

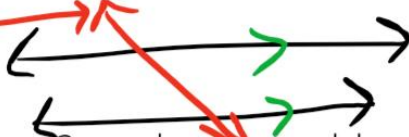
Vocabulary

Parallel Line Properties

parallel lines - Two or more lines in the same plane that do not intersect.



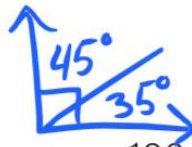
transversal - A line that cuts across two or more (usually parallel) lines. **Transversal**



supplementary angles - 2 angles that add up to a total of 180 degrees.



complementary angles - 2 angles that add up to a total of 90 degrees.



straight angle - an angle that measures 180 degrees.



Linear pair- Two angles that are adjacent and whose non-common sides form a straight line/ straight angle.



Linear pairs are supplementary

Corresponding Angles - the angles that occupy the same relative position at each intersection where a straight line crosses two others

Alternate Exterior angles - The pairs of angles on opposite sides of a transversal but outside the two lines.

Same Side Exterior - pairs of angles that are on the same side of the transversal outside of the two lines.

Alternate Interior - the pairs of angles on opposite sides of a transversal and on the inside of the two lines.

Same Side Interior - angles that are on the same side of the transversal outside of the two lines.

Vocabulary / Properties

Parallel Line Properties

1

2

5

6

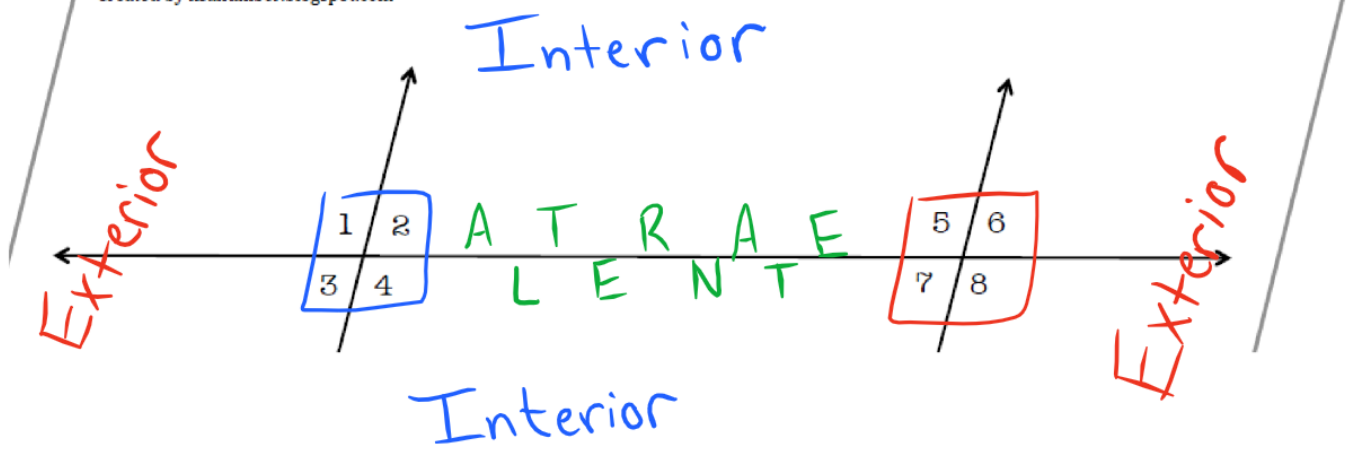
Corresponding \angle s:
 $\angle 1 \cong \angle 5$
 Alternate exterior \angle s:
 $\angle 1 \cong \angle 8$
 Same side exterior \angle s:
 $\angle 1 + \angle 6$ are Supplementary

Corresponding \angle s:
 $\angle 2 \cong \angle 6$
 Alternate interior \angle s:
 $\angle 2 \cong \angle 7$
 Same side interior \angle s:
 $\angle 2 + \angle 5$ are Supplementary

Corresponding \angle s:
 $\angle 5 \cong \angle 1$
 Alternate interior \angle s:
 $\angle 5 \cong \angle 4$
 Same side interior \angle s:
 $\angle 5 + \angle 2$ are Supplementary

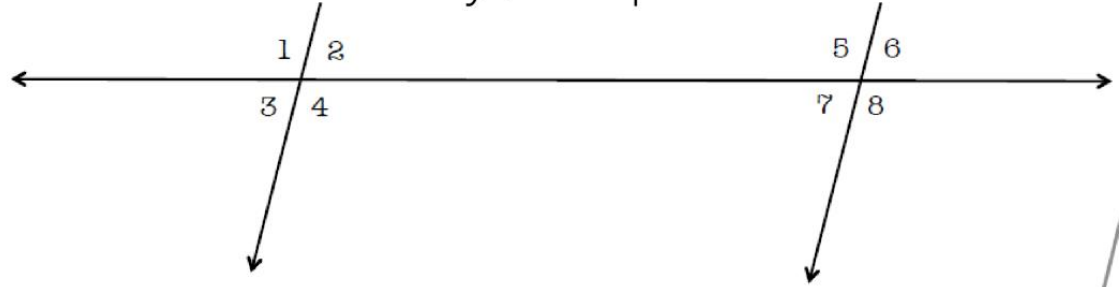
Corresponding \angle s:
 $\angle 6 \cong \angle 2$
 Alternate exterior \angle s:
 $\angle 6 \cong \angle 3$
 Same side exterior \angle s:
 $\angle 6 + \angle 1$ are Supplementary

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Vocabulary / Properties

Parallel Line Properties



Corresponding \angle s:
 $\angle 3 \cong \angle 7$
 Alternate exterior \angle s:
 $\angle 3 \cong \angle 6$
 Same side exterior \angle s:
 $\angle 3$ and $\angle 8$ are supp.

Corresponding \angle s:
 $\angle 4 \cong \angle 8$
 Alternate interior \angle s:
 $\angle 4 \cong \angle 5$
 Same side interior \angle s:
 $\angle 4$ and $\angle 7$ are supp.

Corresponding \angle s:
 $\angle 7 \cong \angle 3$
 Alternate interior \angle s:
 $\angle 7 \cong \angle 2$
 Same side interior \angle s:
 $\angle 7$ and $\angle 4$ are supp.

Corresponding \angle s:
 $\angle 8 \cong \angle 4$
 Alternate exterior \angle s:
 $\angle 8 \cong \angle 1$
 Same side exterior \angle s:
 $\angle 8$ and $\angle 3$ are supp.

We will be proving each of these properties to be true.

Before we do, we need to discuss what proofs are.

What does it mean to prove something?

Proof - Evidence or argument establishing or helping to establish a fact or the truth of a statement.

What are the three pieces to every proof?

1. *Given*

2. *Logic*

3. *Conclusion*

What logical pieces do we already have?

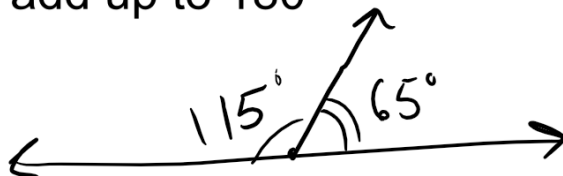
Reflexive Property

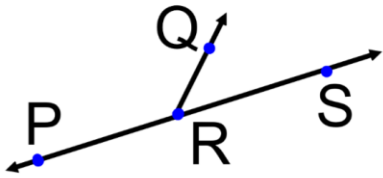
Let's add another one. Transitive property

If ^I ^{nobody} $a = b$ and ^{nobody} ^{perfect} $b = c$, then ^I ^{perfect} $a = c$

Another Logic piece

Linear Pair Conjecture - Linear Pairs of angles add up to 180°





Given: $\angle PRQ$ and $\angle QRS$ are linear pairs.

Prove: Linear pairs are supplementary.

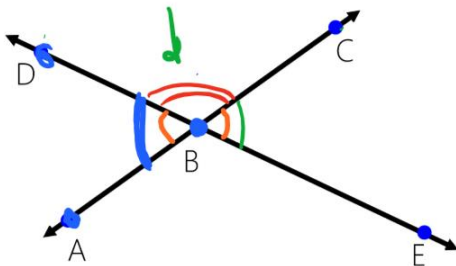
Given We know $\angle PRQ$ and $\angle QRS$ are linear pairs, because it is given.

Logic $m\angle PRQ + m\angle QRS = 180^\circ$, by the Linear pairs conjecture

Conclusion Thus Linear Pairs are supp. by Def. of supp.

Parallel Lines Properties

Given that DE and CA are lines, Prove that vertical angles are congruent.



Prove $\angle CBE \cong \angle ABD$
 (What we know) Statement | (How we know it) Reason

\overline{DE} + \overline{CA} are lines

Given

$\angle DBC$ and $\angle CBE$ are linear pairs

Def. of Linear Pairs

$\angle DBC$ and $\angle ABD$ are linear pairs

Def. of Linear Pair

$m\angle DBC + m\angle CBE = 180^\circ$

Linear pairs conjecture

$m\angle DBC + m\angle ABD = 180^\circ$

Linear pairs conjecture

$m\angle CBE = 180 - m\angle DBC$

Inverse prop. of addition

$m\angle ABD = 180 - m\angle DBC$

Inverse prop. of addition

$m\angle CBE = m\angle ABD$

Transitive prop.

$\angle CBE \cong \angle ABD$

Def. of congruence

We will use these properties to prove the parallel line properties.

Vertical Angles

Linear Pairs

Review

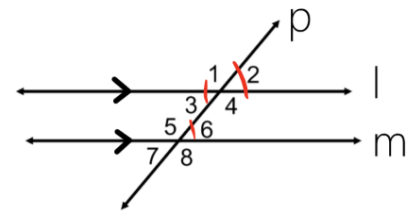
Parallel Line Properties

Use the given figure to answer the following questions.

1. Identify the parallel lines and their transversal

$l + m$

p



2. Name two pairs of congruent angles and what property makes them congruent.

$\angle 1 \cong \angle 5$ corresponding

$\angle 2 \cong \angle 7$ Alt. Exterior

3. Name two pairs of supplementary angles and what property makes them supplementary.

$\angle 2 + \angle 8$ same side Ext.

$\angle 3 + \angle 5$ same side Int