

MATHEMATICS • CLASS 10

CHAPTER 5

Arithmetic Progressions

NCERT SOLUTIONS



EXERCISE 5.1 — Q1 (i) & (ii)

Q1. In each situation, decide whether the numbers form an AP. Give a reason.

(i) A taxi charges ₹15 for the first kilometre and ₹8 for each additional kilometre. Consider the fare after each kilometre.

Fares: ₹15, ₹23, ₹31, ₹39, ...

$$23 - 15 = 8$$

$$31 - 23 = 8$$

$$39 - 31 = 8$$

Each extra kilometre adds the same amount.

Answer: Yes, an AP with $a = 15$ and $d = 8$.

(ii) A vacuum pump removes $\frac{1}{4}$ of the air remaining in a cylinder each time.

Let the initial amount of air be A , with $A > 0$.

The fraction left each time is $1 - \frac{1}{4} = \frac{3}{4}$.

After successive operations: $\frac{3A}{4}, \frac{9A}{16}, \frac{27A}{64}, \dots$

$$\frac{9A}{16} - \frac{3A}{4} = -\frac{3A}{16}$$

$$\frac{27A}{64} - \frac{9A}{16} = -\frac{9A}{64}$$

These differences are unequal.

Answer: No, the amounts do not form an AP.

EXERCISE 5.1 — Q1 (iii) & (iv)

Q1. Decide whether the numbers form an AP, and explain.

- (iii) Digging a well costs ₹150 for the first metre. The charge rises by ₹50 for each subsequent metre.

Charges for successive metres:

₹150, ₹200, ₹250, ₹300, ...

$$200 - 150 = 50$$

$$250 - 200 = 50$$

$$300 - 250 = 50$$

The charge per metre increases by a fixed amount.

Answer: Yes, an AP with $a = 150$ and $d = 50$.

- (iv) ₹10,000 is deposited at 8% compound interest per annum. Consider the amount in the account each year.

Each year, multiply the previous amount by 1.08.

$$\text{After 1 year: } 10000 \times 1.08 = ₹10800$$

$$\text{After 2 years: } 10800 \times 1.08 = ₹11664$$

$$\text{After 3 years: } 11664 \times 1.08 = ₹12597.12$$

Differences:

$$11664 - 10800 = 864$$

$$12597.12 - 11664 = 933.12$$

Since $864 \neq 933.12$, the difference is not fixed.

Answer: No, the amounts do not form an AP.

EXERCISE 5.1 — Q2

Q2. Write the first four terms for each given first term a and common difference d .
Start with a , then add d each time: $a, a+d, a+2d, a+3d$.

- (i) $a = 10, d = 10 \rightarrow 10, 10+10, 10+20, 10+30 \rightarrow \text{Answer: } 10, 20, 30, 40.$
- (ii) $a = -2, d = 0 \rightarrow -2, -2+0, -2+0, -2+0 \rightarrow \text{Answer: } -2, -2, -2, -2.$
- (iii) $a = 4, d = -3 \rightarrow 4, 4-3, 4-6, 4-9 \rightarrow \text{Answer: } 4, 1, -2, -5.$
- (iv) $a = -1, d = \frac{1}{2} \rightarrow -1, -1+\frac{1}{2}, -1+\frac{2}{2}, -1+\frac{3}{2} \rightarrow \text{Answer: } -1, -\frac{1}{2}, 0, \frac{1}{2},$
- (v) $a = -1.25, d = -0.25 \rightarrow -1.25, -1.25-0.25, -1.25-0.50, -1.25-0.75 \rightarrow \text{Answer: } -1.25, -1.50, -1.75, -2.00.$

* Adding zero leaves the term unchanged; a negative d makes the terms decrease.

EXERCISE 5.1 — Q3

Q3. For each AP, write the first term a and the common difference d .
Use $d = \text{second term} - \text{first term}$.

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

$$a = 3$$

$$d = 1 - 3 = -2$$

Answer: $a = 3, d = -2$.

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

$$a = -5$$

$$d = -1 - (-5) = 4$$

Answer: $a = -5, d = 4$.

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

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

$$d = \frac{5}{3} - \frac{1}{3} = \frac{4}{3}$$

Answer: $a = \frac{1}{3}, d = \frac{4}{3}$.

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

$$a = 0.6$$

$$d = 1.7 - 0.6 = 1.1$$

Answer: $a = 0.6, d = 1.1$.

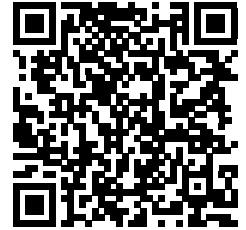


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