How can we prove the Pythagorean Theorem?

We have a fun paper-folding proof that will concretely show that really does add up to We first start by making the creases with the given directions below:

**Folding Directions: Fold where you see the red lines!**

|  |  |
| --- | --- |
| 1. Start with a plain piece of square paper (the length and width must be equal) |  |
| 1. Fold the square in half to make the crease, . |  |
| 1. Fold the triangle in half to make the crease, . |  |
| 1. Fold in half to make crease . |  |
| 1. Hold the triangle so that the right angle is in the left hand. |  |
| 1. Fold to make crease so that point lies anywhere between but does not reach point . |  |
| 1. At this point unfold your paper. There is a small square that should have been made in the middle of the paper. |  |
| 1. Fold the edge of the small square so that the sides extend to the edges of the paper. Do this to all four sides. |  |

**Contacts**

* Sherri Maine: [smaine@fredonia.edu](mailto:smaine@fredonia.edu)
* Stephen Kirsch: [skirsch@fredonia.edu](mailto:skirsch@fredonia.edu)

**Labeling Directions:**

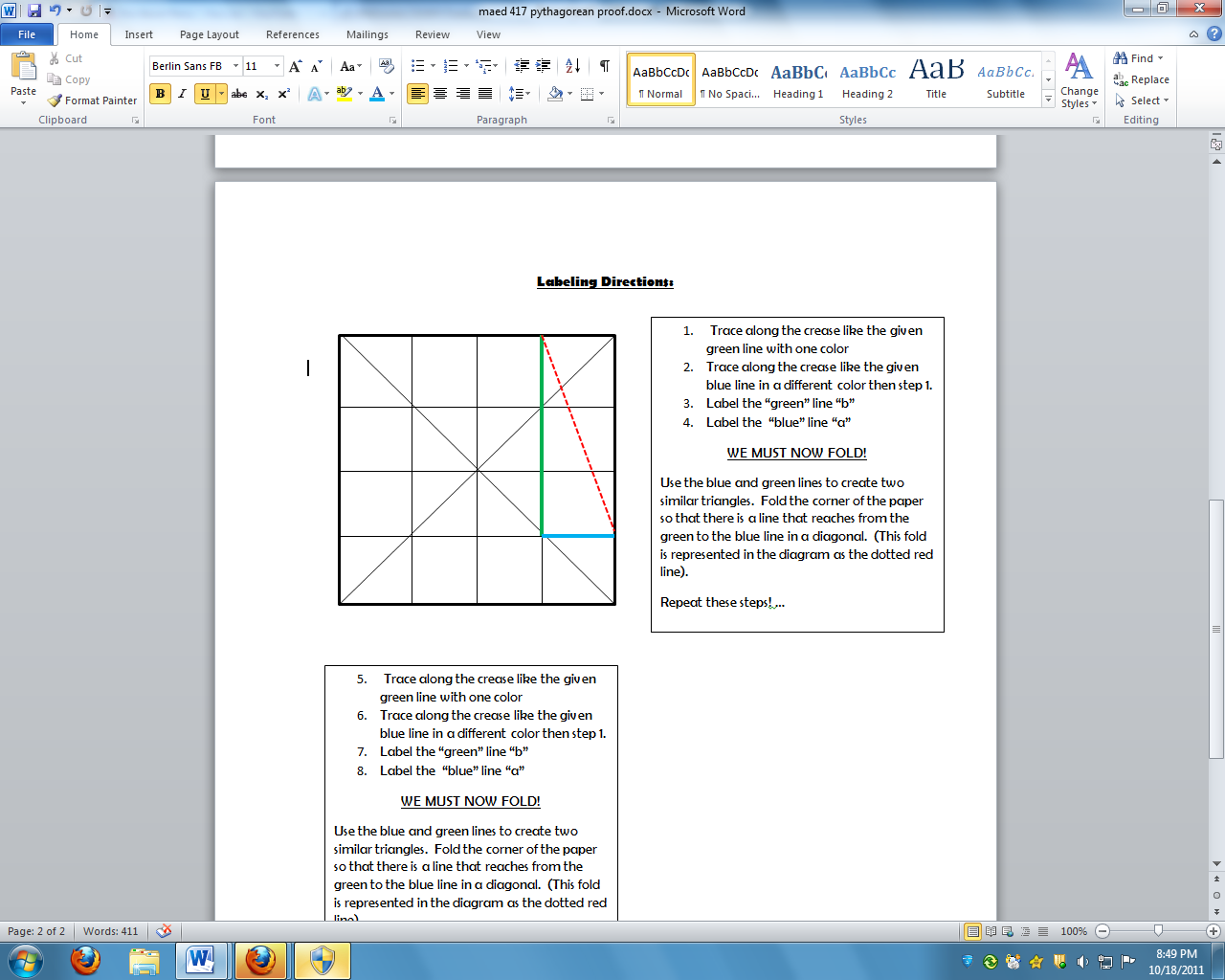
USE THE DIAGRAM TO LABEL YOUR PAPER PROOF! :)

1. Trace along the crease like the given green line with one color
2. Trace along the crease like the given blue line in a different color than step 1.
3. Label the green line (the longest leg)
4. Label the blue line (the shortest leg)

WE MUST NOW FOLD!

Use the blue and green segments to create two similar right triangles. Fold the corner of the paper so that there is a segment that reaches from the green to the blue line in a diagonal. (This fold is represented in the diagram as the dotted red line).

Repeat these steps! …



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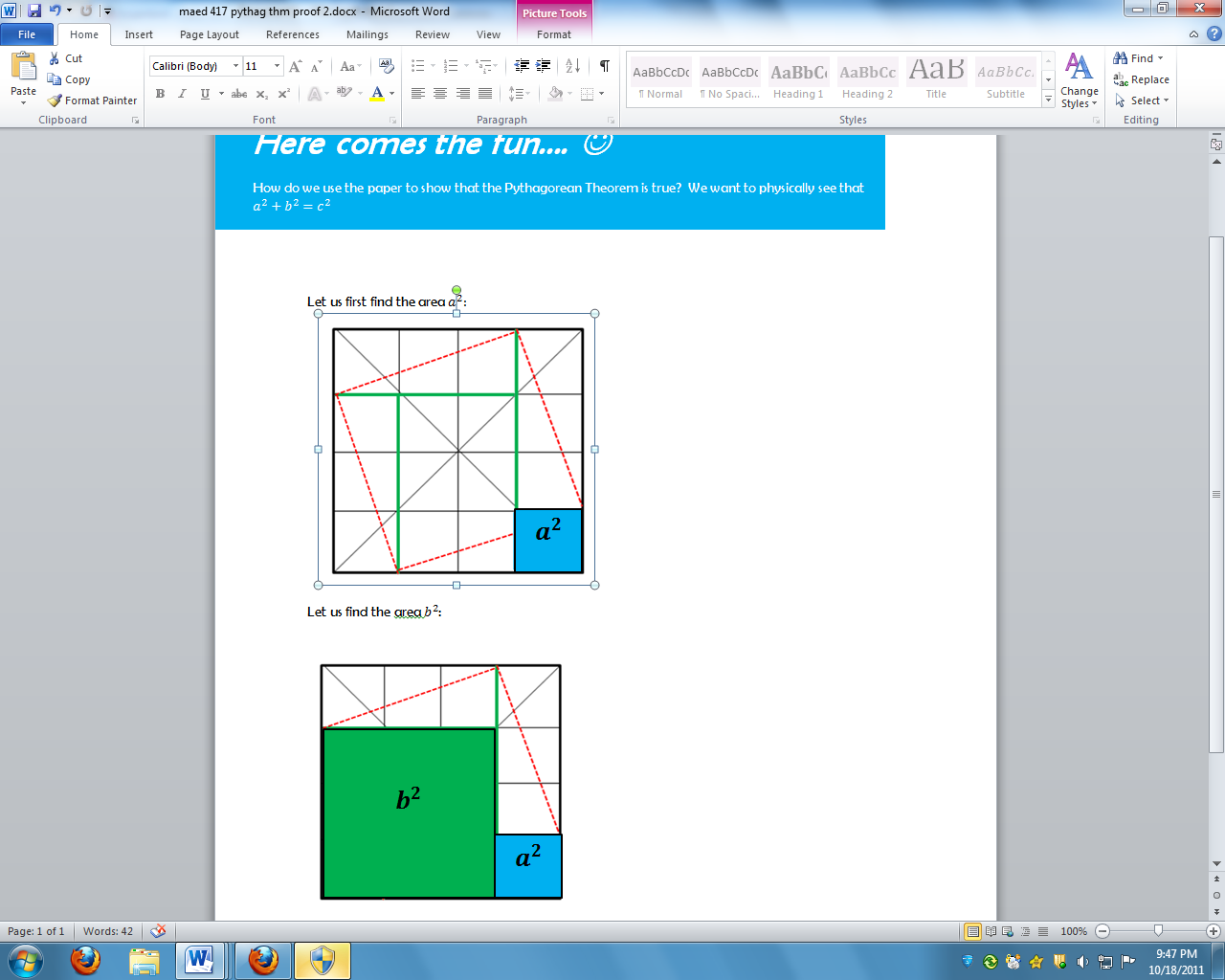
Fold the corner of the paper so that there is a segment that reaches from the green to the blue line in a diagonal.

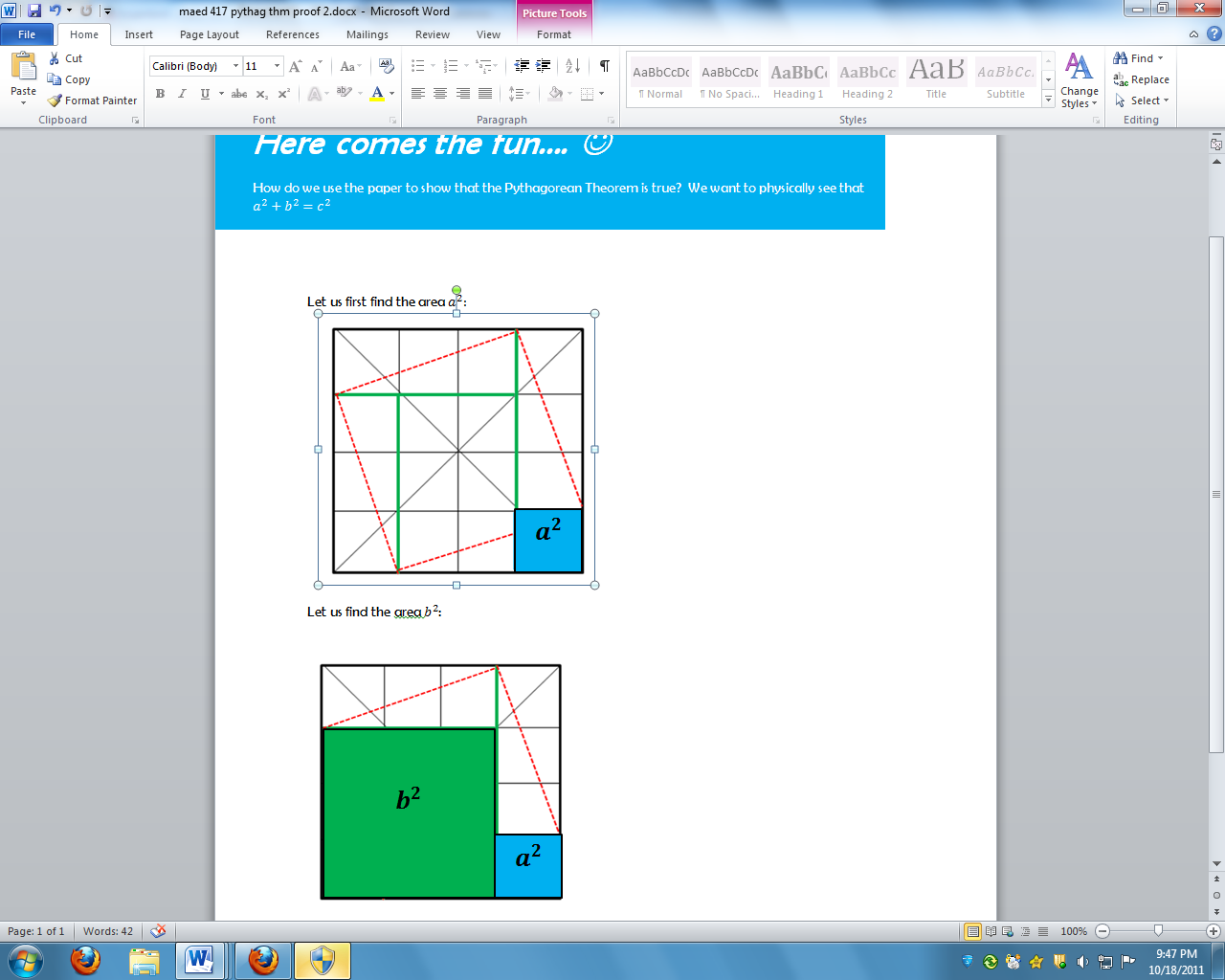
Our creases made with the red dotted segments represent the hypotenuse of the triangle with legs and .

1. Trace along the crease of the dotted red lines.
2. We can label the hypotenuse

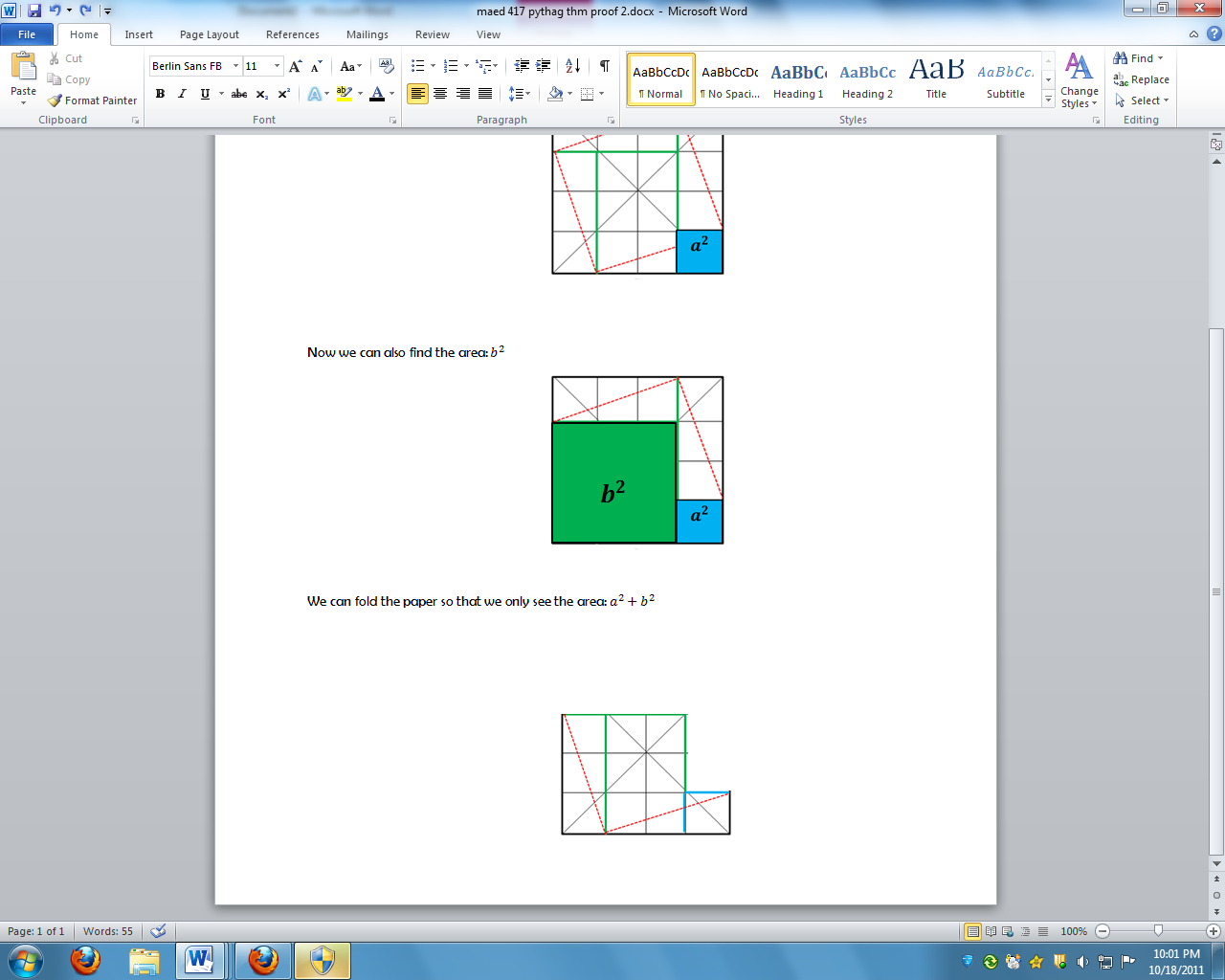
Here comes the fun…. ☺

How do we use the paper to show that the Pythagorean Theorem is true? We want to physically see that:

Let us first find the area:

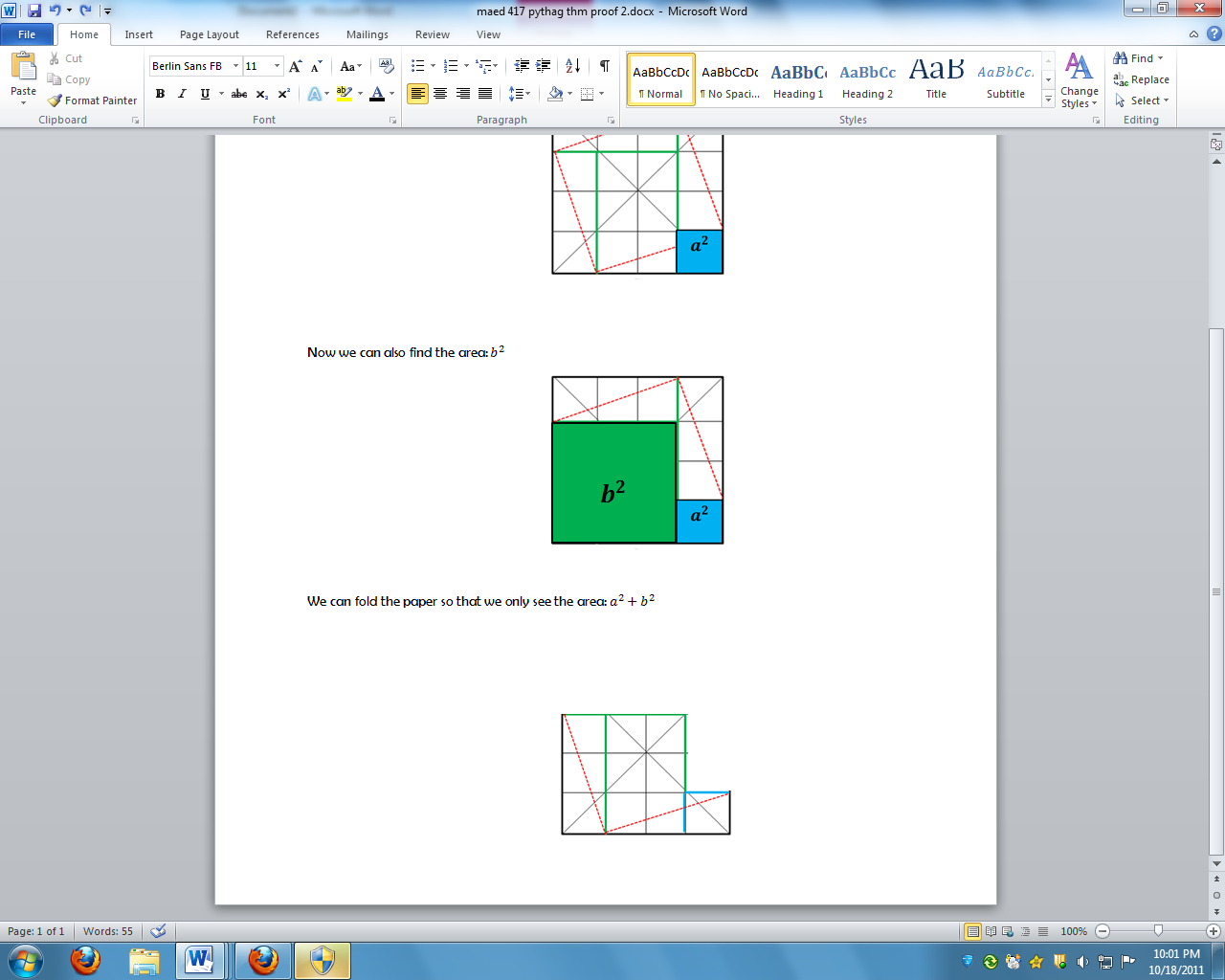


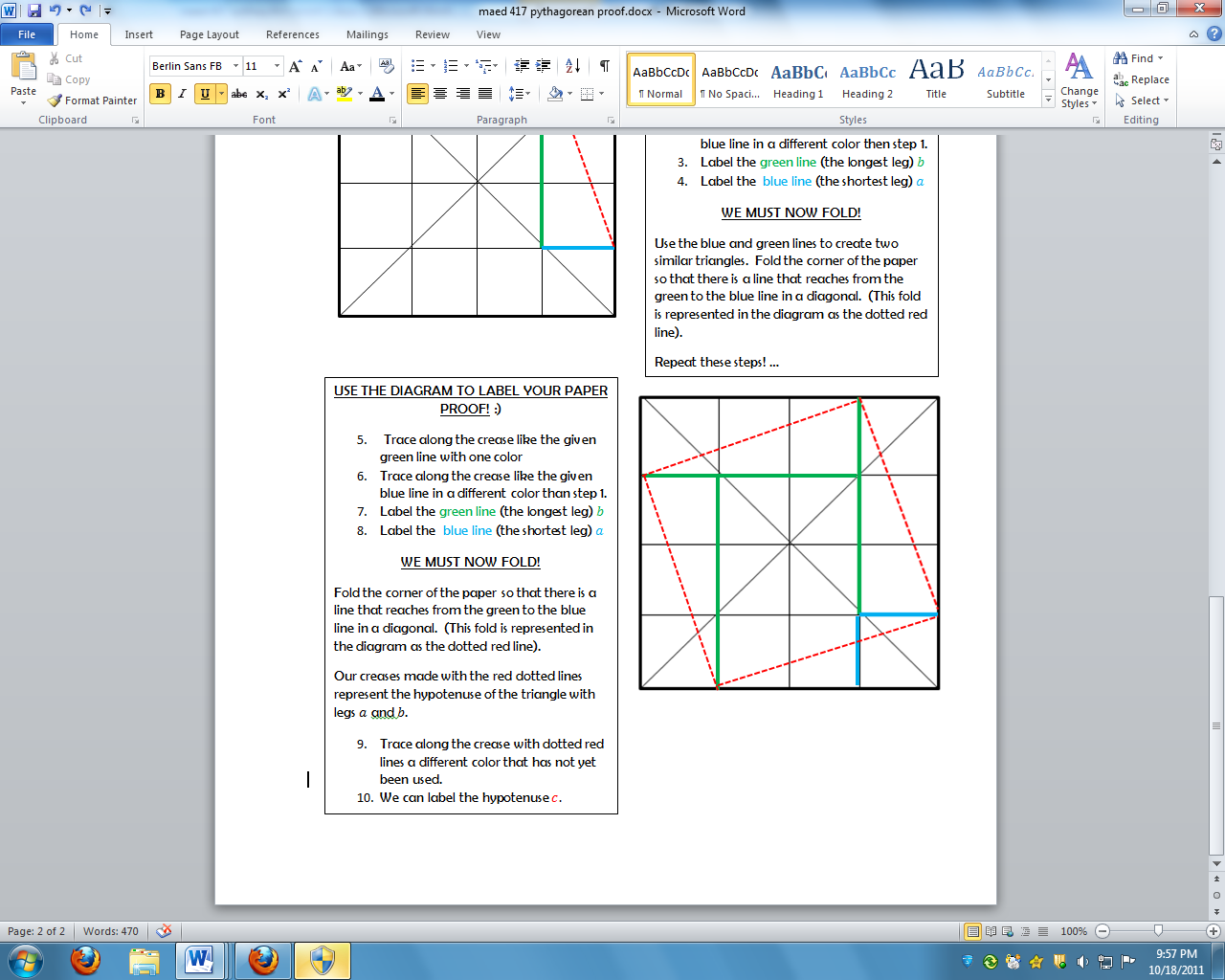
Now we can also find the area:

Fold the paper so that we only see the area: . (In order to do this you must make a cut along for the length of).

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We need to show that there is a way to manipulate so that the area clearly is equal to



We know that the red dotted line represented the hypotenuse, . The red dotted line borders the square found above. Therefore we have found the area of !

must be true!

Take a look at the triangles that are outlined in pink!

**Fun Math Website**

* <http://vihart.com/>

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The triangles can be moved in a different spot on the shape without changing the area! We were able to move the triangles to complete a square!