



CLASS 10 MATHS

PART Ex 5.1 · Examples

## ARITHMETIC PROGRESSIONS

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## NCERT SOLVED EXAMPLES

**E1** For the AP :  $\frac{3}{2}, \frac{1}{2}, -\frac{1}{2}, -\frac{3}{2}, \dots$  write  $a$  and  $d$ .

$$\text{First term } a = \frac{3}{2}$$

$$d = a_2 - a_1 = \frac{1}{2} - \frac{3}{2}$$

$$d = -1 \quad \boxed{a = \frac{3}{2}, d = -1}$$

## EXAMPLES (Continued)

**E2** Which of these form an AP? If so, write the next two terms.**(i)** 4, 10, 16, 22, ...

$$d = 10 - 4 = 6 \text{ (constant)} \rightarrow \text{AP}$$

$$\text{Next terms : } 22 + 6 = 28, 28 + 6 = 34$$

**28, 34****(ii)** 1, -1, -3, -5, ...

$$d = -1 - 1 = -2 \text{ (constant)} \rightarrow \text{AP}$$

$$\text{Next terms : } -7, -9$$

**-7, -9****(iii)** -2, 2, -2, 2, ...

$$a_2 - a_1 = 4, \quad a_3 - a_2 = -4$$

**Not an AP****(iv)** 1, 1, 1, 2, 2, 2, 3, 3, 3, ...

$$\text{Differences are } 0, 0, 1, \dots \text{ (not constant)}$$

**Not an AP****Remember :** A list is an AP only if  $d = a_2 - a_1 = a_3 - a_2 = \dots$  is the same throughout.

UNDERSTAND CONCEPTS



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CLASS 10 MATHS

PART 1 (Ex 5.1)

## ARITHMETIC PROGRESSIONS

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## EXERCISE 5.1 — SOLUTIONS

1 In which of the following situations does the list of numbers make an AP, and why?

(i) Taxi fare : 15, 23, 31, 39, ...

Each term increases by 8 (constant) **Yes, an AP (d = 8)**

(ii) Air in cylinder : each time  $\frac{1}{4}$  is removed, so  $\frac{3}{4}$  of the air remains — a constant ratio, not a constant difference

**Not an AP**

(iii) Cost of digging : 150, 200, 250, 300, ...

Each term increases by 50 (constant) **Yes, an AP (d = 50)**

(iv) Compound interest : 10000, 10800, 11664, ... grows by a constant ratio, not a constant difference

**Not an AP**

## EXERCISE 5.1 — SOLUTIONS (Continued)

2 Write the first four terms of the AP with the given a and d.

(i)  $a = 10, d = 10$  : **10, 20, 30, 40**

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

(iii)  $a = 4, d = -3$  : **4, 1, -2, -5**

(iv)  $a = -1, d = \frac{1}{2}$  : **-1,  $-\frac{1}{2}$ , 0,  $\frac{1}{2}$**

(v)  $a = -1.25, d = -0.25$  : **-1.25, -1.50, -1.75, -2.00**

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

(i) 3, 1, -1, -3, ... **a = 3, d = -2**

(ii) -5, -1, 3, 7, ... **a = -5, d = 4**

(iii)  $\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3}, \dots$  **a =  $\frac{1}{3}$ , d =  $\frac{4}{3}$**

(iv) 0.6, 1.7, 2.8, 3.9, ... **a = 0.6, d = 1.1**



**Remember :** Add the common difference d to a term to get the next term. If d is not constant, it is not an AP.

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PART 2 (Ex 5.1)

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## EXERCISE 5.1 — SOLUTIONS (Continued)

4 Which of the following are APs? If so, find  $d$  and write three more terms.

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

differences 2, 4, 8 (not equal)

Not an AP

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

$d = \frac{1}{2}$  ; next :  $4, \frac{9}{2}, 5$

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

$d = -2$  ; next : **-9.2, -11.2, -13.2**

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

$d = 4$  ; next : **6, 10, 14**

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

$d = \sqrt{2}$  ; next :  **$3+4\sqrt{2}, 3+5\sqrt{2}, 3+6\sqrt{2}$**

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

differences 0.02, 0.002, ... (not equal)

Not an AP

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

$d = -4$  ; next : **-16, -20, -24**

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

$d = 0$  ; next :  **$-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}$**

## EXERCISE 5.1 — SOLUTIONS (Continued)

4 (Continued)

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

differences 2, 6, 18 (not equal)

Not an AP

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

$d = a$  ; next :  **$5a, 6a, 7a$**

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

differences  $a^2 - a, a^3 - a^2, \dots$  (not equal)

Not an AP

(xii)  $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \dots = \sqrt{2}, 2\sqrt{2}, 3\sqrt{2}, 4\sqrt{2}$

$d = \sqrt{2}$  ; next :  **$\sqrt{50}, \sqrt{72}, \sqrt{98}$**

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

differences are not equal

Not an AP

(xiv)  $1^2, 3^2, 5^2, 7^2, \dots = 1, 9, 25, 49$

differences 8, 16, 24 (not equal)

Not an AP

(xv)  $1^2, 5^2, 7^2, 73, \dots = 1, 25, 49, 73$

$d = 24$  (constant) ; next : **97, 121, 145**

AP



## Remember :

Always check the difference between consecutive terms. A sequence can look like squares yet still be an AP — as in part (xv).

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