

6-3

Proving That a Quadrilateral Is a Parallelogram

Content Standards
G.CO.11 Prove theorems about parallelograms . . . the diagonals of a parallelogram bisect each other and its converse . . .
 Also **G.SRT.5**

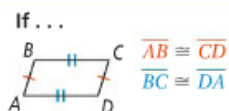
Objective To determine whether a quadrilateral is a parallelogram

take note

Theorem 6-8

Theorem

If both pairs of opposite sides of a quadrilateral are congruent, then the quadrilateral is a parallelogram.



Then . . .

$ABCD$ is a \square



take note

Theorem 6-9

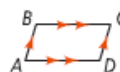
Theorem

If an angle of a quadrilateral is supplementary to both of its consecutive angles, then the quadrilateral is a parallelogram.



Then . . .

$ABCD$ is a \square

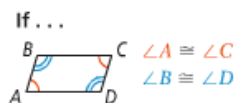


You will prove Theorem 6-9 in Exercise 21.

Theorem 6-10

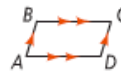
Theorem

If both pairs of opposite angles of a quadrilateral are congruent, then the quadrilateral is a parallelogram.

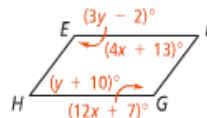


Then . . .

$ABCD$ is a \square



Got It? 1. Use the diagram at the right. For what values of x and y must $EFGH$ be a parallelogram?



Take note

Theorem 6-11

Theorem

If the diagonals of a quadrilateral bisect each other, then the quadrilateral is a parallelogram.

If ...



Then ...

$ABCD$ is a \square



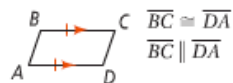
Take note

Theorem 6-12

Theorem

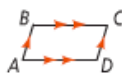
If one pair of opposite sides of a quadrilateral is both congruent and parallel, then the quadrilateral is a parallelogram.

If ...



Then ...

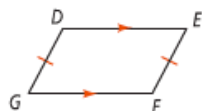
$ABCD$ is a \square



Got It? 2. Can you prove that the quadrilateral is a parallelogram based on the given information? Explain.

a. Given: $\overline{EF} \cong \overline{GD}$, $\overline{DE} \parallel \overline{FG}$

Prove: $DEFG$ is a parallelogram.



b. Given: $\angle ALN \cong \angle DNL$, $\angle ANL \cong \angle DLN$

Prove: $LAND$ is a parallelogram.



Take note

Concept Summary Proving That a Quadrilateral Is a Parallelogram

Method

Prove that both pairs of opposite sides are parallel.

Prove that both pairs of opposite sides are congruent.

Prove that an angle is supplementary to both of its consecutive angles.

Prove that both pairs of opposite angles are congruent.

Prove that the diagonals bisect each other.

Prove that one pair of opposite sides is congruent and parallel.

Source

Definition of parallelogram

Theorem 6-8

Theorem 6-9

Theorem 6-10

Theorem 6-11

Theorem 6-12

Diagram

