Name: _____

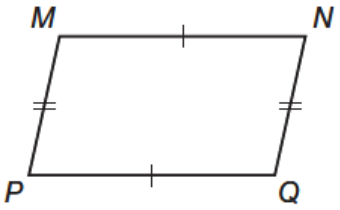
Date: _____

Period: _____

Geometry Lesson 61

Objective: TSW determine if the quadrilateral is a parallelogram.

If a quadrilateral has certain characteristics, it can be identified as a parallelogram. This lesson introduces four methods of identifying parallelograms.



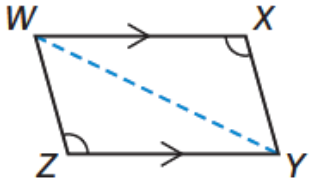
Identifying Parallelograms - If both pairs of opposite sides of a quadrilateral are congruent, then the quadrilateral is a parallelogram.

MNQP is a parallelogram.

Example 1 Proving a Quadrilateral is a Parallelogram Using Opposite Sides

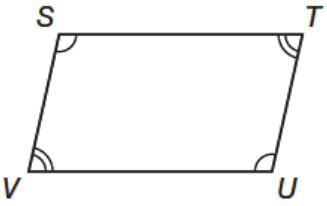
In quadrilateral *WXYZ*, $\overline{WX} \parallel \overline{ZY}$ and $\angle Z \cong \angle X$. Is *WXYZ* a parallelogram?

SOLUTION



Identifying Parallelograms - If both pairs of opposite angles of a quadrilateral are congruent, then it is a parallelogram.

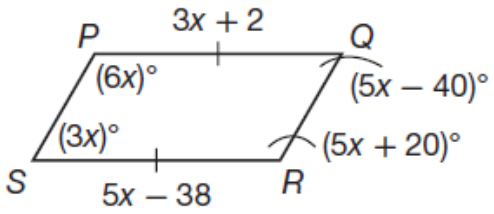
STUV is a parallelogram.



Example 2 Proving a Quadrilateral is a Parallelogram Using Opposite Angles

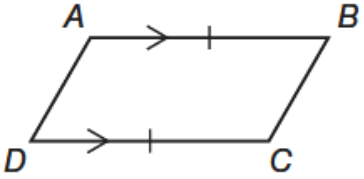
In quadrilateral *PQRS*, $\overline{PQ} \cong \overline{SR}$. Is *PQRS* a parallelogram?

SOLUTION



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

ABCD is a parallelogram.

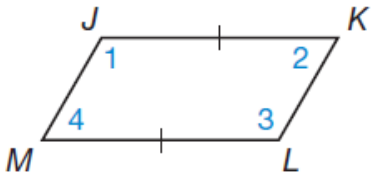


Example 3 Proving a Quadrilateral is a Parallelogram Using One Pair of Sides

In quadrilateral *JKLM*, $\angle J$ and $\angle M$ are supplementary and $\overline{JK} \cong \overline{ML}$.

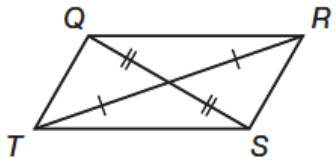
Is *JKLM* a parallelogram?

SOLUTION



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

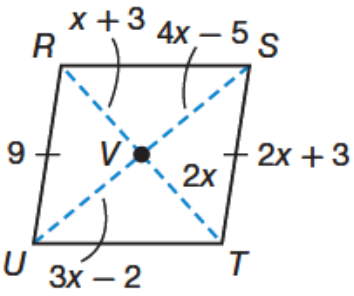
QRST is a parallelogram.



Example 4 Proving a Quadrilateral is a Parallelogram Using Diagonals

In quadrilateral *RSTU*, $\overline{RU} \cong \overline{ST}$. Is *RSTU* a parallelogram?

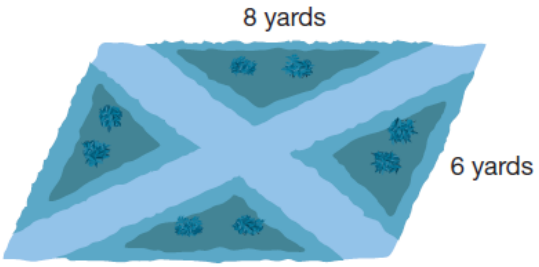
SOLUTION



Example 5 Application: Gardening

A gardener wants to know how much fencing to buy for the perimeter of her garden, shown below. The garden has two paths that bisect each other to form an "X." How much fencing does the gardener need?

SOLUTION

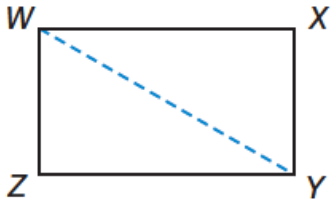


You Try!!!!!

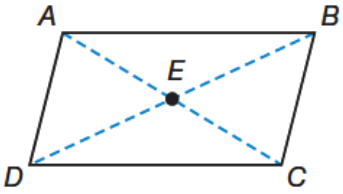
a.In quadrilateral *ABCD*, $\overline{AD} \cong \overline{BC}$ and $\overline{AB} \cong \overline{DC}$. Prove that the diagonals of *ABCD* bisect each other.

b. In quadrilateral *EFGH*, $\angle E \cong \angle G$ and $\angle F \cong \angle H$. Prove that the opposite sides are congruent.

c.In quadrilateral *WXYZ*, $\Delta WXY \cong \Delta YZW$. Prove that *WXYZ* is a parallelogram by showing that $\overline{WX} \parallel \overline{ZY}$ and $\overline{WX} \cong \overline{ZY}$.



d.In the diagram, $\Delta AED \cong \Delta CEB$. Prove that quadrilateral *ABCD* is a parallelogram.



e.A school has a railing on the front staircase. If $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$, prove that the top railing and the bottom railing are parallel.