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## MATHS

## BOOKS - JBD PUBLICATION

## SEQUENCES AND SERIES

## Exercise

1. $1, \frac{2}{3}, \frac{4}{9}, \frac{8}{27}, \ldots \ldots \ldots \ldots \ldots$ is a G.P of 10 terms. Its 10 th terms if:
A. $\left(\frac{2}{3}\right)^{10}$
B. $\left(\frac{2}{3}\right)^{9}$
C. $\frac{2}{3^{10}}$
D. $\left(\frac{2}{3}\right)^{11}$
2. Which term of the sequences $\sqrt{3}, 3,3 \sqrt{3}, \ldots . . . . . . . .$. is 729 ?
A. 10th
B. 8th
C. 14th
D. 12th

## Answer:

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3. If a,b,c and in A.P, then $x^{a}, x^{b}, x^{c}$ are in:
A. A.P
B. G.P
C. H.P.
D. None of these

## Answer:

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4. The sum of the first n odd number is :
A. 2 n
B. $n^{2}$
C. $\frac{n(n+1)}{2}$
D. $\frac{n(n+1)}{2}$

## Answer:

5. The sum of first 30 natural numbers is:
A. 465
B. 900
C. 930
D. None of these

## Answer:

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6. If $(p+q)^{t h}$ term of an A.P. is $m$ and $(p-q)$ th term is $n$, then the $p t h$ term is:
A. $\frac{1}{2}(m-n)$
B. $m n$
C. $\sqrt{m n}$
D. $\frac{1}{2}(m+n)$

## Answer:

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7. If 100 times the 100 th term of an A.P with non- zero common difference equals the 50 times its 50th term,then the 150th term of this A.P is
a. 150 times its 50th term
b. 150
c. 0
d. -150
A. 0
B. 150
C. -150
D. None of these

## Answer:

8. If the A.M of two numbers is 9 and G.M is 4 , then these numbers are roots of the equation:
A. $x^{2}-18 x-16=0$
B. $x^{2}-18 x+16=0$
C. $x^{2}-16 x+18=0$
D. $x^{2}+16 x-18=0$

## Answer:

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9. If second term of a GP. is 2 and the sum of its infinte terms is 8 , then its first term is
A. 4
B. -4
C. 2
D. -2

## Answer:

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10. If the pth,term of an A.P. is $q$ and the qth is $p$, then the rth term is
A. $P+q+r$
B. $p-q+r$
C. $p-q+r$
D. $p+q-r$

## Answer:

11. Three numbers $\mathrm{a}, \mathrm{b}$ and c are in the A.P if

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12. G.M of 8 and 18 is:
A. 13
B. 26
C. 10
D. 12

## Answer:

13. If $1+2+3+\ldots \ldots \ldots \ldots . . .+n=45$, then $1^{3}+2^{3}+3^{3}+\ldots \ldots \ldots .+n^{3}$ is:
A. $(45)^{2}$
B. $(45)^{3}$
C. $(45)^{4}$
D. None of these

## Answer:

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14. If $g_{1}, g_{2}$ are two G.M's between two numbers a and b , then $\frac{g_{1}^{2}}{g_{2}}+\frac{g_{2}^{2}}{g_{1}}$ is equal to:
A. $a b$
B. $a+b$
C. $\frac{a+b}{a b}$
D. None of these

## Answer:

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15. If the sum of $n$ terms of an A.P. is given by $\delta_{n}=3 n+2 n^{2}$, then the common difference of an A.P. is
A. 4
B. 3
C. 2
D. None of these

## Answer:

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16. Which term of the sequences $8-6 i, 7-4 i, 6-2 i$, $\qquad$ is a real number?
A. 7th
B. 6th
C. 5th
D. 4th

## Answer:

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17. If the sum of first $n$ even natural numbers is equal to $k$ times the sum of first n odd natural numbers, then k is equal to:
A. $\frac{n+1}{2}$
B. $\frac{n+1}{2 n}$
C. $\frac{1}{n}$
D. None of these

## Answer:

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18. If $\sum n=210$, then $\sum n^{2}$ is equal to:
A. 2870
B. 2670
C. 2570
D. None of these

## Answer:

## (D) Watch Video Solution

19. If 7th and 13th terms of an A.P. be 34 and 64 respectively, then its 18th term is:
A. 87
B. 88
C. 89
D. None of these

## Answer:

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20. The nth term of a G.P. is 128 and the sum of its $n$ terms is 225 . If its common ratio is 2 , then its first term is:
A. 1
B. 2
C. 3
D. None of these

## Answer:

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21. The value of $\sum_{1}^{5}(n)$ is:
A. 15
B. 20
C. 25
D. None of these

## Answer:

22. Angles $A, B$ and $C$ of a $\triangle A B C$ are in $A P . I f \frac{b}{c}=\frac{\sqrt{3}}{\sqrt{2}}$, then $\angle A$ is equal to
A. $75^{\circ}$
B. $60^{\circ}$
C. $45^{\circ}$
D. None of these

## Answer:

## (D) Watch Video Solution

23. Two positive numbers whose difference is 12 and whose A.M. exceeds the G.M by 2 are:
A. 16,4
B. 12,3
C. 9,6
D. None of these

## Answer:

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24. The product $(32),(32)^{1 / 6}(32)^{1 / 36} \ldots . \infty$ is equal to:
A. 8
B. 32
C. 64
D. None of these

## Answer:

25. The G.M. between $-2 i$ and $8 i$ is:
A. $\pm 2$
B. $\pm 4$
C. $\pm 4 i$
D. None of these

## Answer:

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26. If the ratio of A.M and G.M between two numbers is $5: 3$, then the ratio of two numbers is:
A. 3:1
B. 1:3
C. 1:9
D. None of these

## Answer:

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27. If $a, b, c$ are in G.P, then $\log a, \log b, \log c$ are:
A. A.P.
B. G.P.
C. not in A.P
D. None of these

## Answer:

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28. Find the sum to $n$ terms of the series
$1^{2}+3^{2}+5^{2}+\ldots$. upto n terms.
A. $\frac{n}{3}\left(4 n^{2}+1\right)$
B. $\frac{n}{3}\left(4 n^{2}-5\right)$
C. $\frac{n}{3}\left(4 n^{2}-1\right)$
D. None of these

## Answer:

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29. The sum of the series is $1+\frac{4}{5}+\frac{7}{5^{2}}+\frac{10}{5^{3}}+\ldots \ldots \ldots \ldots \infty$ is:
A. $\frac{23}{16}$
B. $\frac{35}{16}$
C. $\frac{16}{35}$
D. None of these

## Answer:

30. The sum of the series $1+3 x+6 x^{2}+10 x^{3}+\ldots \ldots \ldots \ldots \infty$ is:
A. $\frac{1}{(x-1)^{3}}$
B. $\frac{1}{(1-x)^{2}}$
C. $\frac{1}{(x-3)^{2}}$
D. None of these

## Answer:

1. Insert five numbers between 8 and 26 such that the resulting sequence is an A.P.
2. Find the indicated terms of the sequences given below whose nth terms are: $a_{n}=\frac{n(n-2)}{n+3}, a_{20}$

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3. Find the indicated terms of the sequences given below whose nth terms are: $a_{n}=(-1)^{n-1} n^{3}, a_{9}$

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4. First term of a sequence is 1 and the $(n+1)$ th term is obtained by adding $(n+1)$ to the $n$th term for all natural numbers n , the 6 th term of the sequence is
5. Show that the sequence whose $n^{\text {th }}$ term is $2 n^{2}+n+1$ is not an A.P.

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6. Determine $k$ so that $k+2,4 k-6$ and $3 k-2$ are three consecutive terms of an A.P.

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7. Show that the sum of $(m+n)^{t h}$ and $(m-n)^{t h}$ terms of an A.P. is equal to twice the $m^{\text {th }}$ term.

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8. Find the sum of all two digit numbers which when divided by 4 , yields 1 as remainder.
9. If the lengths of the sides of a right angled triangle are in A.P., then show that their ratio is 3:4:5.

## (D) Watch Video Solution

10. Which term of the following sequence:- $\sqrt{3}, 3,3 \sqrt{3}$,....is 729 ?

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11. Find the 10th term of a G.P. whose 8th term is 192 and the common ratio is 2 .

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12. The 5th, 8th and 11th terms of a G.P. are $\mathrm{p}, \mathrm{q}$ and x , respectively. Show that $q^{2}=p s$.

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13. If the 4th, 10th and 16th terms of a G.P. are $x, y$ and $z$, respectively. Prove that $x, y, z$ are in G.P.

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14. If A.M. and G.M of roots of a quadratic equations are 6 and 5 respectively, then obtain the quadratic equation.

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15. Prove that

$$
\frac{1}{3^{2}} \times \frac{1}{3^{4}} \times \frac{1}{3^{8}} \ldots \ldots \ldots \ldots=3
$$

16. Prove that
$\frac{1}{4^{3}} \times \frac{1}{4^{9}} \times \frac{1}{4^{27}} \ldots \ldots \ldots \ldots \ldots=8$

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17. Find the sum of $n$ terms of the series whose $n$th term is given by
$n^{2}+2^{n}$

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18. A man starts repaying a loan as first instalment of Rs. 100. If he increases the instalment by Rs 5 every month, what amount he will pay in the 30th instalment?
19. Find the sum of first $n$ terms of an A.P. whose $n$th term is $3 n+1$.

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20. If 3 rd term of a G.P. is 324 and 7 th term is 64 , then find the 10th term.

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21. How many terms of G.P. $3,3^{2}, 3^{3}, \ldots$ are needed to give the sum 120 ?

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22. If $m$ times the $m t h$ term is equal to $n$ times the $n$th term of an A.P. prove that $(m+n)$ th term of an A.P. is zero.
23. If the pth, qth and rth terms of an A.P. be $x, y, z$ repsectively, then show that : $x(q-r)+y(r-p)+z(p-q)=0$

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24. In an A.P., the first term is 2 and the sum of the first five terms is one-fourth of the next five terms. Show that 20th term is $\mathbf{- 1 1 2}$.

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25. Find the sum of all natural numbers lying between 100 and 1000 , which are multiples of 5 .

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26. Let the sum of $\mathrm{n}, 2 \mathrm{n}, 3 \mathrm{n}$ terms of an A.P. be $S_{1}, S_{2}$ and $S_{3}$, respectively, show that $S_{3}=3\left(S_{2}-S_{1}\right)$
27. The sums of $n$ terms of two arithmetic progressions are in the ratio $5 n+4: 9 n+6$. Find the ratio of their 18th terms.

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28. Prove that the sum of n arithmetic means between two numbers is n times the single A.M. between them.

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29. The digits of a positive integer having three digits are in AP and their sum is 15 . The number obtained by reversing the digits is 594 less then the original number. Find the number.
30. If the first and the nth terms of a GP are $a$ and $b$ respectively and if P is the product of the first n terms, then $P^{2}$ is equal to

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31. How many terms of the series $\sqrt{3}+3+3 \sqrt{3}+\ldots . .$. will make the sum $39+13 \sqrt{3}$ ?

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32. Find the sum of n terms of the following sequences: $8+88+888+. . . . . . . . . . . . . . . . u p ~ t o ~ n ~ t e r m s . ~$

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33. The A.M. between two positive numbers is 34 and their G.M. is 16 .
find the numbers.
34. If $a$ be the A.M. and $x$, $y$ be the two G.M's between $b$ and $c$, show that

$$
x^{3}+y^{3}=2 a b c .
$$

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35. The sum of three numbers which are consecutive terms of an A.P. is
36. If the second number is reduced by 1 and the third is increased by 1 , we obtain three consecutive terms of a G.P. Find the numbers.

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36. If $a, b, c$ are in A.P. and $x, y, z$ are in G.P., then show that $x^{b-c} \cdot y(c-a) . z(a-b)=1$.
37. Find a G.P. for which sum of the first two terms is -4 and the fifth term is 4 times the third term.

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38. The sum of an inifinite G.P. is 8 . If the second term is 2 , then find the first term and the series.

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39. Find the sum to $n$ terms of the series $3 \times 8+6 \times 11+9 \times 14+\ldots$

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40. Find the sum of the series
$1 \cdot n+2 \cdot(n-1)+3 \cdot(n-2)+4 \cdot(n-3)+\ldots+(n-1) \cdot 2+n \cdot 1$ also, find the coefficient of $x^{n-1}$ in th expansion of $\left(1+2 x+3 x^{2}+\ldots . n x^{n-1}\right)^{2}$.

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41. The difference between any two consecutive interior angles of a polygon is $5^{\circ}$. If the smallest angle is $120^{\circ}$, find the number of the sides of the polygon.

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42. A manufacturer reckons that the value of a machine, which costs him Rs. 15625, will depreciate each year by $20 \%$. Find the estimated value at the end of 5 years.
43. If A.M and G.M of two positive numbers are 13 and 12 respectively. Find the numbers.

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44. Find the sum of integers from 1 to 100 that are divisible by 2 or 5 .

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45. The ratio of the sums of $m$ and $n$ terms of an A.P. is $m^{2}: n^{2}$. Show that the ratio of $m^{\text {th }}$ and $n^{\text {th }}$ term is (2m-1): (2n-1).

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46. If $a^{2}, b^{2}, c^{2}$ are in A.P. Prove that $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are also in A.P.
47. If $S_{1}, S_{2}, S_{3}$ be respectively the sum of $\mathrm{n}, 2 \mathrm{n}$ and 3 n terms of a GP,
then $\frac{S_{1}\left(S_{3}-S_{2}\right)}{\left(S_{2}-S_{1}\right)^{2}}$ is equal to

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48. Let $S$ be the sum, $P$ the product and $R$ the sum of reciprocals of $n$ terms in a G.P. Prove that $P^{2} R^{n}=S^{n}$.

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49. Let $S$ be the sum, $P$ the product and $R$ the sum of reciprocals of $n$ terms in a G.P. Prove that $P^{2} R^{n}=S^{n}$.
50. The sum of two numbers is 6 times their geometric mean, show that numbers are in the ratio $(3+2 \sqrt{2}):(3-2 \sqrt{2})$.

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51. The sum of two numbers is 6 times their geometric mean, show that numbers are in the ratio $(3+2 \sqrt{2}):(3-2 \sqrt{2})$.

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52. The sum of three numbers in G.P. is 56 . If we subtract $1,7,21$ from these numbers in that order, we obtain an arithmetic progression. Find the numbers.

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53. If $a, b, c$ are in G.P. and $x, y$ are the arithmetic means of $a, b$ and $b, c$ respectively. Then prove that
$\frac{a}{x}+\frac{c}{y}=2$ and $\frac{1}{x}+\frac{1}{y}=\frac{2}{b}$.

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54. Find the sum of first n terms of the series.
$3+7+13+21+31+$ $\qquad$
