

Arithmetic Progressions and Coordinate Geometry

Mathematics · Class 10 · Topic-wise Practice Worksheet

TIME 45 minutes	QUESTIONS 18	TOTAL MARKS 24	MAX. SCORE ___ / 24
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Name: _____ Class/Sec: _____ Date: _____

INSTRUCTIONS

- There are **18 questions** in this worksheet. All questions are compulsory.
- Each question has four options (A), (B), (C) and (D). Exactly **one** option is correct.
- Questions 1–15 carry **1 mark** each. Questions 16–18 (Achievers Section) carry **3 marks** each.
- There is no negative marking. Use of a calculator is **not** allowed.
- Rough work may be done on the blank space at the side of each page.

Section A — Mathematical Reasoning

Q1–Q8 · 1 mark each

- The n -th term of an AP with first term a and common difference d is _____.
 (A) $a + (n - 1)d$ (B) $a + nd$
 (C) $a - (n - 1)d$ (D) $na + d$
- The sum of the first n terms of an AP is _____.
 (A) $\frac{n}{2} [2a + nd]$ (B) $\frac{n}{2} [a + (n - 1)d]$
 (C) $n[2a + (n - 1)d]$ (D) $\frac{n}{2} [2a + (n - 1)d]$
- The common difference of the AP 3, 7, 11, 15, ... is _____.
 (A) 4 (B) 3
 (C) 7 (D) -4
- The 10th term of the AP 2, 5, 8, ... is _____.
 (A) 26 (B) 29
 (C) 30 (D) 32
- The distance between the points (x_1, y_1) and (x_2, y_2) is _____.
 (A) $|x_2 - x_1| + |y_2 - y_1|$ (B) $(x_2 - x_1)^2 + (y_2 - y_1)^2$
 (C) $\sqrt{(x_2 + x_1)^2 + (y_2 + y_1)^2}$ (D) $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
- The distance of the point (3, 4) from the origin is _____.
 (A) 3 (B) 4
 (C) 5 (D) 7
- The mid-point of the segment joining (x_1, y_1) and (x_2, y_2) is _____.
 (A) $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$ (B) $(\frac{x_1 - x_2}{2}, \frac{y_1 - y_2}{2})$
 (C) $(x_1 + x_2, y_1 + y_2)$ (D) $(\frac{x_1}{2}, \frac{y_2}{2})$

8. The point that divides the line segment joining A and B internally in the ratio $m : n$ is found using the _____.

- (A) Distance formula (B) Slope formula
(C) Area formula (D) Section formula

Section B — Everyday Mathematics and Reasoning

Q9–Q15 · 1 mark each

9. Which of the following lists of numbers forms an AP?

- (A) 1, 4, 7, 10, ... (B) 2, 4, 8, 16, ...
(C) 1, 4, 9, 16, ... (D) 3, 6, 12, 24, ...

10. The sum of the first 15 terms of the AP 5, 9, 13, ... is _____.

- (A) 435 (B) 465
(C) 495 (D) 525

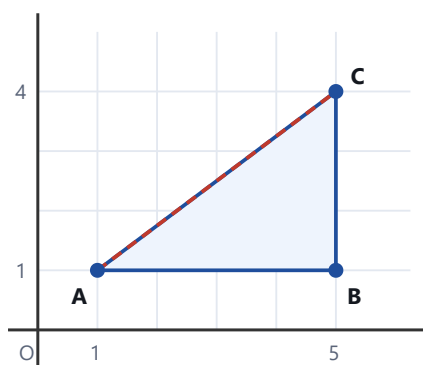
11. The mid-point of the segment joining (2, 3) and (6, 7) is _____.

- (A) (8, 10) (B) (4, 5)
(C) (2, 2) (D) (3, 4)

12. The point dividing the segment joining (1, 2) and (5, 10) internally in the ratio 1 : 3 is _____.

- (A) (4, 8) (B) (3, 6)
(C) (2, 4) (D) (2, 6)

13. Points A, B and C are plotted below. The length of AC is _____.



Points A(1, 1), B(5, 1) and C(5, 4) on a grid

- (A) 3 units (B) 4 units
(C) 7 units (D) 5 units

14. One row of the table below is **incorrectly** matched. Which row is it?

Row	AP	Common difference
(A)	10, 7, 4, 1, ...	-3
(B)	0.5, 1.0, 1.5, ...	0.5
(C)	-5, -1, 3, 7, ...	-4
(D)	2, 2, 2, 2, ...	0

Table 3.1 — Arithmetic progressions and their common differences

- (A) (A) (B) (B)
(C) (C) (D) (D)

15. A man saves ₹200 in the first month and increases his saving by ₹50 every month. His saving in the 12th month is _____.
- (A) ₹750 (B) ₹700
(C) ₹600 (D) ₹800

Achievers Section

Q16–Q18 · 3 marks each

16. How many two-digit numbers are divisible by 3?
- (A) 29 (B) 30
(C) 31 (D) 33
17. The points (1, 2), (4, y), (x, 6) and (3, 5) are the vertices of a parallelogram taken in order. The values of x and y are _____.
- (A) $x = 3, y = 6$ (B) $x = 6, y = 3$
(C) $x = 6, y = 5$ (D) $x = 5, y = 3$
18. How many terms of the AP 9, 17, 25, ... must be added to give a sum of 636?
- (A) 10 (B) 12
(C) 14 (D) 16

Answer Key

1	A	2	D	3	A	4	B	5	D
6	C	7	A	8	D	9	A	10	C
11	B	12	C	13	D	14	C	15	A
16	B	17	B	18	B				

Solutions

1. Answer: (A) $a + (n - 1)d$

Starting from a , the common difference has been added $n - 1$ times by the time the n -th term is reached, so $a_n = a + (n - 1)d$.

2. Answer: (D) $\frac{n}{2} [2a + (n - 1)d]$

Pairing the first and last terms gives $S_n = \frac{n}{2} [2a + (n - 1)d]$, which can also be written as $\frac{n}{2} (a + l)$ where l is the last term.

3. Answer: (A) 4

Subtracting any term from the next: $7 - 3 = 4$, $11 - 7 = 4$. So the common difference is **4**.

4. Answer: (B) 29

Here $a = 2$ and $d = 3$, so $a_{10} = 2 + (10 - 1)(3) = 2 + 27 = \mathbf{29}$. Using $10d$ instead of $9d$ is the usual slip.

5. Answer: (D) $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

The horizontal and vertical gaps are the legs of a right triangle whose hypotenuse is the required distance, so Pythagoras gives $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

6. Answer: (C) 5

Distance $= \sqrt{3^2 + 4^2} = \sqrt{25} = \mathbf{5}$ units, the familiar 3–4–5 right triangle.

7. Answer: (A) $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$

The mid-point is the average of the two endpoints in each coordinate separately: $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$. It is the section formula with ratio 1 : 1.

8. Answer: (D) Section formula

The **section formula** gives that point as $(\frac{mx_2 + nx_1}{m + n}, \frac{my_2 + ny_1}{m + n})$. Setting $m = n = 1$ recovers the mid-point formula.

9. Answer: (A) 1, 4, 7, 10, ...

An AP needs the same difference between consecutive terms. In **1, 4, 7, 10** that difference is always 3. The other lists double each time or are the perfect squares, whose differences 3, 5, 7 keep growing.

10. Answer: (C) 495

Here $a = 5$, $d = 4$ and $n = 15$, so $S = \frac{15}{2} [2(5) + 14(4)] = \frac{15}{2} (10 + 56) = \frac{15}{2} \times 66 = \mathbf{495}$.

11. Answer: (B) (4, 5)

Averaging each coordinate: $(\frac{2 + 6}{2}, \frac{3 + 7}{2}) = \mathbf{(4, 5)}$.

12. Answer: (C) (2, 4)

By the section formula with $m = 1$ and $n = 3$, the point is $(\frac{1(5) + 3(1)}{4}, \frac{1(10) + 3(2)}{4}) = (\frac{8}{4}, \frac{16}{4}) = \mathbf{(2, 4)}$. It lies a quarter of the way from the first point, as the ratio requires.

13. Answer: (D) 5 units

A is (1, 1) and C is (5, 4), so $AC = \sqrt{(5 - 1)^2 + (4 - 1)^2} = \sqrt{16 + 9} = \sqrt{25} = \mathbf{5 \text{ units}}$. The legs $AB = 4$ and $BC = 3$ confirm the 3–4–5 triangle.

14. Answer: (C) (C)

In $-5, -1, 3, 7$ the terms are *increasing*: $-1 - (-5) = +4$, so the common difference is $+4$, not -4 . Row **(C)** is therefore wrong. A constant list really does have common difference 0, so row **(D)** is fine.

15. Answer: (A) ₹750

The monthly savings form an AP with $a = 200$ and $d = 50$, so the 12th term is $200 + 11(50) = 200 + 550 = \text{₹}750$.

16. Answer: (B) 30

Such numbers form the AP 12, 15, ..., 99 with $d = 3$. From $99 = 12 + (n - 1)(3)$ we get $87 = 3(n - 1)$, so $n - 1 = 29$ and $n = 30$.

17. Answer: (B) $x = 6, y = 3$

The diagonals of a parallelogram bisect each other, so the mid-point of the first and third vertices equals that of the second and fourth. Comparing x-coordinates: $\frac{1+x}{2} = \frac{4+3}{2}$, so $1+x = 7$ and $x = 6$. Comparing y-coordinates: $\frac{2+6}{2} = \frac{y+5}{2}$, so $8 = y + 5$ and $y = 3$. Hence **$x = 6$ and $y = 3$** .

18. Answer: (B) 12

With $a = 9$ and $d = 8$, $S_n = \frac{n}{2} [18 + (n - 1)8] = 636$, so $n(8n + 10) = 1272$ and $4n^2 + 5n - 636 = 0$. The discriminant is $25 + 10 \cdot 176 = 10 \cdot 201 = 101^2$, giving $n = \frac{-5 + 101}{8} = 12$. The 12th term is $9 + 11(8) = 97$, and $\frac{12}{2} (9 + 97) = 636$ confirms it.