CLASS 10 — MATHEMATICS

Chapter: Coordinate Geometry

Answer Key with Step-by-Step Solutions

Maximum Marks: 40 **Time Allowed: 1 hour 30 minutes**

Results used: distance formula PQ = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$; distance from the origin $\sqrt{x^2 + y^2}$; section formula (internal division in the ratio $m_1 : m_2$) $\left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$; mid-point $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

SECTION A — MCQ Answer Key

Q	Option	Answer	Explanation / calculation
Q1	**(C)**	10 units	$\sqrt{(-6)^2 + 8^2} = \sqrt{100} = 10$.
Q2	**(A)**	5 units	$\sqrt{(4 - 1)^2 + (2 + 2)^2} = \sqrt{9 + 16} = 5$.
Q3	**(C)**	(2, 2)	$\left(\frac{-3 + 7}{2}, \frac{5 - 1}{2}\right) = (2, 2)$.
Q4	**(D)**	negative y-axis	The x-coordinate is 0, so the point is on the y-axis; its y-coordinate -4 is negative.
Q5	**(B)**	3 : 1	Let the ratio be $k : 1$. On the x-axis, $y = 0$: $\frac{2k - 6}{k + 1} = 0 \Rightarrow k = 3$. Ratio 3 : 1.
Q6	**(D)**	5	$k = \frac{3 + 7}{2} = 5$. (The x-coordinate check: $(-1 + 5)/2 = 2$ ✓)
Q7	**(A)**	(3, 4)	$\left(\frac{1 \times 7 + 2 \times 1}{3}, \frac{1 \times 8 + 2 \times 2}{3}\right) = \left(\frac{9}{3}, \frac{12}{3}\right) = (3, 4)$.
Q8	**(B)**	$3x + y = 5$	$(x - 3)^2 + (y - 6)^2 = (x + 3)^2 + (y - 4)^2 \Rightarrow -6x - 12y + 45 = 6x - 8y + 25 \Rightarrow 12x + 4y = 20 \Rightarrow 3x + y = 5$.
Q9	**(A)**	Both true; R explains A	AB = $2\sqrt{2}$, BC = $2\sqrt{2}$, AC = $4\sqrt{2}$. AB + BC = AC, so the points are collinear. R is the test used, so R explains A.
Q10	**(D)**	A false, R true	$(-3, 0)$ has y-coordinate 0, so it lies on the x-axis, not the y-axis. A is false; R is true.

Marking: 1 mark for each correct option; no part marks in Section A.

SECTION B — Very Short Answer

Q11. Point on the x-axis equidistant from A and B [2 marks]

Let the point be P(x, 0). PA = PB $\Rightarrow$ PA^2 = PB^2.

$(x - 7)^2 + 1 = (x - 3)^2 + 25 \Rightarrow x^2 - 14x + 50 = x^2 - 6x + 34 \Rightarrow -8x = -16 \Rightarrow x = 2$.

Check: PA = $\sqrt{25+1} = \sqrt{26}$, PB = $\sqrt{1+25} = \sqrt{26}$ ✓

Answer: (2, 0)

> **Marking scheme:**
> Setting $PA^2 = PB^2$ with P(x, 0): 1 mark
> P = (2, 0): 1 mark

Q12. Values of y [2 marks]

$PQ^2 = (5+1)^2 + (y-3)^2 = 100 \Rightarrow (y-3)^2 = 64$.

$y - 3 = \pm 8 \Rightarrow y = 11$ or $y = -5$.

Answer: $y = 11$ or $y = -5$

> **Marking scheme:**
> Correct equation $(y-3)^2 = 64$: 1 mark
> Both values: 1 mark

Q13. Divide AB in the ratio 3 : 2 [2 marks]

$m_1 = 3$, $m_2 = 2$, A(−2, 4), B(8, −1).

$$x = \frac{3 \times 8 + 2 \times (-2)}{5} = \frac{20}{5} = 4; \quad y = \frac{3 \times (-1) + 2 \times 4}{5} = \frac{5}{5} = 1.$$

Answer: (4, 1)

> **Marking scheme:**
> Correct substitution in the section formula: 1 mark
> Point (4, 1): 1 mark

Q14. Other end of the diameter [2 marks]

The centre is the mid-point of the diameter PQ. Let Q = (a, b).

$\frac{3+a}{2} = -1 \Rightarrow a = -5$; $\frac{-4+b}{2} = 2 \Rightarrow b = 8$.

Answer: Q(−5, 8)

> **Marking scheme:**
> Using the mid-point formula: 1 mark
> Q = (−5, 8): 1 mark

Q15. Ratio in which the y-axis divides the segment [2 marks]

Let the ratio be k : 1. On the y-axis, $x = 0$: $\frac{6k-3}{k+1} = 0 \Rightarrow k = \frac{1}{2}$. Ratio = 1 : 2.

$y = \frac{1 \times 2 + 2 \times 5}{3} = \frac{12}{3} = 4$. Point of intersection: (0, 4).

Answer: 1 : 2; (0, 4)

> **Marking scheme:**
> Ratio 1 : 2: 1 mark
> Point (0, 4): 1 mark

SECTION C — Short Answer

Q16. Isosceles right triangle [3 marks]

AB = $\sqrt{(4-1)^2 + (5-1)^2} = \sqrt{25} = 5$.

AC = $\sqrt{(-3-1)^2 + (4-1)^2} = \sqrt{25} = 5$.

BC = $\sqrt{(-3-4)^2 + (4-5)^2} = \sqrt{50} = 5\sqrt{2}$.

AB = AC, so the triangle is isosceles. Also $AB^2 + AC^2 = 25 + 25 = 50 = BC^2$, so by the converse of Pythagoras theorem, $\angle A = 90°$.

Hence ABC is an isosceles right triangle, right-angled at A.

Answer: Isosceles right triangle with $\angle A = 90°$ (shown)

> **Marking scheme:**
> All three distances: 1 mark
> AB = AC (isosceles): 1 mark
> $AB^2 + AC^2 = BC^2$ (right angle): 1 mark

Q17. Points of trisection [3 marks]

Let P and Q divide AB in the ratios 1 : 2 and 2 : 1 respectively.

$P = (\frac{1 \times 6 + 2 \times (-3)}{3}, \frac{1 \times (-2) + 2 \times 7}{3}) = (\frac{0}{3}, \frac{12}{3}) = (0, 4)$.

$Q = (\frac{2 \times 6 + 1 \times (-3)}{3}, \frac{2 \times (-2) + 1 \times 7}{3}) = (\frac{9}{3}, \frac{3}{3}) = (3, 1)$.

Check: Q is the mid-point of P and B: $((0 + 6)/2, (4 - 2)/2) = (3, 1)$ ✓

Answer: (0, 4) and (3, 1)

> **Marking scheme:**
> Recognising the ratios 1 : 2 and 2 : 1: 1 mark
> P(0, 4): 1 mark
> Q(3, 1): 1 mark

Q18. Parallelogram ABCD [3 marks]

The diagonals of a parallelogram bisect each other, so the mid-point of AC = the mid-point of BD.

x-coordinates: $\frac{2 + x}{2} = \frac{5 + 1}{2} \Rightarrow 2 + x = 6 \Rightarrow x = 4$.

y-coordinates: $\frac{1 + 6}{2} = \frac{2 + y}{2} \Rightarrow 7 = 2 + y \Rightarrow y = 5$.

Answer: $x = 4$, $y = 5$

> **Marking scheme:**
> Using the property that diagonals bisect each other: 1 mark
> $x = 4$: 1 mark
> $y = 5$: 1 mark

Q19. Ratio and the value of m [3 marks]

Let P divide AB in the ratio k : 1. Using the y-coordinate: $\frac{8k + 3}{k + 1} = 6 \Rightarrow 8k + 3 = 6k + 6 \Rightarrow k = \frac{3}{2}$.

So the ratio is 3 : 2.

$m = \frac{3 \times 2 + 2 \times (-4)}{5} = \frac{6 - 8}{5} = -\frac{2}{5}$.

Answer: 3 : 2; $m = -\frac{2}{5}$

> **Marking scheme:**
> Forming the equation from the y-coordinate: 1 mark
> Ratio 3 : 2: 1 mark
> $m = -2/5$: 1 mark

SECTION D — Long Answer

Q20. Rhombus ABCD [4 marks]

AB = $\sqrt{(3-2)^2+(4+1)^2} = \sqrt{26}$; BC = $\sqrt{(-2-3)^2+(3-4)^2} = \sqrt{26}$;

CD = $\sqrt{(-3+2)^2+(-2-3)^2} = \sqrt{26}$; DA = $\sqrt{(2+3)^2+(-1+2)^2} = \sqrt{26}$.

All four sides are equal.

Diagonals: AC = $\sqrt{(-2-2)^2+(3+1)^2} = \sqrt{32} = 4\sqrt{2}$; BD = $\sqrt{(-3-3)^2+(-2-4)^2} = \sqrt{72} = 6\sqrt{2}$.

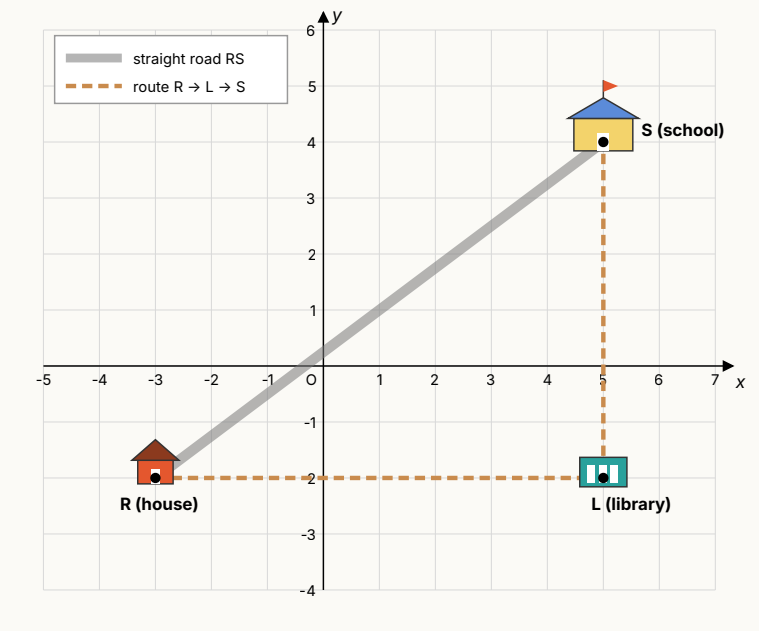
A quadrilateral with all sides equal is a rhombus. Since AC ≠ BD (the diagonals are unequal), ABCD is **not a square**.

Perimeter = $4 \times \sqrt{26} = 4\sqrt{26}$ units (≈ 20.4 units).

Answer: Rhombus (all sides $\sqrt{26}$); not a square since AC = $4\sqrt{2}$ ≠ BD = $6\sqrt{2}$; perimeter = $4\sqrt{26}$ units

> **Marking scheme:**
> All four sides = $\sqrt{26}$: 1 mark
> Conclusion: rhombus: 1 mark
> Diagonals unequal ⇒ not a square: 1 mark
> Perimeter $4\sqrt{26}$: 1 mark

SECTION E — Case Study



Q21. Riya's town map [4 marks]

(i) RS = $\sqrt{(5+3)^2 + (4+2)^2} = \sqrt{64+36} =$ **10 km**.

(ii) B = $(\frac{-3+5}{2}, \frac{-2+4}{2}) =$ **(1, 1)**.

(iii) RL = $\sqrt{(5+3)^2 + 0^2} = 8$ km; LS = $\sqrt{0^2 + (4+2)^2} = 6$ km.

$RL^2 + LS^2 = 64 + 36 = 100 = RS^2$, so by the converse of Pythagoras theorem, $\angle L = 90°$.

Route R → L → S = 8 + 6 = 14 km. Straight road RS = 10 km. So the road is **4 km shorter**.

Answer: (i) 10 km (ii) (1, 1) (iii) right-angled at L; 4 km shorter

> **Marking scheme:**
> (i) RS = 10 km: 1 mark
> (ii) B(1, 1): 1 mark
> (iii) RL, LS and the right angle at L: 1 mark; 4 km shorter: 1 mark

Final Answer Summary

Q	Final answer	Q	Final answer
Q1	(C) 10 units	**Q12**	11 or −5
Q2	(A) 5 units	**Q13**	(4, 1)
Q3	(C) (2, 2)	**Q14**	(−5, 8)
Q4	(D) negative y-axis	**Q15**	1 : 2; (0, 4)
Q5	(B) 3 : 1	**Q16**	Shown ($\angle A = 90°$, AB = AC = 5)
Q6	(D) 5	**Q17**	(0, 4), (3, 1)
Q7	(A) (3, 4)	**Q18**	$x = 4$, $y = 5$
Q8	(B) $3x + y = 5$	**Q19**	3 : 2; $m = -\frac{2}{5}$
Q9	(A)	**Q20**	Rhombus, not square; $4\sqrt{26}$ units
Q10	(D)	**Q21**	(i) 10 km (ii) (1, 1) (iii) 4 km shorter
Q11	(2, 0)		

Marks: Section A 10 + Section B 10 + Section C 12 + Section D 4 + Section E 4 = **40**

— End of Solutions —