## EXERCISE 9.1

Write the first five terms of each of the sequences in Exercises 1 to $\mathbf{6}$ whose nth terms are:

1. $\mathbf{a}_{\mathrm{n}}=\mathbf{n}(\mathrm{n}+2)$

## Solution:

Given,
$\mathrm{n}^{\text {th }}$ term of a sequence $\mathrm{a}_{\mathrm{n}}=\mathrm{n}(\mathrm{n}+2)$
On substituting $n=1,2,3,4$, and 5 , we get the first five terms
$a_{1}=1(1+2)=3$
$\mathrm{a}_{2}=2(2+2)=8$
$\mathrm{a}_{3}=3(3+2)=15$
$a_{4}=4(4+2)=24$
$a_{5}=5(5+2)=35$
Hence, the required terms are $3,8,15,24$, and 35 .
2. $\mathbf{a}_{\mathrm{n}}=\mathbf{n} / \mathbf{n}+\mathbf{1}$

## Solution:

Given the $\mathrm{n}^{\text {th }}$ term, $\mathrm{a}_{\mathrm{n}}=\mathrm{n} / \mathrm{n}+1$
On substituting $n=1,2,3,4,5$, we get
$a_{1}=\frac{1}{1+1}=\frac{1}{2}, a_{2}=\frac{2}{2+1}=\frac{2}{3}, a_{3}=\frac{3}{3+1}=\frac{3}{4}, a_{4}=\frac{4}{4+1}=\frac{4}{5}, a_{5}=\frac{5}{5+1}=\frac{5}{6}$
Hence, the required terms are $1 / 2,2 / 3,3 / 4,4 / 5$ and 5/6.
3. $a_{n}=2^{n}$

## Solution:

Given the $\mathrm{n}^{\text {th }}$ term, $a_{n}=2^{n}$
On substituting $n=1,2,3,4,5$, we get
$a_{1}=2^{1}=2$
$a_{2}=2^{2}=4$
$\mathrm{a}_{3}=2^{3}=8$
$\mathrm{a}_{4}=2^{4}=16$
$\mathrm{a}_{5}=2^{5}=32$
Hence, the required terms are 2, 4, 8, 16, and 32 .
4. $a_{n}=(2 n-3) / 6$

## Solution:

Given the $\mathrm{n}^{\mathrm{h}}$ term, $a_{n}=(2 \mathrm{n}-3) / 6$
On substituting $n=1,2,3,4,5$, we get
$\mathrm{a}_{1}=\frac{2 \times 1-3}{6}=\frac{-1}{6}$
$\mathrm{a}_{2}=\frac{2 \times 2-3}{6}=\frac{1}{6}$
$\mathrm{a}_{3}=\frac{2 \times 3-3}{6}=\frac{3}{6}=\frac{1}{2}$
$\mathrm{a}_{4}=\frac{2 \times 4-3}{6}=\frac{5}{6}$
$\mathrm{a}_{5}=\frac{2 \times 5-3}{6}=\frac{7}{6}$
Hence, the required terms are $-1 / 6,1 / 6,1 / 2,5 / 6$ and $7 / 6$.
5. $a_{n}=(-1)^{n-1} 5^{n+1}$

## Solution:

Given the $\mathrm{n}^{\text {h. }}$ term, $\mathrm{a}_{\mathrm{n}}=(-1)^{\mathrm{n}-1} 5^{n+1}$
On substituting $n=1,2,3,4,5$, we get
$\mathrm{a}_{1}=(-1)^{1-1} 5^{1+1}=5^{2}=25$
$\mathrm{a}_{2}=(-1)^{2-1} 5^{2+1}=-5^{3}=-125$
$\mathrm{a}_{3}=(-1)^{3-1} 5^{3+1}=5^{4}=625$
$a_{4}=(-1)^{4-1} 5^{4+1}=-5^{5}=-3125$
$\mathrm{a}^{5}=(-1)^{5-1} 5^{5+1}=5^{6}=15625$
Hence, the required terms are $25,-125,625,-3125$, and 15625 .
6.
$\mathrm{a}_{\mathrm{n}}=\mathrm{n} \frac{\mathrm{n}^{2}+5}{4}$

## Solution:

On substituting $n=1,2,3,4,5$, we get the first 5 terms.
$a_{1}=1 \cdot \frac{1^{2}+5}{4}=\frac{6}{4}=\frac{3}{2}$
$a_{2}=2 \cdot \frac{2^{2}+5}{4}=2 \cdot \frac{9}{4}=\frac{9}{2}$
$a_{3}=3 \cdot \frac{3^{2}+5}{4}=3 \cdot \frac{14}{4}=\frac{21}{2}$
$a_{4}=4 \cdot \frac{4^{2}+5}{4}=21$
$a_{5}=5 \cdot \frac{5^{2}+5}{4}=5 \cdot \frac{30}{4}=\frac{75}{2}$

Hence, the required terms are $3 / 2,9 / 2,21 / 2,21$ and $75 / 2$.
Find the indicated terms in each of the sequences in Exercises 7 to 10 whose $\mathbf{n}^{\text {th }}$ terms are:
7. $\mathbf{a}_{\mathrm{n}}=\mathbf{4 n}-\mathbf{3} ; \mathbf{a}_{17}, \mathbf{a}_{24}$

## Solution:

Given,
The $n^{\text {th }}$ term of the sequence is $\mathrm{a}_{\mathrm{n}}=4 \mathrm{n}-3$
On substituting $n=17$, we get
$a_{17}=4(17)-3=68-3=65$
Next, on substituting $n=24$, we get
$\mathrm{a}_{24}=4(24)-3=96-3=93$
8. $\mathbf{a}_{\mathrm{n}}=\mathbf{n}^{2} / \mathbf{2}^{\mathrm{n}} ; \mathbf{a}^{7}$

## Solution:

Given,
The $n^{\text {th }}$ term of the sequence is $\mathrm{a}_{\mathrm{n}}=\mathrm{n}^{2} / 2^{\mathrm{n}}$

Now, on substituting $n=7$, we get
$a_{7}=7^{2} / 2^{7}=49 / 128$
9. $a_{n}=(-1)^{n-1} n^{3} ; a_{9}$

## Solution:

Given,

The $n^{\mathrm{th}}$ term of the sequence is $\mathrm{a}_{\mathrm{n}}=(-1)^{\mathrm{n-1}} \mathrm{n}^{3}$
On substituting $n=9$, we get
$\mathrm{a}_{9}=(-1)^{9-1}(9)^{3}=1 \times 729=729$
$a_{n}=\frac{n(n-2)}{n+3} ; a_{20}$
10.

## Solution:

On substituting $n=20$, we get
$\mathrm{a}_{20}=\frac{20(20-2)}{20+3}=\frac{20(18)}{23}=\frac{360}{23}$

Write the first five terms of each of the sequences in Exercises 11 to 13 and obtain the corresponding series:
11. $a_{1}=3, a_{n}=3 a_{n-1}+2$ for all $n>1$

## Solution:

Given, $a_{n}=3 a_{n-1}+2$ and $a_{1}=3$

Then,
$a_{2}=3 a_{1}+2=3(3)+2=11$
$\mathrm{a}_{3}=3 \mathrm{a}_{2}+2=3(11)+2=35$
$a_{4}=3 a_{3}+2=3(35)+2=107$
$a_{5}=3 a_{4}+2=3(107)+2=323$
Thus, the first 5 terms of the sequence are $3,11,35,107$ and 323.

Hence, the corresponding series is
$3+11+35+107+323$ $\qquad$
12. $a_{1}=-1, a_{n}=a_{n-1} / n, n \geq 2$

Solution:
Given,
$a_{n}=a_{n-1} / n$ and $a_{1}=-1$
Then,
$a_{2}=a_{1} / 2=-1 / 2$
$\mathrm{a}_{3}=\mathrm{a}_{2} / 3=-1 / 6$
$a_{4}=a_{3} / 4=-1 / 24$
$\mathrm{a}_{5}=\mathrm{a}_{4} / 5=-1 / 120$
Thus, the first 5 terms of the sequence are $-1,-1 / 2,-1 / 6,-1 / 24$ and $-1 / 120$.
Hence, the corresponding series is
$-1+(-1 / 2)+(-1 / 6)+(-1 / 24)+(-1 / 120)+\ldots \ldots$.
13. $a_{1}=a_{2}=2, a_{n}=a_{n-1}-1, n>2$

## Solution:

Given,
$a_{1}=a_{2}, a_{n}=a_{n-1}-1$
Then,
$\mathrm{a}_{3}=\mathrm{a}_{2}-1=2-1=1$
$\mathrm{a}_{4}=\mathrm{a}_{3}-1=1-1=0$
$\mathrm{a}_{5}=\mathrm{a}_{4}-1=0-1=-1$
Thus, the first 5 terms of the sequence are $2,2,1,0$ and -1 .
The corresponding series is
$2+2+1+0+(-1)+$ $\qquad$
14. The Fibonacci sequence is defined by
$1=a_{1}=a_{2}$ and $a_{n}=a_{n-1}+a_{n-2}, n>2$
Find $\mathbf{a}_{\mathrm{nt}} / \mathbf{a}_{\mathrm{n}}$, for $\mathrm{n}=1,2,3,4,5$
Solution:

Given,
$1=a_{1}=a_{2}$
$a_{n}=a_{n-1}+a_{n-2}, n>2$
So,
$\mathrm{a}_{3}=\mathrm{a}_{2}+\mathrm{a}_{1}=1+1=2$
$\mathrm{a}_{4}=\mathrm{a}_{3}+\mathrm{a}_{2}=2+1=3$
$\mathrm{a}_{5}=\mathrm{a}_{4}+\mathrm{a}_{3}=3+2=5$
$\mathrm{a}_{6}=\mathrm{a}_{5}+\mathrm{a}_{4}=5+3=8$
Thus,
For $\mathrm{n}=1, \frac{\mathrm{a}_{\mathrm{n}}+1}{\mathrm{a}_{\mathrm{n}}}=\frac{\mathrm{a}_{2}}{\mathrm{a}_{1}}=\frac{1}{1}=1$
For $\mathrm{n}=2, \frac{\mathrm{a}_{\mathrm{n}}+1}{\mathrm{a}_{\mathrm{n}}}=\frac{\mathrm{a}_{3}}{\mathrm{a}_{2}}=\frac{2}{1}=2$
For $\mathrm{n}=3, \frac{\mathrm{a}_{\mathrm{n}}+1}{\mathrm{a}_{\mathrm{n}}}=\frac{\mathrm{a}_{4}}{\mathrm{a}_{3}}=\frac{3}{2}$
For $\mathrm{n}=4, \frac{\mathrm{a}_{\mathrm{n}}+1}{\mathrm{a}_{\mathrm{n}}}=\frac{\mathrm{a}_{5}}{\mathrm{a}_{4}}=\frac{5}{3}$
For $\mathrm{n}=5, \frac{\mathrm{a}_{\mathrm{n}}+1}{\mathrm{a}_{\mathrm{n}}}=\frac{\mathrm{a}_{6}}{\mathrm{a}_{5}}=\frac{8}{5}$

