Section 3.3 Parallel Lines and Angles Formed by Transversals

Complete the outline as you view Video Lecture 3.3. Pause the video as needed to fill in the blanks. Then press Play to continue. Also, circle your answer to each numbered exercise.

Objective 1 Prove and Use Theorems About Parallel Lines Cut by a Transversal

Helpful Hint
If $p \rightarrow q$ is the __________, then $q \rightarrow p$ is the converse.

Also, if $p \rightarrow q$ is a true statement, then $q \rightarrow p$ might be true or false.

Alternate Interior Angles Converse Theorem

<table>
<thead>
<tr>
<th>Theorem</th>
<th>If $\ell \parallel m$ ...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>If two parallel lines are cut by a transversal, then alternate interior angles are congruent.</td>
<td></td>
<td>$\angle 4 \cong \angle 5$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\angle 3 \cong \angle 6$</td>
</tr>
</tbody>
</table>

Work Video Exercise 1 with me.
Find the measure of $\angle 1$ and $\angle 2$. Justify each answer.

1. 

Diagram: Two parallel lines cut by a transversal, with angles labeled $\angle 1$, $\angle 2$, $\angle 4$, and $\angle 5$. The angle $\angle 1$ is found by subtracting $127^\circ$ from $180^\circ$, giving $53^\circ$. The angle $\angle 2$ is found by subtracting $127^\circ$ from $180^\circ$, giving $53^\circ$. The angles $\angle 4$ and $\angle 5$ are congruent.
### Corresponding Angles Converse Theorem

**Theorem**

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

<table>
<thead>
<tr>
<th>Angle 1</th>
<th>Angle 2</th>
<th>Angle 3</th>
<th>Angle 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\angle 1 \cong \angle 2$</td>
<td>$\angle 3 \cong \angle 4$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Same-Side Interior (or Consecutive) Angles Converse Theorem

**Theorem**

If two parallel lines are cut by a transversal, then same-side interior angles are supplementary.

- $m\angle 4 + m\angle 5 = ____^\circ$
- $m\angle 3 + m\angle 6 = ____^\circ$

### Alternate Exterior Angles Converse Theorem

**Theorem**

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

- $\angle 1 \cong \angle 2$

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**Work Video Exercise 2 with me.**

Identify all the numbered angles that are congruent to the angle whose measure is given. Justify your answers.

2.

![Diagram](image-url)
Pause and work Video Exercise 3.
Find the values of $x$ and $y$.

3.

\[ \begin{align*}
\angle 1 &= 45^\circ \\
\angle 2 &= x^\circ \\
\angle 3 &= y^\circ \\
\angle 4 &= 45^\circ \\
\angle 5 &= x^\circ \\
\angle 6 &= y^\circ \\
\angle 7 &= 45^\circ \\
\angle 8 &= 45^\circ
\end{align*} \]

Play and check.

Work Video Exercise 4 with me.
Use the given angle measure and the figure shown to find the measures of the other seven numbered angles.

4. Suppose that $m \angle 6 = 103^\circ$. 

\[ \begin{align*}
\angle 1 &= 103^\circ \\
\angle 2 &= \_\_\_^\circ \\
\angle 3 &= \_\_\_^\circ \\
\angle 4 &= \_\_\_^\circ \\
\angle 5 &= \_\_\_^\circ \\
\angle 6 &= 103^\circ \\
\angle 7 &= \_\_\_^\circ \\
\angle 8 &= \_\_\_^\circ
\end{align*} \]
Pause and work Video Exercise 5.
Find the measures of the numbered angles. Name the theorem that justifies each answer.

5.

\[ \angle 1 \]

Play and check.

Work Video Exercise 6 with me.
Find the measure of \( \angle 1 \).

6.
Objective 2 Use Algebra to Find Angle Measures of Angles Formed by Parallel Lines and a Transversal

Work Video Exercise 7 with me.

Find the value of \( x \).

7.

Pause and work Video Exercise 8.

Find \( x \). Then find the measure of each labeled angle.

8.

Play and check.