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Where Minds Pollinate

Class 11
Mathematics
Chapter 4
Exercise 4.1
Notes

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Unit # 04

Sequences And Series.

Exercise # 4.1

Q.1 In each of the following, the n th term of the sequence is given. In each case find first 4 terms, the 10th term, a_{10} and 15th term a_{15} .

1. $a_n = 3n + 1$

Sol:-

$$a_1 = 3(1) + 1 \Rightarrow a_1 = 4$$

$$a_2 = 3(2) + 1 \Rightarrow a_2 = 7$$

$$a_3 = 3(3) + 1 \Rightarrow a_3 = 10$$

$$a_4 = 3(4) + 1 \Rightarrow a_4 = 13$$

$$a_{10} = 3(10) + 1 \Rightarrow a_{10} = 31$$

$$a_{15} = 3(15) + 1 \Rightarrow a_{15} = 46$$

2. $a_n = 3n - 1$

Sol:-

$$a_1 = 3(1) - 1 \Rightarrow a_1 = 2$$

$$a_2 = 3(2) - 1 \Rightarrow a_2 = 5$$

$$a_3 = 3(3) - 1 \Rightarrow a_3 = 8$$

$$a_4 = 3(4) - 1 \Rightarrow a_4 = 11$$

$$a_{10} = 3(10) - 1 \Rightarrow a_{10} = 29$$

$$a_{15} = 3(15) - 1 \Rightarrow a_{15} = 44$$

$$3. a_n = \frac{n}{n+1}$$

Sol:-

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

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

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

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

$$a_{10} = \frac{10}{10+1} \Rightarrow a_{10} = \frac{10}{11}$$

$$a_{15} = \frac{15}{15+1} \Rightarrow a_{15} = \frac{15}{16}$$

$$4. a_n = n^2 + 1$$

Sol:-

$$a_1 = (1)^2 + 1 \Rightarrow a_1 = 2$$

$$a_2 = (2)^2 + 1 \Rightarrow a_2 = 5$$

$$a_3 = (3)^2 + 1 \Rightarrow a_3 = 10$$

$$a_4 = (4)^2 + 1 \Rightarrow a_4 = 17$$

$$a_{10} = (10)^2 + 1 \Rightarrow a_{10} = 101$$

$$a_{15} = (15)^2 + 1 \Rightarrow a_{15} = 226$$

$$5. a_n = n^2 - 2n$$

Sol:-

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

$$a_2 = (2)^2 - 2(2) \Rightarrow a_2 = 0$$

$$a_3 = (3)^2 - 2(3) \Rightarrow a_3 = 3$$

$$a_4 = (4)^2 - 2(4) \Rightarrow a_4 = 8$$

$$a_{10} = (10)^2 - 2(10) \Rightarrow a_{10} = 80$$

$$a_{15} = (15)^2 - 2(15) \Rightarrow a_{15} = 195$$

$$a_n = \frac{n^2 - 1}{n^2 + 1}$$

Sol:-

$$a_1 = \frac{(1)^2 - 1}{(1)^2 + 1} \Rightarrow a_1 = 0$$

$$a_2 = \frac{(2)^2 - 1}{(2)^2 + 1} \Rightarrow a_2 = 3/5$$

$$a_3 = \frac{(3)^2 - 1}{(3)^2 + 1} \Rightarrow a_3 = 4/5$$

$$a_4 = \frac{(4)^2 - 1}{(4)^2 + 1} \Rightarrow a_4 = 15/17$$

$$a_{10} = \frac{(10)^2 - 1}{(10)^2 + 1} \Rightarrow a_{10} = 99/101$$

$$a_{15} = \frac{(15)^2 - 1}{(15)^2 + 1} \Rightarrow a_{15} = 112/113$$

$$a_n = \left(\frac{-1}{2} \right)^{n-1}$$

Sol:-

$$a_1 = \left(\frac{-1}{2} \right)^{1-1} \Rightarrow a_1 = 1$$

$$a_2 = \left(\frac{-1}{2} \right)^{2-1} \Rightarrow a_2 = -1/2$$

$$a_3 = \left(\frac{-1}{2}\right)^{3-1} \Rightarrow a_3 = \frac{1}{4}$$

$$a_4 = \left(\frac{-1}{2}\right)^{4-1} \Rightarrow a_4 = -\frac{1}{8}$$

$$a_{10} = \left(\frac{-1}{2}\right)^{10-1} \Rightarrow a_{10} = -\frac{1}{512}$$

$$a_{15} = \left(\frac{-1}{2}\right)^{15-1} \Rightarrow a_{15} = \frac{1}{16384}$$

8. $a_n = (-1)^n \cdot n^2$

Sol:-

$$a_n = (-1)^n \cdot n^2 \Rightarrow a_n = n^2$$

$$a_1 = (1)^2 \Rightarrow a_1 = 1$$

$$a_2 = (2)^2 \Rightarrow a_2 = 4$$

$$a_3 = (3)^2 \Rightarrow a_3 = 9$$

$$a_4 = (4)^2 \Rightarrow a_4 = 16$$

$$a_{10} = (10)^2 \Rightarrow a_{10} = 100$$

$$a_{15} = (15)^2 \Rightarrow a_{15} = 225$$

9. $a_n = (-1)^n (n+3)$

Sol:-

$$a_1 = (-1)^1 (1+3) \Rightarrow a_1 = -4$$

$$a_2 = (-1)^2 (2+3) \Rightarrow a_2 = 5$$

$$a_3 = (-1)^3 (3+3) \Rightarrow a_3 = -6$$

$$a_4 = (-1)^4 (4+3) \Rightarrow a_4 = 7$$

$$a_{10} = (-1)^{10} (10+3) \Rightarrow a_{10} = 13$$

$$a_{15} = (-1)^{15} (15+3) \Rightarrow a_{15} = -18$$

$$10. a_n = (-1)^{n+1} (3n - 5)$$

Sol:-

$$a_1 = (-1)^{1+1} (3(1) - 5) \Rightarrow a_1 = -2$$

$$a_2 = (-1)^{2+1} [3(2) - 5] \Rightarrow a_2 = -1$$

$$a_3 = (-1)^{3+1} [3(3) - 5] \Rightarrow a_3 = 4$$

$$a_4 = (-1)^{4+1} [3(4) - 5] \Rightarrow a_4 = -7$$

$$a_{10} = (-1)^{10+1} [3(10) - 5] \Rightarrow a_{10} = -25$$

$$a_{15} = (-1)^{15+1} [3(15) - 5] \Rightarrow a_{15} = 40$$

Q. Find the indicated term of the sequence.

$$11. a_n = 4n - 3; a_8$$

$$a_8 = 4(8) - 3 \Rightarrow a_8 = 29$$

$$12. a_n = 5n + 11; a_9$$

$$a_9 = 5(9) + 11 \Rightarrow a_9 = 56$$

$$13. a_n = (3n + 4)(2n - 5); a_7$$

$$a_7 = [3(7) + 4][2(7) - 5] \Rightarrow a_7 = 225$$

$$14. a_n = (-1)^{n-1} (3.4n - 17.3); a_{12}$$

$$a_{12} = (-1)^{12-1} [3.4(12) - 17.3] \Rightarrow a_{12} = -23.5$$

15. $a_n = 4n^2(11n+31)$; a_{22}

$$a_{22} = 4(22)^2 [11(22) + 31] \Rightarrow a_{22} = 528528$$

16. $a_n = \left(1 + \frac{1}{n}\right)^2$; a_{20}

$$a_{20} = \left(1 + \frac{1}{20}\right)^2 \Rightarrow a_{20} = 441/400$$

17. $a_n = \log 10^n$; a_{43}

$$a_{43} = \log_{10} (10)^{43} \Rightarrow a_{43} = 1$$

18. $a_n = \ln e^n$, a_{67}

$$a_{67} = \ln e^{67} \quad \left\{ \ln a \Leftrightarrow \log_e a \right.$$

$$a_{67} = \log_e (e)^{67} \Rightarrow a_{67} = 67 \log_e (e)$$

$$a_{67} = 67$$

Predict the general term or n^{th} term, a_n of the sequence.

19. 1, 3, 5, 7, 9, ...

Sol:-

$$1 = 2(1) - 1$$

$$3 = 2(2) - 1$$

$$5 = 2(3) - 1$$

$$7 = 2(4) - 1$$

$$9 = 2(5) - 1$$

:

$$a_n = 2n - 1$$

$$3, 9, 27, 81, 243, \dots$$

Sol:-

$$3 = 3^1$$

$$9 = 3^2$$

$$27 = 3^3$$

$$81 = 3^4$$

$$243 = 3^5$$

:

$$a_n = 3^n$$

$$1. \sqrt{2}, \sqrt{4}, \sqrt{6}, \sqrt{8}, \sqrt{10}, \dots$$

Sol:-

$$\sqrt{2} = \sqrt{2(1)}$$

$$\sqrt{4} = \sqrt{2(2)}$$

$$\sqrt{6} = \sqrt{2(3)}$$

$$\sqrt{8} = \sqrt{2(4)}$$

$$\sqrt{10} = \sqrt{2(5)}$$

:

$$a_n = \sqrt{2n}$$

22. $1.2, 2.3, 3.4, 4.5, \dots$

Sol:-

$$1.2 = 1.1(1) + 0.1$$

$$2.3 = 1.1(2) + 0.1$$

$$3.4 = 1.1(3) + 0.1$$

$$4.5 = 1.1(4) + 0.1$$

$\vdots$

$$a_n = 1.1n + 0.1$$