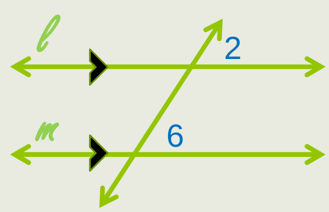
Section 3-3 Proving Lines Parallel – Day 1, Calculations.

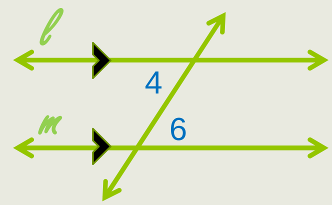
Michael Schuetz

Theorem 3-4: Converse of the Corresponding Angles Theorem.

Theorem		
If two lines and a transversal form corresponding angles that are congruent, then the lines are parallel.	If	$\angle 2 \cong \angle 6$ 
	Then	$l \parallel m$

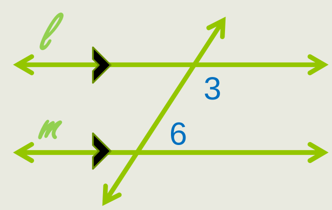
Theorem 3-5: Converse of the Alternate Interior Angles Theorem.

Theorem		
If two lines and a transversal form alternate interior angles that are congruent, then the lines are parallel.	If	$\angle 4 \cong \angle 6$
	Then	$l \parallel m$



Theorem 3-6: Converse of the Same-Side Interior Angles Postulate.

Theorem		
If two lines and a transversal form same-side interior angles that are supplementary, then the lines are parallel.	If	$m\angle 3 + m\angle 6 = 180$
	Then	$l \parallel m$



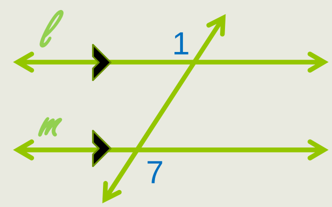
Theorem 3-7: Converse of the Alternate Exterior Angles Theorem.

Theorem

If two lines and a transversal form alternate exterior angles that are congruent, then the lines are parallel.

If

$\angle 1 \cong \angle 7$

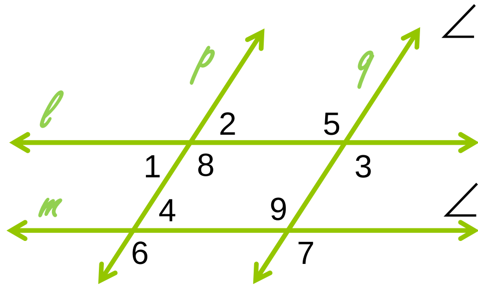


Then

$l \parallel m$

Example 1, Identifying parallel lines

- Which lines are parallel if $\angle 3 \cong \angle 8$ and $\angle 1 \cong \angle 4$? Justifies your answers?



$\angle 3 \cong \angle 8$ $p // q$

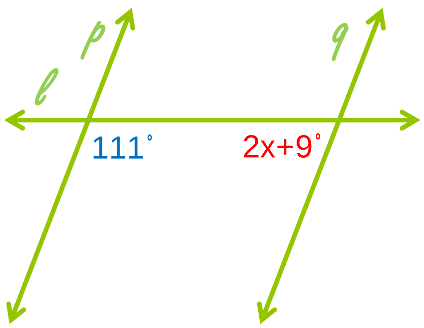
Converse of the corresponding angles theorem

$\angle 1 \cong \angle 4$ $l // m$

Converse of the alternate interior angles theorem

Example 2, Using Algebra

- What is the value of x that makes p//q? Which theorem or postulate justifies your answer?



The converse of the Same-Side Interior Postulate tells us that to make p//q, then

$$111^o + (2x+9)^o = 180^o$$

$$2x^o + 120^o = 180^o$$

$$2x = 60^o$$

$$x = 30^o$$

Homework: Day 1

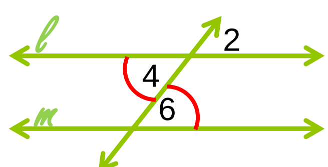
- P. 160, #'s 7-10, 13-16, 27-28, 31-34, 47-50

Section 3-3 Proving Lines Parallel – Day 2, Proofs.

Michael Schuetz

Proof of Theorem 3-5:

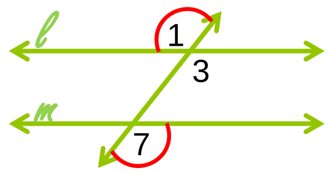
- Given: $\angle 4 \cong \angle 6$
- Prove: $\ell // m$



Statements	Reasons
1. $\angle 4 \cong \angle 6$	1. Given
2. $\angle 2 \cong \angle 4$	2. Vertical angles are congruent
3. $\angle 2 \cong \angle 6$	3. Transitive property
4. $l // m$	4. Theorem 3-4: If corresponding angles are congruent then the lines are parallel.

Proof of Theorem 3-7:

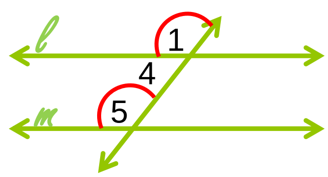
- Given: $\angle 1 \cong \angle 7$
- Prove: $\ell // m$



Statements	Reasons
1. $\angle 1 \cong \angle 7$	1. Given
2. $\angle 3 \cong \angle 1$	2. Vertical angles are congruent
3. $\angle 3 \cong \angle 7$	3. Transitive property
4. $l // m$	4. Theorem 3-4: If corresponding angles are congruent then the lines are parallel.

Proof of Theorem 3-4:

- Given: $\angle 1 \cong \angle 5$
- Prove: $\ell // m$



Statements	Reasons
1. $\angle 1 \cong \angle 5$	1. Given
2. $m\angle 1 + m\angle 4 = 180^0$	2. Angles 1 and 4 form a linear pair
3. $m\angle 5 + m\angle 4 = 180^0$	3. Substitution
4. $l // m$	4. Theorem 3-6: If same-side interior angles are supplementary then the lines are parallel.

Homework: Day 2

- P. 161, #'s 17-26, 29, 35-41