

# 11.1 Parallel Lines Cut by a Transversal

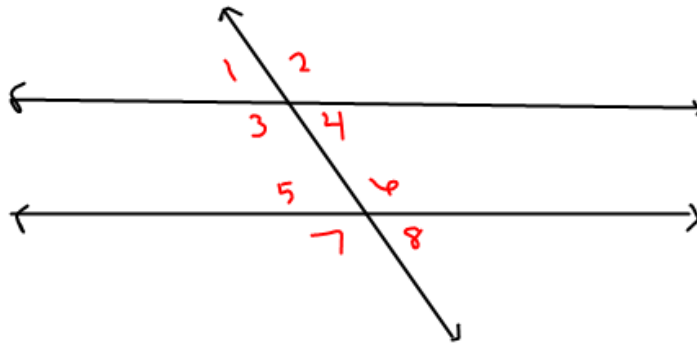
## Common Core Standard

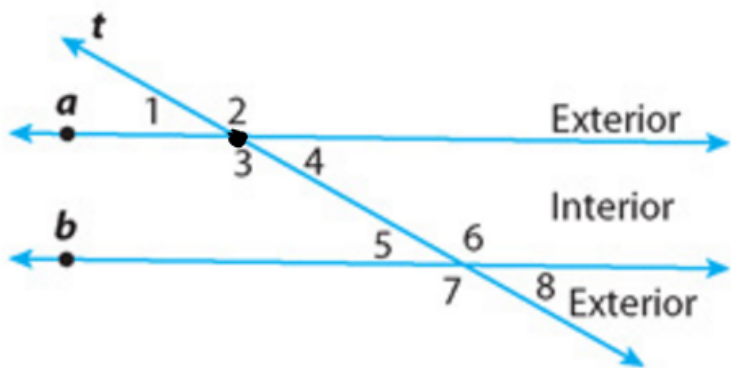
### **8.G.5**

Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles

## Vocabulary

- Transversal - a line that intersects 2 lines in the same plane at 2 different points





Alternate-Exterior Angles - opposite sides of the transversal, on the outside of lines a + b  
 $\angle 1 + \angle 8$ ,  $\angle 2 + \angle 7$  **congruent**

Same-Side Interior Angles - on the same side of the transversal, between lines a + b  
 $\angle 3 + \angle 5$ ,  $\angle 4 + \angle 6$  **total  $180^\circ$**

Corresponding angles - lie on the same side of the transversal and on the same side of lines a + b  
 $\angle 1 + \angle 5$ ,  $\angle 4 + \angle 8$  **congruent**

Supplementary Angles - "side by side"  
 $\angle 1 + \angle 2$ ,  $\angle 1 + \angle 3$  **total  $180^\circ$**

Vertical Angles - share same vertex. "Across from one another"  
 $\angle 2 + \angle 3$  **congruent**

Alternate-Interior Angles - nonadjacent angles that lie on opposite sides of the transversal, between a + b  
 $\angle 3 + \angle 6$ ,  $\angle 4 + \angle 5$  **congruent**

Adjacent Angles - share a vertex and create a  $90^\circ$  angle



**EXPLORE ACTIVITY 2**COMMON  
CORE

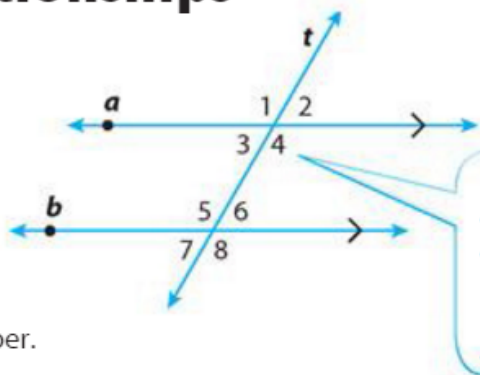
8.G.5

## Justifying Angle Relationships

You can use tracing paper to informally justify your conclusions from the first Explore Activity.

**Lines  $a$  and  $b$  are parallel. (The black arrows on the diagram indicate parallel lines.)**

**A** Trace the diagram onto tracing paper.



**B** Position the tracing paper over the original diagram so that  $\angle 1$  on the tracing is over  $\angle 5$  on the original diagram. Compare the two angles. Do they appear to be congruent?

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**C** Use the tracing paper to compare all eight angles in the diagram to each other. List all of the congruent angle pairs.

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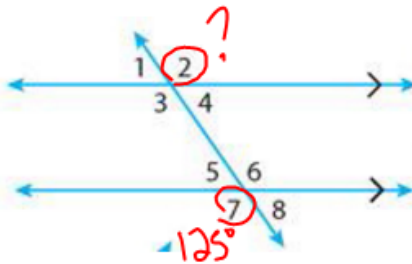
## **Finding Unknown Angle Measures**

You can find any unknown angle measure when two parallel lines are cut by a transversal if you are given at least one other angle measure.

**EXAMPLE 1****A** Find  $m\angle 2$  when  $m\angle 7 = 125^\circ$ .

$\angle 2$  is congruent to  $\angle 7$  because they are alternate exterior angles.

Therefore,  $m\angle 2 = 125^\circ$ .



$\angle 2 + \angle 7$  are Alt. ext.

$$6x + 3x = 180$$

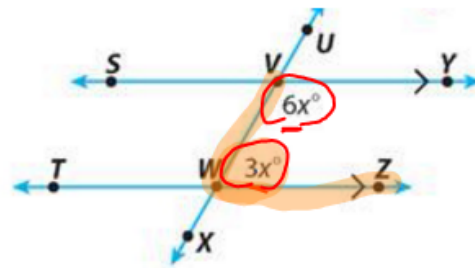
$$\frac{9x}{9} = \frac{180}{9}$$

$$x = 20$$

$$3 \times 20 = \boxed{60^\circ}$$

**B** Find  $m\angle VWZ$ .

$\angle VWZ$  is supplementary to  $\angle YVW$  because they are same-side interior angles.  
 $m\angle VWZ + m\angle YVW = 180^\circ$

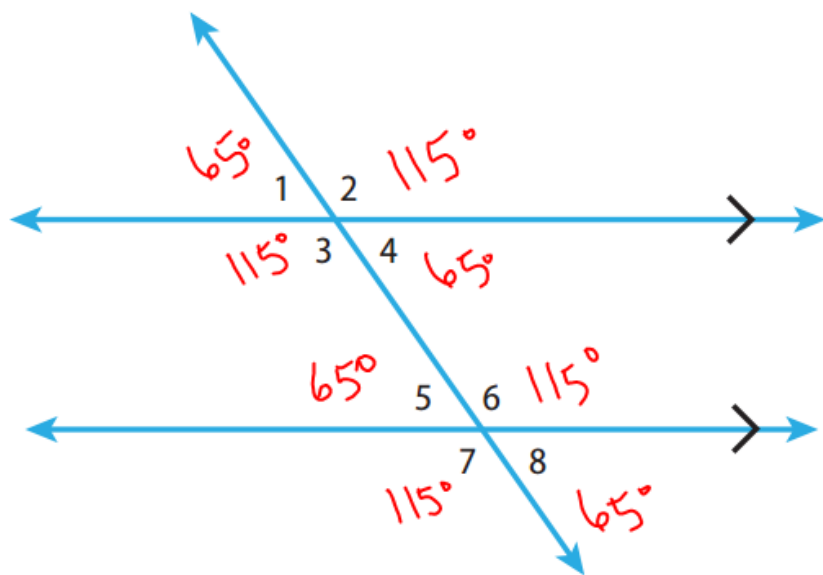


$\angle V + \angle W$  are  
S.S. interior

## ADDITIONAL EXAMPLE 1

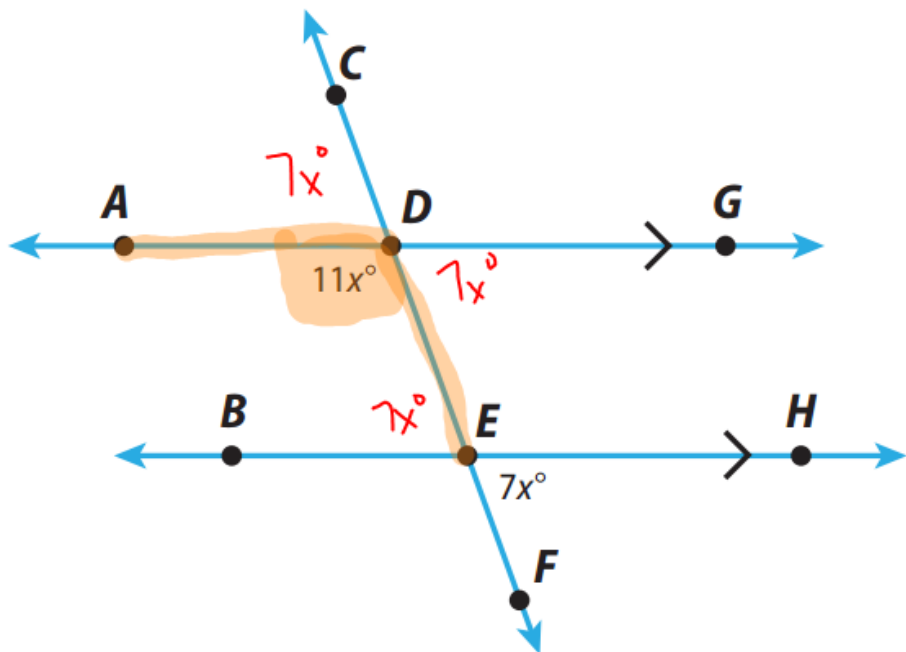
**A** Find  $m\angle 1$  when  $m\angle 5 = 65^\circ$ .

$$m\angle 1 = 65^\circ$$



## ADDITIONAL EXAMPLE 1

**B** Find  $m\angle ADE$ .



$$7x + 11x = 180$$

$$\frac{18x}{18} = \frac{180}{18}$$

$$x = 10$$

$$m\angle ADE = 11 \times 10 = 110^\circ$$



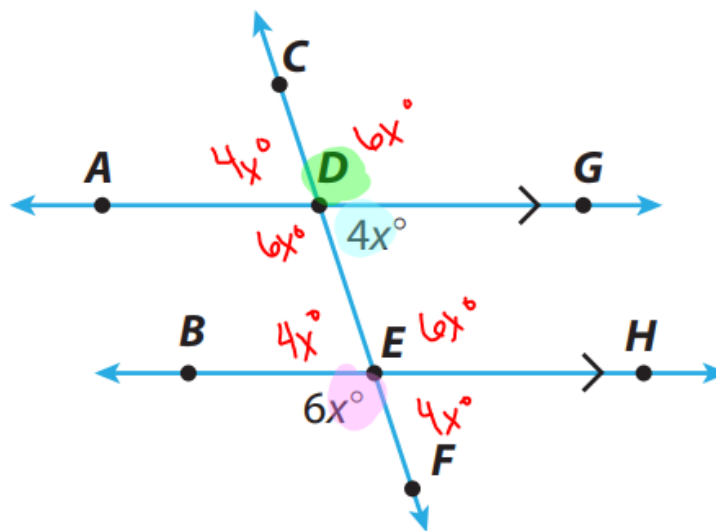
## YOUR TURN

Find each angle measure.

5.  $m\angle GDE = \underline{72^\circ}$

6.  $m\angle BEF = \underline{108^\circ}$

7.  $m\angle CDG = \underline{108^\circ}$

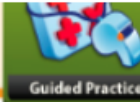


$$6 \cdot 18 =$$

$$4 \cdot 18 =$$

$$\begin{aligned} 4x + 6x &= 180 \\ 10x &= 180 \\ \frac{10x}{10} &= \frac{180}{10} \\ x &= 18 \end{aligned}$$

## Guided Practice

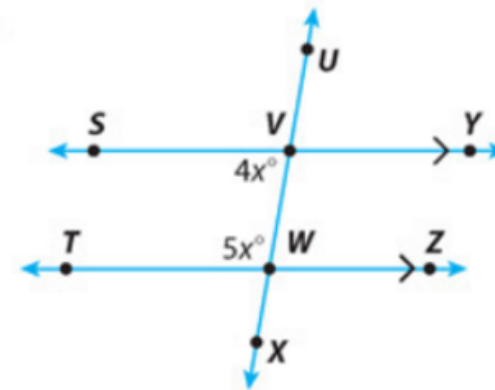


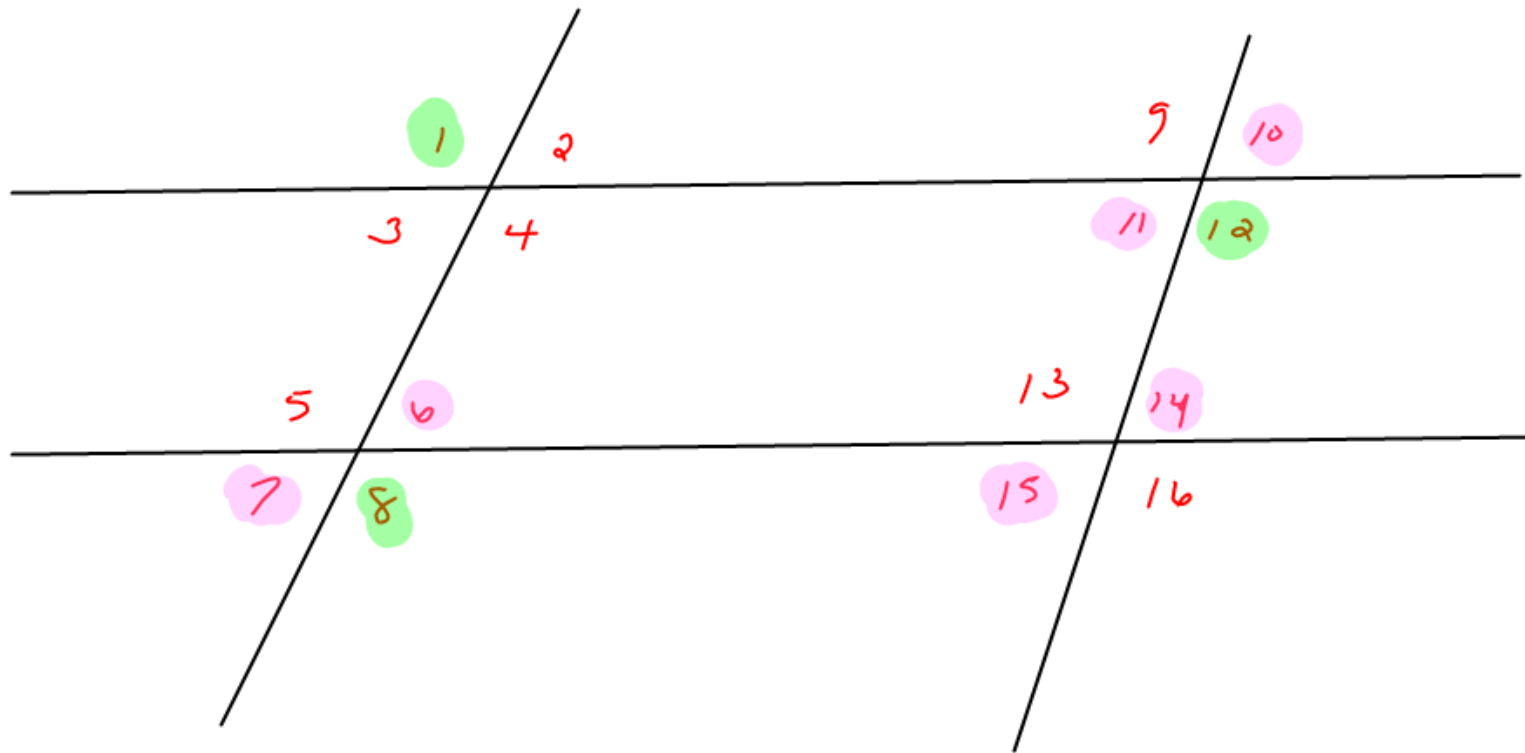
Online Assessment  
and Intervention.



Use the figure for Exercises 1–4. ([Explore Activity 1 and Example 1](#))

- $\angle UVY$  and \_\_\_\_\_ are a pair of corresponding angles.
- $\angle WVY$  and  $\angle VWT$  are \_\_\_\_\_ angles.
- Find  $m\angle SVW$ . \_\_\_\_\_
- Find  $m\angle VWT$ . \_\_\_\_\_
- Vocabulary** When two parallel lines are cut by a transversal,  
\_\_\_\_\_ angles are supplementary. ([Explore Activity 1](#))





HW

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