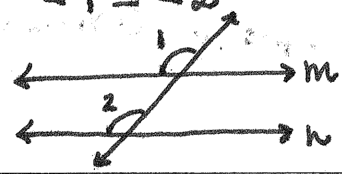
Honors Geometry Name KEY

Section 3.3 Proving Lines Parallel Date ______________ Period ______

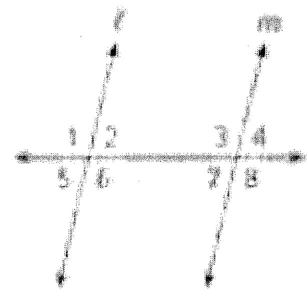
ecall that the converse of a theorem is found by exchanging the hypothesis and conclusion.
The converse of a theorem is not automatically true.
If it is true, it must be stated as a postulate or proved as a separate theorem.

I. CONVERSE OF THE CORRESPONDING ANGLES POSTULATE

Postulate	Hypothesis	Conclusion
If two coplanar lines are cut by a transversal so that a pair of corresponding angles are congruent, then the two lines are parallel.	$\angle 1 \cong \angle 2$ 	$m \parallel n$

Example #1:

Use the Converse of the Corresponding Angles Postulate and the given information to show that $l \parallel m$.



A. $\angle 1 \cong \angle 3$ So, by the Converse of the Corr. ∠s Post, $l \parallel m$

B. $m\angle 4 = m\angle 2$

$\angle 4 \cong \angle 2$ (Def. of Cong ang) So, by the converse of the corr. ∠s Post, $l \parallel m$

C. $m\angle 7 = (4x+25)°$, $m\angle 5 = (5x+12)°$ and $x = 13$.

$m\angle 7 = 4(13)+25$ $m\angle 5 = 5(13)+12$

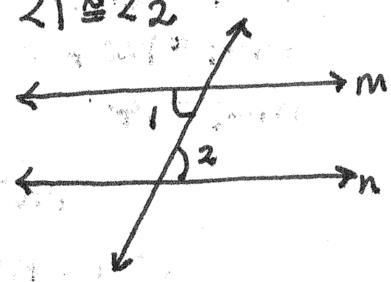
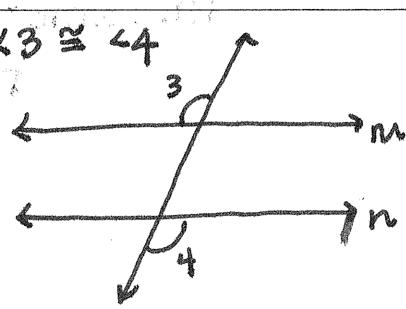
$m\angle 7 = 77°$ $m\angle 5 = 77°$

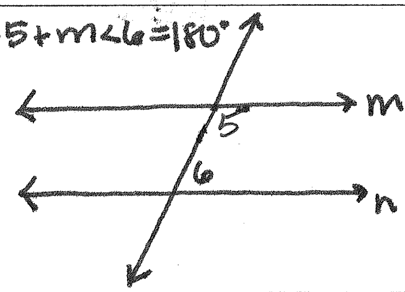
$m\angle 5 = m\angle 7$

$\angle 5 \cong \angle 7$

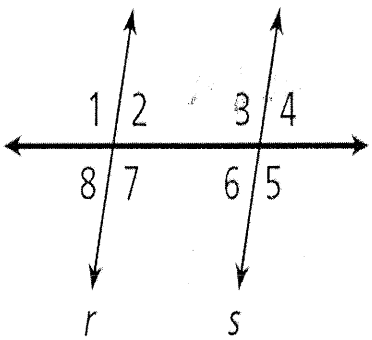
So, by the Converse of the Corresp. ∠s Post, $l \parallel m$.

II. PROVING LINES PARALLEL

Theorem	Hypothesis	Conclusion
Converse of the Alternate Interior Angles Theorem If two coplanar lines are cut by a transversal so that a pair of alternate interior angles are congruent, then the two lines are parallel.	$\angle 1 \cong \angle 2$ 	$m \parallel n$
Converse of the Alternate Exterior Angles Theorem If two coplanar lines are cut by a transversal so that a pair of alternate exterior angles are congruent, then the two lines are parallel.	$\angle 3 \cong \angle 4$ 	$m \parallel n$

Converse of the Same-Side Interior Angles Theorem If two coplanar lines are cut by a transversal so that a pair of same-side interior angles are supplementary, then the two lines are parallel.	$m\angle 5 + m\angle 6 = 180°$ 	$m \parallel n$

Example #2: Use the given information and the theorems you have learned to show that $r \parallel s$.



A. $m\angle 4 = m\angle 8$

$\angle 4 \cong \angle 8$; so, by the Converse of the alt. ext ∠s Thm, $r \parallel s$.

B. $m\angle 2 = (10x + 8)°, m\angle 3 = (25x - 3)°, x = 5$

$m\angle 2 + m\angle 3 \stackrel{?}{=} 180°$

$10x + 8 + 25x - 3 \stackrel{?}{=} 180$

$50 + 8 + 125 - 3 \stackrel{?}{=} 180$

$58 + 122 \stackrel{?}{=} 180$

$180 \stackrel{\checkmark}{=} 180$ ✓

OR

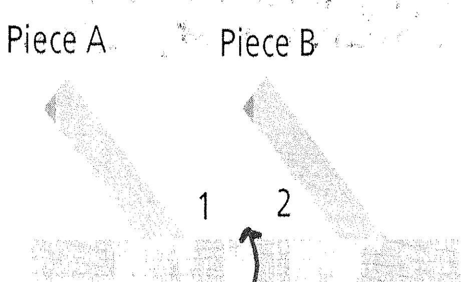
$m\angle 2 = 10(5) + 8 = 58°$

$m\angle 3 = 25(5) - 3 = 122°$

$180°$ ✓

So, by the converse of the same-side int. Thm, $r \parallel s$.

Example #3: A carpenter is creating a woodwork pattern and wants two long pieces to be parallel. $m\angle 1 = (8x + 20)°$ and $m\angle 2 = (2x + 10)°$. If $x = 15$, show that pieces A and B are parallel.



same side int ∠s

$m\angle 1 + m\angle 2 = 180°$

$m\angle 1 = (8x + 20)°$

$m\angle 1 = 8(15) + 20$

$m\angle 1 = 120 + 20$

$m\angle 1 = 140°$

$m\angle 2 = (2x + 10)°$

$m\angle 2 = 2(15) + 10$

$m\angle 2 = 30 + 10$

$m\angle 2 = 40°$

$140° + 40° = 180°$ ✓

So, by the Converse of the same-side int. ∠s Thm, Piece A // Piece B.