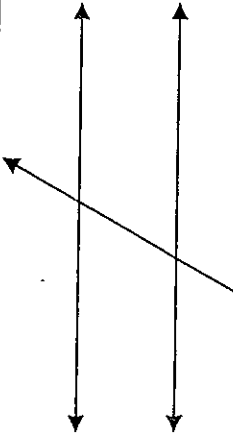
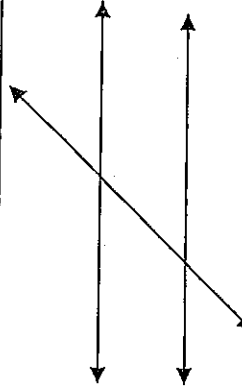
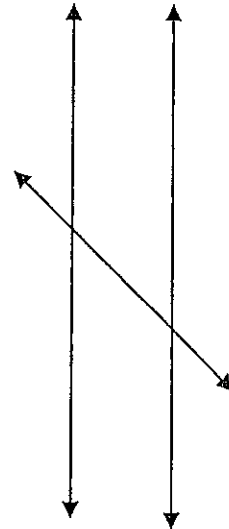
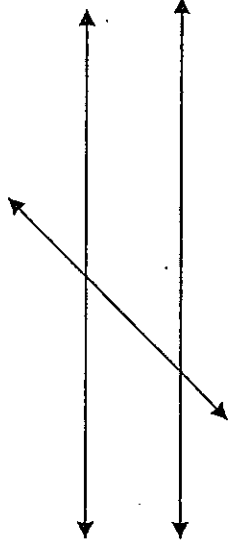
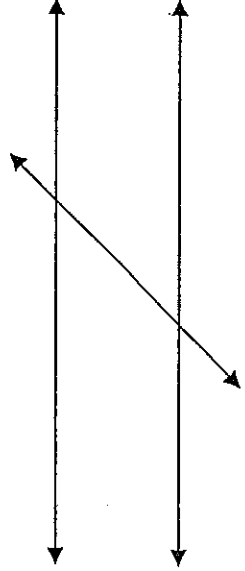
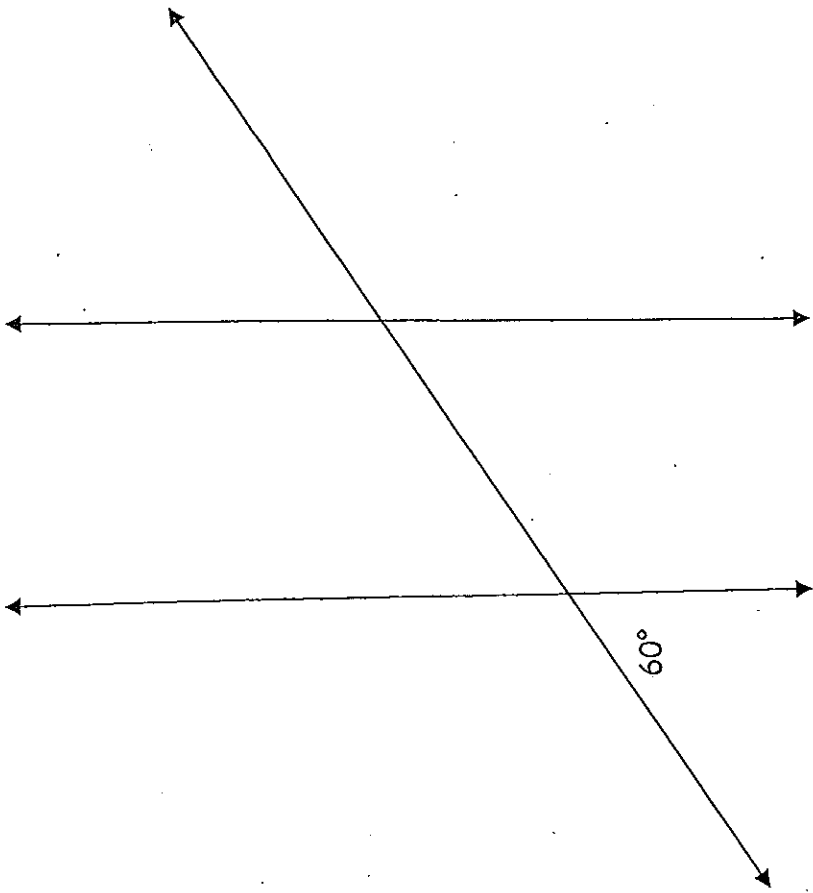
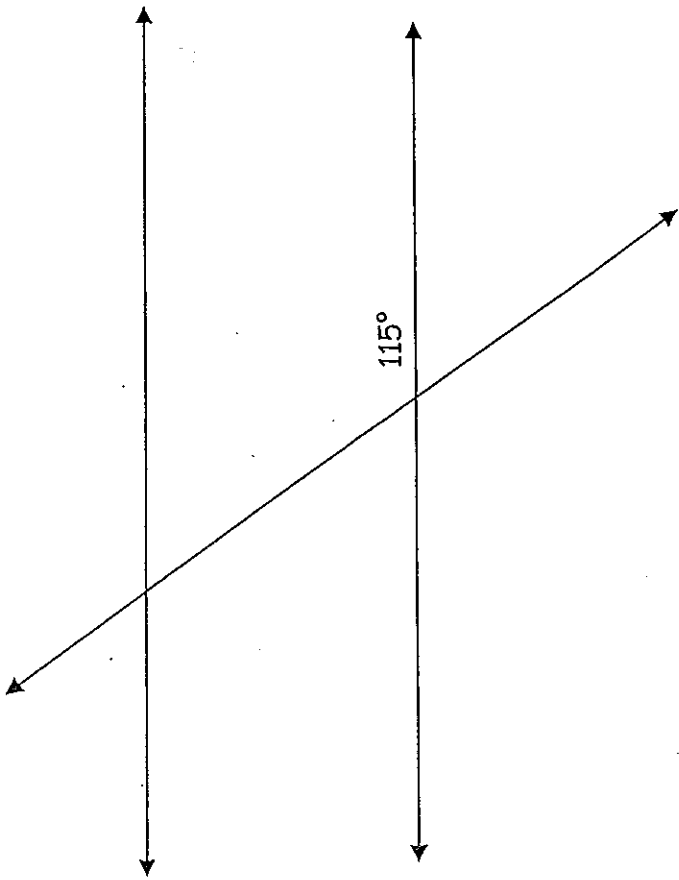


Angle Type	Description/Facts	Picture	Congruent?	My Notes
Alternate Exterior Angles	<p>Angles are <b>OUTSIDE</b> the parallel lines on <b>OPPOSITE</b> sides of the transversal.</p> <p>There are ____ pairs.</p>			
Alternate Interior Angles	<p>Angles are <b>INSIDE</b> the parallel lines on <b>OPPOSITE</b> sides of the transversal.</p> <p>There are ____ pairs.</p>			
Corresponding Angles	<p>Angles are in the <b>SAME</b> position on each line.</p> <p>There are ____ pairs.</p>			
Vertical Angles	<p>Angles are opposite of each other and share a vertex.</p> <p>There are ____ pairs.</p>			
Supplementary Angles	<p>They are <b>ADJACENT</b> (right next to) each other and share a side.</p> <p>Interior Angles on the <b>SAME</b> side of the transversal form a <b>LINEAR PAIR</b> or are called <b>SAME SIDE INTERIOR</b>.</p> <p>There are many pairs.</p>		★	

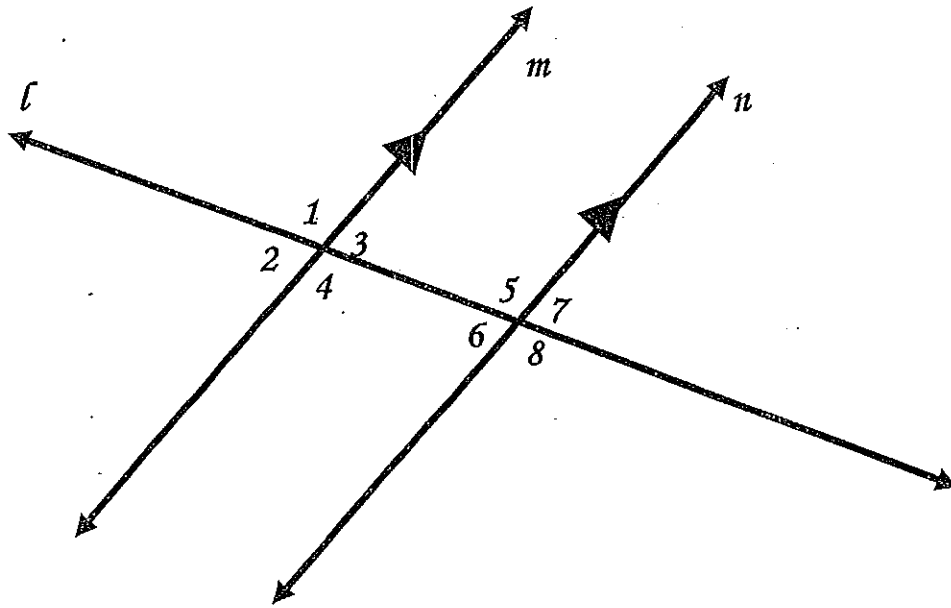
When you know one angle, you can find every other angle in the picture!



Application of the properties of angle pairs formed by parallel lines cut by a transversal.

What are corresponding angles?

What are alternate exterior angles?



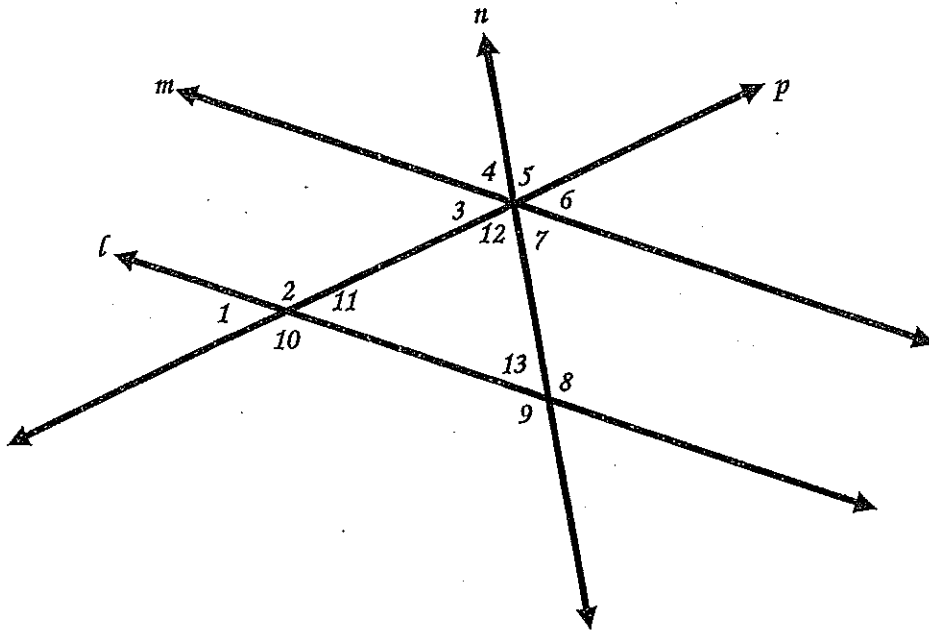
What are alternate interior angles?

What are consecutive exterior angles?

What are consecutive interior angles?

What are vertical angles?

What angles are congruent?  
What angles are supplementary?

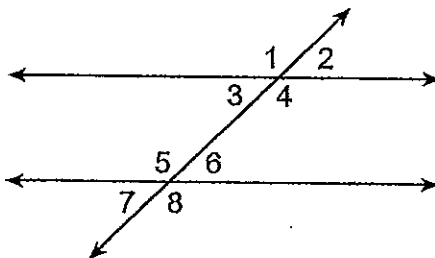


Name: \_\_\_\_\_ Period: \_\_\_\_\_

## Parallel Lines Cut By a Transversal

Questions 1 through 5 refer to the following:

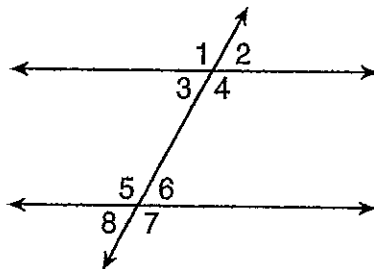
In the diagram below, two parallel lines are cut by a transversal. Based on this diagram, identify the angle relationship for the given angle pair.



- 1)  $\angle 3$  and  $\angle 6$
- A) corresponding angles  
B) vertical angles  
C) alternate interior angles  
D) alternate exterior angles
- 2)  $\angle 1$  and  $\angle 4$
- A) corresponding angles  
B) vertical angles  
C) supplementary angles  
D) alternate interior angles
- 3)  $\angle 3$  and  $\angle 7$
- A) corresponding angles  
B) alternate exterior angles  
C) interior angles on the same side of the transversal  
D) alternate interior angles
- 4)  $\angle 2$  and  $\angle 7$
- A) supplementary angles  
B) alternate interior angles  
C) alternate exterior angles  
D) vertical angles
- 5)  $\angle 4$  and  $\angle 6$
- A) interior angles on the same side of the transversal  
B) corresponding angles  
C) alternate interior angles  
D) vertical angles

Questions 6 through 8 refer to the following:

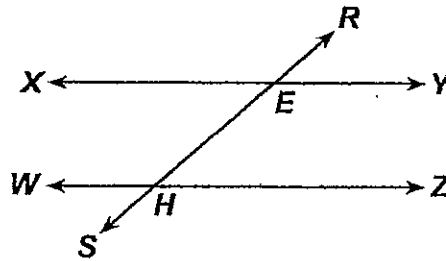
In the diagram below, two parallel lines are cut by a transversal and eight angles are formed.



- 6) In the diagram shown, what is one pair of alternate interior angles?
- A)  $\angle 6$  and  $\angle 8$   
B)  $\angle 1$  and  $\angle 2$   
C)  $\angle 4$  and  $\angle 6$   
D)  $\angle 4$  and  $\angle 5$
- 7) In the diagram shown, what is one pair of interior angles on the same side of the transversal?
- A)  $\angle 4$  and  $\angle 5$   
B)  $\angle 4$  and  $\angle 6$   
C)  $\angle 2$  and  $\angle 7$   
D)  $\angle 6$  and  $\angle 8$
- 8) In the diagram shown, what is one pair of corresponding angles?
- A)  $\angle 2$  and  $\angle 8$   
B)  $\angle 1$  and  $\angle 5$   
C)  $\angle 4$  and  $\angle 6$   
D)  $\angle 4$  and  $\angle 5$

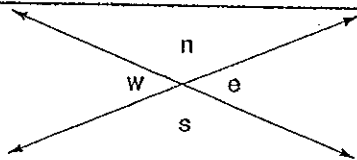
Questions 9 and 10 refer to the following:

In the diagram below, transversal  $\overleftrightarrow{RS}$  intersects parallel lines  $\overleftrightarrow{XY}$  and  $\overleftrightarrow{WZ}$  at  $E$  and  $H$ , respectively.



- 9) What are a pair of alternate interior angles in the diagram shown?
- A)  $\angle XEH$  and  $\angle ZHE$       B)  $\angle XER$  and  $\angle ZHE$       C)  $\angle WHE$  and  $\angle ZHE$       D)  $\angle YEH$  and  $\angle ZHE$
- 10) What are a pair of alternate exterior angles in the diagram shown?
- A)  $\angle WHS$  and  $\angle ZHS$       B)  $\angle YER$  and  $\angle ZHS$       C)  $\angle XER$  and  $\angle ZHS$       D)  $\angle ZHE$  and  $\angle ZHS$

# Vertical Angles



Vertical angles are congruent.  $\angle n \cong \angle s$   $\angle w \cong \angle e$

If  $m\angle n = 140^\circ$ , then  $m\angle s = 140^\circ$ .

Supplementary angles measure a total of  $180^\circ$ .

If  $m\angle n = 140^\circ$ , then  $m\angle w = 40^\circ$ .

If  $\angle w \cong \angle e$ , then  $m\angle e = 40^\circ$ .

Find the measures of the missing angles.

1.  $m\angle t = \underline{129^\circ}$   
 $m\angle e = \underline{51^\circ}$   
 $m\angle f = \underline{51^\circ}$

2.  $m\angle f = \underline{\hspace{2cm}}$   
 $m\angle u = \underline{\hspace{2cm}}$   
 $m\angle n = \underline{\hspace{2cm}}$

3.  $m\angle j = \underline{\hspace{2cm}}$   
 $m\angle e = \underline{\hspace{2cm}}$   
 $m\angle t = \underline{\hspace{2cm}}$

4.  $m\angle a = \underline{\hspace{2cm}}$   
 $m\angle c = \underline{\hspace{2cm}}$   
 $m\angle t = \underline{\hspace{2cm}}$

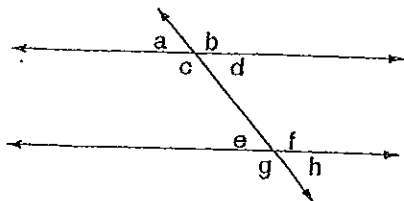
5.  $m\angle s = \underline{\hspace{2cm}}$   
 $m\angle u = \underline{\hspace{2cm}}$   
 $m\angle n = \underline{\hspace{2cm}}$

6.  $m\angle i = \underline{\hspace{2cm}}$   
 $m\angle p = \underline{\hspace{2cm}}$   
 $m\angle z = \underline{\hspace{2cm}}$

7.  $m\angle c = \underline{\hspace{2cm}}$   
 $m\angle u = \underline{\hspace{2cm}}$   
 $m\angle t = \underline{\hspace{2cm}}$

8.  $m\angle t = \underline{\hspace{2cm}}$   
 $m\angle a = \underline{\hspace{2cm}}$   
 $m\angle g = \underline{\hspace{2cm}}$

# Corresponding Angles



When a line intersects parallel lines, **corresponding angles** are congruent.

In the diagram at the left, the following pairs of angles are **corresponding**:

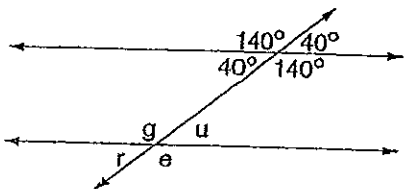
$\angle a$  and  $\angle e$        $\angle b$  and  $\angle f$

$\angle c$  and  $\angle g$        $\angle d$  and  $\angle h$

If  $m\angle a = 70^\circ$ , then  $m\angle e = 70^\circ$ .

Find the measures of the angles.

1.



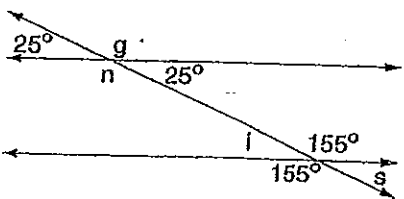
$m\angle g =$  \_\_\_\_\_

$m\angle u =$  \_\_\_\_\_

$m\angle e =$  \_\_\_\_\_

$m\angle r =$  \_\_\_\_\_

2.



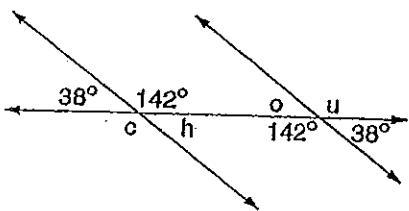
$m\angle n =$  \_\_\_\_\_

$m\angle g =$  \_\_\_\_\_

$m\angle i =$  \_\_\_\_\_

$m\angle s =$  \_\_\_\_\_

3.



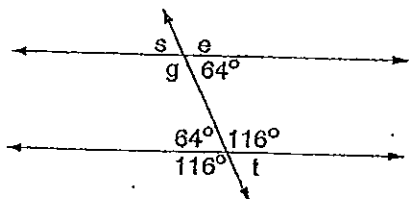
$m\angle u =$  \_\_\_\_\_

$m\angle o =$  \_\_\_\_\_

$m\angle c =$  \_\_\_\_\_

$m\angle h =$  \_\_\_\_\_

4.



$m\angle s =$  \_\_\_\_\_

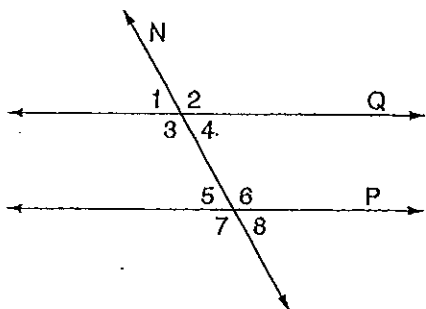
$m\angle e =$  \_\_\_\_\_

$m\angle g =$  \_\_\_\_\_

$m\angle t =$  \_\_\_\_\_



# Alternate Angles



Line Q is parallel to line P.  
Line N intersects lines Q and P, forming 8 angles.

Angles 4 and 5 are **alternate interior angles**.  
Angles 1 and 8 are **alternate exterior angles**.

When parallel lines are intersected by the same line, the alternate interior angles are congruent and the alternate exterior angles are congruent.

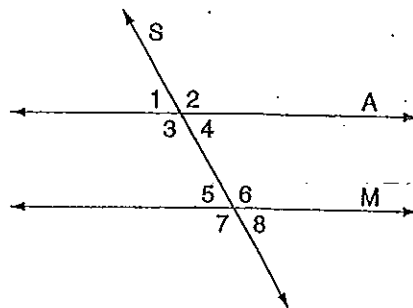
**Alternate interior angles**

$$\angle 4 \cong \angle 5 \quad \angle 3 \cong \angle 6$$

**Alternate exterior angles**

$$\angle 1 \cong \angle 8 \quad \angle 2 \cong \angle 7$$

Use the diagram at the right to find the angle measures.  
Line A is parallel to Line M.



**A. Let  $m\angle 1 = 58^\circ$ .**

$$m\angle 2 = \underline{\hspace{2cm}} \quad m\angle 3 = \underline{\hspace{2cm}}$$

$$m\angle 4 = \underline{\hspace{2cm}} \quad m\angle 5 = \underline{\hspace{2cm}}$$

$$m\angle 6 = \underline{\hspace{2cm}} \quad m\angle 7 = \underline{\hspace{2cm}} \quad m\angle 8 = \underline{\hspace{2cm}}$$

**B. Let  $m\angle 2 = 116^\circ$ .**

$$m\angle 1 = \underline{\hspace{2cm}} \quad m\angle 3 = \underline{\hspace{2cm}} \quad m\angle 4 = \underline{\hspace{2cm}} \quad m\angle 5 = \underline{\hspace{2cm}}$$

$$m\angle 6 = \underline{\hspace{2cm}} \quad m\angle 7 = \underline{\hspace{2cm}} \quad m\angle 8 = \underline{\hspace{2cm}}$$

**C. Let  $m\angle 5 = 63^\circ$ .**

$$m\angle 1 = \underline{\hspace{2cm}} \quad m\angle 2 = \underline{\hspace{2cm}} \quad m\angle 3 = \underline{\hspace{2cm}} \quad m\angle 4 = \underline{\hspace{2cm}}$$

$$m\angle 6 = \underline{\hspace{2cm}} \quad m\angle 7 = \underline{\hspace{2cm}} \quad m\angle 8 = \underline{\hspace{2cm}}$$

**D. Let  $m\angle 7 = 123^\circ$ .**

$$m\angle 1 = \underline{\hspace{2cm}} \quad m\angle 2 = \underline{\hspace{2cm}} \quad m\angle 3 = \underline{\hspace{2cm}} \quad m\angle 4 = \underline{\hspace{2cm}}$$

$$m\angle 5 = \underline{\hspace{2cm}} \quad m\angle 6 = \underline{\hspace{2cm}} \quad m\angle 8 = \underline{\hspace{2cm}}$$

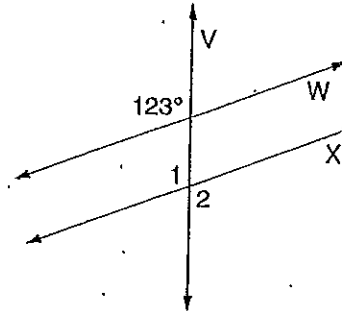
## Finding Angle Measurements

Use the information given to find the measure of each angle.

**A. X is parallel to W.**

$\angle 1 =$  \_\_\_\_\_

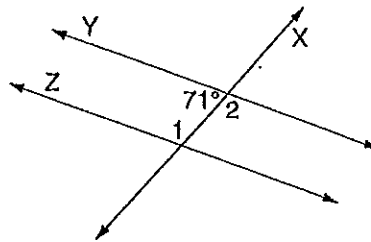
$\angle 2 =$  \_\_\_\_\_



**B. Y is parallel to Z.**

$\angle 1 =$  \_\_\_\_\_

$\angle 2 =$  \_\_\_\_\_



**C. B is parallel to C.**

**D is parallel to E.**

$m\angle 1 = 53^\circ$

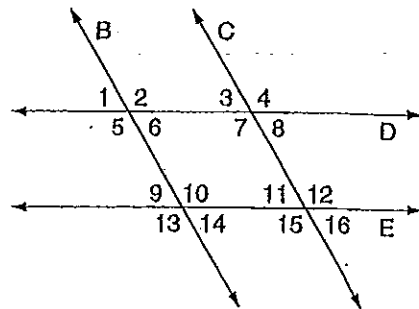
$\angle 2 =$  \_\_\_\_\_       $\angle 3 =$  \_\_\_\_\_       $\angle 4 =$  \_\_\_\_\_

$\angle 5 =$  \_\_\_\_\_       $\angle 6 =$  \_\_\_\_\_       $\angle 7 =$  \_\_\_\_\_

$\angle 8 =$  \_\_\_\_\_       $\angle 9 =$  \_\_\_\_\_       $\angle 10 =$  \_\_\_\_\_

$\angle 11 =$  \_\_\_\_\_       $\angle 12 =$  \_\_\_\_\_       $\angle 13 =$  \_\_\_\_\_

$\angle 14 =$  \_\_\_\_\_       $\angle 15 =$  \_\_\_\_\_       $\angle 16 =$  \_\_\_\_\_



**D. R is perpendicular to U.**

**S is parallel to T.**

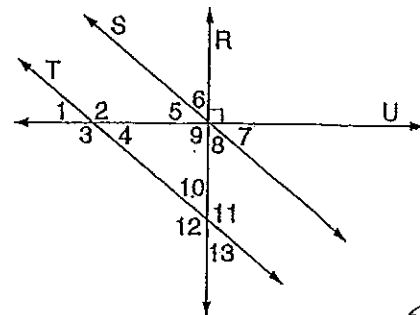
$m\angle 1 = 39^\circ$

$\angle 2 =$  \_\_\_\_\_       $\angle 3 =$  \_\_\_\_\_       $\angle 4 =$  \_\_\_\_\_

$\angle 5 =$  \_\_\_\_\_       $\angle 6 =$  \_\_\_\_\_       $\angle 7 =$  \_\_\_\_\_

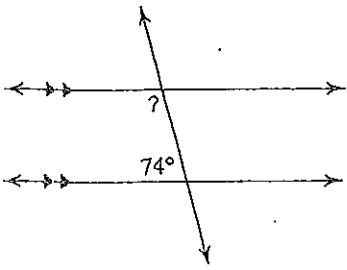
$\angle 8 =$  \_\_\_\_\_       $\angle 9 =$  \_\_\_\_\_       $\angle 10 =$  \_\_\_\_\_

$\angle 11 =$  \_\_\_\_\_       $\angle 12 =$  \_\_\_\_\_       $\angle 13 =$  \_\_\_\_\_

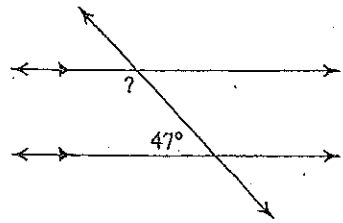


Find the measure of each angle indicated.

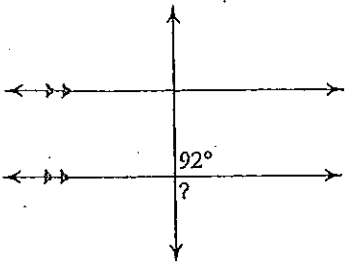
1)



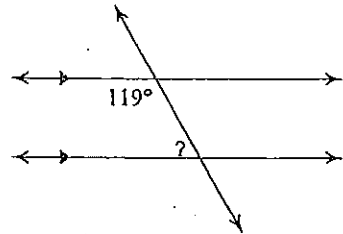
2)



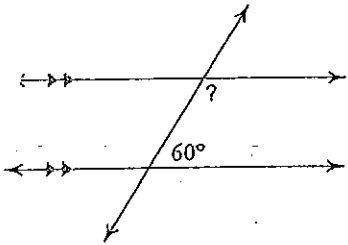
3)



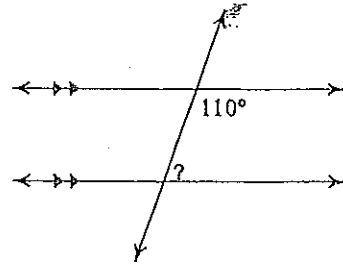
4)



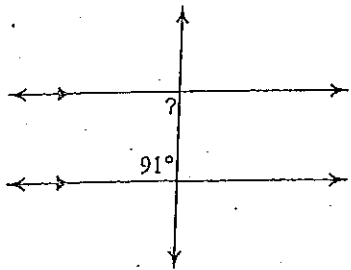
5)



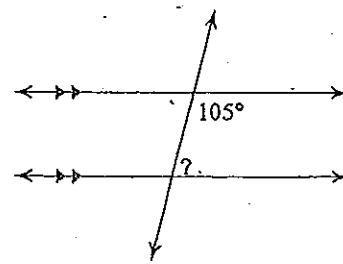
6)



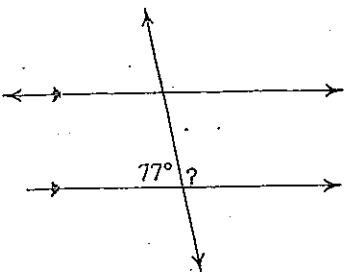
7)



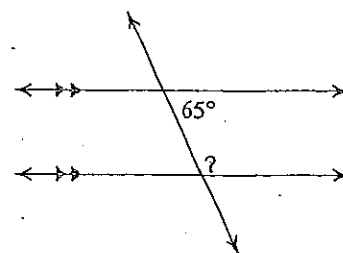
8)



9)



10)



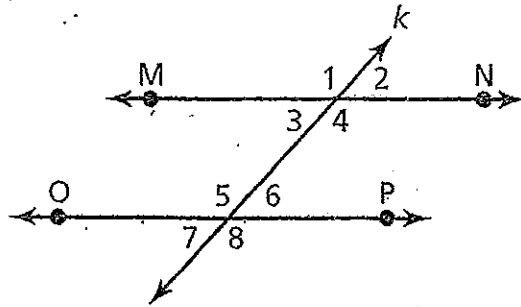
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37

In the diagram below,  $MN \parallel OP$ , and transversal  $k$  intersects both lines.



[not drawn to scale]

Name two angles in the diagram that are congruent to  $\angle 4$ .

**Answer**  $\angle$  \_\_\_\_\_ and  $\angle$  \_\_\_\_\_

On the lines below, explain how you determined these angles are congruent to  $\angle 4$ .

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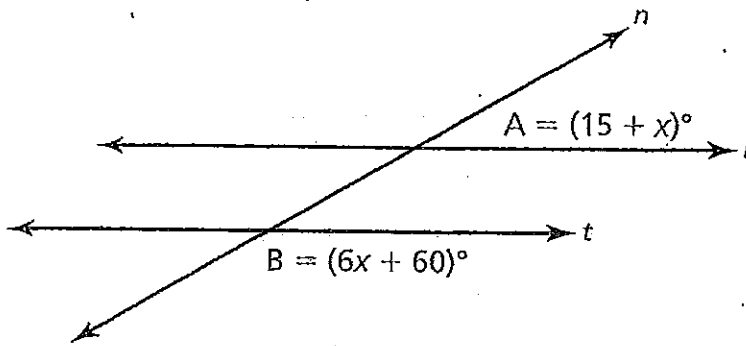
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(you must use vocabulary in your explanation)

44 In the diagram below, line  $r$  and line  $t$  are parallel. Line  $n$  is a transversal.



[not drawn to scale]

What is the measure, in degrees, of  $\angle A$ ?

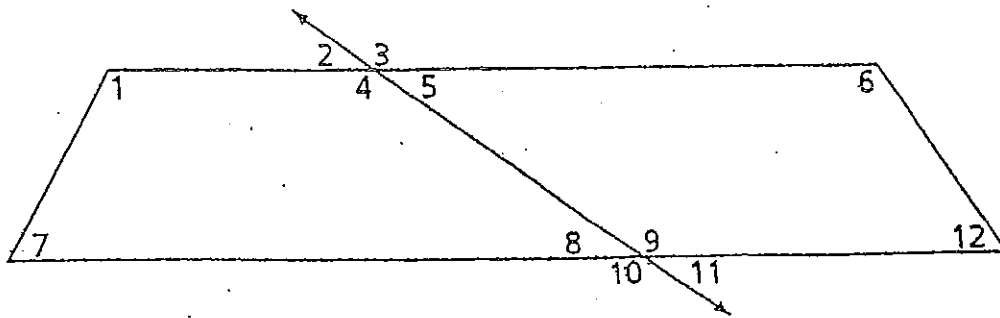
*Show your work.*

Answer \_\_\_\_\_ degrees

118

35

The figure below shows a trapezoid intersected by a line. The angles formed are represented by the numbers 1 through 12.



On the line below, list two angles in the figure that are congruent to  $\angle 5$ .

---

On the line below, list two angles in the figure that are supplementary to  $\angle 5$ .

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