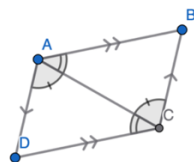


Parallelogram Properties

The key move in every proof this lesson: draw a diagonal to create two triangles → prove the triangles congruent → extract what you need by CPCTC.

PROPERTY 1 — Opposite Sides Are Congruent



Proof — Property 1

Given: Parallelogram ABCD. Diagonal AC drawn. $AB \parallel DC$ and $AD \parallel BC$.

Statement	Justification
Conditional form: <i>If a quadrilateral is a parallelogram, then opposite sides are congruent.</i>	

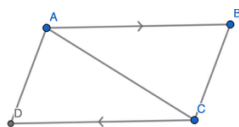
PROPERTY 2 — Opposite Angles Are Congruent

Proof — Property 2

From the Property 1 proof, $\triangle ABC \cong \triangle CDA$ is already established.

Statement	Justification
Conditional form: <i>If a quadrilateral is a parallelogram, then opposite angles are congruent.</i>	

PROPERTY 3 — Consecutive Angles Are Supplementary

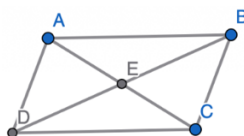


Proof — Property 3

Given: Parallelogram ABCD. $AB \parallel DC$.

Statement	Justification
Conditional form: <i>If a quadrilateral is a parallelogram, then consecutive angles are supplementary.</i>	

PROPERTY 4 — Diagonals Bisect Each Other



Proof — Property 4

Given: Parallelogram ABCD, diagonals intersecting at E.

Statement	Justification
Conditional form: <i>If a quadrilateral is a parallelogram, then the diagonals bisect each other.</i>	

THE CONVERSE — If opposite sides congruent, then parallelogram



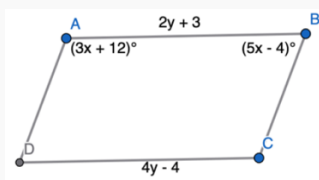
Proof — Converse

Given: Quadrilateral ABCD with $AB = CD$ and $BC = AD$. Diagonal AC drawn.

Statement	Justification
Conditional form: If both pairs of opposite sides of a quadrilateral are congruent, then it is a parallelogram.	

WORKED EXAMPLE

Worked Example — Parallelogram ABCD



Given: ABCD is a parallelogram. Find x and y and all 4 angles.