Creating the Pythagorean Spiral

A Pythagorean Spiral is a series of right triangles arranged in a spiral configuration such that the hypotenuse of one right triangle is a leg of the next right triangle. In this project, you will use your knowledge of the Pythagorean theorem to find the lengths of the sides of each of the 17 right triangles that make up one revolution of the spiral. Finally, you will decorate your spiral in a unique and creative way.

**Materials:**
- Piece White Computer Paper
- Ruler
- Pencil
- Colored Pencils/Markers

**STEP 1:** Beginning In The Correct Location

Place the computer paper in landscape orientation. With the paper in this position measure from the top left hand corner, 15 cm to the right and 10 cm down. This will be the starting point for your diagram. This position is crucial to placing the full diagram on the paper.

![Diagram](image)

**STEP 2:** Placing The Triangle

Using your ruler create a right triangle starting at the above location. To the left of your starting point draw a horizontal line 3 cm long. Then again starting at your starting point, draw a vertical line 3 cm long. The base of the triangle needs to be parallel with the top and bottom of the paper. Once the two legs of the triangle have been drawn, connect them together forming the hypotenuse. The lengths of the sides of the original triangle should be as shown below:

![Diagram](image)

**STEP 3:** Calculate The Hypotenuse’s Length

Using the Pythagorean theorem calculate the length of the hypotenuse. Do the calculations on a separate piece of paper and then place the reduced answer on the hypotenuse. All answers must be in their most reduced forms!!! I will do the first one for you.

\[
a = 3 \text{ cm} \quad b = 3 \text{ cm} \\
\]

\[
\begin{align*}
as^2 + b^2 &= c^2 \\
(3)^2 + (3)^2 &= c^2 \\
9 + 9 &= c^2 \\
18 &= c^2 \\
\sqrt{18} &= c \\
3\sqrt{2} &= c
\end{align*}
\]

**STEP 4:** Beginning The Spiral Effect

(Step I) Using that hypotenuse of the triangle that you just created, form a new right triangle on top of the previous hypotenuse. (Step II) Create a new side “b” on the old triangle such that it is 90° degrees to the old hypotenuse and 3 cm in length. (Step III) Connect the new side “b” to the center location. (Step IV) Thus forming the next right triangle in the Spiral.
**STEP 5:** Keep Going
Return to Step 3 to calculate the newly created triangle’s hypotenuse. Continue the process 17 times.