

**RD SHARMA**  
**Solutions**  
**Class 10 Maths**  
**Chapter 9**  
**Ex 9.1**

1. Write the first terms of each of the following sequences whose  $n^{\text{th}}$  term are

(i)  $a_n = 3n + 2$

(ii)  $a_n = \frac{n-2}{3}$

(iii)  $a_n = 3^n$

(iv)  $a_n = \frac{3n-2}{5}$

(v)  $a_n = (-1)^n 2^n$

(vi)  $a_n = \frac{n(n-2)}{2}$

(vii)  $a_n = n^2 - n + 1$

(viii)  $a_n = n^2 - n + 1$

(ix)  $a_n = \frac{2n-3}{6}$

**Sol:**

We have to write first five terms of given sequences

(i)  $a_n = 3n + 2$

Given sequence  $a_n = 3n + 2$

To write first five terms of given sequence put  $n = 1, 2, 3, 4, 5$ , we get

$$a_1 = (3 \times 1) + 2 = 3 + 2 = 5$$

$$a_2 = (3 \times 2) + 2 = 6 + 2 = 8$$

$$a_3 = (3 \times 3) + 2 = 9 + 2 = 11$$

$$a_4 = (3 \times 4) + 2 = 12 + 2 = 14$$

$$a_5 = (3 \times 5) + 2 = 15 + 2 = 17$$

$\therefore$  The required first five terms of given sequence  $a_n = 3n + 2$  are 5, 8, 11, 14, 17.

(ii)  $a_n = \frac{n-2}{3}$

Given sequence  $a_n = \frac{n-2}{3}$

To write first five terms of given sequence  $a_n = \frac{n-2}{3}$

put  $n = 1, 2, 3, 4, 5$  then we get

$$a_1 = \frac{1-2}{3} = \frac{-1}{3}; a_2 = \frac{2-2}{3} = 0$$

$$a_3 = \frac{3-2}{3} = \frac{1}{3}; a_4 = \frac{4-2}{3} = \frac{2}{3}$$

$$a_5 = \frac{5-2}{3} = 1$$

$\therefore$  The required first five terms of given sequence  $a_n = \frac{n-2}{3}$  are  $\frac{-1}{3}, 0, \frac{1}{3}, \frac{2}{3}, 1$ .

(iii)  $a_n = 3^n$

Given sequence  $a_n = 3^n$

To write first five terms of given sequence, put  $n = 1, 2, 3, 4, 5$  in given sequence.

Then,

$$a_1 = 3^1 = 3; a_2 = 3^2 = 9; a_3 = 27; a_4 = 3^4 = 81; a_5 = 3^5 = 243.$$

(iv)  $a_n = \frac{3n-2}{5}$

Given sequence,  $a_n = \frac{3n-2}{5}$

To write first five terms, put  $n = 1, 2, 3, 4, 5$  in given sequence  $a_n = \frac{3n-2}{5}$

Then, we get

$$a_1 = \frac{3 \times 1 - 2}{5} = \frac{3-2}{5} = \frac{1}{5}$$

$$a_2 = \frac{3 \times 2 - 2}{5} = \frac{6-2}{5} = \frac{4}{5}$$

$$a_3 = \frac{3 \times 3 - 2}{5} = \frac{9-2}{5} = \frac{7}{5}$$

$$a_4 = \frac{3 \times 4 - 2}{5} = \frac{12-2}{5} = \frac{10}{5}$$

$$a_5 = \frac{3 \times 5 - 2}{5} = \frac{15-2}{5} = \frac{13}{5}$$

$\therefore$  The required first five terms are  $\frac{1}{5}, \frac{4}{5}, \frac{7}{5}, \frac{10}{5}, \frac{13}{5}$

(v)  $a_n = (-1)^n 2^n$

Given sequence is  $a_n = (-1)^n 2^n$

To get first five terms of given sequence  $a_n$ , put  $n = 1, 2, 3, 4, 5$ .

$$a_1 = (-1)^1 \cdot 2^1 = (-1) \cdot 2 = -2$$

$$a_2 = (-1)^2 \cdot 2^2 = (-1) \cdot 4 = 4$$

$$a_3 = (-1)^3 \cdot 2^3 = (-1) \cdot 8 = -8$$

$$a_4 = (-1)^4 \cdot 2^4 = (-1) \cdot 16 = 16$$

$$a_5 = (-1)^5 \cdot 2^5 = (-1) \cdot 32 = -32$$

$\therefore$  The first five terms are -2, 4, -8, 16, -32.

(vi)  $a_n = \frac{n(n-2)}{2}$

The given sequence is,  $a_n = \frac{n(n-2)}{2}$

To write first five terms of given sequence  $a_n = \frac{n(n-2)}{2}$

Put  $n = 1, 2, 3, 4, 5$ . Then, we get

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

$$a_2 = \frac{2(2-2)}{2} = \frac{2 \cdot 0}{2} = 0$$

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

$$a_4 = \frac{4(4-2)}{2} = \frac{4 \cdot 2}{2} = 4$$

$$a_5 = \frac{5(5-2)}{2} = \frac{5 \cdot 3}{2} = \frac{15}{2}$$

∴ The required first five terms are  $\frac{-1}{2}, 0, \frac{3}{2}, 4, \frac{15}{2}$ .

(vii)  $a_n = n^2 - n + 1$

The given sequence is,  $a_n = n^2 - n + 1$

To write first five terms of given sequence  $a_n$  we get put  $n = 1, 2, 3, 4, 5$ . Then we get  $a_1 = 1^2 - 1 + 1 = 1$

$$a_2 = 2^2 - 2 + 1 = 3$$

$$a_3 = 3^2 - 3 + 1 = 7$$

$$a_4 = 4^2 - 4 + 1 = 13$$

$$a_5 = 5^2 - 5 + 1 = 21$$

∴ The required first five terms of given sequence  $a_n = n^2 - n + 1$  are 1, 3, 7, 13, 21

(viii)  $a_n = 2n^2 - 3n + 1$

The given sequence is  $a_n = 2n^2 - 3n + 1$

To write first five terms of given sequence  $a_n$ , we put  $n = 1, 2, 3, 4, 5$ . Then we get

$$a_1 = 2 \cdot 1^2 - 3 \cdot 1 + 1 = 2 - 3 + 1 = 0$$

$$a_2 = 2 \cdot 2^2 - 3 \cdot 2 + 1 = 8 - 6 + 1 = 3$$

$$a_3 = 2 \cdot 3^2 - 3 \cdot 3 + 1 = 18 - 9 + 1 = 10$$

$$a_4 = 2 \cdot 4^2 - 3 \cdot 4 + 1 = 32 - 12 + 1 = 21$$

$$a_5 = 2 \cdot 5^2 - 3 \cdot 5 + 1 = 50 - 15 + 1 = 36$$

∴ The required first five terms of given sequence  $a_n = 2n^2 - 3n + 1$  are 0, 3, 10, 21, 36

(ix)  $a_n = \frac{2n-3}{6}$

Given sequence is,  $a_n = \frac{2n-3}{6}$

To write first five terms of given sequence we put  $n = 1, 2, 3, 4, 5$ . Then, we get,

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

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

$$a_3 = \frac{2 \cdot 3 - 3}{6} = \frac{6 - 3}{6} = \frac{3}{6}$$

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

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

∴ The required first five terms of given sequence  $a_n = \frac{2n-3}{6}$  are  $\frac{-1}{6}, \frac{1}{6}, \frac{3}{6}, \frac{5}{6}, \frac{7}{6}$ .

2. Find the indicated terms in each of the following sequences whose  $n$ th terms are:

(i)  $a_n = 5n - 4$ ;  $a_{12}$  and  $a_{15}$

(ii)  $a_n = \frac{3n-2}{4n+5}$ ;  $a_7$  and  $a_8$

(iii)  $a_n = n(n-1)(n-2)$ ;  $a_5$  and  $a_8$

(iv)  $a_n = (n-1)(2-n)(3+n)$ ;  $a_{11}$   $a_{21}$   $a_3$

(v)  $a_n = (-1)^n n$ ;  $a_3, a_5, a_8$

**Sol:**

We have to find the required term of a sequence when  $n^{\text{th}}$  term of that sequence is given.

(i)  $a_n = 5n - 4$ ;  $a_{12}$  and  $a_{15}$

Given  $n^{\text{th}}$  term of a sequence  $a_n = 5n - 4$

To find  $12^{\text{th}}$  term,  $15^{\text{th}}$  terms of that sequence, we put  $n = 12, 15$  in its  $n^{\text{th}}$  term.

Then, we get

$$a_{12} = 5.12 - 4 = 60 - 4 = 56$$

$$a_{15} = 5.15 - 4 = 75 - 4 = 71$$

$\therefore$  The required terms  $a_{12} = 56, a_{15} = 71$

(ii)  $a_n = \frac{3n-2}{4n+5}$ ;  $a_7$  and  $a_8$

Given  $n^{\text{th}}$  term is  $(a_n) = \frac{3n-2}{4n+5}$

To find  $7^{\text{th}}, 8^{\text{th}}$  terms of given sequence, we put  $n = 7, 8$ .

$$a_7 = \frac{(3.7)-2}{(4.7)+5} = \frac{19}{33}$$

$$a_8 = \frac{(3.8)-2}{(4.8)+5} = \frac{22}{37}$$

$\therefore$  The required terms  $a_7 = \frac{19}{33}$  and  $a_8 = \frac{22}{37}$ .

(iii)  $a_n = n(n-1)(n-2)$ ;  $a_5$  and  $a_8$

Given  $n^{\text{th}}$  term is  $a_n = n(n-1)(n-2)$

To find  $5^{\text{th}}, 8^{\text{th}}$  terms of given sequence, put  $n = 5, 8$  in an then, we get

$$a_5 = 5(5-1).(5-2) = 5.4.3 = 60$$

$$a_8 = 8.(8-1).(8-2) = 8.7.6 = 336$$

$\therefore$  The required terms are  $a_5 = 60$  and  $a_8 = 336$

(iv)  $a_n = (n-1)(2-n)(3+n)$ ;  $a_{11}$   $a_{21}$   $a_3$

The given  $n^{\text{th}}$  term is  $a_n = (n-1)(2-n)(3+n)$

To find  $a_1, a_2, a_3$  of given sequence put  $n = 1, 2, 3$  is an

$$a_1 = (1-1)(2-1)(3+1) = 0.1.4 = 0$$

$$a_2 = (2-1)(2-2)(3+2) = 1.0.5 = 0$$

$$a_3 = (3-1)(2-3)(3+3) = 2.-1.6 = -12$$

$\therefore$  The required terms  $a_1 = 0, a_2 = 0, a_3 = -12$

(v)  $a_n = (-1)^n n$ ;  $a_3, a_5, a_8$

The given  $n^{\text{th}}$  term is,  $a_n = (-1)^n . n$

To find  $a_3, a_5, a_8$  of given sequence put  $n = 3, 5, 8$ , in an.

$$a_3 = (-1)^3 \cdot 3 = -1 \cdot 3 = -3$$

$$a_5 = (-1)^5 \cdot 5 = -1 \cdot 5 = -5$$

$$a_8 = (-1)^8 \cdot 8 = 1 \cdot 8 = 8$$

$\therefore$  The required terms  $a_3 = -3, a_5 = -5, a_8 = 8$

3. Find the next five terms of each of the following sequences given by:

(i)  $a_1 = 1, a_n = a_{n-1} + 2, n \geq 2$

(ii)  $a_1 = a_2 = 2, a_n = a_{n-1} - 3, n > 2$

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

(iv)  $a_1 = 4, a_n = 4a_{n-1} + 3, n > 1$

**Sol:**

We have to find next five terms of following sequences.

(i)  $a_1 = 1, a_n = a_{n-1} + 2, n \geq 2$

Given, first term ( $a_1$ ) = 1,

$n^{\text{th}}$  term  $a_n = a_{n-1} + 2, n \geq 2$

To find 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> terms, we use given condition  $n \geq 2$  for  $n^{\text{th}}$  term  $a_n = a_{n-1} + 2$

$$a_2 = a_{2-1} + 2 = a_1 + 2 = 1 + 2 = 3 (\because a_1 = 1)$$

$$a_3 = a_{3-1} + 2 = a_2 + 2 = 3 + 2 = 5$$

$$a_4 = a_{4-1} + 2 = a_3 + 2 = 5 + 2 = 7$$

$$a_5 = a_{5-1} + 2 = a_4 + 2 = 7 + 2 = 9$$

$$a_6 = a_{6-1} + 2 = a_5 + 2 = 9 + 2 = 11$$

$\therefore$  The next five terms are,

$$a_2 = 3, a_3 = 5, a_4 = 7, a_5 = 9, a_6 = 11$$

(ii)  $a_1 = a_2 = 2, a_n = a_{n-1} - 3, n > 2$

Given,

First term ( $a_1$ ) = 2

Second term ( $a_2$ ) = 2

$n^{\text{th}}$  term ( $a_n$ ) =  $a_{n-1} - 3$

To find next five terms i.e.,  $a_3, a_4, a_5, a_6, a_7$  we put  $n = 3, 4, 5, 6, 7$  in  $a_n$

$$a_3 = a_{3-1} - 3 = 2 - 3 = -1$$

$$a_4 = a_{4-1} - 3 = a_3 - 3 = -1 - 3 = -4$$

$$a_5 = a_{5-1} - 3 = a_4 - 3 = -4 - 3 = -7$$

$$a_6 = a_{6-1} - 3 = a_5 - 3 = -7 - 3 = -10$$

$$a_7 = a_{7-1} - 3 = a_6 - 3 = -10 - 3 = -13$$

$\therefore$  The next five terms are,  $a_3 = -1, a_4 = -4, a_5 = -7, a_6 = -10, a_7 = -13$

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

Given, first term ( $a_1$ ) = -1

$$n^{\text{th}} \text{ term } (a_n) = \frac{a_{n-1}}{n}, n \geq 2$$

To find next five terms i.e.,  $a_2, a_3, a_4, a_5, a_6$  we put  $n = 2, 3, 4, 5, 6$  is an

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

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

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

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

$\therefore$  The next five terms are,

$$a_2 = \frac{-1}{2}, a_3 = \frac{-1}{6}, a_4 = \frac{-1}{24}, a_5 = \frac{-1}{120}, a_6 = \frac{-1}{720}$$

(iv)  $a_1 = 4, a_n = 4 a_{n-1} + 3, n > 1$

Given,

$$\text{First term } (a_1) = 4$$

$$n^{\text{th}} \text{ term } (a_n) = 4 a_{n-1} + 3, n > 1$$

To find next five terms i.e.,  $a_2, a_3, a_4, a_5, a_6$  we put  $n = 2, 3, 4, 5, 6$  is  $a_n$

Then, we get

$$a_2 = 4a_{2-1} + 3 = 4.a_1 + 3 = 4.4 + 3 = 19 (\because a_1 = 4)$$

$$a_3 = 4a_{3-1} + 3 = 4.a_2 + 3 = 4(19) + 3 = 79$$

$$a_4 = 4 a_{4-1} + 3 = 4.a_3 + 3 = 4(79) + 3 = 319$$

$$a_5 = 4 a_{5-1} + 3 = 4.a_4 + 3 = 4(319) + 3 = 1279$$

$$a_6 = 4.a_{6-1} + 3 = 4.a_5 + 3 = 4(1279) + 3 = 5119$$

$\therefore$  The required next five terms are,

$$a_2 = 19, a_3 = 79, a_4 = 319, a_5 = 1279, a_6 = 5119$$