

Exercise 9.3

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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.