



# VIDYA BHAWAN, BALIKA VIDYAPITH

Shakti Utthan Ashram, Lakhisarai-811311(Bihar)

(Affiliated to CBSE up to +2 Level)

CLASS: X

SUB.: MATHS

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## Arithmetic Progression

### Exercise 5.1

1. In which of the following situations, does the list of numbers involved make as 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

**Solution:** We can write the given condition as;

Taxi fare for 1 km = 15

Taxi fare for first 2 kms =  $15+8 = 23$

Taxi fare for first 3 kms =  $23+8 = 31$

Taxi fare for first 4 kms =  $31+8 = 39$

And so on.....

Thus, 15, 23, 31, 39 ... forms an A.P. because every next term is 8 more than the preceding term.

(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.

**Solution:** We can write the given condition as;

Cost of digging a well for first metre = Rs.150

Cost of digging a well for first 2 metres =  $\text{Rs.}150+50 = \text{Rs.}200$

Cost of digging a well for first 3 metres =  $\text{Rs.}200+50 = \text{Rs.}250$

Cost of digging a well for first 4 metres =  $\text{Rs.}250+50 = \text{Rs.}300$

And so on..

Clearly, 150, 200, 250, 300 ... forms an A.P. with a common difference of 50 between each term.

(iv) The amount of money in the account every year, when Rs 10000 is deposited at compound interest at 8% per annum.

2. Write first four terms of the A.P. when the first term  $a$  and the common difference 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)  $a = -1.25, d = -0.25$

**Solutions:** (i)  $a = 10, d = 10$

Let us consider, the Arithmetic Progression series be  $a_1, a_2, a_3, a_4, a_5 \dots$

$$a_1 = a = 10$$

$$a_2 = a_1 + d = 10 + 10 = 20$$

$$a_3 = a_2 + d = 20 + 10 = 30$$

$$a_4 = a_3 + d = 30 + 10 = 40$$

$$a_5 = a_4 + d = 40 + 10 = 50$$

And so on...

Therefore, the A.P. series will be 10, 20, 30, 40, 50 ...

And First four terms of this A.P. will be 10, 20, 30, and 40.

**3. For the following A.P.s, write the first term and the common difference.**

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

(ii) -5, -1, 3, 7 ...

(iii)  $1/3, 5/3, 9/3, 13/3$  ....

(iv) 0.6, 1.7, 2.8, 3.9 ...

**Solutions** (i) Given series, 3, 1, -1, -3 ...

First term,  $a = 3$

Common difference,  $d = \text{Second term} - \text{First term}$

$$\Rightarrow 1 - 3 = -2$$

$$\Rightarrow d = -2$$

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

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

(ii) 2,  $5/2$ , 3,  $7/2$  ....

(iii) -1.2, -3.2, -5.2, -7.2 ...

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

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

(vi) 0.2, 0.22, 0.222, 0.2222 ....

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

(viii)  $-1/2, -1/2, -1/2, -1/2$  ....

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

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

(xi)  $a, a^2, a^3, a^4$  ...

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

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

(xiv)  $1^2, 3^2, 5^2, 7^2$  ...

(xv)  $1^2, 5^2, 7^2, 7^3$  ...

**Solution** (i) Given to us, 2, 4, 8, 16 ...

Here, the common difference is;

$$a_2 - a_1 = 4 - 2 = 2$$

$$a_3 - a_2 = 8 - 4 = 4$$

$$a_4 - a_3 = 16 - 8 = 8$$

Since,  $a_{n+1} - a_n$  or the common difference is not the same every time.

Therefore, the given series are not forming an A.P.