Exercise 9.3

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,…
(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,….

(i) – 5, –1, 3, 7,…
Given arithmetic series is – 5, –1, 3, 7,...
c a, a + d, a + 2d + a + 3d,….
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
⇒ Common difference (d) = 4.

(ii) 1/5, 3/5, 5/5, 7/5, ...
Given arithmetic series is 1/5, 3/5, 5/5, 7/5, ...
It is seen that, it's of the form of 1/5, 2/5, 5/5, 7/5,.....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
⇒ 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
⇒ Common difference (d) = 0.25

(iv) –1.1, – 3.1, – 5.1, –7.1, ...
General series is –1.1, – 3.1, – 5.1, –7.1, ...
It is seen that, it's of the form of a, a + d, a + 2d, a + 3d, ...
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)
⇒ 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, ...
⇒4, 4 - 3, 4 + 2(-3), 4 + 3(-3), ...
⇒ 4, 1, – 2, – 5, – 8 .....

(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,
⇒ -1, -1 + 1/2, -1 + 2½, -1 + 3½, ...
⇒ -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, ...
⇒ -1.5, -1.5 + (-0.5), –1.5 + 2(– 0.5), –1.5 + 3(– 0.5)
⇒ – 1.5, – 2, – 2.5, – 3, ...

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 $3^{th}/4$ 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, ...
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) = Rs 1100
And, the amount at the end of second year is = 1100 + 0.1(1100) = Rs 1210
And, the amount at the end of third year is = 1210 + 0.1(1210) = Rs 1331
Cleary, these amounts 1100, 1210 and 1331 are not in an A.P since the difference between them is not the same.