Lesson 4.4.1: Proving Properties of Parallel Lines Cut by a Transversal

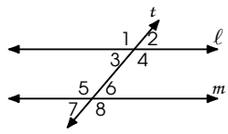
Parallel Lines: two lines that lie in the same plane and do not intersect
Transversal: a line that passes through two lines in the same plane at two distinct points
Corresponding Angles Postulate: If two parallel lines are cut by a transversal, then the corresponding angles are congruent.
Alternate Interior Angles theorem: If two parallel lines are cut by a transversal, then the alternate interior angles are congruent.
Alternate Exterior Angles theorem: If two parallel lines are cut by a transversal, then the alternate exterior angles are congruent.
Consecutive Interior Angles theorem: If two parallel lines are cut by a transversal, then the consecutive or same-side interior angles are supplementary.
Consecutive Exterior Angles theorem: If two parallel lines are cut by a transversal, then the consecutive or same-side exterior angles are supplementary.

Practice Exercises 4.4.1

Complete the following proofs.

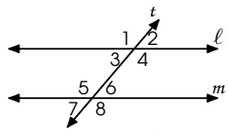
1. Given: t is a transversal
   $\ell \parallel m$

   Prove: $\angle 2$ and $\angle 8$ are supplementary



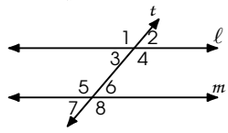
2. Given: t is a transversal
   $\ell \parallel m$

   Prove: $\angle 2 \cong \angle 7$



3. Given: t is a transversal
   $\ell \parallel m$

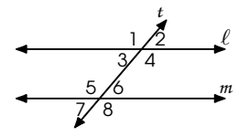
   Prove: $\angle 4 \cong \angle 5$



Activity 4.4.1

1. Given: t is a transversal
   $\ell \parallel m$

   Prove: $\angle 3 \cong \angle 6$

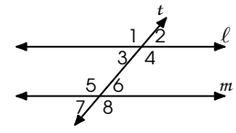


Proof:

Statements	Reasons
1. t is a transversal, $\ell \parallel m$	1.
2. $\angle 3 \cong \angle 7$	2.
3. $\angle 7 \cong \angle 6$	3.
4. $\angle 3 \cong \angle 6$	4.

2. Given: t is a transversal
   $\ell \parallel m$

   Prove: $\angle 1 \cong \angle 8$

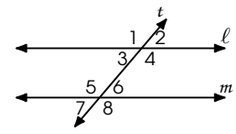


Proof:

Statements	Reasons
1. t is a transversal, $\ell \parallel m$	1.
2. $\angle 1 \cong \angle 5$	2.
3. $\angle 5 \cong \angle 8$	3.
4. $\angle 1 \cong \angle 8$	4.

3. Given: t is a transversal
   $\ell \parallel m$

   Prove: $\angle 3$ and $\angle 5$ are supplementary



Proof:

Statements	Reasons
1. t is a transversal, $\ell \parallel m$	1.
2. $\angle 3 \cong \angle 7$	2.
3. $\angle 7$ and $\angle 5$ form a linear pair	3.
4. $\angle 7$ and $\angle 5$ are supplementary	4.
5. $\angle 3$ and $\angle 5$ are supplementary	5.

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Practice Exercises 4.4.1
Complete the following proofs.
1. Given: t is a transversal
$\ell \parallel m$
Prove: $\angle 2$ and $\angle 8$ are supplementary
2. Given: t is a transversal
$\ell \parallel m$
Prove: $\angle 2 \cong \angle 7$
3. Given: t is a transversal
$\ell \parallel m$
Prove: $\angle 4 \cong \angle 5$
Activity 4.4.1
1. Given: t is a transversal
$\ell \parallel m$
Prove: $\angle 3 \cong \angle 6$
Proof:
2. Given: t is a transversal
$\ell \parallel m$
Prove: $\angle 1 \cong \angle 8$
Proof:
3. Given: t is a transversal
$\ell \parallel m$
Prove: $\angle 3$ and $\angle 5$ are supplementary
Proof: