# Introducing Scratch

4 – Drawing

Exercise 1. Drawing Program

In this lesson we're going to create a drawing program similar to Windows Paint.

1. Start with a new project and remove the default cat sprite.

2. Create a new sprite.

3. Put a tiny dot in the middle of the sprite. Make sure it is right in the sprite centre. All it needs to do is mark the position of the mouse pointer so we don't really want it to be very visible.

4. Call the new sprite Pointer.

5. Add the following code blocks. Note that the dark green blocks are from the **Pen** category.

6. To view the pen category, click the **Add Extension** button at the bottom of the category list and then select **Pen**.
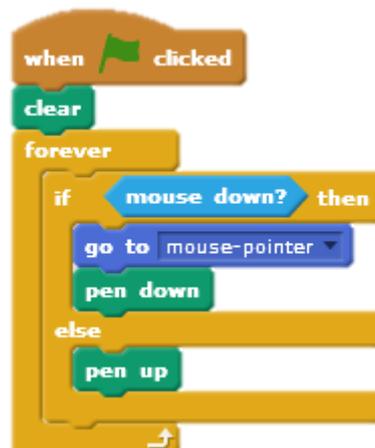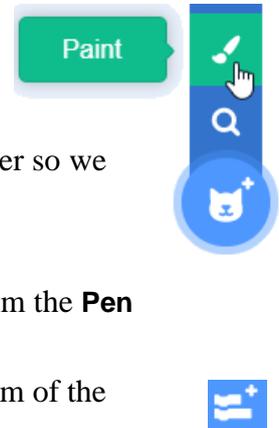

This will start by clearing all drawing from the stage when the 🚩 button is clicked. It will then use the forever loop to continually check to see if the mouse button is being pressed. If the mouse button is being pressed, the sprite will move to the mouse pointer and put the pen down (start drawing). If the mouse button is not down, the pen will be up (stop drawing).

7. Test the program so far by drawing something on the stage.

Next we will add a keyboard controls to the program.

8. Add the following code block.
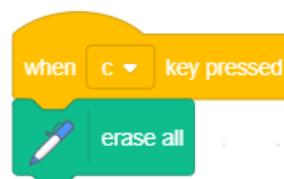
This will clear the stage whenever the **C** key is pressed.

9. Save the program as *Drawing*.

Exercise 2.   Brush Changes

1. Add the following code blocks

These blocks will allow the user to change the brush size by pressing the up and down arrows (you can even do it while you are drawing).

We will add some icons that the user can click on to change brush size and brush colours.

2. Create a new sprite that looks like a small red square (the size of a convenient icon the user can click to change colour). Rename the sprite as Red.
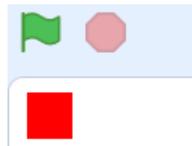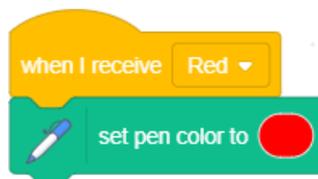

3. Position the sprite/icon in the top corner of the stage.

4. Add the following code blocks to the new sprite.

This will send out a message that the red icon has been clicked.

5. Select the Pointer sprite and add the following code blocks.

This will change the pointer/pen colour to red when it receives the message that the red icon has been clicked.

Tip   You can easily set the red colour by clicking the square in the **set pen color to** block, and then clicking on the colour picker icon to select the colour you want.

6. Repeat steps 8 to 11 to create a black icon that will change the pen colour to black when it is clicked. Tip – you can copy the existing sprite and use the fill icon ⬧ to change colour.
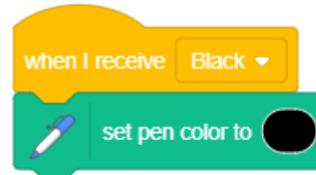
7. Position it near the red icon (you can rearrange them in whatever order suits you). Try to make the new sprite the same size and shape as your first one.
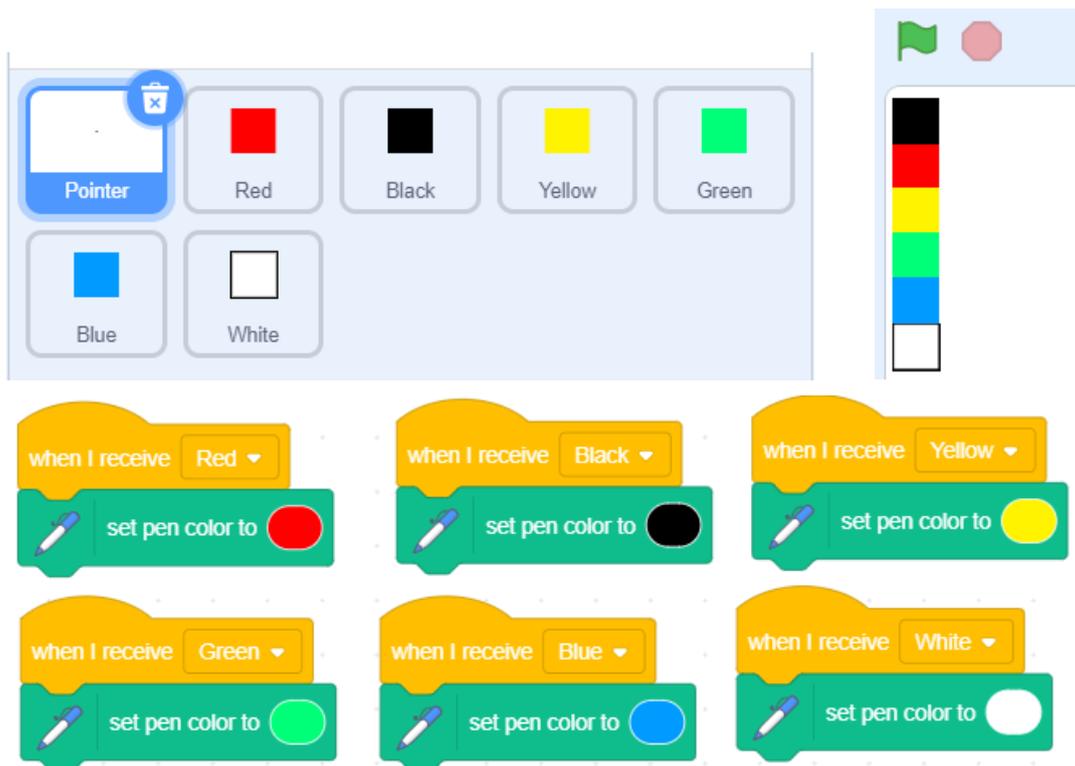
In the *Black* sprite   In the *Pointer* sprite

Tip   When you are drawing a sprite, you can use the chequered grid to help you make it the right size. The zoom options can also help when drawing.

8.   Test your black and red icons now and try drawing with both colours.

9. Create some additional colour change buttons.

Now we will create icons for 3 brush sizes. We'll start with an icon for a small brush size.

10. Create a new sprite in the shape of a white square with a small circle in the middle of it (for your small brush size). The reason for the white circle is that it gives your icon a larger area for users to click on. It might help to add a thin border around it.

11. Name the new sprite **Small** and position it in the bottom corner of the stage (leave room next to it for the medium and large brush size icons).

Tip   If you would like your sprite / icons to be lined up, one easy way to do it is to edit
their coordinates in the sprite properties. E.g. if you want them all to be lined up
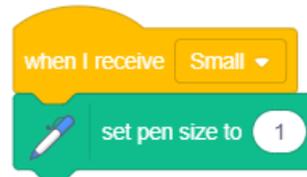vertically then make sure they all have exactly the same x coordinates.

Sprite [Small]   ↔ x (-225)   ↕ y (-161)

12. Add the following code blocks.

In the *Small* sprite   In the *Pointer* sprite

```
when this sprite clicked
broadcast  Small ▾
```

```
when I receive  Small ▾
 🖊  set pen size to  1
```

13. Create a new sprite similar to the previous one with a larger dot (this will be for your
medium brush size).

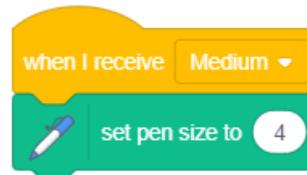14. Name the new sprite Medium and position it next to the Small icon.

[· | ●]

15. Add the following code blocks.

In the *Medium* sprite   In the *Pointer* sprite

```
when this sprite clicked
broadcast  Medium ▾
```

```
when I receive  Medium ▾
 🖊  set pen size to  4
```

16. Create a new sprite larger circle than the previous two (this will be for your large brush
size).

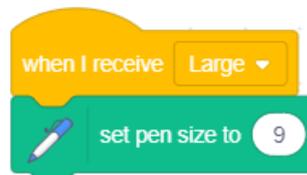17. Name the new sprite Large and position it next to the Small and Medium icons.

[· | ● | ⬤]

18. Add the following code blocks.

In the *Large* sprite   In the *Pointer* sprite

```
when this sprite clicked
broadcast  Large ▾
```

```
when I receive  Large ▾
 🖊  set pen size to  9
```
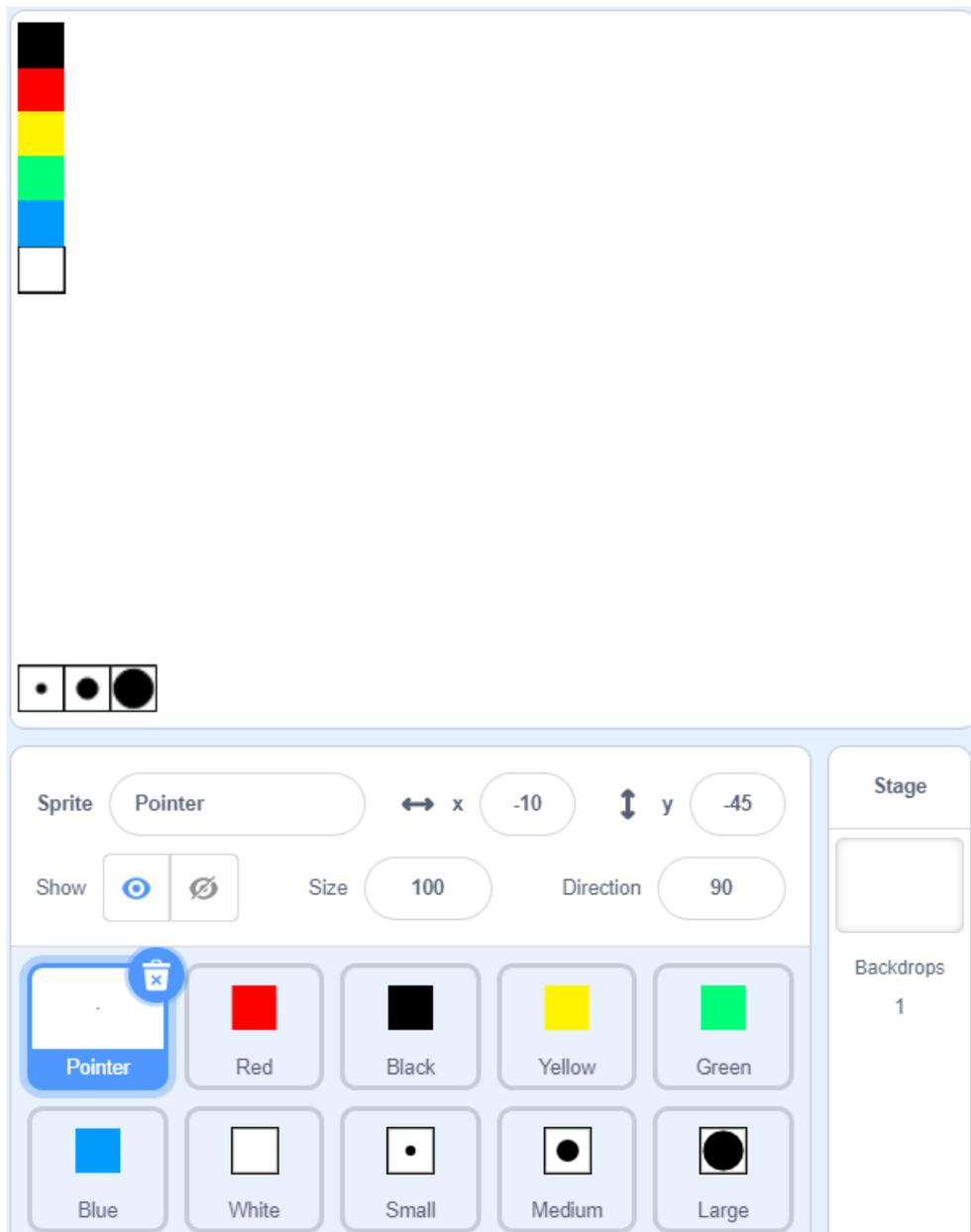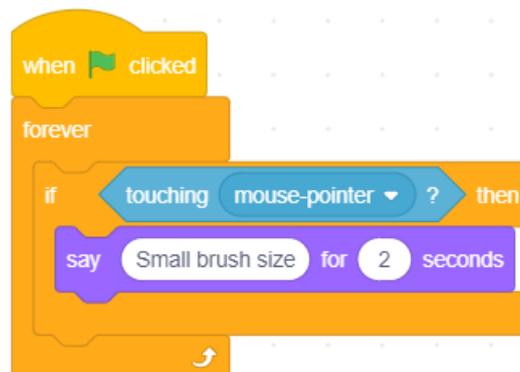
19. Test the program. Click on each icon to test drawing with the different brush sizes.

20. Add additional colour icons and additional size icons. Below is an example of how the
whole stage might look with additional colour icons.

Below is an example of how the code blocks for the pointer would look in the above sample.

21. Add a tool tip. Many programs have tool tips that give a little text tip when you move your mouse over an icon. You could add tool tips to your own icon sprites by adding a block similar to the following (this example is in the small brush sprite).

Exercise 3. Code Reference

Pointer sprite

```
when [flag] clicked
erase all
forever
    if < mouse down? > then
        go to (mouse-pointer ▼)
        pen down
    else
        pen up
```

```
when (c ▼) key pressed
erase all
```

```
when (up arrow ▼) key pressed
change pen size by (1)
```

```
when (down arrow ▼) key pressed
change pen size by (-1)
```

```
when I receive (Red ▼)
set pen color to (red)
```

```
when I receive (Black ▼)
set pen color to (black)
```

```
when I receive (Yellow ▼)
set pen color to (yellow)
```

```
when I receive (Green ▼)
set pen color to (green)
```

```
when I receive (Blue ▼)
set pen color to (blue)
```

```
when I receive (White ▼)
set pen color to (white)
```

```
when I receive (Small ▼)
set pen size to (1)
```

```
when I receive (Medium ▼)
set pen size to (4)
```

```
when I receive (Large ▼)
set pen size to (9)
```