

Chapter 9 - Sequences And Series

Page No 180:

Question 1:Write the first five terms of the sequences whose n^{th} term is $a_n = n(n + 2)$ **Answer:**

$$a_n = n(n + 2)$$

Substituting $n = 1, 2, 3, 4,$ and $5,$ we obtain

$$a_1 = 1(1 + 2) = 3$$

$$a_2 = 2(2 + 2) = 8$$

$$a_3 = 3(3 + 2) = 15$$

$$a_4 = 4(4 + 2) = 24$$

$$a_5 = 5(5 + 2) = 35$$

Therefore, the required terms are $3, 8, 15, 24,$ and $35.$ **Question 2:**Write the first five terms of the sequences whose n^{th} term is $a_n = \frac{n}{n+1}$ **Answer:**

$$a_n = \frac{n}{n+1}$$

Substituting $n = 1, 2, 3, 4, 5,$ we obtain

$$a_1 = \frac{1}{1+1} = \frac{1}{2}, a_2 = \frac{2}{2+1} = \frac{2}{3}, a_3 = \frac{3}{3+1} = \frac{3}{4}, a_4 = \frac{4}{4+1} = \frac{4}{5}, a_5 = \frac{5}{5+1} = \frac{5}{6}$$

Therefore, the required terms are $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5},$ and $\frac{5}{6}.$ **Question 3:**Write the first five terms of the sequences whose n^{th} term is $a_n = 2^n$ **Answer:**

$$a_n = 2^n$$

Substituting $n = 1, 2, 3, 4, 5,$ we obtain

$$a_1 = 2^1 = 2$$

$$a_2 = 2^2 = 4$$

$$a_3 = 2^3 = 8$$

$$a_4 = 2^4 = 16$$

$$a_5 = 2^5 = 32$$

Therefore, the required terms are $2, 4, 8, 16,$ and $32.$

Question 4:

Write the first five terms of the sequences whose n^{th} term is $a_n = \frac{2n-3}{6}$

Answer:

Substituting $n = 1, 2, 3, 4, 5$, we obtain

$$a_1 = \frac{2 \times 1 - 3}{6} = \frac{-1}{6}$$

$$a_2 = \frac{2 \times 2 - 3}{6} = \frac{1}{6}$$

$$a_3 = \frac{2 \times 3 - 3}{6} = \frac{3}{6} = \frac{1}{2}$$

$$a_4 = \frac{2 \times 4 - 3}{6} = \frac{5}{6}$$

$$a_5 = \frac{2 \times 5 - 3}{6} = \frac{7}{6}$$

Therefore, the required terms are $\frac{-1}{6}, \frac{1}{6}, \frac{1}{2}, \frac{5}{6}$, and $\frac{7}{6}$.

Question 5:

Write the first five terms of the sequences whose n^{th} term is $a_n = (-1)^{n-1} 5^{n+1}$

Answer:

Substituting $n = 1, 2, 3, 4, 5$, we obtain

$$a_1 = (-1)^{1-1} 5^{1+1} = 5^2 = 25$$

$$a_2 = (-1)^{2-1} 5^{2+1} = -5^3 = -125$$

$$a_3 = (-1)^{3-1} 5^{3+1} = 5^4 = 625$$

$$a_4 = (-1)^{4-1} 5^{4+1} = -5^5 = -3125$$

$$a_5 = (-1)^{5-1} 5^{5+1} = 5^6 = 15625$$

Therefore, the required terms are 25, -125, 625, -3125, and 15625.

Question 6:

Write the first five terms of the sequences whose n^{th} term is $a_n = n \frac{n^2+5}{4}$

Answer:

Substituting $n = 1, 2, 3, 4, 5$, we obtain

$$a_1 = 1 \cdot \frac{1^2+5}{4} = \frac{6}{4} = \frac{3}{2}$$

$$a_2 = 2 \cdot \frac{2^2+5}{4} = 2 \cdot \frac{9}{4} = \frac{9}{2}$$

$$a_3 = 3 \cdot \frac{3^2+5}{4} = 3 \cdot \frac{14}{4} = \frac{21}{2}$$

$$a_4 = 4 \cdot \frac{4^2+5}{4} = 21$$

$$a_5 = 5 \cdot \frac{5^2+5}{4} = 5 \cdot \frac{30}{4} = \frac{75}{2}$$

Therefore, the required terms are $\frac{3}{2}$, $\frac{9}{2}$, $\frac{21}{2}$, 21, and $\frac{75}{2}$.

Question 7:

Find the 17th term in the following sequence whose n^{th} term is $a_n = 4n - 3$; a_{17} , a_{24}

Answer:

Substituting $n = 17$, we obtain

$$a_{17} = 4(17) - 3 = 68 - 3 = 65$$

Substituting $n = 24$, we obtain

$$a_{24} = 4(24) - 3 = 96 - 3 = 93$$

Question 8:

Find the 7th term in the following sequence whose n^{th} term is $a_n = \frac{n^2}{2n}$; a_7

Answer:

Substituting $n = 7$, we obtain

$$a_7 = \frac{7^2}{2 \times 7} = \frac{7}{2}$$

Question 8:

Find the indicated terms in each of the sequences in Exercises 7 to 10 whose n^{th} terms are : $a_n = n^2/2^n$; a^7

Answer:

Here,

$$a_n = n^2/2^n$$

Substituting $n = 7$, we obtain

$$a_7 = \frac{7^2}{2^7} = \frac{49}{128}$$

Question 9:

Find the 9th term in the following sequence whose n^{th} term is $a_n = (-1)^{n-1} n^3$; a_9

Answer:

Substituting $n = 9$, we obtain

$$a_9 = (-1)^{9-1} (9)^3 = (9)^3 = 729$$

Question 10:

Find the 20th term in the following sequence whose n^{th} term is $a_n = \frac{n(n-2)}{n+3}$; a_{20}

Answer:

Substituting $n = 20$, we obtain

$$a_{20} = \frac{20(20-2)}{20+3} = \frac{20(18)}{23} = \frac{360}{23}$$

Page No 181:

Question 11:

Write the first five terms of the following sequence and obtain the corresponding series:

$$a_1 = 3, a_n = 3a_{n-1} + 2 \text{ for all } n > 1$$

Answer:

$$a_1 = 3, a_n = 3a_{n-1} + 2 \text{ for all } n > 1$$

$$\Rightarrow a_2 = 3a_1 + 2 = 3(3) + 2 = 11$$

$$a_3 = 3a_2 + 2 = 3(11) + 2 = 35$$

$$a_4 = 3a_3 + 2 = 3(35) + 2 = 107$$

$$a_5 = 3a_4 + 2 = 3(107) + 2 = 323$$

Hence, the first five terms of the sequence are 3, 11, 35, 107, and 323.

 The corresponding series is $3 + 11 + 35 + 107 + 323 + \dots$
Question 12:

Write the first five terms of the following sequence and obtain the corresponding series:

$$a_1 = -1, a_n = \frac{a_{n-1}}{n}, n \geq 2$$

Answer:

$$a_1 = -1, a_n = \frac{a_{n-1}}{n}, n \geq 2$$

$$\Rightarrow a_2 = \frac{a_1}{2} = \frac{-1}{2}$$

$$a_3 = \frac{a_2}{3} = \frac{-1}{6}$$

$$a_4 = \frac{a_3}{4} = \frac{-1}{24}$$

$$a_5 = \frac{a_4}{5} = \frac{-1}{120}$$

 Hence, the first five terms of the sequence are $-1, \frac{-1}{2}, \frac{-1}{6}, \frac{-1}{24},$ and $\frac{-1}{120}$.

 The corresponding series is $(-1) + \left(\frac{-1}{2}\right) + \left(\frac{-1}{6}\right) + \left(\frac{-1}{24}\right) + \left(\frac{-1}{120}\right) + \dots$
Question 13:

Write the first five terms of the following sequence and obtain the corresponding series:

$$a_1 = a_2 = 2, a_n = a_{n-1} - 1, n > 2$$

Answer:

$$a_1 = a_2 = 2, a_n = a_{n-1} - 1, n > 2$$

$$\Rightarrow a_3 = a_2 - 1 = 2 - 1 = 1$$

$$a_4 = a_3 - 1 = 1 - 1 = 0$$

$$a_5 = a_4 - 1 = 0 - 1 = -1$$