



NCERT Solutions For Class 10 Chapter 5 Maths Arithmetic  
Progressions Exercise 5.1

1. In which of the following situations, does the list of numbers involved make an arithmetic progression, and why?

- (i) The taxi fare after each km when the fare is Rs 15 for the first km and Rs 8 for each additional km.
- (ii) The amount of air present in a cylinder when a vacuum pump removes 14<sup>th</sup> of the air remaining in the cylinder at a time.
- (iii) The cost of digging a well after every meter of digging, when it costs Rs 150 for the first meter and rises by Rs 50 for each subsequent meter.
- (iv) The amount of money in the account every year, when Rs 10,000 is deposited at compound Interest at 8% per annum.

**Ans. (i)** Taxi fare for 1st km = Rs 15, Taxi fare after 2 km =  $15 + 8 = \text{Rs } 23$

Taxi fare after 3 km =  $23 + 8 = \text{Rs } 31$

Taxi fare after 4 km =  $31 + 8 = \text{Rs } 39$

Therefore, the sequence is 15, 23, 31, 39...

It is an arithmetic progression because difference between any two consecutive terms is equal which is 8. ( $23 - 15 = 8$ ,  $31 - 23 = 8$ ,  $39 - 31 = 8$ , ...)

**(ii)** Let amount of air initially present in a cylinder =  $V$

Amount of air left after pumping out air by vacuum

$$\text{pump} = V - \frac{V}{4} = \frac{4V - V}{4} = \frac{3V}{4}$$

Amount of air left when vacuum pump again pumps out air

$$= \frac{3}{4}V - \left(\frac{1}{4} \times \frac{3}{4}V\right) = \frac{3}{4}V - \frac{3}{16}V = \frac{12V - 3V}{16} = \frac{9}{16}V$$

So, the sequence we get is like  $V, \frac{3}{4}V, \frac{9}{16}V, \dots$

Checking for difference between consecutive terms  
...

$$\frac{3}{4}V - V = -\frac{V}{4}, \frac{9}{16}V - \frac{3}{4}V = \frac{9V - 12V}{16} = \frac{-3V}{16}$$

Difference between consecutive terms is not equal.

Therefore, it is not an arithmetic progression.

**(iii)** Cost of digging 1 meter of well = Rs 150

Cost of digging 2 meters of well =  $150 + 50 = \text{Rs } 200$

Cost of digging 3 meters of well =  $200 + 50 = \text{Rs } 250$

Therefore, we get a sequence of the form 150, 200, 250...

It is an arithmetic progression because difference between any two consecutive terms is equal. ( $200 - 150 = 250 - 200 = 50$ ...)

Here, difference between any two consecutive terms which is also called common difference is equal to 50.

$$\begin{aligned} \text{(iv) Amount in bank after 1st year} &= 10000 \left( 1 + \frac{8}{100} \right) \\ \dots (1) \end{aligned}$$

$$\begin{aligned} \text{Amount in bank after two years} &= 10000 \left( 1 + \frac{8}{100} \right)^2 \\ \dots (2) \end{aligned}$$

$$\begin{aligned} \text{Amount in bank after three years} &= 10000 \left( 1 + \frac{8}{100} \right)^3 \\ \dots (3) \end{aligned}$$

$$\begin{aligned} \text{Amount in bank after four years} &= 10000 \left( 1 + \frac{8}{100} \right)^4 \\ \dots (4) \end{aligned}$$

It is not an arithmetic progression because  $(2) - (1) \neq (3) - (2)$

(Difference between consecutive terms is not equal)

Therefore, it is not an Arithmetic Progression.

**2.** Write first four terms of the AP, when the first term  $a$  and common difference  $d$  are given as follows:

(i)  $a = 10, d = 10$

(ii)  $a = -2, d = 0$

(iii)  $a = 4, d = -3$

(iv)  $a = -1, d = \frac{1}{2}$

(v)  $a = -1.25, d = -0.25$

**Ans. (i)** First term =  $a = 10, d = 10$

Second term =  $a + d = 10 + 10 = 20$

Third term = second term +  $d = 20 + 10 = 30$

$$\text{Fourth term} = \text{third term} + d = 30 + 10 = 40$$

Therefore, first four terms are: 10, 20, 30, 40

$$\text{(ii) First term} = a = -2, d = 0$$

$$\text{Second term} = a + d = -2 + 0 = -2$$

$$\text{Third term} = \text{second term} + d = -2 + 0 = -2$$

$$\text{Fourth term} = \text{third term} + d = -2 + 0 = -2$$

Therefore, first four terms are: -2, -2, -2, -2

$$\text{(iii) First term} = a = 4, d = -3$$

$$\text{Second term} = a + d = 4 - 3 = 1$$

$$\text{Third term} = \text{second term} + d = 1 - 3 = -2$$

$$\text{Fourth term} = \text{third term} + d = -2 - 3 = -5$$

Therefore, first four terms are: 4, 1, -2, -5

$$\text{(iv) First term} = a = -1, d = \frac{1}{2}$$

$$\text{Second term} = a + d = -1 + \frac{1}{2} = -\frac{1}{2}$$

$$\text{Third term} = \text{second term} + d = -\frac{1}{2} + \frac{1}{2} = 0$$

$$\text{Fourth term} = \text{third term} + d = 0 + \frac{1}{2} = \frac{1}{2}$$

Therefore, first four terms are:  $-1, -\frac{1}{2}, 0, \frac{1}{2}$

$$\text{(v) First term} = a = -1.25, d = -0.25$$

$$\text{Second term} = a + d = -1.25 - 0.25 = -1.50$$

$$\text{Third term} = \text{second term} + d = -1.50 - 0.25 = -1.75$$

$$\text{Fourth term} = \text{third term} + d$$

$$= -1.75 - 0.25 = -2.00$$

Therefore, first four terms are: -1.25, -1.50, -1.75, -2.00

3. For the following APs, write the first term and the common difference.

(i)  $3, 1, -1, -3 \dots$

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

(iii)  $\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3} \dots$

(iv)  $0.6, 1.7, 2.8, 3.9 \dots$

**Ans. (i)**  $3, 1, -1, -3 \dots$

First term =  $a = 3$ ,

Common difference (d) = Second term – first term =  
Third term – second term and so on

Therefore, Common difference (d) =  $1 - 3 = -2$

**(ii)**  $-5, -1, 3, 7 \dots$

First term =  $a = -5$

Common difference (d) = Second term – First term  
= Third term – Second term and so on

Therefore, Common difference (d) =  $-1 - (-5) = -1 + 5 = 4$

**(iii)**  $\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3} \dots$

First term =  $a = \frac{1}{3}$

Common difference (d) = Second term – First term  
= Third term – Second term and so on

Therefore, Common difference (d) =  $\frac{5}{3} - \frac{1}{3} = \frac{4}{3}$

**(iv)**  $0.6, 1.7, 2.8, 3.9 \dots$

First term =  $a = 0.6$

Common difference (d) = Second term – First term  
= Third term – Second term and so on

Therefore, Common difference (d) =  $1.7 - 0.6 = 1.1$

4. Which of the following are APs? If they form an AP, find the common difference  $d$  and write three more terms.

(i)  $2, 4, 8, 16 \dots$

(ii)  $2, \frac{5}{2}, 3, \frac{7}{2} \dots$

(iii)  $-1.2, -3.2, -5.2, -7.2 \dots$

(iv)  $-10, -6, -2, 2 \dots$

(v)  $3, 3 + \sqrt{2}, 3 + 2\sqrt{2}, 3 + 3\sqrt{2} \dots$

(vi)  $0.2, 0.22, 0.222, 0.2222 \dots$

(vii)  $0, -4, -8, -12 \dots$

(viii)  $-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2} \dots$

(ix)  $1, 3, 9, 27 \dots$

(x)  $a, 2a, 3a, 4a \dots$

(xi)  $a, a^2, a^3, a^4 \dots$

(xii)  $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32} \dots$

(xiii)  $\sqrt{3}, \sqrt{6}, \sqrt{9}, \sqrt{12} \dots$

(xiv)  $1^2, 3^2, 5^2, 7^2 \dots$

(xv)  $1^2, 5^2, 7^2, 73 \dots$

**Ans. (i)**  $2, 4, 8, 16 \dots$

It is not an AP because difference between consecutive terms is not equal.

$$\text{As } 4 - 2 \neq 8 - 4$$

**(ii)**  $2, \frac{5}{2}, 3, \frac{7}{2} \dots$

It is an AP because difference between consecutive terms is equal.

$$\Rightarrow \frac{5}{2} - 2 = 3 - \frac{5}{2} = \frac{1}{2}$$

$$\text{Common difference (d)} = \frac{1}{2}$$

