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## MATHS

## NCERT - NCERT MATHEMATICS(TELUGU)

## SEQUENCES AND SERIES

## Example

1. Write the first three terms in each of the following sequences defined by the following:
(i) $a_{n}=2 n+5$, (ii) $a_{n}=\frac{n-3}{4}$

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2. What is the $20^{\text {th }}$ term of the sequence defined by
$a_{n}=(n-1)(2-n)(3+n) ?$

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3. Let the sequence $a_{n}$ be defined as follows:
$a_{1}=1, a_{n}=a_{n-1}+2$ for $n \geq 2$.
Find first five terms and write corresponding series

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4. If the sum of n terms of an A.P. is $n P+\frac{1}{2} n(n-1) Q$
, where P and Q are constants, find the common
difference.

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5. The sum of n terms of two arithmetic progressions
are in the ratio $(3 n+8):(7 n+15)$. Find the ratio of their $12^{\text {th }}$ terms.

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6. The income of a person is Rs. $3,00,000$, in the first
year and he receives an increase of Rs. 10,000 to his income per year for the next 19 years. Find the total amount, he received in 20 years.

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7. Insert 6 numbers between 3 and 24 such that the resulting sequence is an A.P.

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8. Find the $10^{\text {th }}$ and $n^{\text {th }}$ term of G.P. : $5,25,125, \ldots .$.

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9. Which term of the G.P., $2,8,32, \ldots$ up to $n$ terms is

131072 ?

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10. In a GP the $3^{r d}$ term is 24 and $6^{\text {th }}$ term is 192 . find the $10^{\text {th }}$ term.

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11. Find the sum of first n terms and the sum of first 5
terms of the geometric series $1+\frac{2}{3}+\frac{4}{9}+\ldots \ldots \ldots \ldots$
12. How many terms of the G.P. $3, \frac{3}{2}, \frac{3}{4}, \ldots \ldots$ are needed to give the sum $\frac{3069}{512}$ is

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13. The sum of first three terms of a G.P. is $\frac{13}{12}$ and their product is -1 . Find the common ratio and the terms.

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14. Find the sum of the sequence $7,77,777,7777, \ldots$ to $n$ terms.
15. A person has 2 parents, 4 grandparents, 8 great grandparents, and so on.Find the number of his ancestors during the ten generations preceding his own.

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16. Insert three numbers between 1 and 256 so that the resulting sequence is a G.P.
17. If A.M. and G.M. of two positive numbers $a$ and $b$ are 10 and 8 , respectively, find the numbers.

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18. Find the sum to $n$ terms of the series : $5+11+19+29+41 \ldots \ldots \ldots$.

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19. Find the sum to n terms of the series whose $n^{\text {th }}$ term is $n(n+3)$.

## Miscellaneous Examples

1. If $p^{\text {th }}, q^{\text {th }}, r^{\text {th }}$ and $s^{\text {th }}$ terms of an A.P. are in G.P, then show that $(p-q),(q-r),(r-s)$ are also in G.P.

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2. If $\mathrm{a}, \mathrm{b}, \mathrm{c}$ are in G.P. and $a^{\frac{1}{x}}=b^{\frac{1}{y}}=c^{\frac{1}{z}}$, prove that $\mathrm{x}, \mathrm{y}$
, z are in A.P

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3. If $a, b, c, d$ and $p$ are different real numbers such that $\left(a^{2}+b^{2}+c^{2}\right) p^{2}-2(a b+b c+c d) p+\left(b^{2}+c^{2}+d^{2}\right) \leq 0$ , then show that $\mathrm{a}, \mathrm{b}, \mathrm{c}$ and d are in GP.

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4. If $a, b, c$ are in G.P then prove that equations $a x^{2}+2 b x+c=0$ and $d x^{2}+2 e x+f=0$ have a common root if $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in A.P.

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1. Write the first five terms of each of the sequences whose $n^{\text {th }}$ terms are:
$a_{n}=n(n+2)$

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2. Write the first five terms of each of the sequences whose $n^{\text {th }}$ terms are:
$a_{n}=\frac{n}{n+1}$

## D Watch Video Solution

3. Write the first five terms of each of the sequences
whose $n^{\text {th }}$ terms are:
$a_{n}=2^{n}$

## - Watch Video Solution

4. Write the first five terms of each of the sequences
whose $n^{\text {th }}$ terms are:
$a_{n}=\frac{2 n-3}{6}$

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5. Write the first five terms of each of the sequences whose $n^{\text {th }}$ terms are:
$a_{n}=(-1)^{n-1} 5^{n+1}$
6. Write the first five terms of each of the sequences whose $n^{\text {th }}$ terms are:
$a_{n}=n \frac{n^{2}+5}{4}$

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7. Find the indicated terms in each of the sequences
whose $n^{\text {th }}$ terms are:
$a_{n}=4 n-3, a_{17}, a_{24}$

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8. Find the indicated terms in each of the sequences whose $n^{\text {th }}$ terms are:
$a_{n}=\frac{n^{2}}{2^{n}}, a_{7}$

## - Watch Video Solution

9. Find the indicated terms in each of the sequences whose $n^{\text {th }}$ terms are:
$a_{n}=(-1)^{n-1} n^{3}, a_{9}$
10. Find the indicated terms in each of the sequences
whose $n^{\text {th }}$ terms are:
$a_{n}=\frac{n(n-2)}{n+3}, a_{20}$

## D Watch Video Solution

11. Write the first five terms of each of the sequences and obtain the corresponding series:
$a_{1}=3, a_{n}=3 a_{n-1}+2$ for all $n>1$

## D Watch Video Solution

12. Write the first five terms of each of the sequences and obtain the corresponding series:
$a_{1}=-1, a_{n}=\frac{a_{n-1}}{n}, n \geq 2$

## D Watch Video Solution

13. Write the first five terms of each of the sequences and obtain the corresponding series:
$a_{1}=a_{2}=2, a_{n}=a_{n-1}-1, n>2$
(D) Watch Video Solution
14. The Fibonacci sequence is defined by
$1=a_{1}=a_{2}$ and $a_{n}=a_{n-1}+a_{n-2}, n>2 \quad$ Find
$\frac{a_{n+1}}{a_{n}}$ for $\mathrm{n}=1,2,3,4,5$

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Exercise 92

1. Find the sum of odd integers from 1 to 2001.

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

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3. 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 $20^{\text {th }}$ term is -112.

## D Watch Video Solution

4. How many terms of A.P. $-6, \frac{-11}{2},-5 \ldots . .$. are needed to obtain a sum -25?

## D Watch Video Solution

5. In an A.P. if $p^{t h}$ term is $\frac{1}{q}$ and $q^{t h}$ term is $\frac{1}{p}$, prove that the sum of first pq terms is $\frac{1}{2}(p q+1)$, where $p \neq q$.

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6. If the sum of a certain number of terms of the A.P. 25 ,
$22,19, \ldots$ is 116 . Find the last term.

- Watch Video Solution

7. Find the sum to $n$ terms of the A.P., whose $k^{\text {th }}$ term is $5 k+1$.

## D Watch Video Solution

8. If the sum of n terms of an A.P. is $\left(p n+q n^{2}\right)$, where p and q are constants, find the common difference.

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9. The sums of n terms of two arithmetic progressions
are in the ratio $5 n+4: 9 n+6$. Find the ratio of their $18^{\text {th }}$ terms.
10. If the sum of first $p$ terms of an A.P. is equal to the sum of the first $q$ terms, then find the sum of the first $(p+q)$ terms.

## - Watch Video Solution

11. 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 $(2 m-1):(2 n-1)$.
12. If the sum of n terms of an A.P. is $3 n^{2}+5 n$ and its $m^{\text {th }}$ term is 164 , find the value of $m$.

## D Watch Video Solution

13. Insert five numbers between 8 and 26 such that the resulting sequence is an A.P.

## - View Text Solution

14. If $\frac{a^{n+1}+b^{n+1}}{a^{n}+b^{n}}$ is the AM of a and b then $\mathrm{n}=$
15. Between 1 and $31, \mathrm{~m}$ numbers have been inserted in
such a way that the resulting sequence is an A. P. and the ratio of $7^{\text {th }}$ and $(m-1)^{\text {th }}$ numbers is $5: 9$. Find the value of $m$.

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16. 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 $30^{\text {th }}$ instalment?

## D Watch Video Solution

17. 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.

## D View Text Solution

## Exercise 93

1. Find the $20^{\text {th }}$ and $n^{\text {th }}$ term of the G.P.
$5 \quad 5 \quad 5$
$\overline{2}, \overline{4}, \overline{8}, \ldots \ldots$.

## D Watch Video Solution

2. Find the $12^{\text {th }}$ term of a G.P. whose $8^{\text {th }}$ term is 192 and the common ratio is 2 .

## - Watch Video Solution

3. The $5^{\text {th }}, 8^{\text {th }}$ and $11^{\text {th }}$ terms of a G.P. are $\mathrm{p}, \mathrm{q}$ and s respectively. Then $q^{2}=. . . . . . .$.

## - Watch Video Solution

4. The $4^{\text {th }}$ term of a G.P. is square of its second term, and the first term is -3 .Determine its $7^{\text {th }}$ term.
5. Which term of the following sequences:
(a) $2,2 \sqrt{2}, 4 \ldots \ldots \ldots$ is 128 ? (b) $\sqrt{3}, 3,3 \sqrt{3}, \ldots \ldots \ldots \ldots$ is 729 ?
(c) $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots \ldots$ is $\frac{1}{19683}$ ?

## - Watch Video Solution

6. For what values of x , the numbers $-\frac{2}{7}, x,-\frac{7}{2}$ are in G.P ?

Watch Video Solution
7. Find the sum to indicated number of terms in each of
the geometric progressions in
$0.15,0.015,0.0015, \ldots . . . . . . .20$ terms .

## D Watch Video Solution

8. Find the sum to indicated number of terms in each of
the geometric progressions in
$\sqrt{7}, \sqrt{21} 3 \sqrt{7}, \ldots \ldots . . . n$ terms

- Watch Video Solution

9. Find the sum to indicated number of terms in each of
the geometric progressions in Exercises
$1,-a, a^{2},-a^{3}, \ldots \ldots . n$ terms (if $a \neq-1$ )

## D Watch Video Solution

10. Find the sum to indicated number of terms in each of the geometric progressions in
$x^{3}, x^{5}, x^{7}, \ldots \ldots \ldots . n$ terms (if $x \neq \pm 1$ )

## - Watch Video Solution

11. Evaluate $\sum_{k=1}^{11}\left(2+3^{k}\right)$

## - Watch Video Solution

12. The sum of first three terms of a G.P. is $39 / 10$ and their product is 1 . Find the common ratio and the terms.

## D Watch Video Solution

13. How many terms of a G.P. $3,3^{2}, 3^{3}, \ldots . . . . . .$. . Are needed to give the sum 120 ?
14. The sum of first three terms of a G.P. is 16 and the sum of the next three terms is 128 . Determine the first term, the common ratio and the sum to $n$ terms of the G.P.

## D Watch Video Solution

15. Given a G.P. with $a=729$ and $7^{\text {th }}$ term 64, determine $S_{7}$.
16. Find a G.P. for which sum of the first two terms is $\mathbf{- 4}$ and the fifth term is 4 times the third term.

## (D) Watch Video Solution

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

## - Watch Video Solution

18. Find the sum to $n$ terms of the sequence, $8,88,888$, 8888... .
19. Find the sum of the products of the corresponding terms of the sequences $2,4,8,16,32$ and $128,32,8,2$ $\frac{1}{2}$

## - Watch Video Solution

20. Show that the products of the corresponding terms of the sequences a , ar, $a r^{2}, \ldots a r^{n-1}$ and $\mathrm{A}, \mathrm{AR}$,
$\mathrm{AR}^{2}, \ldots \mathrm{AR}^{n-1}$ form a G.P, and find the common ratio.
21. Find four numbers forming a geometric progression
in which the third term is greater than the first term by 9 , and the second term is greater than the $4^{\text {th }}$ by 18.

## - Watch Video Solution

22. If the $p^{\text {th }}, q^{\text {th }}$ and $r^{\text {th }}$ terms of a G.P. are $\mathrm{a}, \mathrm{b}$ and c , respectively. Prove that $a^{q-r} b^{r-p} c^{P-q}=1$.

## (D) Watch Video Solution

23. If $a, b, c$ and $d$ are in G.P. show that

$$
\left(a^{2}+b^{2}+c^{2}\right)\left(b^{2}+c^{2}+d^{2}\right)=(a b+b c+c d)^{2}
$$

24. Insert two numbers between 3 and 81 so that the resulting sequence is G.P.

## D Watch Video Solution

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

## D Watch Video Solution

26. The number of bacteria in a certain culture doubles
every hour. If there were 30 bacteria present in the
culture originally, how many bacteria will be present at the end of $2^{\text {nd }}$ hour, $4^{\text {th }}$ hour and $n^{\text {th }}$ hour ?

## D Watch Video Solution

27. What will Rs 500 amounts to in 10 years after its deposit in a bank which pays annual interest rate of $10 \%$ compounded annually?

## D View Text Solution

28. If A.M. and G.M. of roots of a quadratic equation are

8 and 5, respectively, then obtain the quadratic equation.

## - View Text Solution

## Exercise 94

1. Find the sum to $n$ terms of each of the series in
$1 \times 2+2 \times 3+3 \times 4+4 \times 5+\ldots$.

## - View Text Solution

2. Find the sum to $n$ terms of each of the series in
$1 \times 2 \times 3+2 \times 3 \times 4+3 \times 4 \times 5+\ldots$

## - View Text Solution

3. Find the sum to $n$ terms of each of the series in $3 \times 1^{2}+5 \times 2^{2}+7 \times 3^{2}+\ldots \ldots \ldots$.

## - View Text Solution

4. Find the sum to $n$ terms of each of the series in

$$
\frac{1}{1 \times 2}+\frac{1}{2 \times 3}+\frac{1}{3 \times 4}+\ldots \ldots
$$

## D View Text Solution

5. Find the sum to $n$ terms of each of the series in $5^{2}+6^{2}+7^{2}+\ldots+20^{2}$
6. Find the sum to $n$ terms of each of the series in $3 \times 8+6 \times 11+9 \times 14+\ldots$.

## D View Text Solution

7. Find the sum to $n$ terms of each of the series in
$1^{2}+\left(1^{2}+2^{2}\right)+\left(1^{2}+2^{2}+3^{2}\right)+\ldots$

## (D) View Text Solution

8. Find the sum to n terms of the series in whose $n^{t h}$ terms is given by
$n(n+1)(n+4)$
9. Find the sum to n terms of the series in whose $n^{\text {th }}$ terms is given by $n^{2}+2^{n}$

## - View Text Solution

10. Find the sum to n terms of the series in whose $n^{\text {th }}$
terms is given by
$(2 n-1)^{2}$

- View Text Solution


## Miscellaneous Exercise On Chapter 9

1. 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.

## D Watch Video Solution

2. If the sum of three numbers in A.P., is 24 and their product is 440 , find the numbers.

## D View Text Solution

3. Find the sum of all numbers between 200 and 400
which are divisible by 7 .
4. Find the sum of Integers from 1 to 100 which are divisible by 2 or 5 .

## D Watch Video Solution

5. Find the sum of all two digit numbers which when divided by 4 , yields 1 as remainder.
6. If $f$ is a function satisfying $f(x+y)=f(x) f(y)$ for all $x, y \in N$ such that $f(1)=3$ and $\sum_{x=1}^{n} f(x)=120$, find the value of $n$.

## D Watch Video Solution

7. The sum of some terms of G.P. is 315 whose first term and the common ratio are 5 and 2 , respectively. Find the last term and the number of terms.
8. The first term of a G.P. is 1 . The sum of the third term and fifth term is 90 . Find the common ratio of G.P.

## - View Text Solution

9. 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.

## D Watch Video Solution

10. 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.

## - Watch Video Solution

11. The sum of the first four terms of an A.P. is 56 . The sum of the last four terms is 112 . If its first term is 11 , then find the number of terms.

## D View Text Solution

12. If $\frac{a+b x}{a-b x}=\frac{b+c x}{b-c x}=\frac{c+d x}{c-d x}(x \neq 0)$, then a ,b ,c ,d are in
13. Find the 5 th term of the sequence $1, \sqrt{2}, 2$

## - Watch Video Solution

14. Find the 6th term from the end of the
A.P:17,14,11,......-40

- Watch Video Solution

15. 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., then
16. If $a, b, c, d$ are in G.P, prove that $\left(a^{n}+b^{n}\right),\left(b^{n}+c^{n}\right),\left(c^{n}+d^{n}\right)$ are in G.P.

## D Watch Video Solution

17. Find the product of the following pairs?
$-10 a b^{3},-6 a^{2} b$

## (D) Watch Video Solution

18. Find the product of the following pairs?
$6 p q,-2 p q^{2}$
19. Find the product of the following pairs?
$2 l m, 5 m$

## - Watch Video Solution

20. Find the sum of the following series up to $n$ terms:
(i) $5+55+555+\ldots \ldots$.
$.6+.66 .+.666+. . . . . . . . . .$.

- View Text Solution

21. Find the $20^{\text {th }}$ term of the series
$2 \times 4+4 \times 6+6 \times 8+\ldots+n$ terms.

## - View Text Solution

22. Find the sum of the first $n$ terms of the series: $3+7$
$+13+21+31+. . . . . .$.

## - View Text Solution

23. If $S_{1}, S_{2}, S_{3}$, are the sums of first n natural numbers their squares and their cubes respectively, then $S_{3}\left(1+8 S_{1}\right)=$
24. Find the product of the following pairs?
$a^{2} b c, 12 b^{3} c$

## D Watch Video Solution

25. Find the product of the following pairs?
$12 p^{3} q, 5 p^{2} q^{2}$

D Watch Video Solution
26. A farmer 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?

## - View Text Solution

27. Shamshad Ali buys a scooter for Rs 22000 . He pays

Rs 4000 cash and agrees to pay the balance in annual instalment of Rs 1000 plus $10 \%$ interest on the unpaid amount. How much will the scooter cost him?

## - View Text Solution

28. Find the product of the following pairs?
$12 p^{3} q r^{2},-2 p q^{2}$

## D Watch Video Solution

29. Find the product of the following pairs?
$15 q^{2} r, 2 p^{2} q$

## - Watch Video Solution

30. 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.
31. 150 workers were engaged to finish a job in a certain number of days. 4 workers dropped out on second day,

4 more workers dropped out on third day and so on.

