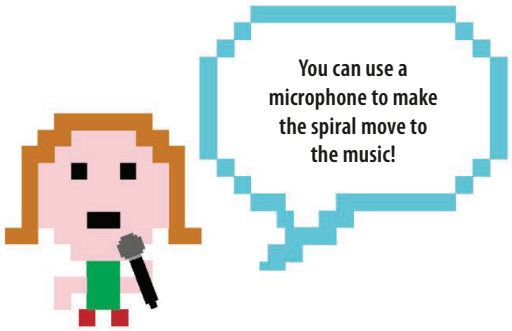
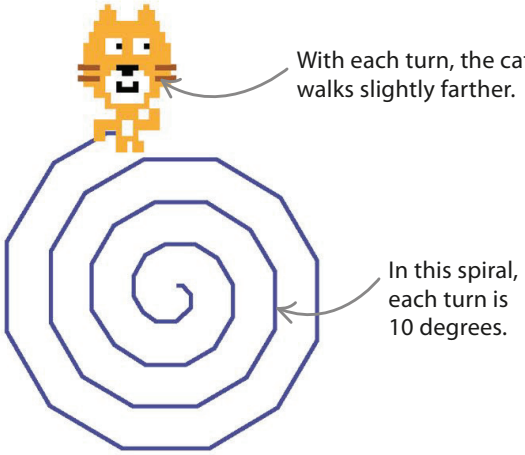
Spiral-o-tron

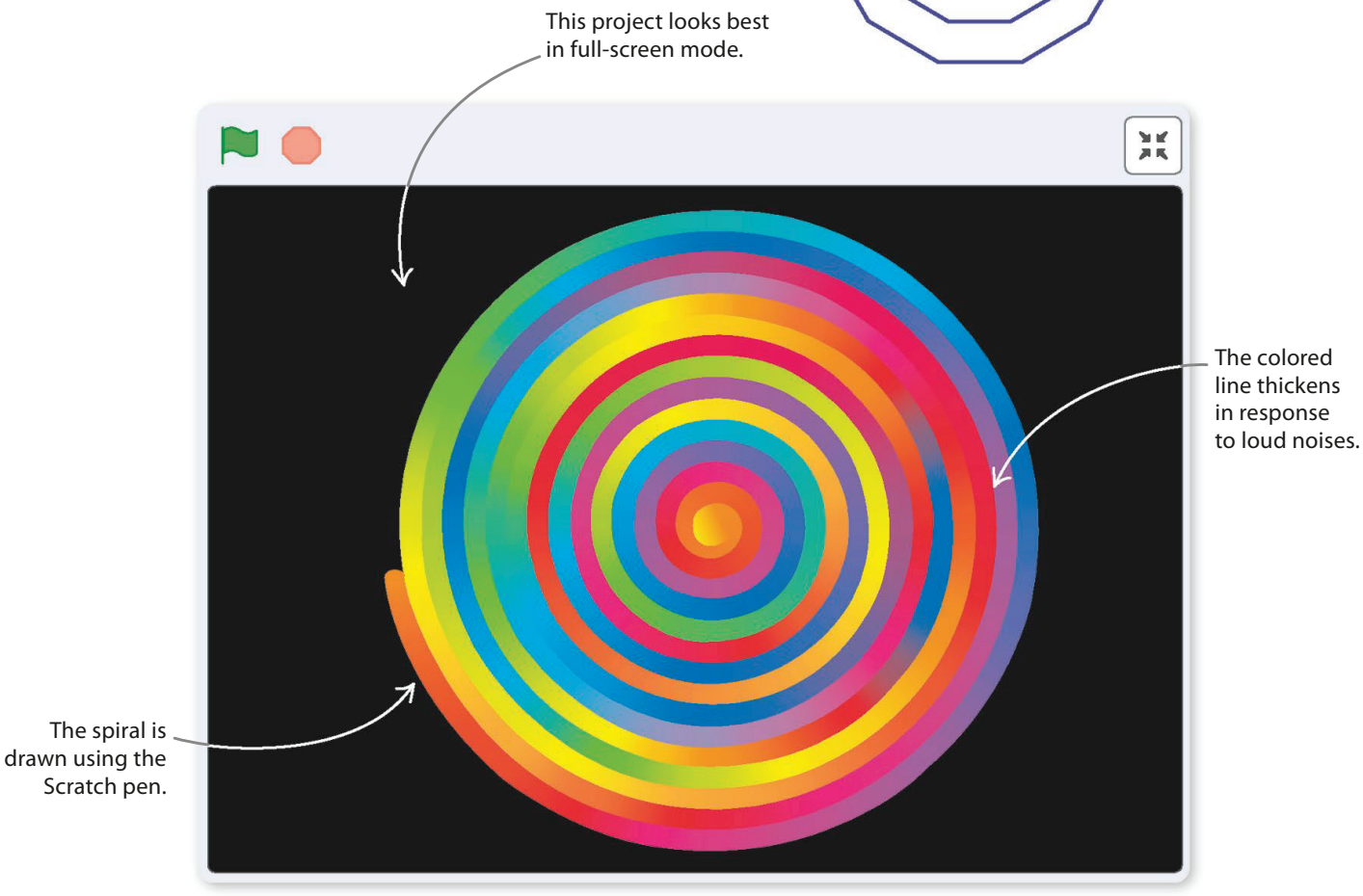
It's easy to use Scratch's Pen feature to create amazing visual effects, such as this multicolored spinning spiral. If your computer has a microphone, you can adapt the project to make the spiral react to sound.



How it works

There are many types of spirals, but this project paints a very simple one. Just take a step, turn 10 degrees to your right, take two steps, turn 10 degrees to your right, take three steps, and so on.



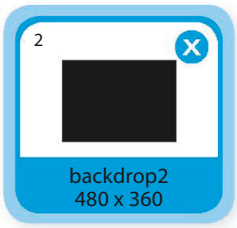


Build the spiral

This project shows you how to use Scratch's pen to create fast-moving, interactive effects. Follow the steps below to build a simple spiral first. You'll need to add the Pen extension like you did in previous projects.

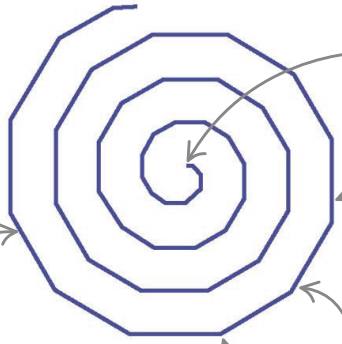
1 Start a new project. Delete the cat sprite and click on the paint symbol in the sprites menu. You don't need to draw a sprite since it's just a guide for the pen. Call the sprite "Spiral".

2 Now, turn the stage black to make the spiral stand out. Click on the backdrop's paint symbol in the lower right of Scratch. Pick black in the paint editor and use the fill tool to create a solid black backdrop. Make sure you are in Bitmap mode.



Use the fill tool to color the backdrop.

3 The project needs lots of variables. Select the spiral sprite and create the following variables: "Repeats", "DrawLength", "DrawLengthIncrease", "TurnAngle", and "StartDirection". Uncheck their boxes so they don't appear on the stage.



StartDirection

The direction the sprite faces at the beginning

DrawLength

Length of each straight section of the spiral

Repeats

How many sections to draw altogether

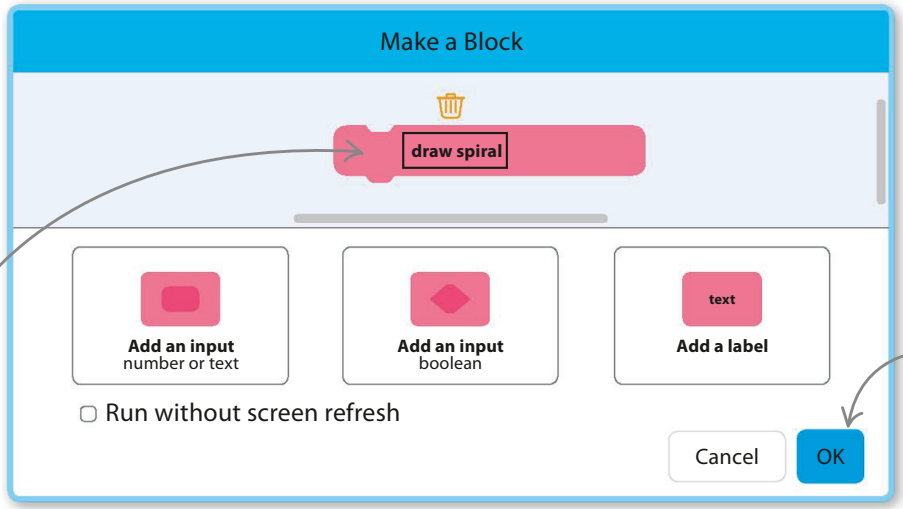
TurnAngle

How much the sprite turns

DrawLengthIncrease

How much longer this straight section is than the last section

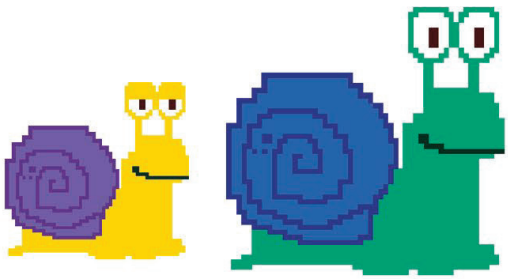
4 Now create a custom block to draw a spiral. Select My Blocks and then click on "Make a Block".



Type "draw spiral".

Click "OK" to make the block.

5 You will now see the "define draw spiral" header in the code area. Add the following code to it. Read through the Scratch blocks and think about the steps. Don't run the project yet because there isn't any code to trigger the new block.



```
define draw spiral
point in direction StartDirection
pen up
go to x: 0 y: 0
set DrawLength to 0
pen down
repeat Repeats
    change DrawLength by DrawLengthIncrease
    move DrawLength steps
    turn TurnAngle degrees
pen up
```

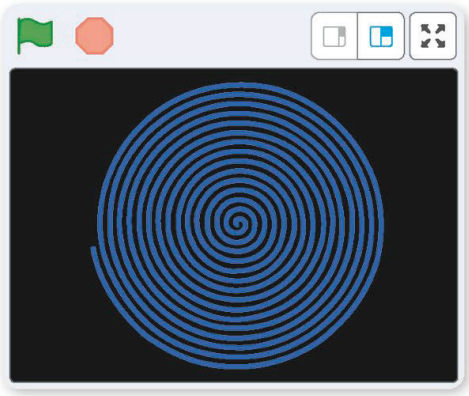
This loop draws the spiral using the method explained earlier.

6 Now add the main code to set up the variables and trigger the "draw spiral" block.

```
when clicked
set Repeats to 900
set DrawLengthIncrease to 0.02
set TurnAngle to 6
set StartDirection to 0
set pen size to 5
erase all
draw spiral
```

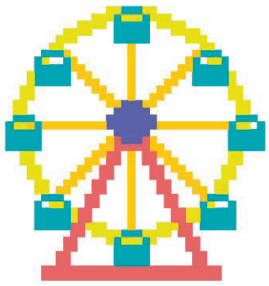
These blocks set the properties of our spiral.

7 Run the project. A spiral like this will appear. It will take around 30 seconds to draw.

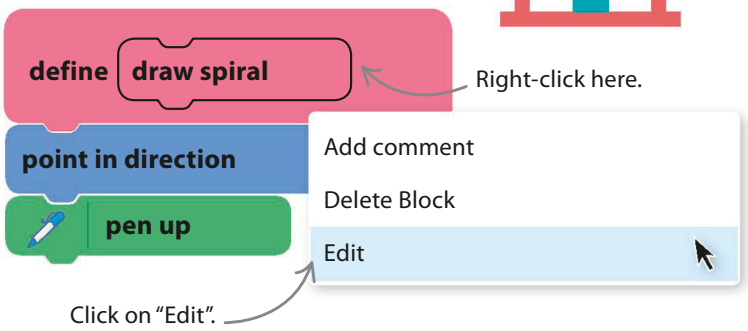


Spin the spiral

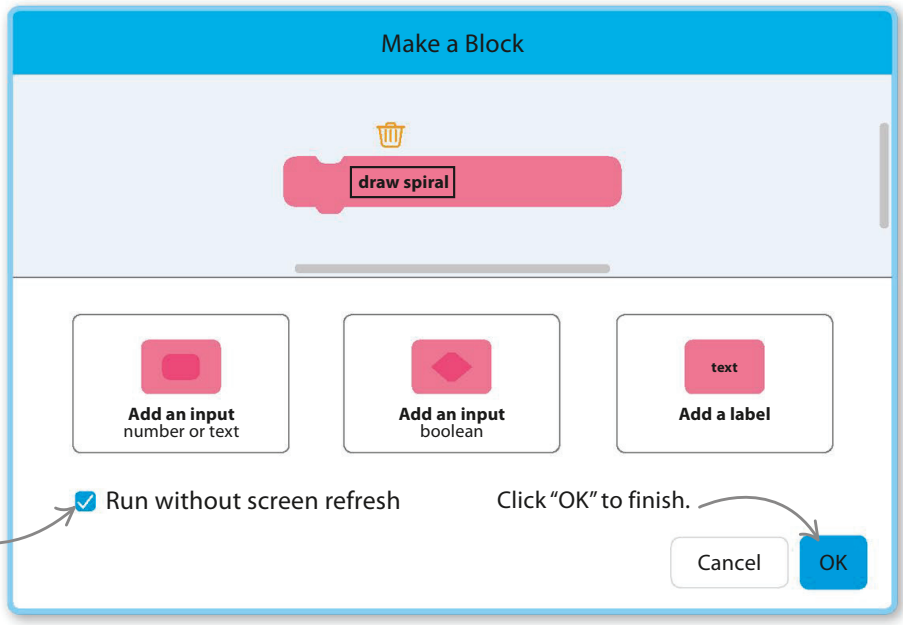
To make the spiral spin, Scratch will draw it repeatedly, each time in a new position. To make this happen quickly, you need to use a special trick to run blocks faster.



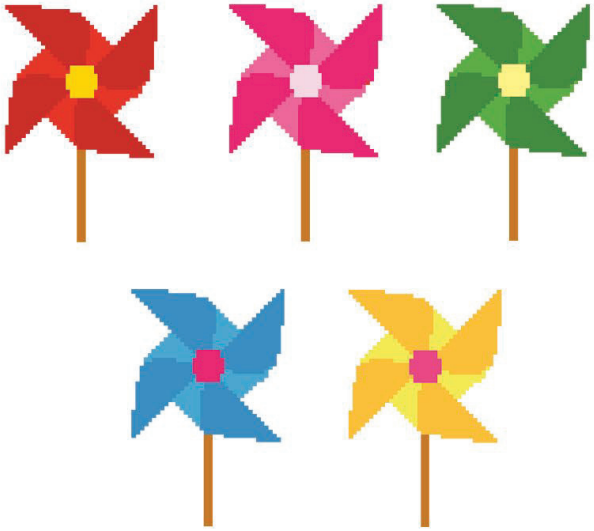
8 The spiral takes a long time to draw because Scratch redraws the whole stage every time you add a new straight-line section to the spiral. You can set the custom block to not redraw the spiral until it's finished. To do this, right-click on the "define" block and choose "Edit".

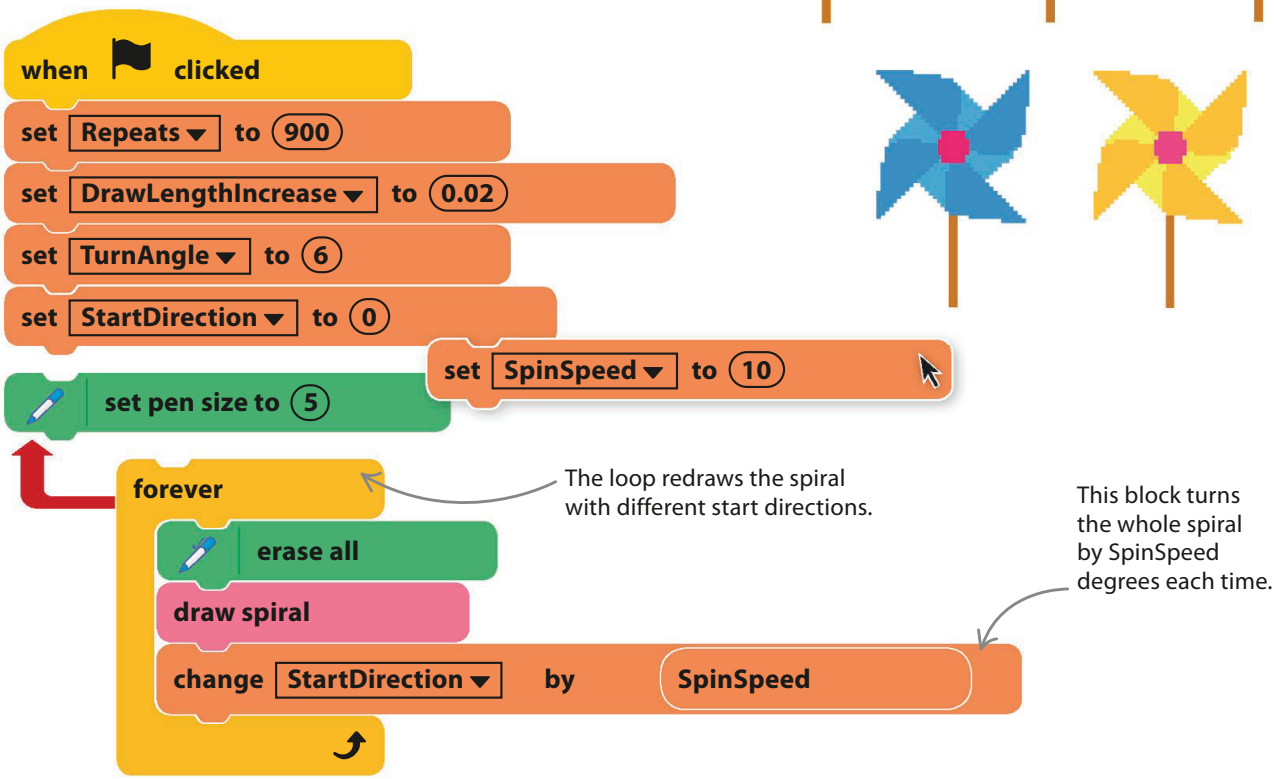


9 Now, check the box labeled "Run without screen refresh".

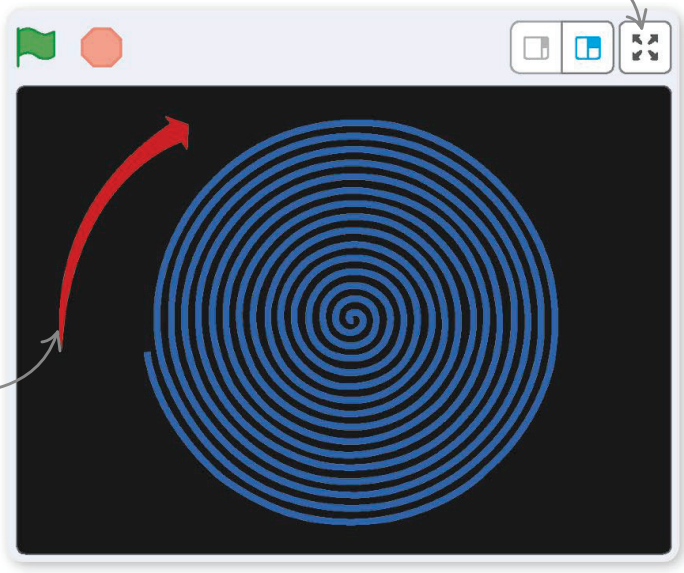


10 Now, run the project, and the spiral will appear so quickly that you won't see it happen. The next trick is to keep redrawing the spiral in different positions so it appears to spin. Add a new variable called "SpinSpeed", uncheck its box, and change the main code to look like this.



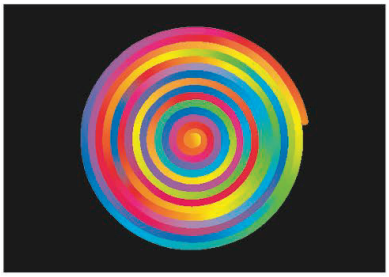


11 Run the project, and watch the spiral spin. Try switching to full-screen mode for a hypnotic effect. If you stare at the center for a while and then look away, you might see things ripple weirdly for a moment—an optical illusion.

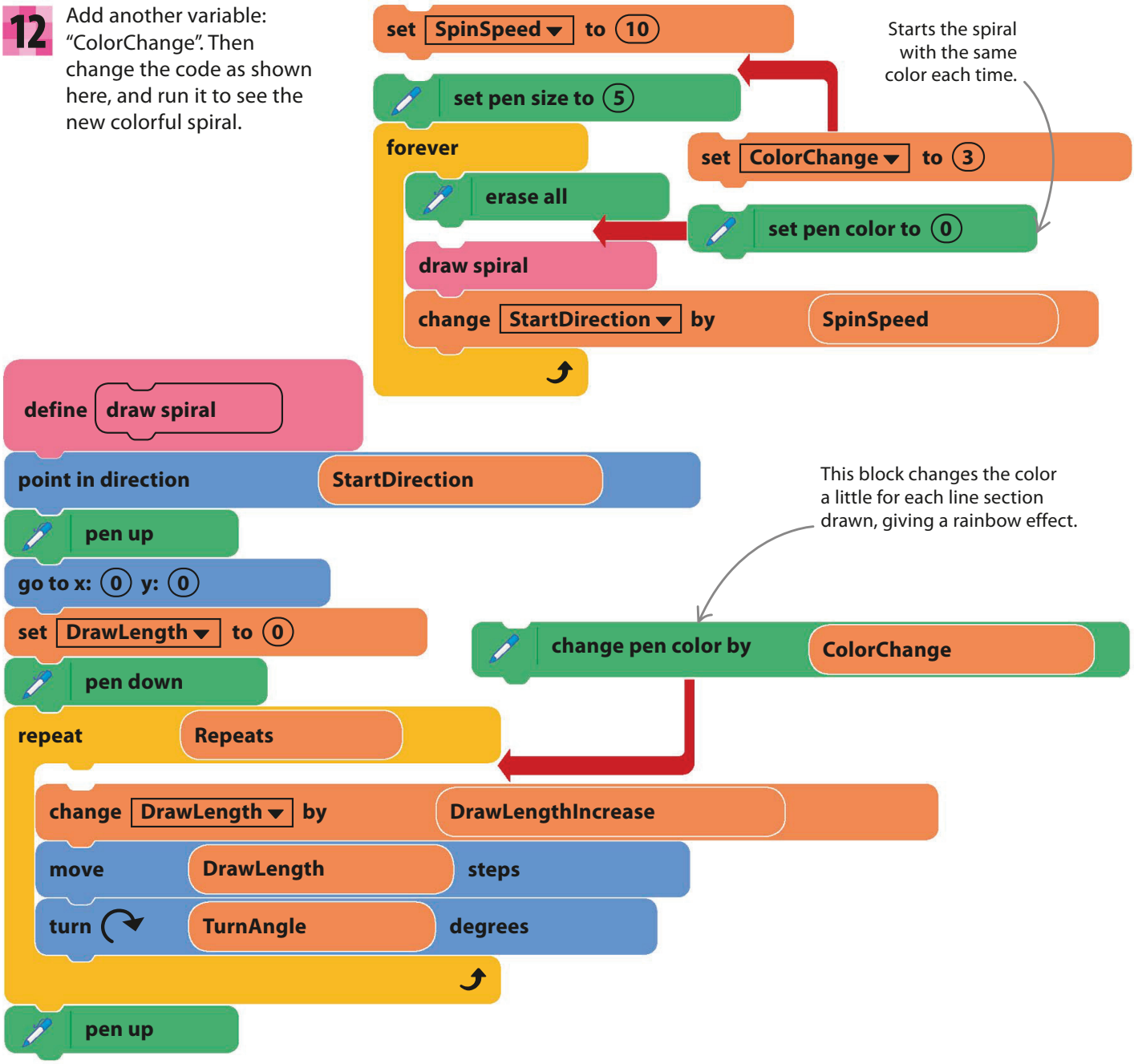


Add some color

The pen color can be controlled to create some amazing effects. Simple changes to the code create patterns like the one shown here.



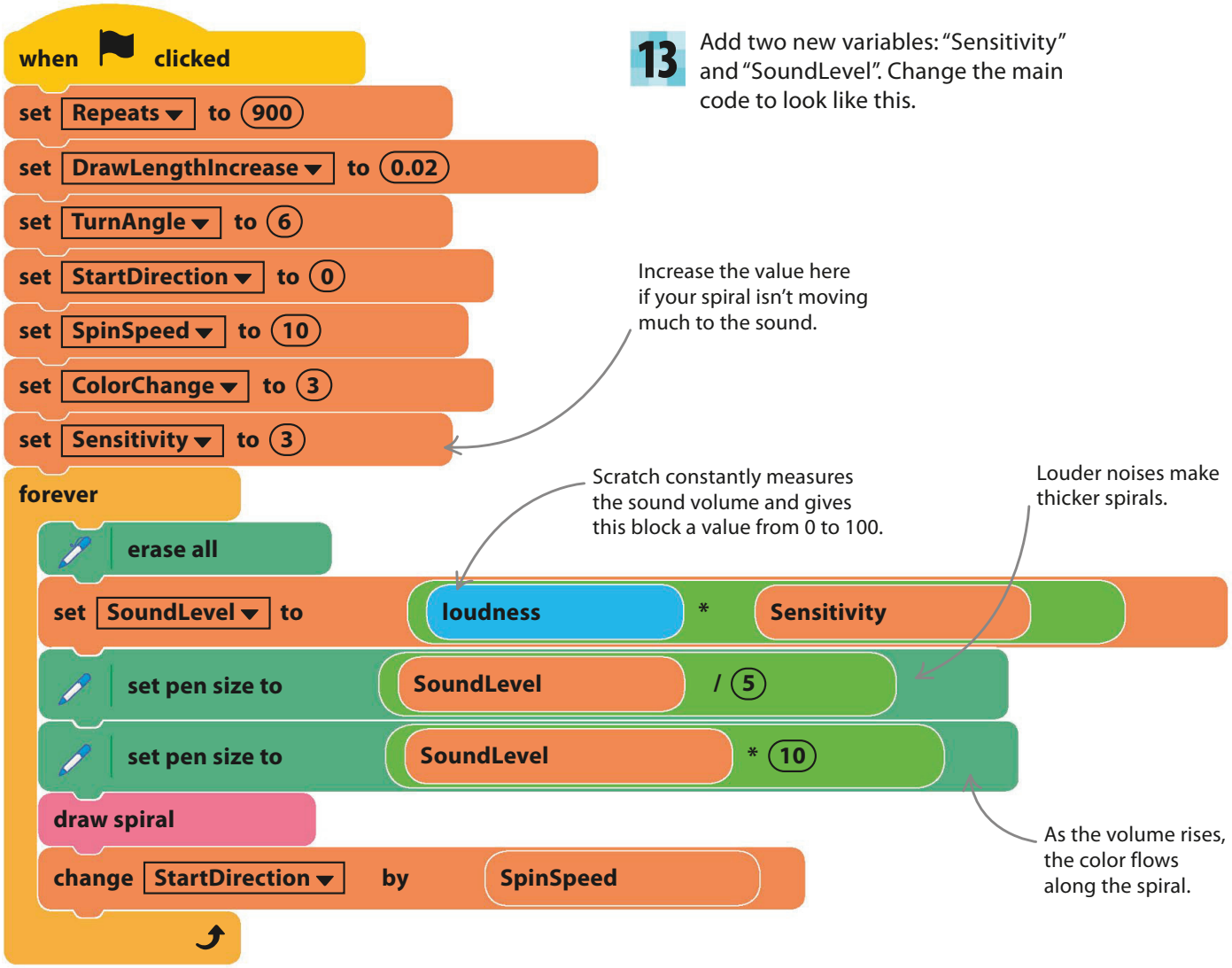
12 Add another variable: "ColorChange". Then change the code as shown here, and run it to see the new colorful spiral.



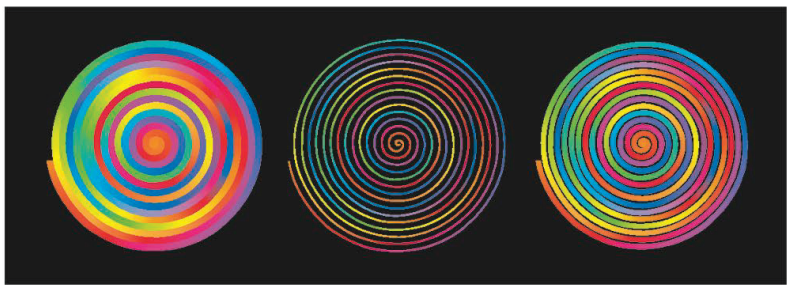
Move to the music

If your computer has a microphone, you can make the spiral react to sounds and music. You'll need to use special blocks that detect and measure sound volume.

13 Add two new variables: "Sensitivity" and "SoundLevel". Change the main code to look like this.



14 Run the project and play some music or sing near your computer. Scratch will ask you to use your microphone—it's OK to click "yes." The spiral will dance to the music!

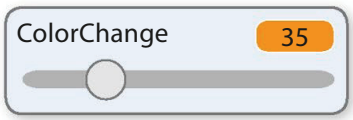


Hacks and tweaks

Don't be afraid to change the variables or other numbers in the code to see what happens. You can also add slider controls to experiment with the look and motion of the spiral.

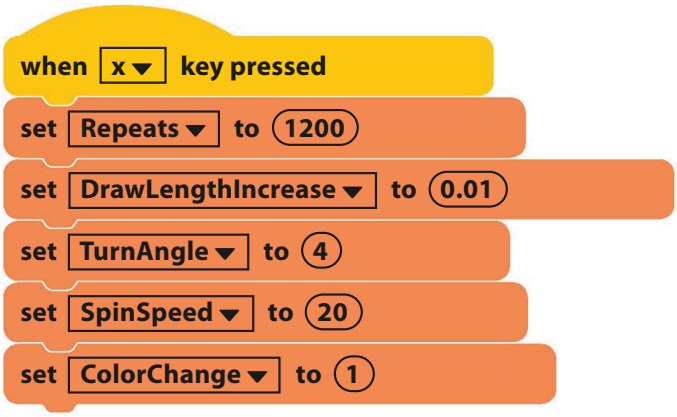
▽ Sliders

If you show the control variables on the stage, you can right-click and add sliders to them. These allow you to experiment with different values while the project is running.



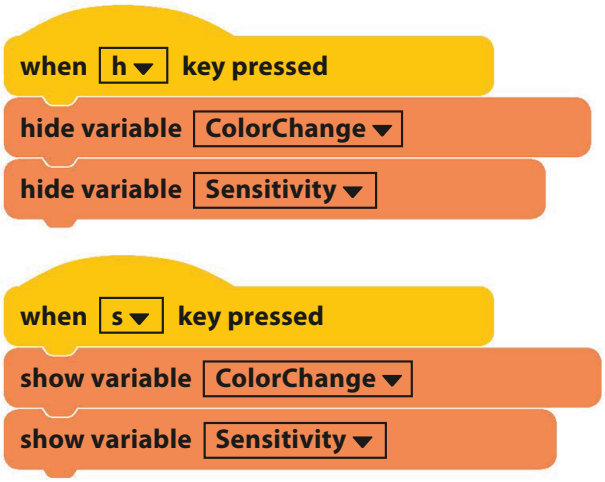
▽ Presets

If you use your sliders to make a spiral you really like, write down all the values and then create a "preset" to set those values at the touch of a key.



▽ Hiders

You can add code blocks like these to show and hide your sliders when you hit certain keys. That way they won't spoil the view!



TRY THIS

Sound reaction

You can have a lot of fun in other projects making sprites react to sound. Check the "loudness" block to see the volume displayed on the stage. Try giving code blocks like these to some sprites or invent your own code blocks.