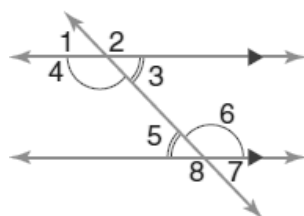


Parallel Lines and Special Angles

Theorem 1: Alternate Interior Angles

If two lines are cut by a transversal, then each pair of alternate interior angles is congruent

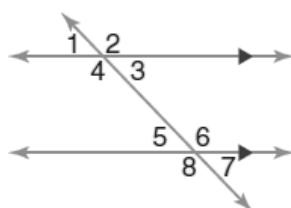


$$\angle 4 \cong \angle 6$$

$$\angle 3 \cong \angle 5$$

Theorem 2: Consecutive Interior angles

If two lines are cut by a transversal, then each pair of consecutive interior angles is supplementary

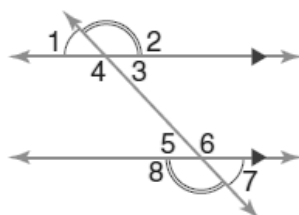


$$m\angle 3 + m\angle 6 = 180^\circ$$

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

Theorem 3: Alternate Exterior angles

If two lines are cut by a transversal, then each pair of alternate exterior angles is congruent

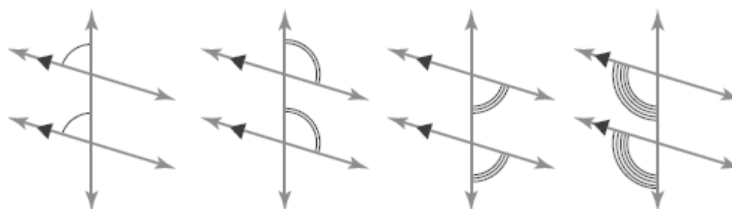


$$\angle 1 \cong \angle 7$$

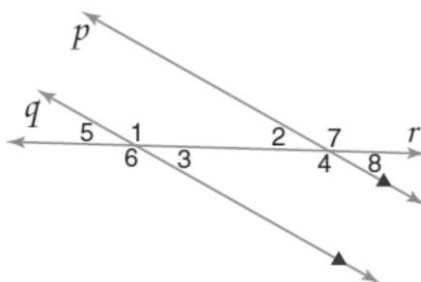
$$\angle 2 \cong \angle 8$$

Postulate

If two parallel lines are cut by a transversal, then each pair of corresponding angles is congruent



Example 1: In the figure, $p \parallel q$, and r is a transversal. If $m\angle 5 = 28^\circ$, find :



a) $m\angle 1$

$\angle 1$ and $\angle 5$ are supplementary angles

$$m\angle 1 + m\angle 5 = 180^\circ$$

$$\Rightarrow m\angle 1 = 180^\circ - m\angle 5$$

$$\Rightarrow m\angle 1 = 180^\circ - 28^\circ = 152^\circ$$

b) $m\angle 2$

$\angle 5$ and $\angle 2$ are corresponding angles

$$\angle 5 \cong \angle 2$$

$$\Rightarrow m\angle 2 = m\angle 5 = 28^\circ$$

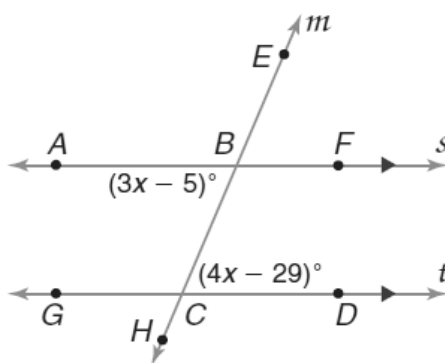
c) $m\angle 8$

$\angle 5$ and $\angle 8$ are alternate exterior angles

$$\angle 5 \cong \angle 8$$

$$\Rightarrow m\angle 8 = m\angle 5 = 28^\circ$$

Example 2: In the figure, $s \parallel t$, and m is a transversal. find x



$\angle ABC$ and $\angle BCD$ are alternate interior angles

$$\angle ABC \cong \angle BCD$$

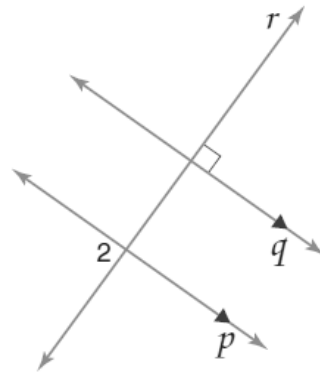
$$\Rightarrow m\angle ABC = m\angle BCD$$

$$\Rightarrow 3x - 5 = 4x - 29$$

$$\Rightarrow 29 - 5 = 4x - 3x$$

$$\Rightarrow 24 = x$$

Example 3: In the figure, $p \parallel q$, and transversal r is perpendicular to q . If $m\angle 2 = 3x - 6$, find x



$$r \perp q$$

\Rightarrow The angles formed is a right angles and $p \parallel q$

$$\Rightarrow m\angle 2 = 3x - 6 = 90^\circ$$

$$\Rightarrow 3x - 6 = 90^\circ$$

$$\Rightarrow 3x = 96$$

$$\Rightarrow x = \frac{96}{3} = 32$$