

THE PYTHAGOREAN SPIRAL PROJECT

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 20 right triangles that make up one revolution of the spiral. Finally you will decorate your spiral in a unique and creative way.

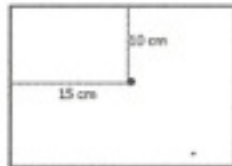
Materials:

- 1 Piece White Computer Paper
- Ruler
- Pencil
- Colored Pencils/Markers

How to Construct a Pythagorean Spiral:

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.



STEP 2: Placing The Triangle

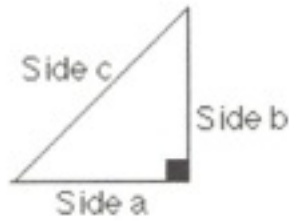
Using your ruler create a right triangle starting at the above location. To the left of your starting point trace a horizontal line 1 cm long. Then again starting at your starting point, draw a vertical line 1 cm long. The base of the triangle needs to be parallel with the top and bottom of the paper. 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:



STEP 3: Calculate The Hypotenuse's Length

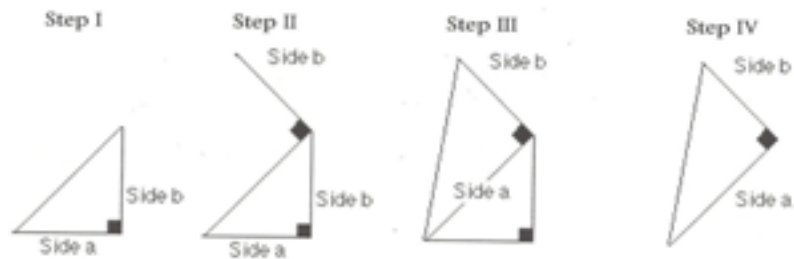
Using the Pythagorean theorem calculate the length of the hypotenuse. Do the calculations on a separate piece of paper. I will do the first one for you.

$$a = 1 \text{ cm} \quad b = 1 \text{ cm}$$



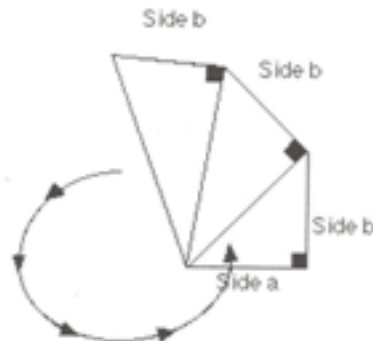
STEP 4: Beginning The Spiral Effect

(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 1 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 15 times.



STEP 6: Coloring The Pattern

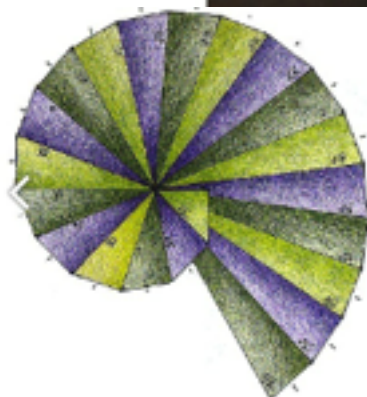
Detail your Pythagorean Spiral with a pattern. The pattern should be consistent with the pattern created by the spiral. BE CREATIVE!!!!

HELPFUL HINTS:

- Complete the assignment in pencil first, and then sharpen up the lines using a black marker.
- When labeling the diagram PRINT CLEARLY.
- Use color and creativity to make the spiral pattern.
- Effort and creativity is rewarded!!!

Project will be due on _____. You will turn in:

- The decorated Pythagorean Spiral
- The calculations for the length of each side of each triangle (on a separate sheet of paper and also on the spiral)
- Reflection page
- This page with your name on it



Name: _____

Block: _____

Grading Rubric for Pythagorean Spiral Project

Number of Points	Constructions	Calculations for each hypotenuse	Creativity
10	Evidence of each construction shown and there are 17 triangles.	All work is shown using the Pythagorean Theorem and each answer is simplified.	The spiral is creatively colored and decorated.
7	Evidence of each construction is shown but there are not 17 triangles.	All work is shown using the Pythagorean Theorem but some answers are not properly simplified.	The spiral is colored but the results are not neat and it is clear that little effort was given.
5	Partial or incorrect constructions shown.	All work is shown but with errors in calculations and/or simplifications.	The spiral is partially colored or incomplete.
2	Construction markings are not visible.	Only partial work is shown and/or no evidence of the Pythagorean Theorem.	The spiral is not colored or decorated.
Your Score:			

Your grade on the Pythagorean Spiral Project is:

CATEGORY	25 points	14-20 points	6-13 points	0-5 points
Recording Sheet and Calculations	Table is complete. All calculations are shown for each triangle created.	Most the table is completed correctly and the work for each triangle is shown.	Missing most of the work for the triangles. Most of the calculations are incorrect.	Few or no work is included for the side lengths of the triangles.
Pythagorean Spiral	Image is neatly drawn and accurately measured.	At least 15 triangles are neat and accurate.	At least 10 Triangles are neatly drawn and accurate.	Minimal effort. The triangles are drawn, but most are inaccurate.
Creativity	Image is colored and spiral is included in creative drawing.	Most of the image is colored.	Less than half of the image is colored.	Image is not colored.
Reflection (at least 250 words)	Reflection is complete and includes key steps necessary to create a spiral. Key math vocabulary is included.	Reflection includes most steps to create a spiral. Some key math vocabulary is included.	Reflection is missing most steps needed to create a spiral. Key math terms are missing.	Reflection is incomplete. Steps are not clear. Math terms are not included.

Suggested Key Math Terms:

Pythagorean Theorem
hypotenuse
square root
vertex
line
substitute

right triangle
right angle
measure
radical
point
square root

leg
side length
square
area
solve
90 degrees

Triangle 1	$a^2 + b^2 = c^2$ $(1)^2 + (1)^2 = c^2$ $2 = c^2$ $\sqrt{2} = c$	Hypotenuse $\sqrt{2}$

