

Parallel Lines cut by a Transversal Guided Notes

Identify the angle pairs in the diagram below.

Alternate Exterior Angles:

$\angle 1 + \angle 8, \angle 2 + \angle 7$

Alternate Interior Angles:

$\angle 3 + \angle 6, \angle 4 + \angle 5$

Corresponding Angles:

$\angle 1 + \angle 5, \angle 3 + \angle 7, \angle 2 + \angle 6, \angle 4 + \angle 8$

Same-Side Interior Angles:

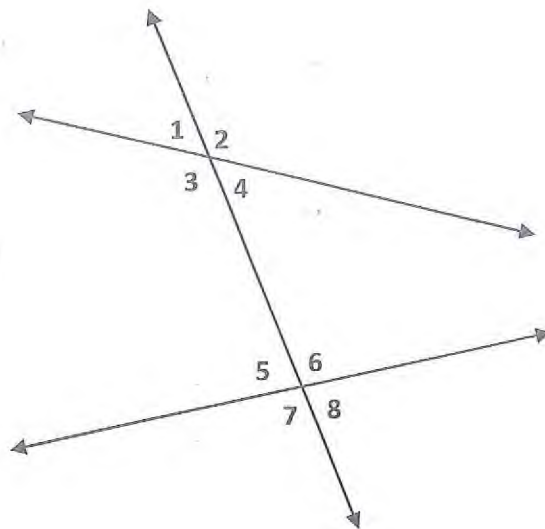
$\angle 3 + \angle 5, \angle 4 + \angle 6$

Same-Side Exterior Angles:

$\angle 1 + \angle 7, \angle 2 + \angle 8$

Vertical Angles:

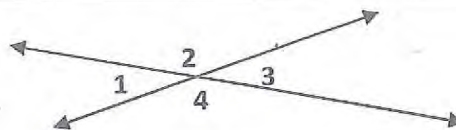
$\angle 1 + \angle 4, \angle 2 + \angle 3, \angle 5 + \angle 8, \angle 6 + \angle 7$



Vertical Angles...

Given: $\angle 1$ and $\angle 3$ are vertical angles.

Prove: $m\angle 1 = m\angle 3$



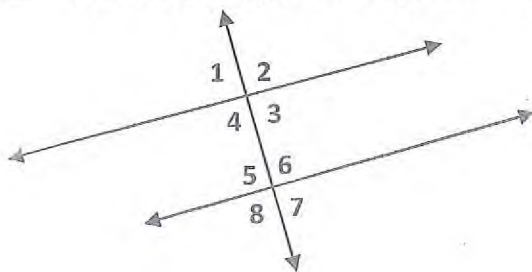
STATEMENTS	REASONS
$\angle 1$ and $\angle 3$ are vertical angles	Given
$\angle 1$ and $\angle 2$ are a linear pair $\angle 2$ and $\angle 3$ are a linear pair	Definition of Linear Pair
$\angle 1$ and $\angle 2$ are supplementary $\angle 2$ and $\angle 3$ are supplementary	Linear Pair Theorem
$m\angle 1 + m\angle 2 = 180$ $m\angle 2 + m\angle 3 = 180$	Definition of Supplementary Angles
$m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	Substitution Prop of Equality
$m\angle 1 = m\angle 3$	Subtraction Prop of Equality

Vertical Angles Theorem: If two angles are vertical angles, then they have equal measures. $m\angle 1 = m\angle 3$
 $m\angle 2 = m\angle 4$

When two **parallel** lines are cut by a transversal, those angle pairs have a special relationship.

Same-Side Interior Angles Postulate: If two parallel lines are cut by a transversal, then the pairs of same-side interior angles are supplementary.

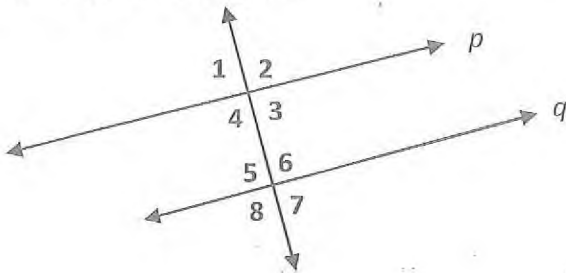
Postulates are assumed to be true and do not need to be proven!



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

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

Alternate Interior Angles...

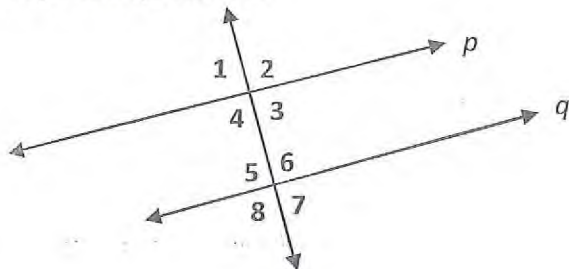


Given: $p \parallel q$
 Prove: $m\angle 3 = m\angle 5$

STATEMENTS	REASONS
$p \parallel q$	Given
$\angle 3$ and $\angle 6$ are supplementary	Same-Side Interior Angles Postulate
$m\angle 3 + m\angle 6 = 180$	Definition of Supplementary Angles
$\angle 5$ and $\angle 6$ are a linear pair	Definition of Linear Pair
$m\angle 5 + m\angle 6 = 180$	Linear Pair Theorem
$m\angle 3 + m\angle 6 = m\angle 5 + m\angle 6$	Substitution Prop of Equality
$m\angle 3 = m\angle 5$	Subtraction

Alternate Interior Angles Theorem: If two parallel lines are cut by a transversal, then the pairs of alternate interior angles have the same measure.

Corresponding Angles...



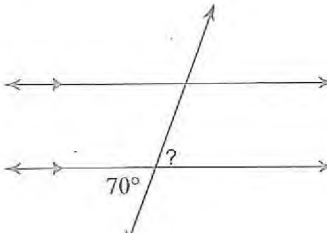
Given: $p \parallel q$
 Prove: $m\angle 1 = m\angle 5$

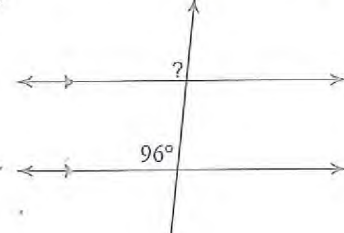
STATEMENTS	REASONS
$p \parallel q$	Given
$m\angle 3 = m\angle 5$	Alternate Interior Angles Theorem
$m\angle 1 = m\angle 3$	Vertical Angles Theorem
$m\angle 1 = m\angle 5$	Transitive Prop of Equality

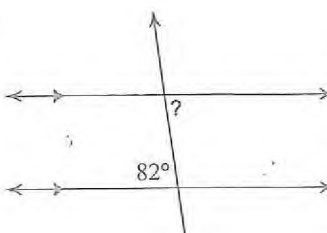
Corresponding Angles Theorem: If two parallel lines are cut by a transversal, then the pairs of corresponding angles have the same measure.

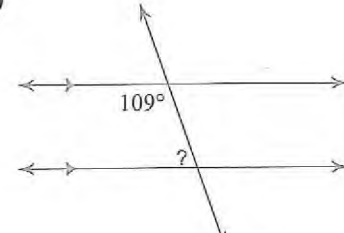
PRACTICE

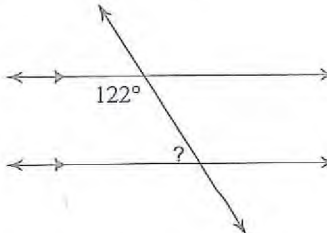
Find the measure of each angle indicated. State the theorem/postulate used to find the measure of the angle.

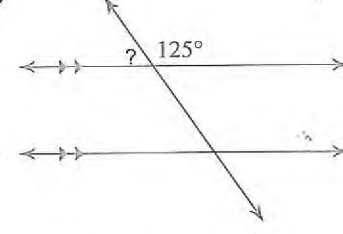
1)  Vertical Angles Thm
70°

2)  Corresponding Angles Thm
96°

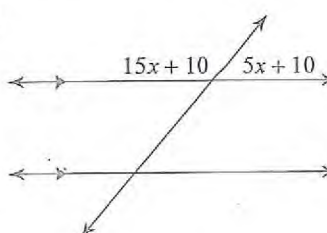
3)  Alternate Interior Angles Thm
82°

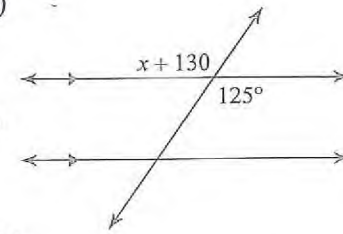
4)  Same-Side Interior Angles Pos
71°

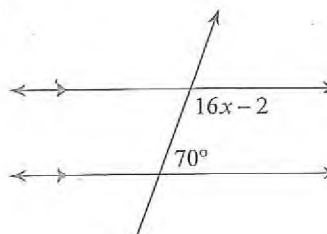
5)  Same-Side Interior Angles Pos
58°

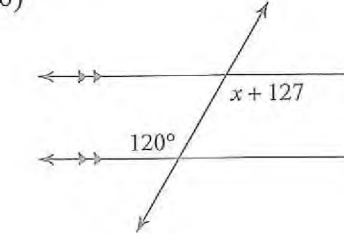
6)  Linear Pair Theorem
55°

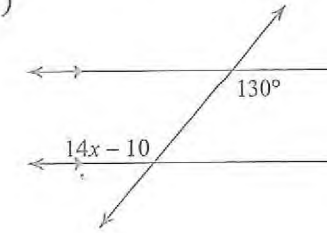
Solve for x . State the theorem/postulate used to find x .

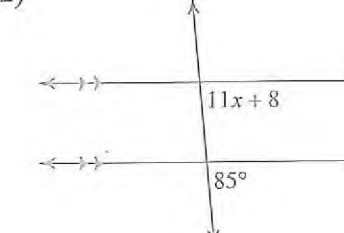
7)  Linear Pair Thm
 $15x + 10 + 5x + 10 = 180$
 $20x + 20 = 180$
 $20x = 160$
 $x = 8$

8)  Vertical Angles Thm
 $x + 130 = 125$
 $x = -5$

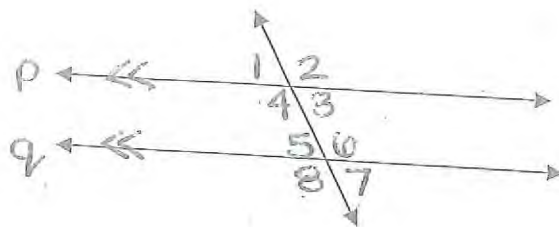
9)  Same-Side Interior Angles Pos
 $16x - 2 + 70 = 180$
 $16x = 112$
 $x = 7$

10)  Alternate Interior Angles Thm
 $x + 127 = 120$
 $x = -7$

11)  Alternate Interior Angles Thm
 $14x - 10 = 130$
 $14x = 140$
 $x = 10$

12)  Corresponding Angles Thm
 $11x + 8 = 85$
 $11x = 77$
 $x = 7$

Use the diagram to the right to complete each proof.



13) If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles have the same measure.

Given: $p \parallel q$
 Prove: $m\angle 1 = m\angle 7$

Statements	Reasons
$p \parallel q$	Given
$m\angle 1 = m\angle 5$	Corresponding Angles Theorem
$m\angle 5 = m\angle 7$	Vertical Angles Theorem
$m\angle 1 = m\angle 7$	Transitive Prop of Equality

*** You can't use the Alternate Interior Angles Theorem in this proof.**

14) Given: $p \parallel q$
 Prove: $m\angle 4 = m\angle 6$

Statements	Reasons
$p \parallel q$	Given
$m\angle 4 = m\angle 8$	Corresponding Angles Theorem
$m\angle 8 = m\angle 6$	Vertical Angles Theorem
$m\angle 4 = m\angle 6$	Transitive Prop of Equality

15) Given: $p \parallel q$
 Prove: $m\angle 3 = m\angle 7$

Statements	Reasons
$p \parallel q$	Given
$m\angle 3 = m\angle 5$	Alternate Interior Angles Theorem
$m\angle 5 = m\angle 7$	Vertical Angles Theorem
$m\angle 3 = m\angle 7$	Transitive Prop of Equality