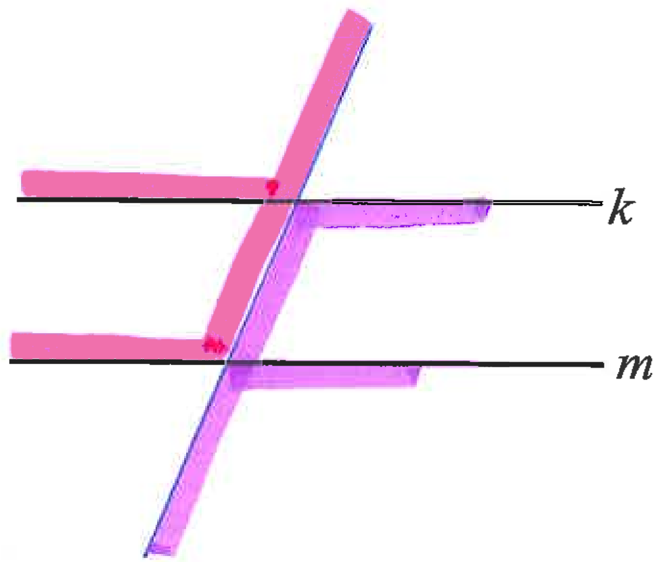
Geometry R – Mrs. Cowen
Unit 4 – Day 1 Notes

Name:____________________
Date: ____________

Parallel Lines Cut By A Transversal

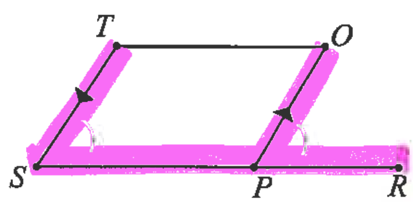
Corresponding Angles:

form a "F"



Postulate: If 2 lines are parallel then the **Corresponding** angles are congruent.

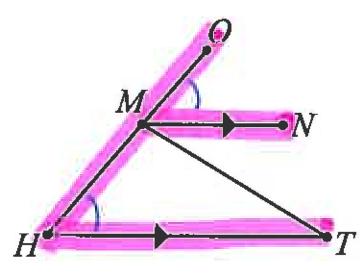
1. Name the congruent **Corresponding Angles**



* find the "F"

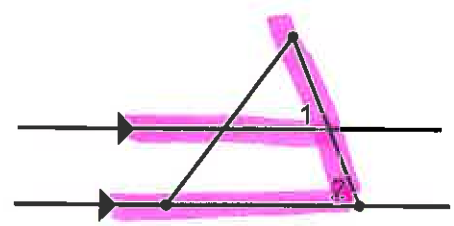
Angles: ∠TSP and ∠OPR

2. Name the congruent **Corresponding Angles**



Angles: ∠OMN and ∠MHT

3. Solve for x:
   m<1 = 45, m<2 = 5x+10



$m\angle 1 = m\angle 2$

$45 = 5x + 10$

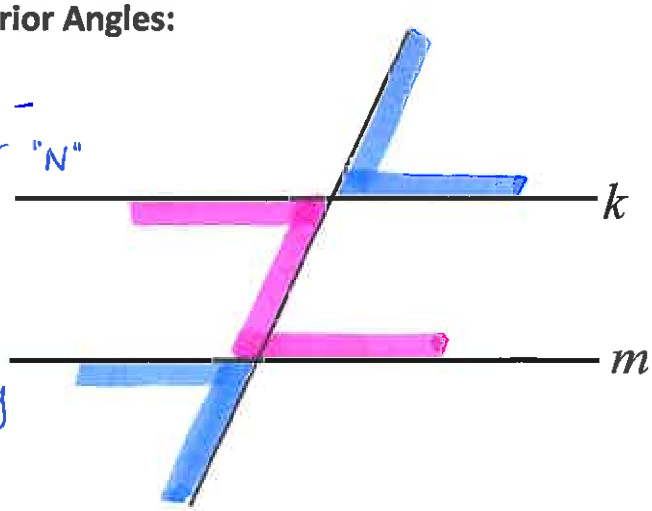
$-10 \quad -10$

$35 = 5x$

$7 = x$

Alternate Interior/Exterior Angles:

Alternate Interior $\angle s$ – form a "Z" or "N"

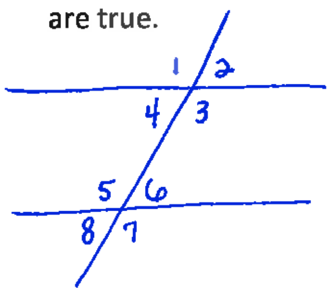


Alternate Exterior $\angle s$ form no letters, they are <u>outside</u> the parallel lines

Theorem: If 2 lines are parallel, then the **Alternate Interior** angles are congruent.

Theorem: If 2 lines are parallel, then the **Alternate Exterior** angles are congruent.

1. Explain how corresponding angles can be used to verify that the Alternate Interior/Exterior angle theorems are true.

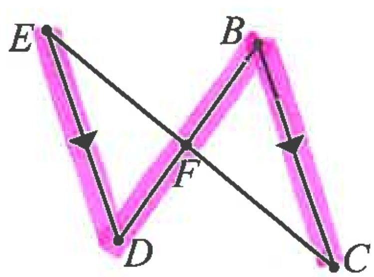


$\angle 1 \cong \angle 3$ since vertical $\angle s$ are $\cong$

$\angle 1 \cong \angle 5$ since corresponding $\angle s$ are $\cong$

by transitive $\angle 3 \cong \angle 5$.

2. Name the congruent **Alternate interior Angles**

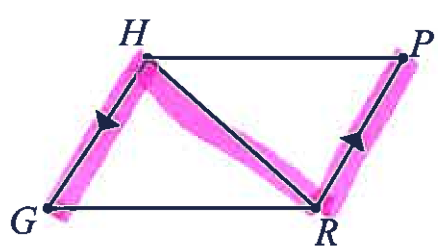


Angles: $\angle D \cong \angle B$

or

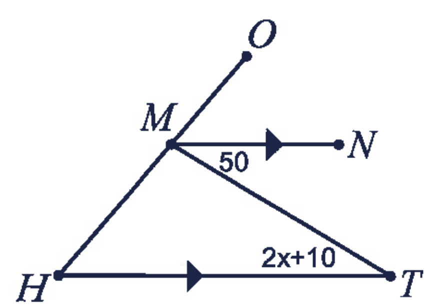
$\angle E \cong \angle C$

3. Name the congruent **Alternate Interior Angles**



Angles: $\angle GHR \cong \angle PRH$

4. Solve for x.



$50 = 2x + 10$

$-10 \quad -10$

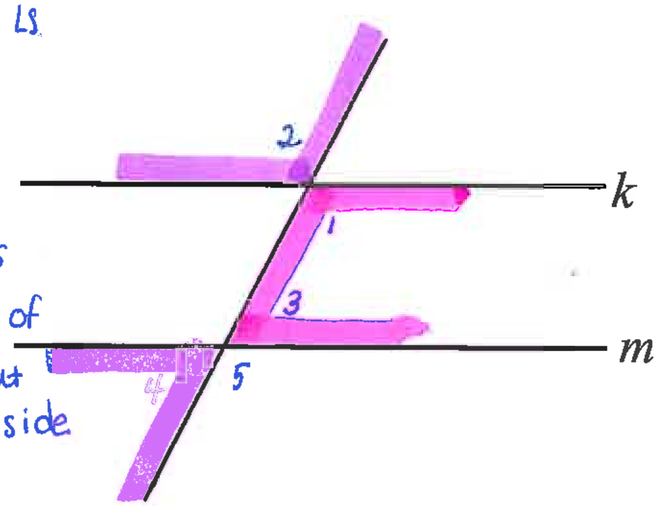
$40 = 2x$

$20 = x$

Same Side Interior/Exterior Angles:

same side interior ∠s
- form a "C"

same side exterior ∠s
- on the outside of the // lines but on the same side



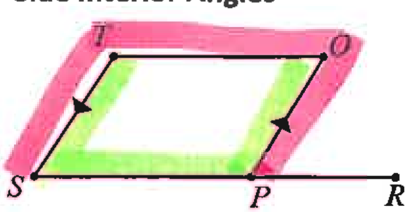
Theorem: If 2 lines are parallel, the **Same Side Interior** angles are supplementary.
$m\angle 1 + m\angle 3 = 180$

Theorem: If 2 lines are parallel, the **Same Side Exterior** angles are supplementary.
$m\angle 2 + m\angle 4 = 180$

1. Explain how corresponding angles can be used to verify that the Same Side Interior/Exterior angle theorems are true.

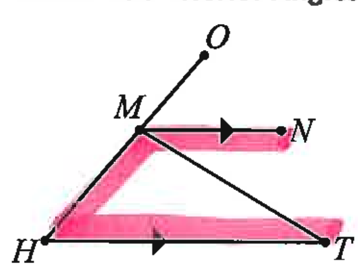
$m\angle 3 + m\angle 5 = 180$ so $\angle 3$ supp to $\angle 5$, since 2 adjacent angles formed by intersecting lines are supplementary. $\angle 1 \cong \angle 5$ because corresponding angles are congruent when formed by parallel lines. By substitution $m\angle 3 + m\angle 1 = 180$ so $\angle 3$ is supp to $\angle 1$.

2. Name the supplementary **Same Side Interior Angles**



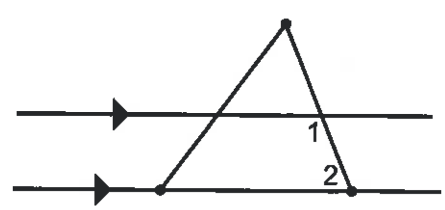
Angles: ∠S supp to ∠OPS
∠T supp ∠O

3. Name the supplementary **Same Side Interior Angles**



Angles: ∠H supp ∠HMN

4. **Solve for x:**
m<1 = 2x+90, m<2 = 3x+10



$2x + 90 + 3x + 10 = 180$
$5x + 100 = 180$
$-100 \quad -100$
$5x = 80$
$x = 16$

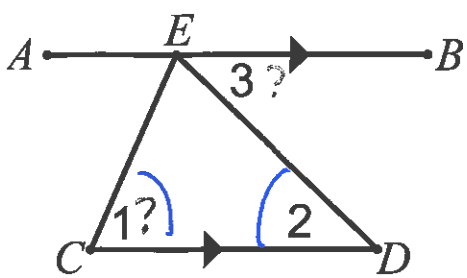
Parallel Line Proofs:

Example:

Given: $\overline{AB} // \overline{CD}$

$\angle 1 \cong \angle 2$

Prove: $\angle 1 \cong \angle 3$



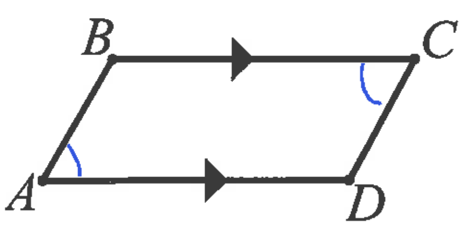
① $\overline{AB} // \overline{CD}$ $\angle 1 \cong \angle 2$	① Given
② $\angle 2 \cong \angle 3$	② If 2 // lines are cut by a trans, the alt int $\angle$s are $\cong$
③ $\angle 1 \cong \angle 3$	③ Transitive

Example: A Paragraph Proof

Given: Parallelogram ABCD

$\angle A \cong \angle C$

Prove: $\angle B \cong \angle D$



We are given ABCD is a parallelogram and $\angle A \cong \angle C$. Since ABCD is a parallelogram we know $\overline{BC} // \overline{AD}$ because parallelograms have opposite sides parallel. Since $\overline{BC} // \overline{AD}$, $\angle A$ supp $\angle B$ and $\angle C$ supp $\angle D$ since if 2 parallel lines are cut by a transversal same side interior $\angle$s are supplementary. We can now conclude $\angle B \cong \angle D$ because $\cong$ angles have $\cong$ supplements.