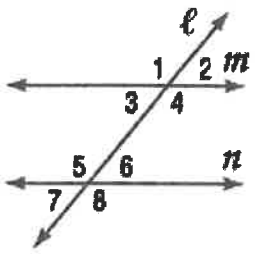
Geometry CP
3.5 Proving Lines Parallel

Recall Theorems from last class.

Corresponding Angles Postulate
Alternate Interior Angles Thm
Alt Exterior Angles Theorem
Consecutive Int Angles Theorem
Consecutive Ext Angles Theorem



What do you notice?

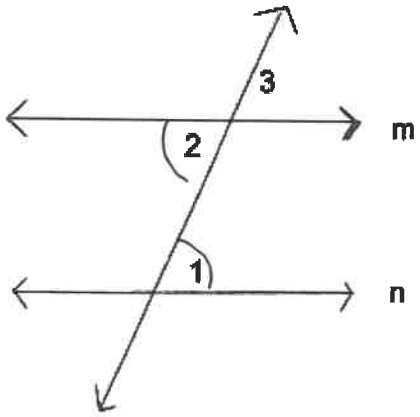
What information do you need?

What do you wonder?

* need arrow on line to show parallel

Converse of corresponding angles Postulate:

If corresponding angles are congruent, then the lines are parallel

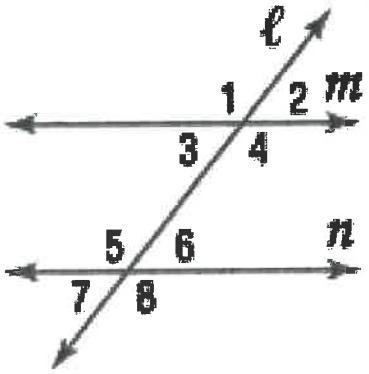


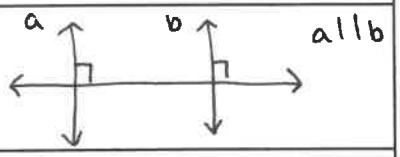
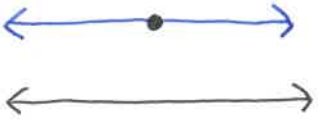
Given: $\angle 1 \cong \angle 2$

Prove: $m \| n$

Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. Given
2. $\angle 2 \cong \angle 3$	2. Vertical Angles Thm
3. $\angle 1 \cong \angle 3$	3. Transitive Prop of congruent angles
4. $m \| n$	4. converse of corresponding angles postulate

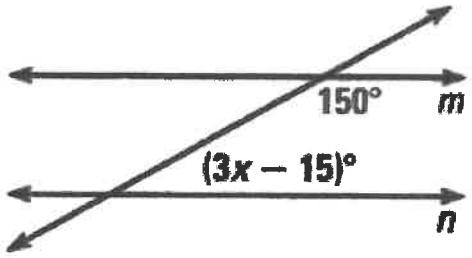
Objectives:
The student will be able to apply theorems to prove lines are parallel.
The student will be able to apply theorems to solve equations and angle measures.



Converse of Corresponding Angles Postulate	If two lines are cut by a transversal so that corresponding angles are congruent, then the lines are parallel	If $\angle 1 \cong \angle 5$, $\angle 2 \cong \angle 6$, $\angle 3 \cong \angle 7$, or $\angle 4 \cong \angle 8$, then $m \parallel n$.
Alternate Exterior Angles **Converse**	If two lines in a plane are cut by a transversal so that a pair of alternate exterior angles is congruent, then the two lines are parallel	If, $<7 \cong <2$ then $m \parallel n$
Consecutive Interior Angles **Converse**	If two lines in a plane are cut by a transversal so that a pair of consecutive interior angles is supplementary, then the lines are parallel.	If <6 and <4 are supplementary, then $m \parallel n$
Alternate Interior Angles **Converse**	If two lines in a plane are cut by a transversal so that a pair of alternate interior angles is congruent, then the lines are parallel	If $<5 \cong <4$ then $m \parallel n$
Perpendicular transversal **Converse**	In a plane, if two lines are perpendicular to the same line,then they are parallel.	
Parallel Postulate	If given a line and a point not on the line, then there exists exactly one line through the point that is parallel to the given line.	

Examples:

1. Find the value of x so that $m \| n$



con int

$3x - 15 + 150 = 180$

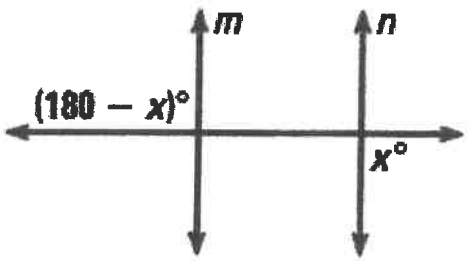
$3x + 135 = 180$

$-135 \quad -135$

$3x = 45$

$x = 15$

2. Find the value of x so that $m \| n$



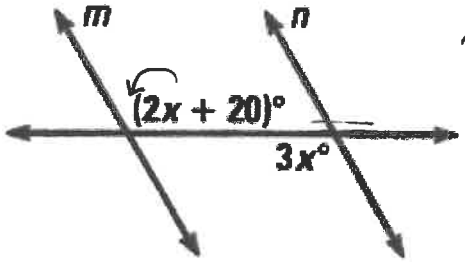
Alt Ext $\cong$ if $\| $ lines

$180 - x = x$

$180 = 2x$

$90 = x$

3. Find the value of x so that $m \| n$



Alt Int

$2x + 20 = 3x$

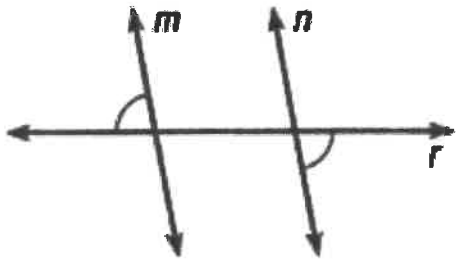
$20 = x$

Conclusion → parallel lines ⇒ Converse

Conclusion → ≅ or supp angles ⇒ Conditional

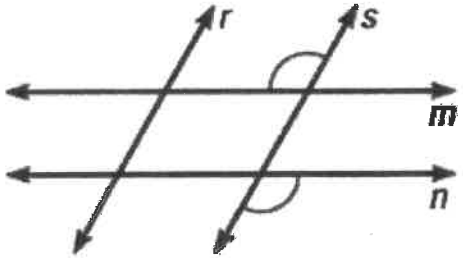
4. Is there enough information to prove $m \| n$? If so state the theorem or postulate that you would use.

a.



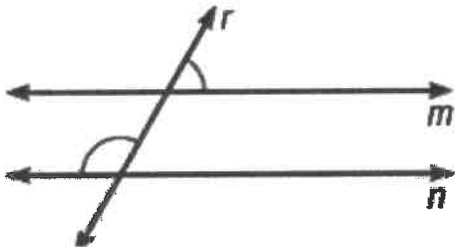
Alternate Exterior Angle Converse

c.



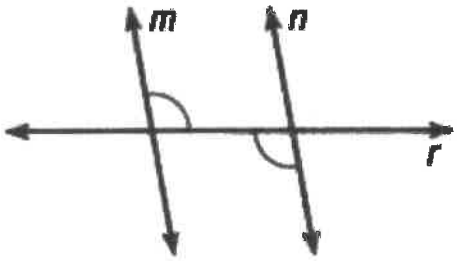
Alternate Exterior Angles Converse

b.



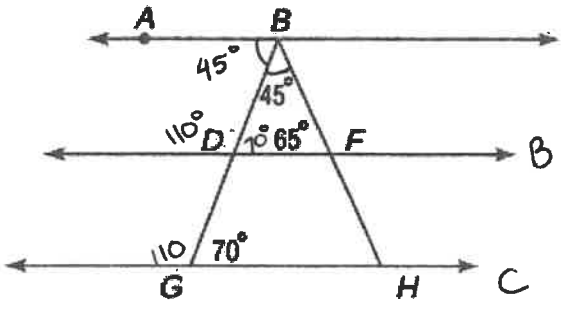
not enough info

d.



Alternate Interior Angle Converse

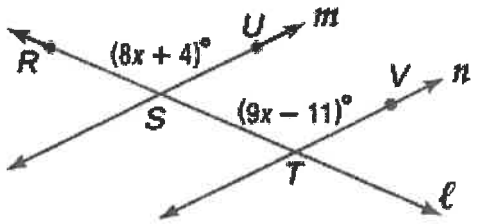
5. In the figure $\overline{BG}$ bisects $\angle ABH$ Determine which lines if any are parallel.



A ∦ B b/c consecutive interior angles are not supplementary

B ∥ C b/c converse of corresponding angle postulate

6. Find x so that $m \| n$

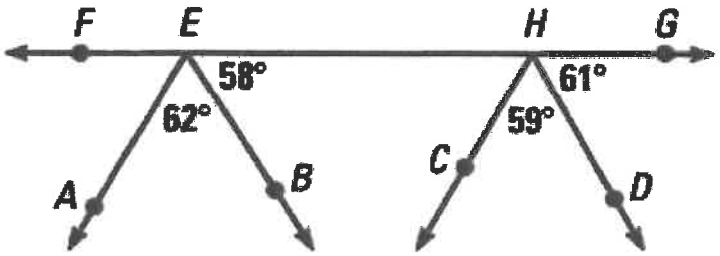


$8x + 4 = 9x - 11$

$4 = x - 11$

$15 = x$

7. Is $\overrightarrow{EB} \| \overrightarrow{HD}$?



not parallel

b/c corresponding angles are not congruent