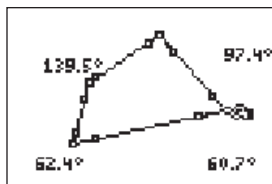# Measuring Angles in a Quadrilateral

Approximate Total Time: 25 minutes

ACTIVITY OVERVIEW:

In this activity we will

- Draw a quadrilateral
- Find the measure of each interior angle
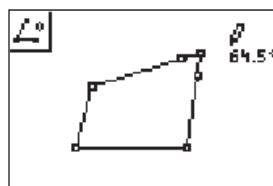- Find the sum of the measures of the interior angles

This activity allows us to use an interactive, investigative approach to determining the sum of the interior angles of a quadrilateral. We will use Cabri Jr. to draw, measure, and calculate as we explore the angles of quadrilaterals.

NCTM Geometry Standard: Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.
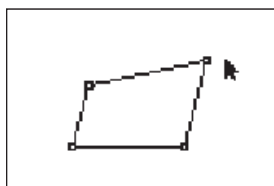
1

Press [APPS]. Move down to the CabriJr APP and press [ENTER]. Press [ENTER], or any key, to begin using the application.

Press [Y=] for the F1 menu and select **New**. (If asked to **Save changes?** press [◄] [ENTER] to choose "No.")

2

Press [WINDOW] for F2, move to **Quadrilateral** and press [ENTER]. Move to the location of a vertex and press [ENTER]. Move to the second vertex and press [ENTER]. Move to the third vertex and press [ENTER]. Move to the fourth vertex and press [ENTER]. Press [CLEAR] to exit the quadrilateral drawing tool.

3

Press [GRAPH] for the F5 menu, move down to **Measure**. Move right and down to **Angle** and press [ENTER]. To measure an interior angle you will select three points. As in naming an angle, the second point will be the vertex of the angle. Each of the other two points can be a vertex of the quadrilateral or any point on the side of the quadrilateral.

4
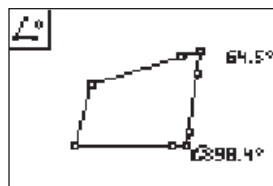
Move the pencil until a side of the quadrilateral is flashing, then press [ENTER] to mark a point on the side. Move the pencil until the vertex of the angle to be measured is flashing. Press [ENTER]. Move the pencil until a second side is flashing. Press [ENTER] to mark the third point naming the angle. The measurement of the interior angle is displayed and the pointer changes to a *hand*. Press [+] to display the angle measurement rounded to tenths. Use the arrow keys to move the measurement to a convenient location. Press [CLEAR] to deactivate the *hand*.

5
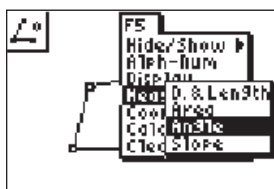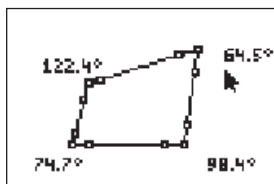
The angle measurement tool is still active, so we will repeat the preceding step to find the measure of another angle of the quadrilateral. To do this, move the pencil until a side is flashing. Press [ENTER] to mark a point on that side. Move the pencil until the vertex of the angle to be measured is flashing, then press [ENTER]. Move the pencil until a second side is flashing. Press [ENTER] to mark the third point naming the angle. The measurement of the angle is displayed and the pointer changes to a *hand*. Press [+] to display the angle measurement rounded to tenths. Use the arrow keys to move the measurement to a convenient location. Press [CLEAR] to deactivate the hand.
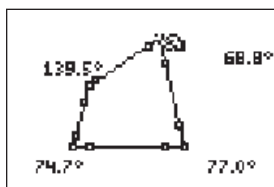
6

Repeat the preceding step to find the measures of the remaining two interior angles of the quadrilateral.

Press CLEAR to exit the measurement tool.

Record the measures of the four angles. Find the sum of the angles. In the example:
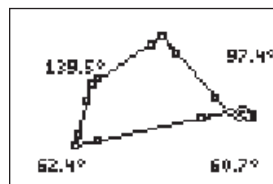122.4° + 64.5° + 98.4° + 74.7° = 360°.

7

Move the arrow until one of the vertices of the quadrilateral is flashing and press ALPHA to activate the *hand*. Use the arrow keys to move the vertex to form a new quadrilateral.

Record the measures of the four angles. Find the sum of the angles. In the example:
139.5° + 68.6° + 77.0° + 74.7° = 360°.

8

Press CLEAR to turn off the *hand* and move the pointer to a different vertex. Press ALPHA to activate the hand and move the vertex to a new location.

Record the measures of the four angles. Find the sum of the angles. In the example:
139.5° + 97.4° + 60.7° + 62.4° = 360°.

Make a conjecture: The sum of the interior angles of a quadrilateral is

_____.

9

To exit the APP, press Y= for the F1 menu. Move to **Quit**, then press ENTER. (Or you can press 2nd MODE for [QUIT].)

10

Note: Sometimes there may be a rounding error in the angle measures and the sum may not be exactly 360°. This is a limitation of the software.

Also, we did not use the **Calculate** feature of the F5 menu since it allows you to add at most 3 values and we want the sum of all four interior angles.