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Transweb Educational Services Pvt Ltd
B -147, Sector -6 Noida, UP - 201301,
www.askiitians.com
Email: info@askiitians.com
Tel: 1800-2000-838

Class: 11
Subject: Math's
Topic: Sequence and Series
No. of Questions: 25

1. If $x > 0$, and $\log_2 x + \log_2 (\sqrt{x}) + \log_2 (\sqrt[4]{x}) + \log_2 (\sqrt[8]{x}) + \log_2 (\sqrt[16]{x}) + \ldots = 4$ then x equals

A. 2
B. 3
C. 4
D. 5

2. If $(1 + 3 + 5 + ... + p) + (1 + 3 + 5 + \ldots + q) = (1 + 3 + 5 + \ldots + r)$ where each set of parentheses contains the sum of consecutive odd integers as shown, the smallest possible value of $p + q + r$, (where $p > 6$) is

A. 12
B. 21
C. 45
D. 54

3. 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

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

5. 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 the smallest value of n for which
Area (S_n) < 1 is

A. 7
B. 8
C. 9
D. 10

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

A. $\frac{1}{mn}$
B. $\frac{1}{m} + \frac{1}{n}$
C. 1
D. 0

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7. Consider an infinite geometric series with the first term a and common ratio r. If its sum is 4 and the second term is 3/4, then

A. a = 4/7, r = 3/7
B. a = 2, r = 3/8
C. a = 3/2, r = 1/2
D. a = 3, r = ¼

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

A. 10
B. 12
C. 11
D. 13

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

A. a (100) < 100
B. a (100) > 100
C. a (200) < 100
D. none of these

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

A. A.P.
B. G.P.
C. H.P.
D. None of these

11. Let x be the arithmetic mean and y, z be the two geometric means between any two positive numbers. Then value of $\frac{y^3 + z^3}{xyz}$ is

A. 2
B. 3
C. $\frac{1}{2}$
D. $\frac{3}{2}$

12. The sum to n terms of the series $\frac{1}{1^3} + \frac{1+2}{1^3+2^3} + \frac{1+2+3}{1^3+2^3+3^3} + \dots$ is

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

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

A. f(2n) – 16 f(n)
B. f(2n) – 7f(n)
C. f(2n – 1) – 8 f(n)
D. none of these

14. The sum of first n terms of the series $1^2 + 2 \times 2^2 + 3^2 + 2 \times 4^2 + 5^2 + 2 \times 6^2 + \dots$ is $n(n+1)^2/2$ when n is even. When n is odd, the sum of the series is

A. $n^2(3n+1)/4$
B. $n^2(n+1)/2$
C. $n^3(n-1)/2$
D. none of these

15. 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. $\frac{1}{2}n(n+1)$
B. $\frac{1}{2}n(n+2)$
C. $\frac{1}{2}n(n+3)$
D. $\frac{1}{2}n(n+5)$

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

A. $\frac{1}{3}(\sqrt{7+3n} - \sqrt{7})$
B. $\frac{\sqrt{4+3n}-2}{3}$
C. $\frac{1}{3}(\sqrt{10+3n} - \sqrt{10})$
D. None of these

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

A. 4/5
B. 21/16
C. 17/11
D. 19/31

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18. If exp {($\sin^2 x + \sin^4 x + \sin^6 x + \ldots$ upto ∞) ln 2} satisfies the equation $x^2 - 17x + 16 = 0$ then value of $\frac{2\cos x}{\sin x + 2\cos x} (0 < x < \pi/2)$ is

A. $\frac{1}{2}$
B. $\frac{3}{2}$
C. $\frac{5}{2}$
D. None of these

19. If three positive real numbers a, b, c are in A.P. such that abc = 4, then the minimum possible value of b is

A. $2^{3/2}$
B. $2^{2/3}$
C. $2^{1/3}$
D. $2^{5/2}$

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

A. 172 : 99
B. 172 : 101
C. 175 : 99
D. 175 : 101

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

22. If A.M. and G.M of two positive no. a and b are 10 and 8 respectively find the no.

23. Find the sum to n terms of the series 5+11+19+29+41+ -------

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24. Find the sum of integers from 1 to 100 that are divisible by 2or5

25. The sum of the first four terms of an A.P. is 56. The sum of the last four term is 112. If its first term is 11, then find the no. of terms.