

Instructor: \_\_\_\_\_

Name: \_\_\_\_\_

**M302B – Developing Knowledge about Quadrilaterals****Lesson Goals:**

- 1) Students will increase the accuracy and power of their internal representations of various quadrilaterals
- 2) Students will develop knowledge of the characteristics of various quadrilaterals (square, rectangle, rhombus, kite, parallelogram, isosceles trapezoid, trapezoid) including side, angle, diagonal, and symmetry relationships
- 3) Students will develop their powers of investigation
  - a. students will develop their ability to utilize The Geometer's Sketchpad to measure side lengths, slopes, and angles
  - b. students will develop their ability to make and test conjectures
- 4) Students will examine necessary and sufficient conditions for defining quadrilaterals
- 5) Students will develop understanding of class inclusion within the quadrilateral family

**Activity 1:**

Open the Geometer Sketchpad file- quads2.gsp. Look under "My Computer" then under "Network Drives" then under "Classfiles on sambaman (X:)" then under "mcgraw." Note: This is a read only file.

The file contains 7 quadrilaterals (named LISA, KRIS, MIKE, CARL, SETH, JOSE, and JAMI), which all appear to be squares or rectangles. Using the arrow tool, click and hold down on the corners of the shapes and drag your mouse. You will find that the shapes are not all squares or rectangles. Which shape is the square? Which shape is the rectangle?

Click and drag the corners of the rectangle to change its shape, size, and orientation (i.e. tilt). Sketch five very different rectangles in the space below (**include skinny, fat, long, wide, narrow, tilted, and square-like rectangles**).

Rectangles

**QUESTION: Why do mathematicians say that a square is a special kind of rectangle?**

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**Activity 2:**

Set the square and rectangle aside for now. Use the computer to make a wide range of examples (**include skinny, fat, long, wide, narrow, tilted, pointy, square-like shapes**) of each shape. Draw four or five very different examples of each shape in the space below.

CarlJoseMikeLisaKris

**Activity 3:**

Select one of the quadrilaterals (your choice but don't choose the square) to examine more closely. Measure the side lengths of the shape (using the arrow tool, click on one of the sides to select it and then select Length from the Measure menu). Measure the four angles in the shape (using the arrow tool, click on each of the three points that form the angle – be sure that the corner itself is the second point you select - then select Angle from the Measure menu).

Click and drag your shape around and notice how the length and angle measures do or don't change. In the space below, make a list of all the characteristics you can find for the quadrilateral you chose. IN ADDITION TO LENGTHS AND ANGLES, THINK ABOUT PARALLEL AND PERPENDICULAR SIDES, AND LINES OF SYMMETRY).

Quadrilateral Name: \_\_\_\_\_

Characteristics:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

**Activity 4:**

Use the line segment tool to draw diagonals inside the quadrilateral you examined in Activity 3. What are the characteristics of the diagonals (think about their lengths, the angle they cross each other at, whether they are symmetry lines for the shape, whether they bisect each other, etc.)

- 1.
- 2.
- 3.
- 4.

**Activity 5:**

Select a different quadrilateral (your choice but don't choose the square) and repeat the steps in Activities 3. In the space below, make a list of all the characteristics you can find for the quadrilateral you chose. IN ADDITION TO LENGTHS AND ANGLES, THINK ABOUT PARALLEL AND PERPENDICULAR SIDES, AND LINES OF SYMMETRY).

Quadrilateral Name: \_\_\_\_\_

Characteristics:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Use the line segment tool to draw diagonals inside the quadrilateral. What are the characteristics of the diagonals (think about their lengths, the angle they cross each other at, whether they are symmetry lines for the shape, whether they bisect each other, etc.).

- 1.
- 2.
- 3.
- 4.

**Activity 5b:**

Select a different quadrilateral (your choice but don't choose the square) and repeat the steps in Activities 3. In the space below, make a list of all the characteristics you can find for the quadrilateral you chose. IN ADDITION TO LENGTHS AND ANGLES, THINK ABOUT PARALLEL AND PERPENDICULAR SIDES, AND LINES OF SYMMETRY).

Quadrilateral Name: \_\_\_\_\_

Characteristics:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Use the line segment tool to draw diagonals inside the quadrilateral. What are the characteristics of the diagonals (think about their lengths, the angle they cross each other at, whether they are symmetry lines for the shape, whether they bisect each other, etc.). TAKE SOME MEASUREMENTS, AS NEEDED, TO HELP YOU IDENTIFY CHARACTERISTICS.

- 1.
- 2.
- 3.
- 4.

**Activity 5c:**

Select a different quadrilateral (your choice but don't choose the square) and repeat the steps in Activities 3. In the space below, make a list of all the characteristics you can find for the quadrilateral you chose. **IN ADDITION TO LENGTHS AND ANGLES, THINK ABOUT PARALLEL AND PERPENDICULAR SIDES, AND LINES OF SYMMETRY).**

Quadrilateral Name: \_\_\_\_\_

Characteristics:

1.

2.

3.

4.

5.

6.

Use the line segment tool to draw diagonals inside the quadrilateral. What are the characteristics of the diagonals (think about their lengths, the angle they cross each other at, whether they are symmetry lines for the shape, whether they bisect each other, etc.) **TAKE SOME MEASUREMENTS, AS NEEDED, TO HELP YOU IDENTIFY CHARACTERISTICS.**

1.

2.

3.

4.

