 Raspberry Pi Projects

CATS!

Introduction

In this project, you will create a simple line-following game in Scratch. Guide the cats to safety, and don't let any of them fall through the gaps!

What you will make

Click and drag with the mouse to draw a line with the pencil. Your objective is to stop the cats falling to their doom by creating a safe path to the exit.

What you will learn

This project covers elements from the following strands of the Raspberry Pi Digital Making Curriculum (http://rpf.io/curriculum):

- Apply basic programming constructs to solve a problem (https://curriculum.raspberrypi.org/programming/builder/)

What you will need

Hardware

- A computer capable of running Scratch

Software

- Scratch 2.0 (either online (https://scratch.mit.edu/projects/editor/) or offline (https://scratch.mit.edu/scratch2download/))

Drawing lines

- Open the starter project

I'm using Scratch online

- Open the 'CATS!' Scratch starter project at jumpto.cc/cats-go (http://jumpto.cc/cats-go).

- If you have a Scratch account, you can click on **Remix** in the top right-hand corner to save a copy of the project to your account.

I'm using Scratch offline

Download the cats.sb2 (https://s3.eu-west-2.amazonaws.com/learning-resources-production/projects/cats/c3b7d5dbde569f8ffefb21025180e169acfdc075/en/resources/cats.sb2) Scratch starter project, and open it using the offline editor.

- Click on the sprite called **Pen**, and add code to set the pen colour to the same blue as the obstacles on the stage. Clear the screen and set the pen size to 5.


You can select a colour by clicking on the colour block (circled) to get the pipette cursor, followed by clicking on the colour you want on the stage.

- Add some more code to make the sprite follow the mouse pointer. Test your program to check that the code works.

Saving a Scratch project

- Give your program a name by typing into the text box in the top-left corner.

- You can click **File** and then **Save now** to save your project.
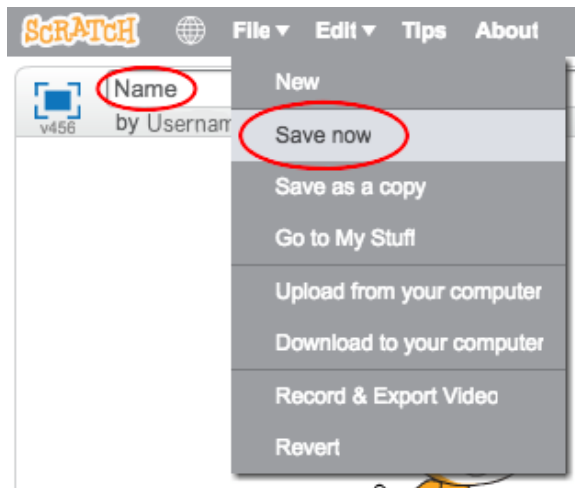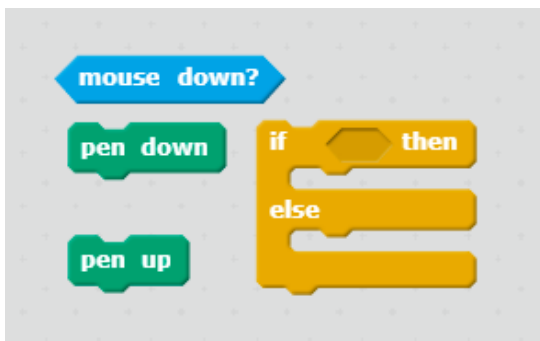

- **Note:** if you're using Scratch online but don't have a Scratch account, you can save a copy of your project by clicking **Download to your computer** instead.

- Add some code to tell the sprite to draw a line on the stage if the mouse button is pressed down.
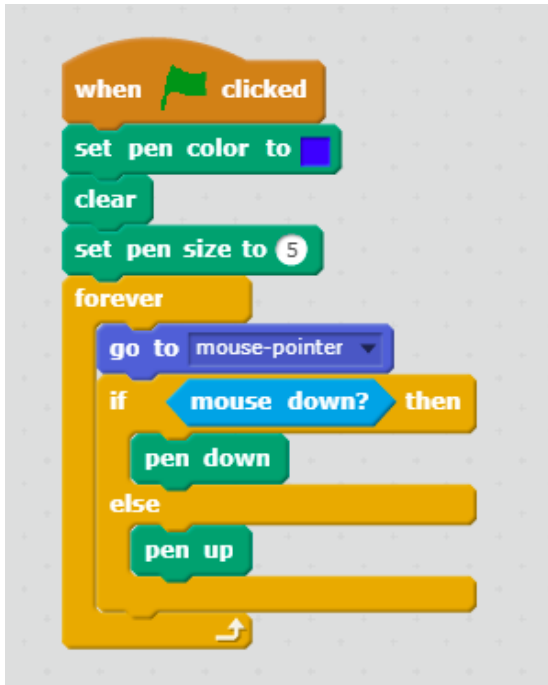
I need a hint

If the `mouse is down`, put the `pen down`. `Else` put the `pen up`.
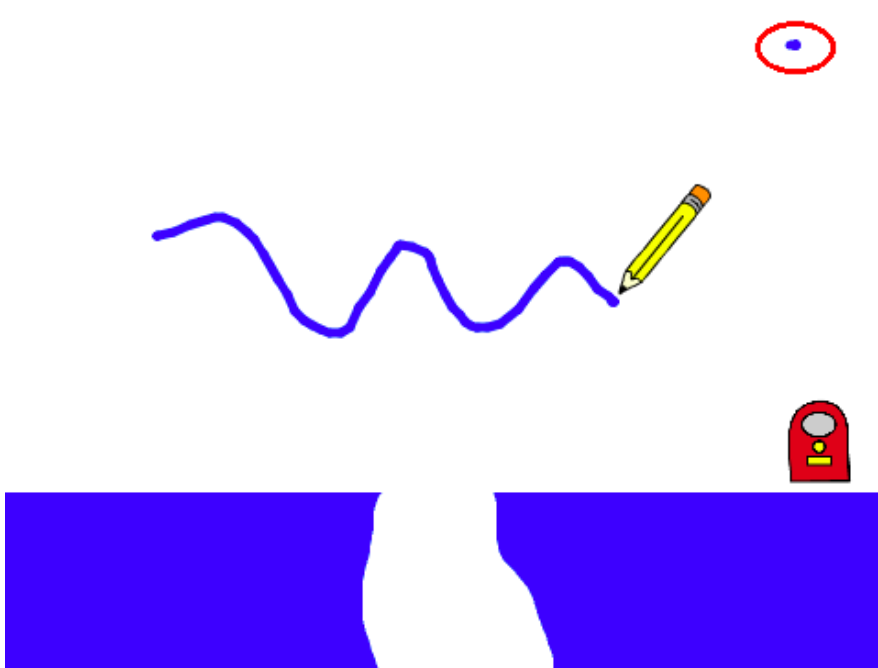
Here are the code blocks you'll need:

This is what your code should look like:

- Test your code. You should be able to click and drag with the mouse to draw a blue line on the screen.

You will probably notice that a blue dot always appears in the top right corner of your stage (circled in red). This is because when you click the green flag to start the game, the mouse is pressed down so the pen immediately starts drawing.

- Add a block to wait one second before the `forever` block to stop this from happening.
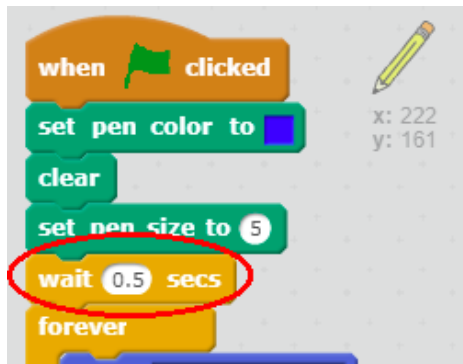
Cloning cats

We want to generate an infinite stream of cats that the player will guide along the path to the exit.

- Click on the sprite called **Cat**, and add some code to make it invisible, and also to clone it every three seconds.


If you run the program at the moment, nothing will happen. Let's make each cloned cat appear and fall out of the sky, so we can check that a new one is being created every three seconds.

- Add some code to tell the sprite that when it starts as a clone, it should become visible and fall until it reaches the blue floor which is drawn on the stage
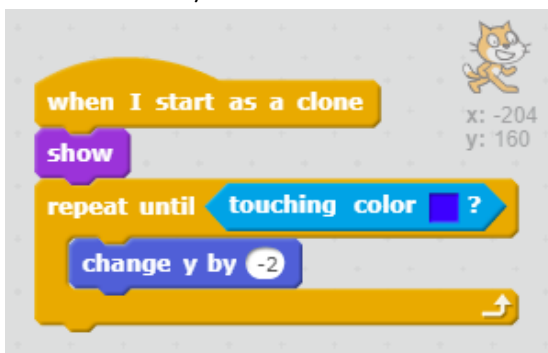
I need a hint

When the sprite starts as a clone `show` the sprite. **Repeat** this until it **touches** the blue stage. **Change** the y coordinate of the sprite by **−2**.
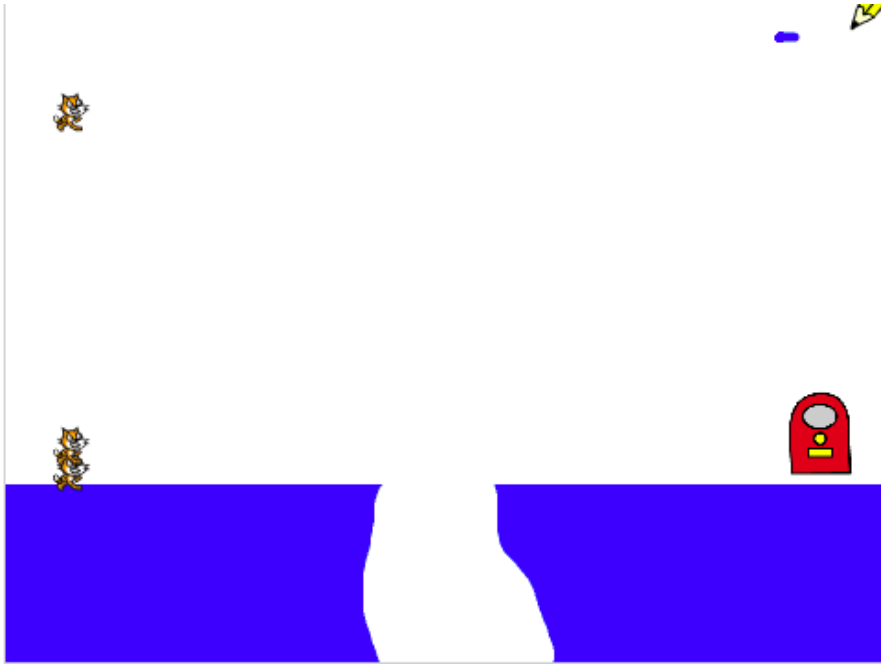
Here are the code blocks you'll need:
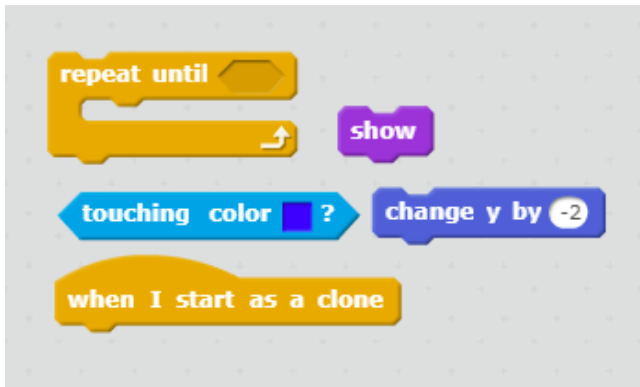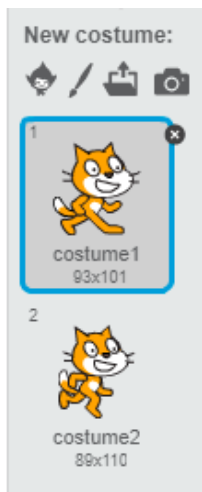

This is what your code should look like:

When you press the green flag, you should see a new cat falling out of the sky every three seconds and landing in a big pile of overlapping cats on the blue floor at the bottom.

Moving cats

When a cat has appeared and fallen until it reaches the floor, we want it to step slowly to the right.

- Add some code to the `when I start as a clone` section to make the cat sprite move ten steps, and switch between the two costumes every 0.1 seconds to make it look like the cat is walking.

I need a hint

The cat sprite should `move 10 steps`, and `switch costume` every `0.1 seconds`. This code (as well as the code to make the cat fall) should repeat `forever`.
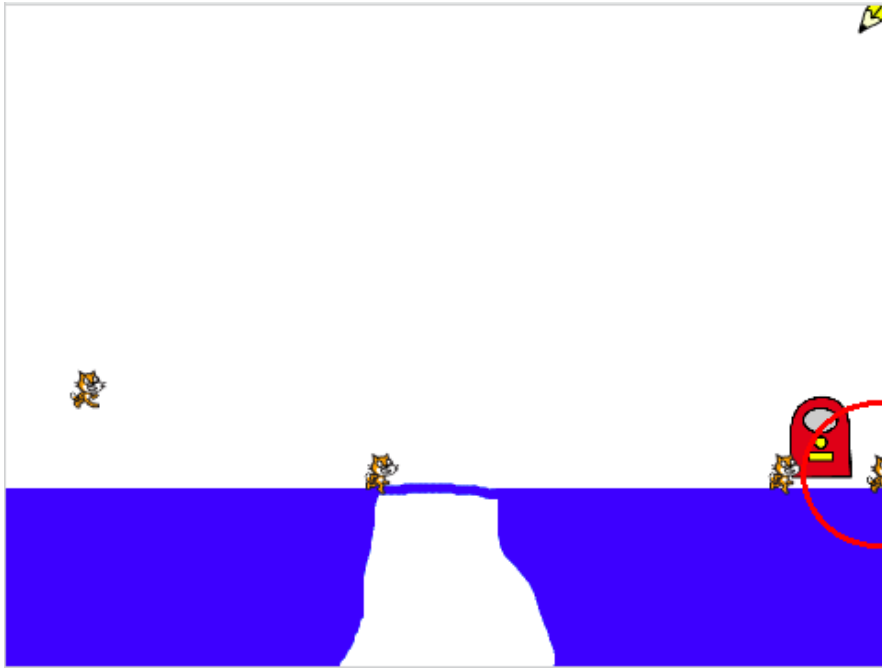
Here are the code blocks you'll need:

This is what your code should look like:

- Press the green flag and check that the cats now move along the blue platform at the bottom.

You will notice that, if you draw a bridge across the gap so that the cats can get all the way to the right edge of the screen, they end up getting stuck walking into the wall.

- Remove the forever loop you added, and instead add a different loop to make the cats only walk until they reach an edge. When a cat reaches the edge of the screen, it should disappear.

I need a hint

Remove the forever loop and replace it with a different loop which repeats `until the cats are touching the edge`. Once they reach an edge, add a block to `delete the clone`, which will make the cat disappear.

Here are the new code blocks you'll need to add:
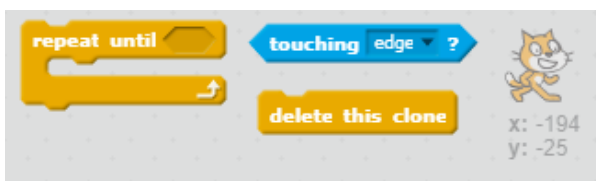
This is what your code should look like:

- Press the green flag and check that the cats disappear when they reach the edge of the screen.

You might notice that the cats don't disappear properly if they fall into the hole, they just get stuck at the bottom. This is because the sprite is getting stuck trying to fall!

This code tells the cat to keep falling until it touches blue. However, in the hole the cat will never reach blue, so it is stuck forever.
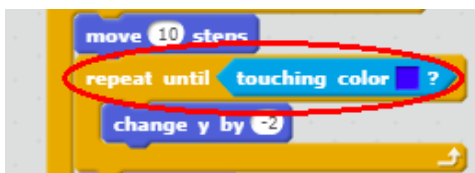

- Add more blocks to this loop to tell it to repeat until it is touching blue `or touching the edge`. This way, the sprite will stop trying to fall if it reaches the edge of the screen.

Sticking to the lines

When testing your game, you might notice that if you draw a low bridge between the two platforms, or a line that slopes upwards, the cats end up walking through the platform rather than on top of it!
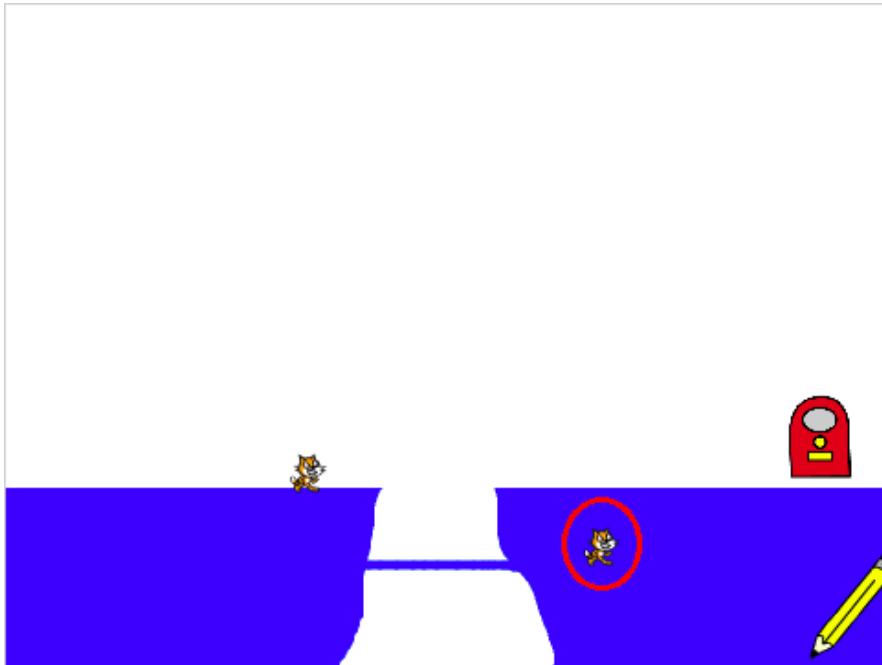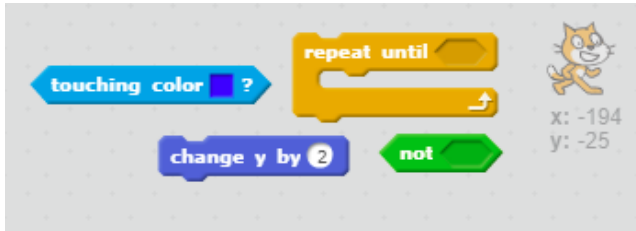

- In the code for the cat sprite, add another loop after the loop which makes the cat fall. This time, the loop should tell the cat to move upwards by two until it is not touching blue.

I need a hint

The cat should `move up 2`, and this should `repeat until it is not touching blue`.

Here are the code blocks you'll need:

This is what your code should look like:

- Click the green flag and try drawing a line which slopes upwards. Check that your cat follows the line.
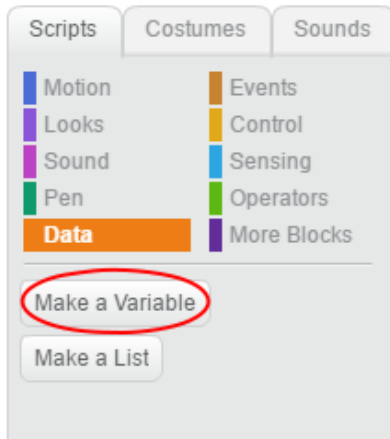

Getting to safety

The object of the game is to guide the cats to safety by creating a safe path for them to reach the door. Let's make a score variable to keep track of how many cats have successfully reached the door.
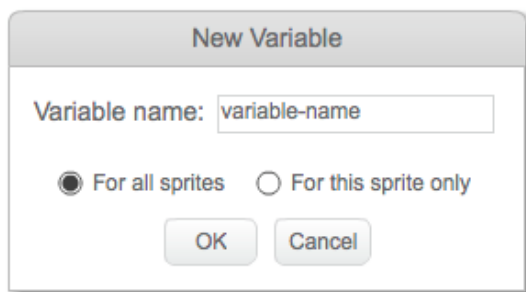
- Create a variable called `score`.
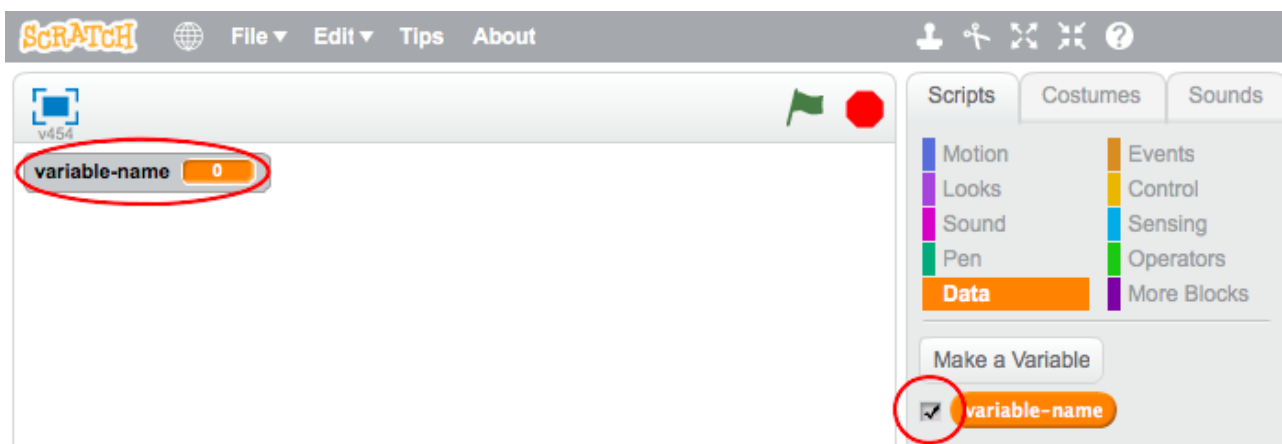
Add a variable in Scratch

- Click on "Data" in the Scripts tab, then click on "Make a Variable"

- Type in the name of your variable. You can choose whether you would like your variable to be available to all sprites, or to only this sprite. Press OK.

- Once you have created the variable, it will be displayed on the stage, or you can untick the variable in the Scripts tab to hide it.

- New blocks will appear and allow you to change the value of the variable.

- Add some code to your cat sprite to add one to the score each time a cat reaches the door. Don't forget to also set the score to zero at the start of the game.
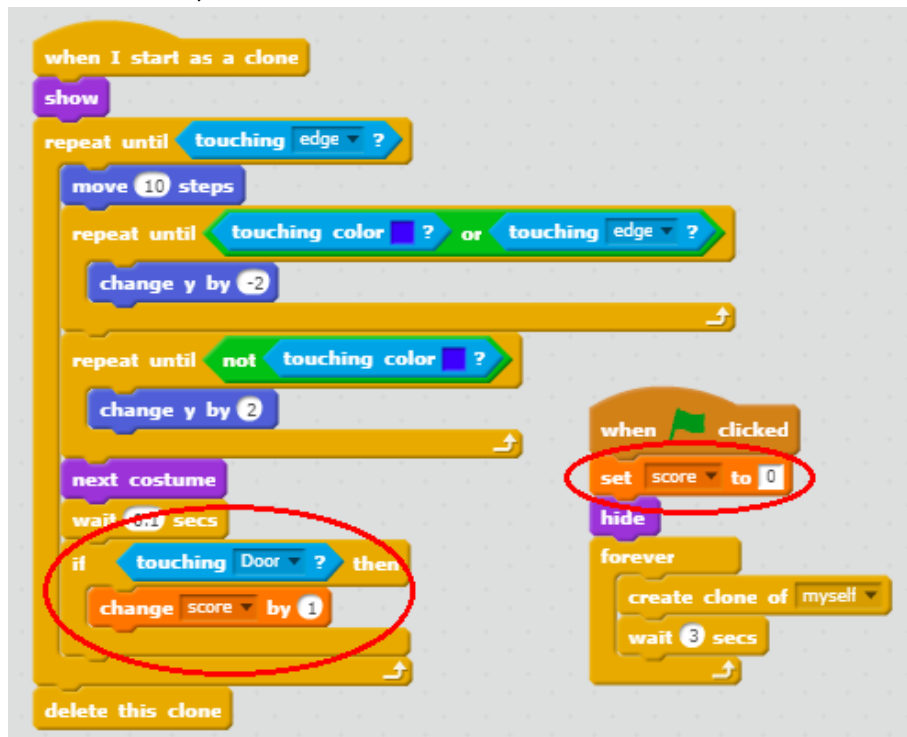
I need a hint

If the cat is `touching the door sprite,` then `add 1 to the score`.

Here are the new code blocks you'll need to add:

This is what your code should look like:

- Add some more code so that a cat sprite that reaches the door makes a 'meow' sound and then disappears.

Challenge: more obstacles

The level we have created at the moment is rather easy to win. Could you make your game harder?

- Add more backgrounds with different platform designs.

- Move the location of the door depending on which background is displayed.

- Add some more sprites to represent moving obstacles. Perhaps you could have roaming dogs or rotating spikes for the cats to avoid?

- Only allow the player to use a fixed amount of "ink" to draw extra lines on the game. You can keep track of how much "ink" is used by creating a variable and using the timer to time how long the mouse is held down.

- Create a sprite to represent to the player how much ink they have left.