

8.2 Use Properties of Parallelograms

parallelogram - quadrilateral with both pairs of opposite sides parallel

THEOREMS

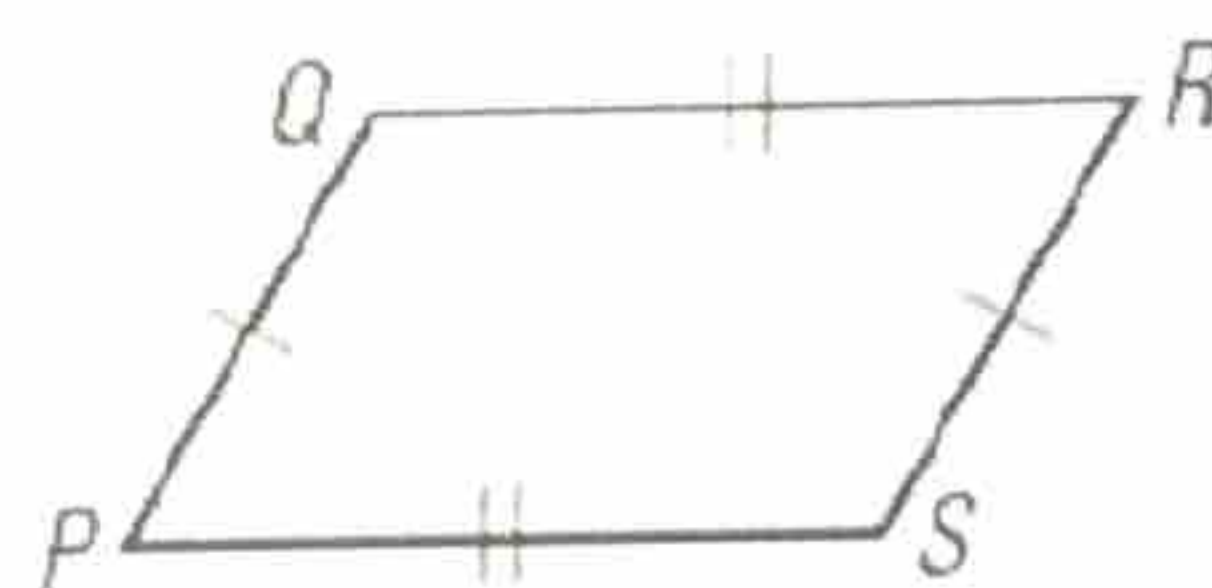
For Your Notebook

THEOREM 8.3

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

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

Proof: p. 516

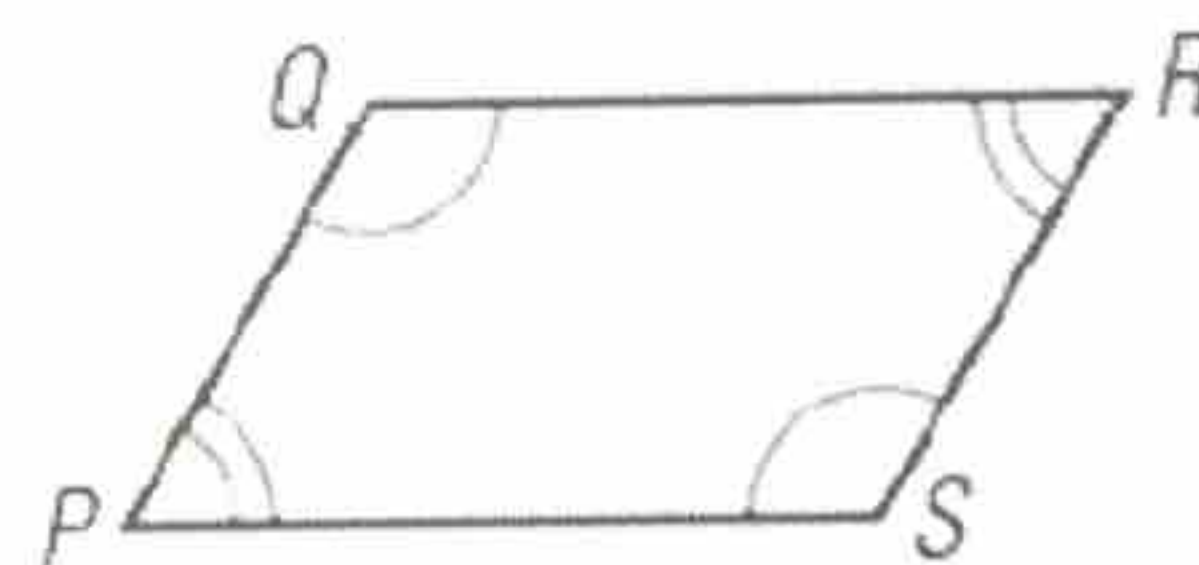


THEOREM 8.4

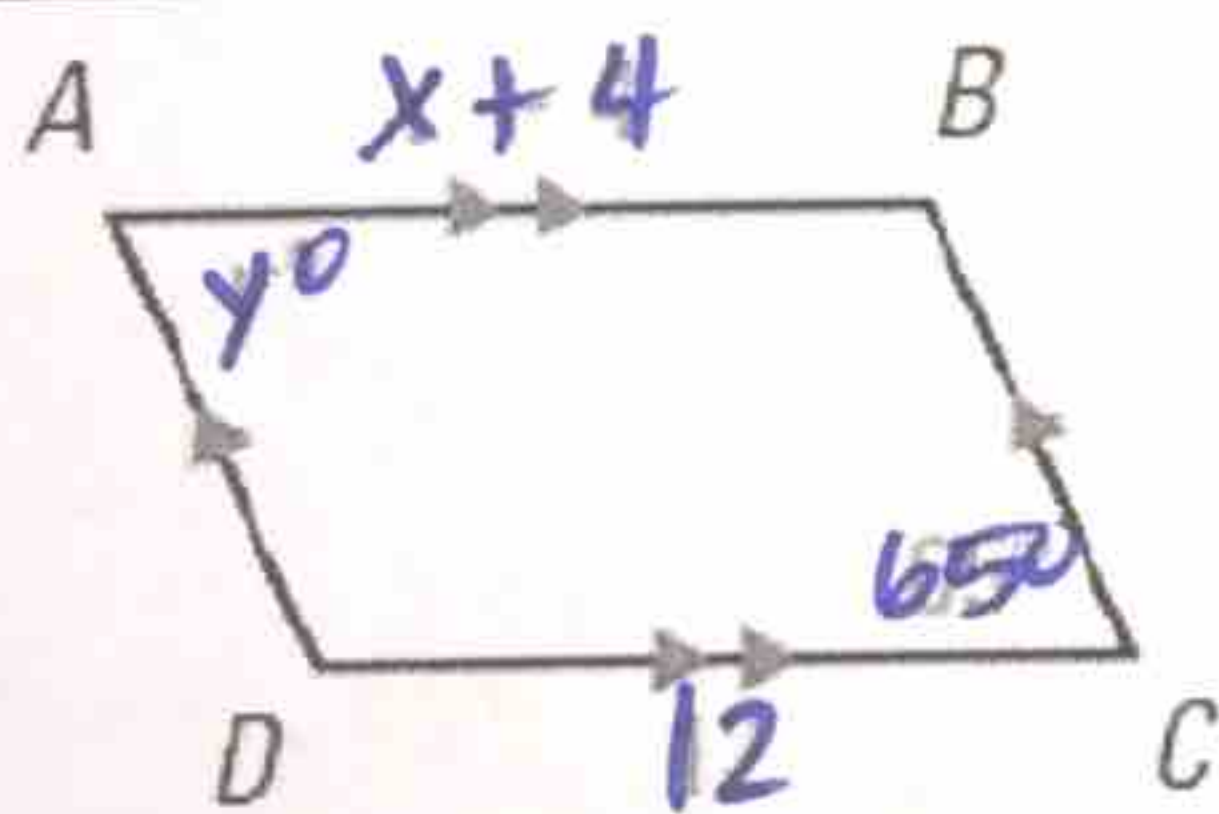
If a quadrilateral is a parallelogram, then its opposite angles are congruent.

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

Proof: Ex. 42, p. 520



Ex 1: Find the values of x and y .



$$AB = CD$$

$$x + 4 = 12$$

$$\boxed{x = 8}$$

$$m\angle A = m\angle C$$

$$y^\circ = 65^\circ$$

$$\boxed{y = 65}$$

THEOREM

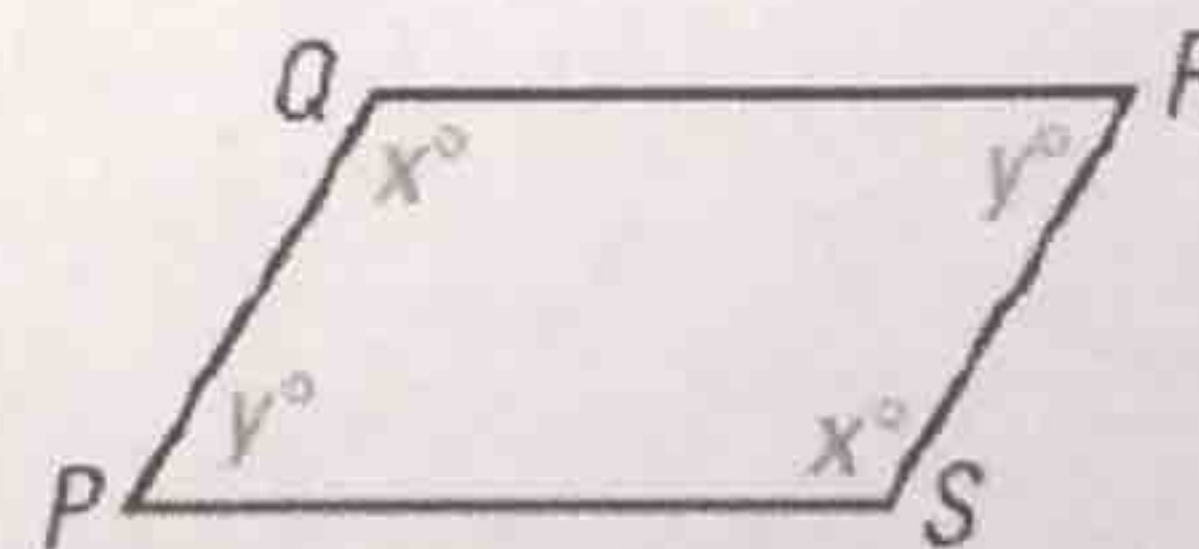
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THEOREM 8.5

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

If $PQRS$ is a parallelogram, then $x^\circ + y^\circ = 180^\circ$.

Proof: Ex. 43, p. 520



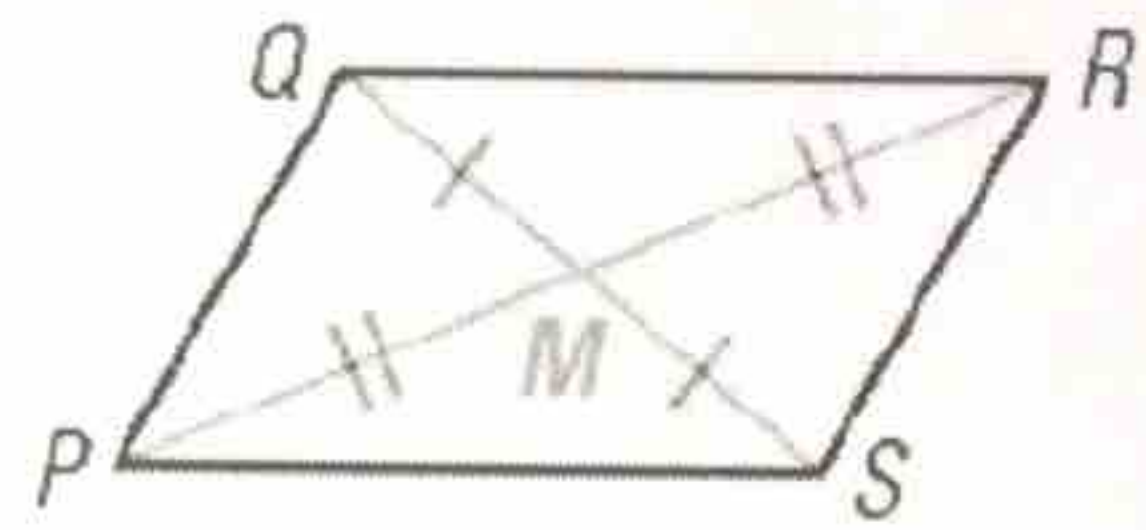
THEOREM

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THEOREM 8.6

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

Proof: Ex. 44, p. 521

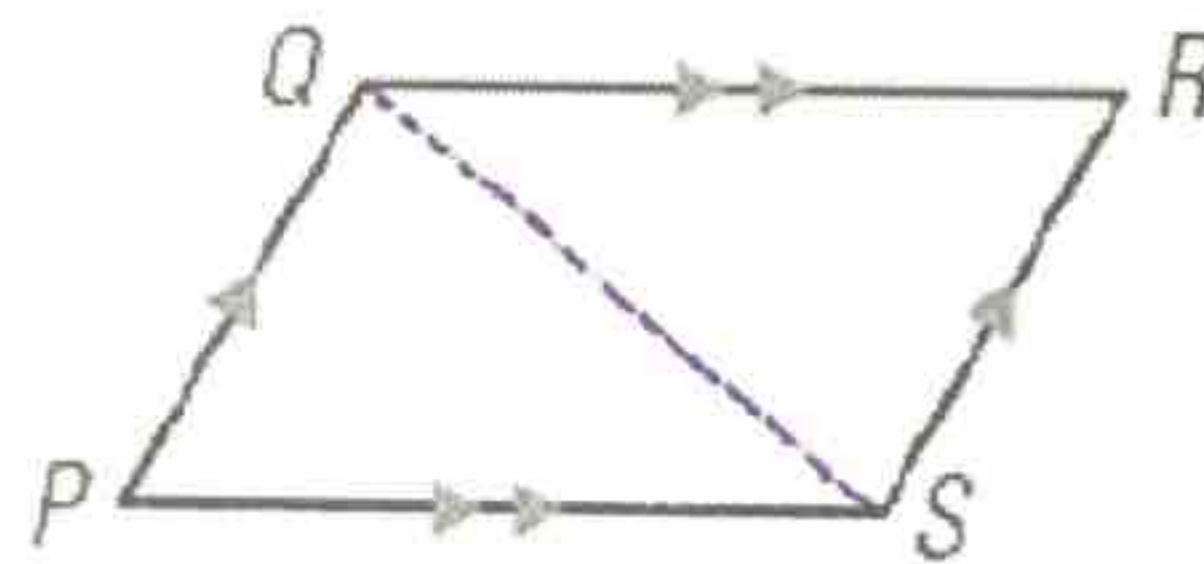


$$\overline{QM} \cong \overline{SM} \text{ and } \overline{PM} \cong \overline{RM}$$

Ex 2: Prove Theorem 8.3

GIVEN \blacktriangleright PQRS is a parallelogram.

PROVE \blacktriangleright $\overline{PQ} \cong \overline{RS}$, $\overline{QR} \cong \overline{PS}$



STATEMENTS

REASONS

1. PQRS is a

1. Given

2. DRAW \overline{QS}

2. Through any 2 points there exists exactly 1 line (Postulate 5)

3. $\overline{PQ} \parallel \overline{RS}$, $\overline{QR} \parallel \overline{PS}$

3. Definition of parallelogram

4. $\angle PQS \cong \angle RSQ$

4. Alternate Interior Angles Theorem

$\angle PSQ \cong \angle RQS$

5. $\overline{QS} \cong \overline{QS}$

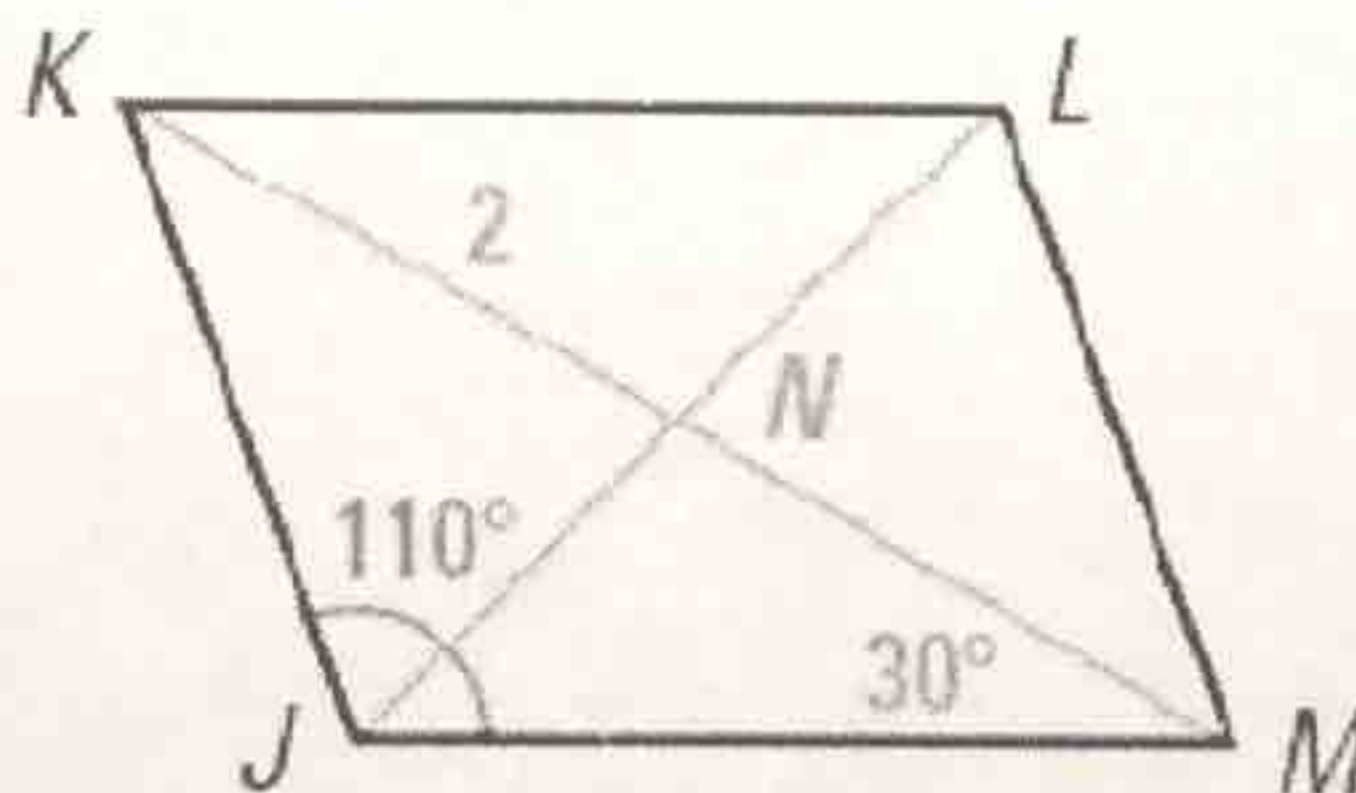
5. Reflexive Property of Congruence

6. $\triangle PQS \cong \triangle RSQ$

6. ASA Congruence Postulate

7. $\overline{PQ} \cong \overline{RS}$, $\overline{QR} \cong \overline{PS}$

7. CPCTC



Ex 3: Find the measure of NM.

$$\overline{KN} \cong \overline{NM} \quad (\text{Thm 8.6})$$

$$\boxed{NM = 2}$$

Ex 4: Find the $m\angle JML$

$$m\angle KJM = m\angle KLM = 110^\circ$$

quadrilateral = 360°

$$110^\circ + x + 110^\circ + x = 360$$

$$2x + 220 = 360$$

$$\boxed{x = 70^\circ}$$