Handout 4

Dragging and Measuring Facilities of Cinderella

Cinderella has a wide range of facilities; among these facilities are the dragging and measuring facilities. In this activity, you will experience the dragging and measuring facilities of Cinderella to make and investigate new geometric conjectures.

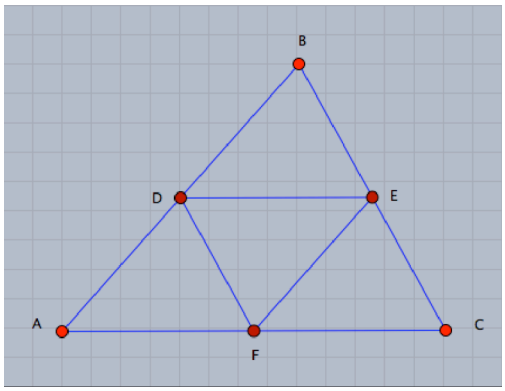
Student Activity:

1. Launch Cinderella or open new Cinderella file.

2. Use Cinderella to construct any triangle. (Use **"Add Point"** tool  to construct three points A, B, and C as three vertices of the triangle, then switch to **"Draw a Segment"** tool  to join up the three points using a press-drag-release sequence with the mouse to end up with triangle ABC)

3. Construct the midpoints of the sides of the triangle. (Use **"Midpoint"** tool  with the mouse press-drag-release sequences to bisect the three sides $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$ at D, E, and F respectively)

4. Join the midpoints of the sides to get the four triangles: △ADF, △DBE, △EDF, and △CEF. (Use **"Draw a Segment"** tool  to join the midpoints D, E, and F). Your construction should look like the figure shown below before you continue.



5. Switch to **"Move"** mode by pressing the button  in the toolbar. Use Cinderella's dragging facility to drag free points (A, B, or C), visually observe the four triangles and try to make a conjecture about the area of the four triangles. In other words, what can you say about the area of the four triangles?

6. Using measuring facilities of Cinderella, the area of each triangle can be measured. For doing so, switch to the **"Define a Polygon"** mode by pressing the button  in the toolbar, define the four triangles as polygons: Poly0, Poly1, Poly2, and Poly3, then switch to the **"Measure Area of a Polygon"** mode by pressing the button  in the toolbar and just click inside each triangle (polygon) to get its area.

7. Use dragging to alter the triangle △ ABC and visually observe the area of the four triangles. What can you conclude about the area of the four triangles obtained by joining the midpoints of the sides of a triangle? Write down your conjecture in the form of mathematical theorems.

8. Produce a mathematical proof for the investigated conjecture.

9. Pose follow-up problems related to this geometric situation.