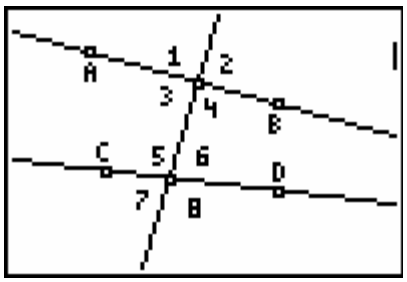
Name: _____ Period: _____ Date: _____

Geometry: Properties of Parallel Lines

Part 1: Transversal Lines



Transversal – A line that intersects two coplanar lines at two different points. A transversal creates eight angles: (Use the figure on the right. You do not have to use Cabri Jr. for part 1.)

Corresponding angles – pairs of angles that lie in relative positions when tow lines are cut by a transversal. ∠1 and ∠5 is a pair of corresponding angles. ∠3 and ∠7 is another pair of corresponding angles. Name the two remaining pairs of corresponding angles. _____ and _____.

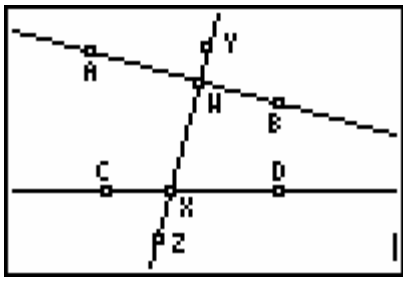
Alternate interior angles – pairs of angles that lie on opposite sides of a transversal and between the two lines cut by the transversal. ∠3 and ∠6 is a pair of alternate interior angles. ∠___ and ∠___ is another pair of alternate interior angles.

Alternate exterior angles – pairs of angles that lie on opposite sides of a transversal and are outside the two lines cut by the transversal. ∠2 and ∠7 is a pair of alternate exterior angles. ∠___ and ∠___ is another pair of alternate exterior angles.

Same-side interior angles – are pairs of angles that lie on the same side of a transversal and are between the two lines cut by the transversal. ∠3 and ∠5 is a pair of same-side interior angles. ∠___ and ∠___ is another pair of same-side interior angles.

Same-side exterior angles – are pairs of angles that lie on the same side of a transversal and are outside the two lines cut by the transversal. ∠1 and ∠7 is a pair of same-side interior angles. ∠___ and ∠___ is another pair of same-side exterior angles.

Part 2: Angles Cut by a Transversal



Draw two non-parallel lines cut by a transversal.

- Draw a non-horizontal line $\overleftrightarrow{AB}$ on the top half of the screen.
- Draw a horizontal line $\overleftrightarrow{CD}$ on the bottom half of the screen.
- Place a point W on $\overleftrightarrow{AB}$ and a point X on $\overleftrightarrow{CD}$.
- Draw a transversal line between these two points.
- Construct a point Y on $\overleftrightarrow{WX}$ above line $\overleftrightarrow{AB}$ and a point Z on $\overleftrightarrow{WX}$ below $\overleftrightarrow{CD}$ as shown.
- Find the measurement of ∠AWX and ∠CXZ.

Exploration:

∇ Drag each line or a point on the line to find conditions when the measures of ∠AWX and ∠CXZ are equal. Note the relationship of the three lines each time the condition is met.

∇ Investigate the relationships between the following pairs of angles when the measures of ∠AWX and ∠CXZ are equal.

- ∠AWX and ∠WXD _____
- ∠AWX and ∠CXW _____
- ∠CXZ and ∠YWB _____
- ∠CXZ and ∠AWY _____

Questions and Conjectures:

1. For each angle pairing mentioned in the exploration, determine the angle relationship of the pair.
   a. Alternate interior angles:_____
   b. Alternate exterior angles:_____
   c. Same-side interior angles:_____
   d. Same-side exterior angles:_____
2. Make a conjecture about the relationship among the three lines when the measures of ∠AWX and ∠CXZ are equal.

3. What are the relationships between the angles listed below when the measures of ∠AWX and ∠CXZ are equal? (Equal, Supplementary, Complementary, etc.)
   - ∠AWX and ∠WXD _____
   - ∠AWX and ∠CXW _____
   - ∠CXZ and ∠YWB _____
   - ∠CXZ and ∠AWY _____

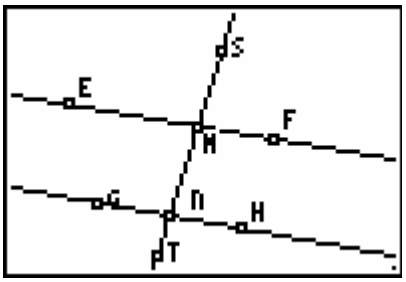
Show your teacher your calculator screen and completed answers. Teacher Signature:_____

Name: _____ Period: _____ Date: _____

Part 3: Parallel Lines Cut by a Transversal

Draw two parallel lines cut by a transversal.

- Clear the previous construction.
- Draw a non-horizontal line $\overleftrightarrow{EF}$ on the top half of the screen.
- Draw a point G not on $\overleftrightarrow{EF}$ on the bottom half of the screen.
- Construct line $\overleftrightarrow{GH}$ parallel to $\overleftrightarrow{EF}$.
  - Hit [ZOOM] then scroll down to Parallel hit [ENTER].
  - Scroll to point G and press [ENTER].
  - Scroll to $\overleftrightarrow{EF}$ and press [ENTER].
  - Place point H on the line created.
- Construct line $\overleftrightarrow{ST}$ as a transversal that intersects $\overleftrightarrow{EF}$ and $\overleftrightarrow{GH}$.
- Construct point M at the intersection of $\overleftrightarrow{EF}$ and $\overleftrightarrow{ST}$.
- Construct point N at the intersection of $\overleftrightarrow{GH}$ and $\overleftrightarrow{ST}$.



Exploration:

∇ Measure two angles that are corresponding angles. Drag the lines and the points on the lines. Note the relationship between the two angles:

∇ Repeat the previous Exploration using a pair of angles that are (Note the relationship of each.):

a. Alternate interior angles:_____
b. Alternate exterior angles:_____
c. Same-side interior angles:_____
d. Same-side exterior angles:_____

Questions and Conjectures:

4. Answer the following questions based on angles formed by two parallel lines cut by a transversal.
   a. Name all pairs of corresponding angles and make a conjecture about their measurements (equal, supplementary, complementary, etc.)

   b. Name all pairs of alternate interior angles and make a conjecture about their measurements.

   c. Name all pairs of alternate exterior angles and make a conjecture about their measurements.

   d. Name all pairs of same-side interior angles and make a conjecture about their measurements.

   e. Name all pairs of same-side exterior angles and make a conjecture about their measurements.
5. For parallel lines and a transversal, if two angles are corresponding angles, then _____
6. For parallel lines and a transversal, if two angles are alternate interior angles, then _____
7. For parallel lines and a transversal, if two angles are alternate exterior angles, then _____
8. For parallel lines and a transversal, if two angles are same-side interior angles, then _____
9. For parallel lines and a transversal, if two angles are same-side exterior angles, then _____

Show your teacher your calculator screen and completed answers. Teacher Signature:_____