

Honors Geometry

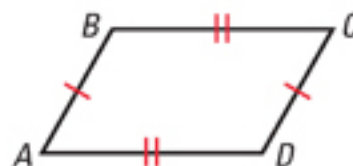
Notes Section 8.3

Show that a Quadrilateral is a Parallelogram

THEOREM 8.7

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

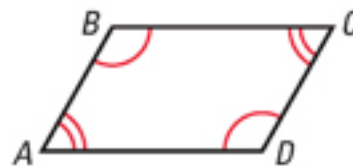
If $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{AD}$, then $ABCD$ is a parallelogram.



THEOREM 8.8

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

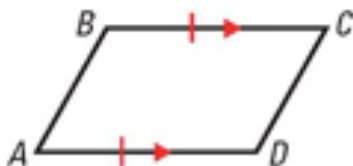
If $\angle A \cong \angle C$ and $\angle B \cong \angle D$, then $ABCD$ is a parallelogram.



THEOREM 8.9

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

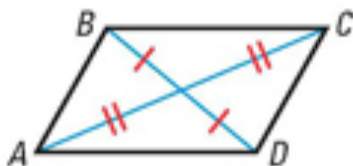
If $\overline{BC} \parallel \overline{AD}$ and $\overline{BC} \cong \overline{AD}$, then $ABCD$ is a parallelogram.



THEOREM 8.10

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

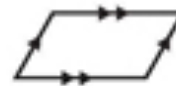
If \overline{BD} and \overline{AC} bisect each other, then $ABCD$ is a parallelogram.



Ways to Prove a Quadrilateral is a Parallelogram

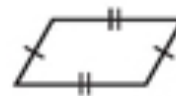
1. Show both pairs of opposite sides are parallel.

(DEFINITION)



2. Show both pairs of opposite sides are congruent.

(THEOREM 8.7)



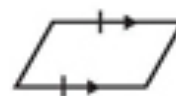
3. Show both pairs of opposite angles are congruent.

(THEOREM 8.8)



4. Show one pair of opposite sides are congruent and parallel.

(THEOREM 8.9)

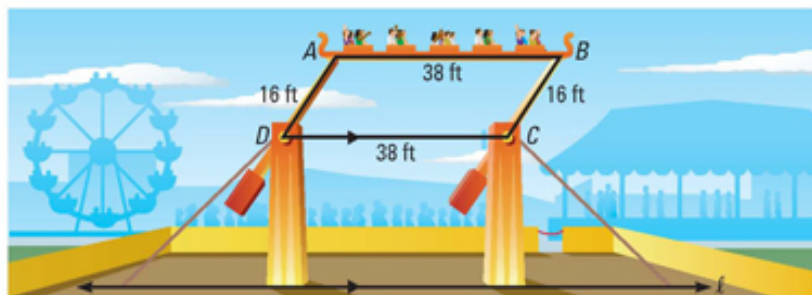


5. Show the diagonals bisect each other.

(THEOREM 8.10)



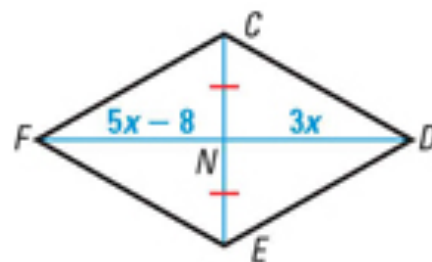
EXAMPLE 1 An amusement park ride has a moving platform attached to four swinging arms. The platform swings back and forth, higher and higher, until it goes over the top and around in a circular motion. AD and BC represent two of the swinging arms, and DC is parallel to the ground (line l). Explain why the moving platform AB is always parallel to the ground.



EXAMPLE 2 The doorway is part of a building in England. Over time, the building has leaned sideways. Explain how you know that $SV=TV$.

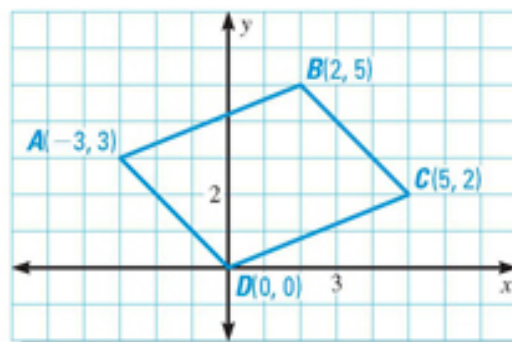


EXAMPLE 3 For what value of x is the quadrilateral $CDEF$ a parallelogram?



EXAMPLE 4 Show that quadrilateral $ABCD$ is a parallelogram.

a) Definition of a Parallelogram



b) Theorem 8-7

c) Theorem 8-9

d) Theorem 8-10