

6.2

Parallel Lines and Transversals

For use with Exploration 6.2

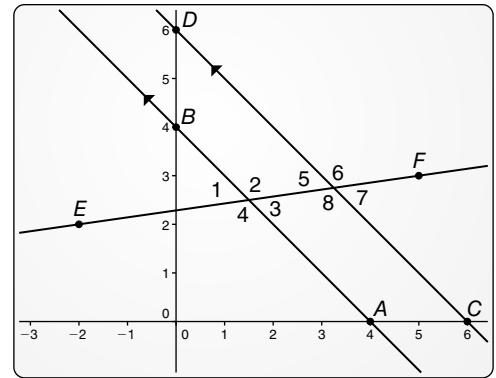
Essential Question When two parallel lines are cut by a transversal, which of the resulting pairs of angles are congruent?

1 EXPLORATION: Exploring Parallel Lines

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner.

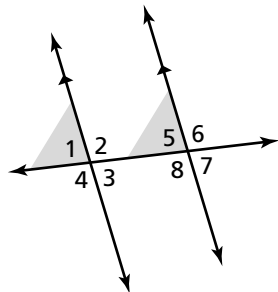
Use dynamic geometry software to draw two parallel lines. Draw a third line that intersects both parallel lines. Find the measures of the eight angles that are formed. What can you conclude?



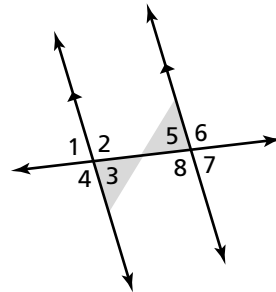
2 EXPLORATION: Writing Conjectures

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



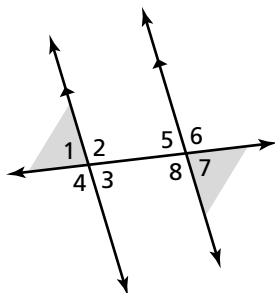
b. alternate interior angles



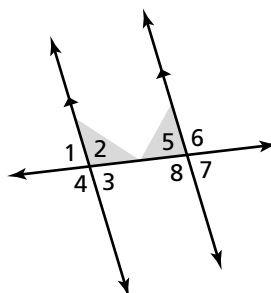
6.2 Parallel Lines and Transversals (continued)

2 EXPLORATION: Writing Conjectures (continued)

c. alternate exterior angles



d. consecutive interior angles



Communicate Your Answer

- When two parallel lines are cut by a transversal, which of the resulting pairs of angles are congruent?
- In Exploration 2, $m\angle 1 = 80^\circ$. Find the other angle measures.

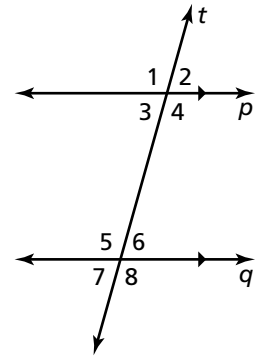
6.2**Practice**

For use after Lesson 6.2

Theorems**Corresponding Angles Theorem**

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

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

**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, $\angle 3 \cong \angle 6$ and $\angle 4 \cong \angle 5$.

Alternate Exterior Angles Theorem

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

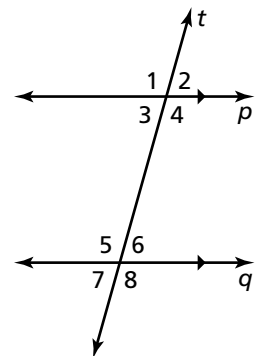
Examples In the diagram, $\angle 1 \cong \angle 8$ and $\angle 2 \cong \angle 7$.

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, $\angle 3$ and $\angle 5$ are supplementary, and $\angle 4$ and $\angle 6$ are supplementary.

Notes:



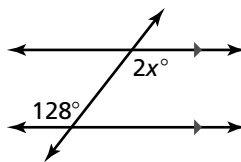
6.2 Practice (continued)**Worked-Out Examples****Example #1****Find the value of x . Show your steps.**

Alternative interior angles are congruent.

$$128^\circ = 2x^\circ$$

$$\frac{128}{2} = \frac{2x}{2}$$

$$64 = x$$

**Example #2****Find the value of x . Show your steps.**

Consecutive interior angles are supplementary.

$$72^\circ + (7x + 24)^\circ = 180^\circ$$

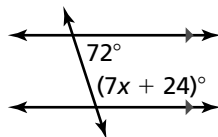
$$96 + 7x = 180$$

$$96 - 96 + 7x = 180 - 96$$

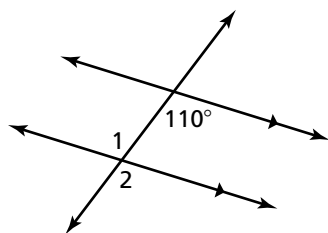
$$7x = 84$$

$$\frac{7x}{7} = \frac{84}{7}$$

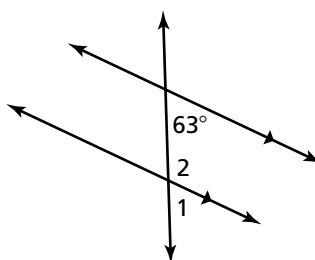
$$x = 12$$

**Practice A****In Exercises 1–4, find $m\angle 1$ and $m\angle 2$. Tell which theorem you use in each case.**

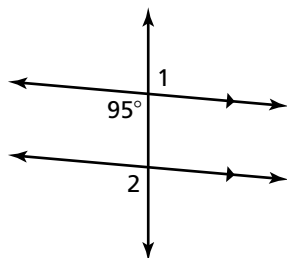
1.



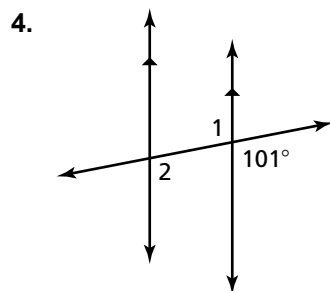
2.



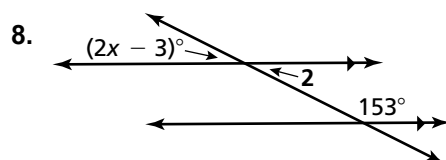
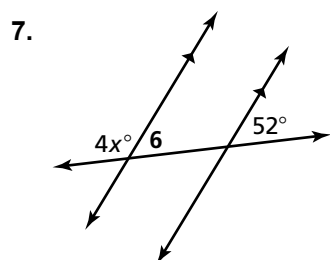
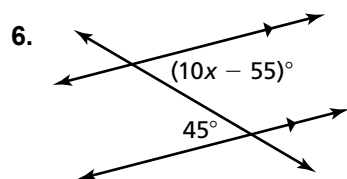
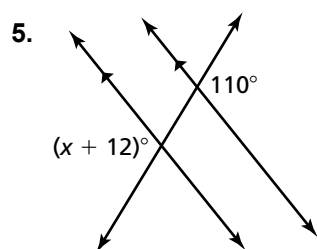
3.



6.2 Practice (continued)

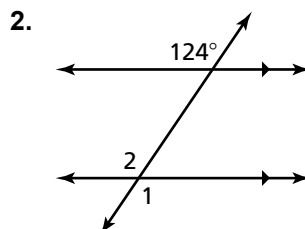
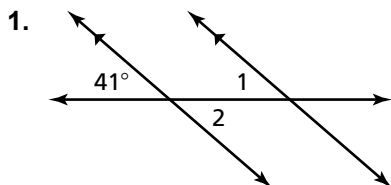


In Exercises 5–8, find the value of x . Show your steps.

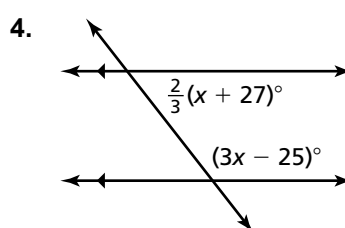
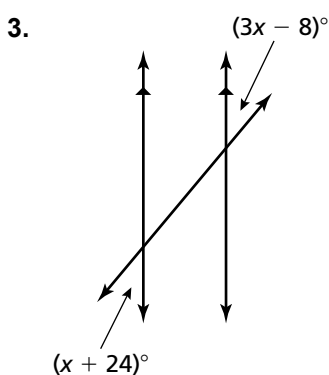


Practice B

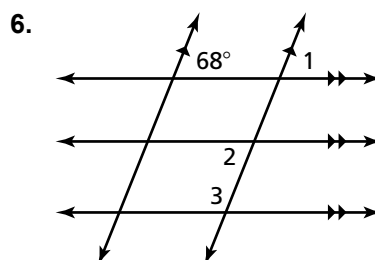
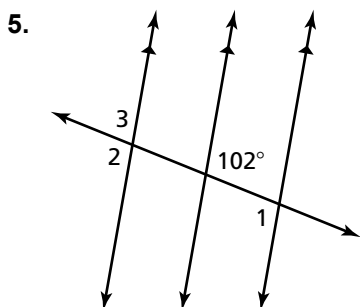
In Exercises 1 and 2, find $m\angle 1$ and $m\angle 2$. Tell which theorem you used in each case.



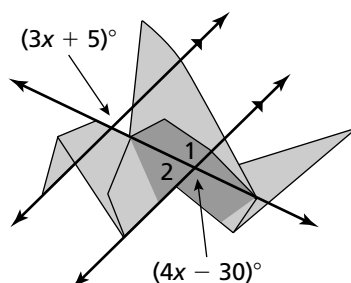
In Exercises 3 and 4, find the value of x . Show your steps.



In Exercises 5 and 6, find $m\angle 1$, $m\angle 2$, and $m\angle 3$. Explain your reasoning.



7. The figure shows a two-dimensional representation of a bird made out of origami paper. Find $m\angle 1$ and $m\angle 2$. Explain your reasoning.



8. The figure shows three pairs of parallel lines. Which angles are congruent to $\angle 1$? Tell which theorem you used in each case.

