



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

## Student Exploration: Classifying Quadrilaterals

**Vocabulary:** isosceles, kite, parallelogram, quadrilateral, rectangle, rhombus, square, trapezoid

**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)



1. Kim's family just adopted a Dachshund. They already have a German Shepherd.

A. How are the two animals the same? \_\_\_\_\_

\_\_\_\_\_

B. How are the two animals different? \_\_\_\_\_

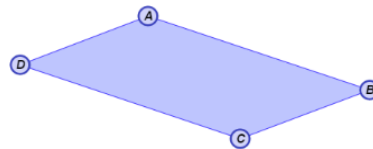
\_\_\_\_\_

2. Michael has a turtle and a hamster. What do these animals have in common with Kim's animals? \_\_\_\_\_

\_\_\_\_\_

### Gizmo Warm-up

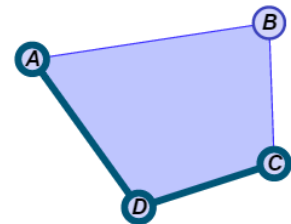
In the *Classifying Quadrilaterals* Gizmo, you can manipulate a variety of dynamic polygons, and name them based on the conditions you put on them.



1. With **Quadrilateral** and **None** selected, drag the vertices to create several **quadrilaterals**. What seems to always be true about a quadrilateral? (Fill in the blanks below.)

A quadrilateral is a \_\_\_\_\_ with \_\_\_\_\_ sides.

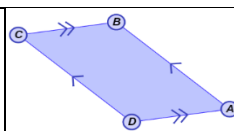
2. You can select **Show angle measure tool** to open a Gizmo protractor, and **Show ruler** to open a Gizmo ruler. Attach the "donuts" to points, as shown to the right.



Create a variety of quadrilaterals. Use the Gizmo protractor to measure all angles of each quadrilateral.

What is the sum of the angle measures of a quadrilateral? \_\_\_\_\_



<b>Activity A:</b> <b>Classifying by traits</b>	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> <li>• Be sure <b>Quadrilateral</b> is selected.</li> </ul>	
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- Under **Condition**, choose **One pair of opposite sides parallel**. Drag the vertices to see a variety of these figures.
  - Create a quadrilateral of your choice. Sketch your quadrilateral in the space to the right.
  - Name the pair of opposite, parallel sides. \_\_\_\_\_
  - Turn on **Show name of shape**. What is this shape called? \_\_\_\_\_
  - Select **Trapezoid**. Drag the vertices to experiment with the figure. What seems to always be true about a **trapezoid**? (Fill in the blanks below.)  
 A trapezoid is a \_\_\_\_\_ with \_\_\_\_\_
  - Select **Isosceles trapezoid**. Create a variety of these figures by dragging the vertices. Sketch one of them in the space to the right.
  - When is a trapezoid **isosceles**? \_\_\_\_\_
  - Which pairs of angles of this isosceles trapezoid appear to be congruent?  
 \_\_\_\_\_ Use the Gizmo protractors to verify this.
- Select **Quadrilateral** and **Two pairs of opposite sides parallel**. Be sure **Show name of shape** is checked.
  - Drag the vertices around to see a variety of these figures. Sketch an example in the space to the right.
  - Name the two pairs of parallel sides. \_\_\_\_\_
  - What is the shape you drew above called? \_\_\_\_\_
  - Select **Parallelogram** and drag the figure's vertices. What defines a **parallelogram**?  
 A parallelogram is a \_\_\_\_\_ with \_\_\_\_\_
  - How do you think the lengths of the parallel sides of a parallelogram compare?  
 \_\_\_\_\_ Use the Gizmo rulers to check.

**(Activity A continued on next page)**



**Activity A (continued from previous page)**

3. Be sure **Parallelogram** and **Show name of shape** are still selected.

A. Under **Condition**, select **All sides are  $\cong$** . Look at a variety of these figures by dragging the vertices. Sketch one figure you create to the right. What is the name of this type of figure?

\_\_\_\_\_

B. Select **Rhombus** and experiment with this figure. What is a **rhombus**?

A rhombus is a \_\_\_\_\_ with \_\_\_\_\_

C. Select **Parallelogram**. Then choose **All angles are  $90^\circ$**  from the **Condition** menu and drag the vertices. Sketch it to the right. What is this type of figure called?

\_\_\_\_\_

D. Select **Rectangle**, and vary the given figure. Describe a **rectangle** below.

A rectangle is a \_\_\_\_\_ with \_\_\_\_\_

E. Select **Parallelogram** and **All angles are  $90^\circ$  and all sides are  $\cong$**  from the dropdowns. Vary the figure. Sketch an example of it to the right. What is the name of this shape?

\_\_\_\_\_

F. Keep manipulating this figure in the Gizmo. What defines a **square**?

A square is a \_\_\_\_\_ with \_\_\_\_\_

4. With **Show name of shape** still checked, select **Quadrilateral**.


A. Under **Condition**, select **Two pairs of adjacent sides  $\cong$** . Drag the vertices around. Sketch your shape in the space to the right. What is the name of this quadrilateral?

\_\_\_\_\_

B. Vary the figure by dragging its vertices. What is always true about a **kite**?

A kite is a \_\_\_\_\_ with \_\_\_\_\_



<b>Activity B:</b> <b>Using quadrilaterals</b>	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> <li>• Be sure <b>Quadrilateral</b> is selected, and the <b>Condition</b> chosen is <b>None</b>.</li> <li>• Turn on <b>Show name of shape</b>.</li> </ul>	
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1. Fill in the first blank with *always*, *sometimes*, or *never* to form a true statement. Then explain your answer, and check each one in the Gizmo.

A. A rhombus is \_\_\_\_\_ a rectangle.

Explain: \_\_\_\_\_  
 \_\_\_\_\_

B. A parallelogram is \_\_\_\_\_ a square.

Explain: \_\_\_\_\_  
 \_\_\_\_\_

C. A square is \_\_\_\_\_ a rectangle.

Explain: \_\_\_\_\_  
 \_\_\_\_\_

2. Find the value of  $x$  for each quadrilateral. Show all of your work.

A. Each side of a square is  $(x + 5)$  units long. The perimeter of the square is 52 units.

B.

