

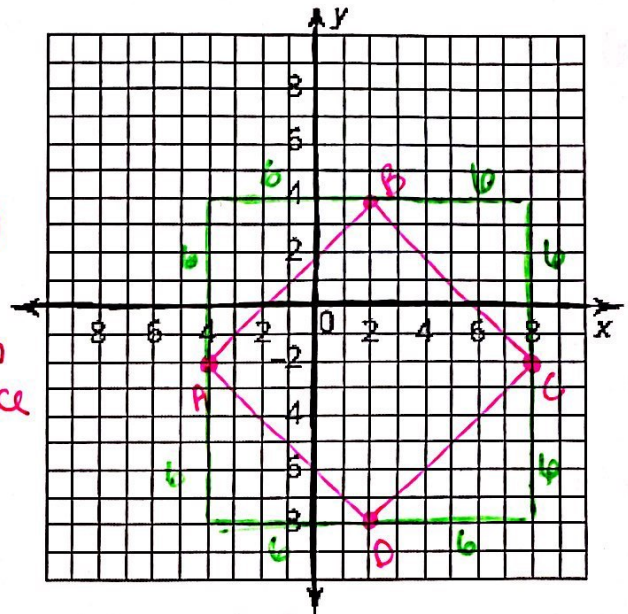
Intro to Coordinate Proofs Exploratory Activity

Plot the following coordinate points: A(-4, -2), B(2, 4), C(8, -2), and D(2, -8). Use your graph to answer the following questions:

1. Your graph should have created a square. How would you prove that all the sides are congruent? Prove all the sides are congruent below:

All sides are $6\sqrt{2}$ (used 45-45-90 relationship)

Could also use Pythagorean Thm or distance formula



2. How would you prove there are 4 right angles? Prove all the angles are 90 degrees below:

Need to prove each line is perpendicular to the one it intersects with (negative reciprocals for slopes)

Slope of \overline{AB} : 1
 \overline{BC} : -1
 \overline{CD} : 1
 \overline{AD} : -1

Since the slopes are negative reciprocals, the lines are perpendicular.

3. What is the area and perimeter of the square?

$$\begin{aligned} \text{Area} &= 6\sqrt{2} \cdot 6\sqrt{2} \\ &= 36 \cdot \sqrt{4} \\ &= 36 \cdot 2 \\ &= 72 \text{ units}^2 \end{aligned}$$

$$\begin{aligned} \text{Perimeter} &= 6\sqrt{2} + 6\sqrt{2} + 6\sqrt{2} + 6\sqrt{2} \\ &= 24\sqrt{2} \text{ units} \end{aligned}$$

2. Plot the following coordinate points: A(2, 6), B(8, -3) and C(2, -7). Use your graph to answer the following questions:

1. Your graph should have created a right triangle. How would you prove that the triangle is a right triangle?

Prove $AB \perp BC$ using their slopes

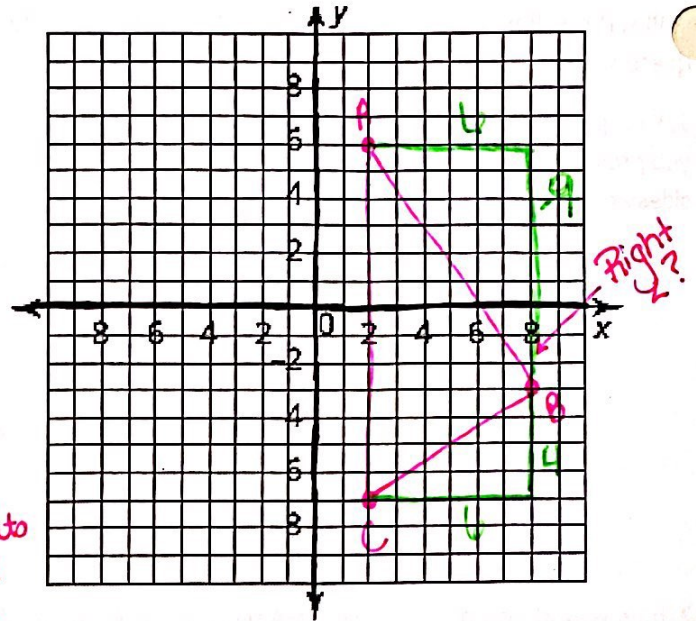
Slope of \overline{AB} : $-\frac{9}{6} = -\frac{3}{2}$
 Slope of \overline{BC} : $\frac{4}{6} = \frac{2}{3}$ > Negative reciprocals

So ABC is a right triangle.

2. What is the area and perimeter of the triangle?

Need to find length of all sides

$AC = 13$ units $BC = 2\sqrt{13}$ units $AB = 3\sqrt{13}$ units
 $4^2 + 6^2 = BC^2$ $6^2 + 9^2 = AB^2$
 $52 = BC^2$ $117 = AB^2$
 $2\sqrt{13} = BC$ $3\sqrt{13} = AB$



Perimeter = $13 + 2\sqrt{13} + 3\sqrt{13}$
 = $13 + 5\sqrt{13}$ units

Area = $\frac{1}{2} (2\sqrt{13})(3\sqrt{13})$
 = $\frac{1}{2} (6 \cdot 13)$
 = 39 units²

3. Plot the following coordinate points: A(-7, -7), B(-4, -1), C(5, -3), and D(4, -5). Use your graph to answer the following questions:

1. Your graph should have created a trapezoid. How will you prove that the figure is a trapezoid?

You need 1 set of parallel sides

Is $\overline{AB} \parallel \overline{CD}$? Do they have the same slopes?

Slope of $\overline{AB} = \frac{6}{3} = 2$
 $\overline{CD} = 2$

Since \overline{AB} and \overline{CD} have the same slope, those sides are parallel, thus ABCD is a trapezoid.

