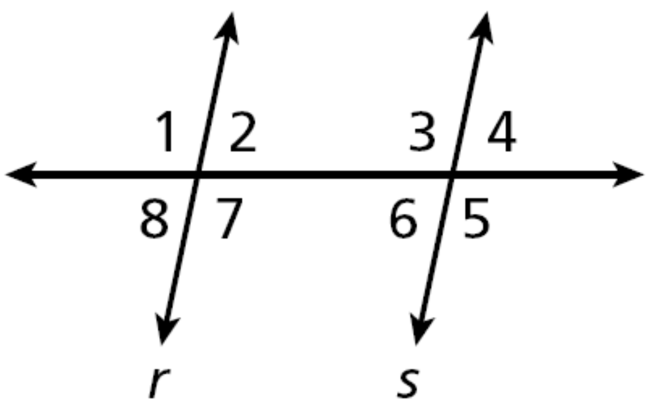
Example 2A: Determining Whether Lines are Parallel

Use the given information and the theorems you have learned to show that *r* || *s*.

∠4 ≅ ∠8

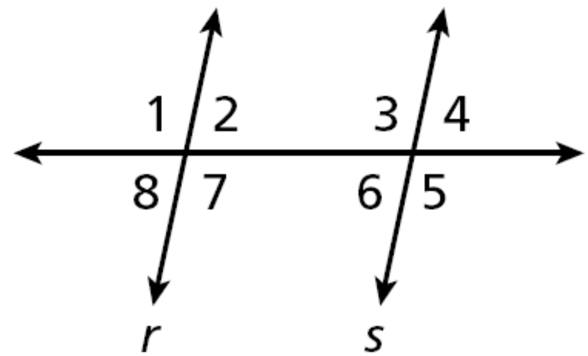


∠4 ≅ ∠8 — *∠4 and ∠8 are alternate exterior angles.*

r || *s* — *Conv. Of Alt. Int. ∠s Thm.*

Check It Out! Example 2a

Refer to the diagram. Use the given information and the theorems you have learned to show that *r* || *s*.



m∠4 = m∠8

∠4 ≅ ∠8 *Congruent angles*

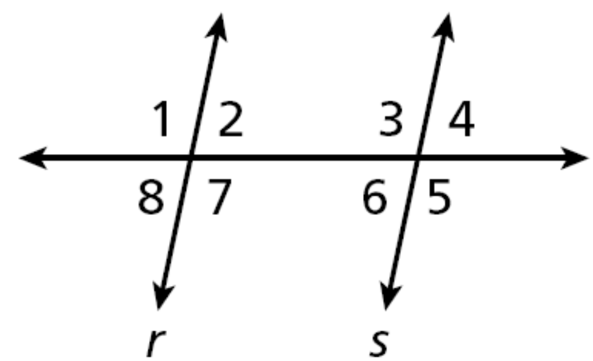
∠4 ≅ ∠8 *∠4 and ∠8 are alternate exterior angles.*

r || *s* *Conv. of Alt. Int. ∠s Thm.*

Check It Out! Example 2b

Refer to the diagram. Use the given information and the theorems you have learned to show that *r* || *s*.

m∠3 = 2*x*°, m∠7 = (*x* + 50)°, *x* = 50



m∠3 = 2*x*

= 2(50) = 100° *Substitute 50 for x.*

m∠7 = *x* + 50

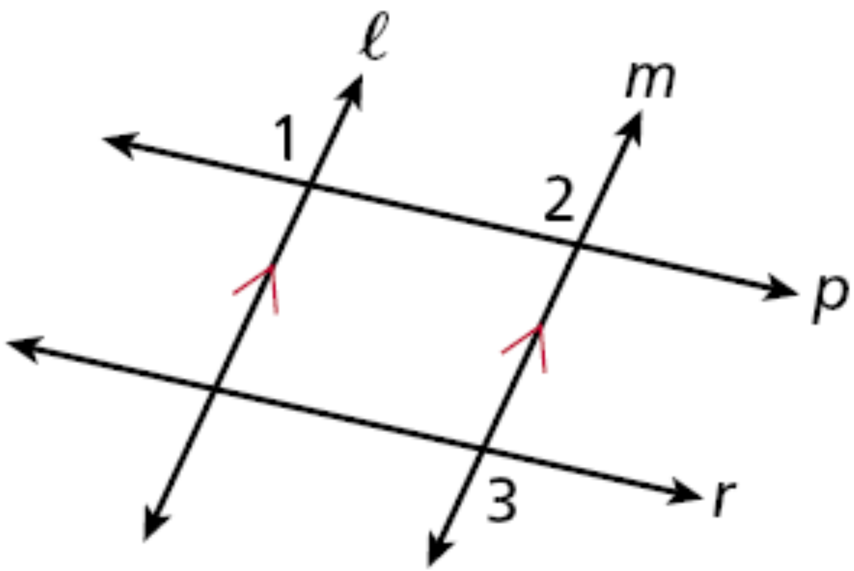
= 50 + 50 = 100° *Substitute 5 for x.*

m∠3 = 100° and m∠7 = 100°

∠3 ≅ ∠7 r||s *Conv. of the Alt. Int. ∠s Thm.*

Example 3: Proving Lines Parallel

Given: $p \parallel r$, $\angle 1 \cong \angle 3$
Prove: $\ell \parallel m$



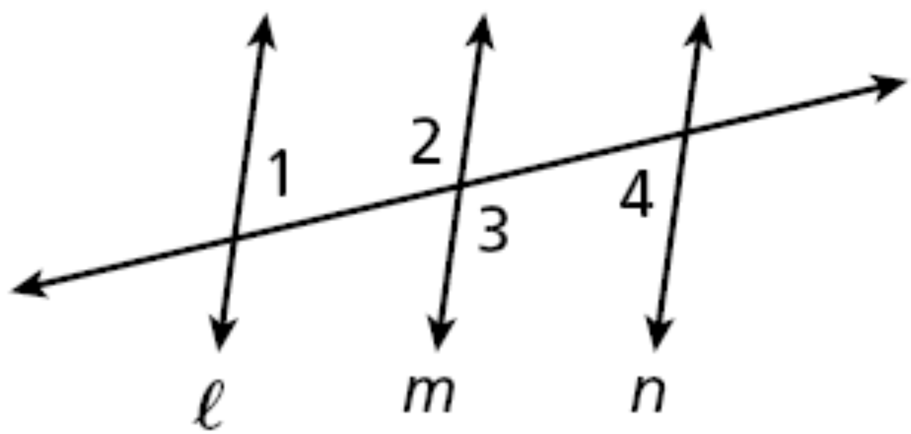
Example 3 Continued

Statements	Reasons
1. $p \parallel r$	**1.** Given
2. $\angle 3 \cong \angle 2$	**2.** Alt. Ext. ∠s Thm.
3. $\angle 1 \cong \angle 3$	**3.** Given
4. $\angle 1 \cong \angle 2$	**4.** Trans. Prop. of ≅
5. $\ell \parallel m$	**5.** Conv. of Corr. ∠s Post.

Check It Out! Example 3

Given: $\angle 1 \cong \angle 4$, $\angle 3$ and $\angle 4$ are supplementary.

Prove: $\ell \parallel m$

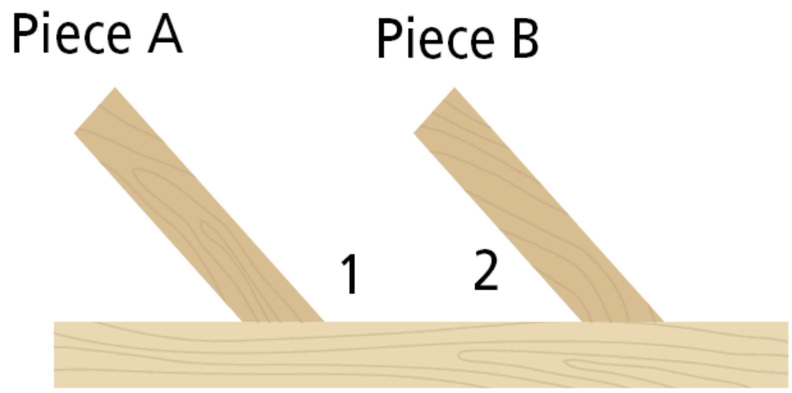


Check It Out! Example 3 Continued

Statements	Reasons
1. ∠1 ≅ ∠4	**1.** Given
2. m∠1 = m∠4	**2.** Def. ≅ ∠s
3. ∠3 and ∠4 are supp.	**3.** Given
4. m∠3 + m∠4 = 180°	**4.** Trans. Prop. of ≅
5. m∠3 + m∠1 = 180°	**5.** Substitution
6. m∠2 = m∠3	**6.** Vert.∠s Thm.
7. m∠2 + m∠1 = 180°	**7.** Substitution
8. ℓ || *m*	**8.** Conv. of Same-Side Interior ∠s Post.

Example 4: Carpentry Application

A carpenter is creating a woodwork pattern and wants two long pieces to be parallel. m∠1= (8x + 20)° and m∠2 = (2x + 10)°. If x = 15, show that pieces A and B are parallel.



∠1 and ∠2 are same-side interior angles. If ∠1 and ∠2 are supplementary, then pieces A and B are parallel.

Example 4 Continued

$m\angle 1 = 8x + 20$

$= 8(15) + 20 = 140$ *Substitute 15 for x.*

$m\angle 2 = 2x + 10$

$= 2(15) + 10 = 40$ *Substitute 15 for x.*

$m\angle 1 + m\angle 2 = 140 + 40$

$= 180$

∠1 and ∠2 are supplementary.

The same-side interior angles are supplementary, so pieces A and B are parallel by the Converse of the Same-Side Interior Angles Theorem.