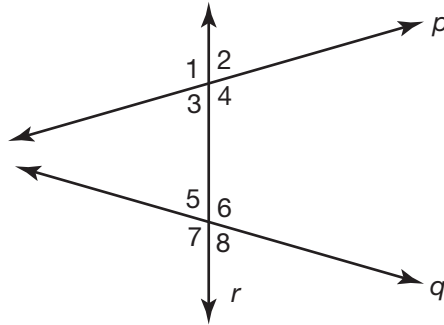


## Investigate Problem 1

Line  $t$  is called a *transversal* of lines  $m$  and  $n$ . When a line intersects two or more other lines all at different points, the line is called a **transversal**. The transversal is said to “cut” the lines.

How many angles are created when two lines are cut by a transversal? Use a complete sentence in your answer.

3. Now consider the lines below, formed from Rhode Island Avenue (line  $p$ ), Massachusetts Avenue (line  $q$ ), and 9th Street (transversal  $r$ ).



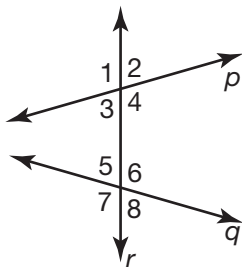
We can classify the angles created when two lines are cut by a transversal. Four of the eight angles are *interior angles*, and the other four angles are *exterior angles*. Which four angles do you think are the interior angles? Which four angles do you think are the exterior angles? Explain your reasoning. Use complete sentences in your answer.

In Question 4 through Question 8, you will learn about other ways to classify these angles.

4. Two angles are **alternate interior angles** if they lie between the two lines on opposite (alternate) sides of the transversal. Angle 3 and  $\angle 6$  in the figure above are alternate interior angles. Name any other pairs of alternate interior angles given in the figure. Use a complete sentence in your answer.

## Investigate Problem 1

5. Two angles are **alternate exterior angles** if they lie outside the two lines on opposite (alternate) sides of the transversal. Angle 1 and  $\angle 8$  in the figure below at the left are alternate exterior angles. Name any other pairs of alternate exterior angles given in the figure. Use a complete sentence in your answer.



6. Complete the following statement:

Two angles are **same-side interior angles**, if they lie

\_\_\_\_\_ the two lines on the \_\_\_\_\_ side of the transversal.

Name all pairs of same-side interior angles given in the figure at the left. Use a complete sentence in your answer.

7. Complete the following statement:

Two angles are **same-side exterior angles**, if they lie \_\_\_\_\_ the two lines on the \_\_\_\_\_ side of the transversal.

Name all pairs of same-side exterior angles given in the figure at the left. Use a complete sentence in your answer.

8. Two angles are **corresponding angles** if they are on the same side of the transversal in corresponding positions. Angle 1 and  $\angle 5$  in the figure at the left are corresponding angles. Name any other pairs of corresponding angles given in the figure. Use a complete sentence in your answer.

9. Suppose that  $m\angle 5 = 70^\circ$  in the figure above at the left.

What is  $m\angle 6$ ? Use a complete sentence to explain your reasoning.



## Investigate Problem 1

What is  $m\angle 7$ ? Use a complete sentence to explain your reasoning.

What is  $m\angle 8$ ? Use a complete sentence to explain your reasoning.

10. Suppose that  $m\angle 1 = 115^\circ$  in the figure on the previous page. Use this information to find  $m\angle 2$ ,  $m\angle 3$ , and  $m\angle 4$ . Use complete sentences to explain your reasoning.



11. Find the value of each sum.

$$m\angle 3 + m\angle 5$$

$$m\angle 4 + m\angle 6$$

$$m\angle 3 + m\angle 6$$

$$m\angle 4 + m\angle 5$$

12. Compare the measures of the angles in each angle pair.

$$\angle 1 \text{ and } \angle 5$$

$$\angle 3 \text{ and } \angle 7$$

$$\angle 2 \text{ and } \angle 6$$

$$\angle 4 \text{ and } \angle 8$$

13. List all pairs of supplementary angles formed by lines  $p$  and  $q$  and transversal  $r$ .

What is the relationship between the measures of the angles in each pair? Use a complete sentence in your answer.

## Investigate Problem 1

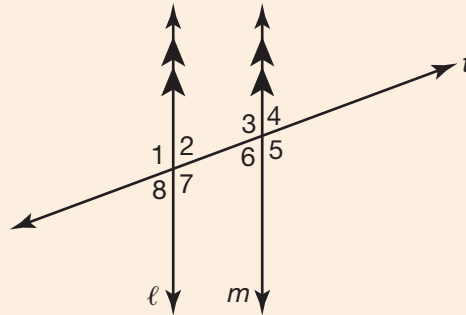
List all pairs of vertical angles formed by the lines and the transversal.

What is the relationship between the measures of the angles in each pair? Use a complete sentence in your answer.

## Problem 2 Properties of Parallel Lines



Consider the lines below, formed from Rhode Island Avenue (transversal  $t$ ), 9th Street (line  $\ell$ ), and 7th Street (line  $m$ ). Lines  $\ell$  and  $m$  are parallel. This is indicated on a figure by using double arrows ( $\rightarrow\rightarrow$ ). You can write this in symbols as  $\ell \parallel m$  where  $\parallel$  means “is parallel to.”



- Use a protractor to measure all of the angles in the figure above. Record your results below.
- Identify all of the congruent angles. Use complete sentences in your answer.
- Identify all pairs of corresponding angles. What do you notice about each pair of angles? Use a complete sentence in your answer.

## Problem 2

### Properties of Parallel Lines

- D.** Identify all pairs of alternate interior angles. What do you notice about each pair of angles? Use a complete sentence in your answer.
- E.** Identify all pairs of alternate exterior angles. What do you notice about each pair of angles? Use a complete sentence in your answer.

## Investigate Problem 2

- 1.** What can you conclude about the angles that are formed when a transversal cuts a pair of parallel lines? Use complete sentences in your answer.

What can you conclude about the pairs of same-side interior angles and the pairs of same-side exterior angles? Use complete sentences in your answer.

## Investigate Problem 2

2. The lines shown in the figure are parallel, and  $m\angle 1 = 102^\circ$ . Find the missing angle measures without using a protractor. Use complete sentences to explain how you found your answers.

