LESSON MAKER PRO

Polygon Grid Lab

Use coordinates to find area and perimeter.

HIGH SCHOOL · MA.912.GR.3.4

MA.912.GR.3.4 "Use coordinate geometry to solve mathematical and real-world problems on the coordinate plane involving perimeter or area of polygons."

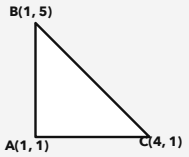
NAME _____ DATE _____

COORDINATE POLYGON TOOLS

Find horizontal and vertical lengths by subtracting coordinates. Use $d = \text{sqrt}((x_2 - x_1)^2 + (y_2 - y_1)^2)$ for a slanted side, add side lengths for perimeter, and split a polygon into familiar shapes for area.

WORKED EXAMPLE

Find the area and perimeter of triangle ABC shown.

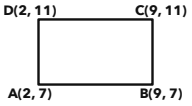


1. AB = 5 - 1 = 4 and AC = 4 - 1 = 3.
2. BC = $\text{sqrt}(3^2 + 4^2) = 5$.
3. Area = 1/2(3)(4) = 6. Perimeter = 3 + 4 + 5 = 12.

Answer: Area = 6 square units; perimeter = 12 units.

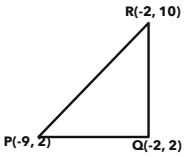
PRACTICE 4 problems

1 Find the area of rectangle ABCD shown.



ANSWER _____

2 Find the perimeter of triangle PQR shown.



ANSWER _____

3 Find the area of the rectangle with vertices (2, -9), (10, -9), (10, -2), and (2, -2).

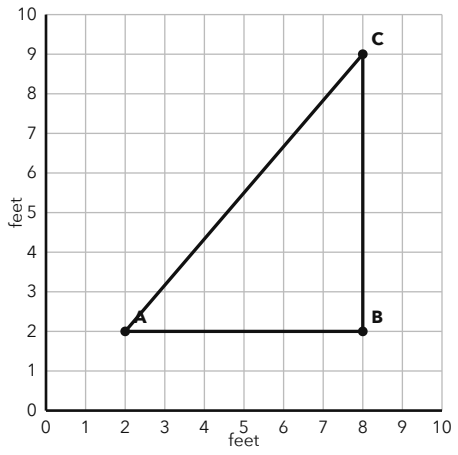
ANSWER _____

4 Find the perimeter of the triangle with vertices (2, 2), (10, 2), and (2, 11).

ANSWER _____

APPLY IT Show your work

1 A gaming club places a triangular floor mat on the grid. Each unit is 1 foot. Find the mat's area and the length of border needed.



ANSWER _____

2 Student filmmakers design a triangular backdrop with vertices (-8, 2), (7, 2), and (7, 9), where each unit is 1 foot. Find the fabric area and the LED-strip length needed around the edge.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A quadrilateral has vertices (-8, -9), (9, -9), (9, 2), and (2, 2), in order. Find its area and perimeter. Then explain in one sentence why it can be treated as a trapezoid.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the area of rectangle ABCD shown.	**28 square units**
2	Find the perimeter of triangle PQR shown.	**15 + sqrt(113) units**
3	Find the area of the rectangle with vertices (2, -9), (10, -9), (10, -2), and (2, -2).	**56 square units**
4	Find the perimeter of the triangle with vertices (2, 2), (10, 2), and (2, 11).	**17 + sqrt(145) units**

PART 2 · APPLY IT

1. **Area = 21 square feet; border = 13 + sqrt(85) feet.** The horizontal and vertical legs measure 6 feet and 7 feet. Use 1/2bh for area, then add both legs and the slanted distance.
2. **Area = 105/2 square feet; LED-strip length = 22 + sqrt(274) feet.** The base is 15 feet and the height is 7 feet, so the area is 1/2(15)(7). Use the distance formula for the third side, then add all three sides.

CHALLENGE

Area = 132 square units; perimeter = 35 + sqrt(221) units; it is a trapezoid because the sides from (-8, -9) to (9, -9) and from (9, 2) to (2, 2) are horizontal and parallel.

Accept equivalent radical forms and 105/2 or 52 1/2 for the second word problem's area. Require units and the stated parallel-side reasoning for the challenge.