

## Mathematics Online Class X On 29-06-2021

### ARITHMETIC SEQUENCE



#### Question

Write the arithmetic sequence with first term 30 and second term 50

#### Answer

First term =  $x_1 = 30$

Second term =  $x_2 = 50$

Common difference =  $d = x_2 - x_1 = 50 - 30 = 20$

$\therefore$  arithmetic sequence is 30 , 50 , 70 , 90 , ...

#### Question

Write an arithmetic sequence with first term 30 and third term 50

#### Answer

First term =  $x_1 = 30$

Third term =  $x_3 = 50$

Now  $x_3 - x_1 = 50 - 30 = 20$

$$2d = 20 \quad \therefore \text{Common difference} = d = \frac{20}{2} = 10$$

$\therefore$  arithmetic sequence is 30 , 40 , 50 , 60 , ...

#### Question

Write an arithmetic sequence with third term 30 and seventh term 50

#### Answer

Third term =  $x_3 = 30$

Seventh term =  $x_7 = 50$

Now  $x_7 - x_3 = 50 - 30 = 20$

$$4d = 20 \quad \therefore \text{Common difference} = d = \frac{20}{4} = 5$$

First term =  $x_1 = x_3 - 2d = 30 - 2 \times 5 = 30 - 10 = 20$

$\therefore$  arithmetic sequence is 20 , 25 , 30 , 35 , ...

### Question

Write an arithmetic sequence with tenth term 30 and twentieth term 70

### Answer

$$\text{Tenth term} = x_{10} = 30$$

$$\text{Twentieth term} = x_{20} = 70$$

$$\text{Now } x_{20} - x_{10} = 70 - 30 = 40$$

$$10d = 40 \quad \therefore \text{Common difference} = d = \frac{40}{10} = 4$$

$$\text{First term} = x_1 = x_{10} - 9d = 30 - 9 \times 4 = 30 - 36 = -6$$

$\therefore$  arithmetic sequence is  $-6, -2, 2, 6, \dots$

### NOTE

In an arithmetic sequence, the difference between any two terms is the product of the position difference and common difference.

That is,

Term difference = position difference  $\times$  common difference

In an arithmetic sequence, term difference is proportional to the position difference.

The constant of proportionality is the common difference.

### Question

Is 100 a term of the arithmetic sequence  $4, 7, 10, \dots$

### Answer

#### Method-1

In an arithmetic sequence, term difference is always a multiple of common difference.

$$100 - 4 = 96, \text{ which is a multiple of common difference } 3.$$

$\therefore$  100 is a term of this sequence.

#### Method-2

When we divide the terms of an arithmetic sequence by common difference, we get the same remainder.

That is, when we divide 4 by 3, remainder is 1.

when we divide 7 by 3, remainder is 1.

when we divide 10 by 3, remainder is 1.

when we divide 100 by 3, remainder is also 1.

∴ 100 is a term of this sequence.

### ASSIGNMENT

Questions 1 to 4 of page number 21 of the text book.

- (1) In each of the arithmetic sequences below, some terms are missing and their positions are marked with  $\bigcirc$ . Find them.
- i) 24, 42,  $\bigcirc$ ,  $\bigcirc$ , ...                      ii)  $\bigcirc$ , 24, 42,  $\bigcirc$ , ...
- iii)  $\bigcirc$ ,  $\bigcirc$ , 24, 42, ...                      iv) 24,  $\bigcirc$ , 42,  $\bigcirc$ , ...
- v)  $\bigcirc$ , 24,  $\bigcirc$ , 42, ...                      vi) 24,  $\bigcirc$ ,  $\bigcirc$ , 42, ...
- (2) The terms in two positions of some arithmetic sequences are given below. Write the first five terms of each:
- i) 3<sup>rd</sup> term 34                      ii) 3<sup>rd</sup> term 43                      iii) 3<sup>rd</sup> term 2  
6<sup>th</sup> term 67                      6<sup>th</sup> term 76                      5<sup>th</sup> term 3
- iv) 4<sup>th</sup> term 2                      v) 2<sup>nd</sup> term 5  
7<sup>th</sup> term 3                      5<sup>th</sup> term 2
- (3) The 5<sup>th</sup> term of an arithmetic sequence is 38 and the 9<sup>th</sup> term is 66. What is its 25<sup>th</sup> term?
- (4) Is 101 a term of the arithmetic sequence 13, 24, 35, ...? What about 1001?