Polygons on the Coordinate Plane

Polygons on the coordinate plane: Mistakes and missing information

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QUICK REVIEW

Plot vertices in their named order and close the polygon. For horizontal sides, subtract the smaller x from the larger x. For vertical sides, use the y values. For example, $(-3, 1)$ to $(2, 1)$ is $2 - (-3) = 5$ units. Add every boundary side for perimeter.

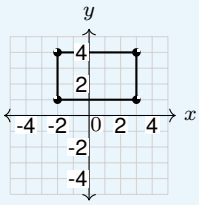
Worked example

Plot and connect the rectangle, then find perimeter. A$(-2, 1)$, B$(3, 1)$, C$(3, 4)$, D$(-2, 4)$.

1. Horizontal side $= |3 - (-2)| = 5$; vertical side $= |4 - (1)| = 3$.

2. Opposite sides match, so perimeter $= 5 + 3 + 5 + 3 = 16$ units.

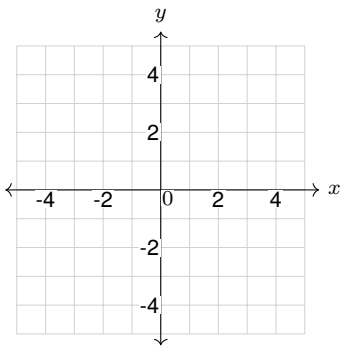
Answer: ABCD is a rectangle; side lengths $5, 3$; perimeter 16 units.



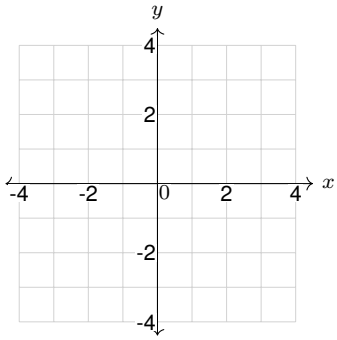
Practice Problems

Show your thinking.

1. Only three corners are given. Recover D, draw the rectangle, and find perimeter. A$(-4, -1)$, B$(1, -1)$, C$(1, 2)$.

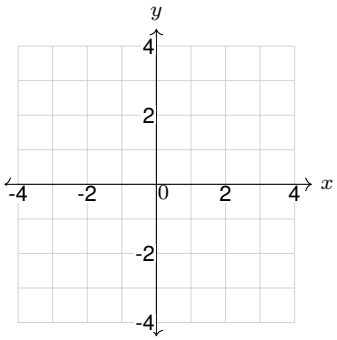


2. A student calls AB and BC parallel. Plot and test the claim. Plot and connect A$(-2, -2)$, B$(2, -2)$, C$(2, 3)$. Identify the perpendicular sides and their lengths; do not find the diagonal length.

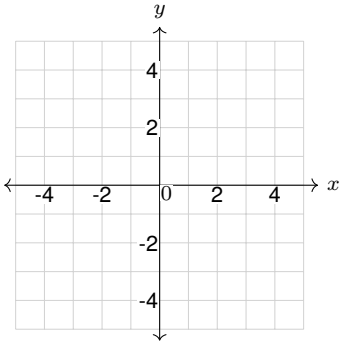


3. ABCD is an axis-aligned rectangle. Find its missing fourth corner and the perimeter using coordinate differences. A$(1, -2)$, B$(4, -2)$, C$(4, 3)$.

4. A student labels the horizontal side 0 because both endpoints have $y = 0$. Repair by drawing and finding perimeter. A$(-3, 0)$, B$(3, 0)$, C$(3, 2)$, D$(-3, 2)$.



5. Design a closed path that follows each side of this concave polygon. Plot and connect $(-4, -2)$, $(1, -2)$, $(1, 0)$, $(-1, 0)$, $(-1, 2)$, $(-4, 2)$ in order, closing the polygon. Find its perimeter.



6. A rectangle runs from $x = -3$ to $x = 1$ and from $y = -1$ to $y = 2$. Why is $4 + 3$ not its perimeter? Find the perimeter.

Answer Key

1. D$(-4, 2)$; perimeter 16 units.
2. AB and BC are perpendicular; AB 4 units, BC 5 units.
3. D$(1, 3)$; perimeter 16 units.
4. ABCD is a rectangle; side lengths $6, 2$; perimeter 16 units.
5. Perimeter 18 units.
6. 14 units; $4 + 3$ counts only two sides.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. D shares A's horizontal coordinate -4 and C's vertical coordinate 2, so D$(-4, 2)$.
2. Width $= 1 - (-4) = 5$, height $= 2 - (-1) = 3$.
3. Perimeter $= 2(5 + 3) = 16$ units.

Problem 2

1. A and B share $y = -2$, so AB is horizontal with length $|2 - (-2)| = 4$.
2. B and C share $x = 2$, so BC is vertical with length $|3 - (-2)| = 5$.
3. A horizontal line and a vertical line meet at a 90° angle, so the triangle has a right angle at B.

Problem 3

1. D shares A's horizontal coordinate 1 and C's vertical coordinate 3, so D$(1, 3)$.
2. Width $= 4 - (1) = 3$, height $= 3 - (-2) = 5$.
3. Perimeter $= 2(3 + 5) = 16$ units.

Problem 4

1. Horizontal side $= |3 - (-3)| = 6$; vertical side $= |2 - (0)| = 2$.
2. Opposite sides match, so perimeter $= 6 + 2 + 6 + 2 = 16$ units.

Problem 5

1. The first horizontal/vertical lengths are $|1 - (-4)| = 5$ and $|0 - (-2)| = 2$.
2. In boundary order, side lengths are $5, 2, 2, 2, 3, 4$; total $= 5 + 2 + 2 + 2 + 3 + 4 = 18$ units.

Problem 6

1. Width is $1 - (-3) = 4$ and height is $2 - (-1) = 3$ units.
2. There are two of each side: $4 + 3 + 4 + 3 = 14$ units.

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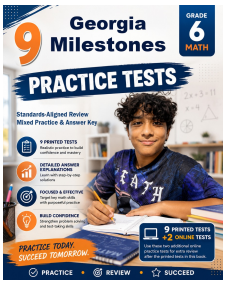

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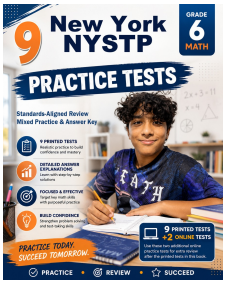

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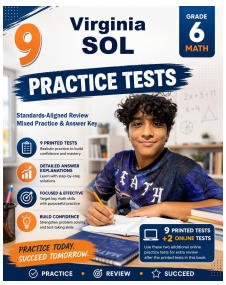

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