MATHS

JEE (MAIN AND ADVANCED) MATHEMATICS

SEQUENCE AND SERIES

Exercise I

1. If a, b, c, d, e, f are in A.P then $e - c =$

A. $2(c - a)$

B. $2(d - c)$

C. $2(f - d)$

D. $d - c$

Answer: B

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2. If seven times of 7th term of an Arithmetic Progression is euqal to the 11 times of 11^{th} term of it, then find the 18^{th} term of that Arithmetic Progression.

A. 0

B. 10

C. 12

D. 8

Answer: A

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3. If $1 + 6 + 11 + 16 + \ldots + x = 148$ then x=

A. 36

B. 8

C. 148

D. 30

Answer: A

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4. The sum of n terms of an AP is $2n^2 + n$. Then 8^{th} term of the AP is

A. 27

B. 31

C. 35

D. 39

Answer: B

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5. If $a_1, a_2, a_3, a_4,$ .....are in A.P such that $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 450$ then $a_1 + a_8 + a_{17} + a_{24}$=

A. 100

B. 150

C. 300

D. 450

Answer: C

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

A. 6

B. 7

C. 8

D. 9

Answer: D

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7. If $1, \frac{1}{2}\log_3\left(3^{1-x}+2\right), \log_3\left(4.3^x-1\right)$ are in A.P. then x equals

A. $\log_3^4$

B. $1-\log_{30^4}$

C. $1-\log_4^3$

D. $\log_4^3$

Answer: B

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8. If the first term of an A.P. is 2 and the sum of first five terms is equal to one fourth of the sum of the next five terms, then the sum of the first 30 terms is

A. 2550

B. 3000

C. -2550

D. -30000

Answer: C

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9. The first, second and last terms of an A.P are α, β, γ respectively then the sum of first n terms is

A. $\beta + \gamma - 2\alpha$

B. $\frac{\beta + \gamma - 2\alpha}{\beta - \alpha}$

C. $\frac{\beta+\gamma+2\alpha}{\beta+\alpha}$

D. $\frac{(\alpha+\gamma)(\beta+\gamma-2\alpha)}{2(\beta-\alpha)}$

Answer: D

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10. If the ratio between the sum of first n terms of two A.P's is $7n+1:4n+27$ then the ratio of 11^{th} terms is

A. $4:3$

B. $3:4$

C. $78:61$

D. $148:111$

Answer: D

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11. If the sum of m terms of an A.P, is equal to the sum of n terms of the A.P ., then the sum of (m + n) terms is

A. 0

B. $m + n$

C. $-(m + n)$

D. $2m + 2n$

Answer: A

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12. Let a_1, a_2, a_3..... be terms of an A.P. If $\frac{a_1 + a_2 + \ldots . a_p}{a_1 + a_2 + \ldots . a_q} = \frac{p^2}{q^2}(p \neq q)$ then $\frac{a_6}{a_{21}} =$

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

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

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

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

Answer: C

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13. The ratio of the sums of m and n terms of an A.P is $m^2 : n^2$, then the ratio of the m^{th} and n^{th} terms is

A. $2m - 1 : 2n - 1$

B. $m - 1 : n - 1$

C. $2m + 1 : 2n + 1$

D. $m + 1 : n + 1$

Answer: A

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14. If S_n be the sum of n terms of an A.P and $\frac{s_{pn}}{s_n}$ is independent of n and first term is a then the common difference is

A. a

B. 2a

C. 3a

D. 4a

Answer: B

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15. If S_n denotes the sum of first n terms of an A.P. and $S_{2n} = 3S_n$, then $\frac{S_{3n}}{S_n} =$

A. 10

B. 8

C. 7

D. 6

Answer: D

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

A. 0

B. 1

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

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

Answer: A

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17. If p^{th} term of an A.P is $\frac{1}{q}$ and q^{th} term of A.P is $\frac{1}{p}$ then sum of the first pq terms is

A. $\frac{p+q}{pq}$

B. $\frac{pq}{p+q}$

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

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

Answer: D

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18. If $s_1, s_2, s_3 \ldots . s_p$ are the sums of n terms of 'p' A.P's whose first terms are 1,2,3...p and common differences are 1,3,5... $(2p-1)$ respectively then $s_1 + s_2 + s_3 + \ldots + s_p$=

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

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

C. nq

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

Answer: A

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19. If x,y, z are real numbers satisfying the equation $25\left(9x^2+y^2\right)+9z^2-15(5xy+yz+3zx)=0$ then x,y, z are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: A

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20. If $a_1, a_2, a_3, \ldots . a_n$ are in A.P where $a_i > 0, \forall I$ then $\frac{1}{\sqrt{a_1}+\sqrt{a_2}} + \frac{1}{\sqrt{a_2}+\sqrt{a_3}} + \ldots + \frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}} = \frac{k}{\sqrt{a_1}+\sqrt{a_n}}$ then k=

A. $1-n$

B. $n-1$

C. n

D. $n+1$

Answer: B

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21. If $a_1, a_2, a_3, \ldots . a_n$ be an A.P of non-zero terms then $\frac{1}{a_1+a_2} + \frac{1}{a_2 a_3} + \ldots \frac{1}{a_{n-1}a_n}$=

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

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

C. $\frac{n-1}{a_1 . a_n}$

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

Answer: C

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22. If $a_1, a_2, a_3, \ldots . a_n$ be an A.P with common difference d, then $\sec a_1 \sec a_2 + \sec a_2 \sec a_3 + \ldots + \sec a_{n-1} \sec a_n =$

A. $\frac{\tan a}{\sin a_1 \sin a_2}$

B. $\frac{\tan a_n - \tan a_1}{\sin d}$

C. $\frac{n-1}{\tan a_1 \tan a_2}$

D. $\frac{\tan a_1 - \tan a_n}{\sin d}$

Answer: B

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23. If S_1, S_2, S_3 be the sum of n, 2n, 3n terms respectively of an A.P then

A. $S_3 = S_1 + S_2$

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

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

D. $S_3 = 3(S_1 + S_2)$

Answer: C

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24. If the length of sides of right angled triangle are in A.P., then the sines of the acute angles are

A. $\frac{3}{5}, \frac{4}{5}$

B. $\frac{5}{13}, \frac{12}{13}$

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

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

Answer: A

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25. n A.M.'s are inserted between 2 and 100 then sum of n A.M's is

A. 50n

B. 51n

C. 50

D. 51

Answer: B

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

A. 7

B. 8

C. 9

D. 10

Answer: B

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27. If the sum of m A.M's between two positive numbers is α and sum of n A.M's between the same numbers is β then $\frac{\alpha}{\beta}=$

A. $\sqrt{\frac{m}{n}}$

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

C. $\frac{m}{n}$

D. mn

Answer: C

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28. If the A.M between m th and n th term of an A.P be equal to A.M. between p^{th} and q^{th} terms of the A.P then

A. $m + n = p + q$

B. $m + q = p + n$

C. $m + p = n + q$

D. $m + n + p + q = 0$

Answer: A

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

A. 0

B. 1

C. -1

D. $1/2$

Answer: B

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30. How many terms are to be added to make the sum 52 in the series (-8) + (-6) + (-4) + ... ?

A. 3

B. 13

C. 12

D. 31

Answer: B

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31. If the sum of three numbers which are in A.P is 27 and the product of first and last is 77, then the numbers are

A. 7,9,11

B. 6,9,12

C. 7,10,11

D. 6,8,14

Answer: A

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32. Four numbers are in arithmetic progression. The sum of first and last terms in 8 and the product of both middle terms is 15. the least number of the series is

A. 4

B. 3

C. 2

D. 1

Answer: D

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33. If $S_n$danotes the sum of n terms of n terms of an A.P. then $S_{n+3} - 3S_{n+2} + 3S_{n+1} - S_n =$

A. 0

B. 1

C. 3

D. 2

Answer: A

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34. If $S_1, S_2, S_3,$ are the sums of first n natural numbers their squares and their cubes respectively, then $S_3(1 + 8S_1) =$

A. S_2^2

B. $9S_2$

C. $9S_2^2$

D. $3S_2^2$

Answer: C

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35. In a G.P if the first term is 3, n^{th} term is 96 and the sum of n terms is 189, then the number of terms is

A. 5

B. 6

C. 8

D. 9

Answer: B

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36. The third term of G.P is 4. The product of first five terms is

A. 2^6

B. 2^8

C. 2^{10}

D. 2^{12}

Answer: C

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37. If the p^{th} term of a G.P is α and qth term is β then nth term is

A. $\left(\frac{\alpha^{n-p}}{\beta^{n-q}}\right)^{\frac{1}{p-q}}$

B. $\left(\frac{\alpha^{n-q}}{\beta^{n-p}}\right)^{\frac{1}{p-q}}$

C. $\left(\frac{\alpha^{n-q}}{\beta^{n-p}}\right)^{\frac{1}{q-p}}$

D. $\left(\frac{\alpha^{n-p}}{\beta^{n-q}}\right)^{\frac{1}{q-p}}$

Answer: B

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38. In a geometrical progression consisting of positive terms, each term equals the sum of the next two terms. Then the common ratio of this progression equals to

A. $\sqrt{5}$

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

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

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

Answer: B

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39. Sum of n terms of the series $6 + 66 + 666...$is

A. $\frac{1}{3}(10^n - 1)$

B. $\frac{2}{27}\left(10^{n+1} - 9n - 10\right)$

C. $\frac{4}{27}\left(10^{n+1} - 9n - 10\right)$

D. $\frac{8}{3}(10^n - 1)$

Answer: B

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40. A G.P consists of an even number of terms. If the sum of all the terms is five times the sum of those terms occuping the odd places, then common ratio is

A. 2

B. 3

C. 4

D. 5

Answer: C

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41. If $A = 1 + r^a + r^{2a} + r^{3a} + \ldots\infty$ and $B = 1 + r^b + r^{2b} + \ldots\infty$ then $\frac{a}{b}$=

A. $\log \frac{(1-A)}{(1-B)}$

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

C. $\log_B^A$

D. $\log_A^B$

Answer: B

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42. 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 $|a| < 1, |b| < 1, |c| <$, then x,y,z, are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: C

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43. If S_n represents the sum of n terms of G.P whose first term and common ratio are a and r respectively, then $s_1 + s_2 + s_3 + \ldots + s_n$=

A. $\frac{an}{1-r} - \frac{ar(1-r^n)}{(1-r)^2}$

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

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

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

Answer: A

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44. The least value of n for which $1+2+2^2+\ldots n$ terms is greater than 100 is

A. 7

B. 8

C. 9

D. 10

Answer: A

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45. The sides a, b, c of ΔABC are in G.P, and $\log a - \log 2b, \log 2b - \log 3c, \log 3c - \log a$ are in A.P., then ΔABC is

A. acute angled

B. obtuse angled

C. right angled

D. triangle does not exist

Answer: B

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46. If p^{th}, q^{th}, r^{th} terms of a G.P are a,b,c then $\Sigma(q-r)\log a =$

A. 0

B. 1

C. pqr

D. abc

Answer: A

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47. If g_1, g_2, g_3 are three geometric means between two positive numbers a,b then $g_1 g_3$ =

A. g_2

B. g_2^2

C. $2g_2$

D. $2g_2^2$

Answer: B

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48. 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 altermately positive and negative then the first term is

A. -4

B. -12

C. 12

D. 4

Answer: B

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49. If $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ is the AM of a and b then n = ...

A. 0

B. 1

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

D. -1

Answer: C

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50. If 8G.M.'s inserted between 2 and 3 then the product of the 8 G.M.' s is

A. 6

B. 36

C. 216

D. 1296

Answer: D

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51. If the A.M of the roots of a quadratic in x is 3 and G.M is $2\sqrt{2}$, then the quadratic is

A. $x^2 - 3x + 8 = 0$

B. $x^2 - 6x + 2\sqrt{2} = 0$

C. $x^2 - 6x + 8 = 0$

D. $x^2 - 3x + 2\sqrt{2} = 0$

Answer: C

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52. If `A and G are the A.M. and G.M. respectively between two numbers then the numbers are

A. $A \pm \sqrt{G^2 + A^2}$

B. $A \pm \sqrt{A^2 - G^2}$

C. $A \pm \sqrt{A^2 + 2G^2}$

D. $G \pm \sqrt{A^2 - G^2}$

Answer: B

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53. If the G.M of two non-zero positive numbers is to their A.M is 12:13 then numbers are in the ratio

A. $5:8$

B. $4:9$

C. $6:11$

D. $3:8$

Answer: B

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54. If one G.M. 'G' and two arithmetic means p and q be inserted between any two given number than G^2=

A. $(2p-q)(2q-p)$

B. $(2p-q)(q-2p)$

C. $\frac{2p+q}{2q+p}$

D. $\frac{2p+q}{q+2p}$

Answer: A

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55. Let x be the arithmetic mean 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. $1/2$

D. $3/2$

Answer: A

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56. How many terms of the series 1 + 3 + 9 + ... Sum to 364 ?

A. 5

B. 6

C. 4

D. 3

Answer: B

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57. If (1 - y) $(1 + 2x + 4x^2 + 8x^3 + 16x^4 + 32x^5) = 1 - y^6, (y \neq 1)$, then a value of y/x is

A. $1/2$

B. 2

C. $25/24$

D. $24/25$

Answer: B

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58. the sum to infinity of $\frac{1}{7} + \frac{2}{7^2} + \frac{1}{7^3} + \frac{2}{7^4} + \ldots$ is

A. $1/5$

B. $7/24$

C. $5/48$

D. $3/16$

Answer: D

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59. $(666\ldots Ndigits)^2$ + (888 .... N digits) =

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

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60. If the sum of three numbers in a G.P is 26 and the sum of products two at a time is 156, then the numbers are

A. $2, 6, 18$

B. $1, 8, 64$

C. $1, 5, 25$

D. $1, 4, 1$

Answer: A

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61. If 3rd term of an H.P is 7 and 7^{th} term of H.P is 3 then 10^{th} term is

A. $\frac{10}{21}$

B. $\frac{21}{10}$

C. $\frac{10}{7}$

D. $\frac{3}{7}$

Answer: B

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62. Three numbers form a H.P the sum of the numbers is 11 and the sum of their reciprocals is 1. Then one among those numbers is

A. 3

B. 4

C. $\frac{1}{6}$

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

Answer: A

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63. If a, b, c are in H.P then $\left(\frac{1}{b}+\frac{1}{c}-\frac{1}{a}\right)\left(\frac{1}{c}+\frac{1}{a}-\frac{1}{b}\right)=$

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. $\frac{3}{b^2}-\frac{2}{ab}$

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

Answer: C

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64. If a,b, c are in H.P and a^2, b^2, c^2 are in H.P then

A. a=b=c

B. $2b=3a+c$

C. $b^2=\frac{ac}{8}$

D. $2c=3b+a$

Answer: A

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65. If $a_1, a_2, \ldots a_n$ are in H.P. then $a_1.\, a_2 + a_2.\, a_3 + a_3.\, a_4 + \ldots + a_{n-1}.\, a_n$=

A. $(n-1)a_1a_n$

B. na_1a_n

C. $(n+1)a_1a_n$

D. $(n+2)a_1a_n$

Answer: A

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66. If the first two terms of a H.P are $\frac{2}{5}$ and $\frac{12}{13}$ respectively then the largest term is

A. 2nd term

B. 6th term

C. 4th term

D. 5th term

Answer: A

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67. 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

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68. If $\frac{a-x}{px} = \frac{a-y}{qy} = \frac{a-z}{rz}$ and p, q, r, be in A.P then x,y, z are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: C

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69. The A.M and H.M between two numbers are 27 and 12 respectively then G.M is

A. 18

B. 16

C. 20

D. 25

Answer: A

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70. Two A.M.'s A_1 and A_2, two G.M.'s G_1, G_2 and two H.M.'s H_1, H_2 are inserted between any two non-zero positive numbers then $\frac{1}{H_1} + \frac{1}{H_2} =$

A. $\frac{1}{A_1} + \frac{1}{A_2}$

B. $\frac{1}{G_1} + \frac{1}{G_2}$

C. $\frac{G_1 G_2}{A_1 + A_2}$

D. $\frac{A_1 + A_2}{G_1 G_2}$

Answer: D

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71. The harmonic mean of two numbers is 4. Their arithmetric mean is A and geometric mean is G. If G satisifies $2A + G^2 = 27$, the numbers are

A. 1,13

B. 9,12

C. 3,6

D. 4,8

Answer: C

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72. H_1, H_2 are 2 H.M.'s between a,b then $\frac{H_1 + H_2}{H_1 . H_2} =$

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

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

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

D. $\frac{ab}{a - b}$

Answer: B

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73. The G.M. of two numbers is 6. Their A.M. 'A' and H.M. H satisfy the equation $90A + 5H = 918$ then

A. A= 10, A= 4

B. $A = \frac{1}{5}, A = 10$

C. A= 5, A= 10

D. $A = \frac{1}{5}, A = 5$

Answer: B

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74. If a,b,c are in H.P and ab + bc ca = 15, then ca =

A. 5

B. 7

C. 9

D. 10

Answer: A

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75. If three are four harmonic means between 1/12, 1/42, then the third harmonic mean is

A. $1/18$

B. $1/24$

C. $1/30$

D. $1/36$

Answer: C

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76. If a, 8, b are in A.P, a, 4 , b are in G.P, a , x, b are in H.P then x =

A. 2

B. 1

C. 4

D. 16

Answer: A

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77. If a,b,c are in A.P., p,q,r are in H.P and ap, bq, cr are in G.P., then $\frac{p}{r} + \frac{r}{p}$ =

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

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

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

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

Answer: A

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

A. 3

B. 4

C. 6

D. 2

Answer: A

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79. If the sum of $1 + 4x + 7x^2 + 10x^3 + \ldots . \infty (|x| < 1)$ is $\frac{35}{16}$ then x=

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

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

C. $\frac{1}{5}$

D. $\frac{1}{6}$

Answer: C

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80. The sum of n terms of the series $1+2\left(1+\frac{1}{n}\right)+3\left(1+\frac{1}{n}\right)^2+$ ....is

A. n^2

B. $n(n+1)$

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

D. $(n+1)^2$

Answer: A

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

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

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

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

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

Answer: C

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82. The sum of n terms of the series $1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 +$ ....is

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

B. $n(n+1)$

C. $-(n+1)n$

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

Answer: A

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83. If $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\ldots..\infty=\frac{\pi^2}{6}$ then $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots.=$

A. $\frac{\pi^2}{8}$

B. $\frac{\pi^2}{12}$

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

D. $\frac{\pi^2}{2}$

Answer: A

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84. The sum of first 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 odd the sum is

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

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

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

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

Answer: B

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Practice Exercise

1. If sum of the series $a - (a+d) + (a+2d) - (a+3d) + ...$up to 21 terms is

A. $-10d$

B. $a + 20d$

C. $a + 10d$

D. 20d

Answer: C

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2. The first term of an A.P of consecutive integers is $p^2 + 1$. The sum of (2p + 1) terms of this series can be expressed as

A. $(a + 1)^2$

B. $(2a + 1)\left(a^2 + a + 1\right)$

C. $(a + 1)^3$

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

Answer: B

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3. The sum of n terms of an A.P is $3n^2 + n$. Then 8^{th} term of the A.P is

A. 46

B. 45

C. 47

D. 49

Answer: A

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4. The ratio between the sum of n terms of two A.P.'s is $3n + 8 : 7n + 15$. Then the ratio between their 12^{th} terms is

A. $16 : 7$

B. $16 : 9$

C. $7:16$

D. $18:7$

Answer: C

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5. The sum of all integers between 50 and 500 which are divisible by 7 is

A. 18696

B. 15696

C. 17696

D. 14696

Answer: C

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6. If 5^{th} term of A.P is $\frac{1}{6}$ and 6^{th} term of A.P is $\frac{1}{5}$ then sum of first 30 term is

A. $\frac{11}{30}$

B. $\frac{30}{11}$

C. $\frac{29}{2}$

D. $\frac{31}{2}$

Answer: D

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7. The interior angles of a polygon are in A.P. if the smallest angle is 100° and the common difference is 4° then the number of sides is q

A. 5

B. 7

C. 36

D. 44

Answer: A

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8. The sum of r terms of an A.P. is denoted by S_r and $\frac{S_{m+1}}{S_{n+1}} = \frac{(m+1)^2}{(n+1)^2}$, then the ratio of the 8^{th} term to 6^{th} term is

A. $\frac{15}{19}$

B. $\frac{15}{11}$

C. $\frac{14}{19}$

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

Answer: B

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9. The n^{th} term of an A.P is p and the sum of the first n terms is s. The first term is

A. $\frac{2p+sn}{n}$

B. $\frac{2p-sn}{n}$

C. $\frac{2s+pn}{n}$

D. $\frac{2s-pn}{n}$

Answer: D

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10. If $s_1, s_2, s_3 \ldots . s_p$ are the sums of n terms of 'p' A.P's whose first terms are 1,2,3...p and common differences are 1,3,5... $(2p-1)$ respectively then $s_1+s_2+s_3+\ldots+s_p$=

A. $pn(pn+1)$

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

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

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

Answer: B

Watch Video Solution

11. If $a_1, a_2, a_3 \ldots . a_n$ are in A.P. with common difference d then sin d $[\cos eca_1 \cos eca_2 + \cos eca_2 \cos eca_3 + \cos eca_3 \cos eca_4 + \ldots \text{n terms}]$=

A. $\cot a_1 - \cot a_{n+1}$

B. $\tan a_1 - \tan a_{n+1}$

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

D. $\cos eca_1 - \cos eca_{n+1}$

Answer: A

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12. If S_1, S_2, S_3 be the sum of 10, 20, 30 terms respectively of an A.P. Then

A. $S_3 = S_1 + S_2$

B. $\_(3) = 2(S_1 + S_2)$

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

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

Answer: D

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13. The first, second and last terms of an A.P. are a, b, c respectively, then the sum to first n terms is

A. $b + c - 2a$

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

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

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

Answer: D

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14. If the sum of the first ten terms of an A.P is four times the sum of its five terms, the ratio of the first terms to the common difference is

A. $1:2$

B. $2:1$

C. $1:4$

D. $4:1$

Answer: A

Watch Video Solution

15. If a,b,c are in A.P then $a\left(\frac{1}{b}+\frac{1}{c}\right), b\left(\frac{1}{c}+\frac{1}{a}\right), c\left(\frac{1}{a}+\frac{1}{b}\right)$ are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: A

Watch Video Solution

16. If p, q, r are in A.P the $p^2(q+r), q^2(r+p), r^2(p+q)$ are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: A

Watch Video Solution

17. If the A.M. between p^{th} and q^{th} terms of an A.P be equal to A.M between r^{th} and s^{th} terms of A.P then

A. $p+s=q+r$

B. $p+q=r+s$

C. $p+r=q+s$

D. $p+q+r+s=0$

Answer: B

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18. If n A.M's are inserted between two quantites a and b then their sum is equal to

A. $n(a+b)$

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

C. $2n(a+b)$

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

Answer: B

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19. If n A.M.'s are inserted between 4 and 96 then sum of n A.M.'s is

A. 49n

B. 50n

C. 51n

D. 52n

Answer: B

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20. If n A.M.'s are inserted between 20 and 80 such that the ratio of first mean to the last mean is $1:3$ then the value of n is

A. 11

B. 12

C. 13

D. 14

Answer: A

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21. Fifth term of G.P. is 2. The product of its first nine terms is

A. 1024

B. 256

C. 512

D. 356

Answer: C

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22. If $(m+n)^{th}$ term and $(m-n)^{th}$ terms of a G.P. are p and q respectively. Then the m^{th} term is

A. $\sqrt{\frac{p}{q}}$

B. $\sqrt{\frac{q}{p}}$

C. $\sqrt{pq}$

D. pq

Answer: C

Watch Video Solution

23. Let a_n be the n^{th} term of G.P. If $\Sigma_{n=1}^{100} a_{2n} = \alpha$ and $\Sigma_{n=1}^{100} a_{2n-1} = \beta$, then the common ratio of the G.P is

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

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

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

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

Answer: C

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24. If 4^{th}, 7^{th}, 10^{th} 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

25. If l, m, n are the p^{th}, q^{th}, r^{th} terms of a G.P which are +ve, then

$$\begin{vmatrix} \log l & p & 1 \\ \log m & q & 1 \\ \log n & r & 1 \end{vmatrix} =$$

A. 3

B. 2

C. 1

D. 0

Answer: D

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26. If $S = 1 + a + a^2 + \ldots + \infty (a < 1)$ then the value of q=

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

B. $\frac{s}{1-s}$

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

D. $\frac{1-s}{s}$

Answer: C

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

A. $xy + xz = yz + x$

B. $xyz = x + y + z$

C. $xy + yz = xz + y$

D. $yz + zx = xy + z$

Answer: D

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28. If 3 and 2 are A.M and G.M of the roots of a quadratic equation then the equation is

A. $x^2 - 3x + 4 = 0$

B. $x^2 - 6x - 4 = 0$

C. $x^2 + 6x + 4 = 0$

D. $x^2 - 6x + 4 = 0$

Answer: D

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29. If a,b,c are in G.P where a,b,c are positive numbers and $\log\frac{5c}{a}, \log\frac{3b}{5c}$ and $\log\frac{a}{3b}$ are in A.P then the triangle whose sides are a,b, c is

A. Right angled

B. A cute angled

C. Obtuse angled

D. Do not form a triangle

Answer: D

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30. The arithrmetic mean of two positive numbers is 9 and geometric mean is 4. Then these numbers are the roots of the equation

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

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

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

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

Answer: B

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31. If A and G are A.M and G.M between two positive numbers a and b are connected by the relation $A + G = a - b$ then the numbers are in the ratio

A. $1:3$

B. $1:6$

C. $1:9$

D. $1:12$

Answer: C

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32. Between 4 and 2916, $(2n+1)$ G.M's are inserted then $(n+1)^{th}$ G.M is

A. 36

B. 54

C. 108

D. 324

Answer: C

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33. If the A.M and G.M between two numbers are in the ratio m"n then the numbers are in the ratio

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

B. $m+\sqrt{m^2+n^2}:m-\sqrt{m^2+n^2}$

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

D. $n+\sqrt{m^2-n^2}:n-\sqrt{m^2-n^2}$

Answer: C

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34. α, β, γ are the geometric means between ca, ab, ab, bc, bc, ca respectively and a,b,c are in A.P then $\alpha^2, \beta^2, \gamma^2$ are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: A

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35. A square is drawn by joining the mid points of the given square a third square in the same way and this process containues indefinitely. If a side of the first square is 16cm, then the sum of the areas of all the squares

A. 128 sq. cm

B. 256 sq .cm

C. 512 sq cm

D. 1024 sq cm

Answer: C

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36. If p^{th}, q^{th}, r^{th} terms of a H.P be respectively a, b and c then $(q-r)bc+(r-p)ca+(p-q)ab$=

A. 0

B. 2abc

C. qpr

D. abc pqr

Answer: A

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37. If mth terms of H.P is n and nth term is m, then (m + n)th term is

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

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

C. $\frac{2mn}{m+n}$

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

Answer: A

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38. If a,b,c are in A.P and b,c,a are in H.P then a^4=

A. bc

B. b^2c^2

C. b/c

D. b^2/c^2

Answer: B

Watch Video Solution

39. If $a_1, a_2, \ldots . a_n$ are in H.P then

$$\frac{a_1}{a_2 + a_3 + \ldots + a_n}, \frac{a_2}{a_1 + a_3 + \ldots + a_n}, \frac{a_3}{a_1 + a_2 + a_4 \ldots + a_n} \ldots . \frac{}{a_1 + a}$$

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: C

Watch Video Solution

40. If a, b, c, d are in H.P then $ab + bc + cd$=

A. ad

B. 2ad

C. 3ad

D. 4ad

Answer: C

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41. If 3 and 2 are A.M and G.M of two number then H.M of the numbers is

A. $3/4$

B. $4/3$

C. $2/3$

D. $3/2$

Answer: B

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42. If the harmonic mean between a and b is $\frac{a^{n+1}+b^{n-1}}{a^n+b^n}$, then n =

A. 0

B. 1

C. -1

D. $1/2$

Answer: C

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43. $\log_3^2, \log_6^2, \log_{120^2}$ are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: C

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44. Let $a_1, a_2 \ldots . a_{10}$ be A.P and $h_1, h_2 \ldots h_{10}$ be in H.P. If $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$ the $a_3 h_8$=

A. $2/3$

B. 4

C. 9

D. 6

Answer: D

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45. If p th term of a H.P is qr and q^{th} term is r p then r^{th} term is

A. p^2

B. q^2

C. pqr

D. p/q

Answer: C

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

A. $x<3$

B. $x>1/3$

C. $x<1/3$

D. $x>3$

Answer: D

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47. If $3+(3+d)\frac{1}{4}+(3+2d)\frac{1}{4^2}+\ldots\infty=8$ then d=

A. 9

B. 5

C. 4

D. 1

Answer: A

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48. If $1+2x+3x^2+4x^3+\ldots\infty=\frac{9}{4}(|x|<1)$ then x=

A. $1/3$

B. $1/4$

C. $1/5$

D. $1/6$

Answer: A

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49. If the sum to infinity of the series $3 + 5x + 7x^2 + \ldots\infty = \frac{44}{9}$ then x=

A. $1/2$

B. $1/3$

C. $1/4$

D. 1

Answer: C

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50. Let $p = 3^{1/3}.3^{2/9}.3^{3/27}.... \infty$ then $p^{1/3}$=

A. $3^{2/3}$

B. $\sqrt{3}$

C. $3^{1/3}$

D. $3^{\frac{1}{4}}$

Answer: D

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51. If $\frac{a+be^x}{a-be^x} = \frac{b+ce^x}{b-ce^x} = \frac{c+de^x}{c-de^x}$ then a, b, c, d are in

A. A.P

B. G.P

C. H.P

D. A.G.P

Answer: B

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52. Given sum of the first n terms of an A.P is $2n + 3n^2$. Another A.P is formed with the same first term and is double the common difference, the sum of n terms of the new A.P. is

A. $n + 4n^2$

B. $6n^2 - n$

C. $n^2 + 4n$

D. $3n + 2n^2$

Answer: B

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53. The sum $\frac{3}{1^2} + \frac{5}{1^2 + 2^2} + \frac{7}{1^2 + 2^2 + 3^2} +$ ..... upto 11 terms is

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

B. $\frac{11}{4}$

C. $\frac{11}{2}$

D. $\frac{60}{11}$

Answer: C

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54. Given a sequence of 4 numbers, first three of which are in G.P.,and the last three are in A.P. with common difference six. If first and last term of the sequence are equal, then the last term is

A. 16

B. 8

C. 4

D. 2

Answer: B

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55. The value of $1^2 + 3^2 + 5^2 + \ldots + 25^2$ is

A. 2925

B. 1469

C. 1728

D. 1456

Answer: A

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56. Let $a_1, a_2, a_3 \ldots\ldots$ be terms of an A.P. If $\frac{a_1 + a_2 + \ldots\ldots a_p}{a_1 + a_2 + \ldots\ldots a_q} = \frac{p^2}{q^2}(p \neq q)$ then $\frac{a_6}{a_{21}} =$

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

B. $\frac{121}{1681}$

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

D. $\frac{121}{1861}$

Answer: C

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57. The sum of the series $2^2 + 2\left(4^2\right) + 3\left(6^2\right) +$ ....upto 10 terms is

A. 11300

B. 11200

C. 12100

D. 12300

Answer: C

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58. If

$$S = \tan^{-1}\left(\frac{1}{n^2+n+1}\right) + \tan^{-1}\left(\frac{1}{n^2+2n+3}\right) + \ldots. + \tan^{-1}\left(\frac{}{1+}\right.$$

, then $\tan(s)$ is equal to

A. $\frac{20}{401+20n}$

B. $\frac{n}{n^2+20n+1}$

C. $\frac{20}{n^2+20n+1}$

D. $\frac{n}{401+20n}$

Answer: C

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59. If $a_1, a_2, a_3, \ldots, a_n$ are in A.P such that $a_4 - a_7 + a_{10} = m$, then sum of the first 13 terms of the A.P is

A. 10m

B. 12m

C. 13m

D. 15m

Answer: C

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60. Given an A.P whose terms are all positive integers. The sum of its nine terms is greater than 200 and less than 220. If the second term in it is 12, then its 4th term is

A. 8

B. 16

C. 20

D. 24

Answer: C

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61. If the sum $\frac{3}{1^2}+\frac{5}{1^2+2^2}+\frac{7}{1^2+2^2+3^2}+\ldots+$ upto 20 terms is equal to $\frac{k}{21}$, then k is equal to

A. 120

B. 180

C. 240

D. 60

Answer: A

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62. In a geometric progression, if the ratio of the sum of first 5 terms to the sum of their reciprocals is 49, and the sum of the first and the third term is 35. Then the first term of this geometric progression is

A. 7

B. 21

C. 28

D. 42

Answer: C

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63. The sum of the first 20 terms common between the series $3 + 7 + 11 + 15 \ldots$ and $1 + 6 + 11 + 16 + \ldots$ is

A. 4000

B. 4020

C. 4200

D. 4220

Answer: B

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64. Let G be the geometric mean of two positive numbers a and b, and M be the arithmetic mean of $\frac{1}{a}$ and $\frac{1}{b}$. If $\frac{1}{M} : G$ is $4:5$, then a: b can be

A. $1:4$

B. $1:2$

C. $2:3$

D. $3:4$

Answer: A

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65. The lest positive integer n such that $1-\frac{2}{3}-\frac{2}{3^2}-\ldots.-\frac{2}{3^{n-1}}<\frac{1}{100}$, is

A. 4

B. 5

C. 6

D. 7

Answer: D

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66. The number of terms in an A.P is even the sum of the odd terms in it is 24 and that the even terms is 30. If the last terms exceeds the first term by $10\frac{1}{2}$, then the number of terms in the A.P is

A. 4

B. 8

C. 12

D. 16

Answer: B

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67. Let $f(n) = \left[\frac{1}{3} + \frac{3n}{100}\right] n$, where [n] denotes the greatest integer less than or equal to n. Then $\Sigma_{n=1}^{56} f(n)$ is equal to

A. 56

B. 689

C. 1287

D. 1399

Answer: D

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68. If the sum of first n terms of two A.P's are in the ratio $3n + 8 : 7n + 15$,then the ratio of 12th term is

A. $8 : 7$

B. $7:16$

C. $74:169$

D. $13:47$

Answer: B

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69. A tree, in each year grows 5cm less than it grew in the previous year. If it grew half a metre in the first year, then the height of th etree (in metres) when it ceases to grow, is

A. 3.00

B. 2.75

C. 2.50

D. 2.00

Answer: B

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70. If $\log_{10} 2, \log_{10}(2^x - 1)$ and $\log_{10}(2^x + 3)$ are three consecutive terms of an A.P for

A. no real x

B. exactly one real x

C. exactly two real x

D. more than two real x

Answer: B

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71. If $\frac{48}{(2)(3)} + \frac{47}{(3)(4)} + \frac{46}{(4)(5)} + \ldots . \frac{2}{(48)(49)} + \frac{1}{(49)(50)} = \frac{51}{2} + K\left(1 +$, then K equals

A. -1

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

C. 1

D. 2

Answer: A

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