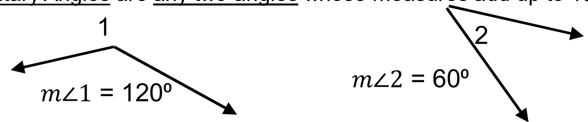
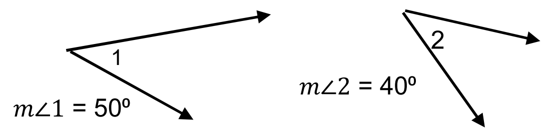
SM2 HANDOUT 7-3 (Special Angle Pairs)

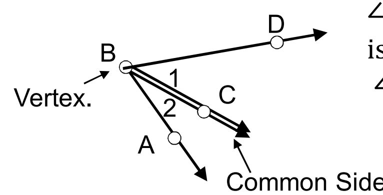
Supplementary Angles are any two angles whose measures add up to 180.



Complementary Angles are any two angles whose measures add up to 90.

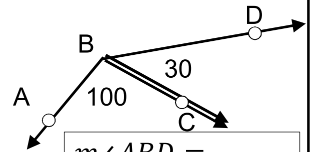


Adjacent Angles have a common side and share a common vertex



$\angle ABC$ is adjacent to __ $\angle CBD$

$\angle 2$ is adjacent to _____ $\angle 1$



$m\angle ABD =$ ______

Angle Addition Postulate

If $\angle ABC$ is adjacent to $\angle CBD$ then $m\angle ABC + m\angle CBD = m\angle ABD$

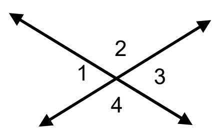
or

If $\angle 1$ is adjacent to $\angle 2$ then $m\angle 1 + m\angle 2 = m\angle ABD$

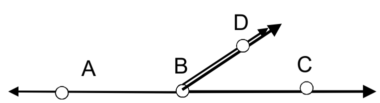
Vertical Angle Pair: angles formed by two crossing lines and have no common sides.

$\angle 2$ and $\angle 4$ are a vertical angle pair

Are there any other vertical angle pairs?



Linear Pair of angles is made up of..



In the crossed-lines figure above, name 4 linear pairs of angles.

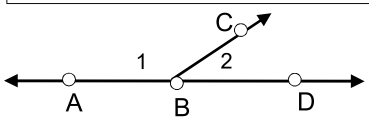
A Two-Column Proof is a logical argument written so that the
1st column contains a statement and the
2nd column provides a justification for the truthfulness of the statement.

Statement	Justification (reason)

A drawing is NOT a proof!!!

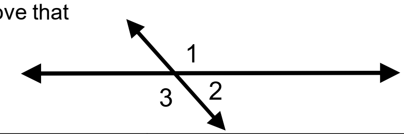
Prove the Linear Pair Theorem: (If two angles form a linear pair, then the sum of their measures is 180 degrees.)

Statement	Justification (reason)
1 $\angle 1$ *and* $\angle 2$ are a linear pair	Hypothesis to be proven
2 $\angle 1$ *and* $\angle 2$ are adjacent angles	Definition of a linear pair
3 $\angle ABD$ is a straight angle	Definition of a linear pair
4 $m\angle ABD = 185$	Definition of a straight angle
5 $m\angle 1 + \angle 2 = m\angle ABD = 180$	Steps 3, 4, 5 and Angle Addition Postulate
6 The sum of the measures of linear pairs is 180 degrees	Quad Erat Demonstrandum ☺



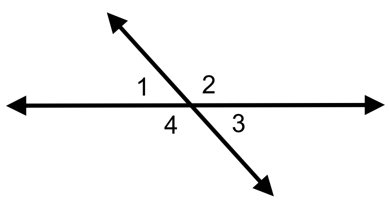
Linear Pair of angles is made up of *two "adjacent angles"* whose *un-shared sides form a straight angle.*

Use the Linear Pair Theorem to prove that vertical angles are congruent.



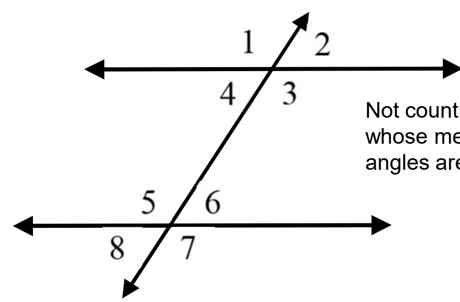
Statement	Justification (reason)
$m\angle 1 + m\angle 2 = 180$	Linear Pair Theorem
$m\angle$ ___ $+ m\angle 3 = 180$	Linear Pair Theorem
$m\angle$ ___ $+ m\angle$ ___ $= m\angle$ ___ $+ m\angle$ ___	substitution (steps 1 and 2)
$m\angle$ ___ $= m\angle$ ___	Property of equality
$\angle 1$ and $\angle 3$ are vertical angles.	Def'n of vertical angles
Vertical angles are congruent.	QED

Linear Pair Theorem: If two angles form a linear pair, then the sum of their measures is 180 degrees.)



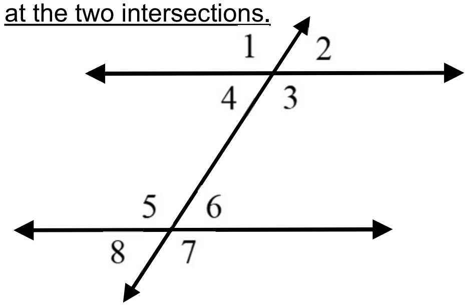
Vertical Angle Theorem: If two angles are vertical angles then the two angles are congruent.

Transversal line: A line that intersects two other lines (usually parallel lines).



Not counting straight angles or angles whose measure is greater than 180, eight angles are formed.

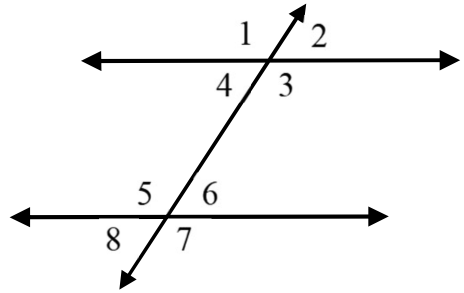
Corresponding Angles: pairs of angles that are in the same relative position at the two intersections.



$\angle 1, \angle 5$

Name the three other corresponding angle pairs.

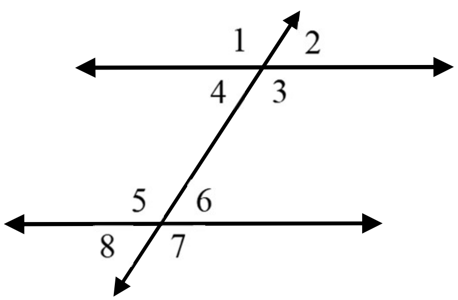
Alternate Interior Angles: pairs of angles that are in between the parallel lines and on alternate sides of the transversal.



$\angle 4, \angle 6$

Name the one other alternate interior angle pair.

Alternate Exterior Angles: pairs of angles that are outside the parallel lines and on alternate sides of the transversal.

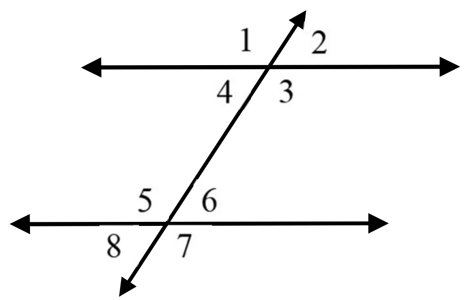


$\angle 1, \angle 7$

Name the one other alternate exterior angle pair.

$\angle 2, \angle 8$

Consecutive Interior Angles: pairs of angles that are in between the parallel lines and are on same side of the transversal.

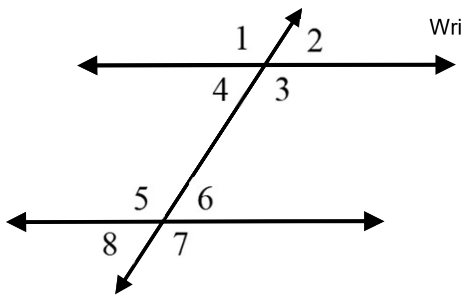


$\angle 3, \angle 6$

Name the one other consecutive interior angle pair.

Corresponding Angles Postulate: If two parallel lines are cut by a transversal, then Corresponding angles are congruent.

$m\angle 1 = m\angle 5$

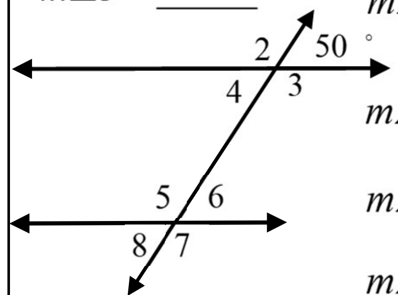


Write three other congruence statements.

The two red lines are parallel. Find the measures of all the other angles and give the theorem that justifies your answer.

$m\angle 2 =$ ______

$m\angle 3 =$ ______



$m\angle 4 =$ ______

$m\angle 5 =$ ______

$m\angle 6 =$ ______

$m\angle 7 =$ ______

$m\angle 8 =$ ______

The two red lines are parallel, what can you say about ...

Linear Angle Pairs:

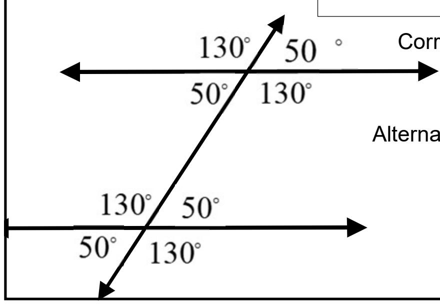
Vertical angle pair:

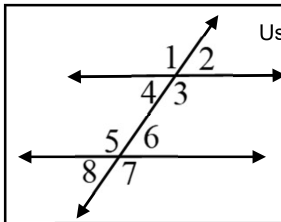
Alternate Interior Angles:

Consecutive Interior Angles

Corresponding Angles:

Alternate Exterior Angles:

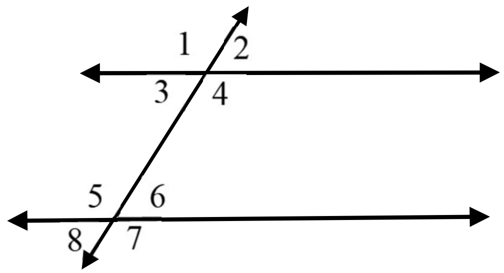




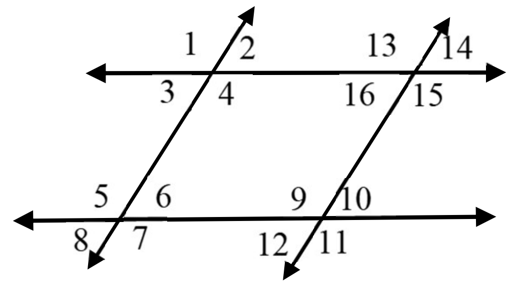
Use the Corresponding Angles Postulate,
and
Vertical Angle Theorem
to prove the
Alternate Interior Angle Theorem.
(If *two angles are Alternate Interior Angles*, then *they are congruent*.)

	Two parallel lines are cut by a transversal	Given in the figure
1	$\angle 3$ and $\angle 5$ are Alt. Int. Angles.	Hypothesis to be proven
2	$m\angle 3 =$ _____	Vertical Angles Theorem
3	$m\angle 1 =$ ____	Corresponding Angles Postulate
4	_____ = ____	Substitution (steps 2 and 3)
5	Alt. Int. Angles are congruent.	QED

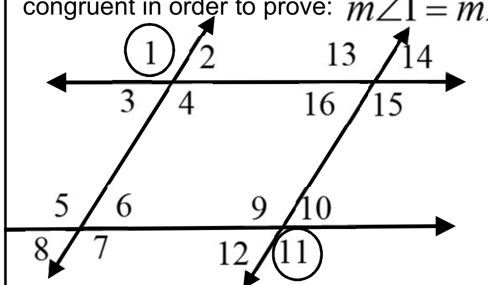
One pair of parallel lines



Two pairs of parallel lines

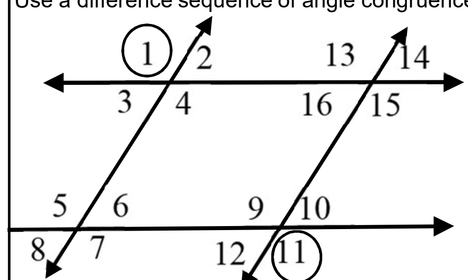


Starting with angle 1: circle the angles that you can prove are congruent in order to prove: $m\angle 1 = m\angle 11$



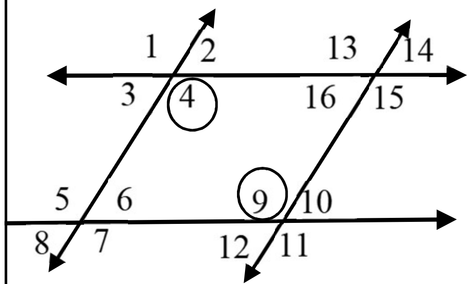
Write a congruence statement and provide a justification for each.

Use a difference sequence of angle congruences to prove: $m\angle 1 = m\angle 11$



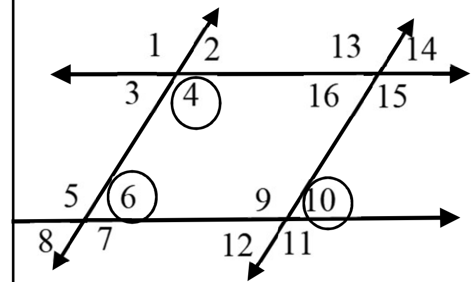
Write a congruence statement and provide a justification for each.

What sequence of angles would you "link" to prove $m\angle 4 = m\angle 9$



Write a congruence statement and provide a justification for each.

What sequence of angles would you "link" to prove $m\angle 4 + m\angle 10 = 180$



Write a congruence statement and provide a justification for each.