

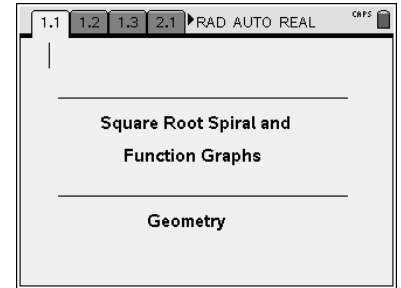
Square Root Spiral and Function Graphs
Student Worksheet

Name _____
 Class _____

In this activity, you will investigate the:

- spiral formed by square roots of consecutive numbers
- numerical approximations for square roots
- plot of the square root spiral arm lengths
- graph of the square root function

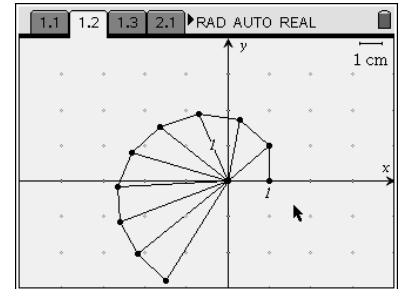
Open the file **Sqrt Spiral Function_EN.tns** on your TI-Nspire™ handheld device and work through the activity. Use this document as a guide to the activity and to record your answers.



Problem 1 – Investigating the Square Root Spiral

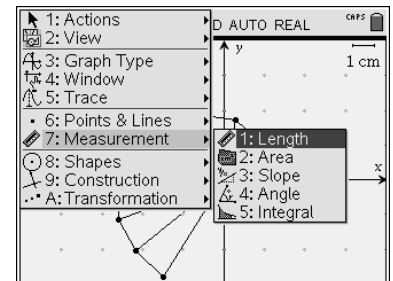
Advance to Page 1.2 by pressing **ctrl** and the right side of the NavPad. Examine the right triangles that form what looks like a spiral.

1. Based on the grid, what are the lengths of the outside leg and the base leg of the smallest right triangle? Record your answers in the table below on the Triangle Number 2 row. (Note that Triangle Number 1 is not seen since its outside leg length is 0.)



Triangle Number	Outside Leg	Base Leg	Arm Hypotenuse Radical Form	Arm Hypotenuse Decimal Form
1	0	1	$\sqrt{1}$	1.000
2				
3				
4				
5				
6				
7				
8				
9				
10				

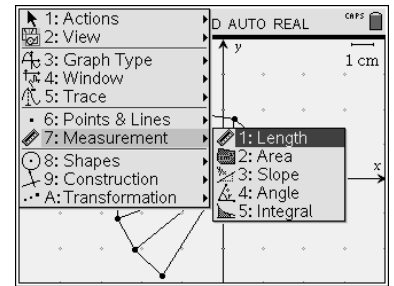
2. Use the Measurement tool to find the lengths of the segments (legs) around the outside of the spiral. Record your answers in the Outside Leg column in the table above.
3. Using the Pythagorean Theorem, find the length in radical form of the spiral arm of the smallest right triangle (Triangle 2 in the table) and record the answer in the table above.



4. Examine the next larger triangle (Triangle 3 in the table) of the spiral. Explain what you observe about its base leg and one side of the smallest triangle (Triangle 2 in the table) in the spiral.


5. Using the Pythagorean Theorem, find the length in radical form of the spiral arm of each of the other right triangles and record your answers in the table.

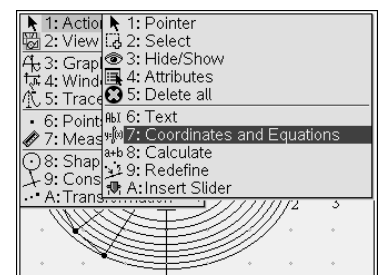
6. For each of the right triangles forming the spiral, use the Measurement tool to find the length of each spiral arm (hypotenuse) to the nearest thousandth. Record the results in the table.



Advance to Page 1.3.

7. Explain how the radius of each concentric circle is related to the length of each spiral arm.

8. Select , 1: Actions, 7: Coordinates and Equations, and examine the points on the positive x-axis. Explain how the x-coordinate of each concentric circle radius compares with the measurements in decimal form you recorded in the table.



Problem 2 – Investigating the Graph of the Square Root Function

Advance to Page 2.1 by pressing  and the right side of the NavPad.


9. Enter your measurements of the outside leg, base leg (in radical form), and spiral arm (in radical form) in the lists on Page 2.1. The first two entries have been done for you.

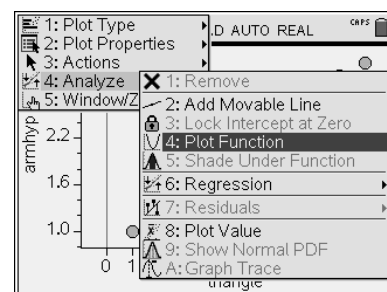
Advance to Page 2.2. We now consider how the lengths of the spiral arms are related to the triangle number.

10. Examine the plot of the triangle number (triangle) and the spiral arm length (armhyp) that resulted from the data you entered. Explain whether the triangle-armhyp plot would be described as increasing or decreasing.

Advance to 2.3 and examine another plot of the triangle-armhyp data that does not show the square root spiral.

11. Decide on a likely function that fits the data and record it below.

12. Select , 4: Analyze, and 4: Plot Function. Enter your likely function. How well does your likely function fit the plot?
(Repeat with other functions if a good fit is not obtained.)



13. Explain whether the shape of your best-fit function would be described as having a constant or variable slope. Justify your answer.

14. Explain how the square root spiral and the concentric circles constructed with radius equal to the spiral arm length could help you predict the shape of the square root function.