

Making your own Scribbling program with Scratch

TechResort Mini Makers Session #1115



What do I need?

- A laptop running a web browser (Chrome works best)
- *A mouse (optional)*
- *An email address to sign up to Scratch with, or an existing Scratch account (optional)*

What is Scratch?

Scratch is a **programming language** that allows you to **drag and drop** different blocks together to write **code** that can control certain objects and events. You can use this to make animations and games!



How are we going to be using Scratch?

In this session we're going to use Scratch to make a **pattern drawing machine** that will create **geometric patterns** on the Scratch stage.

By the end of the session you should be able to create all sorts of shapes and patterns on your screen!

Once you have finished reading this page, please turn it over and begin following the script. Please ask an elf if you need help.

Getting Started

- Load up your web browser and navigate to the home page:

<http://scratch.mit.edu>

- If you haven't already got a Scratch account, then ask one of the Elves and they will help you set up an account if you want one. If you already have one – or don't want one - then log in, or click on 'Start Creating'.

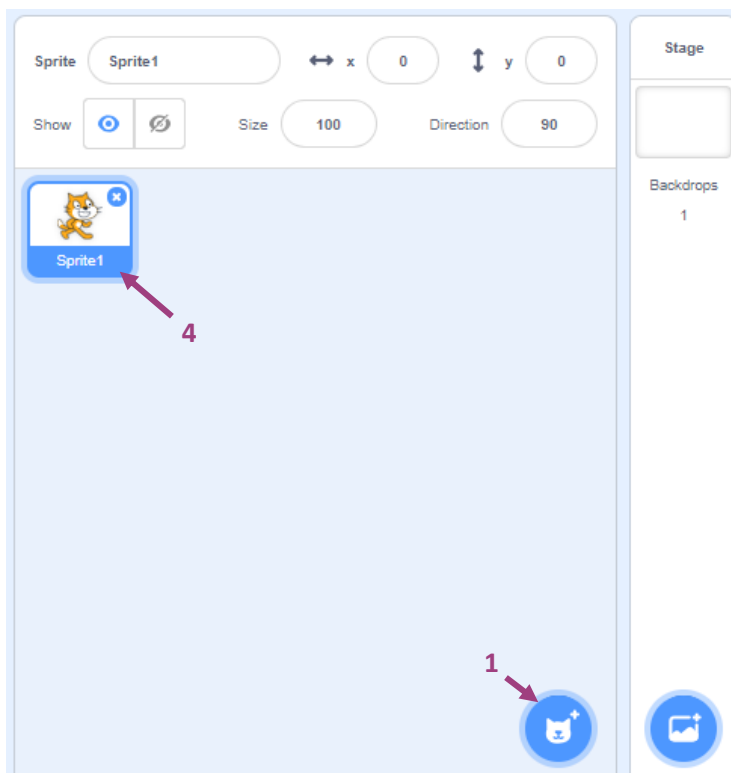
You don't need an account to create your program in Scratch – but you will need one if you want to save, or continue working from home!


First Experiments

Scratch allows you to draw on the canvas using **'pen up'**, **'pen down'** and other commands. We are going to use these to generate our shapes and patterns. Let's get started!

Choose a Suitable Sprite

This is the Sprite window. It shows all the Sprites you have in your project:



1. Hover over the cat in the blue circle to bring up the Sprite menu.
2. Click on the magnifying glass  to choose a new Sprite.
3. Choose a simple shape like **'Ball'**.
4. Delete the cat by right-clicking it and choosing **'delete'**.

Draw a Simple Line



The side menu allows you to switch between blocks of different types.

If the **'Pen'** blocks aren't showing, click on **'Add Extension'**



in the bottom left of the window and click the **'Pen'** option.

- Click on the **'Events'** menu item and you will see the first block you need. It looks like this:



- Drag it across the main grey canvas.
- Now drag the following blocks in this order:
 1. From **'Pen'**: **'pen down'**
 2. From **'Motion'**: **'move 10 steps'**
 - a. Change the number '10' to '50'
- You're written a program! It should look like this:



- Now click the green flag – it should draw a line for you!
- If your program isn't behaving correctly, take a look at the steps on the next page! If it works, then move on to the next section.

- If your program isn't working as it should, don't worry. You may need to **debug** your code. All programmers have to debug their programs at some point – it's all part of the coding experience!
 - Double-check that you've got the right blocks in the right order (take another look at the picture on the previous page to make sure your code matches exactly).
 - Make sure all the blocks are joined together properly (like Lego). If they're not joined, they won't work.
 - When you're happy the program works, move on to the next section.

Draw a Square

Squares have four side of the same length, and each angle is 90 degrees.

- Add the following lines to your program. All can be found in the '**Motion**' menu.
 1. Turn 90 degrees (it can be either direction).
 2. Move 50 steps.
 3. Turn 90 degrees (making sure it's the same direction as before).
 4. Move 50 steps.
 5. Turn 90 degrees.
 6. Move 50 steps.
- Your program should look like the image on the next page.

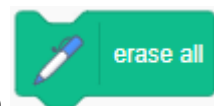


- Run the program and see what happens!

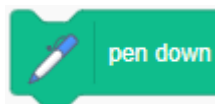
If you've drawn a square, well done! You can move onto the next section. If you haven't drawn a square, then debug your program carefully.

Housekeeping

Notice that any lines you draw stay on the stage and it can start to look a bit messy.



- To make our canvas blank each time we start it find the block from the **'Pen'** menu.



- Drag it so it slots in before the  block in your code.

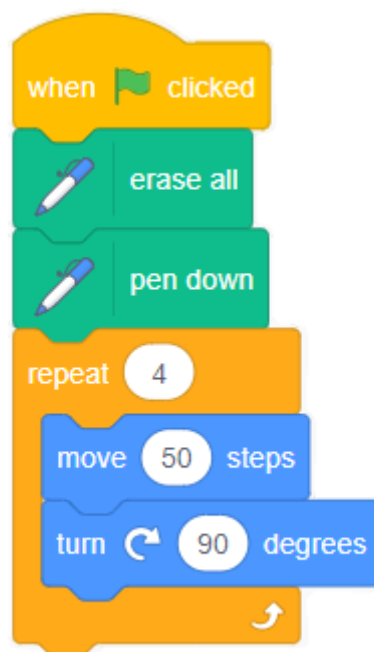
You can get rid of any extra blocks you don't need by dragging them back to the left. You can also right-click them and select **'Delete Block'**.

Going Loopy!

When we drew the square we used the same blocks four times – once for each side of the square. There are better ways to repeat the same piece of code though.

They are called **Loops** because when they get to the end of the code inside them, they loop back to the beginning.

- Look in '**Control**' and use a '**repeat 10**' loop to create code that looks a bit like this:



Notice how the '**repeat**' command makes the blocks '**move 50 steps**' then '**turn 90 degrees**' run four times.

Experimentation

- Change the number of steps – what happens?
- Change the number of degrees – what happens to the shape?
- Change the number of repeats – what do you draw?

Storing Special Data

Sometimes we want to store data – such as numbers and words – which will help us control our code. Storing it can help us hold the data for use later, or use that data repeatedly throughout the code.

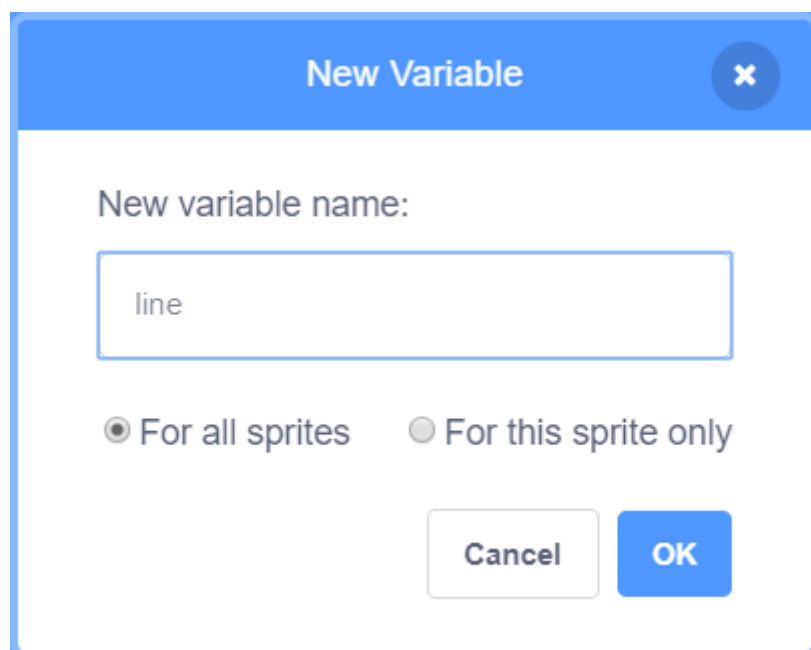
This is where **variables** come in.

So far, we've changed the angle and line length manually by typing numbers directly into the boxes.

Now we're going to make the computer choose them randomly by assigning numbers to a variable, and then using the variable in our code.

Storing the Length

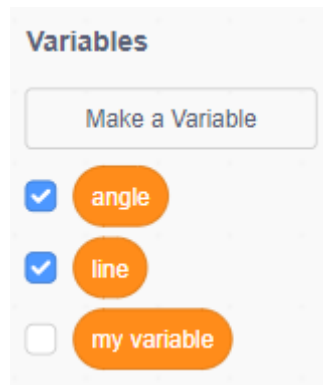
- Look in the **'Variables'** section.
- Click **'Make a Variable'**.
- Type a variable name that makes sense for what you're going to store in it. I used the name *line*:



- Click **'OK'** and an orange variable block called **'line'** should appear in the data section.

Storing the Angle

- In **'variables'** make another variable.
- Type a sensible name like *angle*.
- Your list of blocks in the **'Variable'** menu should look like this:



Adding Data to the Variables

We need to set the data for the variables immediately before the **'pen down'** block.

- Drag **'set <variable name> to 0'** block from **'Variables'** between **'erase all'** and **'pen down'**.
 - Make sure the dropdown box shows your variable name for the length of the line.
 - Set the number to 50
- Drag another **'set <variable name> to 0'** block from **'Variables'** to below your last one.
 - Make sure the dropdown box shows your variable name for the angle.
 - Set the number to 90

Using the Variables

Now we've set the values, we can drag the variables to replace the numbers in our code.


- Drag the orange oval variable names in to the move and turn commands. Remember to use 'line' for 'move', and 'angle' for 'turn'.
- Your code should look something like this:



Block colours: Notice how the blocks come in different colours. The colour of each block shows you exactly which menu item you should click on to find it.

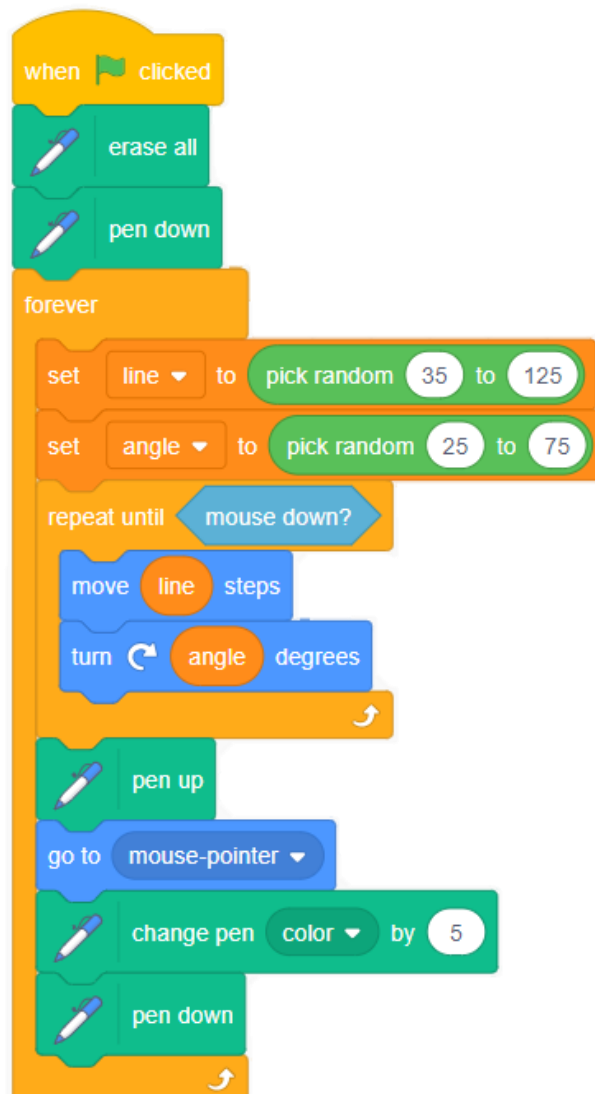
Extensions are all the same colour, but you can see the difference in them using the icon instead – like the pen icon for the 'Pen' extension).

More Experimentation

- What happens if you use the **'Operators'** block  instead of a number when you set your length and angle variable?
- Can you set up another variable to change the number of times the repeat loop repeats?
- Can you make the position on the canvas change without drawing (hint: **'pen up'**) and then draw something somewhere else on the canvas?

Making Your Code Even Better

Can you make code like this?



It's Never Finished!

Microsoft didn't stop creating Windows after the first version. They keep adding to it to try and make it better!

If you finish our suggestions before the session ends, you should think about how you can make your program better, more fun, more efficient, or just working in a different way! The important thing is to experiment – it doesn't matter if it doesn't always work out!

Save your code into a different project (in case anything goes wrong, you can always come back to the version that works), and experiment with it!