## 7.5 Investigate: What are the properties of the midpoints of the sides of a quadrilateral?

Principles of Mathematics 9

Method 3: Use a Graphing Calculator

1. Start the Cabri® Jr. application. Clear any previous drawing from the screen.

2. Construct any quadrilateral. Select **Quad.** from the **F2** menu. Place each vertex by moving the cursor to the location you want and pressing ENTER . Select **Alph-Num** from the **F5** menu and label the vertices A, B, C, and D.

3. Select **Midpoint** from the **F3** menu. Move the cursor to side AB and press ENTER . Construct midpoints on the other three sides in the same way. Label the midpoints E, F, G, and H.
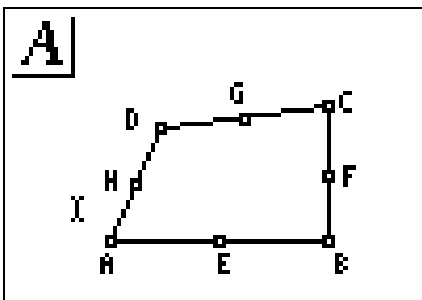
4. Select **Segment** from the **F2** menu. Move the cursor to E and press ENTER . Then, move the cursor to F and press ENTER again. Construct segments FG, GH, and HE in the same way. What type of quadrilateral does EFGH appear to be?

5. Select **Measure** from the **F5** menu. Then, press ▶ and select **D.&Length**. Measure and compare the sides of the smaller quadrilateral. What relationships are there among these lengths?

6. Do any of these relationships change if you drag any of the vertices of ABCD to a different location?

7. Select **Measure** from the **F5** menu. Then, press ▶ and select **Angle**. Measure all the interior angles of quadrilateral EFGH.

8. If the co-interior angles formed by a transversal and two line segments are supplementary, the segments are parallel. Select **Calculate** from the **F5** menu. Use angle sums to see if any of the sides of the quadrilateral EFGH are parallel. Does moving a vertex of the original quadrilateral ABCD change any of the angle sums?

9. Reflect Do your measurements confirm your conjecture in step 4? Do you think that joining the midpoints of the sides of any quadrilateral produces the same type of geometric shape? Explain your reasoning.