

Chapter 9 Arithmetic and Geometric Progressions Ex 9.1

Question 1.

For the following A.P.s, write the first term a and the common difference d :

(i) 3, 1, -1, -3,

(ii) 13, 53, 93, 133,

(iii) -3.2, -3, -2.8, -2.6, ...

Solution:

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

Here first term (a) = 3

and the common difference (d)

$$= 1 - 3 = -2,$$

$$-1 - 1 = -2, \dots$$

$$= -2$$

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

Here first common term (a) = $\frac{1}{3}$

and common difference (d) =

$$\frac{5}{3} - \frac{1}{3} = \frac{4}{3}, \frac{9}{3} - \frac{5}{3} = \frac{4}{3}, \dots$$

$$= \frac{4}{3}$$

(iii) -3.2, -3, -2.8, -2.6, ...

Here first term (a) = -3.2

and common difference (d)

$$= -3 - (-3.2) = -3 + 3.2 = 0.2$$

$$= (d) = 0.2$$

Question 2.

Write first four terms of the A.P., when the first term a and the common difference d are given as follows:

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

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

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

(iv) $a = 12, d = -12$

Solution:

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

\therefore A.P. = 10, 20, 30, 40, ...

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

\therefore A.P. = -2, -2, -2, -2, ...

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

\therefore A.P. = 4, 1, -2, -5, ...

(iv) $a = \frac{1}{2}, d = -\frac{1}{6}$

A.P. is $\frac{1}{2}, \left(\frac{1}{2} - \frac{1}{6}\right) = \frac{2}{6}$

$= \frac{2}{6} - \frac{1}{6} = \frac{1}{6}, \dots$

A.P. = $\frac{1}{2}, \frac{2}{6}, \frac{1}{6}, 0, \dots$

$= \frac{1}{2}, \frac{1}{3}, \frac{1}{6}, 0, \dots$

Question 3.

Which of the following lists of numbers form an A.P.? If they form an A.P., find the common difference d and write the next three terms :

(i) 4, 10, 16, 22, ...

(ii) -2, 2, -2, 2, ...

(iii) 2, 4, 8, 16, ...

(iv) 2, 52, 3, 72, ...

(v) -10, -6, -2, 2, ...

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

(vii) 1, 3, 9, 27, ...

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

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

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

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

(xii) $a, 2a + 1, 3a + 2, 4a + 3, \dots$

Solution:

(i) $4, 10, 16, 22, \dots$

Here $a = 4, d = 10 - 4 = 6, 16 - 10 = 6, 22 - 16 = 6$

\therefore common difference is same

\therefore It is in A.P

and next three terms are 28, 34, 40

(ii) $-2, 2, -2, 2, \dots$

Here, $a = -2$

$$d = 2 - (-2) = 2 + 2 = 4$$

$$-2 - 2 = -4$$

$$2 - (-2) = 4$$

\therefore Common difference is not same.

\therefore It is not an A.P.

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

Here, $a = 2$

$$d = 4 - 2 = 2, 8 - 4 = 4, 16 - 8 = 8$$

\therefore Common difference is not same.

\therefore It is not an A.P.

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

Here $a = 2,$

$$d = \frac{5}{2} - 2 = \frac{1}{2}$$

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

$$\frac{7}{2} - 3 = \frac{1}{2}$$

\therefore Common difference is same.

\therefore It is an A.P.

and next three terms are $4, \frac{9}{2}, 5$

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

Here, first term (a) = -10

$$d = -6 - (-10) = -6 + 10 = 4$$

$$-2 - (-6) = -2 + 6 = 4$$

$$2 - (-2) = 2 + 2 = 4$$

\therefore Common difference is same.

\therefore It is an A.P.

and next three terms are $6, 10, 14, 20$

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

$= 1, 9, 25, 49, \dots$

Here, first term $(a) = 1^2 = 1$

$d = 9 - 1 = 8$

$25 - 9 = 16$

$49 - 25 = 24$

\therefore Common difference is not same.

\therefore It is not an A.P.

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

Here, first term $(a) = 1$

$d = 3 - 1 = 2$

$9 - 3 = 6$

$27 - 9 = 18$

\therefore Common difference is not same.

\therefore It is not an A.P.

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

$\Rightarrow \sqrt{2}, 2\sqrt{2}, 3\sqrt{2}, 4\sqrt{2}, \dots$

Here, first term $(a) = \sqrt{2}$

and common difference (d)

$= 2\sqrt{2} - \sqrt{2} = \sqrt{2}$

$= 3\sqrt{2} - 2\sqrt{2} = \sqrt{2}$

∴ The common difference is same.

∴ It is an A.P.

and next three terms are

$$\sqrt{50}, \sqrt{72}, \sqrt{98}, \dots$$

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

Here, first term (a) = 3

$$\text{and } d = 3 + \sqrt{2} - 2 = \sqrt{2}$$

$$3 + 2\sqrt{2} - 3 - \sqrt{2} = \sqrt{2}$$

$$3 + 3\sqrt{2} - 3 + 2\sqrt{2} = \sqrt{2}$$

∴ Common difference is same.

∴ It is an A.P.

and next three terms are

$$3 + 4\sqrt{2}, 3 + 5\sqrt{2}, 3 + 6\sqrt{2}, \dots$$

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

Here, $a = \sqrt{3}$

$$d = \sqrt{6} - \sqrt{3} = \sqrt{3} \times \sqrt{2} - \sqrt{3}$$

$$= \sqrt{3}(\sqrt{2} - 1)$$

$$= \sqrt{9} - \sqrt{6} = 3 - \sqrt{2} \sqrt{3} = \sqrt{3}(\sqrt{3} - \sqrt{2})$$

∴ Common difference is not same.

∴ It is not an A.P.

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

Here first term (a) = a

Common difference (d) = $2a - a = a$

$$3a - 2a = a$$

$$4a - 3a = a$$

∴ The common difference is same.

∴ It is an A.P.

and next three terms are

$$5a, 6a, 7a$$

(xii) $a, 2a + 1, 3a + 2, 4a + 3, \dots$

Here first term (a) = a

and common difference (d)

$$= 2a + 1 - a = a + 1$$

$$3a + 2 - 2a - 1 = a + 1$$

$$4a + 3 - 3a - 2 = a + 1$$

∴ Common difference is same.

∴ It is an A.P.

and three next terms are

$$5a + 4, 6a + 5, 7a + 6, \dots$$