11. [10] Given a triangle $ABC$ on a patty paper, find a triangle inside $\triangle ABC$ that is half the area of $\triangle ABC$. Explain your process and justify why your method works. Make sure that your method works with all kinds of triangles and not just on special ones.

Hint: the area of a triangle is $\frac{1}{2} \cdot \text{base} \cdot \text{height}$.

This is a patty paper exercise so the only tools you may use are patty paper(s) and a pencil.

Since the area of a $\triangle$ is $\frac{1}{2}$ \cdot \text{base} \cdot \text{height}, to find the area of $\triangle ABC$ with half the area we either need to half the base length or half the height length.

Given a $\triangle ABC$, let $AB$ be called the base. Fold the line back $\overline{AB}$ back on itself so that the point $A$ lies on $B$. The fold directions are provided above a picture of this is on the right.

Unfold. We now have the half-way point between $A$ and $B$ denote the point as $D$. Use another patty paper to draw a straight line from $D$ to $C$.

The triangle $ADC$ has half the area of $\triangle ABC$ because the base of $\triangle ADC$ is $\frac{1}{3}$ the base of $\triangle ABC$.

Notice $\triangle DBC$ also has half the area of $\triangle ABC$.

Directions: 1. 2.