

MATHEMATICS • CLASS 11

CHAPTER 8

Sequences and Series

NCERT SOLUTIONS



EXERCISE 8.1 — QUESTIONS 1–3

Find the first five terms by substituting $n = 1, 2, 3, 4, 5$.

Q1. $a_n = n(n + 2)$

Solution:

Substitute $n = 1$:

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

Similarly,

$$a_2 = 2(2 + 2) = 2 \times 4 = 8$$

$$a_3 = 3(3 + 2) = 3 \times 5 = 15$$

$$a_4 = 4(4 + 2) = 4 \times 6 = 24$$

$$a_5 = 5(5 + 2) = 5 \times 7 = 35$$

First five terms:

3, 8, 15, 24, 35.

Q2. $a_n = \frac{n}{n + 1}$

Solution:

Substitute $n = 1$:

$$a_1 = \frac{1}{1 + 1} = \frac{1}{2}$$

Similarly,

$$a_2 = \frac{2}{2 + 1} = \frac{2}{3}$$

$$a_3 = \frac{3}{3 + 1} = \frac{3}{4}$$

$$a_4 = \frac{4}{4 + 1} = \frac{4}{5}$$

$$a_5 = \frac{5}{5 + 1} = \frac{5}{6}$$

First five terms:

$\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}$.

Q3. $a_n = 2^n$

Solution:

Substitute $n = 1$:

$$a_1 = 2^1 = 2$$

Similarly,

$$a_2 = 2^2 = 4$$

$$a_3 = 2^3 = 8$$

$$a_4 = 2^4 = 16$$

$$a_5 = 2^5 = 32$$

First five terms:

2, 4, 8, 16, 32.

EXERCISE 8.1 — QUESTIONS 4–6

Q4. $a_n = \frac{2n-3}{6}$

For $n=1$,

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

For $n=2$,

$$a_2 = \frac{2(2)-3}{6} = \frac{4-3}{6} = \frac{1}{6}$$

For $n=3$,

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

For $n=4$,

$$a_4 = \frac{2(4)-3}{6} = \frac{8-3}{6} = \frac{5}{6}$$

For $n=5$,

$$a_5 = \frac{2(5)-3}{6} = \frac{10-3}{6} = \frac{7}{6}$$

Answer: $-\frac{1}{6}, \frac{1}{6}, \frac{1}{2}, \frac{5}{6}, \frac{7}{6}$

Q5. $a_n = (-1)^{n-1} 5^{n+1}$

For $n=1$,

$$a_1 = (-1)^{1-1} 5^{1+1} = (-1)^0 5^2 = 25$$

For $n=2$,

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

For $n=3$,

$$a_3 = (-1)^{3-1} 5^{3+1} = (-1)^2 5^4 = 625$$

For $n=4$,

$$a_4 = (-1)^{4-1} 5^{4+1} = (-1)^3 5^5 = -3125$$

For $n=5$,

$$a_5 = (-1)^{5-1} 5^{5+1} = (-1)^4 5^6 = 15625$$

Answer: 25, -125, 625, -3125, 15625

Q6. $a_n = \frac{n(n^2+5)}{4}$

For $n=1$,

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

For $n=2$,

$$a_2 = \frac{2(2^2+5)}{4} = \frac{2(4+5)}{4} = \frac{18}{4} = \frac{9}{2}$$

For $n=3$,

$$a_3 = \frac{3(3^2+5)}{4} = \frac{3(9+5)}{4} = \frac{42}{4} = \frac{21}{2}$$

For $n=4$,

$$a_4 = \frac{4(4^2+5)}{4} = \frac{4(16+5)}{4} = \frac{84}{4} = 21$$

For $n=5$,

$$a_5 = \frac{5(5^2+5)}{4} = \frac{5(25+5)}{4} = \frac{150}{4} = \frac{75}{2}$$

Answer: $\frac{3}{2}, \frac{9}{2}, \frac{21}{2}, 21, \frac{75}{2}$

EXERCISE 8.1 – QUESTIONS 7–10

Q7. $a_n = 4n - 3$

Substitute $n = 17$ and $n = 24$.

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

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

Q8. $a_n = \frac{n^2}{2}$

Substitute $n = 7$.

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

Q9. $a_n = (-1)^{n-1} n^3$

Substitute $n = 9$.

$$a_9 = (-1)^8 \cdot 9^3 = 1 \cdot 729 = 729$$

Q10. $a_n = \frac{n(n-2)}{n+3}$

Substitute $n = 20$.

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

EXERCISE 8.1 — QUESTIONS 11–12

Q11. $a_1 = 3$, $a_n = 3a_{n-1} + 2$ ($n > 1$).

Solution:

Using the given recurrence relation,
the first five terms are

$$a_1 = 3$$

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

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

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

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

Series:

$$3 + 11 + 35 + 107 + 323 + \dots$$

Q12. $a_1 = -1$, $a_n = \frac{a_{n-1}}{n}$ ($n \geq 2$).

Solution:

Using the given recurrence relation,
the first five terms are

$$a_1 = -1$$

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

$$a_3 = \frac{a_2}{3} = \frac{(-1/2)}{3} = \frac{-1}{6}$$

$$a_4 = \frac{a_3}{4} = \frac{(-1/6)}{4} = \frac{-1}{24}$$

$$a_5 = \frac{a_4}{5} = \frac{(-1/24)}{5} = \frac{-1}{120}$$

Series:

$$-1 - \frac{1}{2} - \frac{1}{6} - \frac{1}{24} - \frac{1}{120} - \dots$$

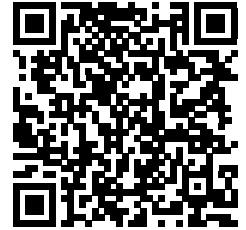


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