

## Spiral of Theodorus

Calculations and spiral due March 22, 2019

Final product (spiral and art) due March 27, 2019

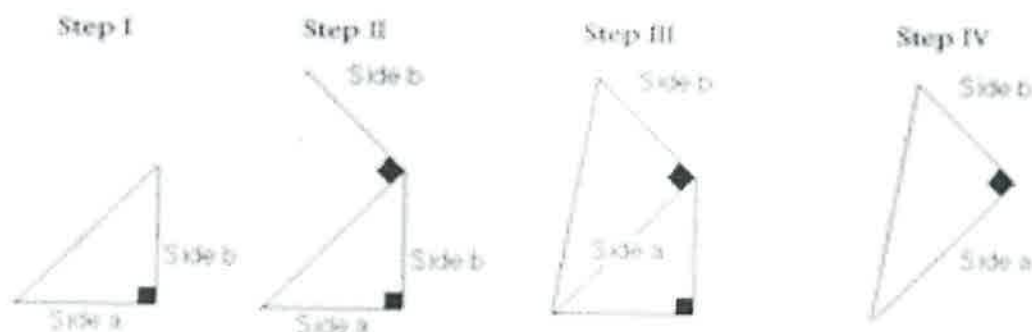
A Spiral of Theodorus, also known as a Pythagorean Spiral, is a series of right triangles arranged in a spiral configuration such that the hypotenuse of one right triangle is a leg of the next right triangle. In this project, you will use your knowledge of the Pythagorean Theorem to find the lengths of each side of the right triangles that make up one revolution of the spiral. Then, you will decorate your spiral in a unique and creative way.

### Materials:

- Ruler
- Protractor
- Paper
- Pencil
- Art supplies (colored pencils, markers, etc.)

1. Place the paper in landscape orientation and 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.
2. Using a ruler, create a right triangle starting at the above location. To the left of your starting point trace a horizontal line between 1.5-3.3 centimeters long. Then, again starting at your starting point, draw a vertical line the same length as your first leg. The base of the triangle needs to be parallel with the top and bottom of the paper (and therefore perpendicular to each other!). Once the two legs of the triangle have been drawn, connect them together forming the hypotenuse. Label the hypotenuse and legs of your original triangle with their lengths. You may leave the label of measurement off, if you identify it elsewhere on your paper.
3. Using the hypotenuse of the triangle you just created, form a new right triangle on top of the previous hypotenuse. Create a new side "b" on the old triangle such that it is 90° degrees to the old hypotenuse and 1 cm in length. Connect the new side "b" to the center location. Thus forming the next right triangle in the Spiral. Repeat this process until you have a complete spiral.

\*You may continue your spiral past one full spiral **IF** you do not overlap your lines, and it does not interfere with the creation of your final art product.\*



4. Use the Pythagorean Theorem to calculate the length of each hypotenuse. Do the calculations for the lengths of each right triangle on a separate piece of paper, be sure to number your triangles as you solve. Label the length of each hypotenuse in exact form on your spiral.
5. Detail your Pythagorean Spiral with a pattern and/or color.

### Art Examples

Name:

Date:

Class Period:

Spiral of Theodorus

	<b>4 - Exceeds Expectations</b>	<b>3 - Meets Expectations</b>	<b>2 - Partially Meets Expectations</b>	<b>1 - Needs Improvement</b>
I can apply the Pythagorean Theorem to real world and mathematical problems.	Original leg lengths are fractions/decimals, and all calculations are accurate.  All radicals are simplified.	Original leg lengths are whole numbers, and all calculations are accurate.  All radicals are simplified.	Original leg lengths are whole numbers, and more than half of calculations are accurate.  Most radicals are simplified.	Original leg lengths are whole numbers, and less than half of calculations are accurate.  Some or no radicals are simplified.
I can strive for neatness, accuracy, and thoroughness.	Spiral extends beyond one complete rotation, and is still extremely neat and accurately labeled with leg and hypotenuse lengths.  All pencil marks are outlined in Sharpie and then erased, or incorporated into overall design. Drawing looks exceptionally clean.  <b>Student completes research about Theodorus and/or the Spiral of Theodorus and uses the graphic organizer to write a paragraph summarizing their findings with correct citations.</b>	Spiral makes one complete rotation. Spiral is neat and accurately labeled with leg and hypotenuse lengths.  All pencil marks are outlined in Sharpie and then erased.	Spiral is incomplete OR Spiral is not neat or accurately labeled with leg and hypotenuse lengths.  Pencil marks are partially outlined in Sharpie, or completely outlined but not erased.	Spiral is incomplete and spiral is not neat or accurately labeled with leg and hypotenuse lengths.  Pencil marks are not outlined in Sharpie.

Name:

Date:

Class Period:

**Spiral of Theodorus**

	<b>4 - Exceeds Expectations</b>	<b>3 - Meets Expectations</b>	<b>2 - Partially Meets Expectations</b>	<b>1 - Needs Improvement</b>
I can show a theme or subject for my spiral (animal, person, creature, etc).	Obvious spiral subject portrayed, strong visual communication of subject.	Spiral subject is clearly represented.	Spiral subject is somewhat communicated visually.	Spiral is not shown as a theme or subject.
I can create a background for your spiral creature. Background should show depth (horizon line, sky or background "habitat" details).	Background strongly relates to foreground subject.  Horizon line and background details fill the empty space of the composition.	Background relates to subject.  Some details present in background space.  Horizon line present.	Background is somewhat related to subject.  Some background details present.	Background is not portrayed, or not related to subject.
I can use shading techniques in foreground (spiral subject) and background.	Shading with pencil or colored pencil present within the spiral to show form.  Shading present in background elements.	Shading is present in subject and attempted in the background.	Shading attempted in both subject and background.	No shading, shapes and forms are colored flat.