

**CHAPTER – 1**  
**ARITHMETIC PROGRESSION AND**  
**GEOMETRIC PROGRESSION**

**Sequence:**

A sequence is a collection (lists) of numbers arranged in a definite order according to some definite rule.

Each number in the sequence is called a term of the sequence.

(Textual Solved Examples)

**Ex.1 Find the first four terms of the sequence whose 'n<sup>th</sup>' term is  $3n + 1$**

**Solution:**

$$\text{Here, } t_n = 3n + 1$$

$$\text{For } n = 1, \quad t_1 = 3 \times 1 + 1 = 4$$

$$\text{For } n = 2, \quad t_2 = 3 \times 2 + 1 = 7$$

$$\text{For } n = 3, \quad t_3 = 3 \times 3 + 1 = 10$$

$$\text{For } n = 4, \quad t_4 = 3 \times 4 + 1 = 13$$

Thus the first four terms of the sequence are 4, 7, 10, 13.

## EXERCISE - 1.1

### Textual

### Solutions

1. For each sequence, find the next four terms :

i) 1, 2, 4, 7, 11, ...

Find :  $t_6$ ,  $t_7$ ,  $t_8$ ,  $t_9$ .

Solution :

$$t_1 = 1, \quad t_2 = 2, \quad t_3 = 4, \quad t_4 = 7, \quad t_5 = 11$$

$$t_2 - t_1 = 2 - 1 = 1$$

$$t_3 - t_2 = 4 - 2 = 2$$

$$t_4 - t_3 = 7 - 4 = 3$$

$$t_5 - t_4 = 11 - 7 = 4$$

$$\therefore t_6 = 11 + 5 = 16$$

$$t_7 = 16 + 6 = 22$$

$$t_8 = 22 + 7 = 29$$

$$t_9 = 29 + 8 = 37$$

$\therefore$  The next four terms of the sequence are 16, 22, 29, 37.

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## **EXERCISE - 1.2**

### **Textual**

### **Solutions**

1. Which of the following lists of numbers are Arithmetic Progressions?  
Justify.

i) 1, 3, 6, 10, ...

Find : If the numbers are Arithmetic Progression (A.P)

Solution :

$$t_1 = 1, t_2 = 3, t_3 = 6, t_4 = 10$$

$$d = t_2 - t_1 = 3 - 1 = 2$$

$$d = t_3 - t_2 = 6 - 3 = 3$$

The difference (d) is not constant

∴ The given sequence is not an A. P.

### EXERCISE - 1.3

#### Solutions

1. Find the twenty fifth term of the A.P : 12, 16, 20, 24, ...

**Solution :**

$$\text{Here } a = 12$$

$$\text{Hence, } t_1 = 12$$

$$t_2 - t_1 = 16 - 12 = 4$$

$$t_3 - t_2 = 20 - 16 = 4$$

$$t_4 - t_3 = 24 - 20 = 4$$

$$\therefore d = 4$$

$$t_n = a + (n - 1) d$$

$$t_{25} = 12 + (25 - 1)4$$

$$t_{25} = 12 + 24 \times 4$$

$$t_{25} = 12 + 96$$

$$t_{25} = 108$$

**$\therefore$  The 25<sup>th</sup> term of the A.P. is 108 .**

## EXERCISE - 1.4

### Textual

### Solutions

1. Find the sum of the first 'n' natural numbers and hence find the sum of first 20 natural numbers.

**Solution :**

$$\text{Here, } t_1 = 1, t_n = 20$$

$$S_n = \frac{n}{2} \times (t_1 + t_n)$$

$$S_n = \frac{20}{2} \times (1 + 20)$$

$$S_n = 10 \times 21$$

$$\therefore S_n = 210$$

## **EXERCISE – 1.5**

### **Textual**

### **Solutions**

1. Find four consecutive terms in an A.P. whose sum is 12 and the sum of 3<sup>rd</sup> and 4<sup>th</sup> term is 14.

**Solution :**

**Given :** sum of 4 consecutive terms = 12

Sum of 3<sup>rd</sup> and 4<sup>th</sup> terms = 14

**Find :** Four consecutive terms in an A.P.

Let the four consecutive terms be  $a - 3d$ ,  $a - d$ ,  $a + d$ ,  $a + 3d$ .

According to the 1<sup>st</sup> condition.

$$\therefore (a - 3d) + (a - d) + (a + d) + (a + 3d) = 12$$

$$a + a + a + a - 3a - d + d + 3d = 12$$

$$\therefore 4a = 12$$

$$\therefore a = \frac{12}{4}$$

$$\therefore a = 3$$

According to the 2<sup>nd</sup> condition.

$$\therefore (a + d) + (a + 3d) = 14$$

$$\therefore 2a + 4d = 14$$

$$\therefore a + 2d = 7 \quad \text{--- (dividing all by 2)}$$

$$\therefore 3 + 2d = 7 \quad \text{--- } (\because a = 3)$$

$$\therefore 2d = 7 - 3$$

$$\therefore 2d = 4$$

$$\therefore d = \frac{4}{2} = 2$$

$$\therefore d = 2$$

By putting,  $a = 3$  and  $d = 2$  we get four consecutive terms

$$a - 3d = 3 - 3 \times 2 = 3 - 6 = -3$$

$$a - d = 3 - 2 = 1$$

$$a + d = 3 + 2 = 5$$

$$a + 3d = 3 + 3 \times 2 = 3 + 6 = 9$$

**$\therefore$  The four consecutive terms are  $-3, 1, 5, 9$ .**

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## EXERCISE – 1.6

### Textual

### Solutions

1. Mary got a job with a starting salary of Rs. 15000/- per month. She will get an incentive of Rs. 100/- per month. What will be her salary after 20 months.

**Solution :**

**Given :** Starting salary of Mary = Rs. 15000 per month.

Incentive = Rs. 100 per month.

**Find :** Mary's salary after 20 months. ( $t_{20}$ )

Incentive per month = 100

salary is an A.P. =  $t_1 = a = 15000$

$d = 100$

$t_n = a + (n - 1) d$

$t_{20} = 15000 + (20 - 1) 100$

$= 15000 + 1900$

$\therefore t_{20} = 16900$

∴ Mary's salary after 20 months will be Rs. = 16,900 .

### EXERCISE - 1.7

#### Textual

#### Solutions

1. Find the ninth term of the G.P. 3, 6, 12, 24, ...

Find : The ninth term of the G.P.

Solution :

Hence we have  $a = 3$ ,  $n = 9$ ,  $r = 2$

Now  $t_n = ar^{n-1}$

$$t_9 = 3 \times 2^{9-1}$$

$$t_9 = 3 \times 2^8$$

$$t_9 = 3 \times 256$$

$$t_9 = 768$$

∴ The ninth term of the G.P. is 768.

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## **EXERCISE – 1.8**

### **Textual**

### **Solutions**

1. Find the indicated sums for the following Geometric Progressions.

i) 2, 6, 18, ... Find  $S_7$ .

**Solution :**

**Given :** In a G.P. 2, 6, 18, ...

**Find :**  $S_7$ .

Here we have  $a = 2$ ,  $r = 3$  and  $3 > 1$

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

$$\therefore S_7 = \frac{2(3^7 - 1)}{3 - 1}$$

$$\therefore S_7 = \frac{2(2187 - 1)}{2}$$

$$= \frac{2 \times 2186}{2} = \frac{4372}{2} = 2186$$

$$\therefore S_7 = 2186$$

### EXERCISE - 1.9

#### Textual

#### Solutions

1. Find three consecutive terms in a G.P. such that the sum of the first two terms is 9 and the product of all the three is 216.

Find : Find three consecutive terms in a G.P.

Solution :

Let the three terms be  $\frac{a}{r}$ ,  $a$ ,  $ar$ .

$$\text{Then } \frac{a}{r} + a + ar = 9 \quad \text{--- (1)}$$

$$\text{and } \frac{a}{r} \times a \times ar = 216 \quad \text{--- (2)}$$

From equation(2)

$$a^3 = 216$$

$$a = 6 \quad \text{---(taking cube roots on both sides)}$$

Substituting this value of  $a = 6$  in equation (1) we have

$$\frac{6}{r} + 6 = 9$$

$$\therefore 6 + 6r = 9r$$

$$\therefore 9r - 6r = 6$$

$$\therefore 3r = 6$$

$$\therefore r = \frac{6}{3}$$

$$\therefore r = 2$$

$$\therefore \text{1st term} = \frac{a}{r} = \frac{6}{2} = 3$$

$$\therefore \text{2nd term} = a = 6$$

$$\therefore \text{3rd term} = ar = 6 \times 2 = 12$$

$\therefore$  Thus the three terms in a G.P. are 3, 6, 12.

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**PROBLEM SET - 1**

**Textual**

**Solutions**

1. Find  $t_{11}$  from the following A.P. 4, 9, 14, ...

Find :  $t_{11}$

Solution :

$$t_1 = 4, t_2 = 9, t_3 = 14$$

$$d = t_2 - t_1 = 9 - 4 = 5$$

$$t_3 - t_2 = 14 - 9 = 5$$

$$\therefore d = 5, a = 4$$

$$t_n = a + (n - 1) d$$

$$t_{11} = 4 + (11 - 1) 5$$

$$t_{11} = 4 + 10 \times 5$$

$$t_{11} = 4 + 50$$

$$\therefore t_{11} = 54$$

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