ಎಸ್ಎಸ್ಎಲ್ಸಿ–ಇಂಗ್ಲಿಷ್ ಮಾಧ್ಯಮ

MATHEMATICS Chapter–5

Arithmetic Progression

8. The angles of the triangle are in A. P. The smallest angle is 30^0. Show that the triangle is a right angled triangle.

Soln:- **(……..Contd)**

$\therefore$ the angles are 30^0, 60^0, 90^0; hence the triangle is a right angled triangle as one of its angle is 90^0.

9. The angles of a quadrilateral are in A. P. If the smallest angle is 15^0, find the angles of the quadrilateral.

Soln:- Let  ABCD be a quadrilateral

Therefore let the angles be **a, a + d,** a + 2d**, a + 3d** respectively.

We also know that the sum of the four angles of a quadrilateral is 360^0.

Hence, $15^0+15^0+d+15^0+2d+15^0+3d = 360^0$

$$60^0 + 6d = 360^0$$

$$6d = 360^0 - 60^0 = 300^0$$

$$d = \frac{300}{6} = 50$$

$\therefore$ the other angles of the quadrilateral are

$$15^0, 15^0+50, 15^0+50(2), 15^0+50(3)$$

$$\Rightarrow 15^0, 15^0+50, 15^0+100, 15^0+150$$

$$\Rightarrow 15^0, 65^0, 115^0, 165^0$$

10. Find the three numbers of an A. P whose sum is 12 and their product is 48.

Soln:- Given that the three numbers are in A. P.

Let the numbers be (a – d), a, (a + d).

$$(a - d) + a + (a + d) = 12 \quad \ldots\ldots(i)$$

$$3a = 12$$

$$a = \frac{12}{3} = 4 \quad \ldots\ldots\ldots\ldots\ldots\ldots(ii)$$

$$(a - d)\, a\, (a + d) = 48 \quad \ldots\ldots\ldots(iii)$$

Substituting the value of a in (iii), we get

$$(4 - d)\, 4\, (4 + d) = 48$$

$$(4 - d)(4 + d) = \frac{48}{4} = 12$$

$$4^2 - d^2 = 12 \Rightarrow 16 - d^2 = 12$$

$$\therefore\ d^2 = 16 - 12 = 4$$

$$\Rightarrow d = \pm 2$$

$\therefore$ three numbers are 2, 4 and 6 (or) 6, 4 and 2.

To find nth term of an A.P

The nth term of the A.P, $a_n = a + (n-1)d$

(1) Find a_n and a_{15} for the A.P 1, 4, 7, 10, …….

Soln:- The given A.P is 1, 4, 7, 10, …….

The first term 'a' is 1, the common difference 'd' is 3.

The nth term of an A. P is given by

$$a_n = a + (n-1)d \ldots\ldots\ldots(i)$$

Substituting the values of a and d in (i), we get

$$a_n = 1 + (n-1)3$$

$$= 1 + 3n - 3$$

$$\therefore\ a_n = 3n - 2 \ldots\ldots\ldots(ii)$$

Hence, by substituting for 'n' as 15, we get -

$$a_{15} = 3(15) - 2$$

$$= 45 - 2 = 43$$

(2) Find a_{20} for the A.P 8, 2, - 4, -10, ……

Soln:- The given A.P is 8, 2, - 4, -10, …

The first term 'a' is 8, the common difference 'd' is –6, 'n' the number of terms is 20.

Substituting the values of a, n and d in

$$a_n = a + (n-1)d;\ \text{we get}$$

$$a_{20} = 8 + (20-1) - 6$$

$$= 8 + 19(-6) = -106$$

(3) Which term of the A.P : 21, 18,15, …… is -81? Also, check whether any term is 0?

Ans:- The A.P : 21, 18,15, …… is -81

The first term 'a' is 21, the common difference 'd' is 18 - 21= –3 and 'a_n' the nth term is -81.

But the general eqn for finding the nth term of A.P is

$$a_n = a + (n-1)d \ldots\ldots\ldots(i)$$

Substituting the values of a, a_n and d in the above eqn we get,

$$-81 = 21 + (n-1)(-3)$$

$$-81 = 21 + -3n + 3$$

$$-81 = -3n + 24$$

$$\Rightarrow 3n = 81 + 24$$

$$n = \frac{105}{3} = 35$$

Therefore, the 35^{th} term of the given AP is 81.

To check whether any term of the A.P is 0, i.e.,$a_n = 0$

Substituting the values of a, a_n and d in the eqn (i) we get,

$$0 = 21 + (n-1)(-3)$$

$$0 = 21 + -3n + 3$$

$$0 = -3n + 24$$

$$\Rightarrow 3n = 24$$

$$n = \frac{24}{3} = 8$$

This shows that the 8^{th} term is 0.

(4) The fifth and tenth are in the ratio 1 : 2 and $a_{12} = 36$, find d

$$\text{Soln:- Given that } a_5 : a_{10} = 1:2 \text{ and } a_{12} = 36$$

$$\frac{a_5}{a_{10}} = \frac{1}{2}$$

$$\Rightarrow 2a_5 = a_{10}$$

$$\text{as } a_{12} = a_5 + 7d \text{ and } a_{12} = a_{10} + 2d$$

$$\Rightarrow 2(a_{12} - 7d) = (a_{12} - 2d)$$

$$2(36 - 7d) = (36 - 2d)$$

$$72 - 14d = 36 - 2d$$

$$\Rightarrow 12d = 36$$

$$\therefore\ d = \frac{36}{12} = 3$$

(5) Find the 10th term of the AP: 2, 7, 12 …….

Soln:- Here, $a = 2$, $d = 7 - 2 = 5$ and $n = 10$.

We have $a_n = a + (n-1)\,d$

So, $a_{10} = 2 + (10 - 1) \times 5 = 2 + 45 = 47$

Therefore, the 10th term of the given AP is 47.