Distance and midpoint

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Find the distance between $(1, 2)$ and $(4, 6)$. [2 marks]

$d = \sqrt{3^2 + 4^2} = 5$.

Answer: 5

2. Find the exact distance between $(-1, 3)$ and $(4, 5)$. [2 marks]

$d = \sqrt{5^2 + 2^2} = \sqrt{29}$.

Answer: $\sqrt{29}$

3. Find the midpoint of $(-5, -2)$ and $(3, 8)$. [2 marks]

$(\frac{-5+3}{2}, \frac{-2+8}{2}) = (-1, 3)$.

Answer: $(-1, 3)$.

4. A segment has endpoint $(2, 7)$ and midpoint $(-1, 4)$. Find its other endpoint. [2 marks]

Let $Q = (a, b)$. Then $2 + a = -2$ and $7 + b = 8$, so $a = -4$ and $b = 1$.

Answer: $(-4, 1)$.

5. Show that the triangle with vertices $(0, 0)$, $(4, 0)$ and $(2, 3)$ is isosceles. [2 marks]

Each sloping side has horizontal change of magnitude 2 and vertical change of magnitude 3.

Their equal lengths establish the isosceles claim.

Answer: The two sloping sides both have length $\sqrt{13}$.

6. A map uses kilometres on both axes. Two stations are at $(-3, 2)$ and $(5, -4)$. Find their straight-line separation and explain why this may not be the road distance. [2 marks]

$d = \sqrt{8^2 + (-6)^2} = 10$ km.

The formula measures the direct geometric distance, not a route following roads.

Answer: 10 km; roads need not follow the straight segment.