NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**CONSTRUCTING A PARALLELOGRAM**

**In your definition, make a statement about the sides and the angles.**

A parallelogram is a quadrilateral with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Constructing a Parallelogram on the Geometer’s Sketchpad**

1.) Go to the **Edit Menu** and select **Preferences**. Click the following settings:

 **Angle Unit:**  Degree **Precision:** Units

 **Distance Unit:** cm **Precision:** Tenths

 **Ratios:** **Precision:** Tenths

 Click **OK**

2.) Choose the **Segment Tool** and draw an eight or nine centimeter long horizontal line segment towards the bottom of the screen.

3.) Choose the **Selection Arrow Tool** and click in an open part of the screen to deselect the segment.

4.) Choose the **Text Tool** and click on the left endpoint of the line segment to label it point A and click on the right endpoint of the line segment to label it point B. Your construction should look like this:



5.) Choose the **Segment Tool** and draw a five or six centimeter line segment beginning at point A and sloping up and to the right.

6.) Choose the **Selection Arrow Tool** and click in an open part of the screen to deselect the line segment.

7.) Choose the **Text Tool** and click on the endpoint of the new line segment to give it a label of D. If the **Text Tool** does not label the point a D, double click on the letter given and change it to a capital letter D. Click **OK**. Your construction should now look like this:

8.) Using the **Selection Arrow Tool**, click in an open part of the screen to deselect point D. Select point B and $\overbar{AD}$. Go to the **Construct Menu** and select the **Parallel Line** option. A line through point B and parallel to $\overbar{AD}$ will appear. Click in an empty portion of the screen to deselect the line segment. Your construction should now look like this:

9.) Using the **Selection Arrow Tool**, select point D and $\overbar{AB}$. Go to the **Construct Menu** and choose the **Parallel Line** option.

10.) Using the **Selection Arrow Tool**, with the new horizontal line already selected (meaning it is highlighted) also highlight the line through point B. Go to the **Construct Menu** and select **Intersection**.

11.) Choose the **Text Tool** and click on this new point to give it a label of C. If the **Text Tool** does not label the point a C, double click on the letter given and change it to a capital letter C. Click **OK**.

12.) Choose the **Selection Arrow Tool** and click in an open part of the screen to deselect point C. Your construction should now look like this:

13.) Using the **Selection Arrow Tool**, select the line through points D and C and the line through points B and C. Go to the **Display Menu** and choose the **Hide Parallel Lines** option. Your new lines will be hidden but point C will still be there.

14.) Using the **Selection Arrow Tool**, select points D and C. Go to the **Construct Menu** and choose **Segment**. Click in an open part of the screen to deselect the segment. Repeat with points C and B. Your construction should now look like this:

15.) Using the **Selection Arrow Tool**, select the four sides of your parallelogram. Go to the **Measure Menu** and select **Length**. All four line segments should appear on the screen. Record the lengths below.

 m $\overbar{AB}$ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 m $\overbar{BC}$ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 m $\overbar{CD}$ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 m $\overbar{DA}$ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

16.) Click anywhere on the screen to deselect the side length measurements.

17.) Using the **Selection Arrow Tool**, click on the Points B, A, and D in that order to measure Angle A. Angles are named by three points. The identified angle is the letter in the middle. Angle A could have also been measured by clicking on the Points D, A, and B. Go to the **Measure Menu** and select **Angle**. Click anywhere on the screen to deselect the angle measurement.

 m ∠ BAD = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

18.) Use the **Selection Arrow Tool** and click on Points A, B, and C or Points C, B, and A. Go to the **Measure Menu** and select **Angle**. Click anywhere on the screen to deselect the angle measurement.

 m ∠ ABC = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

19.) Use the **Selection Arrow Tool** and click on Points B, C, and D or Points D, C, and B. Go to the **Measure Menu** and select **Angle**. Click anywhere on the screen to deselect the angle measurement.

 m ∠ BCD = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

20.) Use the **Selection Arrow Tool** and click on Points C, D, and A or Points A, D, and C. Go to the **Measure Menu** and select **Angle**. Click anywhere on the screen to deselect the angle measurement.

 m ∠ CDA = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

21.) Use the **Selection Arrow Tool** and go to the **Measure Menu** and select **Calculate**. Click on one of the angle measurements, then the addition sign, etc. Once all the angles have been included in the addition sentence, click **OK**. Click anywhere in an open part of the screen to deselect the sum of the angles.

 What is the sum of the angles of the parallelogram? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

22.) Using the **Selection Arrow Tool**, drag point B around. Your parallelogram should stay together. Get teacher initials: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

23.) As you drag point B around, explain what is happening to the opposite angle measurements.

 ∠A and ∠C:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

∠B and ∠D:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

24**.**) As point B is dragged around, the sum of the four angles \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

25.) Explain what is happening to the lengths of the opposite sides of the parallelogram as you are dragging point B around the screen.

m $\overbar{AB}$ and m $\overbar{DC}$: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 m $\overbar{AD}$ and m $\overbar{BC}$: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

26.) Using the **Selection Arrow Tool**, click in an open part of the screen to deselect all parts of the construction.