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India's Number 1 Education App

MATHS

BOOKS - BITSAT GUIDE

SEQUENCES AND SERIES

Practice Exercise

1. The number of numbers lying between 100 and 500 which are divisible by 7 but not by 21 is

A. 57

B. 19

C. 38

D. 40

Answer: C

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2. Let S_n denotes the sum to terms of an A.P. whose first term is a . If the commom difference d

is given by $d = S_n - kS_{n-1} + S_{n-2}$, then k is

equal to

A. 3

B. 2

C. 5

D. 7

Answer: B

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3. The sum upto n terms of the sequence log a, log ar, log ar^2, ... Is

A. $\frac{n}{2}\log a^2 r^{n-1}$

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

C. $\frac{3n}{2}\log ar^{n-1}$

D. $\frac{5n}{2}\log a^2 r^{n-1}$

Answer: A

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4. If m times the mth term of an A.P. with non-zero common difference equals n times the nth term of the A.P., where $m \neq n$, then (m+n)th term of this A.P. is

A. mn

B. zero

C. 2mn

D. None

Answer: B

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5. 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_{m+n} equals

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

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

C. 1

D. None

Answer: C

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6. The first second, and middle terms of an AP are a, b, c respectively. Then , their sum is equal to

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

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

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

D. None of these

Answer: B

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

A. 21

B. 19

C. 20

D. 91

Answer: C

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

A. 10

B. 5

C. 12

D. None of these

Answer: C

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9. Let $a_1, a_2, a_3, \ldots$ Be in AP with common difference not multiple of 3. Then, the maximum number of consecutive terms so that all are prime number, is

A. 2

B. 3

C. 5

D. infinite

Answer: D

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10. If $\log_3 2, \log_3(2^x - 5)$ and $\log_3(2^x - 7/2)$ are in AP then x is equal to:

A. 2

B. 3

C. 4

D. 2, 3

Answer: D

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11. If the sum of n terms of an A.P. is given by $S_n = a + bn + cn^2, where a, b, c$ are independent of $n, then\ a = 0$ common difference of A.P. must be $2b$ common difference of A.P. must be $2c$ first term of A.P. is $b + c$

A. $a \neq 0$

B. $d \neq 3b$

C. d = 2c

D. first term of an AP is b-c

Answer: C

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12. A fanner buys a used tractor for Rs 12000. He pays Rs 6000 cash and agrees to pay the balance in annual instalments of Rs 500 plus 12% interest on the unpaid amount. How much will the tractor cost him?

A. Rs. 16680

B. Rs. 16670

C. Rs. 16681

D. Rs. 16682

Answer: A

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13. 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. $\sin 18^\circ$

B. $2\cos 18^\circ$

C. $\cos 18^\circ$

D. $2\sin 18^\circ$

Answer: D

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14. Let S be the sum, P be the product and R be the sum of the reciprocals of 3 terms of a G.P. then $P^2R^3 : S^3$ is equal to $1:1$ (b) $(commonratio)^n : 1$ $(Firserm)^2(commonratio)^2$ (d) None of these

A. $1:1$

B. $(\text{common ratio})^n : 1$

C. $(\text{first term})^2 : (\text{common ratio})^2$

D. None of the above

Answer: A

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15. The sum of three numbers in GP. Is 56. If we subtract 1, 7, 21 from these numbers in that order, we obtain an arithmetic progression. Find the numbers.

A. 8, 16, 32

B. 8, 16, 30

C. 16, 0, 30

D. 32, 16, 9

Answer: A

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16. Find the value of $\left(320(32)^{1/6}(32)^{1/36}\right)_{\infty}$.

A. 16

B. 64

C. 32

D. 0

Answer: B

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

A. 8

B. 9

C. 10

D. 11

Answer: D

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

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

B. $\frac{\beta}{\alpha}$

C. $\left(\frac{\alpha}{\beta}\right)^{1/2}$

D. $\left(\frac{\beta}{\alpha}\right)^{1/2}$

Answer: B

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19. Let S_1, S_2 , ... Be squares such that for each $n \geq 1$ the length of a side of S_n equals the lengths of a diagonal of S_{n+1} . If the length of a sides of S_1 is 10 cm, then for which of the following values of n is the area of S_n less than 1 square cm ?

A. 7

B. 8

C. 9

D. 10

Answer: B

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20. If one GM, g and two AM's, p and q are inserted between two numbers a and b, then (2p-q)(p-2q) is equal to

A. g^2

B. $-g^2$

C. 2g

D. $3g^2$

Answer: B

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21. If

$a, b, care \in G.P.$ and $x, ybetheAM'sbetweena, b$ and $b, crespectivelyth$

1/a+1/b=(x+y)/6(B)ax+cy=b(C)a/x+c/y=2(D)1/x+1/y=2/b`

A. $\frac{a}{x}+\frac{c}{y}=2$

B. $\frac{a}{x}+\frac{2c}{y}=\frac{c}{2a}$

C. $\frac{1}{x}+\frac{1}{y}=\frac{3}{b}$

D. $\frac{2}{x}+\frac{1}{2y}=\frac{3}{ac}$

Answer: A

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22. If x,yz are positive integers, then (x+y) (y+z) (z+x), is

A. $=8xyz$

B. $>8xyz$

C. $<8xyz$

D. $=4xyz$

Answer: B

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23. The minimum value of the expression $3^x + 3^{-1-x}$, $x \in R$ is $a\sqrt{b}$ then $a + b =$ (where a, b are in lowest form)

A. 0

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

C. 3

D. $2\sqrt{3}$

Answer: D

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24. 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

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25. If a,b, c are in G.P., then the equations $ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have common root if $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in

A. GP

B. AP

C. HP

D. None of these

Answer: B

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

A. $2/5$

B. $1/5$

C. $3/5$

D. None of these

Answer: B

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

A. $\pm\sqrt{2}$

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

C. ± 2

D. None of the above

Answer: A

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28. If AM, GM and HM of first and last terms of the series 25, 26, 27, ..., N - 1N are the terms of the series, then find the value of N.

A. 25

B. 225

C. 1225

D. None of the above

Answer: C

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1. If p, q, r and s are positive real numbers such that $p+q+r+s=2$, then $M=(p+q)(r+s)$ satisfies the relation, when (A) $0<M\leq 1$ (B) $1\leq M\leq 2$.(C) $2\leq M\leq 3$ (D) $3\leq M\leq 4$

A. $0<M\leq 1$

B. $1\leq M\leq 2$

C. $2\leq M\leq 3$

D. $3\leq M\leq 4$

Answer: A

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

A. $100.2^{100}+1$

B. $99.2^{100}+1$

C. $99.2^{99}-1$

D. $100.2^{100}-1$

Answer: B

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3. Find the sum to n terms of the series $5+55+555+\ldots$

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

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

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

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

Answer: B

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4. If a, b c are in GP and $a^{\frac{1}{x}} = b^{\frac{1}{y}} = c^{\frac{1}{z}}$, then x, y, z are in

A. AP

B. GP

C. HP

D. None of these

Answer: A

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

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

(b)$1 - 2^{-n}$

(c)$2^{-n} + n - 1$

(d)$2^n - 1$

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

B. 1

C. n-1

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

Answer: A

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6. The sum of $0.2 + 0.22 + 0.222 + \ldots$ to n terms is equal to

A. $\left(\frac{2}{9}\right) - \left(\frac{2}{81}\right)(1 - 10^{-n})$

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

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

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

Answer: C

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7. If AM and HM between two numbers are 27 and 12 respectively, then their GM is

A. 9

B. 18

C. 24

D. 36

Answer: B

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8. The value of $\frac{2}{1!}+\frac{2+4}{2!}+\frac{2+4+6}{3!}+$ ... is

A. e

B. 2e

C. 3e

D. None of these

Answer: C

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9. IF $a_1, a_2, a_3, ...a_{10}$ be in AP and $h_1, h_2, h_3, ...h_{10}$ be in HP. If $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$, then find value of $a_4 h_7$.

A. 2

B. 3

C. 5

D. 6

Answer: D

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10. Let n is a rational number and x is a real number such that |x|lt1, then

$$(1+x)^n = 1 + nx + \frac{n(n-1)x^2}{2!} + \frac{n(n-1)(n-2)}{3!}.\, x^3 + \ldots$$

This can be used to find the sum of different series.

Q. Sum of infinite series

$$1 + \frac{2}{3}\cdot\frac{1}{2} + \frac{2}{3}\cdot\frac{5}{8}\cdot\frac{1}{2^2} + \frac{2}{3}\cdot\frac{5}{6}\cdot\frac{8}{9}\cdot\frac{1}{2^3} + \ldots\infty \text{ is}$$

A. $2^{1/3}$

B. $4^{1/3}$

C. $8^{1/3}$

D. $2^{1/5}$

Answer: B

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11. The HM of two numbers is 4. If their arithmetic mean A and geometric mean G satisfy the relation $2A + G^2 = 27$, then the numbers are

A. 2, 6

B. 3, 6

C. 1, 3

D. 1, 2

Answer: B

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12. For any integer $n \geq 1$, the sum $\sum_{k=1}^{n} k(k+2)$ is equal to

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

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

C. $\frac{n(n+1)(2n+7)}{6}$

D. $\frac{n(n+1)(2n+9)}{6}$

Answer: C

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13. In ΔABC, if $\frac{1}{b+c}+\frac{1}{c+a}=\frac{3}{a+b+c}$, then C is equal to

A. 90°

B. 60°

C. 45°

D. 30°

Answer: B

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14. What is the sum of n terms of the series $\sqrt{2}+\sqrt{8}+\sqrt{18}+\sqrt{32}+..$.?

A. 300

B. $200\sqrt{2}$

C. $300\sqrt{2}$

D. $250\sqrt{2}$

Answer: C

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15. Find the sum of the series $1.\ 3^2 + 2.5^2 + 3.7^2 + \ldots +$ to n terms

A. $\frac{n}{6}(n+1)\left(6n^2+14n+7\right)$

B. $\frac{n}{6}(n+1)(2n+1)(3n+1)$

C. $4n^3 + 4n^2 + n$

D. None of the above

Answer: A

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16. If $a = \log_2 3$, $b = \log_2 5$ and $c = \log_7 2$, then $\log_{140} 63$ in terms of a, b, c is

A. $\frac{2ac + 1}{2c + bc + 1}$

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

C. $\frac{2ac + 1}{2c + ab + a}$

D. None of these

Answer: D

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17. When 2^{31} is divided by 5 the remainder is

A. 4

B. 8

C. 2

D. 6

Answer: C

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18. Let α, β, γ and δ be four positive real numbers such that their product is unity, then the least value of $(1+\alpha)(1+\beta)(1+\gamma)(1+\delta)$ is

A. 6

B. 16

C. 0

D. 32

Answer: B

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