

Module 8b: Angle Pair Relationships

Math Practice(s):

- Construct viable arguments & critique the reasoning of others.
- Model with mathematics.

Learning Target(s):

- If two parallel lines are cut by a transversal, then
 - + corresponding angles are congruent
 - + alternate interior angles are congruent
 - + alternate exterior angles are congruent

Homework:

HW#13: 8b ws

In the diagram, $\overline{KL} \parallel \overline{GH}$.

Corresponding Angles (#VOC):

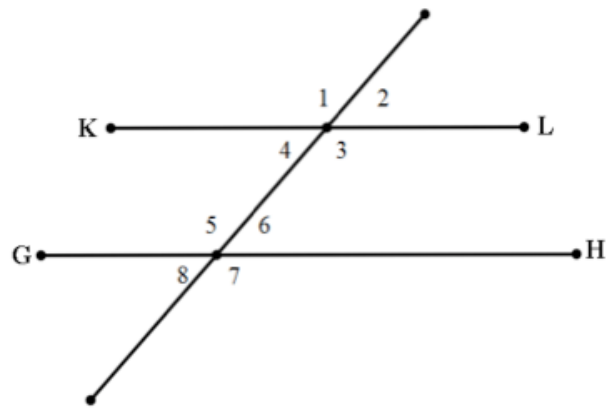
➤ Each angle along \overline{KL} **corresponds** to one of the angles along \overline{GH} .

$$\angle 1 \rightarrow \angle 5$$

$$\angle 4 \rightarrow \angle 8$$

$$\angle 3 \rightarrow \angle 7$$

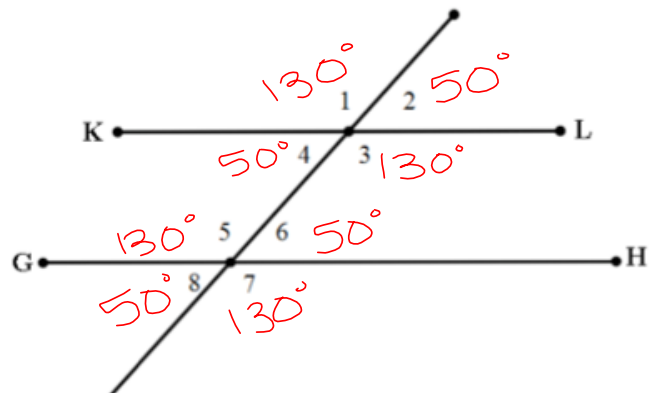
$$\angle 2 \rightarrow \angle 6$$



Investigation

In the diagram, $\overline{KL} \parallel \overline{GH}$ and $m\angle 1 = 130^\circ$.

- A. Use the definition of “linear pair” to determine $m\angle 2$, $m\angle 3$, and $m\angle 4$. Write your answers in the diagram.



- B. Now that you know the $m\angle 4$, use what you know about same-side interior angles to determine $m\angle 5$. Write your answer in the diagram.

$\angle 4$ & $\angle 5$ are SSint \angle s

- C. Now that you know the $m\angle 5$, use what you know about “linear pairs” to determine $m\angle 6$, $m\angle 7$, and $m\angle 8$. Write your answers in the diagram.

- D. Now that all 8 angles measures are labeled in the diagram, what conclusion can you make about the measures of **corresponding angles**?

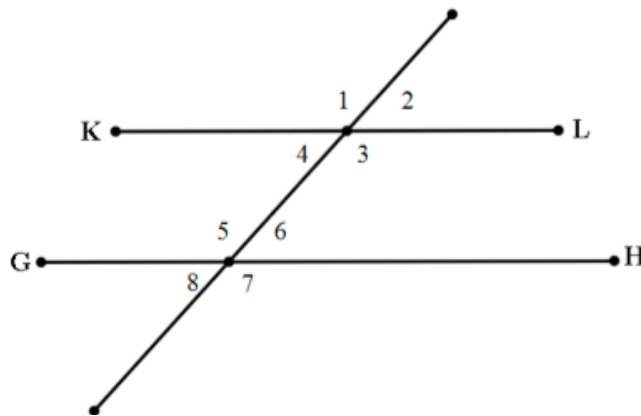
The measures of corresponding angles are equal.

(erase to show)

Corresponding Angles

When two *parallel lines* are cut by a *transversal*, the 2 angles on the same side of the transversal, where one angle is interior and the other angle is exterior are known as corresponding angles.

Corresponding angles are congruent.

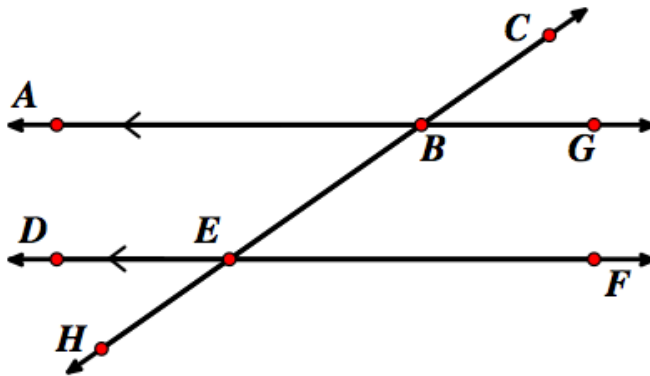


Referring to the corresponding angles named in the diagram above, complete the following table by listing the appropriate **congruence** statements and their related **angle measure equality** statements.

Congruence Statements	Angle Measure Equality Statements
$\angle 1 \cong \angle 5$	$m\angle 1 = m\angle 5$
$\angle 4 \cong \angle 8$	$m\angle 4 = m\angle 8$
$\angle 2 \cong \angle 6$	$m\angle 2 = m\angle 6$
$\angle 3 \cong \angle 7$	$m\angle 3 = m\angle 7$

Practice

For questions 3 – 7, refer to the following diagram.



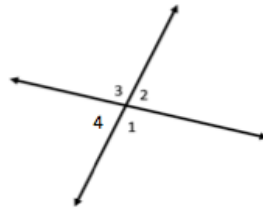
3. $\angle DEH \cong \angle ABE$ because they are corresponding angles.
4. $\angle EBG \cong \angle FEH$ because they are corresponding angles.
5. $m\angle ABC + m\angle ABE = 180^\circ$ because they form a linear pair.
6. $m\angle ABE + m\angle BED = 180^\circ$ because they are same-side interior angles.
7. If $m\angle DEH = 27^\circ$, determine the following:
 - A. $m\angle ABE = 27^\circ$
 - B. $m\angle DEB = 153^\circ$
 - C. $m\angle HEF = 153^\circ$
 - D. $m\angle GBE = 153^\circ$
 - E. $m\angle HED + m\angle ABC = 180^\circ$

(erase to show)

Vertical Angles Theorem

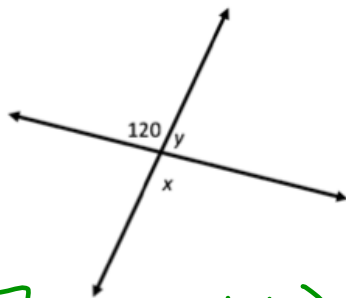
When two lines intersect at a point, the vertical angles are _____.

$\angle 1 \cong \angle 3$
 $\angle 2 \cong \angle 4$



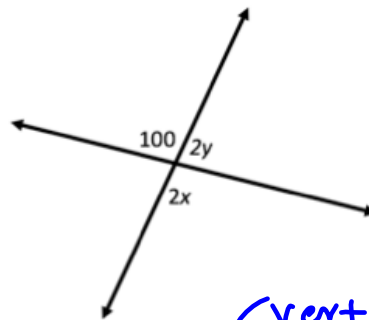
Example 1: Find the value of the variables.

A.



$x = 120^\circ$ (vertical \angle s)
 $120 + y = 180$ (linear pair)
 $y = 60^\circ$

B.

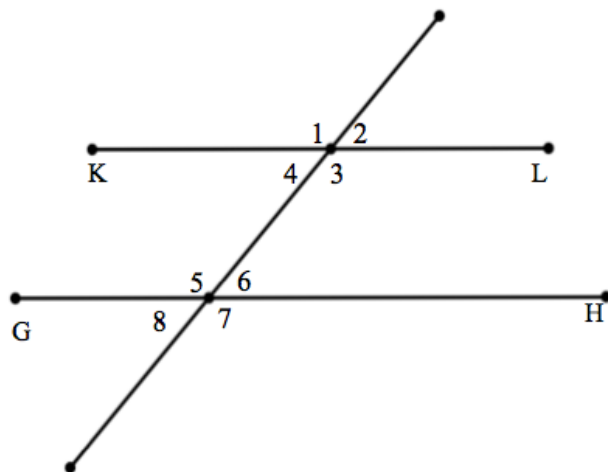


$100 = 2x$ (vert. \angle s)
 $x = 50$
 $2y + 2x = 180$ (linear pair)
 $2y + 100 = 180$
 $\quad -100 \quad -100$
 $2y = 80$
 $\quad \div 2 \quad \div 2$
 $y = 40$

Alternate-Interior/Exterior Angles.

In the diagram, $\overline{KL} \parallel \overline{GH}$,

Alternate-Interior Angles	Alternate-Exterior Angles
$\angle 4 \cong \angle 6$	$\angle 1 \cong \angle 7$
$\angle 5 \cong \angle 3$	$\angle 2 \cong \angle 8$



Practice

1. In the diagram shown below, $\overline{AD} \perp \overline{CF}$. Fill in the blanks to make each statement true.

A. $\angle 13$ and $\angle 10$ are vertical angles.

B. $\angle 11$ and $\angle 14$ are vertical angles.

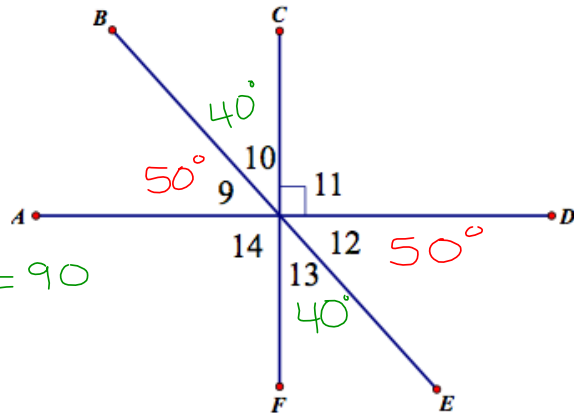
C. $\angle 9$ and $\angle 12$ are vertical angles.

D. If $m\angle 9 = 50^\circ$, then

$$m\angle 10 = 40^\circ \quad m\angle 9 + m\angle 10 = 90$$

$$m\angle 13 = 40^\circ$$

$$m\angle 12 = 50^\circ$$



2. In the diagram shown below, $k \parallel m$. Fill in the blanks to make each statement true.

A. $\angle 7$ and $\angle 3$ are corresponding angles.

B. $\angle 2$ and $\angle 7$ are alternate-exterior angles.

C. $\angle 6$ and $\angle 3$ are alternate-interior angles.

D. $\angle 4$ and $\angle 5$ are alternate-interior angles.

E. $\angle 4$ and $\angle 6$ are same-side interior angles.

F. $\angle 4$ and $\angle 8$ are corresponding angles.

G. $\angle 4$ and $\angle 1$ are vertical angles.

H. If $m\angle 1 = 123^\circ$, then $m\angle 8 = 123^\circ$. (alt ext. \angle s \cong)

