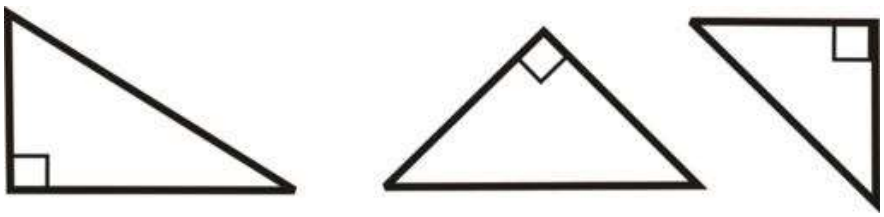
The Pythagorean Theorem – An Investigation Name: _____ Block: _____

Part 1: Definitions

- A _____ triangle is a triangle that has one angle that is _____ degrees (also called a right angle).
- A right triangle has _____ legs. The sides that are not the _____ are the legs of the triangle.
- Hypotenuse is the _____ side of a right triangle. It is always the side _____ from the right angle.
- Label the hypotenuse and the legs on the right triangles.



Part 2: Drawing Right Triangles

Before you draw triangles you need a ruler (or something with a straight edge like a compass card). **Please make sure to label all sides and also the right angle.**

Let's draw a right triangle with legs of 3 units and 4 units. The hypotenuse is 5 units. Remember, the hypotenuse is the longest side of the triangle. The legs are the two shorter sides.

Diagram of Right Triangle (3, 4, 5)	Calculations of a^2, b^2, and c^2

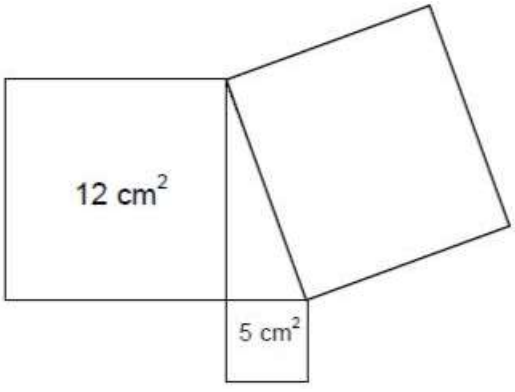
In right triangle trigonometry, it is also best to label the legs as *a* and *b*. The hypotenuse is labelled as c. Please add those labels to your picture. In the second column please calculate a^2, b^2, and c^2. Do you notice a pattern with your calculations?

Now draw the following right triangles and also do the following calculations.

Diagram of Right Triangle	Calculations of a^2, b^2, and c^2
Legs: 6, 8 Hypotenuse: 10	
Legs: 5, 12 Hypotenuse: 13	
Legs: 12, 16 Hypotenuse: 20	
Legs: 8, 15 Hypotenuse: 17	

Part 3: Conclusion

What's the pattern with your calculations of a^2, b^2, and c^2? What do you think the missing area of the square in this diagram? What happens if you add the areas of the smaller squares?



Write your final conclusion/equation for the PT:

_____.

Part 4: Pythagorean Triplets and Calculating Sides of a Right Triangle

Pythagorean triples are whole number values of *a*, *b*, and *c* that give you whole number calculations of a^2, b^2, and c^2. They are convenient to know. As you've learned from part 3, you now know the pattern/equation of the Pythagorean Theorem. You can also manipulate the equation in two ways:

The original equation, _____ can be rearranged into:

_____ and _____.

Finally, if you know the 2 sides of a right triangle you can always calculate the missing third side.

Practice: Include a diagram and SHOW ALL WORK for each question

1. A right triangle has legs of 12 and 15. What is the measurement of the hypotenuse? Draw and label your triangle first before solving. Round your final answer to one decimal place.

2. A right triangle has a leg of 8 and a hypotenuse of 12. What is the length of the other leg? Please round your answer to the nearest whole number.

3. A ladder that is 10 ft. long leans against a wall. It is 3 ft. from the wall. How high against the wall does the ladder reach? Please draw a labelled diagram and solve. Round your final answer to one decimal place.