Name: _____

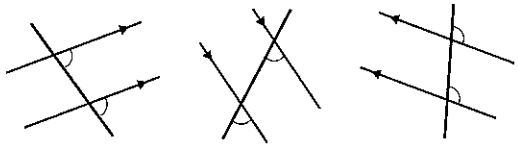
Activity 1.9 ◆ Four Kinds of Related Angles

◆ Four Kinds of Related Angles

Recognizing relationships between angles in a figure is a handy way to find out when angles are the same.

When two parallel lines are crossed by a third line, the crossing line is called a *transversal.* Transversals create corresponding angles and alternate interior angles.

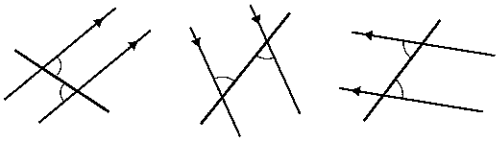
Corresponding Angles: In the following figures, *corresponding angles* are marked:



Corresponding angles are equal.

Note: Do you notice how parallel lines are marked with a corresponding pair of arrowheads?

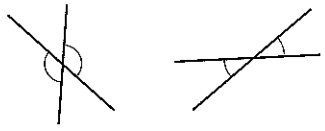
Alternate Interior Angles: Here, *alternate interior angles* are marked:



Alternate interior angles are equal.

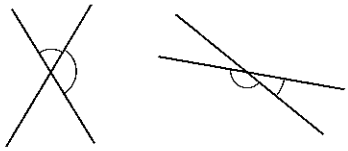
When two lines cross, supplementary and vertical angles are formed.

Vertical Angles: *Vertical angles,* which are across the "vertex" from each other, are marked in the pairs of lines shown. When two lines cross, they always form two pairs of vertical angles.



Vertical angles are equal.

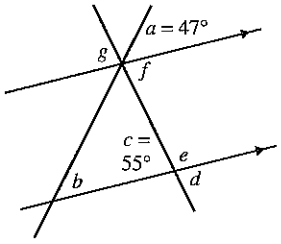
Supplementary Angles: *Supplementary angles,* which are side by side, are marked in the next figures.



Supplementary angles always add up to 180°.

◆ Problems

1. Some books refer to the equality of alternate interior angles as the *"Z" property* and the equality of corresponding angles as the *"F" property.* Can you see how this makes sense?
2. Consider this figure:



In the following blank lines, write *corresponding, alternate interior, supplementary,* or *vertical,* depending on the relationship between the two angles.

(a) Since $\angle a = 47°$, it follows that $\angle b = 47°$ because a and b are _____ angles.

(b) Since $\angle c = 55°$, it follows that $\angle d = 55°$ because c and d are _____ angles.

(c) Since $\angle c = 55°$, it follows that $\angle e = 125°$ because c and e are _____ angles.

(d) Since $\angle c = 55°$, it follows that $\angle f = 55°$ because c and f are _____ angles.

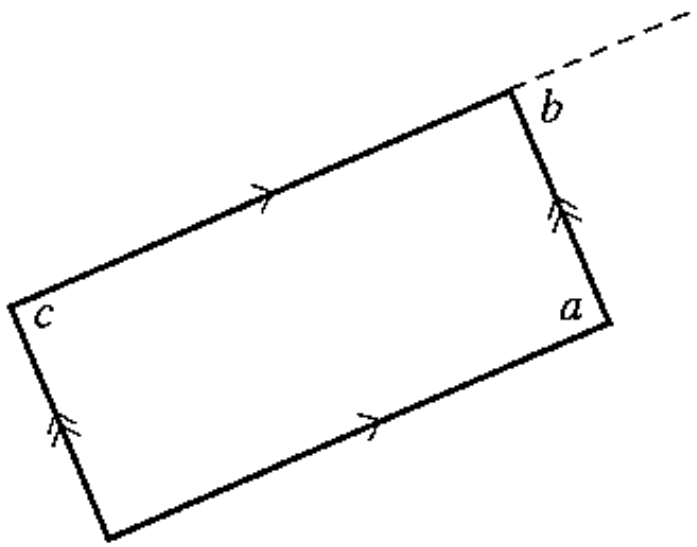
(e) Observe that $\angle g = 55°$. Give two different reasons that this must follow from angles established in parts (a) through (d).

Reason 1:

Reason 2:

3. One useful property of parallelograms is that opposite angles are the same. Written next is Jim's reasoning establishing this property.

This makes sense to me by 2 steps.



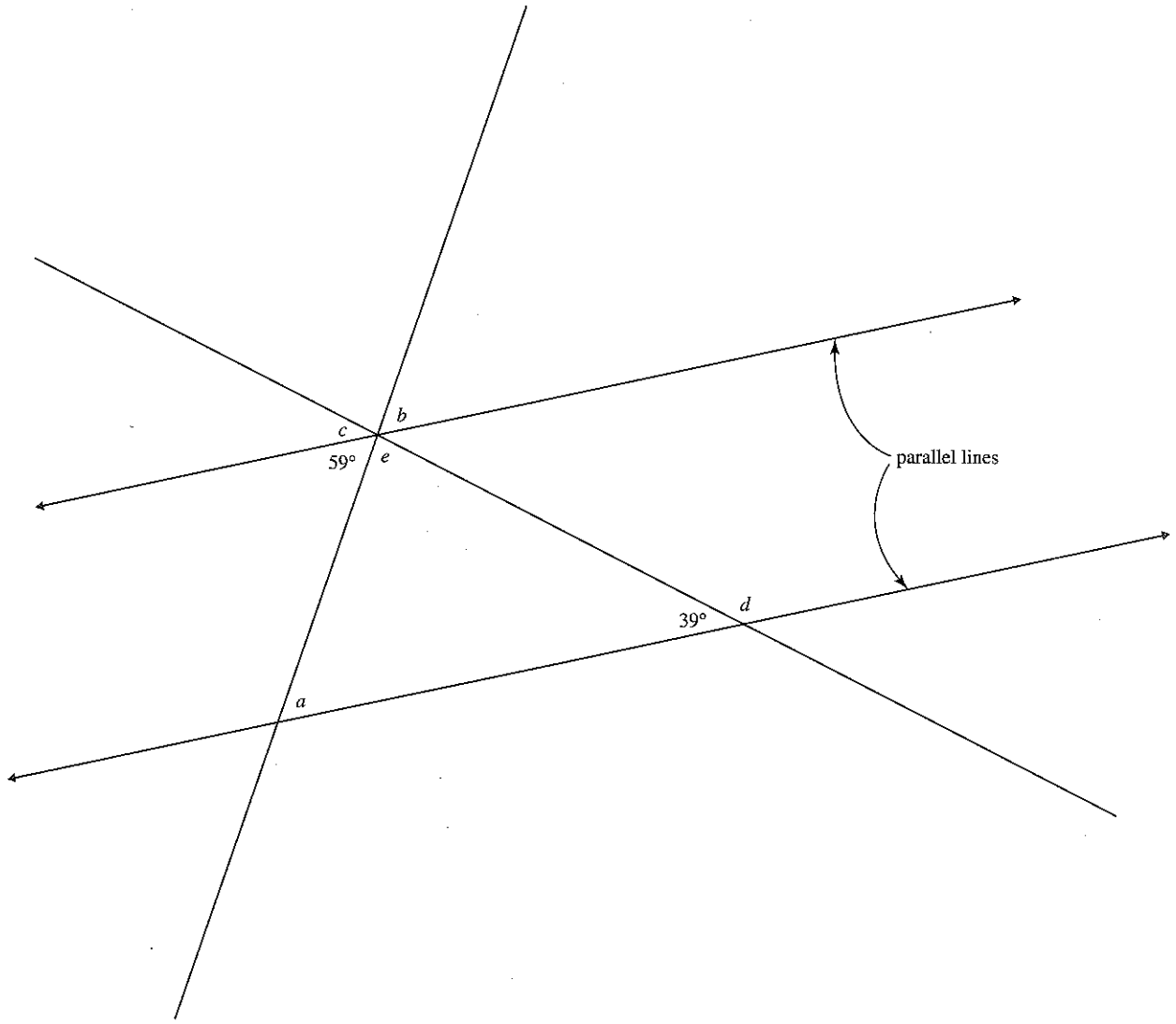
Step 1: a and b are the same.

Step 2: b and c are the same.
So the opposite angles a and c are the same.

After each of the preceeding two steps, give a reason based on the four kinds of related angles.

Name: _____

Activity 1.10 ◆ Figuring Angles and Checking by Measurement



For each of the problems that follow,

(a) figure out the value of the indicated angle by using an angle relationship,

(b) give your reason for your answer, and

(c) measure the actual value of the angle.

◆ Problems

1. (a) Value of angle *a*:

(b) Reason:

(c) Measured value of *a*:

2. (a) Value of angle b:

(b) Reason:

(c) Measured value of b:

3. (a) Value of angle c:

(b) Reason:

(c) Measured value of c:

4. (a) Value of angle d:

(b) Reason:

(c) Measured value of d:

5. (a) Value of angle e:

(b) Reason:

(c) Measured value of e: