



## Exercise 5.2

4. Which term of the AP: 3, 8, 13, 18 ... is 78?

**Ans.** First term =  $a = 3$ , Common difference =  $d = 8 - 3 = 13 - 8 = 5$  and  $a_n = 78$

Using formula  $a_n = a + (n - 1)d$ , to find  $n^{\text{th}}$  term of arithmetic progression,

$$a_n = 3 + (n - 1) 5,$$

$$\Rightarrow 78 = 3 + (n - 1) 5$$

$$\Rightarrow 75 = 5n - 5$$

$$\Rightarrow 80 = 5n \Rightarrow n = 16$$

It means  $16^{\text{th}}$  term of the given AP is equal to 78.

5. Find the number of terms in each of the following APs:

(i) 7, 13, 19..., 205

(ii)  $18, 15\frac{1}{2}, 13\ldots, -47$

**Ans. (i)** 7, 13, 19 ..., 205

First term =  $a = 7$ , Common difference =  $d = 13 - 7 = 19 - 13 = 6$

And  $a_n = 205$

Using formula  $a_n = a + (n - 1)d$ , to find  $n^{\text{th}}$  term of arithmetic progression,

$$205 = 7 + (n - 1) 6 = 7 + 6n - 6$$

$$\Rightarrow 205 = 6n + 1$$

$$\Rightarrow 204 = 6n \Rightarrow n = 34$$

Therefore, there are 34 terms in the given arithmetic progression.

**(ii)**  $18, 15\frac{1}{2}, 13\ldots, -47$

First term =  $a = 18$ , Common difference =  $d =$

$$15\frac{1}{2} - 18 = \frac{31}{2} - 18 = \frac{31 - 36}{2} = \frac{-5}{2}$$

And  $a_n = -47$

Using formula  $a_n = a + (n - 1)d$ , to find  $n^{\text{th}}$  term of arithmetic progression,

$$-47 = 18 + (n - 1) \left( -\frac{5}{2} \right)$$

$$= 36 - \frac{5}{2}n + \frac{5}{2}$$

$$\Rightarrow -94 = 36 - 5n + 5$$

$$\Rightarrow 5n = 135 \Rightarrow n = 27$$

Therefore, there are 27 terms in the given arithmetic progression.

6. Check whether  $-150$  is a term of the AP: 11, 8, 5, 2...

**Ans.** Let  $-150$  is the  $n^{\text{th}}$  of AP 11, 8, 5, 2... which means that  $a_n = -150$

Here, First term =  $a = 11$ , Common difference =  $d = 8 - 11 = -3$

Using formula  $a_n = a + (n - 1)d$ , to find  $n^{\text{th}}$  term of arithmetic progression,

$$-150 = 11 + (n - 1)(-3)$$

$$\Rightarrow -150 = 11 - 3n + 3$$

$$\Rightarrow 3n = 164 \Rightarrow n = \frac{164}{3}$$

But,  $n$  cannot be in fraction.

Therefore, our supposition is wrong.  $-150$  cannot be term in AP.

7. Find the  $31^{\text{st}}$  term of an AP whose  $11^{\text{th}}$  term is 38 and  $16^{\text{th}}$  term is 73.

**Ans.** Here  $a_{11} = 38$  and  $a_{16} = 73$

Using formula  $a_n = a + (n - 1)d$ , to find  $n^{\text{th}}$  term of arithmetic progression,

$$38 = a + (11 - 1)(d) \text{ And } 73 = a + (16 - 1)(d)$$

$$\Rightarrow 38 = a + 10d \text{ And } 73 = a + 15d$$

These are equations consisting of two variables.

We have,  $38 = a + 10d$

$$\Rightarrow a = 38 - 10d$$

Let us put value of  $a$  in equation ( $73 = a + 15d$ ),

$$73 = 38 - 10d + 15d$$



$$\Rightarrow 35 = 5d$$

Therefore, Common difference =  $d = 7$

Putting value of  $d$  in equation  $38 = a + 10d$ ,

$$38 = a + 70$$

$$\Rightarrow a = -32$$

Therefore, common difference =  $d = 7$  and First term =  $a = -32$

Using formula  $a_n = a + (n - 1)d$ , to find  $n^{\text{th}}$  term of arithmetic progression,

$$a_{31} = -32 + (31 - 1)(7)$$

$$= -32 + 210 = 178$$

Therefore,  $31^{\text{st}}$  term of AP is 178.

**8.** An AP consists of 50 terms of which  $3^{\text{rd}}$  term is 12 and the last term is 106. Find the  $29^{\text{th}}$  term.

**Ans.** An AP consists of 50 terms and the  $50^{\text{th}}$  term is equal to 106 and  $a_3 = 12$

Using formula  $a_n = a + (n - 1)d$ , to find  $n^{\text{th}}$  term of arithmetic progression,

$$a_{50} = a + (50 - 1)d \text{ And } a_3 = a + (3 - 1)d$$

$$\Rightarrow 106 = a + 49d \text{ And } 12 = a + 2d$$

These are equations consisting of two variables.

Using equation  $106 = a + 49d$ , we get  $a = 106 - 49d$

Putting value of  $a$  in the equation  $12 = a + 2d$ ,

$$12 = 106 - 49d + 2d$$

$$\Rightarrow 47d = 94 \Rightarrow d = 2$$

Putting value of  $d$  in the equation,  $a = 106 - 49d$ ,

$$a = 106 - 49(2) = 106 - 98 = 8$$

Therefore, First term =  $a = 8$  and Common difference =  $d = 2$

To find  $29^{\text{th}}$  term, we use formula

$a_n = a + (n - 1)d$  which is used to find  $n^{\text{th}}$  term of arithmetic progression,

$$a_{29} = 8 + (29 - 1)2 = 8 + 56 = 64$$

Therefore, 29th term of AP is equal to 64.

**9.** If the third and the ninth terms of an AP are 4 and -8 respectively, which term of this AP is zero?

**Ans.** It is given that 3<sup>rd</sup> and 9<sup>th</sup> term of AP are 4 and -8 respectively.

It means  $a_3 = 4$  and  $a_9 = -8$

Using formula  $a_n = a + (n - 1)d$ , to find n<sup>th</sup> term of arithmetic progression,

$$4 = a + (3 - 1)d \text{ And, } -8 = a + (9 - 1)d$$

$$\Rightarrow 4 = a + 2d \text{ And, } -8 = a + 8d$$

These are equations in two variables.

Using equation  $4 = a + 2d$ , we can say that  $a = 4 - 2d$

Putting value of  $a$  in other equation  $-8 = a + 8d$ ,

$$-8 = 4 - 2d + 8d$$

$$\Rightarrow -12 = 6d \Rightarrow d = -2$$

Putting value of  $d$  in equation  $-8 = a + 8d$ ,

$$-8 = a + 8(-2)$$

$$\Rightarrow -8 = a - 16 \Rightarrow a = 8$$

Therefore, first term =  $a = 8$  and Common Difference =  $d = -2$

We want to know which term is equal to zero.

Using formula  $a_n = a + (n - 1)d$ , to find n<sup>th</sup> term of arithmetic progression,

$$0 = 8 + (n - 1)(-2)$$

$$\Rightarrow 0 = 8 - 2n + 2$$

$$\Rightarrow 0 = 10 - 2n$$

$$\Rightarrow 2n = 10 \Rightarrow n = 5$$

Therefore, 5<sup>th</sup> term is equal to 0.

**10.** The 17<sup>th</sup> term of an AP exceeds its 10<sup>th</sup> term by 7. Find the common difference.

**Ans.**  $a_{17} = a_{10} + 7 \dots (1)$

Using formula  $a_n = a + (n - 1)d$ , to find  $n^{\text{th}}$  term of arithmetic progression,

$$a_{17} = a + 16d \dots (2)$$

$$a_{10} = a + 9d \dots (3)$$

Putting (2) and (3) in equation (1),

$$a + 16d = a + 9d + 7$$

$$\Rightarrow 7d = 7 \Rightarrow d = 1$$

**11.** Which term of the AP: 3, 15, 27, 39... will be 132 more than its  $54^{\text{th}}$  term?

**Ans.** Lets first calculate  $54^{\text{th}}$  of the given AP.

First term =  $a = 3$ , Common difference =  $d = 15 - 3 = 12$

Using formula  $a_n = a + (n - 1)d$ , to find  $n^{\text{th}}$  term of arithmetic progression,

$$a_{54} = a + (54 - 1)d = 3 + 53(12) = 3 + 636 = 639$$

We want to find which term is 132 more than its  $54^{\text{th}}$  term.

Let us suppose it is  $n^{\text{th}}$  term which is 132 more than  $54^{\text{th}}$  term.

$$a_n = a_{54} + 132$$

$$\Rightarrow 3 + (n - 1)12 = 639 + 132$$

$$\Rightarrow 3 + 12n - 12 = 771$$

$$\Rightarrow 12n - 9 = 771$$

$$\Rightarrow 12n = 780 \Rightarrow n = 65$$

Therefore,  $65^{\text{th}}$  term is 132 more than its  $54^{\text{th}}$  term.

**12.** Two AP's have the same common difference. The difference between their  $100^{\text{th}}$  terms is 100, what is the difference between their  $1000^{\text{th}}$  terms.

**Ans.** Let first term of  $1^{\text{st}}$  AP =  $a$

Let first term of  $2^{\text{nd}}$  AP =  $a'$

It is given that their common difference is same.

\*\*\*\*\*END\*\*\*\*\*