LEARNING GOALS

In this project explore visual art through the math embodied by “turtle” geometry. Start with simple actions and shapes that repeat to create simple shapes that turn into complex circular and spiral drawings. Introduces the idea of recursion or ‘looping’

GET STARTED

Open Scratch; a new blank file with a cat sprite will be created. We’re going to create a drawing pen tool sprite, so with your mouse, right-click (or on a Mac ‘control-click’) on the cat sprite and click delete to remove it.

CREATE A DRAWING SPRITE

Now we’ll make our own new sprite by clicking on the paintbrush (new sprite) button
When the Paintbox window comes up, click on the smallest magnifying glass to zoom out all the way... This lets you see the whole stage (and how big your sprite will be). Choose a small brush size to paint a dot, then click **OK**.

Click on scripts tab, then on the next window, click on the Pen button and drag out 3 blocks: *clear, pen down, and pen up*. Don't connect these blocks! Just click on the *pen down* block so your dot is ready to draw.

These blocks will be used like buttons - to put the pen down to put it back up and to clear the screen of any drawn lines. To make sure your pen is down click the *pen down* block until you see a white outline.

Let's start building a program that will make our dot draw! Click on the **Control** button and grab a *when the green flag is clicked* block to start your program. Click on the **Motion** button, grab a *move 10 steps* block, and connect it to your *green flag* block. Change the number to 50.

Click the **green flag** button and the sprite draws 50 steps
Now add a turn to your line... click on the *turn 15 degrees* block and change it to a big number: **120**, then snap it under the *move 50* block; click the green flag to watch your pen move ... click it again.... and again... and again....

What shape do you get? How many times did you click the green-flag button to get this shape? Now lets make it draw a larger shape - just change how many steps it takes... by adding 50 more, and then 50 more to the move steps number.

Click the “clear” block in your scripts and it should erase the lines. Now try adding a *repeat 3* block to your script. What happens if you have it repeat *more* than 3?

This is where it gets really fun... now that its automatically drawing triangles, what happens if you add one more small *turn* block after its draws a single triangle...
Did you count how many times you clicked to make a full circle with your triangles? Try adding a `repeat` around your `repeat 3` block.

Try changing the size and color. Inserting the `change color by #` and `change pen-size by #` adds interesting effects.

Try using randomness to have your spirals pop up across your stage. Click on the **Operator** button and drag out two `pick random` blocks and another `go to x: y:` block. Set the numbers to roughly the size of your screen. Insert this block at the top of your script. (You can also try using the random block with the `change pen color` block.)

You may notice that as your circles are drawn they drag the pen line from random place to random place. You can add a `pen down` and `pen up` block to the beginning and end of your script.
You may even want to have your stage automatically clean each time you run the spirograph. To get it to keep creating spirals you can put a forever around your repeat scripts. Then put the clear block right under the green-flag block.

This is just the beginning drawing with scratch pen has unlimited possibilities!

Happy circle drawing!

Look at more complex drawing with Scratch: examine the fractal geometry found in the natural world, like ferns, clouds, and seashells and use higher level mathematics to experiment with creating your own.

CHECK IT OUT!

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