

### Exercise 9.3

Page No: 9.11

**1. For the following arithmetic progressions write the first term  $a$  and the common difference  $d$ :**

(i) - 5, -1, 3, 7,...

(ii)  $1/5, 3/5, 5/5, 7/5, \dots$

(iii) 0.3, 0.55, 0.80, 1.05,...

(iv) -1.1, - 3.1, - 5.1, - 7.1,...

**Solution:**

We know that if  $a$  is the first term and  $d$  is the common difference, the arithmetic progression is  $a, a + d, a + 2d + a + 3d, \dots$

(i) - 5, -1, 3, 7,...

Given arithmetic series is - 5, -1, 3, 7,...

$a, a + d, a + 2d + a + 3d, \dots$

Thus, by comparing these two we get,  $a = - 5, a + d = 1, a + 2d = 3, a + 3d = 7$

First term ( $a$ ) = - 5

By subtracting second and first term, we get

$$(a + d) - (a) = d$$

$$-1 - (- 5) = d$$

$$4 = d$$

$\Rightarrow$  Common difference ( $d$ ) = 4.

(ii)  $1/5, 3/5, 5/5, 7/5, \dots$

Given arithmetic series is  $1/5, 3/5, 5/5, 7/5, \dots$

It is seen that, it's of the form of  $1/5, 2/5, 5/5, 7/5, \dots a, a + d, a + 2d, a + 3d,$

Thus, by comparing these two, we get

$$a = 1/5, a + d = 3/5, a + 2d = 5/5, a + 3d = 7/5$$

First term ( $a$ ) =  $1/5$

By subtracting first term from second term, we get

$$d = (a + d) - (a)$$

$$d = 3/5 - 1/5$$

$$d = 2/5$$

$\Rightarrow$  common difference ( $d$ ) =  $2/5$

(iii) 0.3, 0.55, 0.80, 1.05, .....

Given arithmetic series 0.3, 0.55, 0.80, 1.05, .....

It is seen that, it's of the form of  $a, a + d, a + 2d, a + 3d,$

Thus, by comparing we get,

$$a = 0.3, a + d = 0.55, a + 2d = 0.80, a + 3d = 1.05$$

First term ( $a$ ) = 0.3.

By subtracting first term from second term. We get

$$d = (a + d) - (a)$$

$$d = 0.55 - 0.3$$

$$d = 0.25$$

$\Rightarrow$  Common difference ( $d$ ) = 0.25

- (iv)  $-1.1, -3.1, -5.1, -7.1, \dots$   
 General series is  $-1.1, -3.1, -5.1, -7.1, \dots$   
 It is seen that, it's of the form of  $a, a + d, a + 2d, a + 3d, \dots$   
 Thus, by comparing these two, we get  
 $a = -1.1, a + d = -3.1, a + 2d = -5.1, a + 3d = -7.1$   
 First term ( $a$ ) =  $-1.1$   
 Common difference ( $d$ ) =  $(a + d) - (a)$   
 $= -3.1 - (-1.1)$   
 $\Rightarrow$  Common difference ( $d$ ) =  $-2$

**2. Write the arithmetic progression when first term  $a$  and common difference  $d$  are as follows:**

- (i)  $a = 4, d = -3$   
 (ii)  $a = -1, d = 1/2$   
 (iii)  $a = -1.5, d = -0.5$

**Solution:**

We know that, if first term ( $a$ ) =  $a$  and common difference =  $d$ , then the arithmetic series is:  $a, a + d, a + 2d, a + 3d,$

- (i)  $a = 4, d = -3$   
 Given, first term ( $a$ ) =  $4$   
 Common difference ( $d$ ) =  $-3$   
 Then arithmetic progression is:  $a, a + d, a + 2d, a + 3d, \dots$   
 $\Rightarrow 4, 4 - 3, a + 2(-3), 4 + 3(-3), \dots$   
 $\Rightarrow 4, 1, -2, -5, -8, \dots$
- (ii)  $a = -1, d = 1/2$   
 Given, first term ( $a$ ) =  $-1$   
 Common difference ( $d$ ) =  $1/2$   
 Then arithmetic progression is:  $a, a + d, a + 2d, a + 3d,$   
 $\Rightarrow -1, -1 + 1/2, -1, 2\frac{1}{2}, -1 + 3\frac{1}{2}, \dots$   
 $\Rightarrow -1, -1/2, 0, 1/2$
- (iii)  $a = -1.5, d = -0.5$   
 Given First term ( $a$ ) =  $-1.5$   
 Common difference ( $d$ ) =  $-0.5$   
 Then arithmetic progression is;  $a, a + d, a + 2d, a + 3d, \dots$   
 $\Rightarrow -1.5, -1.5, -0.5, -1.5 + 2(-0.5), -1.5 + 3(-0.5)$   
 $\Rightarrow -1.5, -2, -2.5, -3, \dots$

**3. In which of the following situations, the sequence of numbers formed will form an A.P.?**

- (i) The cost of digging a well for the first metre is Rs 150 and rises by Rs 20 for each succeeding metre.  
 (ii) The amount of air present in the cylinder when a vacuum pump removes each time  $1/4$  of their remaining in the cylinder.  
 (iii) Divya deposited Rs 1000 at compound interest at the rate of 10% per annum. The amount at

the end of first year, second year, third year, ..., and so on.

**Solution:**

- (i) Given,  
Cost of digging a well for the first meter ( $c_1$ ) = Rs.150.  
And, the cost rises by Rs.20 for each succeeding meter  
Then,  
Cost of digging for the second meter ( $c_2$ ) = Rs.150 + Rs 20 = Rs 170  
Cost of digging for the third meter ( $c_3$ ) = Rs.170 + Rs 20 = Rs 210  
Hence, its clearly seen that the costs of digging a well for different lengths are 150, 170, 190, 210, ....  
Evidently, this series is in A.P.  
With first term ( $a$ ) = 150, common difference ( $d$ ) = 20
- (ii) Given,  
Let the initial volume of air in a cylinder be  $V$  liters each time  $3^{\text{th}}/4$  of air in a remaining i.e  $1 - 1/4$   
First time, the air in cylinder is  $V$ .  
Second time, the air in cylinder is  $3/4 V$ .  
Third time, the air in cylinder is  $(3/4)^2 V$ .  
Thus, series is  $V, 3/4 V, (3/4)^2 V, (3/4)^3 V, \dots$   
Hence, the above series is not a A.P.
- (iii) Given,  
Divya deposited Rs 1000 at compound interest of 10% p.a  
So, the amount at the end of first year is =  $1000 + 0.1(1000) = \text{Rs } 1100$   
And, the amount at the end of second year is =  $1100 + 0.1(1100) = \text{Rs } 1210$   
And, the amount at the end of third year is =  $1210 + 0.1(1210) = \text{Rs } 1331$   
Cleary, these amounts 1100, 1210 and 1331 are not in an A.P since the difference between them is not the same.