

Coordinate Proof

Definition

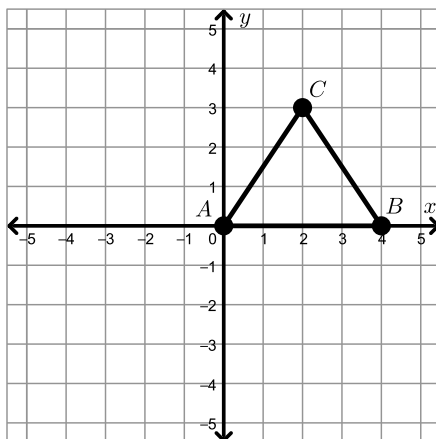
A coordinate proof is a type of proof that uses figures in the coordinate plane and algebraic techniques—such as the distance formula, slope, and midpoint formula—to verify geometric properties or relationships.

Key points:

- Place the figure in a convenient position on the coordinate plane (often with vertices at simple coordinates).
- Use algebra (distance, slope, midpoint) to prove statements about the figure.
- Commonly used to prove properties of parallelograms, triangles, and other polygons.

Example

Prove that triangle ABC with vertices $A(0, 0)$, $B(4, 0)$, and $C(2, 3)$ is isosceles.



1. **Find the lengths of the sides** using the distance formula:

$$AB = \sqrt{(4 - 0)^2 + (0 - 0)^2} = 4$$

$$AC = \sqrt{(2 - 0)^2 + (3 - 0)^2} = \sqrt{4 + 9} = \sqrt{13}$$

$$BC = \sqrt{(2 - 4)^2 + (3 - 0)^2} = \sqrt{(-2)^2 + 3^2} = \sqrt{4 + 9} = \sqrt{13}$$

2. **Compare side lengths:** $AC = BC = \sqrt{13}$.
3. **Conclusion:** Triangle ABC is isosceles because two sides are congruent.

This shows how a coordinate proof uses algebra and coordinates to verify a geometric property.

