Perimeter and Area from Coordinates

Perimeter: distance for every side, then add. Area: length times width, or one half base times height (check the height with slopes). Give square roots exact and to the hundredth.

Name _____ Date _____

Words we use

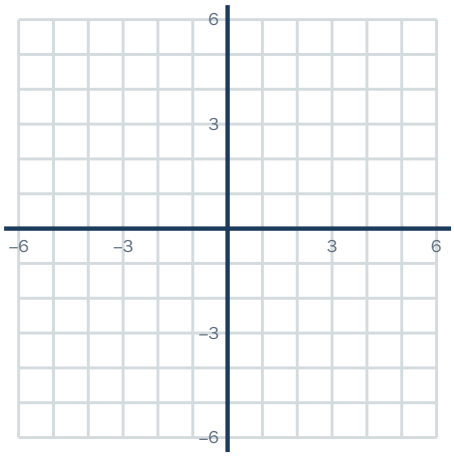
say the math word, then the plain English

WORD	PLAIN ENGLISH	WHAT YOU DO
Perimeter	The distance all the way around a shape.	Distance for every side, then add.
Area	How much flat space a shape covers, in square units.	Rectangle: length times width. Triangle: one half base times height.
Base and height	For a triangle, a side and the perpendicular distance to the opposite corner.	Check perpendicular with slopes first.
Altitude	A segment from a corner that meets the opposite side at a right angle: the height.	Its slope is the negative reciprocal of the base's slope.
Vertex (vertices)	A corner of a shape.	Name the shape by its vertices in order.
Box method	Draw a rectangle around the shape on the grid lines, then subtract the corner pieces.	For shapes with no easy height.

Part A Perimeter

SHAPE	SIDE LENGTHS	PERIMETER
Rectangle (1, 1), (6, 1), (6, 4), (1, 4)		
Triangle (0, 0), (6, 0), (6, 8)		
Pentagon C(−1, 1), D(3, 4), E(6, 0), F(2, −3), G(−4, −4)		

Plot the pentagon and draw the right triangle under FG and under GC.



Part B Area of a rectangle

1. Rectangle A(1, 2), B(6, 0), C(10, 10), D(5, 12). Find AB and BC by the distance formula, then the area.

Part C Area of a triangle

Triangle A(–4, –2), B(8, 7), C(1, 8), with D(4, 4).

1. Slope of AB, slope of AD. Is D on AB?

2. Slope of CD. Is CD perpendicular to AB?

3. AB, CD, and the area.

Part D The box method

1. Triangle (1, 1), (7, 3), (3, 6). Draw the box, find its area, subtract the corner triangles.

2. Challenge: the pentagon from Part A, boxed from x = –4 to 6 and y = –4 to 4. (The answer is 38.5.)

Part E Exit ticket

1. Perimeter of the triangle (0, 0), (6, 0), (6, 8).

2. Base 15, altitude 5: the area.

3. What two things do you check with slopes before using a segment as the height?

Answer key

Part A. 5, 3, 5, 3: 16. 6, 8, 10: 24. 5, 5, 5, root 37 ≈ 6.08, root 34 ≈ 5.83: about 26.91.

Part B. AB = root 29 ≈ 5.39; BC = root 116 ≈ 10.77; area about 58 square units.

Part C. 1. Both 3 over 4; yes. 2. –4 over 3, the negative reciprocal; yes. 3. 15, 5, 37.5 square units.

Part D. 1. Box 6 by 5 = 30; corners 6, 6, 5; area 13. 2. 38.5 (the pieces outside the pentagon add to 41.5).

Part E. 1. 24. 2. 37.5. 3. The foot of the height is on the base (same slope), and the height is perpendicular (negative reciprocal slope).