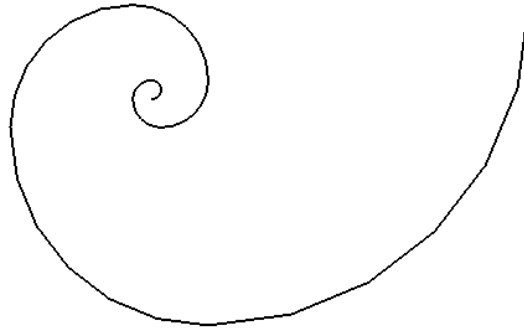# Fibonacci Flower in Google SketchUp

One of the projects last month showed how to use squares and arcs to make the famous Fibonacci spiral:



(If you've just now signed up, and don't have this project, let me know and I will email it to you.)

In this project, we'll see how to take this spiral and use it to make different types of Fibonacci flowers. Look like anything found in nature?
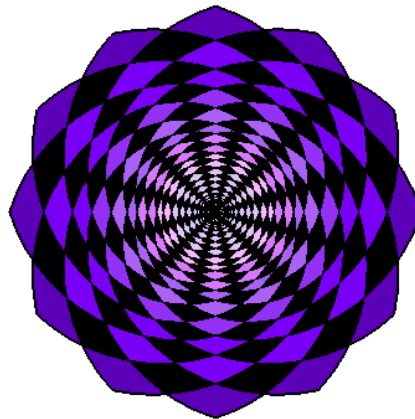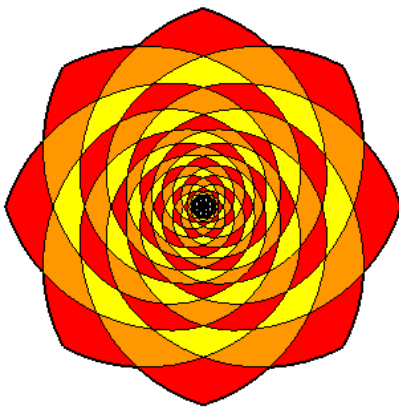


*For this project, it helps to have some basic knowledge of Google SketchUp (though detailed instructions are provided). In particular, it's important to know how to zoom and pan the view. If you need more information on how to get started, and a description of some basic tools, please read 3DVinci's Getting Started Guide (PDF):*

*PC users: go to http://www.3dvinci.net/SketchUp_Intro_PC.pdf.*
*Mac users: go to http://www.3dvinci.net/SketchUp_Intro_MAC.pdf.*

# Step 1: Create the Flower Curves

1. Start with the spiral you saved at the end of last month's Fibonacci Spiral project. If you don't have that model, you can download mine - go to the 3D Warehouse with your browser (http://sketchup.google.com/3dwarehouse) and search for "roskes fibonacci." Click the Download link to open the model in SketchUp.
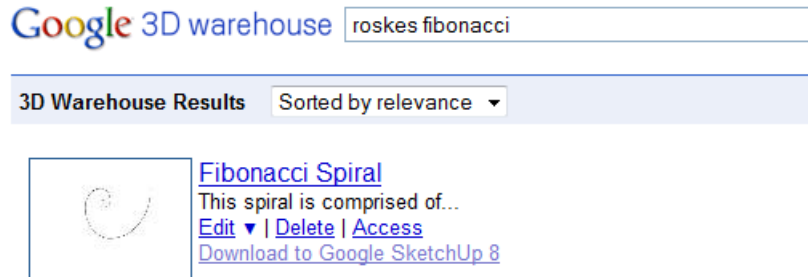


*Note: If you download this model straight into another SketchUp model using the **Get Models** tool, be sure to explode the model before continuing.*

2. This model is comprised of several identical components, each of a different size. To make this curve easier to work with, select everything (press Ctrl + A or Cmd + A), right-click on any selected edge, and choose **Explode**.
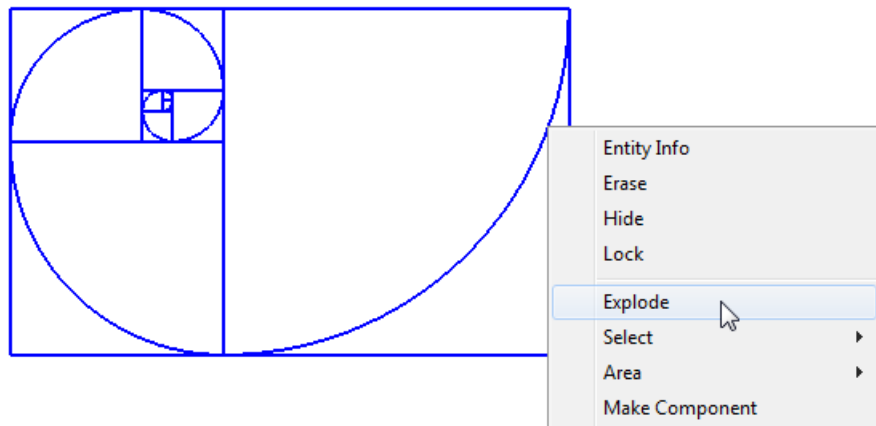


3. Now there are no more components, just one long curve which is still blue because it is selected. Leave it selected.

4.  Activate the **Rotate** tool and click to place the protractor at the very start of the curve - you may have to zoom in closely to click this point.
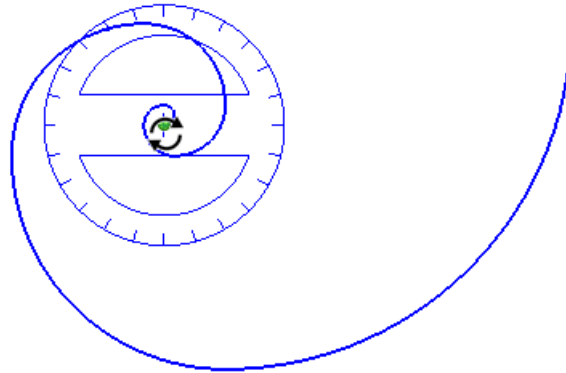
5.  Press the Ctrl key (PC) or Option key (Mac) to make copies. You don't have to keep this key pressed, just tap it to make the "plus" sign appear. The next two clicks define the rotation angle - click anywhere to start, then move your mouse and click again when the **Angle** field indicates a 60-degree angle. (If you can't get 60 to appear, just type 60 and press Enter.)

or for snapping, Ctrl = toggle Copy.         Angle 60.0
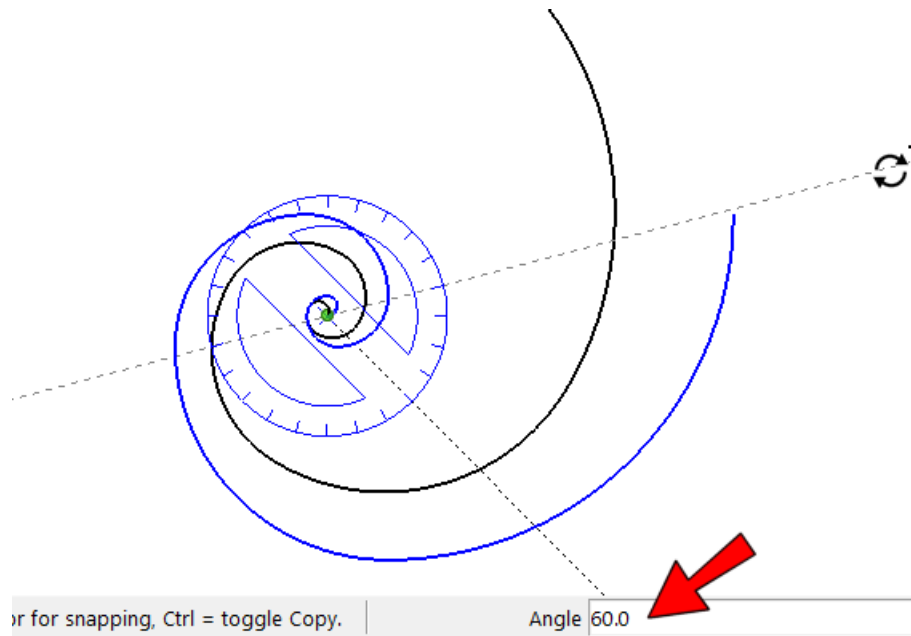
6. Immediately after that first copy is created, type 5x and press Enter. (Remember, you never have to click in the field that currently reads **Angle** - just type and the numbers appear.) Now you have six total spirals.



Angle 5x
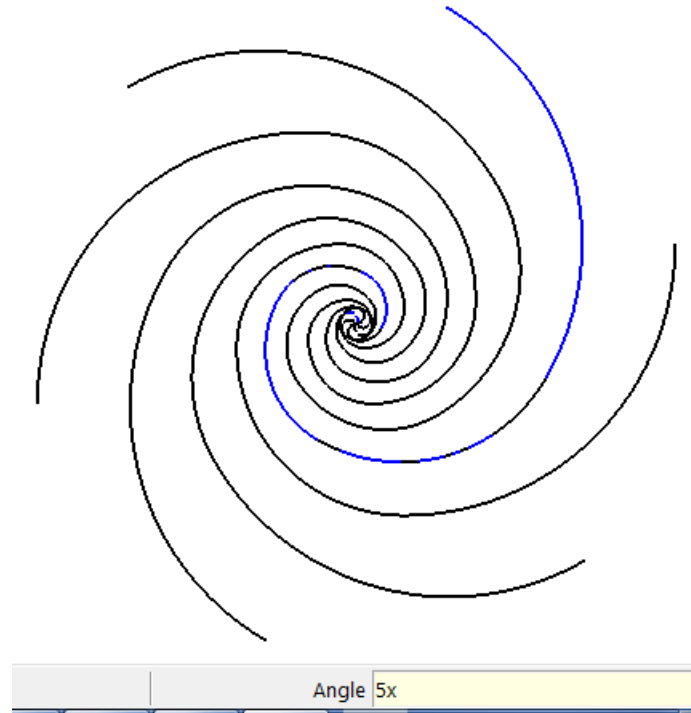
7. The trick to making the flower is taking the six spirals we have and making a mirrored copy of them. We'll start by making a copy in blank space. Select everything again, and activate the **Move** tool.



8. Tap the Ctrl or Option key again to make a copy, and click two points so that a copy is placed anywhere in blank space. Now the copied spirals should be the ones selected.
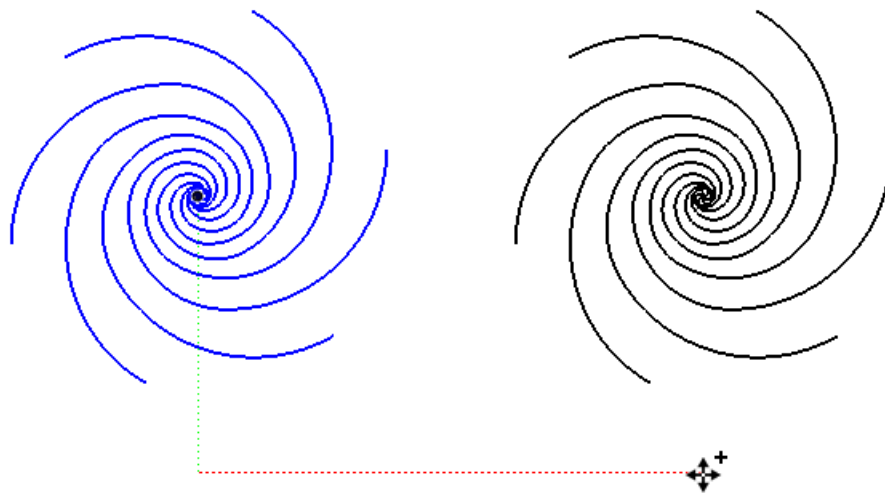
9. With the copied spirals selected, press the S key to activate the **Scale** tool. When the eight drag handles appear, click the one indicated below.
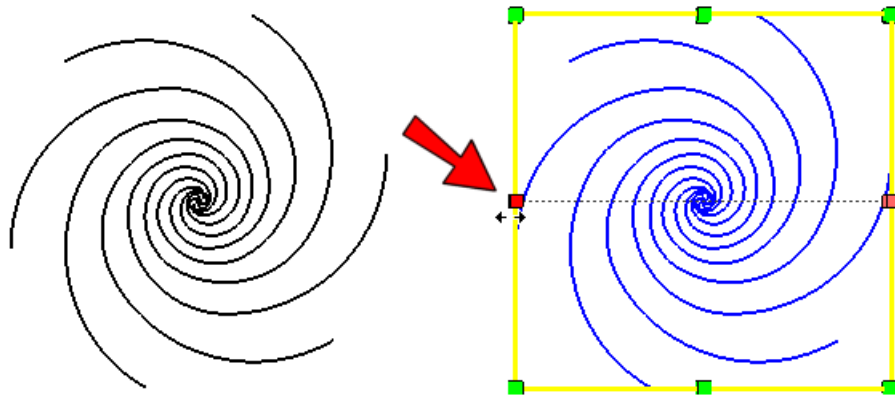
10. Move that handle to the right, so that the spirals turn inside-out. Click to finish when the **Red Scale** value is -1, or just type -1 and press Enter. Again, leave these spirals selected.

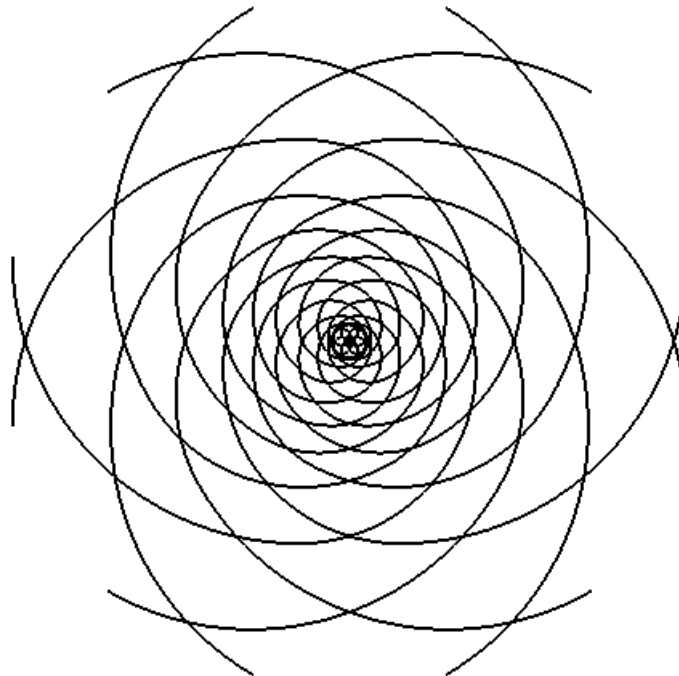bout Center. Shift = Toggle Uniform.                    Red Scale  -1.00
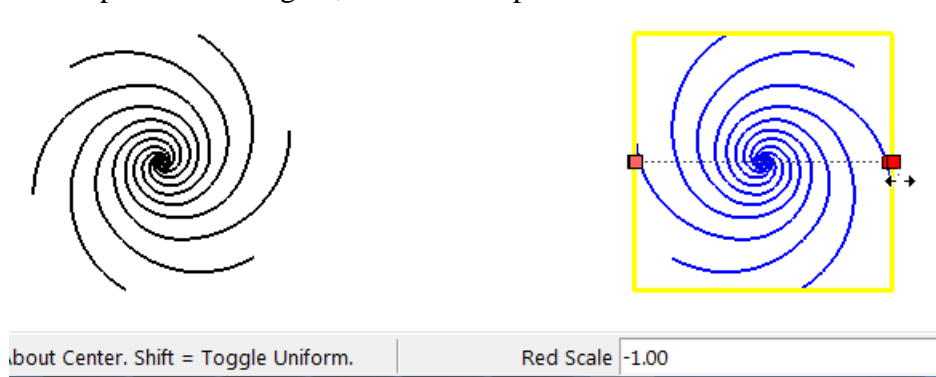
11. Zoom in closely on the selected spirals and activate the **Move** tool. Click the center of the selected spirals.
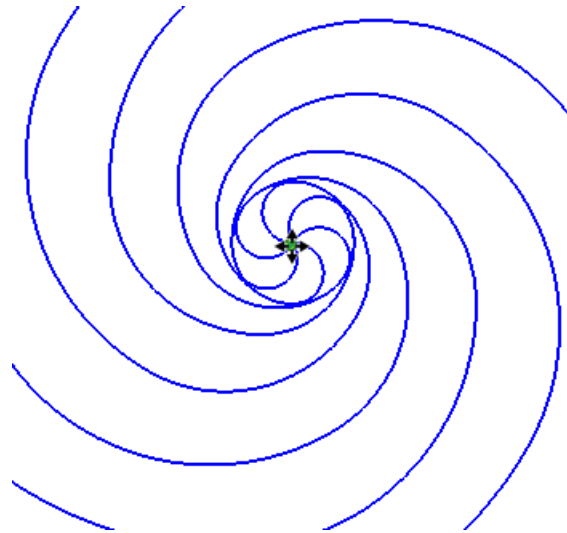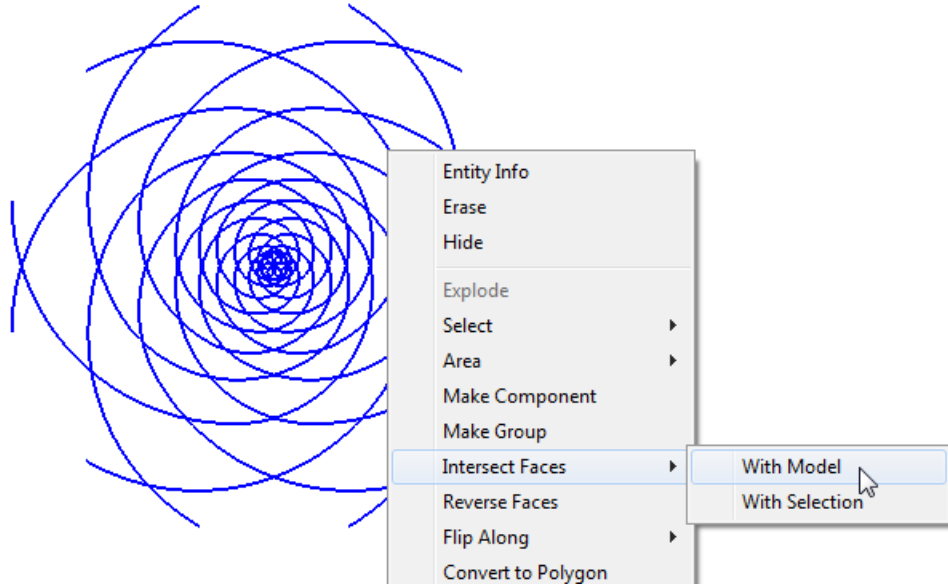
12. For the second move point, click the center of the original set of spirals.
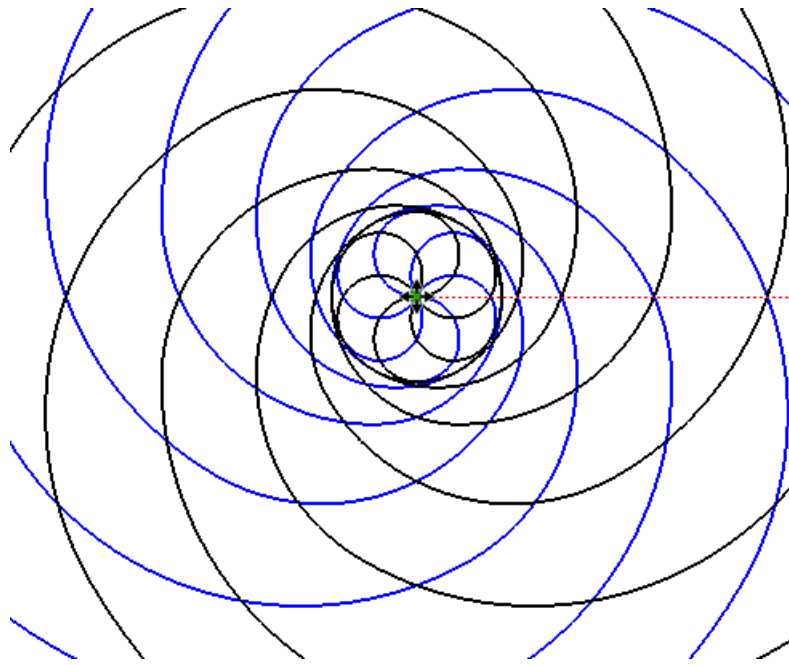


13. Zoom out, and this is what you should have:

14. To make sure all the curves are "broken" by the curves that now intersect them, select everything, right-click on any selected curve, and choose **Intersect Faces / With Model**.
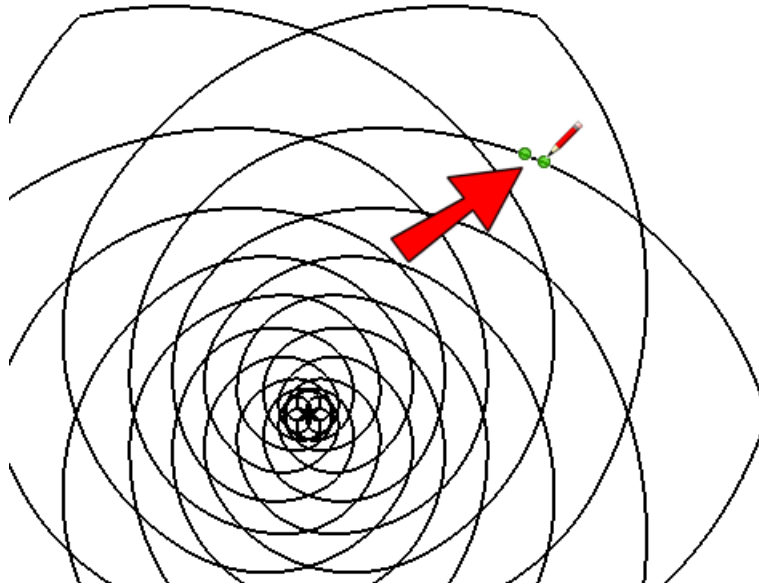
15. Finally, use the **Eraser** to remove the partial curves around the outer edges.
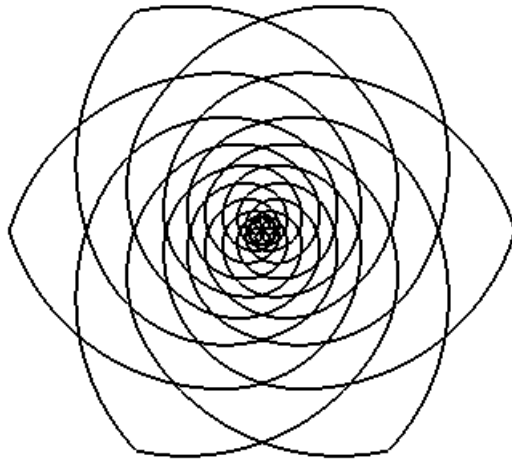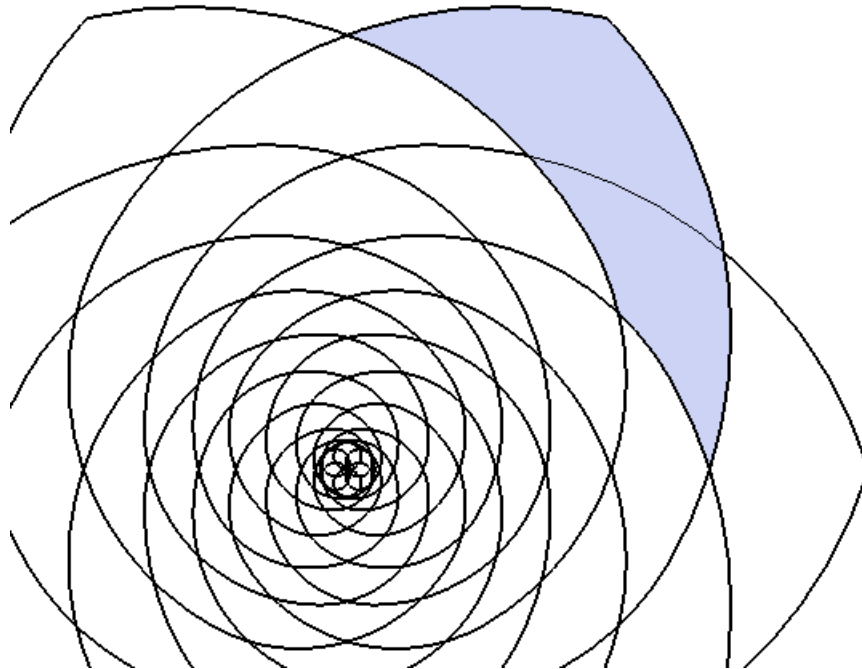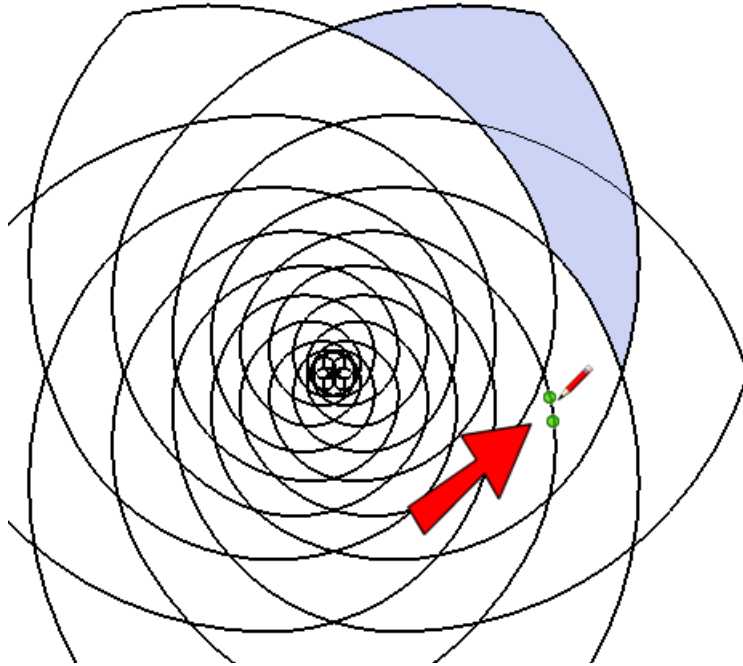
# Step 2: Create the Faces to Paint

1. We'll create one set of spiral faces first, then make rotated copies of those faces to complete the first flower. Activate the **Line** tool and click any two adjacent endpoints within the edge shown below.
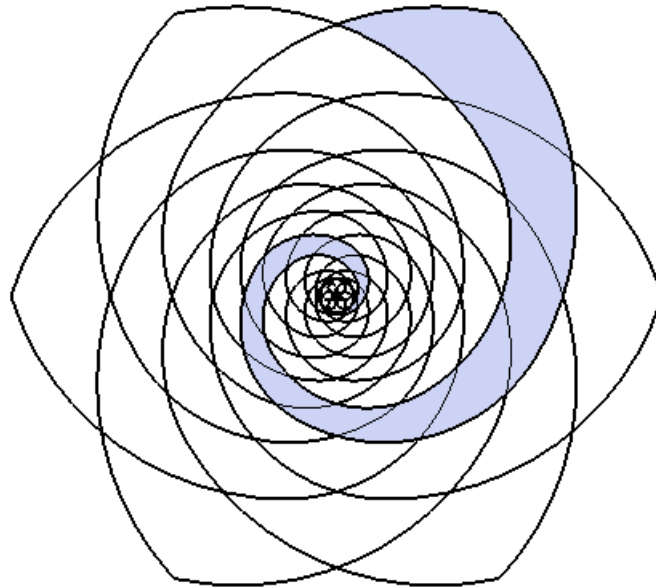
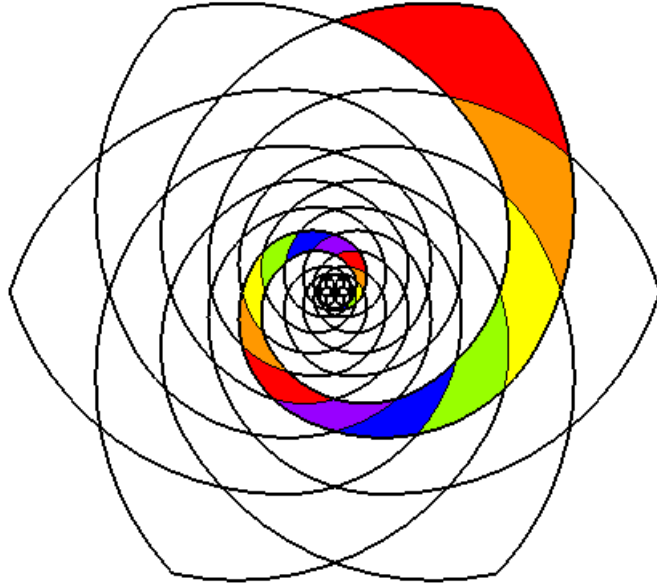This fills in faces on either side of the edge.

2. For the next two faces, create a line anywhere within this edge:



3. Continue in this pattern, filling in two faces at a time, until you have one complete spiral.

4. Paint these faces however you like. I'm using six rainbow colors.

5. Select everything (you'll select edges as well as faces but it doesn't matter if you copy edges on top of existing edges), activate **Rotate**, and place the protractor at the center of the spirals.
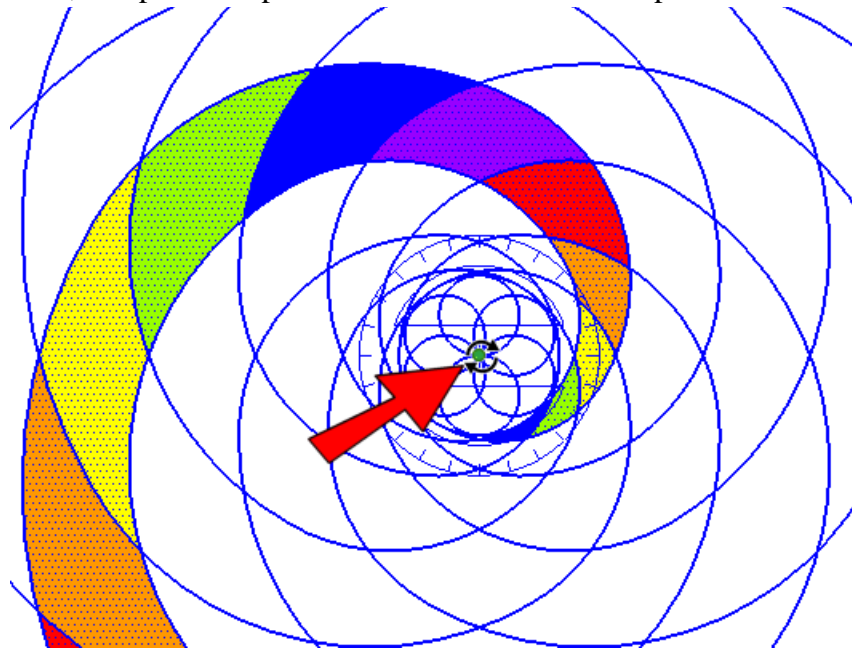
6. Press Ctrl or Option, and click any two adjacent, similar points around the flower, such as Points 1 and 2 below. The angle, as when you created the rotated set of spirals, should be 60 degrees.
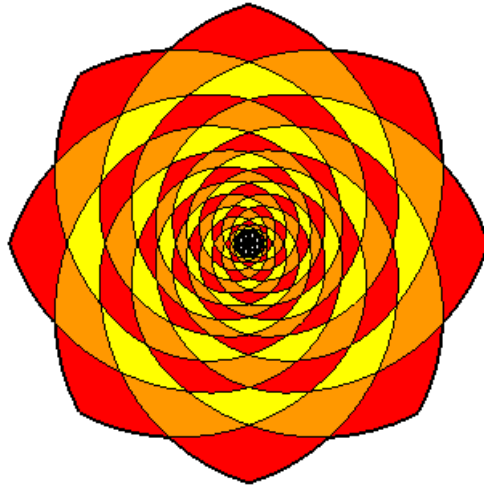


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or snapping, Ctrl = toggle Copy.                    Angle  60.0
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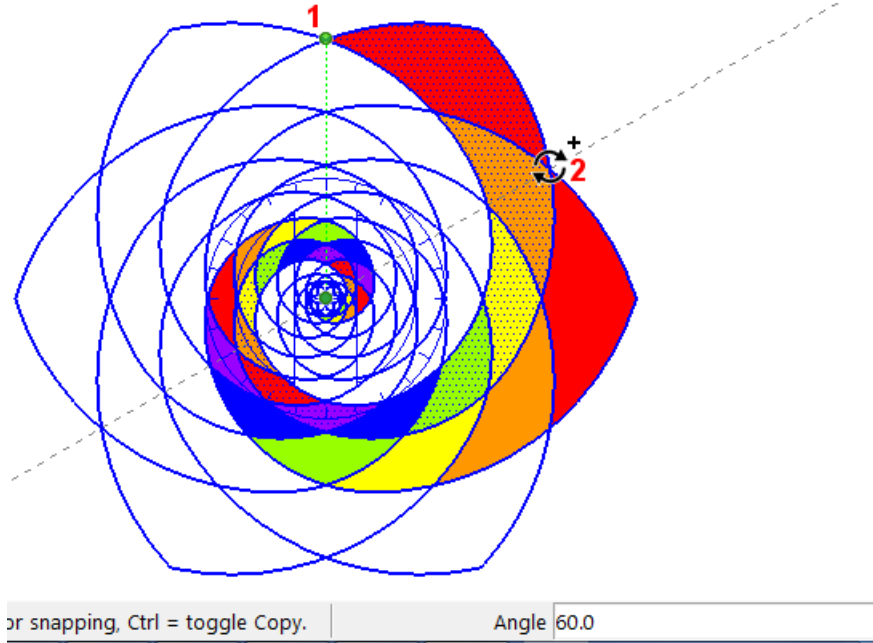
7. Enter 5x, and the faces are copied.
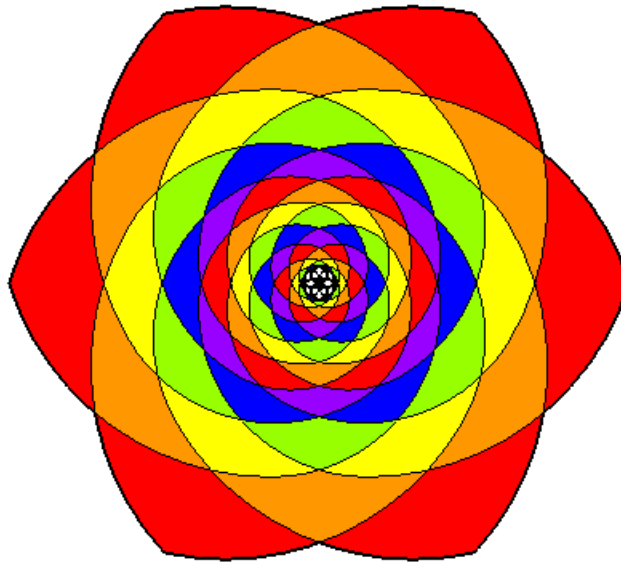
# Try This!

You can create flowers using lots of different rotation angles and color schemes. For example, if your Fibonacci spiral is rotate-copied using an angle of 45 degrees with 7 copies, you can get something like this:



I really like this one, using 12 spirals separated by 30 degrees. The color scheme alternates black with progressively lighter shades of purple.