## Student Activity Instructions Investigation: Angles Formed by Parallel Lines and a Transversal Technology: Geometer's Sketchpad

## Activity Time Frame: One 60 minute period (providing the GSP program is already installed).

In this activity you will investigate angles formed by parallel lines and a transversal. You will be engaged in construction and manipulation of parallel lines, a transversal and the angles created. You will also be expected to prove your understanding of the concept by filling in the accompanying Student Activity Worksheet, discussing the activity with your peers and describing what occurs. When parallel lines are intersected by a third line, called a *transversal*, there are certain relationships between the angles formed. Use the following steps to explore these relationships using Geometer's Sketchpad.

To download Geometer's Sketchpad onto your own computer go to: <u>http://www.keypress.com/x24795.xml</u> and select either the Windows or Macintosh version depending on your operating system. Please pay attention for the minimum system requirements so you can successfully install and use the software. You get 15 minutes of access without having to purchase a license.



## **Steps:**

1. Highlight he Line tool and construct a line with two points A and B. Label the two points.





2. Highlight the **Point** tool and place a point below line AB. Label this point C.

3. Highlight the **Select Arrow** and select line AB (not points A or B) and point C. In the **Construct** menu choose **Parallel Line**.

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4. Select the new line that contains point C with the **Select Arrow** and in the **Construct** menu choose **Point on Object**. Label the new point D

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C Untitled 1 A B C D Selected: Point D

5. Rearrange the points so that C is directly below A and D is directly below B. See diagram below.

6. Highlight the **Line** tool and construct a line so that it: one, bisects lines AB and CD; and two, lies between points A and B, C and D. Label points on the line E and F.







7. With the **Select Arrow** select line AB and EF. In the **Construct** menu choose **Point at Intersection**. Label this point G.





8. With the **Select Arrow** select line CD and EF. In the **Construct** menu choose **Point at Intersection**. Label this point H.



9. Look back at the diagram above to make sure that all points are labeled correctly and that they are located it the appropriate locations. When your sketch looks similar to the above one, select lines AB and CD. In the **Display** menu, choose **Color** and change the color to blue. Also change line EF to red by doing the same steps as before.

10. Measure each angle listed below (select the three points and in the **Measure** menu choose **Angle**) and reposition them so that the angle measure falls in the appropriate angle.







**Reminder:** Fill out the accompanying Student Activity Worksheet as you discuss with your peers your parallel lines and transversal constructions you made using GSP.

Class:	
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Name(s): \_\_\_\_\_

## **Student Activity Worksheet**

Angles to Measure: AGF, FGB, BGH, GHD, DHE, EHC, CHG, and HGA Answer the following questions pertaining to the construction you completed using the Geometer's Sketchpad Program:

1. Find Angles FGB and GHD. They are a pair of corresponding angles. How do their measures compare?

2. For each angle given below, list its corresponding angle and tell how the measures compare.

a) Angle FGB \_\_\_\_\_

b) Angle HGA \_\_\_\_\_

c) Angle BGH \_\_\_\_\_

d) Drag point E slowly and notice the measures of each pair of corresponding angles. How do their measures compare?

e) Complete the following statement: If two parallel lines are cut by a transversal, then the corresponding angles are \_\_\_\_\_\_

3. Find Angles: HGA and GHD. They are a pair of *alternate interior angles*. How do their measures compare?

a) Name the other pair of alternate interior angles in the sketch: \_\_\_\_\_\_, and

\_\_\_\_\_. How do their measures compare? \_\_\_\_\_\_

b) Drag point E slowly and notice the measures of both pairs of alternate interior angles. How do their measures compare?

c) Complete the following statement: If two parallel lines are cut by a transversal, then the alternate interior angles are \_\_\_\_\_\_.

4. Find Angles: AGF and DHE. They are a pair of *alternate exterior angles*. How do their measures compare?

a) Name the other pair of alternate exterior angles in the sketch: \_\_\_\_\_\_ and \_\_\_\_\_ and \_\_\_\_\_. How do their measures compare? \_\_\_\_\_\_

b) Drag point E slowly and notice the measures of both pairs of alternate exterior angles. How do their measures compare?

c) Complete the following statement: If two parallel lines are cut by a transversal, then the alternate exterior angles are \_\_\_\_\_\_