3-2

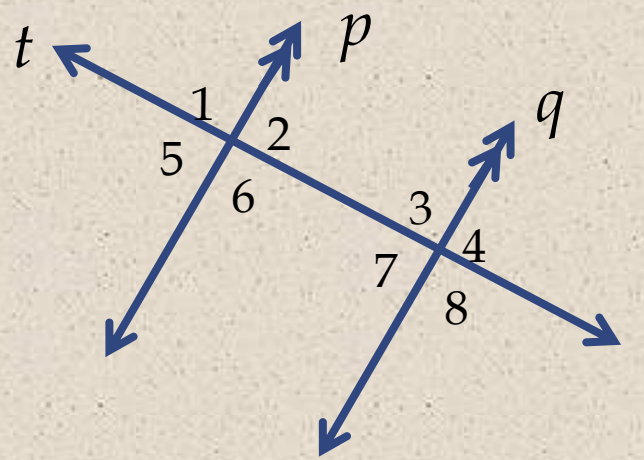
Properties of Parallel Lines

OBJECTIVES

- To prove and use theorems about the angles formed by parallel lines and a transversal

KEY CONCEPTS

If two parallel lines are cut by a transversal (if $p \parallel q$), then:



Postulate/Theorem	Then:	Examples
Corresponding Angles Postulate		
Alternate Interior Angles Theorem		
Same-Side Interior Angles Theorem		
Alternate Exterior Angles Theorem		

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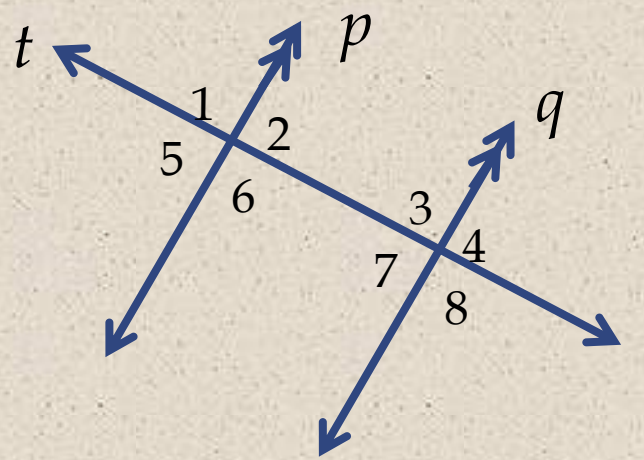

Postulate/Theorem	Then:	Examples
Corresponding Angles Postulate	Corr. angles are congruent	$\angle 1 \cong \angle 3; \angle 2 \cong \angle 4$ $\angle 5 \cong \angle 7; \angle 6 \cong \angle 8$
Alternate Interior Angles Theorem		
Same-Side Interior Angles Theorem		
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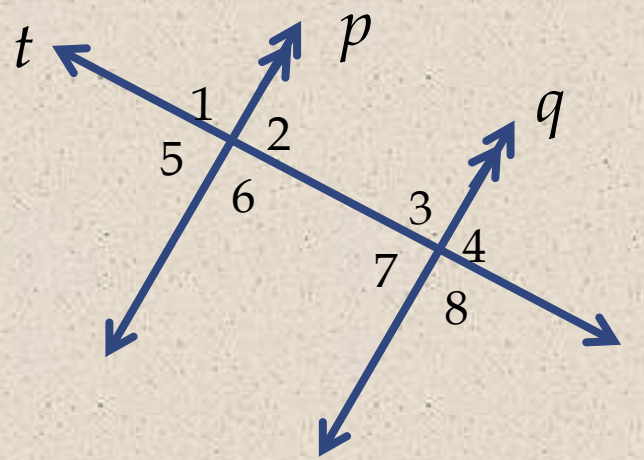

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Alternate Interior Angles Theorem	Alt. int. angles are congruent	$\angle 2 \cong \angle 7; \angle 3 \cong \angle 6$
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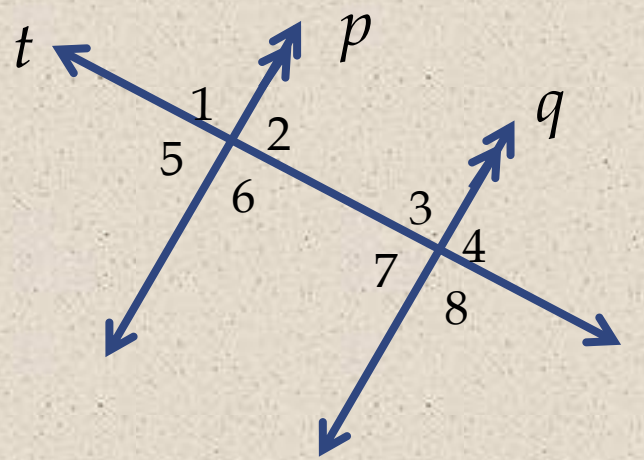

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Alternate Interior Angles Theorem	Alt. int. angles are congruent	$\angle 2 \cong \angle 7; \angle 3 \cong \angle 6$
Same-Side Interior Angles Theorem	SS int. angles are supplementary	$m\angle 2 + m\angle 3 = 180$ $m\angle 6 + m\angle 7 = 180$
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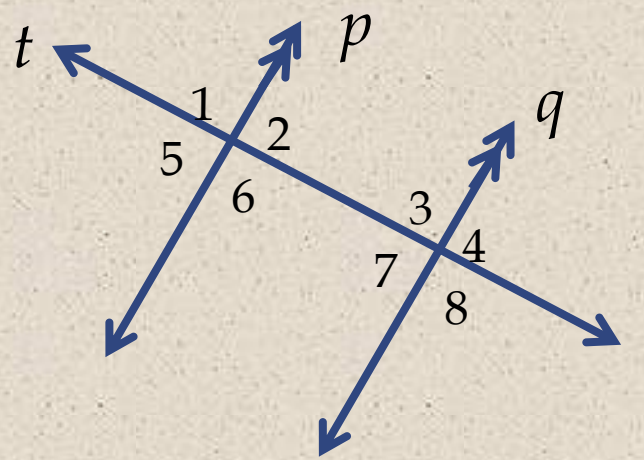

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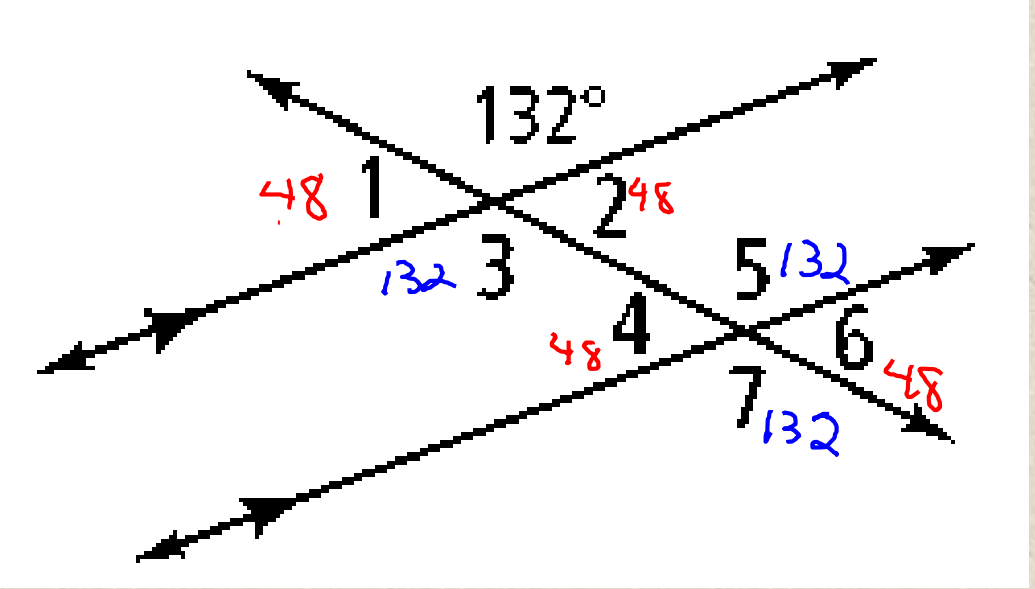
Same-Side Interior Angles Theorem	SS int. angles are supplementary	$m\angle 2 + m\angle 3 = 180$ $m\angle 6 + m\angle 7 = 180$
Alternate Exterior Angles Theorem	Alt. ext. angles are congruent	$\angle 1 \cong \angle 8; \angle 4 \cong \angle 5$

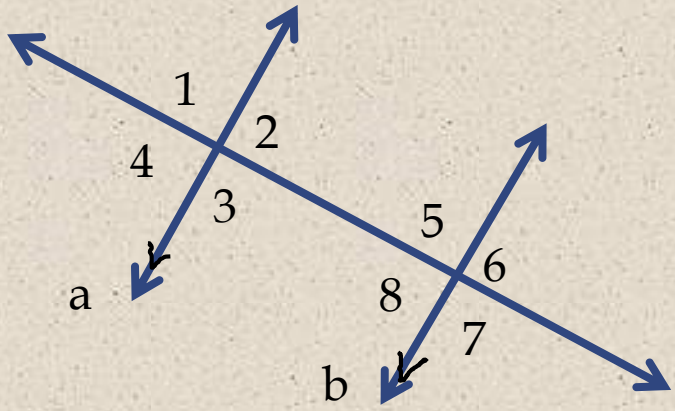
CLASS WORK

1. Identify all the numbered angles that are congruent to the given angle. Justify your answers.



Given: a | | b

Prove: ∠2 ≅ ∠8

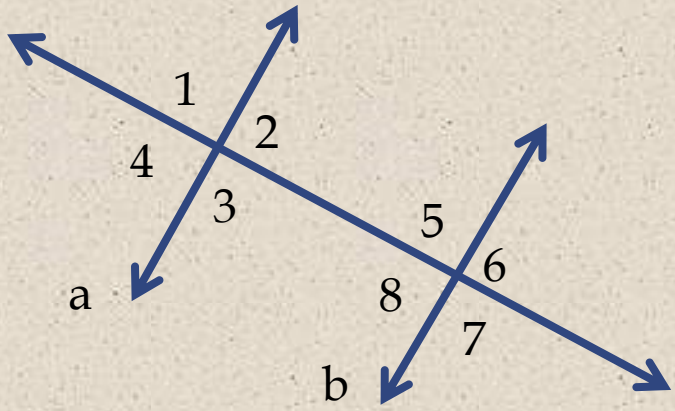


Statements	Reasons

Proof of Alternate Interior Angles Theorem

Given: a||b

Prove: ∠2 ≅ ∠8

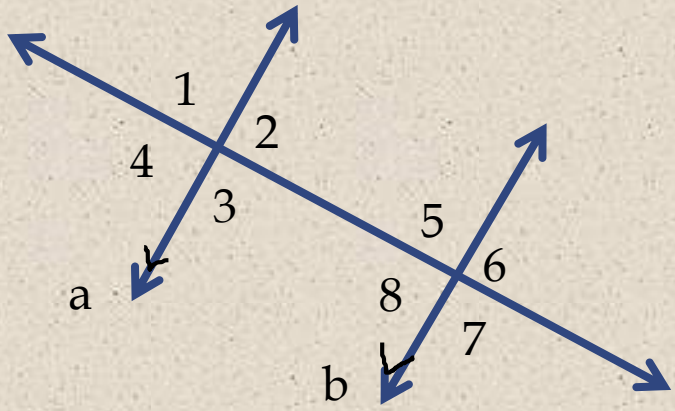


Statements	Reasons
a||b	Given
∠2 ≅ ∠6	Corresponding Angles Postulate
∠6 ≅ ∠8	Vertical angles theorem
∠2 ≅ ∠8	Transitive Property of Congruence

Proof of Alternate Interior Angles Theorem

Given: a | |b

Prove: ∠2 *and* ∠5 are supplementary

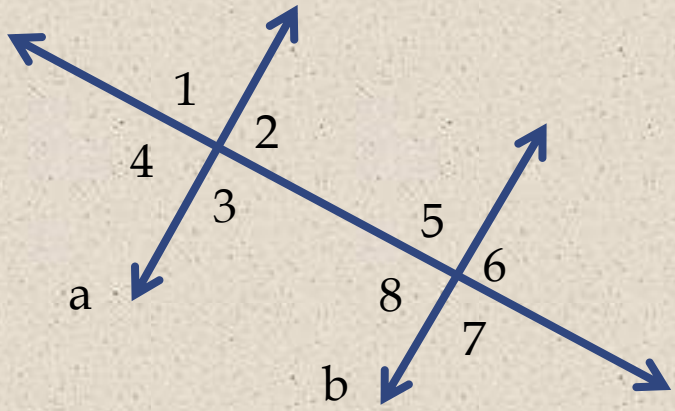


Statements	Reasons

Proof of Same-Side Interior Angles Theorem

Given: a||b

Prove: $\angle 2$ *and* $\angle 5$ are supplementary

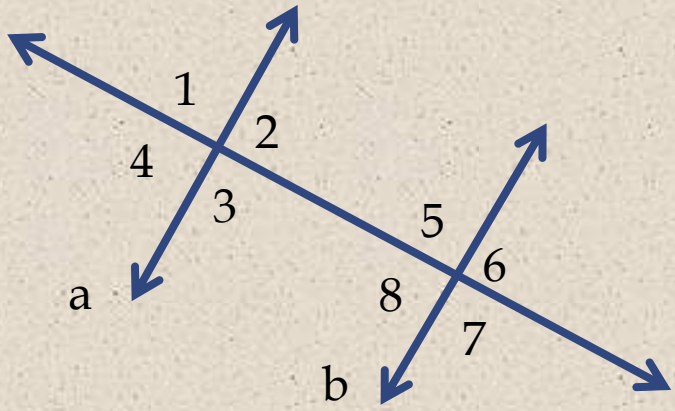


Statements	Reasons
a||b	Given
$m\angle 1 + m\angle 2 = 180$	Linear Pair Theorem
$\angle 1 \cong \angle 5$	Corresponding Angles Postulate
$m\angle 1 = m\angle 5$	Definition of Congruent Angles
$m\angle 5 + m\angle 2 = 180$	Substitution Property of Equality
$\angle 2$ *and* $\angle 5$ are supplementary	Definition of Supplementary Angles

Proof of Same-Side Interior Angles Theorem

Given: a | | b

Prove: ∠1 ≅ ∠7

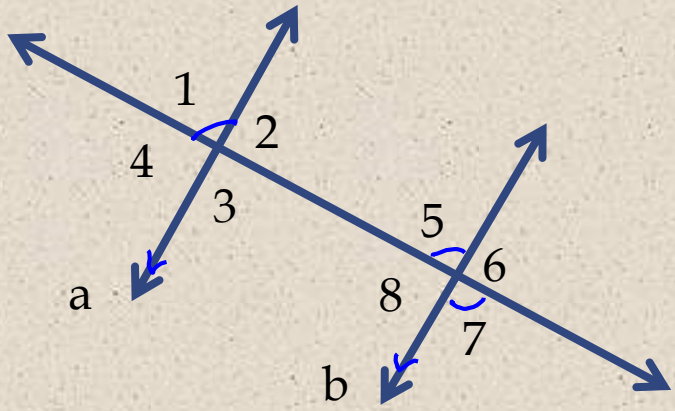


Statements	Reasons

Proof of Alternate Exterior Angles Theorem

Given: a||b

Prove: ∠1 ≅ ∠7



Statements	Reasons
a||b	Given
∠1 ≅ ∠5	Corresponding Angles Postulate
∠7 ≅ ∠5	Vertical angles theorem
∠1 ≅ ∠7	Transitive Property of Congruence

Proof of Alternate Exterior Angles Theorem

CLASS WORK

2. Find $m\angle 1$ and $m\angle 2$. Justify each answer.

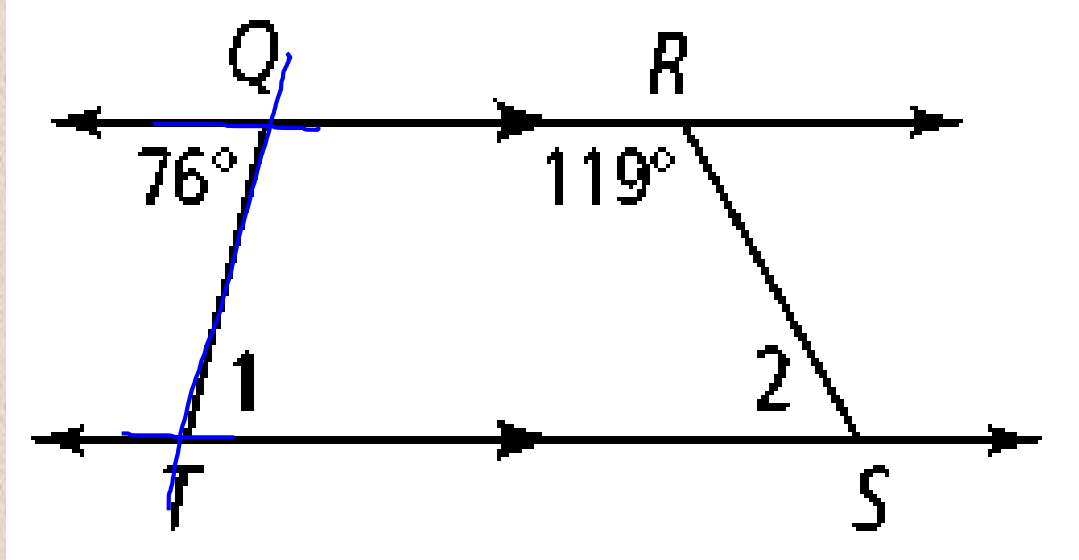
$m\angle 1 = 76$

Alt int. Ls thm

$m\angle 2 + 119 = 180$

$m\angle 2 = 61^\circ$

SS int. Ls



CLASS WORK

3. Find *x and y*.

$5x + 5y = 60$

$-(5x + 4y = 55)$

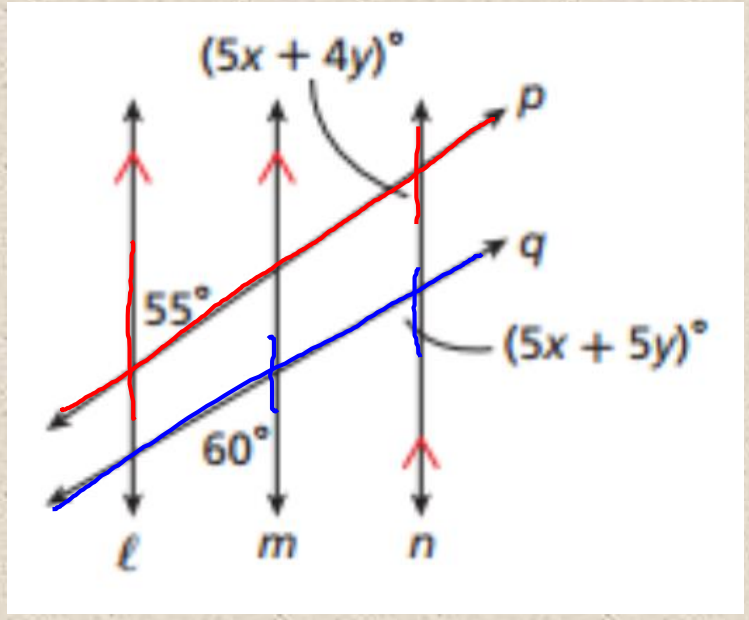
$y = 5$

$5x + 5(5) = 60$

$5x + 25 = 60$

$5x = 35$

$x = 7$



If two parallel lines are cut by a transversal, then:

1. corresponding angles, alternate interior angles, and alternate exterior angles are congruent.

2. Same-side interior angles are supplementary

SUMMARY

LEARNING RUBRIC

- Got It: Proves Theorems with proofs
- Almost There: Applies postulate and theorems to complex/real-world situations
- Moving Forward: Uses postulate and theorem to write equations to solve for angle measures
- Getting Started: Finds all angle measures when one is given

HOMEWORK

Pages 158 – 160

6 – 12 even

20 – 28 even

30, 34