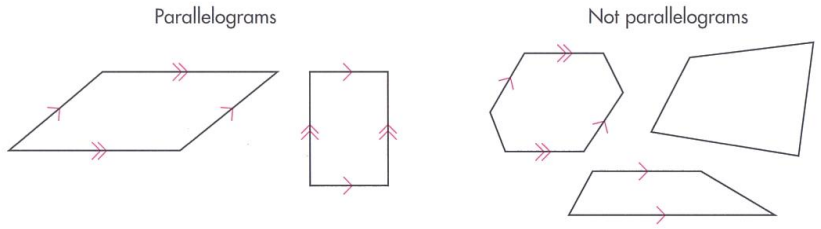
Parallelograms

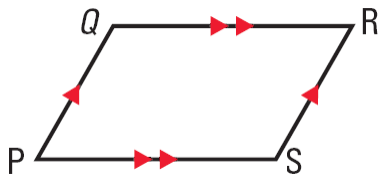
What makes a polygon a parallelogram?



Parallelogram

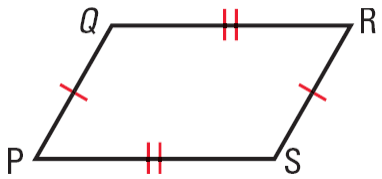
A parallelogram is a quadrilateral with both pairs of opposite sides parallel.

- Written $\square PQRS$
- $PQ \| RS$ and $QR \| PS$



Theorem 1

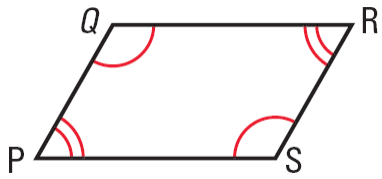
If a quadrilateral is a parallelogram, then its opposite sides are congruent.



If *PQRS* is a parallelogram, then $\overline{PQ} \cong \overline{RS}$ and $\overline{QR} \cong \overline{PS}$.

Theorem 2

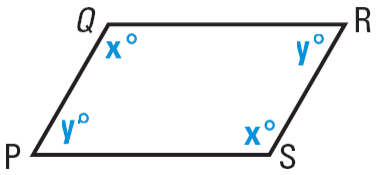
If a quadrilateral is a parallelogram, then its opposite angles are congruent.



If *PQRS* is a parallelogram, then $\angle P \cong \angle R$ and $\angle Q \cong \angle S$.

Theorem 3

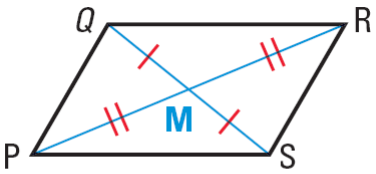
If a quadrilateral is a parallelogram, then consecutive angles are supplementary.



If *PQRS* is a parallelogram, then $x + y = 180°$.

Theorem 4

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

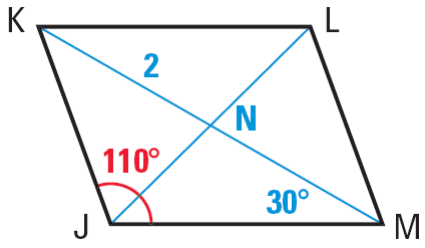


$\overline{QM} \cong \overline{SM}$ and $\overline{PM} \cong \overline{RM}$

Example 1

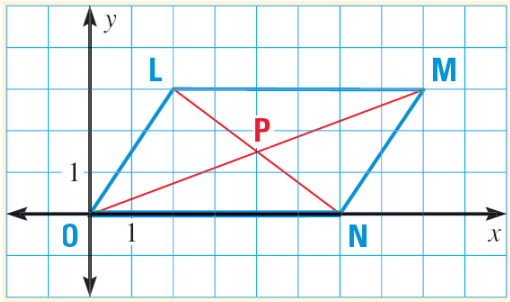
Find each indicated measure.

1. *NM*
2. *KM*
3. $m\angle JKL$
4. $m\angle LKM$



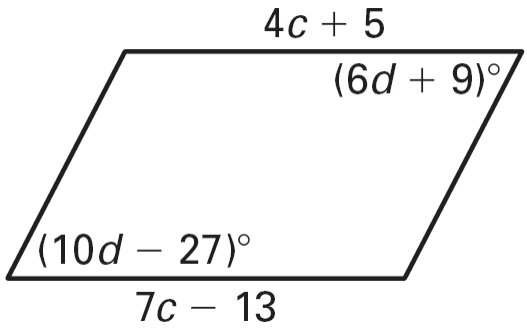
Example 2

The diagonals of parallelogram *LMNO* intersect at point *P*. What are the coordinates of *P*?



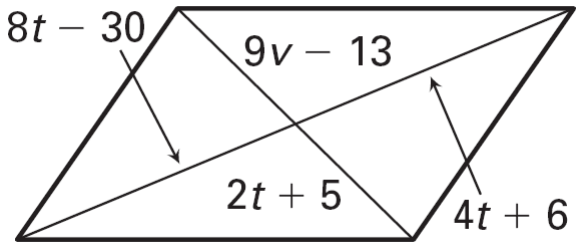
Example 3

Find the values of c and d.



Example 4

For the parallelogram below, find the values of t and v.



Example 5: SAT

For parallelogram *ABCD*, if *AB* > *BD*, which of the following statements must be true?

I. $CD < BD$

II. $\angle ADB > \angle C$

III. $\angle CBD > \angle A$