Geometry Notes CG - 10: Coordinate Geometry Proofs

Review:

To prove two segments are congruent, show they have the **same length (distance)**

To prove two segments are parallel, show they have **the same slope**

To prove two segments are perpendicular, show they have **opposite reciprocal slopes**

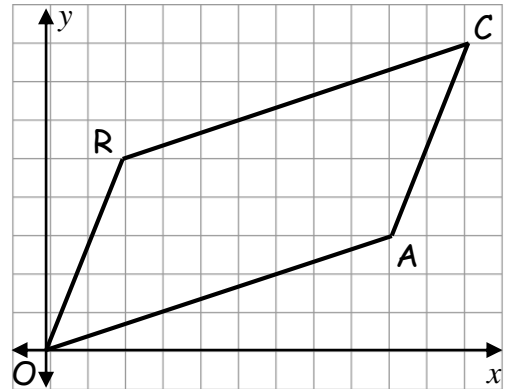To prove two segments bisect each other, show they have **the same midpoint**

Ex: Quadrilateral $ORCA$ has vertices $O(0, 0)$, $R(2, 5)$, $C(11, 8)$ and $A(9, 3)$.

a. Prove that $ORCA$ is a parallelogram.

A parallelogram is a quadrilateral with BOTH pairs of opposite sides parallel.

$$m_{\overline{OR}} = \frac{5}{2}$$

$$m_{\overline{CA}} = \frac{-5}{-2} = \frac{5}{2}$$

$\overline{OR} \parallel \overline{CA}$ b/c they have the same slope.

$$m_{\overline{RC}} = \frac{3}{9} = \frac{1}{3}$$

$$m_{\overline{OA}} = \frac{3}{9} = \frac{1}{3}$$

$\overline{RC} \parallel \overline{OA}$ b/c they have the same slope.

ORCA is a parallelogram b/c both pairs of opposite sides are parallel.

b. Prove that $ORCA$ is *not* a rectangle.

A rectangle has all right angles.

$$m_{\overline{OR}} = \frac{5}{2}$$

$$m_{\overline{AO}} = \frac{1}{3}$$

$\overline{OR}$ is NOT $\perp$ $\overline{CA}$ b/c they do not have opp. recip. slopes. Therefore, $\angle O$ is not a right angle and ORCA is not a rectangle.

c. Prove that the diagonals of $ORCA$ bisect each other.

Midpoint of $\overline{OC}$ is (5.5, 4).
Midpoint of $\overline{RA}$ is (5.5, 4).

Diagonals $\overline{OC}$ and $\overline{RA}$ bisect each other since they have the same midpoint.