Quadrilaterals within Quadrilaterals

Lesson Summary:
Students will investigate quadrilaterals formed by joining the consecutive midpoints of the sides of an existing quadrilateral.

Key Words:
quadrilateral, midpoint, parallelogram

Existing Knowledge:
It is assumed that students are familiar with polygons, especially convex quadrilaterals. It is also assumed that students are familiar with the terms midpoint, convex, kite, and isosceles trapezoid.

Learning Objectives:
1. To solve problems in construction and design.
2. To understand the properties of quadrilaterals.

Materials: Computer lab or set of calculators equipped with Cabri Geometry II and lab worksheet.

Procedure:
• Group students in pairs. The instructor may choose the method to determine the pairings.

• Have students work in pairs on Cabri to perform the following constructions.

Assessment:
The worksheet and drawings serve as the assessment of student learning.
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Team Members’ Names:____________________________________________________________

File Name: ______________________________________________________________________

Goal: Construct quadrilaterals within quadrilaterals.

Investigate using Cabri Geometry II*

1. Display the coordinate system. [use show axes tool]

2. Construct a convex quadrilateral ABCD. [use the polygon tool]

3. Determine a midpoint for each side of quadrilateral ABCD. [use midpoint tool]

4. Label each midpoint L, M, N, or P. [use label tool]

5. Construct segments $\overline{LM}$, $\overline{MN}$, $\overline{NP}$ and $\overline{LP}$. [use segment tool]

6. What kind of quadrilateral is LMNP? Test the necessary properties to justify your answer.

*If you are not familiar with Cabri’s tools, press F1 on the keyboard. A help menu for each tool selected will appear on the bottom of the screen.
7. Construct a kite ABCD, with AB=AD and BC=BD.

8. Locate the midpoints L, M, N, and P as in the previous example.

9. After joining the midpoints, what kind of quadrilateral do you obtain? Justify your answer.

10. Construct an isosceles trapezoid ABCD.

11. Locate the midpoints L, M, N, and P as before. Join the midpoints.

12. Now, locate the midpoints for quadrilateral LMNP. Label these points E, F, G, H. Join E, F, G, and H.

*If you are not familiar with Cabri’s tools, press F1 in the bottom of the screen.

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14. What conjecture can you make with regards to a quadrilateral whose vertices are the midpoints of another quadrilateral?

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*If you are not familiar with Cabri’s tools, press F1 on the keyboard. A help menu for each tool selected will appear on the bottom of the screen.*
Journal Activity
Quadrilaterals within Quadrilaterals

1. What was your favorite thing about this activity?

2. What was the most challenging thing?

3. What did you gain the most confidence about through completing this lesson?

4. Where do you possibly see yourself using this knowledge in the future?

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