FINDING THE AREA OF A TRIANGLE

Introduction and Background

Polygons can usually be deconstructed (decomposed) into smaller polygons. Likewise, smaller polygons can be used to construct (compose) other larger polygons. Composing and decomposing polygons can help us find the area of these polygons.

The area of a rectangle, as you know from earlier *GeoGebra* activities, can be found by counting how many unit squares it takes to completely cover the rectangle's surface. You can do this by dragging unit squares to cover the rectangle or by using the *GeoGebra* grid to count unit squares. Unfortunately, not all polygons are so easy to work with when determining their area.

Triangles, on the other hand, are not so easy. In this activity you will see how to use mathematical reasoning to determine the number of unit squares it takes to cover a triangle.

Step 1. Unit Squares and Triangles

When you open the *GeoGebra* file, you see a red triangle.

If you try to determine how many unit squares it takes to exactly cover the triangle, you have a problem. Try it. Use the MOVE tool to move unit squares in an attempt to exactly cover the triangle.

Move the unit square counters back off to the right side of the screen.

If you try to use the grid to count unit squares within the triangle, you still have the same problem. The problem is that one or more of the sides of a triangle will cut through the unit squares, so there is not a way to exactly determine the area by simply counting unit squares. You end up covering too much or too little of the triangle when using unit squares.

Step 2. Composing a New Polygon

Click on the **View the Clone of the Red Triangle** checkbox. The new, blue triangle is ***congruent*** with the original red triangle. ***Congruent*** means it is identical in every way – the length of the sides are the same and the angles are the same. This cloned congruent triangle does have a visible Rotator Point that you can use to rotate the triangle into new positions.

Use the MOVE tool to move and rotate the blue triangle next to the red triangle so that you form a rectangle.

Use the GRID or the unit square counters to determine the area of the newly composed rectangle: _____ square units

Now that you know the area of the rectangle in square units, how can you use reasoning to determine the area of the original red triangle in square units?