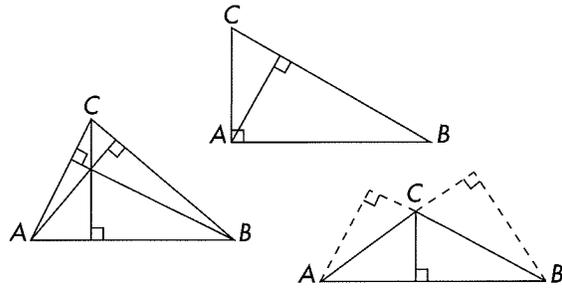




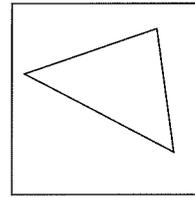
## Guided Investigation 3.4

### THE ALTITUDES OF A TRIANGLE

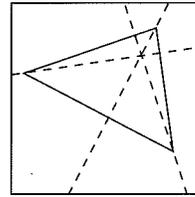
**Definition:** An **altitude** of a triangle is a line segment drawn from a vertex perpendicular to the opposite side (or the line through the opposite side). An altitude is sometimes called the height. Since a triangle has three vertices and three sides, it also has three altitudes. Can you locate the three altitudes of each triangle on the right?



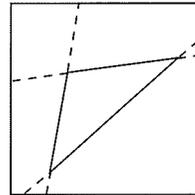
**Step 1:** Draw a large acute triangle on your patty paper.



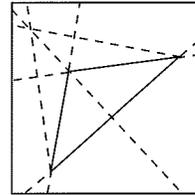
**Step 2:** Fold to construct the three altitudes of your triangle.



**Step 3:** Draw an obtuse triangle. Fold lines, or use a straightedge to draw lines, that extend all three sides of your triangle.



**Step 4:** Fold to construct the altitudes to the three sides (or extended sides) of your obtuse triangle.



Your next patty paper conjecture could be:



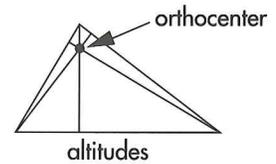
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The altitudes to the three sides (or the lines through the three sides) of a triangle \_\_\_\_\_.

## Guided Investigation 3.4 continued

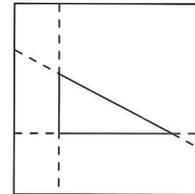
### THE ALTITUDES OF A TRIANGLE

**Definition:** The point of intersection of the altitudes of a triangle is called the **orthocenter** of the triangle.

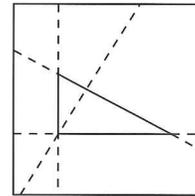


Where is the orthocenter of your acute triangle located? Where is the orthocenter of your obtuse triangle located? Check with others around you and see if they also had the same results. If the orthocenter is in the interior of acute triangles and in the exterior of obtuse triangles, where is it located in right triangles?

**Step 5:** Fold to get a right angle. Fold a third side to get a right triangle. Draw the right triangle on the folds.



**Step 6:** The two legs of the right triangle are altitudes. Fold to find the third altitude.



Your next patty paper conjecture could be:



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The orthocenter is \_\_\_\_\_ an acute triangle, \_\_\_\_\_ an obtuse triangle, and \_\_\_\_\_ a right triangle.