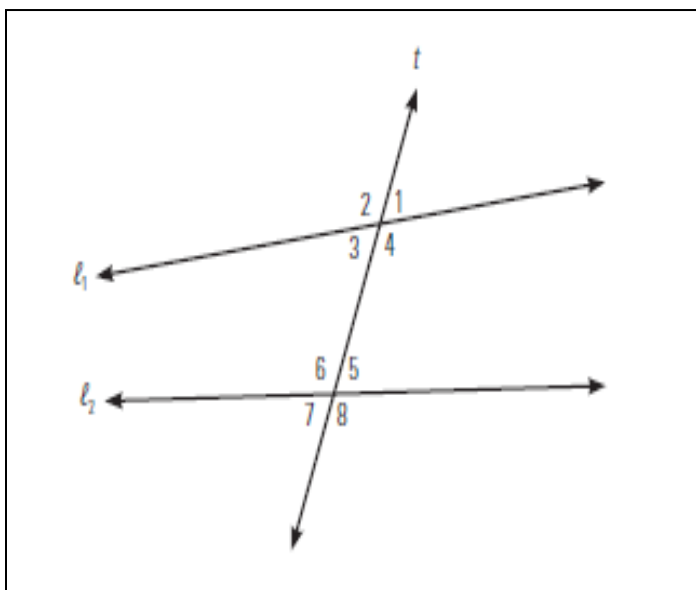## Non-Parallel Lines and Transversals   5.3

NEW SKILLS: WORKING WITH ANGLES FORMED BY INTERSECTING LINES

A line that intersects two other lines at two distinct points is a **transversal**. When two non-parallel lines are intersected by a transversal, they form angles of varying sizes.

Consider the diagram below: t is a transversal that intersects ℓ_1 and ℓ_2.

Eight angles are formed.

- **corresponding** angles are ____&____ ___&_____ ___& ___ ____&____

- **vertically opposite angles** - ____&____ ___&___ ___& ___ ____&___

- **alternate interior angles**. are ____&____ ___&_____

- **alternate exterior angles**. are ____&____ ___&_____

- ____ & _____, and _____ & _____ are pairs of interior angles on the same side of the transversal.

- ____ & _____, and _____ & _____ are pairs of exterior angles on the same side of the transversal.

For more details, see page 198 of *MathWorks   10.*

transversal: a line that intersects two or more lines

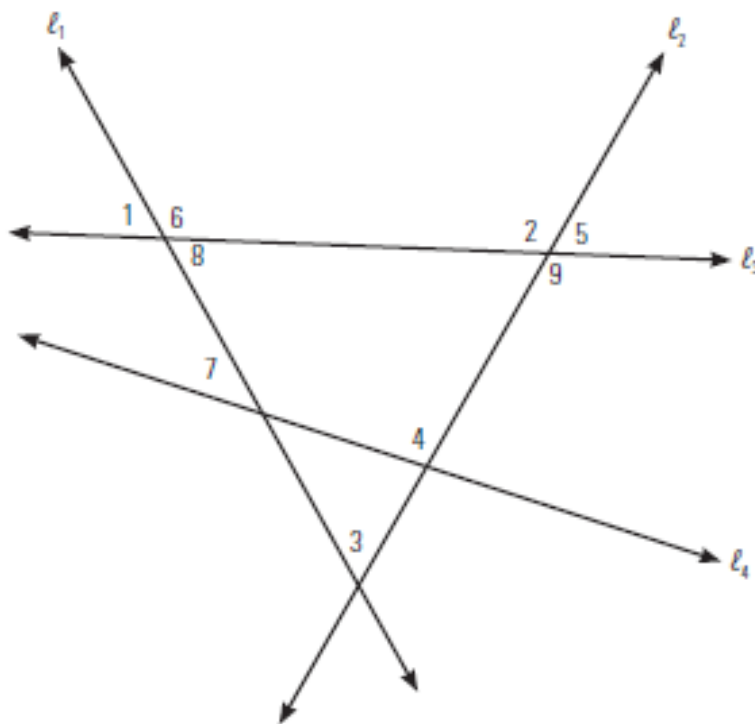**corresponding angles:** two angles that occupy the same relative position at two different intersections

vertically opposite angles: angles created by intersecting lines that share only a vertex

alternate interior angles: angles in opposite positions between two lines intersected by a transversal and also on alternate sides of the same transversal

alternate exterior angles: angles in opposite positions outside two lines intersected by a transversal

Example 1

A transversal is not necessarily one line segment in a specific drawing. In this figure, there are several lines that intersect other lines. These can be considered transversals.
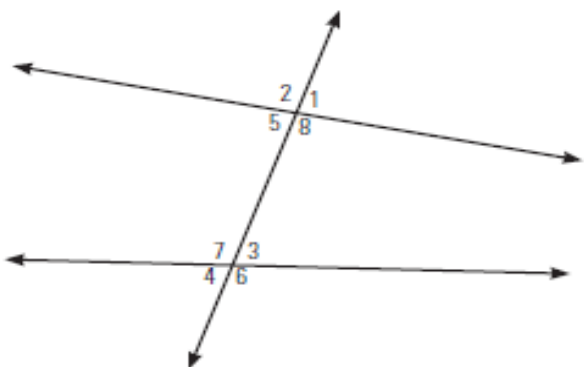
In the following diagram, identify each of the following, and specify which lines and transversals you are using.

a)   an interior angle on the same side of the transversal as ∠6

b)   an angle corresponding to ∠2

c)   an angle corresponding to ∠4

d)   an alternate interior angle to ∠4

SOLUTION

a)   Using ℓ_1 and ℓ_2, with transversal ℓ_3, _____ and _____ are interior angles on the same side of the transversal.

b)   Using ℓ_1 and ℓ_2, with transversal ℓ_3, _____ corresponds to _____.

c)   Using ℓ_1 and ℓ_2, with transversal ℓ_4, _____ corresponds to _____.

d)   Using ℓ_3 and ℓ_4, with transversal ℓ_2, _____ and _____ are alternate interior angles.

1. In the diagram below, identify the relationship between each pair of angles.

a) ∠7 and ∠8

b) ∠2 and ∠7

c) ∠1 and ∠6

d) ∠5 and ∠7

2. Given the diagram below, identify the following angles.
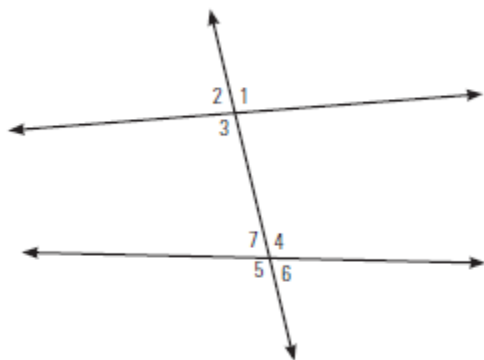
a) an alternate exterior angle to ∠2

b) an interior angle on the same side of the transversal as ∠7

c) an alternate interior angle to ∠4

d) an angle corresponding to ∠5

3. Identify each of the following angles. Name the two lines and the transversal you are using.
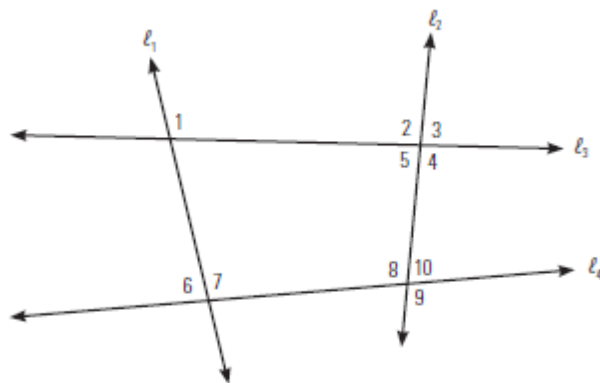
a) two angles corresponding to ∠1

b) an interior angle on the same side of the transversal as ∠10

c) an alterate interior angle to ∠5

d) two interior angles on the same side of the transversal as ∠8

Example 2

In the diagram below, measure and record the sizes of the angles. Identify pairs of equal angles and state why they are equal.
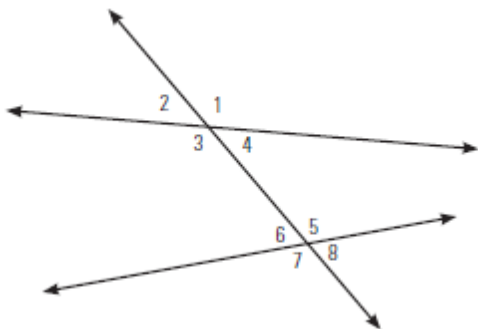
SOLUTION

Use a protractor to measure the angles.

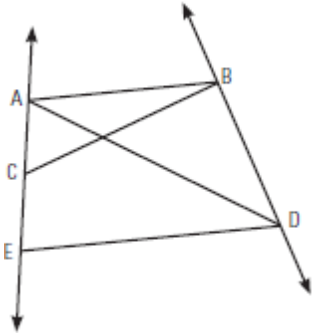_____and _____ measure _____°

_____ and _____ measure _____°

_____and _____ measure _____°
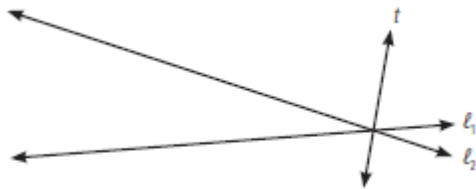
_____ and _____ measure _____°

These are each pairs of _____ _____ angles.

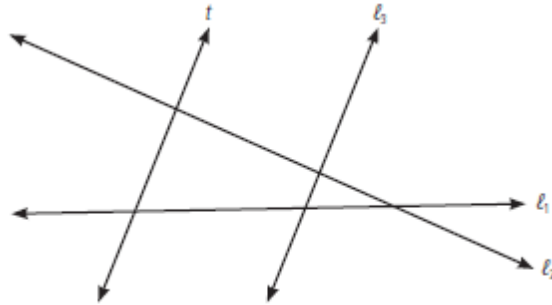**BUIL** **YOU** **SKILL**

4. Look at the diagram below. Identify two transversals that intersect both AB and AD.

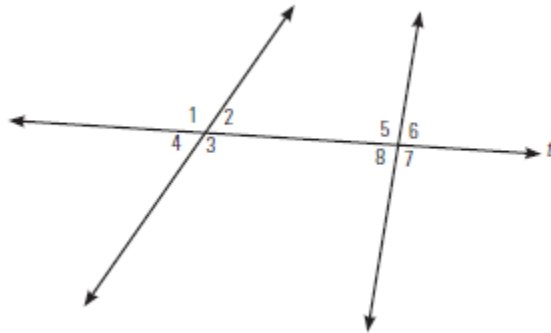5. In the diagram below, can *t* be a transversal that intersects ℓ_1 and ℓ_2? State why or why not.

6. In the diagram below, t is a transversal that intersects ℓ_1 and ℓ_2. Name another pair of lines and their transversal.


PRACTIS YOU NE SKILL

1. In the diagram below, where t is the transversal, identify two pairs of each of the following angles.


a) alternate interior angles

b) corresponding angles

c) interior angles on the same side of the transversal

2. A flashlight shines down onto a floor as shown in the diagram below. If the outer rays are considered to be two lines and the floor is a transversal, name a pair of corresponding angles.
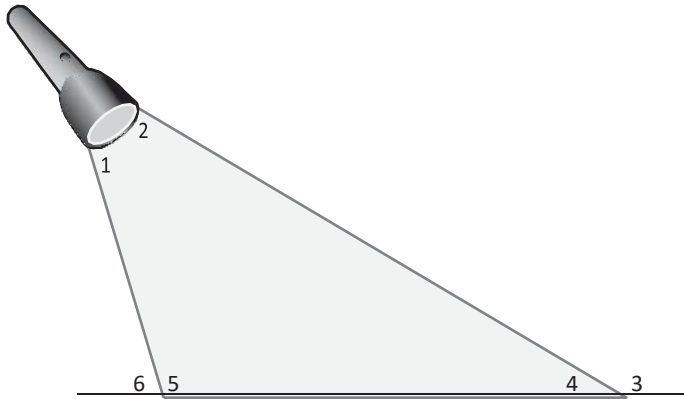
3. In the diagram below, identify which line is a transversal that intersects ℓ_1 and ℓ_2 that makes the following relationships between the pairs of angles.

   a) $\angle 1$ and $\angle 2$ a pair of corresponding angles

   b) $\angle 3$ and $\angle 4$ a pair of alternate interior angles
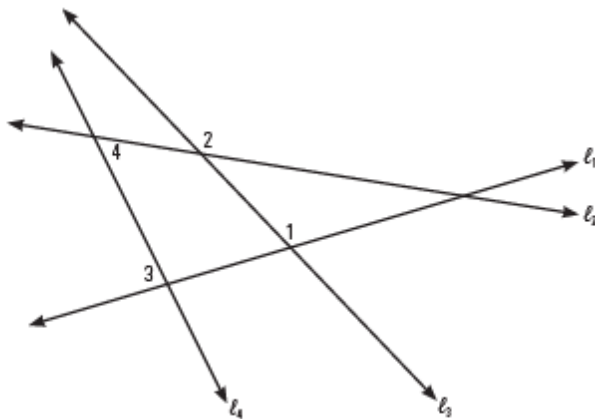
4. In the diagram below, calculate the sizes of each of the interior angles. What is their sum?
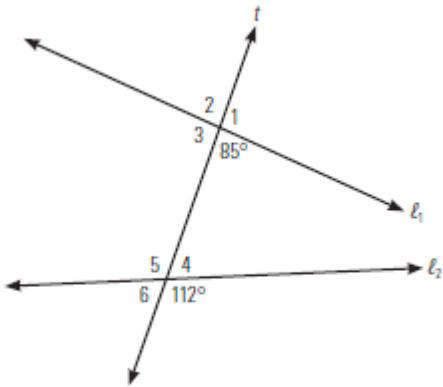
5. Calculate the sizes of the six angles indicated in the figure.