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

**INVESTIGATING THE DIAGONALS OF PARALLELOGRAMS**

The diagonals of parallelograms are line segments connecting the opposite vertices of the parallelogram.

**Diagonal Investigation #1 of Parallelograms: Are the Diagonals of Parallelograms Congruent?**

1.) Using the **Selection Arrow Tool**, select points A and C. Go to the **Construct Menu** and select **Segment**. Click in an open part of the screen to deselect the line segment. Repeat with points B and D.

2.) Using the **Selection Arrow Tool**, select and . Go to the **Measure Menu** and select **Length**. Record the measurements below. Click in an open part of the screen to deselect the measurements.

m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.) Drag point B of your parallelogram around while you watch the diagonal measurements of and the diagonal measurements of .

4.) As the parallelogram is changing, what do you notice about the measurements of the diagonals?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5.) Are the diagonals of parallelograms congruent? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6.) Using the **Selection Arrow Tool**, select and . Go to the **Construct Menu** and select **Intersection**.

7.) Using the **Text Tool**, label this point E. Your construction should look like this:

8.) Using the **Selection Arrow Tool**, click in an open part of the screen to deselect point E.

**Diagonal Investigation #2 of Parallelograms: Do the Diagonals of Parallelograms Bisect Each Other?**

**A line segment is BISECTED if it is cut into two congruent pieces. Diagonal AC cuts diagonal DB into two pieces and vice versa. You will investigate if the diagonals bisect each other into two congruent pieces.**

9.) Using the **Selection Arrow Tool**, select points A and E. Go to the **Measure Menu** and select **Distance**. Click in an open part of the screen to deselect the measurement. Select points E and C, go to the **Measure Menu** and select **Distance**. Click in an open part of the screen to deselect the measurement. Record the measurements below.

m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What do you notice about the lengths of and ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10.) Using the **Selection Arrow Tool**, select points D and E. Go to the **Measure Menu** and select **Distance**. Click in an open part of the screen to deselect the measurement. Select points E and B, go to the **Measure Menu** and select **Distance**. Click in an open part of the screen to deselect the measurement. Record the measurements below.

m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What do you notice about the lengths of and ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11.) Drag point B of your parallelogram.

As the parallelogram is changing, what is happening to the line segment pairs and ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

As the parallelogram is changing, what is happening to the line segment pairs and ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12.) Using the **Selection Arrow Tool**, click in an open part of the screen to deselect point B.

13.) Do the diagonals of parallelograms bisect each other? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Diagonal Investigation #3 of Parallelograms: Are the Diagonals of Parallelograms Perpendicular?**

**Two lines are said to be perpendicular if the angles formed at their intersection are 90°.**

14.) Diagonals AC and DB form four angles where they intersect inside the parallelogram at point E. Measure these four angles and record your results. (Follow step #17 from Constructing a Parallelogram if you do not remember how to measure an angle.)

m ∠ AEB = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m ∠ BEC = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m ∠ CED = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m ∠ DEA = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

15.) Drag point B of your parallelogram around while you watch these four angle measurements. What do you notice? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

16.) Are the diagonals of parallelograms perpendicular? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Diagonal Investigation #4 of Parallelograms: Do each of the Diagonals of Parallelograms Bisect the Vertex Angles?**

17.) Measure ∠ DAC and ∠CAB.

m ∠ DAC = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m ∠ CAB = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Did diagonal AC bisect ∠A? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

18.) Measure ∠ DCA and ∠ACB.

m ∠ DCA = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m ∠ ACB = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Did diagonal AC bisect ∠C? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

19.) Measure ∠ ADB and ∠BDC.

m ∠ ADB = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m ∠ BDC = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Did diagonal BD bisect ∠D? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

20.) Measure ∠ ABD and ∠DBC.

m ∠ ABD = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

m ∠ DBC = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Did diagonal BD bisect ∠B? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

21.) Do each of the diagonals of parallelograms bisect vertex angles? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

22.) Get the **Text Tool** and double click anywhere on the screen. Type the following information on your screen:

- Full Name

- Mathematics Teacher

- Hour

- Name of Polygon

23.) Go to the **File Menu** and select **Print Preview**. Stay on this screen and get the teacher’s initials: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

24**.**) You explored four investigations about the diagonals of parallelograms. Find out from other students around you if their investigations produced the same results. Write out the four investigations below and what you discovered about the diagonals of all parallelograms.

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