and their nth terms are a, b, c respectively, then (a) a=b=c (b)a+c=b (c) a>b>c and $ac-b^2=0$ (d) none of these

A. a=b=c

B. a+c=b

C. $a > b > c$ and $ac - b^2 = 0$

D. none of these

Answer: C

Watch Video Solution

11. The sum of first two terms of an infinite G.P. is 1 and every terms is twice the sum of the successive terms. Its first terms 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 $a^x = b^x = c^z = d^u$, then x, y, z, u are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

Watch Video Solution

15. If a,b,c are in H.P., then $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ will be in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

Watch Video Solution

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

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

A. xyz

B. 0

C. 1

D. -1

Answer: C

Watch Video Solution

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

Watch Video Solution

19. a, b, c are positive real numbers forming a G.P. ILf $ax62 + 2bx + c = 0anddx^2 + 2ex + f = 0$ 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

Watch Video Solution

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

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

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

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

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

Answer: B

Watch Video Solution

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

Watch Video Solution

22. The sum of the 10 terms of the series $\left(x+\frac{1}{x}\right)^2+\left(x^2+\frac{1}{x^2}\right)^2+\left(x^3+\frac{1}{x^3}\right)^2+\dots$ is

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

Watch Video Solution

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

Watch Video Solution

25. If p^{th}, q^{th} and r^{th} terms of an A.P. are in G.P., then the common ratio of G.P. is-

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.

A. A.P.

B. H.P.

C. G.P.

D. none of these

Answer: C

Watch Video Solution

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

Watch Video Solution

28. If x,y,z are positive distinct integers, then (x+y) (y+z) (z+x), is

A. $=8xyz$

B. $>8xyz$

C. $<8xyz$

D. $> 6xyz$

Answer: B

Watch Video Solution

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

Watch Video Solution

30. If a, b, c are in $A. P$ and a, b, d are in $G. P,$ prove that $a, a-b, d-c$ are in $G. P.$

A. $1:2:3$

B. $1:3:5$

C. $2:3:4$

D. $1:2:4$

Answer: A

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

33. 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. 9 or 16

B. 9

C. 16

D. 13

Answer: B

Watch Video Solution

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

A. a=b=c

B. $a \geq b \geq c$

C. a+c=b

D. a+c=2b

Answer: B

Watch Video Solution

36. The sum to infinity of the series

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

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

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

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

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

Answer: C

Watch Video Solution

37. Sum of all two digit numbers which when divided by 4 yield unity as remainder is.

A. 1012

B. 1201

C. 1212

D. 1210

Answer: D

Watch Video Solution

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

Watch Video Solution

39. The sum of the series

$(1+2)+(1+2+2^2)+(1+2+2^2+2^3)+\ldots$ up to n terms, is

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

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

44. The sum of n terms of the following series $1 + (1 + x) + (1 + x + x^2) + ...$ 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

Watch Video Solution

45. For a sequence, if $a_1 = 2$ and $\frac{a_{n+1}}{a_n} = \frac{1}{3}$. Then, $\sum_{r=1}^{20} a_r$ is

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

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

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

D. none of these

Answer: B

Watch Video Solution

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

Watch Video Solution

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

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

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

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

D. none of these

Answer: B

Watch Video Solution

48. The coefficient 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

Watch Video Solution

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

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

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

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

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

Answer: C

Watch Video Solution

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

A. 0

B. n

C. 2n

D. 1

Answer: C

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

54. Let a and b be roots of $x^2-3x+p=0$ and let c and d be the roots of $x^2-12x+q=0$ where a, b, c, d form an increasing G.P. Then the ratio of $(q+p):(q-p)$ is equal to

A. $8:7$

B. $11:10$

C. $17:15$

D. none of these

Answer: C

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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. .If a, b, c are in $H.P.$ then the value of $\frac{b+a}{b-a}+\frac{b+c}{b-c}$

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, are in A.P., b,c,d are in G.P. and c,d,e, are in H.P., then a,c,e are in

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. The sum of n terms of an A. P. is $an(n-1)$. Find the sum of the squares of these terms.

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 $S_n=\frac{1}{1^3}+\frac{1+2}{1^3+2^3}+\ldots+\frac{1+2+3+\ldots+n}{1^3+2^3+3^3+\ldots+n^3}$ 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,c are in A.P., a,x,b are in G.P. and b,y,c are in G.P. then a^2, b^2, y^2 are in

A. H.P.

B. G.P.

C. A.P.

D. none of these

Answer: C

Watch Video Solution

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

A. H.P.

B. G.P.

C. A.P.

D. none of these

Answer: A

Watch Video Solution

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

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

then the value of $\frac{p}{\xi}s\ \frac{1}{3}$ 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. $x^{1/2}. x^{1/4}. x^{1/16}....$ to ∞ is equal to

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, $a_1 a_2 a_3 \ldots \ldots a_n$ is equal to

A. x-y

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

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

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

Answer: C

Watch Video Solution

82. The sum of squares of three distinct real numbers which form an increasing GP is S^2 (common ratio is r). If sum of numbers is αS, then if $r = 3$ then α^2 cannot lie in

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

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

C. $1 < \alpha \leq 3$

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

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

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

Answer: B

Watch Video Solution

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

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

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

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

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

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., G.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, c are in G.P and $a+x, b+x, c+x$ are in H.P, then the value of x is $(a, b, c$ 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 $9^{1/3} \times 9^{1/9} \times 9^{1/27} \times \ldots\infty = .$

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 2 digited 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

Watch Video Solution

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

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

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

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

D. none of these

Answer: A

Watch Video Solution

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

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 $a_1a_4a_5$, 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 $\frac{x+y}{1-xy}, y, \frac{y+z}{1-yz}$ be in A.P., " then " $x, \frac{1}{y}, z$ 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,d,e be 5 numbers such that a,b,c are in A.P; b,c,d are in GP & c,d,e are in HP then prove that a,c,e are 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

Watch Video Solution

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:

$(x+y)+\left(x^2+xy+y^2\right)+(x+y)+\left(x^3+x^2y+xy^2+y^3\right)+$

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

Watch Video Solution

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

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

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. $\frac{a}{1-a} + \frac{ab}{1-ab}$

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

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

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

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

Watch Video Solution

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, for $0 < x < \pi/2$,

$y = \exp\left[\left(\sin^2 x + \sin^4 x + \sin^6 + \dots \infty\right)\log_e 2\right]$

is a zero the quadratic equation $x^2 - 9x + 8 = 0$, then the value of $\frac{\sin x + \cos x}{\sin x - \cos x}$, is

A. 0

B. $2 + \sqrt{3}$

C. $2 - \sqrt{3}$

D. none of these

Answer: B

Watch Video Solution

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

A. 4

B. log 4

C. log 2

D. none of these

Answer: A

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 $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} \dots \infty = \frac{\pi^2}{6}$ then $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} \dots =$

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 $\left[(0.16)^{\log_{0.25}\left(\frac{1}{3}+\frac{1}{3^2}+\frac{1}{3^3}+\ldots\ldots\ldots\ldots\ldots\ldots..+\infty\right)}\right]^{\frac{1}{2}}$ is

A. 2

B. 3

C. 4

D. 1

Answer: C

Watch Video Solution

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

Watch Video Solution

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 $a_1, a_2, a_3, \ldots, a_n$ are in A.P. and $a_i > 0$ for each i=1,2,3, ...,n, then

$$\sum_{r=1}^{n-1} \frac{1}{a_{r+1}^{2/3} + a_{r+1}^{2/3} a_r^{1/3} + a_r^{1/3}}$$ is equal to

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,b,c are in (A) AP (B) GP (C) HP (D) NONE

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 $\dfrac{(ac+ab-bc)(ab+bc-ac)}{(abc)^2}$ 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. $5, \frac{1}{5}$

B. {-1,1}

C. {0,1}

D. none of these

Answer: B

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

Watch Video Solution

125. The coefficient of x^{49} in the product $(x-1)(x-3)(x+99) is -99^2$

b. 1 c. -2500 d. none of these

A. -99^2

B. 1

C. -2500

D. none of these

Answer: C

Watch Video Solution

126. The coefficient of x^{15} in the product of

$(1-x)(1-2x)\left(1-2^2x\right)\left(1-2^3x\right)\left(1-2^4x\right)\ldots\ldots\left(1-2^{15}x\right)$

A. $2^{105}-2^{121}$

B. $2^{121}-2^{105}$

C. $2^{120}-2^{104}$

D. none of these

Answer: A

Watch Video Solution

127. If $S_n=\sum_{r=1}^{n}t_r=\frac{1}{6}n(2n^2+9n+13)$, then $\sum_{r=1}^{n}\sqrt{t_r}$ 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

Watch Video Solution

128. If $\sum_{r=1}^{n} a_r = \frac{1}{6}n(n+1)(m+2)$ 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

Watch Video Solution

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. $\dfrac{n^3+6n^2+11n}{18(n+1)(n+2)(n+3)}$

Answer: D

Watch Video Solution

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. $\frac{4}{3}H_n-\frac{2}{3}$

Answer: D

Watch Video Solution

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

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

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

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

D. $2^{n}-1$

Answer: C

Watch Video Solution

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. $\dfrac{G_1G_2}{A_1A_2}$

Answer: B

Watch Video Solution

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

A. $n/2$

B. $-n/2$

C. $n/3$

D. $-n/3$

Answer: B

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

12. The sides of a right angled triangle arein $A.P.$, then they are in the ratio

A. $2:3:4$

B. $3:4:5$

C. $4:5:6$

D. none of these

Answer: B

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

16. If $p, q, r, s \in N$ and the are four consecutive terms of an A.P., then p^{th}, q^{th}, r^{th} and s^{th} terms of a G.P. are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

Watch Video Solution

17. If x,y,z be three positive prime numbers. The progression in which $\sqrt{x}, \sqrt{y}, \sqrt{z}$ can be three terms (not necessarily consecutive) is

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: D

Watch Video Solution

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

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

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

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

D. none of these

Answer: B

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

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

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

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

D. none of these

Answer: A

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

A. $\log_3 4$

B. $1 - \log_4 3$

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 $< a_n >$ 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

Watch Video Solution

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

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

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

D. $n-1$

Answer: D

Watch Video Solution

34. यदि= a तथा b दो अलग-अलग प्राकृत संख्याएं है तो इनमें कौन सा कथन सत्य है?

A. $2\sqrt{ab} > a+b$

B. $2\sqrt{ab} < a+b$

C. $2\sqrt{ab} = a+b$

D. none of these

Answer: B

Watch Video Solution

35. Natural numbers are divided into groups in the following way: $1, (2, 3), (4, 5, 6), (7, 8, 9, 10),$ Show that the sum of the numbers in the nth group is $\left(n\frac{n^2+1}{2}\right.$

A. 62525

B. 65255

C. 56255

D. 55625

Answer: A

Watch Video Solution

36. 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

Watch Video Solution

37. If $1+\dfrac{1+2}{2}+\dfrac{1+2+3}{3}+\ldots.$ to n terms is S. Then , S is equal to

A. $\dfrac{n(n+3)}{4}$

B. $\dfrac{n(n+2)}{4}$

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

D. n^2

Answer: A

Watch Video Solution

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

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

B. $243(\sqrt{3}+1)$

C. $\frac{121}{\sqrt{3}-1}$

D. $242(\sqrt{3}-1)$

Answer: B

Watch Video Solution

39. In a GP if the $(m+n)th$ term is p and $(m-n)th$ term is q then mth term is

A. 0

B. pq

C. $\sqrt{pq}$

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

Answer: C

Watch Video Solution

40. 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

41. 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

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

A. $1:1$

B. $2:1$

C. $3:1$

D. $4 : 1$

Answer: A

Watch Video Solution

43. Sum of the series $1 + 2.2 + 3.2^2 + 4.2^3 + \dots. + 100.2^{99}$ is

A. 99×2^{100}

B. $99 \times 2^{100} + 1$

C. 100×2^{100}

D. none of these

Answer: B

Watch Video Solution

44. 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

45. 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

Watch Video Solution

46. The $7th$ term of an $H.P.$ is $\frac{1}{10}$ and $12th$ term is $\frac{1}{25}$ Find the $20th$ term

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

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

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

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

Answer: D

Watch Video Solution

47. 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

Watch Video Solution

48. The harmonic mean of the roots of the equation $(5+\sqrt{2})x^2-(4+\sqrt{5})x+8+2\sqrt{5}=0$ is 2 b. 4 c. 6 d. 8

A. 2

B. 4

C. 6

D. 8

Answer: D

Watch Video Solution

49. 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

Watch Video Solution

50. In an $A.P.$, the p^{th} term is $\frac{1}{p}$ 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

Watch Video Solution

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

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

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

Watch Video Solution

52. If three positive unequal numbers 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

Watch Video Solution

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

A. 5

B. 3

C. 4

D. 10

Answer: A

Watch Video Solution

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

A. 510

B. 512

C. 513

D. 508

Answer: C

Watch Video Solution

55. If

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

equals 2005 b. 2004 c. 2003 d. 2001

A. 2005

B. 2004

C. 2003

D. 2001

Answer: A

Watch Video Solution

56. The sum to n terms of the series

$\left(n^2-1^2\right)+2\left(n^2-2^2\right)+3\left(n^2-3^2\right)+\ldots.$, is

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

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

C. 0

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

Answer: A

Watch Video Solution

57. The sum of the series $a-(a+d)+(a+2d)-(a+3d)+$ up to $(2n+1)$ terms is

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

Watch Video Solution

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

A. $H_n + n$

B. $2n - H_n$

C. $(n-1) + H_n$

D. $H_n + 2n$

Answer: B

Watch Video Solution

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

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

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

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

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

Answer: A

Watch Video Solution

60. 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

Watch Video Solution