

MATHEMATICS Chapter-5

Arithmetic Progression

5. Which of the following are APs? If they form an A.P, find the common difference 'd' and write three more terms. (.....Contd)

(vii) 0, -4, -8, -12,

So In: 0, -4, -8, -12,

$$a_2 - a_1 = -4 - 0 = -4$$

$$a_3 - a_2 = -8 - (-4) \\ = -8 + 4 = -4$$

$$a_4 - a_3 = -12 - (-8) \\ = -12 + 8 = -4$$

i.e., $a_{n+1} - a_n$ is the same every time hence it is an A.P

with common difference $d = -4$

And the next three terms are

$$-12 + (-4) = -16$$

$$-16 + (-4) = -20$$

$$-20 + (-4) = -24$$

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

So In: $-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \dots$

$$a_2 - a_1 = -\frac{1}{2} - \left(-\frac{1}{2}\right) = -\frac{1}{2} + \frac{1}{2} = 0$$

$$a_3 - a_2 = -\frac{1}{2} - \left(-\frac{1}{2}\right) = -\frac{1}{2} + \frac{1}{2} = 0$$

$$a_4 - a_3 = -\frac{1}{2} - \left(-\frac{1}{2}\right) = -\frac{1}{2} + \frac{1}{2} = 0$$

i.e., $a_{n+1} - a_n$ is the same every time

hence it is an A.P with common difference $d = 0$

And the next three terms are

$$-\frac{1}{2} + 0 = -\frac{1}{2}$$

$$-\frac{1}{2} + 0 = -\frac{1}{2}$$

$$-\frac{1}{2} + 0 = -\frac{1}{2}$$

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

Soln:-

$$a_2 - a_1 = 3 - 1 = 2$$

$$a_3 - a_2 = 9 - 3 = 6$$

$$a_4 - a_3 = 27 - 9 = 18$$

Here $a_2 - a_1 \neq a_3 - a_2$

So the given list of number does not form an AP

(x) a, 2a, 3a, 4a, ...

Soln:-

$$a_2 - a_1 = 2a - a = a$$

$$a_3 - a_2 = 3a - 2a = a$$

$$a_4 - a_3 = 4a - 3a = a$$

i.e., $a_{n+1} - a_n$ is the same every time hence it

is an A.P with common difference $d = a$

And the next three terms are

$$4a + a = 5a$$

$$5a + a = 6a$$

$$6a + a = 7a$$

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

Soln:-

$$a_2 - a_1 = a^2 - a = a(a-1)$$

$$a_3 - a_2 = a^3 - a^2 = a^2(a-1)$$

Here $a_2 - a_1 \neq a_3 - a_2$

So the given list of number does not form an AP

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

Soln: $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$

$$a_2 - a_1 = \sqrt{8} - \sqrt{2}$$

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

$$a_3 - a_2 = \sqrt{18} - \sqrt{8}$$

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

$$a_4 - a_3 = \sqrt{32} - \sqrt{18}$$

$$= 4\sqrt{2} - 3\sqrt{2} = \sqrt{2}$$

i.e., $a_{n+1} - a_n$ is the same every time hence

it is an A.P with common difference $d = \sqrt{2}$

And the next three terms are

$$\sqrt{32} + \sqrt{2} = 4\sqrt{2} + \sqrt{2} = 5\sqrt{2} = \sqrt{50}$$

$$(5\sqrt{2}) + \sqrt{2} = 6\sqrt{2} = \sqrt{72}$$

$$(6\sqrt{2}) + \sqrt{2} = 7\sqrt{2} = \sqrt{98}$$

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

Soln

$$a_2 - a_1 = 3^2 - 1^2 = 9 - 1 = 8$$

$$a_3 - a_2 = 5^2 - 3^2 = 25 - 9 = 16$$

Here $a_2 - a_1 \neq a_3 - a_2$

So the given list of number does not form an AP

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

Soln

$$a_2 - a_1 = 5^2 - 1^2 = 25 - 1 = 24$$

$$a_3 - a_2 = 7^2 - 5^2 = 49 - 25 = 24$$

$$a_4 - a_3 = 7^2 - 7^2 = 49 - 49 = 0$$

i.e., $a_{n+1} - a_n$ is the same every time hence it is an A.P

with common difference $d = 24$

And the next three terms are

$$73 + 24 = 97$$

$$97 + 24 = 121$$

$$121 + 24 = 145$$

6) 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 $\frac{1}{4}$ of the air remaining in the cylinder at a time. (iii) The cost of digging a well after every

metre of digging, when it costs Rs 150 for the first metre and rises by Rs 50 for each subsequent metre. (iv) The amount of money in the account every year,

when Rs 10000 is deposited at compound interest at 8% per annum

(Exercise 5.1 problem)

Soln:- (i) Taxi fare for 1km=Rs 15= a_1

$$\text{Taxi fare for 2kms} = \text{Rs } 15 + \text{Rs } 8 = \text{Rs } 23 = a_2$$

$$\text{Taxi fare for 3kms} = \text{Rs } 23 + \text{Rs } 8 = \text{Rs } 31 = a_3$$

$$\text{Taxi fare for 4kms} = \text{Rs } 31 + \text{Rs } 8 = \text{Rs } 39 = a_4$$

and so on

$$a_2 - a_1 = \text{Rs } 23 - \text{Rs } 15 = \text{Rs } 8$$

$$a_3 - a_2 = \text{Rs } 31 - \text{Rs } 23 = \text{Rs } 8$$

(Contd.....)