

Warm Up

Find each angle measure:

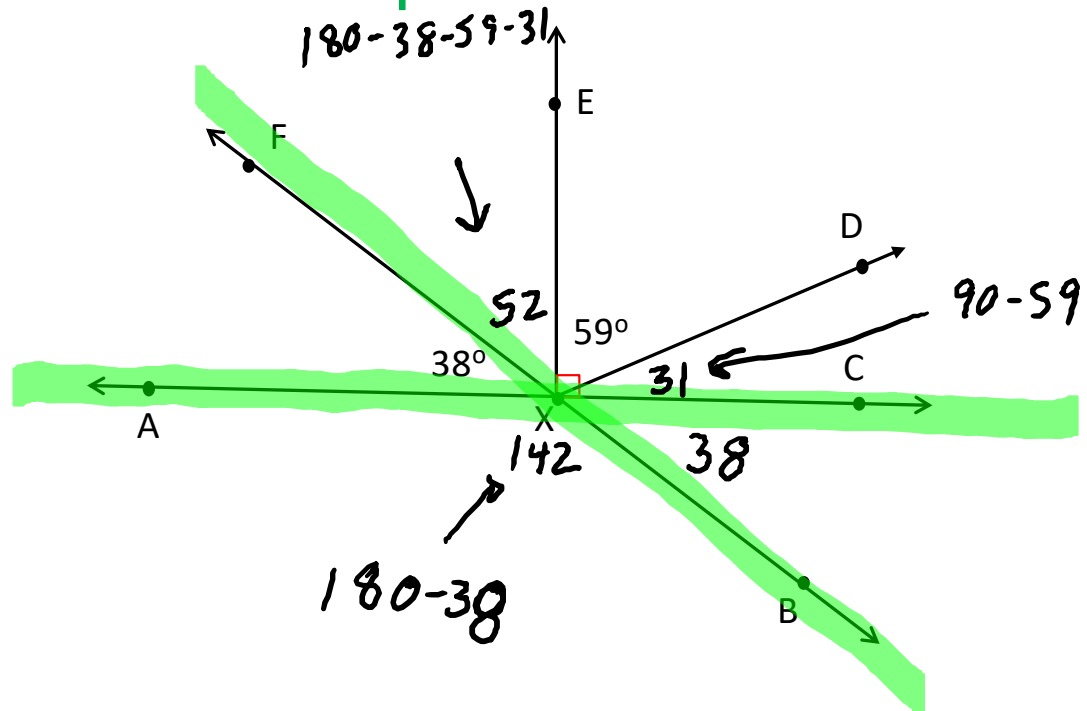
a) $m\angle CXB = 38$

b) $m\angle DXC = 31$

c) $m\angle FXE = 52$

d) $m\angle AXB = 142$

e) $m\angle DXB = 31 + 38 = 69$



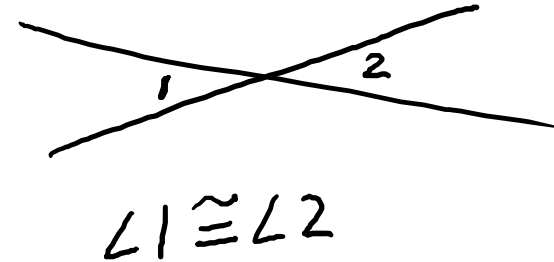
Angle Relationships

Term/Definition

Picture/Example

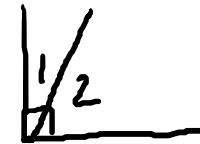
- **Vertical Angles:**

- Def: **Pair of opposite angles formed when two lines cross**
- Theorem: **Vertical angles are congruent**



- **Complementary Angles:**

- Def: **2 angles that add up to 90°**



- **Supplementary Angles:**

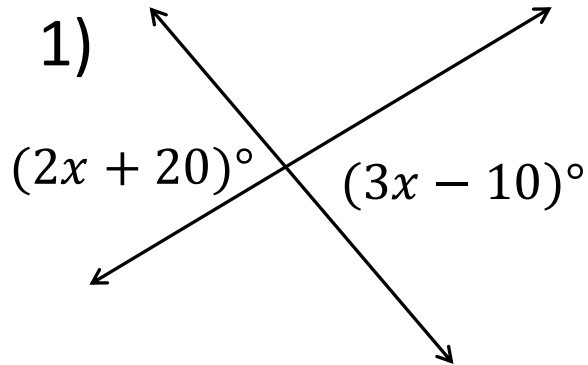
- Def: **2 angles that add up to 180°**



Example Problems

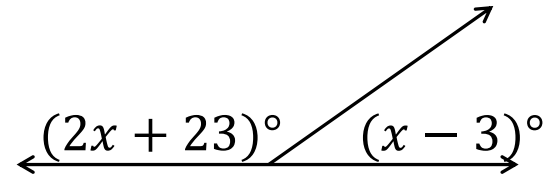
Solve for x in #1 and #2:

1)



$$\begin{array}{r} 2x + 20 = 3x - 10 \\ -2x \quad -2x \\ \hline 20 = x - 10 \\ +10 \quad +10 \\ \hline 30 = x \end{array}$$

2)

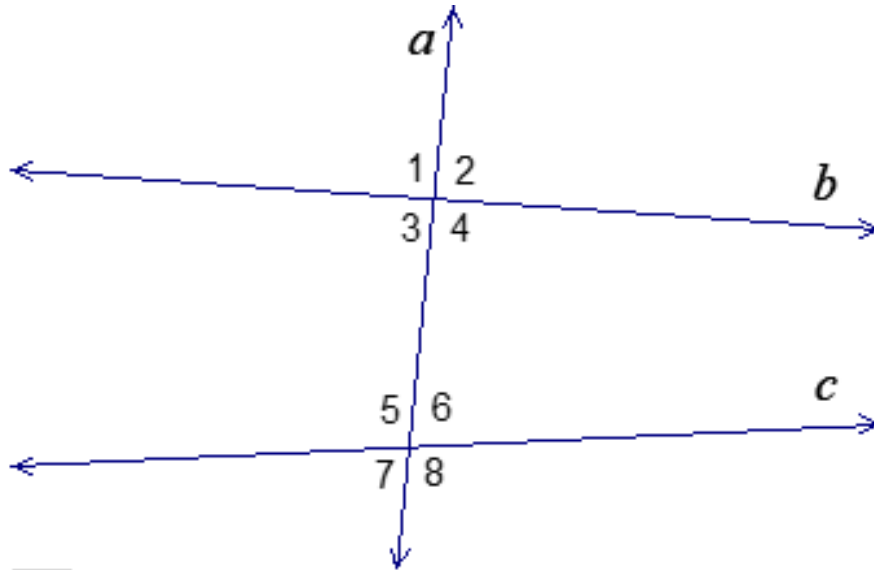


$$2x + 23 + x - 3 = 180$$

$$\begin{array}{r} 3x + 20 = 180 \\ -20 \quad -20 \\ \hline 3x = 160 \end{array}$$

$$\begin{array}{r} 3x = 160 \\ \hline x = \frac{160}{3} \end{array}$$

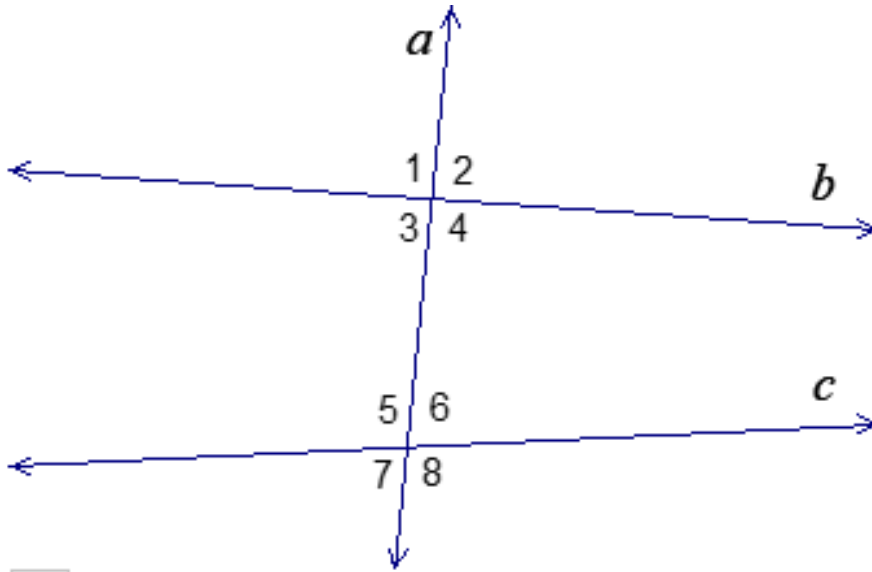
Def. A transversal is a line that intersects two or more coplanar lines at different points.



Line a is a transversal

— We have names for the relationships between the 8 angles that are formed.

Corresponding angles are on the same corner of different intersections.



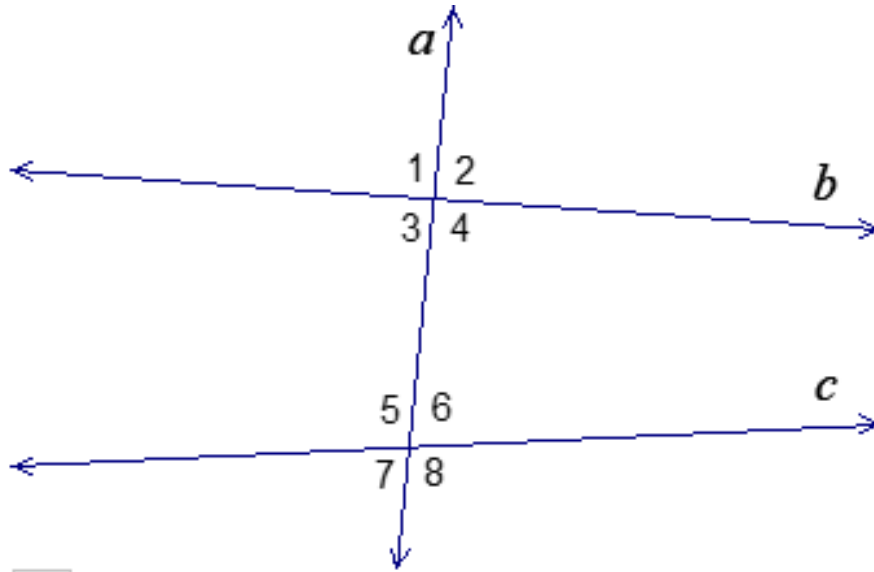
$$2 \leftrightarrow 6$$

$$1 \leftrightarrow 5$$

$$4 \leftrightarrow 8$$

$$3 \leftrightarrow 7$$

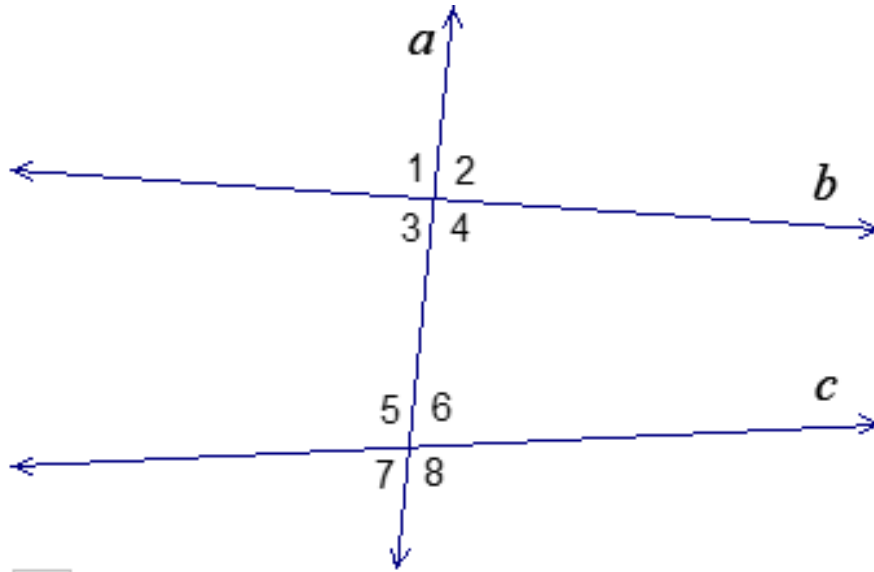
Alternate interior angles are on opposite sides of the transversal and between the two lines.



$$3 \simeq 6$$

$$4 \simeq 5$$

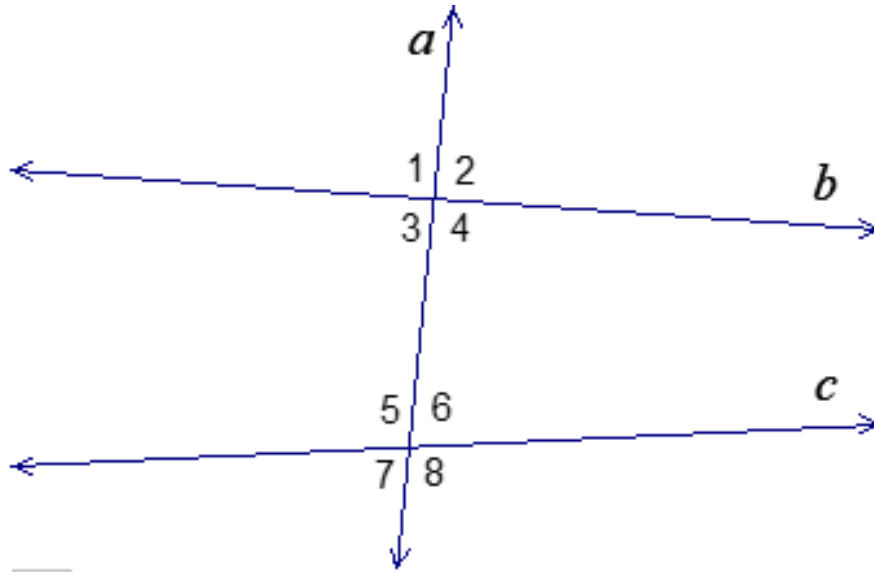
Alternate exterior angles are on opposite sides of the transversal and outside the two lines.



$$\angle 1 \approx \angle 8$$

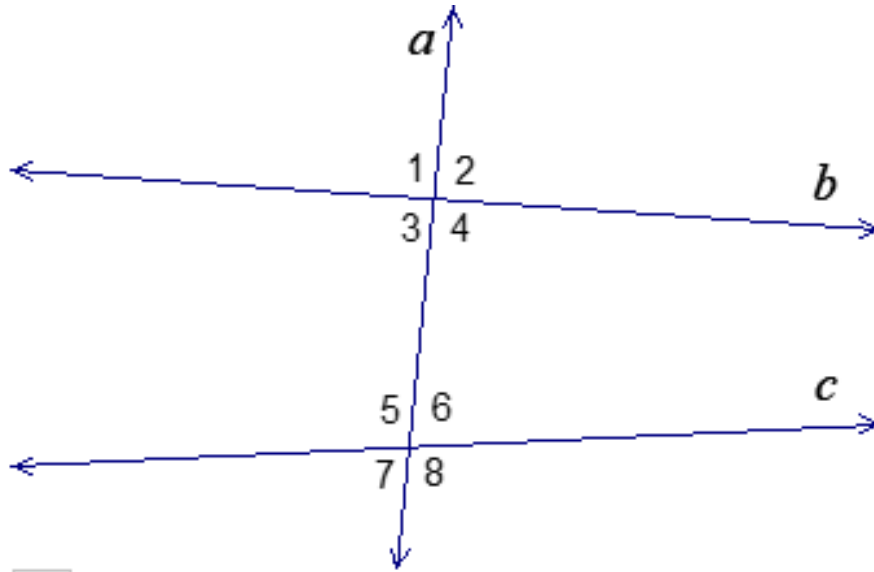
$$\angle 7 \approx \angle 2$$

Same-side interior angles are on the same side of the transversal and between the two lines.



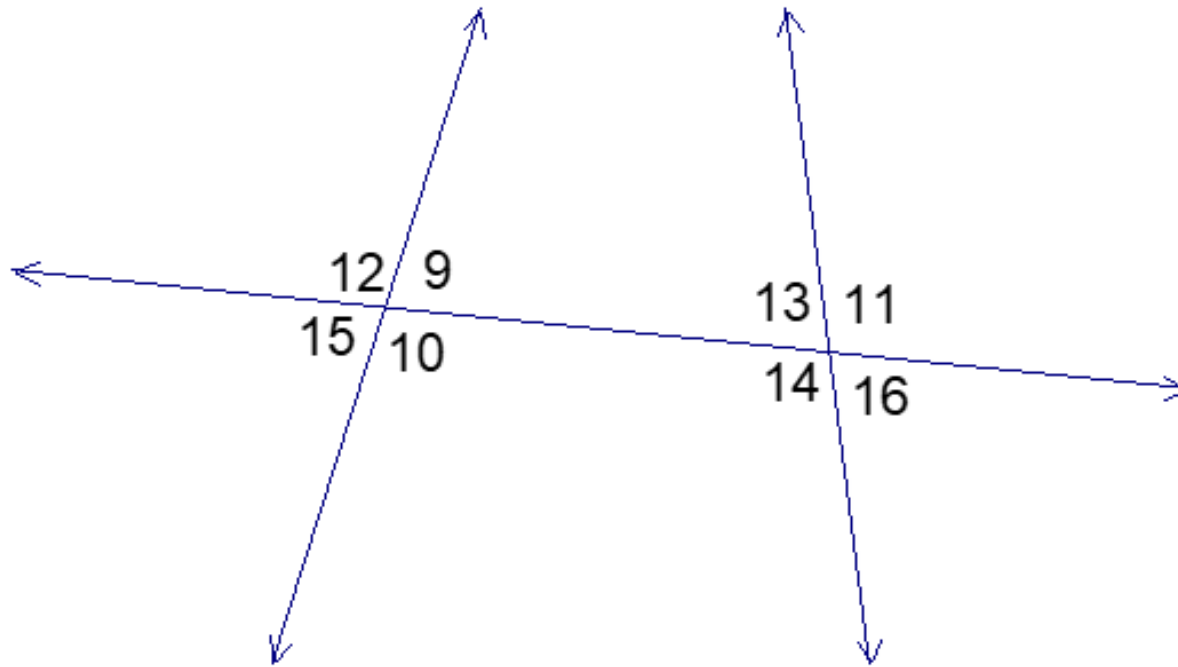
$\angle 4 \rightarrow \angle 6$
 $\angle 3 \rightarrow \angle 5$

Same-side exterior angles are on the same side of the transversal and outside the two lines.

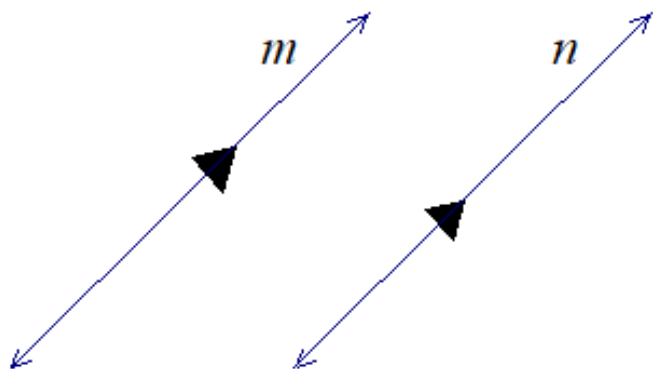


$\angle 2 \simeq \angle 8$
 $\angle 1 \simeq \angle 7$

Ex. Let practice naming some relationships



When lines are parallel:



$$m \parallel n$$

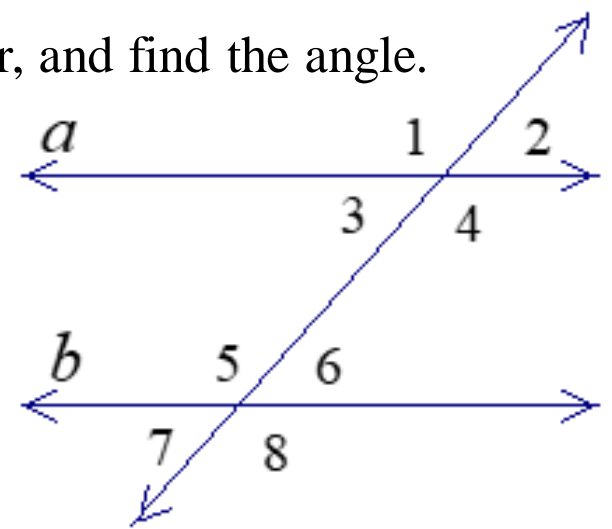
Thm. If two parallel lines are cut by a transversal, then

- Corresp. \angle 's are \cong
- Alt Int. \angle 's are \cong
- Alt Ext. \angle 's are \cong
- Same-side Int. \angle 's are supp.
- Same-side Ext. \angle 's are supp.

Name the relationship, then decide what that means.

Assume $a \parallel b$. State the special name of the angle pair, and find the angle.

- 1) If $m\angle 4 = 100^\circ$, find $m\angle 5$. *alt. int., 100°*
- 2) If $m\angle 4 = 95^\circ$, find $m\angle 6$. *same-side int., 85°*
- 3) If $m\angle 1 = 120^\circ$, find $m\angle 8$. *alt. ext., 120°*
- 4) If $m\angle 3 = 20^\circ$, find $m\angle 7$. *corresp., 20°*



Assume $l \parallel m$. State the special name of the angle pair, and find x .

5) *corresp.*

$$3x + 20 = 2x + 40$$

$$\begin{array}{r} -2x \\ \hline x + 20 = 40 \\ -20 \\ \hline x = 20 \end{array}$$

$x = 20$

6) *same-side int.*

$$5x - 10 + 8x - 5 = 180$$

$$13x - 15 = 180$$

$$\begin{array}{r} +15 \\ \hline 13x = 195 \\ \hline \frac{13x}{13} = \frac{195}{13} \\ x = 15 \end{array}$$

$x = 15$