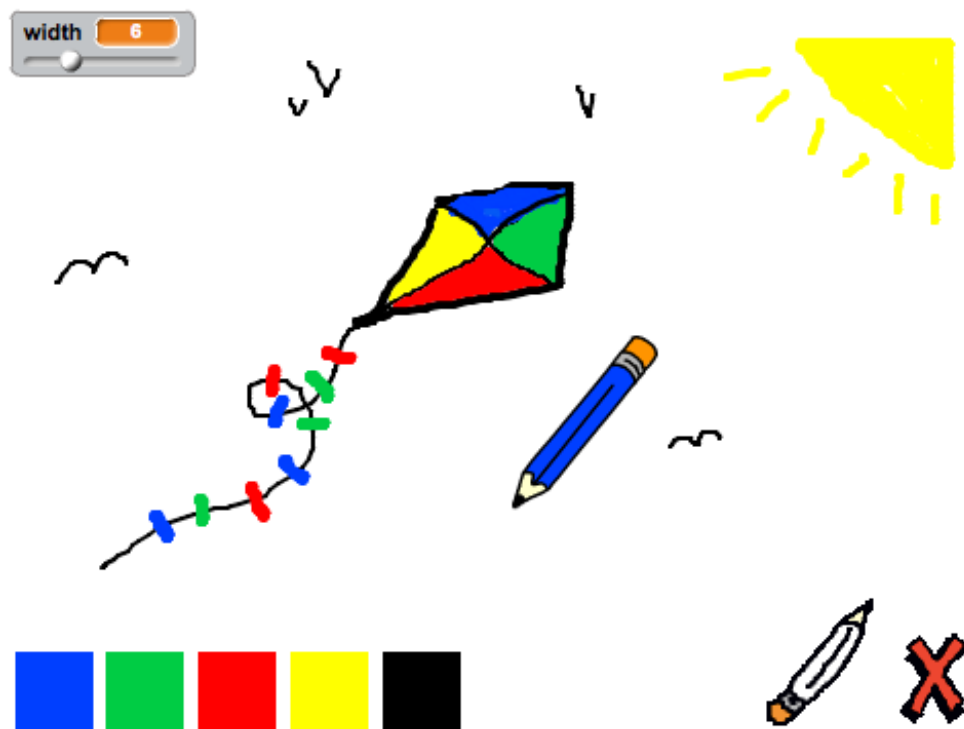


Introduction

In this project, you will be making your own paint program!



Step 1: Making a pencil

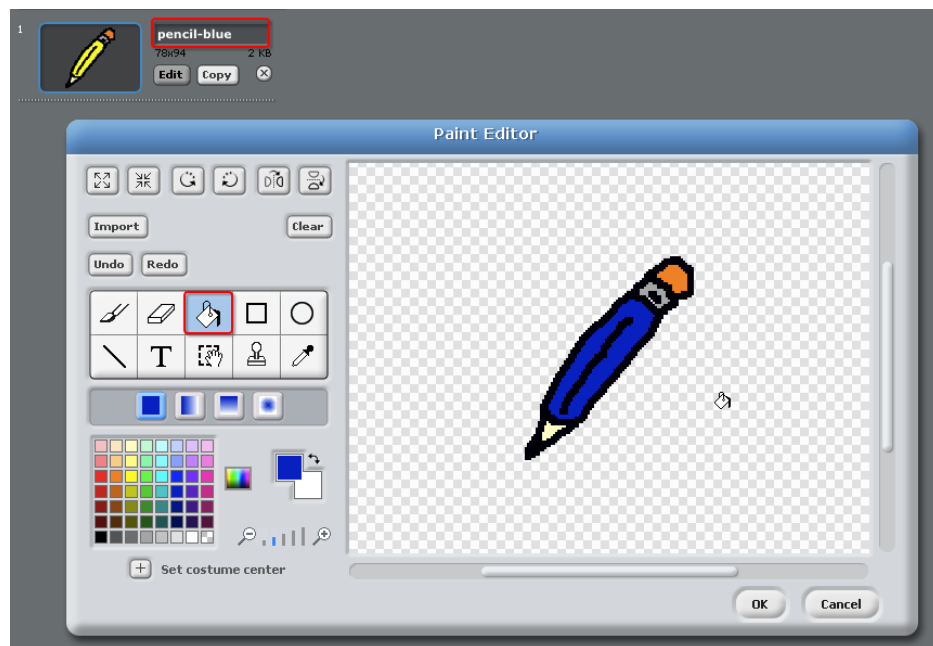
Let's start by making a pencil, that can be used to draw on the stage.

✓ Activity Checklist

- ☐ Start a new Scratch project, and delete the cat sprite so that your project is empty.
- ☐ Add the pencil sprite to your project.



- ☐ Rename your costume 'pencil-blue', and use the 'Fill' tool to make the pencil blue.

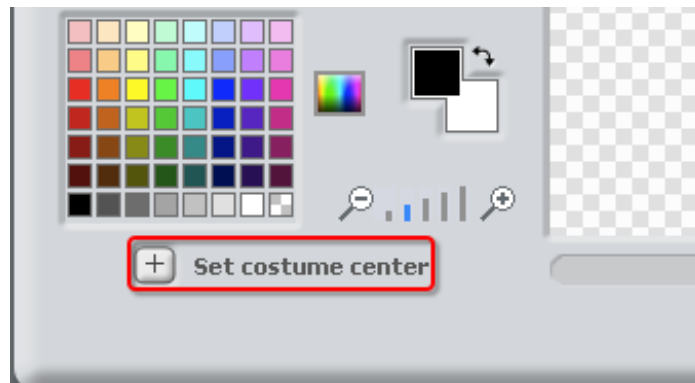


- ☐ As you'll be using the mouse to draw, you'll want the pencil to follow the mouse **forever**. Add this code to your pencil sprite:

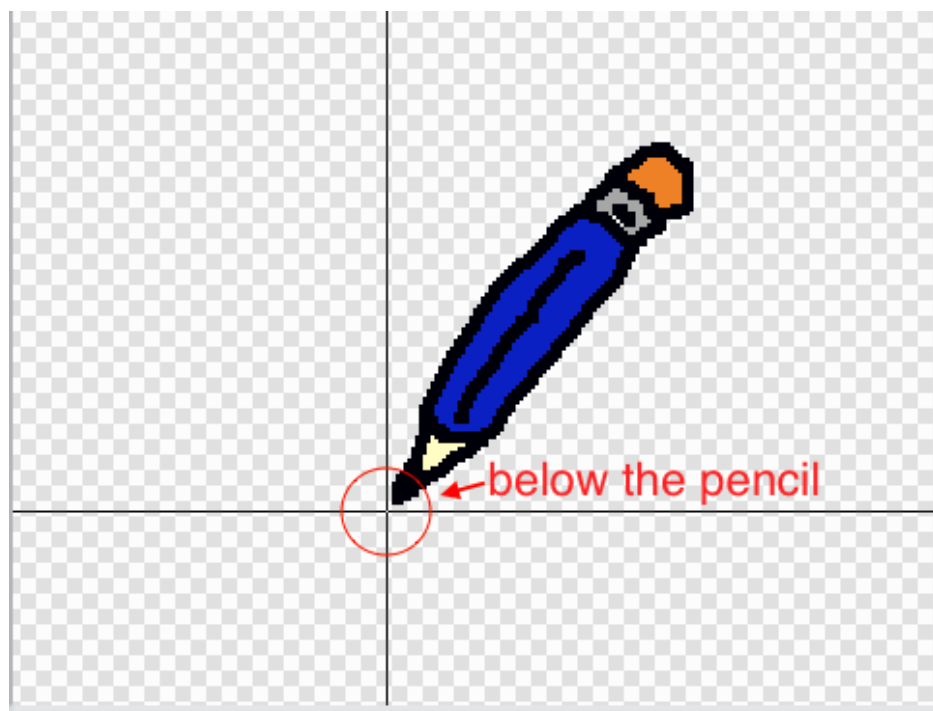


- ☐ Test out this code by clicking the flag and then moving the mouse around the stage. Does this work as you expected?
- ☐ Have you noticed that it's the centre of the pencil, and not the tip, that follows the mouse pointer?

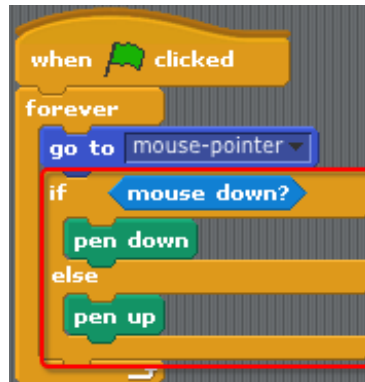
To fix this, click on the 'edit' button of your pencil sprite's costume, and click 'Set costume center'.



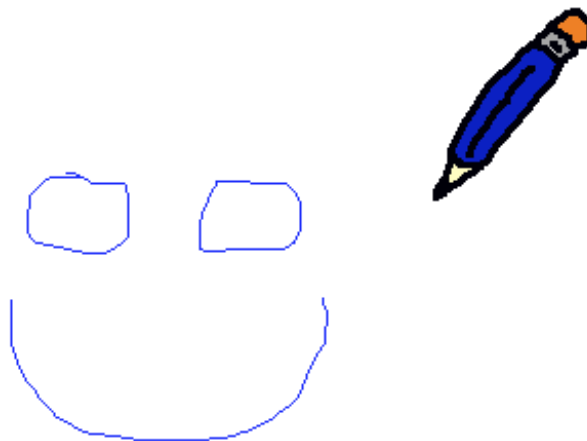
- ☐ You should notice that a crosshair appears on the costume. You can now click **just below** the tip of the pencil, to set this point as the costume centre.



- ☐ Click the 'Scripts' tab, and then test out your pencil again - does it work better than it did before?
- ☐ Next, let's make your pencil draw **if** the mouse has been clicked. Add this code to your pencil sprite:



- ☐ Test your code again. This time, move the pencil around the stage and hold down the mouse button. Can you draw with your pencil?



If not, check that you placed the crosshair **just below** the tip of the pencil, *not* on the tip of the pencil.

Save your project

Step 2: Coloured pens

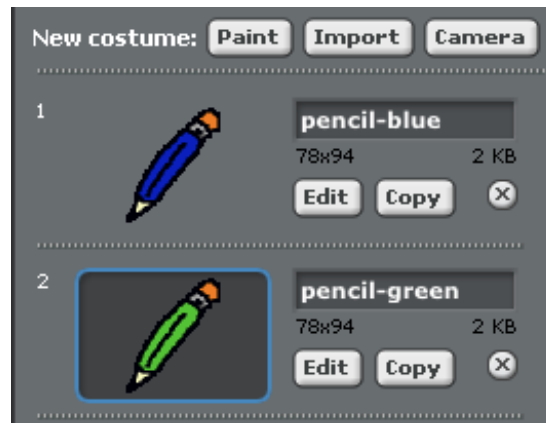
Let's add different colour pens to your project, and allow the user to choose between them!

✓ Activity Checklist

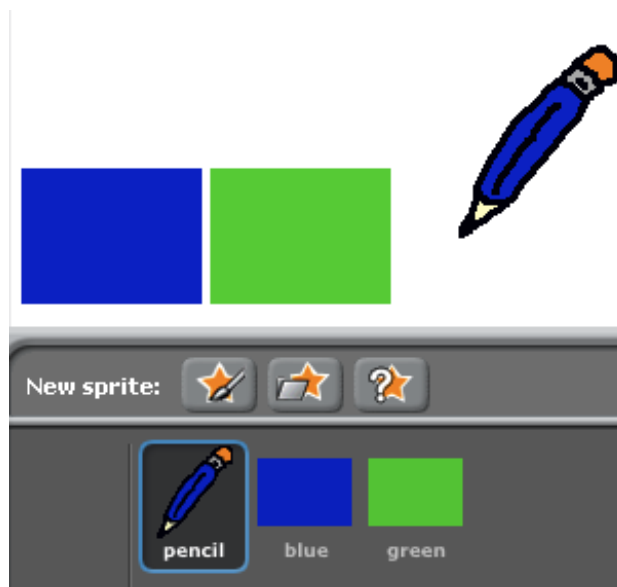
- ☐ Click on your pencil sprite, click 'Costumes' and duplicate your 'pencil-blue' costume using the 'copy' button.



- ☐ Rename your new costume 'pencil-green', and colour the pencil green.



- ☐ Create two new sprites, which you will use to select the blue or green pencil.



- ☐ When the green selector icon is clicked, you need to **broadcast** a message to the pencil sprite, telling it to change its costume and pencil colour.

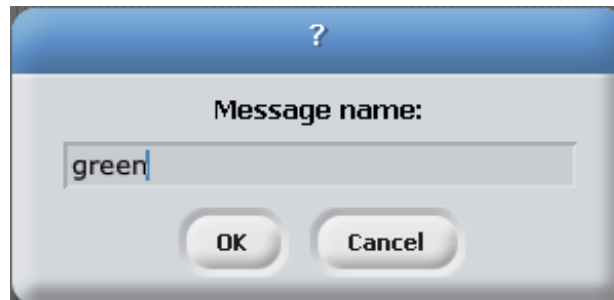
To do this, first add this code to the green selector icon:



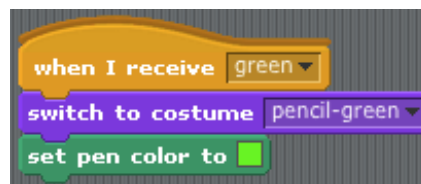
To create the **broadcast** block, click the down arrow and select 'new...'.



You can then type 'green' to create your new message.



- ☐ You now need to tell your pencil sprite what to do when it receives the message. Add this code to your pencil sprite:



To set the pencil to colour to green, click the coloured box in the **set color** block, and click on the green selector icon to choose green as your pencil colour.

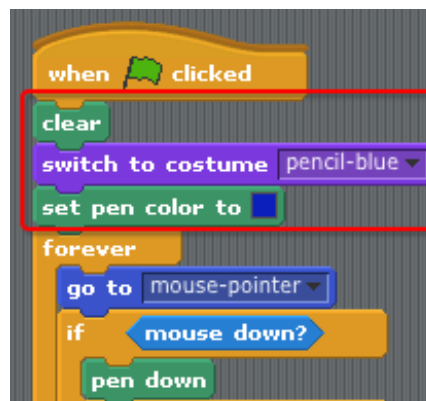
- ☐ You can now do the same for the blue pencil icon, adding this code to the blue selector sprite:



...and adding this code to the pencil sprite:

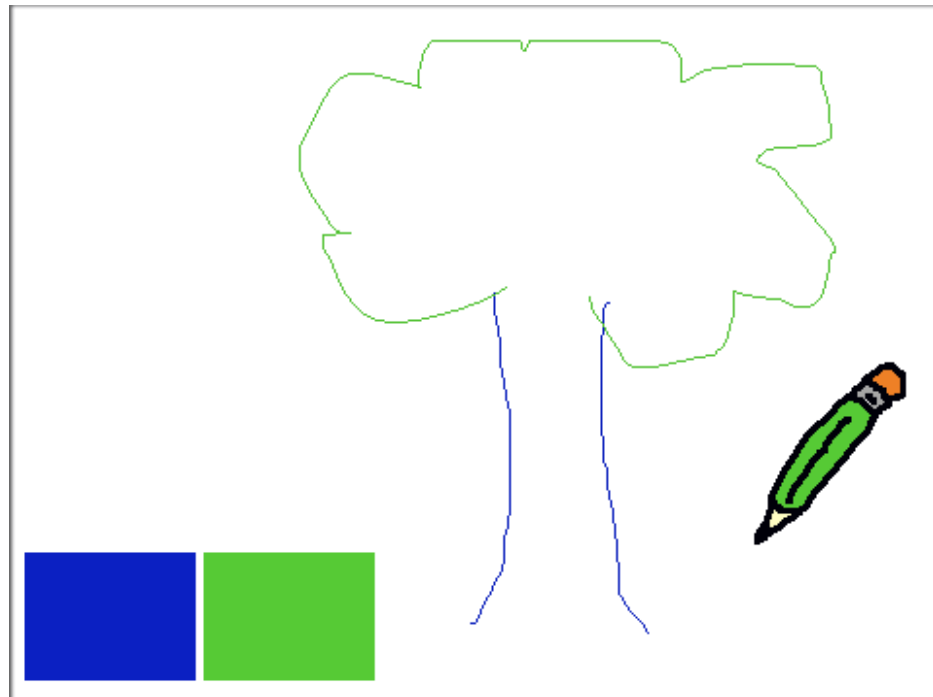


- Finally, you need to tell your pencil sprite what costume and pencil colour to choose, as well as clearing the screen, when your project is started. Add this code to the beginning of the pencil's **when flag clicked** code (before the **forever** loop):



If you prefer, you can start with a different colour pencil!

- Test out your project. Can you switch between blue and green pens?



Save your project

Step 3: Making mistakes

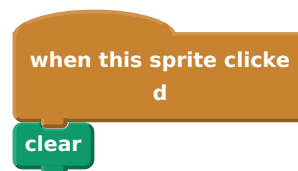
Sometimes mistakes happen, so let's add a 'clear' button and an eraser to your project!

✔ Activity Checklist

- ☐ Let's add a button to clear the stage. To do this, add the 'X' letter sprite from the outlines folder to the stage, and colour it in red.

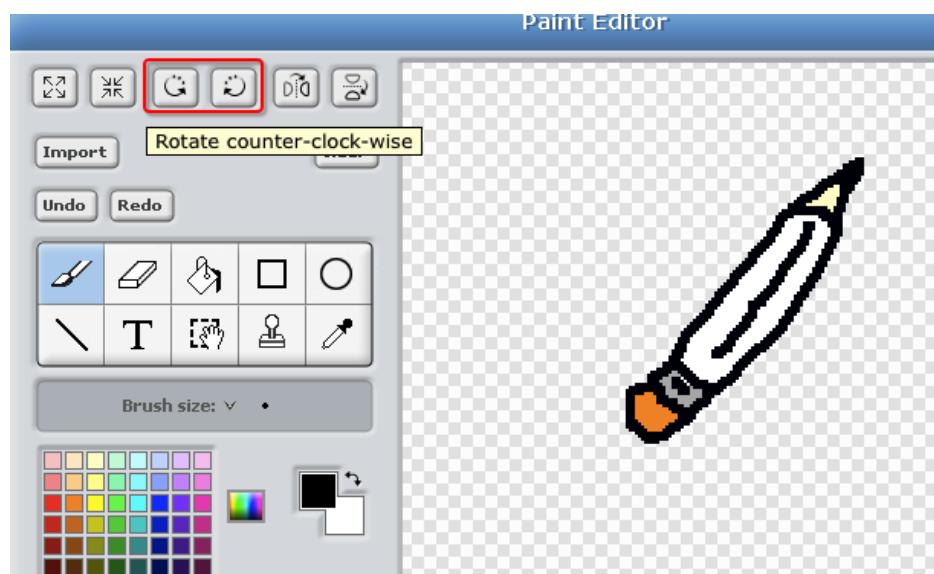


- ☐ Add code to your new cancel button to clear the stage when it's clicked.



Notice that you don't need to send a message to clear the stage, as any sprite can do it!

- ☐ You can also create an eraser. Create a white pen and use the rotate tools to turn the pencil round so the eraser is at the bottom



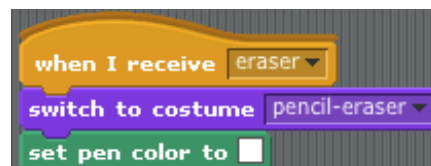
- ☐ You should also add the eraser image as a new selector sprite. This is how your stage should look:



- ☐ You can then add code to the eraser selector sprite, to tell the pencil to switch to an eraser.



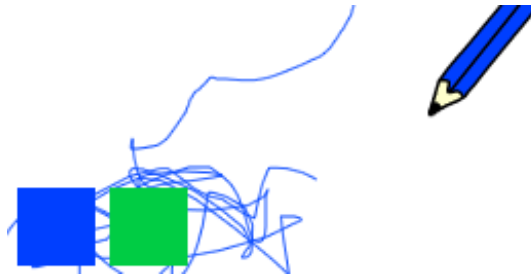
- ☐ When the pencil receives this message, you can create an eraser by switching the pencil costume to the eraser, and switching the pencil colour to the same colour as the stage!



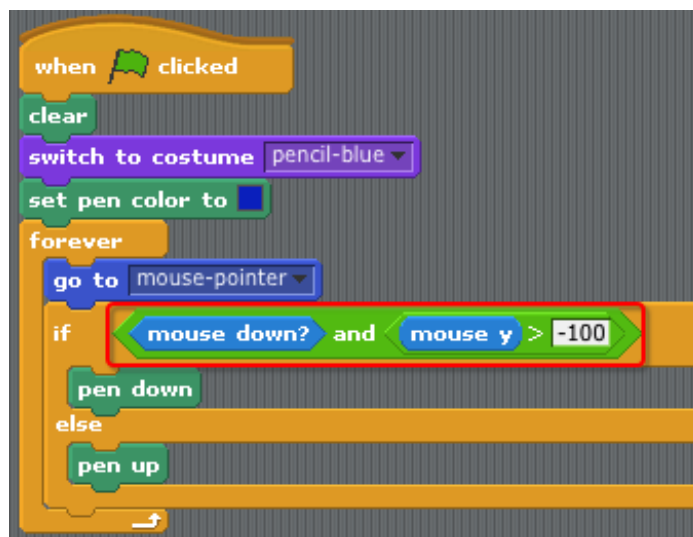
- ☐ Test your project, to see if you can clear and erase on the stage.



- ☐ There's one more problem with the pencil - you can draw anywhere on the stage, including near the selector icons!



To fix this, you have to tell the pencil only to draw if the mouse is clicked *and* if the y-position of the mouse is greater than -100 (`mouse y > -100`). Change your pencil's **if** statement to look like this:



- ☐ Test your project; you now shouldn't be able to draw near the selector blocks.



Save your project

Step 4: Changing the pencil width

Let's allow the user to draw using a range of different pencil sizes.

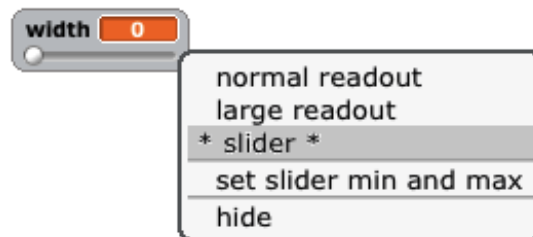
✓ Activity Checklist

- ☐ First, add a new variable called 'width'. If you're not sure how to do this, the 'Ghostbusters' project will help you.
- ☐ Add this line *inside* the **forever** loop of your pencil's code:



Your pencil width will now repeatedly be set to the value of your 'width' variable.

- ☐ You can change the number stored in this variable by right-clicking on your variable (on the stage) and clicking 'slider'.



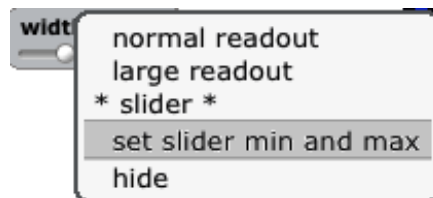
You can now drag the slider below the variable to change its value.



- ☐ Test your project, and see if you can modify the pencil width.



If you prefer, you can set the minimum and maximum value of 'width' that's allowed. To do this, right-click on your variable again and click 'set slider min and max'. Set the minimum and maximum values of your variable to something more sensible, like 1 and 20.



Keep testing your 'width' variable until you're happy.

Save your project

Challenge: Shortcuts

Can you create keyboard shortcuts for your commands? For example:

- ☐ b = Switch to blue pen
- ☐ g = switch to green pen
- ☐ e = switch to eraser
- ☐ c = clear screen

You could even allow the user to change the pen width with

the arrow keys!

Save your project

Challenge: More pens

Can you add red, yellow and black pens to your paint program? You'll find all of the images you need in your 'Resources' folder. Remember to add keyboard shortcuts for these new pens!

Can you use your pens to draw a picture?

