What You Will Learn
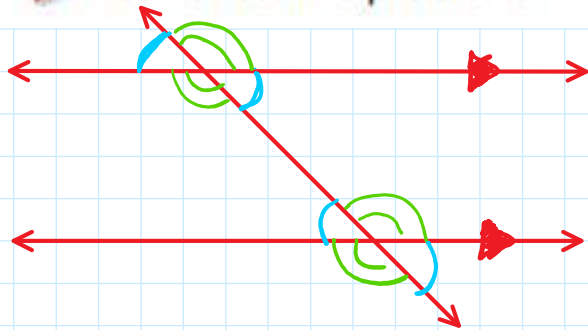
▶ Use properties of parallel lines.

▶ Prove theorems about parallel lines.

▶ Solve real-life problems.

Vertical ∠s

Linear Pair

Supplementary ∠s

⟳ Theorems

Theorem 3.1   Corresponding Angles Theorem

If two parallel lines are cut by a transversal, then the pairs of corresponding angles are congruent.

Examples   In the diagram at the left, $\angle 2 \cong \angle 6$ and $\angle 3 \cong \angle 7$.

Proof   Ex. 36, p. 180

Theorem 3.2   Alternate Interior Angles Theorem

If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are congruent.

Examples   In the diagram at the left, $\angle 3 \cong \angle 6$ and $\angle 4 \cong \angle 5$.

Proof   Example 4, p. 134

Theorem 3.3   Alternate Exterior Angles Theorem

If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles are congruent.

Examples   In the diagram at the left, $\angle 1 \cong \angle 8$ and $\angle 2 \cong \angle 7$.
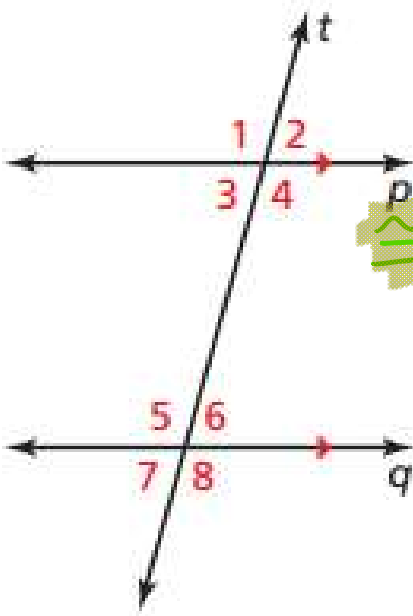
Proof   Ex. 15, p. 136

Theorem 3.4   Consecutive Interior Angles Theorem

If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary.

Examples   In the diagram at the left, $\angle 3$ and $\angle 5$ are supplementary, and $\angle 4$ and $\angle 6$ are supplementary.
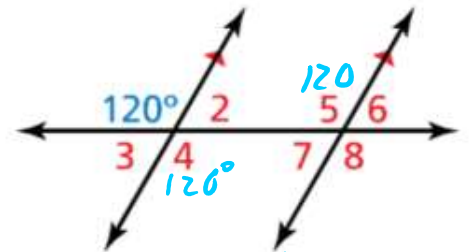
Proof   Ex. 16, p. 136

The measures of three of the numbered angles are 120°. Identify the angles. Explain your reasoning.

$m\angle 4 = 120°$ Vertical ∠s

$m\angle 5 = 120°$ Corresponding ∠s OR Alt.Int.∠s

$m\angle 8 = 120°$ Alt.Ext. ∠s OR Vert. ∠s Corr. ∠s

Find the value of *x*.

$X = 60$

~~$X = 65$~~

115°

4

$(x + 5)°$

a

b
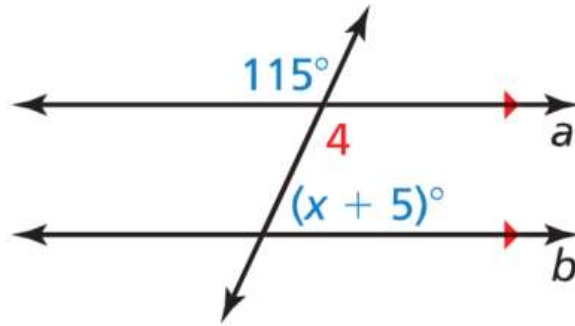
Corr ∠s
↓
linear Pair

Vert. ∠s
↓
Consec. Int. ∠s

Find the value of *x*.

$X = 5$ Corr. ∠s
           L.P.

1   136°

c

136

$(7x + 9)°$ d
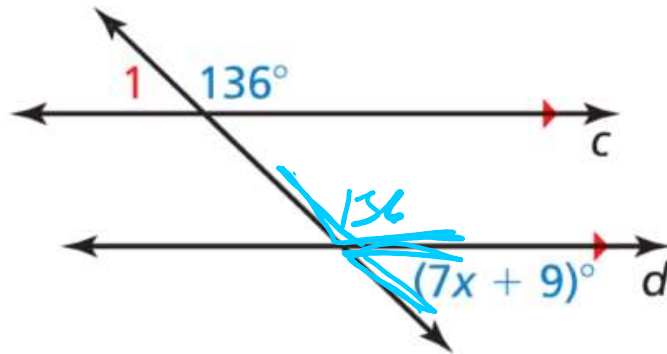
L.P.
↓
Alt. Ext ∠s

Use the diagram.

1. Given $m\angle 1 = 105°$, find $m\angle 4$, $m\angle 5$, and $m\angle 8$. Tell which theorem you use in each case.
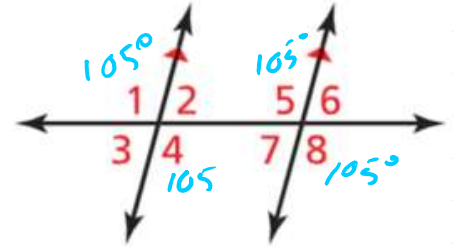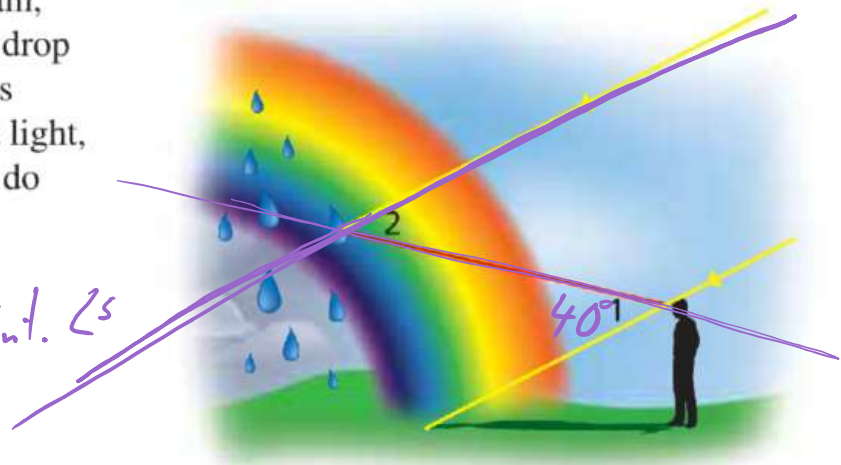

$m\angle 4 = 105°$ Vert. $\angle s$

$m\angle 5 = 105°$ Corr. $\angle s$ OR   Alt. Int. $\angle s$

$m\angle 8 = 105$ Alt. Ext. $\angle s$ OR Vert. $\angle s$ OR Corr. $\angle s$

When sunlight enters a drop of rain, different colors of light leave the drop at different angles. This process is what makes a rainbow. For violet light, $m\angle 2 = 40°$. What is $m\angle 1$? How do you know?

$m\angle 1 = 40°$ Alt. Int. $\angle s$

Practice *sec. 3.2*
Pg. 135
1, 2, 3-13 odd, 14, 15, 23, 25-28