

Unit 11: Theorems with Lines  
Guided Notes

KEY

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Name

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Period

**\*\*If found, please return to Mrs. Brandley's room, M-8.\*\***

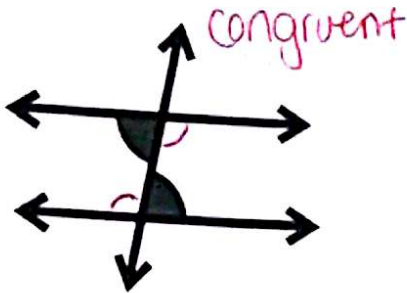
### Concept 1: Lines and Transversals

Parallel lines: lines that are the same distance apart and never touch.

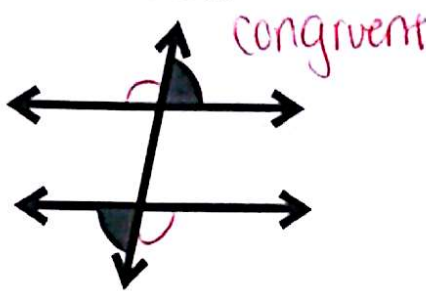
Congruent Angles: angles with the same degree measure.

Supplementary Angles: 2 angles that add to  $180^\circ$ .

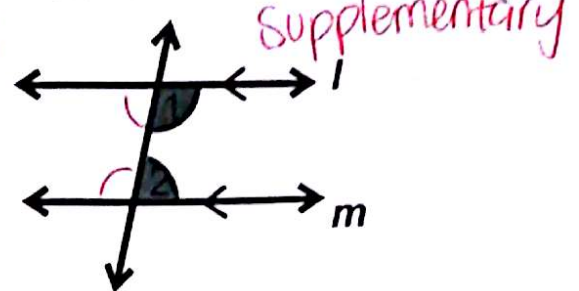
Alternate Interior



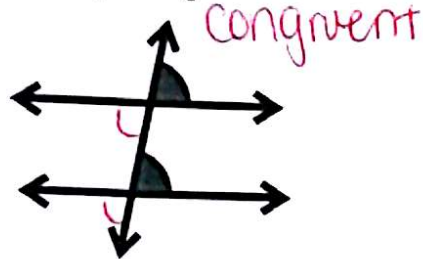
Alternate Exterior



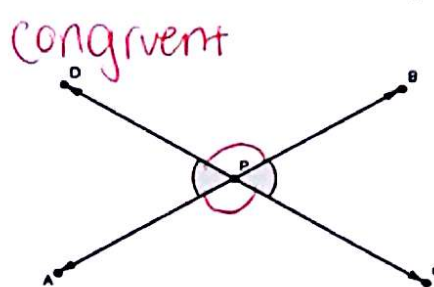
Consecutive Interior



Corresponding

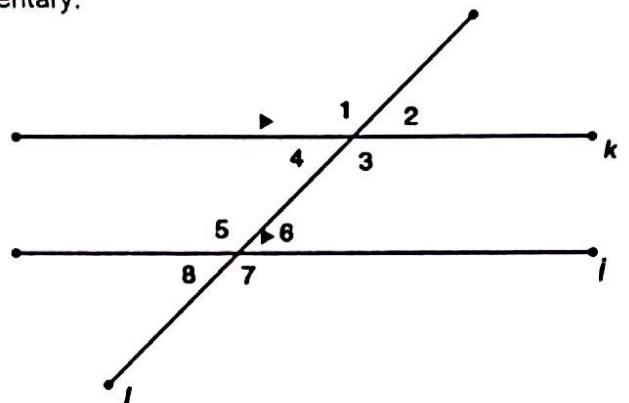


Vertical



Identify each pair of angles as alternate interior, alternate exterior, consecutive interior, corresponding or vertical. In each case, state if they are congruent or supplementary.

1.  $\angle 3$  and  $\angle 7$  corresponding - C
2.  $\angle 1$  and  $\angle 5$  corresponding - C
3.  $\angle 2$  and  $\angle 6$  corresponding - C
4.  $\angle 2$  and  $\angle 4$  vertical - C
5.  $\angle 1$  and  $\angle 3$  vertical - C
6.  $\angle 3$  and  $\angle 5$  alternate interior - C
7.  $\angle 4$  and  $\angle 6$  alternate interior - C
8.  $\angle 4$  and  $\angle 8$  corresponding - C



Parallelogram: A quadrilateral (4-sided shape) where opposite sides are parallel and congruent and opposite angles are congruent.

Opposite sides are parallel and congruent.

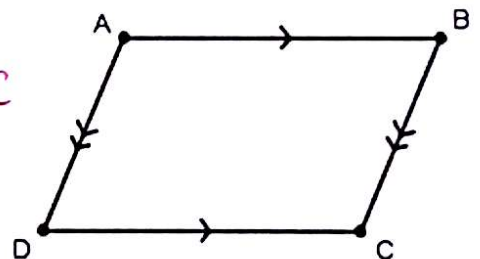
$$AD \parallel BC \quad AD \cong BC \quad AB \parallel DC \quad AB \cong DC$$

Opposite angles are congruent.

$$m\angle A = m\angle C \quad m\angle B = m\angle D$$

Consecutive angles are supplementary.

$$\angle A \neq \angle B, \angle B \neq \angle C, \angle C \neq \angle D, \angle D \neq \angle A$$



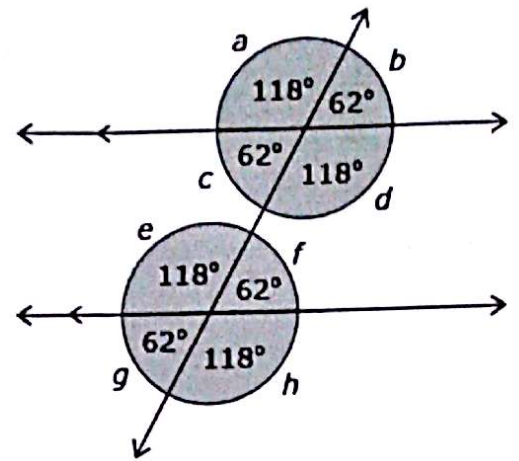
## Concept 2: Using Theorems of Lines and Transversals

Note: If any of the following are true, the two lines must be parallel:

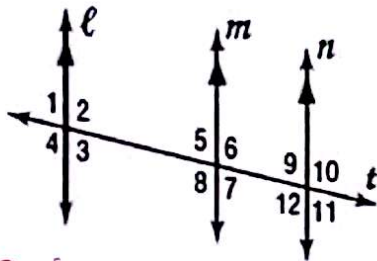
- 1) The alternate interior angles are congruent
- 2) The alternate exterior angles are congruent
- 3) The consecutive interior angles are supplementary.
- 4) The corresponding angles are congruent.
- 5) The vertical angles are congruent.

Based on the above, list 5 ways you could show the two lines in the figure on the right are parallel.

1.  $\angle C \cong \angle F$
2.  $\angle A \cong \angle H$
3.  $m\angle d + m\angle f = 180^\circ$
4.  $\angle B \cong \angle F$
5.  $\angle a \cong \angle d$



Given: In the figure below,  $\angle 1 = 90^\circ$ . Find the measure of each angle and give a justification.



$m\angle 1 = 90^\circ$  because it was given.

$m\angle 2 = 100^\circ$  because  $\angle 1$  &  $\angle 2$  are supplementary and  $100 + 80 = 180$

$m\angle 3 = 80^\circ$  because  $\angle 1$  &  $\angle 3$  are vertical angles.

$m\angle 4 = 100^\circ$  because  $\angle 2$  &  $\angle 4$  are vertical angles.

$m\angle 5 = 90^\circ$  because  $\angle 3$  &  $\angle 5$  are alternate interior angles.

$m\angle 6 = 100^\circ$  because  $\angle 2$  &  $\angle 6$  are corresponding angles.

$p$ : hypothesis  $q$ : conclusion

### Concept 3: Logic Statements

Example 1: I get good grades when I do my homework.

$P$ : I do my homework

$Q$ : I get good grades

Conditional Statement: IF I do my homework then I get good grades.

Converse: IF I get good grades then I do my homework.

Inverse: IF I don't do my homework then I don't get good grades.

Contrapositive: IF I don't get good grades then I don't do my homework

Conditional Statement	$p \rightarrow q$	If $p$ , then $q$
Converse	$q \rightarrow p$	If $q$ , then $p$
Inverse	$\neg p \rightarrow \neg q$	If not $p$ , then not $q$
Contrapositive	$\neg q \rightarrow \neg p$	If not $q$ , then not $p$

Example 2: Snakes are reptiles.

$P$ : It's a snake

$Q$ : It's a reptile

Conditional Statement: IF it's a snake then it's a reptile.

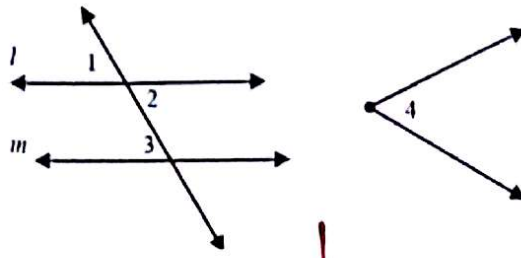
Converse: IF it's a reptile then it's a snake.

Inverse: IF it's not a snake then it's not a reptile.

Contrapositive: IF it's not a reptile then it's not a snake.

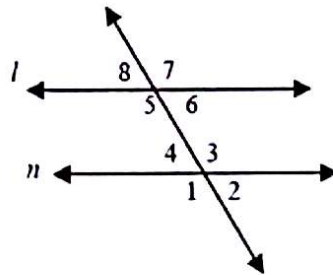
**Concept 4: Proofs with Parallel Lines**

1. Given:  $l \parallel m$ ;  $\angle 2 \cong \angle 4$   
 Prove:  $\angle 4 \cong \angle 3$



Statement	Reason
$l \parallel m$ ; $\angle 2 \cong \angle 4$	given
$\angle 2 \cong \angle 3$	$\angle 2$ & $\angle 3$ are alternate interior angles.

5. Given:  $l \parallel n$   
 Prove:  $m\angle 3 + m\angle 6 = 180^\circ$



I know  $l \parallel n$ .  $\angle 3$  &  $\angle 6$  are consecutive interior angles. Consecutive interior angles are supplementary. Supplementary angles add to  $180^\circ$ . Thus,  $m\angle 3 + m\angle 6 = 180^\circ$ .