

HW
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Geometry

Chapter 3
Section 3-2

Same-Side Interior Angles

Take note

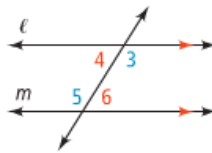
Postulate 3-1 Same-Side Interior Angles Postulate

Postulate

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

If . . .

$\ell \parallel m$



Then . . .

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

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

**Parallel lines are marked with the same number of red arrows

Angle Theorems

Take note

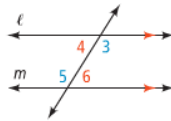
Theorem 3-1 Alternate Interior Angles Theorem

Theorem

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

If ...

$\ell \parallel m$



Then ...

$\angle 4 \cong \angle 6$

$\angle 3 \cong \angle 5$

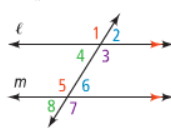
Theorem 3-2 Corresponding Angles Theorem

Theorem

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

If ...

$\ell \parallel m$



Then ...

$\angle 1 \cong \angle 5$

$\angle 2 \cong \angle 6$

$\angle 3 \cong \angle 7$

$\angle 4 \cong \angle 8$

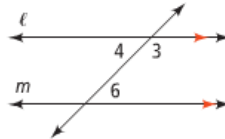
You will prove Theorem 3-2 in Exercise 25.

Proof of Theorem 3-1

Proof Proof of Theorem 3-1: Alternate Interior Angles Theorem

Given: $\ell \parallel m$

Prove: $\angle 4 \cong \angle 6$



Statement	Reasons
1) $\ell \parallel m$	1) Given
2) $m\angle 3 + m\angle 4 = 180$	2) Supplementary Angles
3) $m\angle 3 + m\angle 6 = 180$	3) Same-Side Interior Angles Postulate
4) $m\angle 3 + m\angle 4 = m\angle 3 + m\angle 6$	4) Transitive Property of Equality
5) $m\angle 4 = m\angle 6$	5) Subtraction Property of Equality
6) $\angle 4 \cong \angle 6$	6) Definition of Congruence

Use this as a reference for Theorem 3-2

Alternate Exterior Angles

Take note

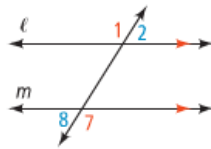
Theorem 3-3 Alternate Exterior Angles Theorem

Theorem

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

If ...

$\ell \parallel m$



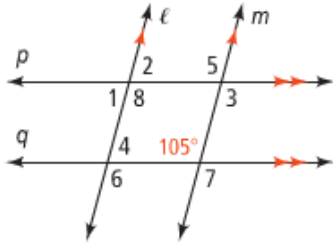
Then ...

$\angle 1 \cong \angle 7$

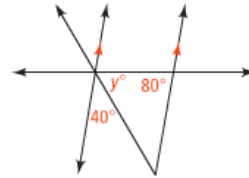
$\angle 2 \cong \angle 8$

Using the Postulate and Theorems

What are the measures of $\angle 3$ and $\angle 4$? Which theorem or postulate justifies each answer?



What is the value of y ?



By the Angle Addition Postulate, $y + 40$ is the measure of an interior angle.

$$(y + 40) + 80 = 180 \quad \text{Same-side interior } \angle \text{ of } \parallel \text{ lines are suppl.}$$

$$y + 120 = 180 \quad \text{Simplify.}$$

$$y = 60 \quad \text{Subtract 120 from each side.}$$

Name Angles $\angle 1$ and $\angle 2$

$$m \angle 1 = (y + 40)$$

$$m \angle 1 + m \angle 2 = 180$$

$$(y+40) + 80 = 180$$

$$y + 120 = 180$$

$$y = 60$$

Angle Addition Postulate

Same-Side Interior Angles Postulate

Substitution

Simplify

Subtraction Property of Equality

Homework

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