Parallel Lines and Angles

In our study of geometry, we have been defining and identifying various pairs of lines and angles. Most recently, we learned that when two lines are cut by a transversal, special pairs of angles are formed. Today we will practice identifying these special pairs of angles and will look for any relationships among the pairs of angles formed.

Problem 1

According to the diagram, lines a and b are parallel and cut by transversal line c.

a. Identify all pairs of corresponding angles.
<1 and <7, <2 and <4, <3 and <5, <8 and <6

b. Identify all pairs of alternate interior angles.
<8 and <4, <3 and <7

c. Identify all pairs of alternate exterior angles.
<2 and <6, <1 and <5

d. Identify all pairs of consecutive (same side) interior angles.
<3 and <4, <8 and <7

e. Identify all pairs of consecutive (same side) exterior angles.
<2 and <5, <1 and <6
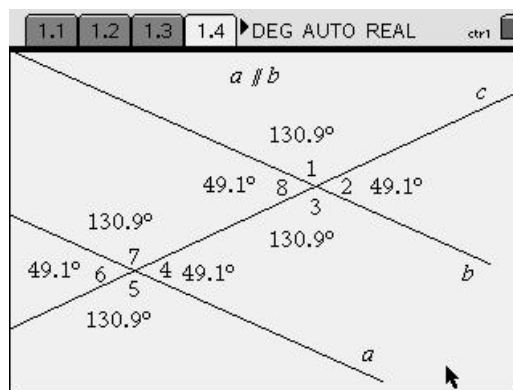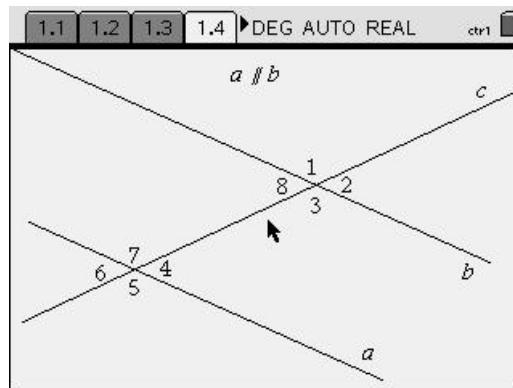
Next measure all eight angles using your handheld. Record the measurements on the diagram.

Problem 2

According to the diagram, lines s and t are parallel and cut by transversal line r.

a. Identify all pairs of corresponding angles.
   <u><1 and <3, <2 and <4, <5 and <7</u>
   <u><6 and <8</u>

b. Identify all pairs of alternate interior angles.
   <u><2 and <6, <3 and <7</u>

c. Identify all pairs of alternate exterior angles.
   <u><1 and <5, <4 and <8</u>

d. Identify all pairs of consecutive (same side) interior angles.
   <u><2 and <3, <6 and <7</u>

e. Identify all pairs of consecutive (same side) exterior angles.
   <u><1 and <4, <5 and <8</u>
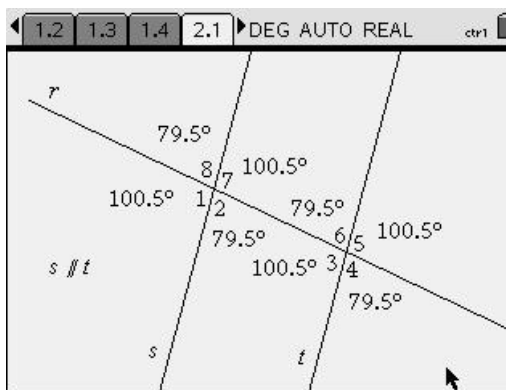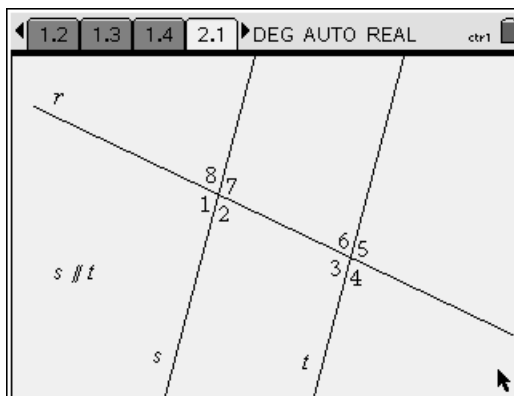
Next measure all eight angles using your handheld. Record the measurements on the diagram.

What have you observed?
Considering both problems, can we make some generalizations?

If two parallel lines are cut by a transversal, then:
        corresponding angles are <u>congruent</u>,
        alternate interior angles are <u>congruent</u>,
        alternate exterior angles are <u>congruent</u>,
        consecutive (same side) interior angles are <u>supplementary</u>, and
        consecutive (same side) exterior angles are <u>supplementary</u>.

Problem 3

Choose any one angle to measure.
        m<___ = ____   choices will vary

Then based on that <u>one</u> measurement,
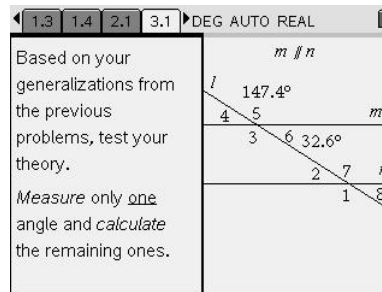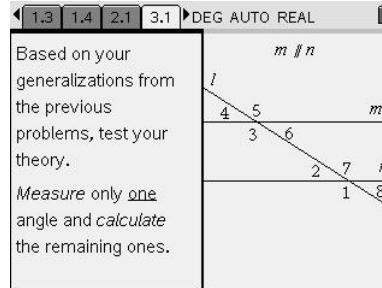calculate the remaining seven measures.

m<1 = <u>147.4</u>	m<5 = <u>147.4</u>
m<2 = <u>32.6</u>	m<6 = <u>32.6</u>
m<3 = <u>147.4</u>	m<7 = <u>147.4</u>
m<4 = <u>32.6</u>	m<8 = <u>32.6</u>

Now verify your calculations on your
handheld.

Problem 4 Extension

Are lines f and g parallel? <u>No</u>

How do you know? Be specific.

Students may respond that they measured and found that alternate interior angles, or alternate exterior angles, or corresponding angles are not congruent. Students may respond that they measured and found that consecutive interior or consecutive exterior angles are not supplementary. Measures should be given as evidence.

Students might also measure the slopes of the two lines and determine that since the slopes are not equal, the lines are not parallel.