Name _____

3-9 Properties of Parallel Lines GEO

OBJECTIVE: **I can prove theorems about parallel lines To use properties of parallel lines to find angle measures**

Warm-Up

Look at the map of streets in Clearwater, Florida. Nicholson Street and Cedar Street are parallel. Which pairs of angles appear to be congruent?

Essential Understanding

Essential Understanding The special angle pairs formed by parallel lines and a transversal are congruent, supplementary, or both.

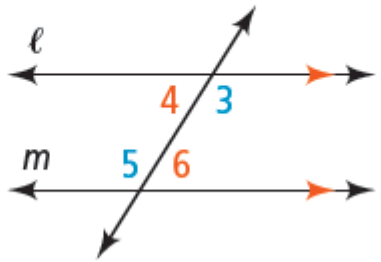
Key Concept: Same-Side Interior Angles Postulate

Postulate

If a transversal intersects two parallel lines, then same-side interior angles are supplementary.

If . . .

$\ell \parallel m$



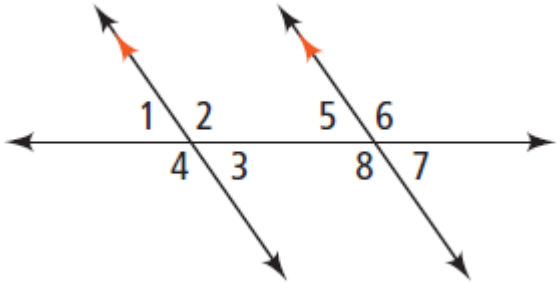
Then . . .

$m\angle 4 + m\angle 5 = 180$

$m\angle 3 + m\angle 6 = 180$

Example #1 Identifying Supplementary Angles

The measure of ∠3 is 55. Which angles are supplementary to ∠3? How do you know?



Your Turn to Work it Out

1. **Reasoning** If you know the measure of one of the angles, can you always find the measures of all 8 angles when two parallel lines are cut by a transversal? Explain.

Concept Understanding

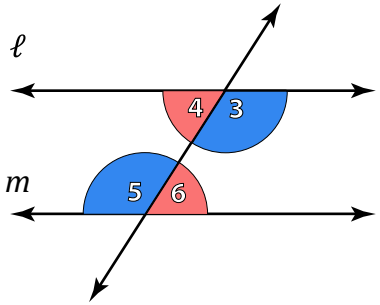
Key Concept: Alternate Interior Angles Theorem

Theorem

If a transversal intersects two parallel lines, then alternate interior angles are congruent.

If...

$\ell \parallel m$



Then . . .

$\angle 4 \cong \angle 6$

$\angle 3 \cong \angle 5$

Concept Understanding

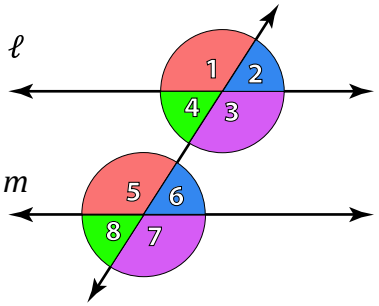
Key Concept: Corresponding Angles Theorem

Theorem

If a transversal intersects two parallel lines, then corresponding angles are congruent.

If...

$\ell \parallel m$



Then . . .

$\angle 1 \cong \angle 5$

$\angle 2 \cong \angle 6$

$\angle 3 \cong \angle 7$

$\angle 4 \cong \angle 8$

Concept Understanding

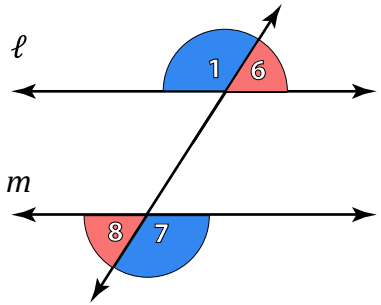
Key Concept: Alternate Exterior Angles

Theorem

If a transversal intersects two parallel lines, then alternate exterior angles are congruent.

If...

$\ell \parallel m$



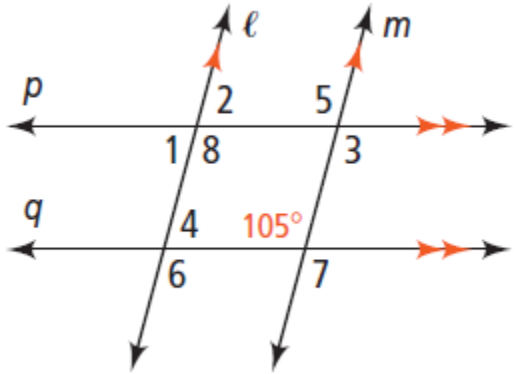
Then . . .

$\angle 1 \cong \angle 7$

$\angle 2 \cong \angle 8$

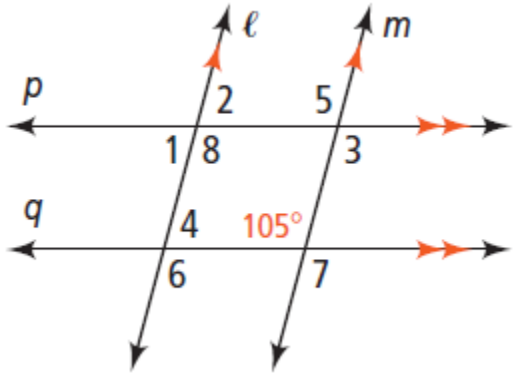
Example #2 Finding Measures of Angles

What are the measures of ∠3 and ∠4?



Your Turn to Work it Out

3. What is the measure of each angle?



a. ∠1

b. ∠2

c. ∠5

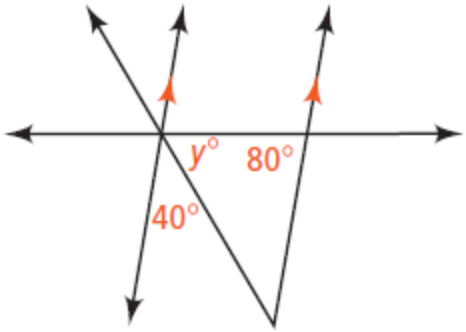
d. ∠6

e. ∠7

f. ∠8

Example #4 Finding an Angle Measure

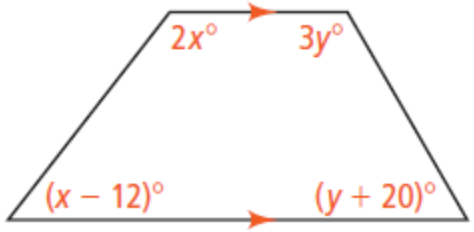
Algebra What is the value of y?



Your Turn to Work it Out

4.

a. In the figure at the right, what are the values of x and y?



b. What are the measures of the four angles in the figure?