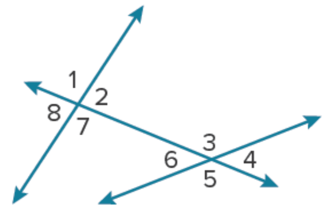
Example 2
Classify Angle Pair Relationships

Check

Classify the relationship between each pair of angles as *alternate interior, alternate exterior, corresponding*, or *consecutive interior angles*.

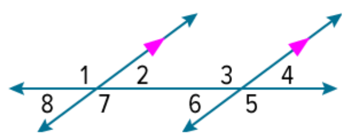


a. ∠1 and ∠5 alternate exterior angles

b. ∠2 and ∠4 corresponding angles

Learn
Angles and Parallel Lines

If two lines are parallel and cut by a transversal, then there are special relationships in the angle pairs formed by the lines.



Theorem 3.14: Corresponding Angles Theorem

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

∠1 ≅ ∠3,
∠2 ≅ ∠4,
∠5 ≅ ∠7,
∠6 ≅ ∠8

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Theorem 3.15: Alternate Interior Angles Theorem

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

$\angle 2 \cong \angle 6$, $\angle 3 \cong \angle 7$

Theorem 3.16: Consecutive Interior Angles Theorem

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

$\angle 2$ and $\angle 3$, $\angle 6$ and $\angle 7$

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Theorem 3.17: Alternate Exterior Angles Theorem

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

$\angle 1 \cong \angle 5$, $\angle 4 \cong \angle 8$

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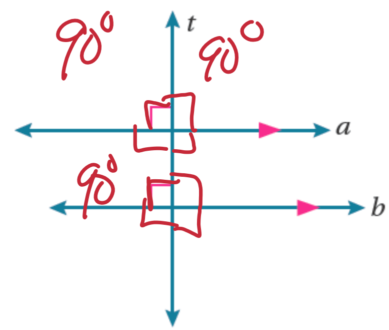
Angles and Parallel Lines

A special relationship also exists when the transversal of two parallel lines is a perpendicular line.

Theorem 3.18: Perpendicular Transversal Theorem

In a plane, if a line is perpendicular to one of two parallel lines, then it is perpendicular to the other.

Example If $a \parallel b$ and $a \perp t$, then $b \perp t$.



McGraw Hill | Parallel Lines and Transversals

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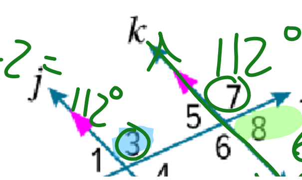
Example 5

Find Values of Variables

Use the figure to find the value of the indicated variable. Justify your reasoning.

a. If $m\angle 3 = (4x + 7)°$ and $m\angle 6 = (5x - 13)°$.



find the value of x.

b. Find the value of y if $m\angle 8 = 68°$ and $m\angle 3 = (3y - 2)°$.

Corresponding
$\angle 3 = \angle 7$

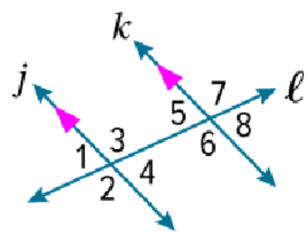
$3y - 2 = 112$
$+2 \quad +2$
$3y = 114$
$y = 38$

Example 5

Find Values of Variables

a. If $m\angle 3 = (4x + 7)°$ and $m\angle 6 = (5x - 13)°$, find the value of x.

Alternate Interior
$4x + 7 = 5x - 13$
$-7 \quad -7$
$4x = 5x - 20$
$-5x \quad -5x$
$-1x = -20$
$x = 20$

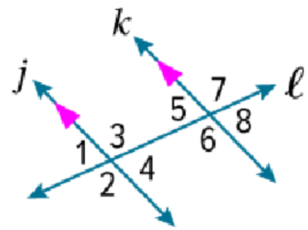


$\angle 3 \cong \angle 6$	Alternate Interior Angles Theorem
$m\angle 3 = m\angle 6$	Definition of congruent angles
$(4x + 7)° = (5x - 13)°$	Substitution
$x = 20$	Solve.

Example 5

Find Values of Variables

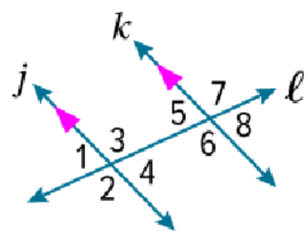
b. Find the value of *y* if $m\angle 8 = 68°$ and $m\angle 3 = (3y - 2)°$.



$\angle 5 \cong \angle 8$	Vertical Angles Theorem
$m\angle 5 = m\angle 8$	Definition of congruent angles
$m\angle 5 = 68°$	Substitution

Example 5
Find Values of Variables

Because lines j and k are parallel, $\angle 5$ and $\angle 3$ are supplementary by the Consecutive Interior Angles Theorem.



$m\angle 3 + m\angle 5 = 180°$	Definition of supplementary angles
$(3y - 2)° + 68° = 180°$	Substitution
$3y° + 66° = 180°$	Simplify.
$y = 38$	Solve.