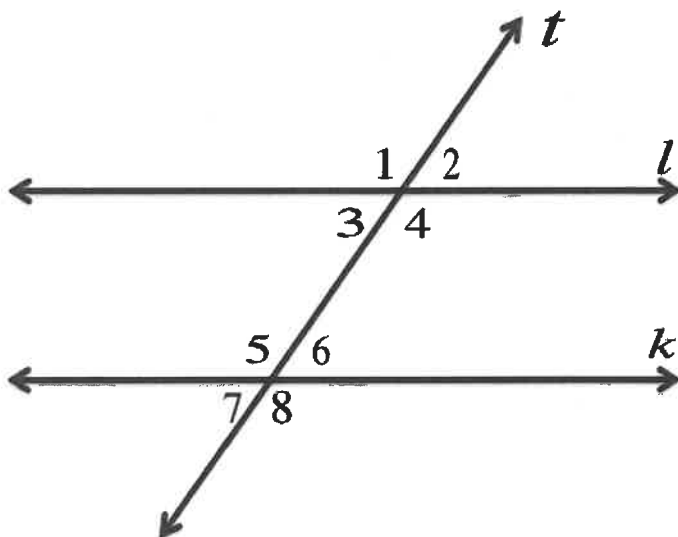


# Unit 2: Parallel Lines

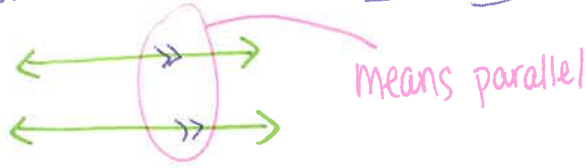
		<i>Initial Score</i>	<i>Updated Score</i>
1	I can identify the relationships between pairs of angles formed by lines of traversal.	<input type="text"/>	<input type="text"/>
2	I can use <i>parallel lines</i> to find angle measures.	<input type="text"/>	<input type="text"/>



# Vocabulary:

## Parallel Lines:

Coplanar lines that do not intersect



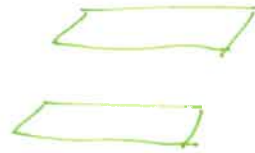
$\parallel$  means: parallel

$\nparallel$  means: NOT parallel

---

## Parallel Planes:

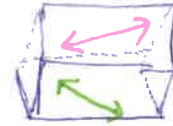
Planes that do not intersect



---

## Skew Lines:

Lines that do not intersect, are not parallel, and are not coplanar.



---

## EXAMPLES:

a) Identify all sets of parallel planes.

- plane DHC  $\parallel$  plane EAB
- plane DAE  $\parallel$  plane CBF
- plane ABC  $\parallel$  plane EFG

b) Name all segments that intersect BC

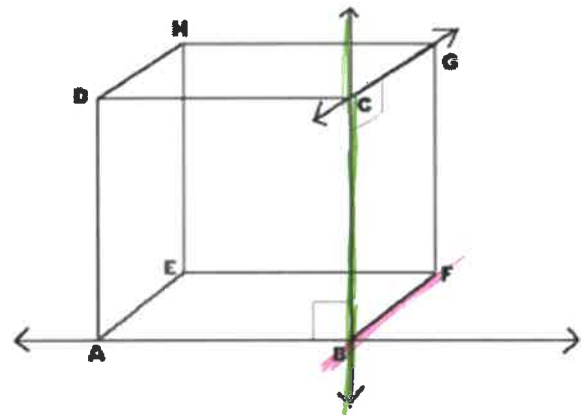
(or lines) \* must cross

$\overline{DC}$ ,  $\overleftrightarrow{GC}$ ,  $\overleftrightarrow{AB}$ ,  $\overline{BF}$

c) Name all segments that are skew to BF

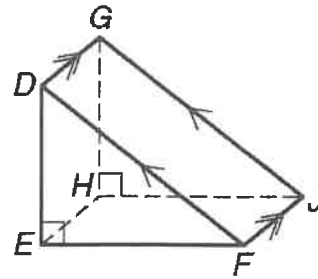
\* not parallel  
\* not intersect

$\overline{HE}$ ,  $\overline{HG}$ ,  $\overline{DC}$ ,  $\overline{DA}$



# Vocabulary Practice

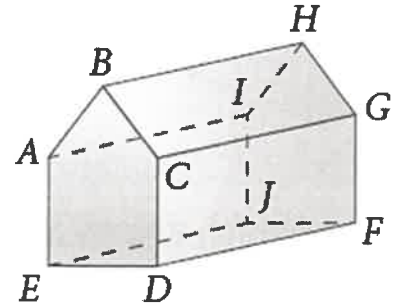
Use the figure for Exercises 1–6.  
Identify each of the following.



- |   |   |
|---|---|
| 1. a segment that is parallel to $\overline{DG}$<br><u><math>\overline{FJ}</math></u>   | 2. a segment that is perpendicular to $\overline{GH}$<br><u><math>\overline{HJ}</math></u>  |
| 3. a segment that is skew to $\overline{JF}$<br><u><math>\overline{HG}</math> or <math>\overline{DE}</math></u>               | 4. one pair of parallel planes<br><u>Plane DEF // Plane GHJ</u>   |
| 5. one pair of perpendicular segments, not including $\overline{GH}$<br><u><math>\overline{DE} \perp \overline{EF}</math></u> | 6. one pair of skew segments, not including $\overline{JF}$<br><u><math>\overline{DG}</math> skew to <math>\overline{EF}</math></u> |

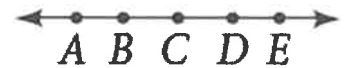
Describe the following statement as *true* or *false*. If *false*, explain.

- Plane AED  $\parallel$  plane FGH true
- Plane ABH  $\parallel$  plane CDF false
- $\overline{AB}$  and  $\overline{HG}$  are skew lines true
- $\overline{AE}$  and  $\overline{BC}$  are skew lines false
- $\overline{CG}$  and  $\overline{AI}$  are skew lines true
- $\overline{CF}$  and  $\overline{AJ}$  are skew lines false



**REVIEW:** Use the following diagram to answer questions 1-3.

- Which ray is opposite  $\overrightarrow{BC}$ ?  
a.  $\overrightarrow{BE}$       b.  $\overrightarrow{BD}$       c.  $\overrightarrow{BA}$       d.  $\overrightarrow{AB}$
- What is another name for  $\overrightarrow{CA}$ ?  
a.  $\overrightarrow{AC}$       b.  $\overrightarrow{CB}$       c.  $\overrightarrow{CE}$       d.  $\overrightarrow{DC}$
- Points A, B, C, D, and E are called  
a. Coplanar      b. Collinear      c. Bisected      d. Midpoint
- Which figure could be the intersection of two planes?  
a. Line      b. ray      c. point      d. segment

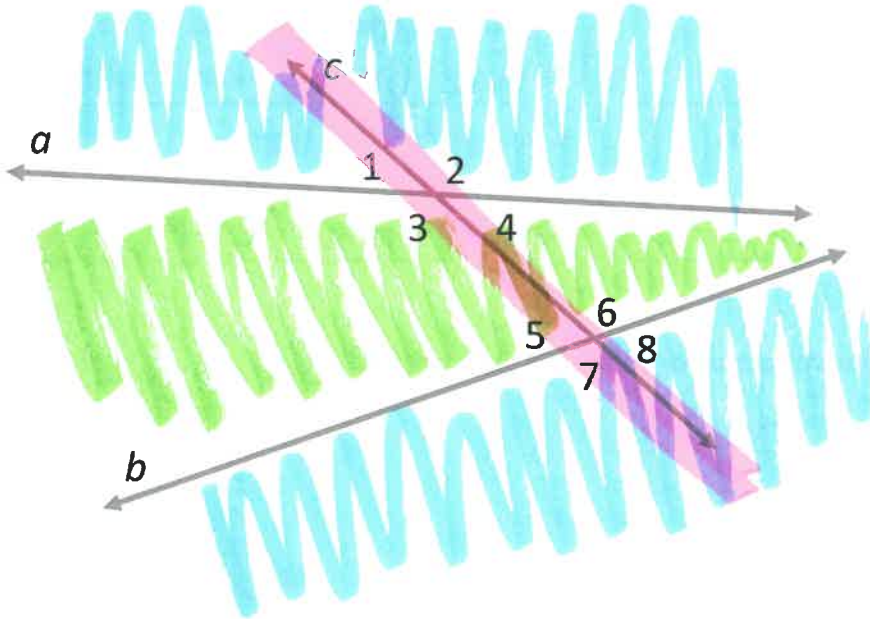


## Angle Relationships:

Transversal:

A line that cuts across two or more (usually parallel) lines.

Line  $c$  is a transversal to lines  $a$  and  $b$ .



- Which angles are in between lines  $a$  and  $b$ ?

$\angle 3, \angle 4, \angle 5, \angle 6$

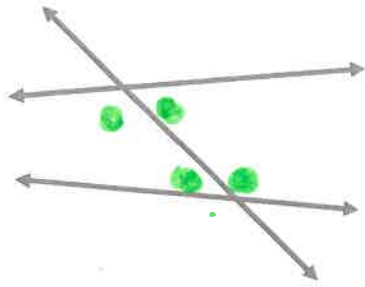
→ These are called INTERIOR ANGLES

- Which angles are not between lines  $a$  and  $b$ ?

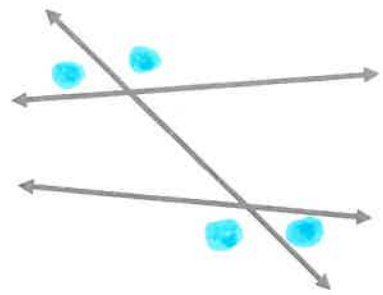
$\angle 1, \angle 2, \angle 7, \angle 8$

→ These are called EXTERIOR ANGLES

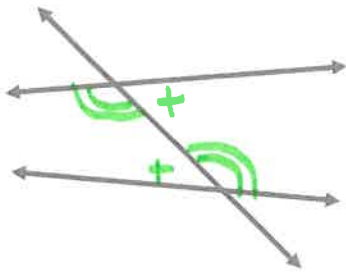
Interior Angles:



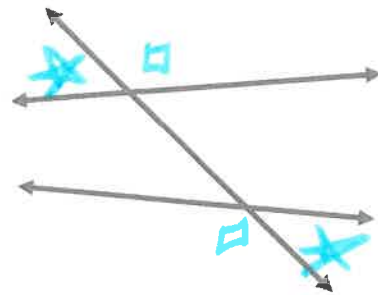
Exterior Angles:



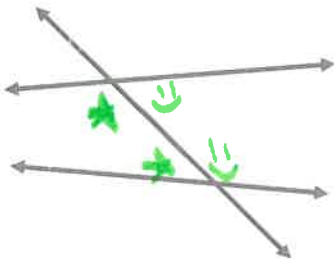
Alternate Interior Angles:



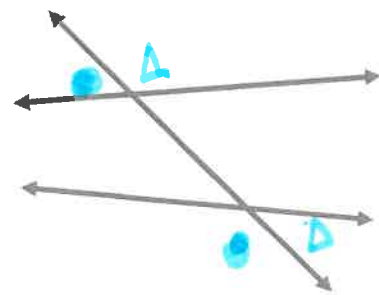
Alternate Exterior Angles:



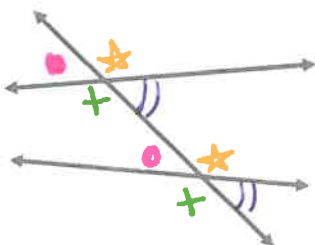
Consecutive (same-side) Interior Angles:



Consecutive (same-side) Exterior Angles:



Corresponding Angles:

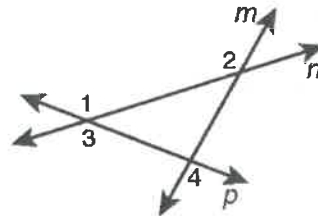


\* Same location of the intersection of lines

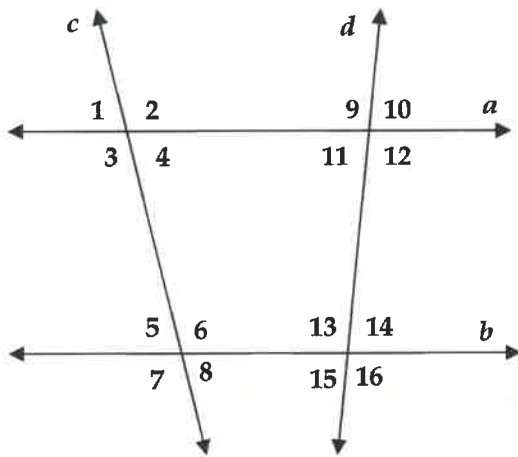
# Angle Relationship Practice:

Use the figure to identify the transversal for each angle pair

- 1 and 2 *n*
- 2 and 4 *m*
- 3 and 4 *p*



Name the transversal that form each pair of angles and then classify their location. (corresponding, alternate interior, alternate exterior, consecutive interior, consecutive exterior, none)



	Transversal	<i>Intersecting</i> Interesting Lines	Angle Location
4. $\angle 5$ and $\angle 14$	<u><i>b</i></u>	<u><i>c &amp; d</i></u>	<u><i>consecutive exterior</i></u>
5. $\angle 2$ and $\angle 11$	<u><i>a</i></u>	<u><i>c &amp; d</i></u>	<u><i>Alternate interior</i></u>
6. $\angle 10$ and $\angle 15$	<u><i>d</i></u>	<u><i>a &amp; b</i></u>	<u><i>Alternate exterior</i></u>
7. $\angle 6$ and $\angle 8$	<u><i>c</i></u>	<u><i>a &amp; b</i></u>	<u><i>none (linear pair)</i></u>
8. $\angle 3$ and $\angle 5$	<u><i>c</i></u>	<u><i>a &amp; b</i></u>	<u><i>consecutive interior</i></u>
9. $\angle 14$ and $\angle 13$	<u><i>b</i></u>	<u><i>c &amp; d</i></u>	<u><i>none (linear pair)</i></u>



# SPECIAL ANGLE PAIRS

- Alternate Interior
- Alternate Exterior
- Consecutive (same side) Interior
- Consecutive (same side) Exterior
- Corresponding

1)  $\angle 3$  and  $\angle 6$

Alternate Exterior

2)  $\angle 1$  and  $\angle 5$

Corresponding

3)  $\angle 4$  and  $\angle 8$

Consecutive Interior

4)  $\angle 1$  and  $\angle 2$

Linear Pair

5)  $\angle 4$  and  $\angle 5$

Alternate Interior

6)  $\angle 1$  and  $\angle 7$

Alternate Exterior

7)  $\angle 2$  and  $\angle 8$

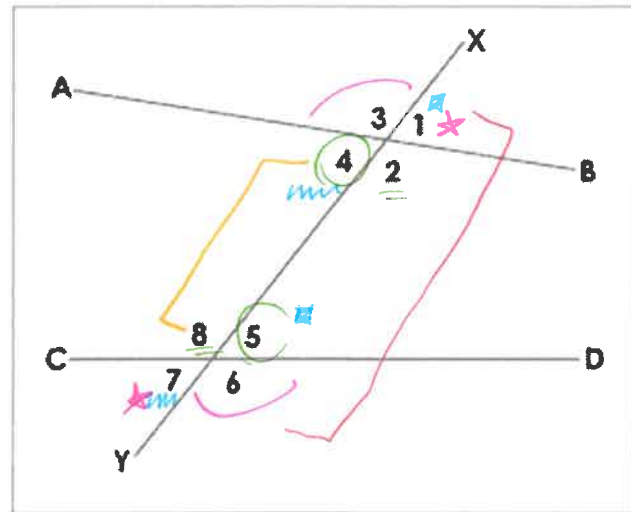
Alternate Interior

8)  $\angle 1$  and  $\angle 6$









Consecutive Exterior

9)  $\angle 4$  and  $\angle 7$

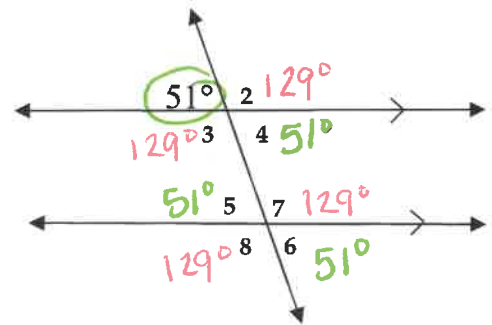
Corresponding



# Calculating with Special Angle Pairs:

Congruent ( $\cong$ )	Supplementary (= 180)
Alternate Interior 	Consecutive Interior 
Alternate Exterior 	Consecutive Exterior 
Corresponding 	Linear Pair 
Vertical 	

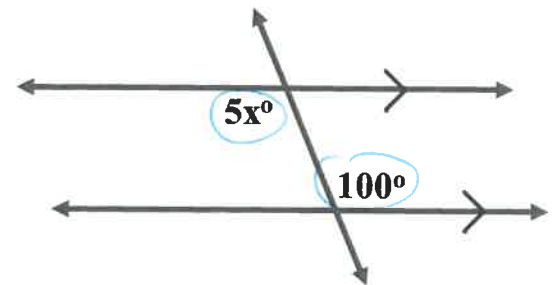
Ex 1) Fill in the measure of each angle.



Ex 2) Find the value of x in the image below:

$$\frac{5x}{5} = \frac{100}{5} \quad (\text{alternate interior angles congruent})$$

$$x = 20$$



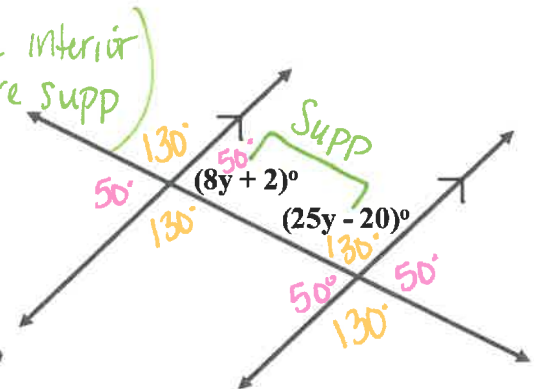
Ex 3) Find the measure of each angle in the image below:

$$(8y + 2) + (25y - 20) = 180 \quad (\text{consecutive interior angles are supp})$$

$$33y - 18 = 180$$

$$\frac{33y}{33} = \frac{198}{33}$$

$$y = 6 \quad \text{plug back in to angles}$$



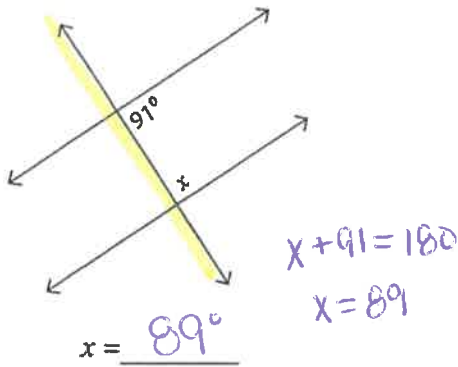


# Calculating Day 1 Practice:

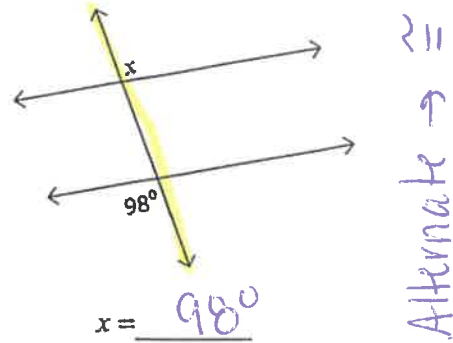
## Alternate & Same Side Angles

Find the value of  $x$ .

1) Same Side  $\rightarrow$  Supp

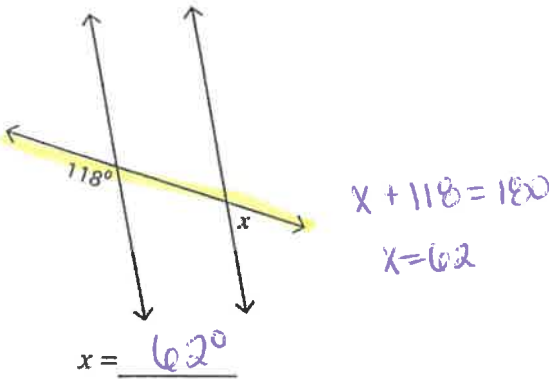


2)

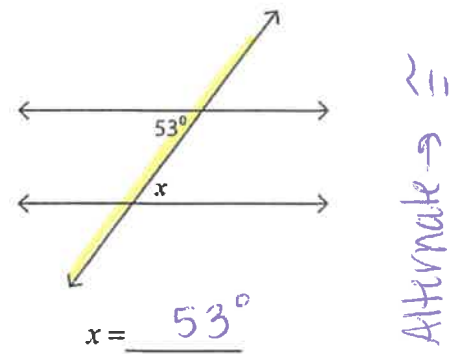


3)

Same Side  $\rightarrow$  Supp

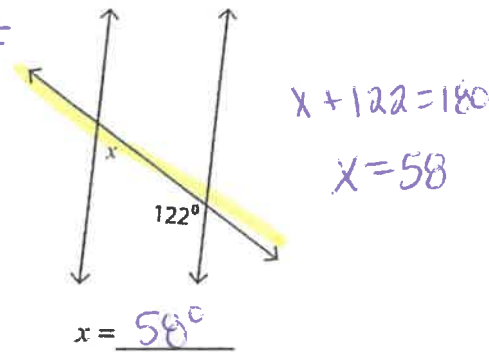


4)

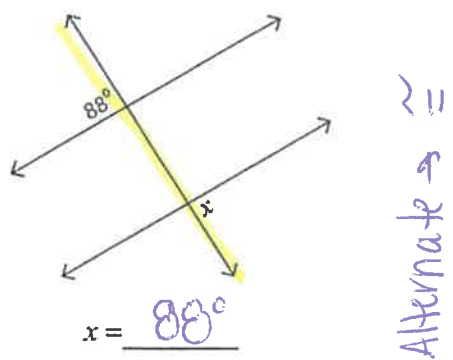


5)

Same Side  $\rightarrow$  Supp

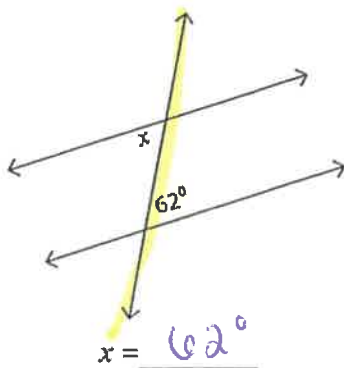


6)

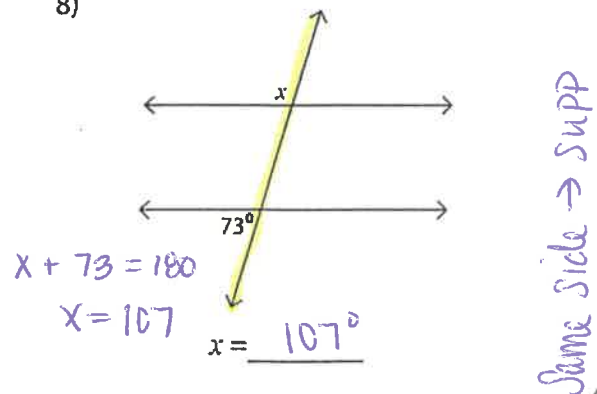


7)

Alternate  $\rightarrow$   $\cong$



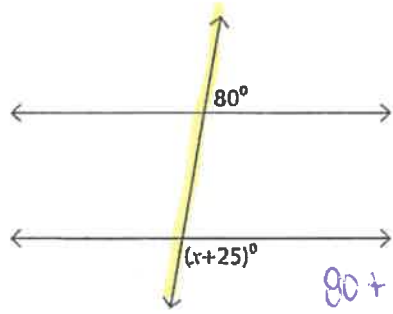
8)



## Alternate & Same Side Angles

Find the value of  $x$ .

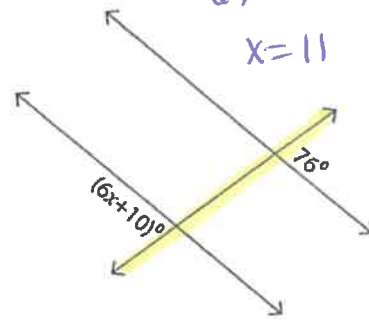
Same Side  $\rightarrow$  Supp



$$\begin{aligned} 80 + x + 25 &= 180 \\ x + 105 &= 180 \\ x &= 75 \end{aligned}$$

$x = \underline{75}$

2)

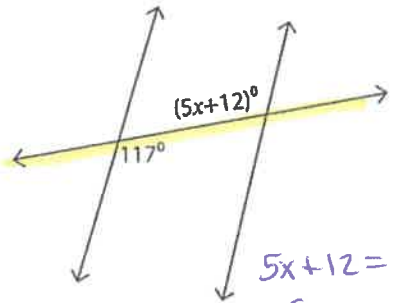


$$\begin{aligned} 6x + 10 &= 76 \\ 6x &= 66 \\ x &= 11 \end{aligned}$$

$x = \underline{11}$

Alternate  $\rightarrow$   $\cong$

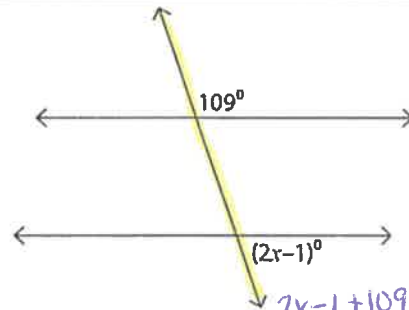
Alternate  $\rightarrow$   $\cong$



$$\begin{aligned} 5x + 12 &= 117 \\ 5x &= 105 \\ x &= 21 \end{aligned}$$

$x = \underline{21}$

4)

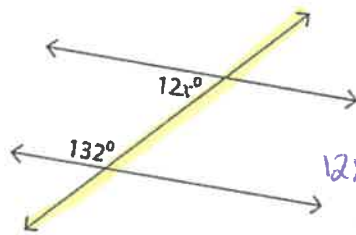


$$\begin{aligned} 2x - 1 + 109 &= 180 \\ 2x + 108 &= 180 \\ 2x &= 72 \\ x &= 36 \end{aligned}$$

$x = \underline{36}$

Same Side  $\rightarrow$  Supp

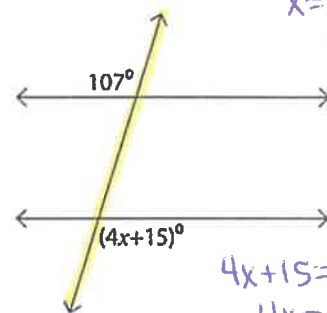
Same Side  $\rightarrow$  Supp



$$\begin{aligned} 12x + 132 &= 180 \\ 12x &= 48 \\ x &= 4 \end{aligned}$$

$x = \underline{4}$

6)

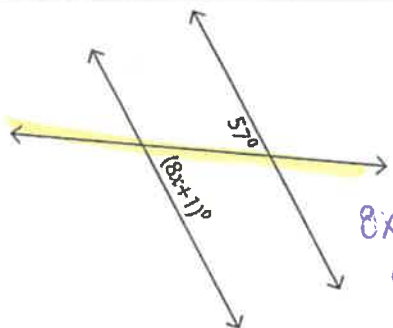


$$\begin{aligned} 4x + 15 &= 107 \\ 4x &= 92 \\ x &= 23 \end{aligned}$$

$x = \underline{23}$

Alternate  $\rightarrow$   $\cong$

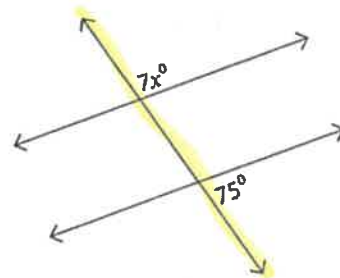
Alternate  $\rightarrow$   $\cong$



$$\begin{aligned} 8x + 1 &= 57 \\ 8x &= 56 \\ x &= 7 \end{aligned}$$

$x = \underline{7}$

8)



$$\begin{aligned} 7x + 75 &= 180 \\ 7x &= 105 \\ x &= 15 \end{aligned}$$

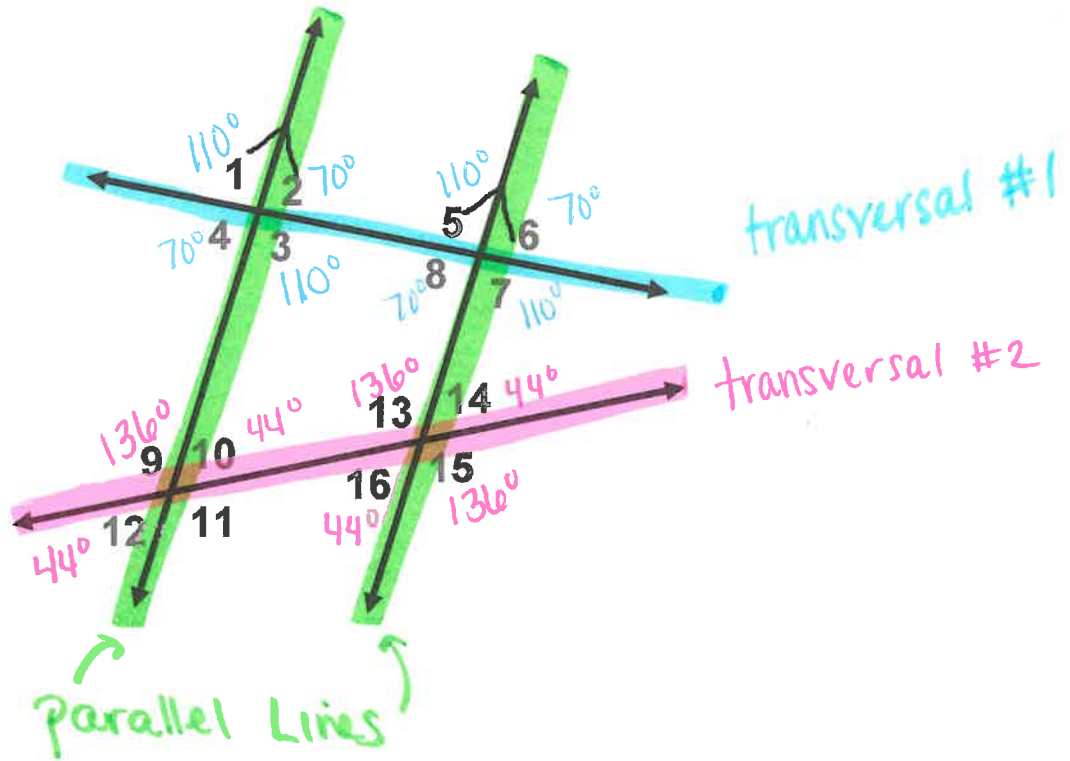
$x = \underline{15}$

Same Side  $\rightarrow$  Supp

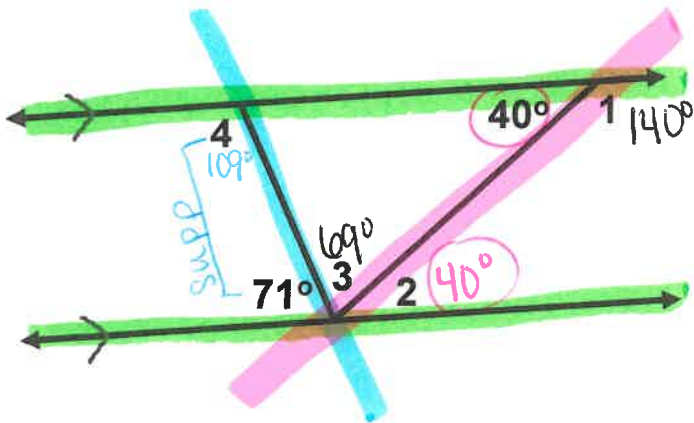
$x = 15$

## Calculating Day 2 (Challenge):

In the figure,  $\angle 3 = 110^\circ$  and  $\angle 12 = 44^\circ$ . Find the measure of each angle.



Using your knowledge of parallel lines and transversals, find the measure of each numbered angle.



$$\angle 1 = 140^\circ$$

$$\angle 2 = 40^\circ$$

$$\angle 3 = 69^\circ$$

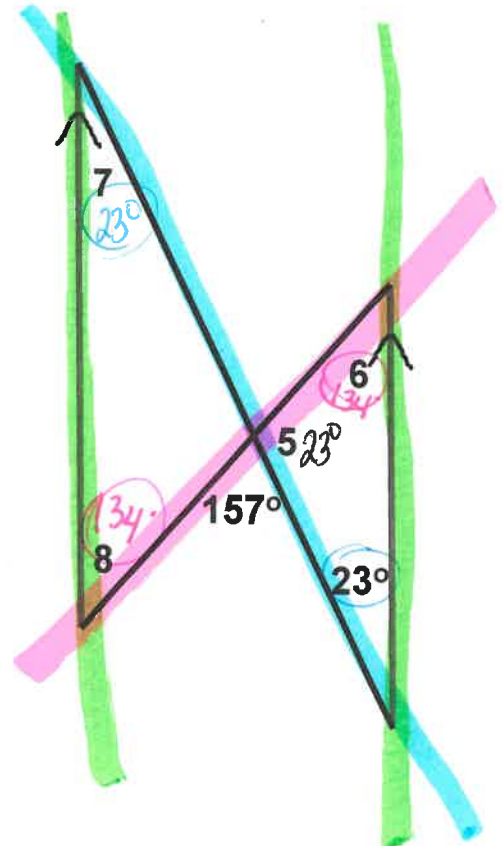
$$\angle 4 = 109^\circ$$

$$\angle 5 = 23^\circ$$

$$\angle 6 = 134^\circ$$

$$\angle 7 = 23^\circ$$

$$\angle 8 = 134^\circ$$



# Calculating Day 2 Practice:

I. Give an examples of each angle pair. *\* many possible answers*

Alternate interior  $\angle 2 \neq \angle 8$  /  $\angle 4 \neq \angle 5$

Alternate exterior  $\angle 1 \neq \angle 7$  /  $\angle 3 \neq \angle 6$

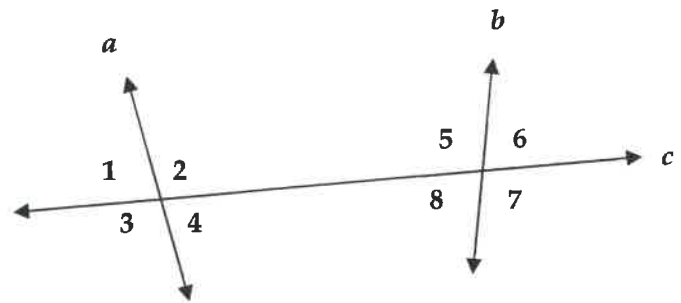
Consecutive interior  $\angle 4 \neq \angle 8$  /  $\angle 2 \neq \angle 5$

Consecutive exterior  $\angle 1 \neq \angle 6$  /  $\angle 3 \neq \angle 7$

Corresponding  $\angle 1 \neq \angle 5$  /  $\angle 2 \neq \angle 6$  /  $\angle 3 \neq \angle 7$  /  $\angle 4 \neq \angle 8$

Vertical  $\angle 1 \neq \angle 4$  /  $\angle 2 \neq \angle 3$  /  $\angle 5 \neq \angle 8$  /  $\angle 6 \neq \angle 7$

Linear pair  $\angle 1 \neq \angle 2$  /  $\angle 3 \neq \angle 4$  /  $\angle 5 \neq \angle 6$  /  $\angle 7 \neq \angle 8$



II. Decide whether each angle pair is congruent or supplementary when the two lines are parallel. Write these angle pairs in the appropriate columns.

Alternate interior, alternate exterior, consecutive interior, consecutive exterior, corresponding, vertical, linear pair

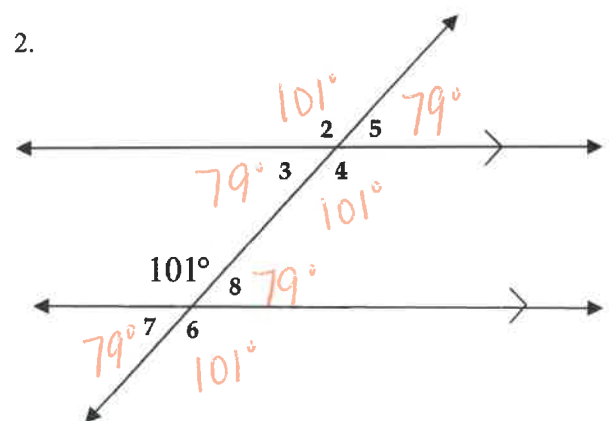
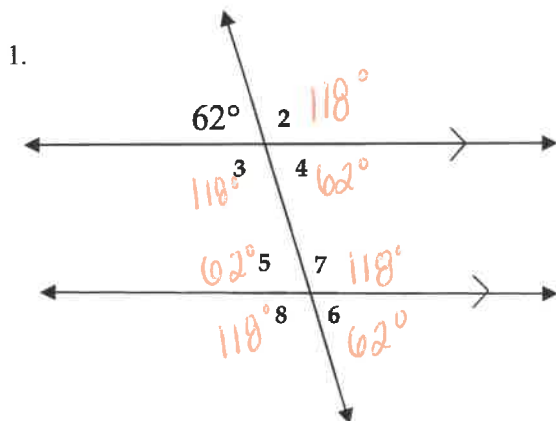
Congruent

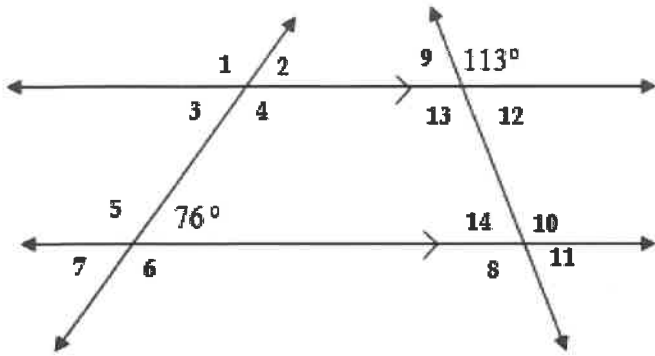
Supplementary

- Alternate interior
- Alternate exterior
- Corresponding
- Vertical

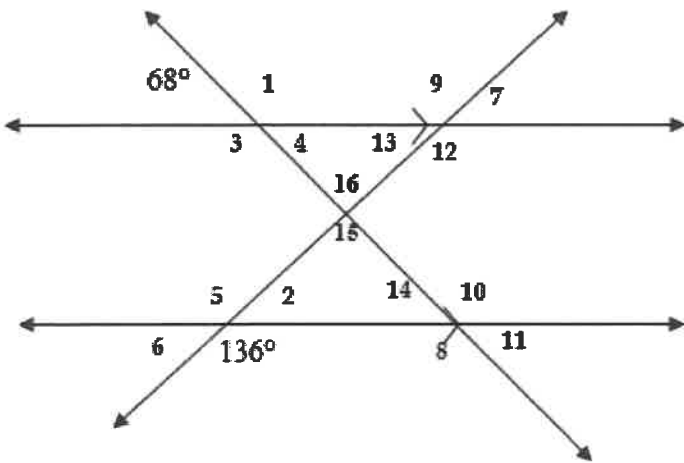
- Consecutive interior
- Consecutive exterior
- Linear Pair

III. Find the measure if each indicated angle directly on the diagram.

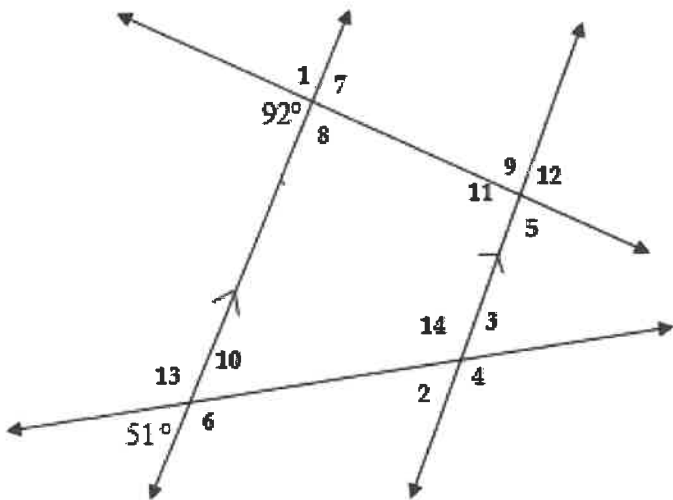




$$\begin{aligned}
 m\angle 1 &= \underline{104^\circ} & m\angle 2 &= \underline{76^\circ} & m\angle 3 &= \underline{76^\circ} \\
 m\angle 4 &= \underline{104^\circ} & m\angle 5 &= \underline{104^\circ} & m\angle 6 &= \underline{104^\circ} \\
 m\angle 7 &= \underline{76^\circ} & m\angle 8 &= \underline{113^\circ} & m\angle 9 &= \underline{67^\circ} \\
 m\angle 10 &= \underline{113^\circ} & m\angle 11 &= \underline{67^\circ} & m\angle 12 &= \underline{67^\circ} \\
 m\angle 13 &= \underline{113^\circ} & m\angle 14 &= \underline{67^\circ}
 \end{aligned}$$



$$\begin{aligned}
 m\angle 1 &= \underline{112^\circ} & m\angle 2 &= \underline{44^\circ} & m\angle 3 &= \underline{112^\circ} \\
 m\angle 4 &= \underline{68^\circ} & m\angle 5 &= \underline{136^\circ} & m\angle 6 &= \underline{44^\circ} \\
 m\angle 7 &= \underline{44^\circ} & m\angle 8 &= \underline{112^\circ} & m\angle 9 &= \underline{136^\circ} \\
 m\angle 10 &= \underline{112^\circ} & m\angle 11 &= \underline{68^\circ} & m\angle 12 &= \underline{136^\circ} \\
 m\angle 13 &= \underline{44^\circ} & m\angle 14 &= \underline{68^\circ} & m\angle 15 &= \underline{68^\circ} \\
 m\angle 16 &= \underline{68^\circ}
 \end{aligned}$$



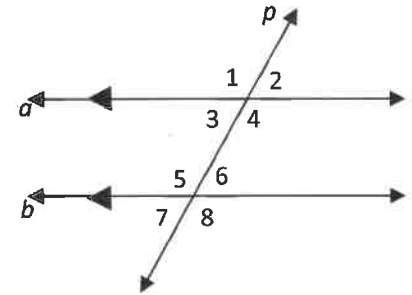
$$\begin{aligned}
 m\angle 1 &= \underline{88^\circ} & m\angle 2 &= \underline{51^\circ} & m\angle 3 &= \underline{51^\circ} \\
 m\angle 4 &= \underline{129^\circ} & m\angle 5 &= \underline{88^\circ} & m\angle 6 &= \underline{129^\circ} \\
 m\angle 7 &= \underline{92^\circ} & m\angle 8 &= \underline{88^\circ} & m\angle 9 &= \underline{88^\circ} \\
 m\angle 10 &= \underline{51^\circ} & m\angle 11 &= \underline{92^\circ} & m\angle 12 &= \underline{92^\circ} \\
 m\angle 13 &= \underline{129^\circ} & m\angle 14 &= \underline{129^\circ}
 \end{aligned}$$



## Unit 2: Parallel Lines Review

$a \parallel b$  and  $p$  is a transversal. Fill in the blanks describing the angle relationships with regard to  $\angle 3$ .

- $\angle 3$  and  $\angle$  1 are a linear pair
- $\angle 3$  and  $\angle$  4 are a linear pair
- $\angle 3$  and  $\angle$  2 are vertical angles
- $\angle 3$  and  $\angle$  7 are corresponding angles
- $\angle 3$  and  $\angle$  6 are alternate interior angles
- $\angle 3$  and  $\angle$  5 are consecutive interior angles



7.  $a \parallel b$  and  $p$  is a transversal. If  $m\angle 1 = 140^\circ$ , find the measure of each angle.

$$m\angle 1 = 140^\circ$$

$$m\angle 2 = 40^\circ$$

$$m\angle 3 = 40^\circ$$

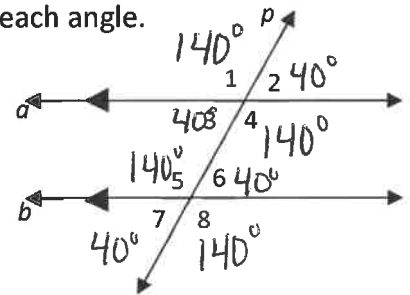
$$m\angle 4 = 140^\circ$$

$$m\angle 5 = 140^\circ$$

$$m\angle 6 = 40^\circ$$

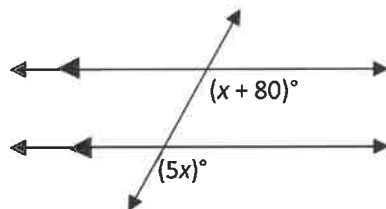
$$m\angle 7 = 40^\circ$$

$$m\angle 8 = 140^\circ$$



Identify the type of angles and their relationship. Write the equation used to solve for  $x$ . Then, find the value of  $x$ .

8.



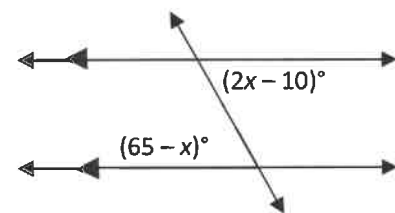
type of angles: Corresponding

equation:  $5x = x + 80$

$$4x = 80$$

answer:  $x = 20$

9.



type of angles: alternate interior

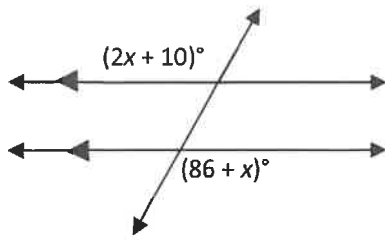
equation:  $65 - x = 2x - 10$

$$75 = 3x$$

answer:  $x = 25$

Identify the type of angles and their relationship. Write the equation used to solve for  $x$ . Then, find the value of  $x$ .

10.

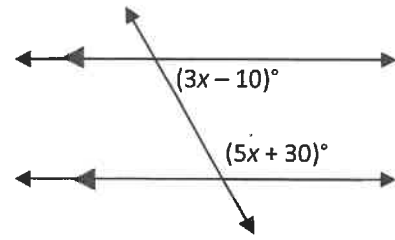


type of angles: alternate exterior

equation:  $2x + 10 = 86 + x$   
 $x = 76$

answer:  $x = 76$

11.

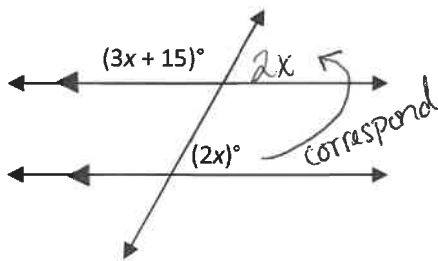


type of angles: Consecutive interior

equation:  $3x - 10 + 5x + 30 = 180$   
 $8x + 20 = 180$   
 $8x = 160$

answer:  $x = 20$

12.

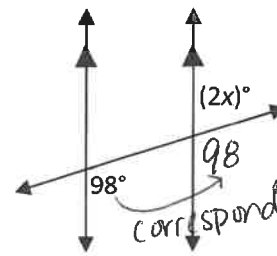


type of angles: N/A

equation:  $3x + 15 + 2x = 180$   
 $5x + 15 = 180$   
 $5x = 165$

answer:  $x = 33$

13.



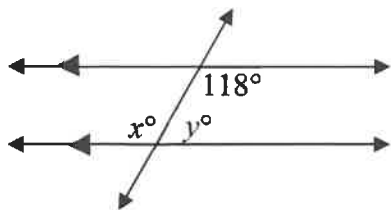
type of angles: N/A

equation:  $2x + 98 = 180$   
 $2x = 82$

answer:  $x = 41$

Solve for  $x$  and  $y$

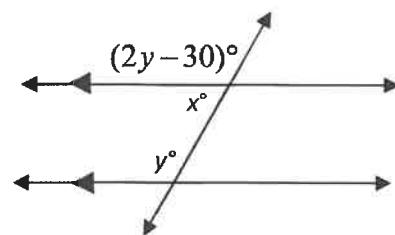
14.



$x = 118^\circ$

$y = 62^\circ$

15.



$2y - 30 = y$        $x = 150^\circ$   
 $-30 = -y$   
 $y = 30^\circ$



Name: \_\_\_\_\_

## Unit 2 Reflection

<p><b>What skills went well in this unit? Circle all the skills that you were successful with on the Quest</b></p> <p>Vocab- Parallel, Perpendicular, and Skew</p> <p>Vocab- Naming transversals and special angle pairs</p> <p>Angle Calculations</p>	<p><b>What were you most proud of in this unit?</b></p> <p>Organization</p> <p>Completion of practice problems (HW)</p> <p>Participation</p> <p>Positive attitude</p> <p>Showing growth</p> <p>Other: _____</p>
<p><b>Looking at the skills above. What skills do you still need more practice with moving forward (use both columns)?</b></p>	
<p><b>Action plan:</b></p>	