



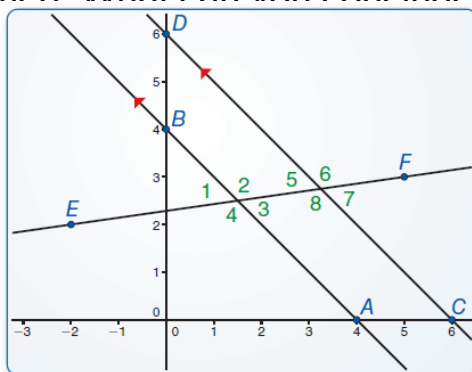
3.2: Parallel Lines & Transversals

Essential Question

When two parallel lines are cut by a transversal, which of the resulting pairs of angles are congruent?

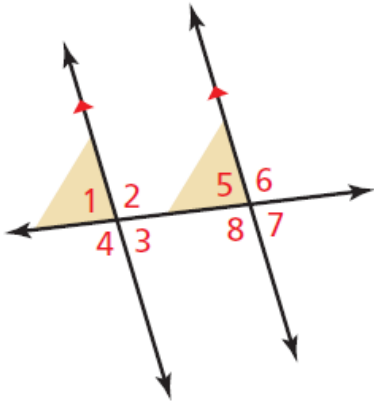
Work with a partner.

Use dynamic geometry software to draw two parallel lines. Draw a third line that intersects both parallel lines. Find the measures of the eight angles that are formed. What can you conclude?

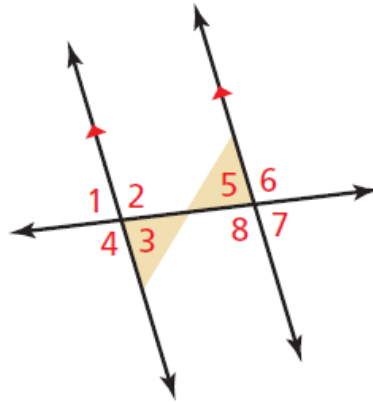


Work with a partner. Use the results of Exploration 1 to write conjectures about the following pairs of angles formed by two parallel lines and a transversal.

a. corresponding angles

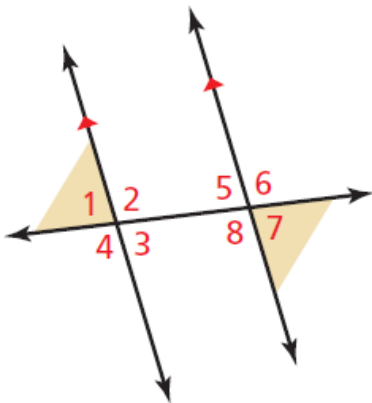


b. alternate interior angles

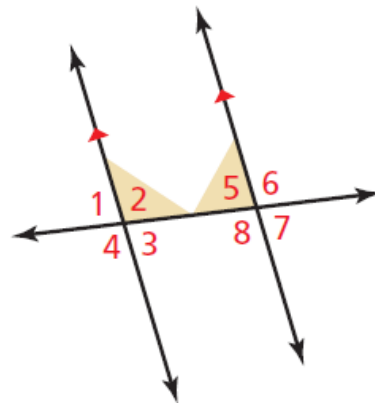


Work with a partner. Use the results of Exploration 1 to write conjectures about the following pairs of angles formed by two parallel lines and a transversal.

c. alternate exterior angles



d. consecutive interior angles



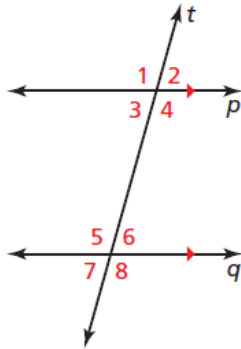
Theorems

Theorem 3.1 Corresponding Angles Theorem

If two parallel lines are cut by a transversal, then the pairs of corresponding angles are congruent.

Examples In the diagram at the left, $\angle 2 \cong \angle 6$ and $\angle 3 \cong \angle 7$.

Proof Ex. 36, p. 180



Theorem 3.2 Alternate Interior Angles Theorem

If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are congruent.

Examples In the diagram at the left, $\angle 3 \cong \angle 6$ and $\angle 4 \cong \angle 5$.

Proof Example 4, p. 134

Theorem 3.3 Alternate Exterior Angles Theorem

If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles are congruent.

Examples In the diagram at the left, $\angle 1 \cong \angle 8$ and $\angle 2 \cong \angle 7$.

Proof Ex. 15, p. 136

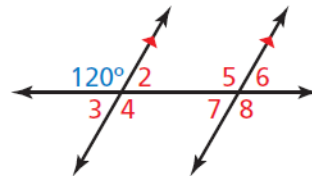
Theorem 3.4 Consecutive Interior Angles Theorem

If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary.

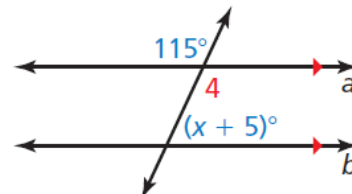
Examples In the diagram at the left, $\angle 3$ and $\angle 5$ are supplementary, and $\angle 4$ and $\angle 6$ are supplementary.

Proof Ex. 16, p. 136

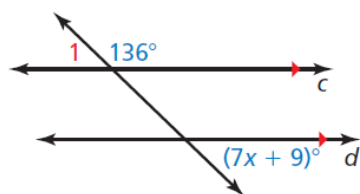
The measures of three of the numbered angles are 120° . Identify the angles. Explain your reasoning.



Find the value of x .

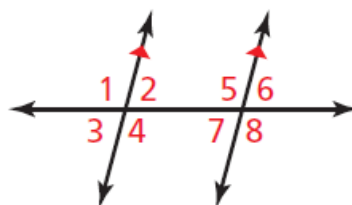


Find the value of x .



Use the diagram.

1. Given $m\angle 1 = 105^\circ$, find $m\angle 4$, $m\angle 5$, and $m\angle 8$. Tell which theorem you use in each case.



2. Given $m\angle 3 = 68^\circ$ and $m\angle 8 = (2x + 4)^\circ$, what is the value of x ? Show your steps.

Prove It!

Prove that if two parallel lines are cut by a transversal, then the pairs of alternate interior angles are congruent.