President Garfield's Pythagorean Proof

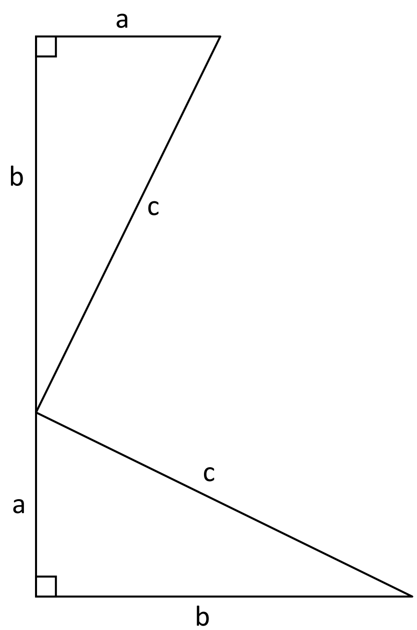
Name: ____
Period:

This activity will help you prove the Pythagorean Theorem using President Garfield's method. His method was published in 1876, New-England Journal of Education (now known simply as the Journal of Education: Lamb, 2012).

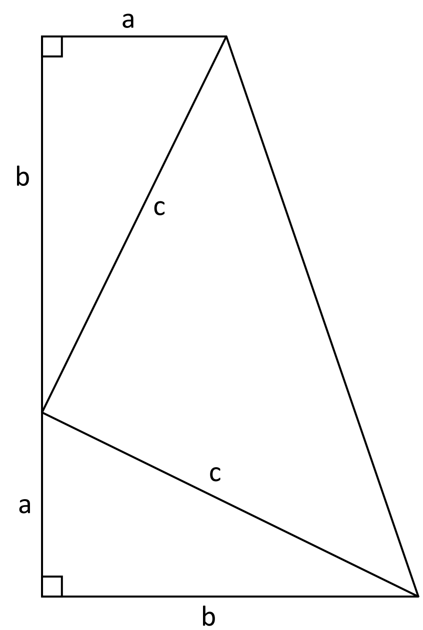
Objective: Prove the Pythagorean Theorem, CCSS.MATH.CONTENT.HSG.SRT.B.4
Directions: Follow the steps below, which will help you to meet the objective.

Available on **MATHguide**: http://www.mathguide.com/activities/ProvingPythagoras2.pdf

1) Start with a right triangle (and its duplicate), labeled accordingly.



2) A segment is drawn so that it creates a large trapezoid.



3) The figure contains two segments, both having a length equal to 'c.' Determine the slope of each segment.

Slope of upper 'c'	
Slope of lower 'c'	

One slope should be positive and the other negative. Remember, slope is defined as rise over run or $\frac{\Delta y}{\Delta x}$.

4) Based on the slopes of the two segments from #3, the two segments must be perpendicular, which would make the trapezoid consist of three right triangles.

Explain why the two segments marked with a 'c' must be perpendicular to each other.

5) One way to determine the area of a figure is to calculate it by looking at the large figure, which is a trapezoid. $A_{trapezoid} = \frac{(height)(base_1 + base_2)}{2}$ **Area =**	6) Another way to determine the area of a figure is to break up a figure into small pieces and find the sum of those areas. Determine the areas of its pieces. $A_{triangle} = \frac{1}{2}(base)(height)$ **triangle 1** + **triangle 2** + **triangle 3** **Area =**
7) We now have two separate calculations for the area of the trapezoid, one from problem #5 and the other from problem #6. Since the areas are representative of the same figure, they must be equal to each other. Set the two areas equal to each other and clean up the equation. =	

Lamb (2012) A Presidential Pythagorean Proof, Scientific American, accessed on February 22nd, 2019 at https://blogs.scientificamerican.com/observations/presidential-pythagorean-proof/