



# Projects

## Flower generator

Generate flowers to create a patterned backdrop image or screensaver



### Step 1 Introduction

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You will create hundreds of flowers of different sizes, shapes, and colours.

You can export the flower pictures and use them as wallpapers on your phone or computer, or as backdrops in other Scratch projects.

#### What you will make



#### What you will need

##### Hardware

- A computer capable of running Scratch 3

##### Software

- Scratch 3 (either **online** (<https://rpf.io/scratch-on>) or **offline** (<https://rpf.io/scratch-off>))



### **What you will learn**

- How to stamp a sprite
- How to make your own Scratch blocks
- How to use block inputs
- How to create random numbers



### **Additional notes for educators**

You can find the **completed project** here (<http://rpf.io/p/en/flower-generator-get>).

## Step 2 Generate a flower

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First you're going to generate a flower that can be drawn on the Stage.

Create a new Scratch project, and delete the cat sprite.



Add the Pen extension to your project.

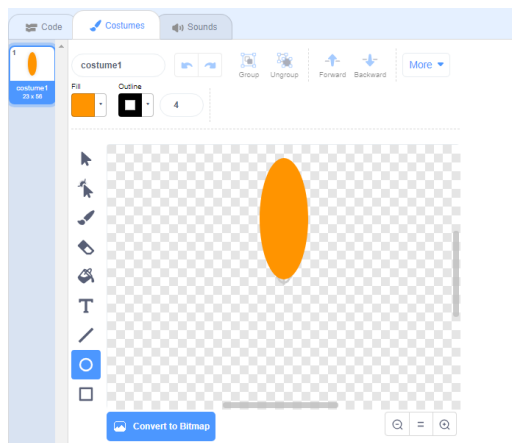


Now use the Paint tool to create a new sprite shaped like a flower petal.



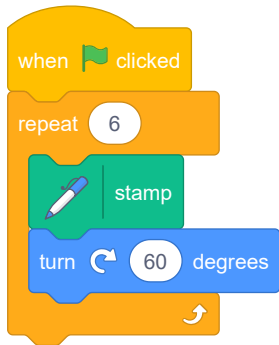
Click on **Choose a sprite**, then click on **Paint** and rename the sprite 'Flower'.

Use the Circle tool to draw a petal shape filled in orange.



Later, you will use code to add more colour.

Add the following code to the Flower sprite to **stamp** a flower with six equally rotated petals **when the green flag is clicked**.

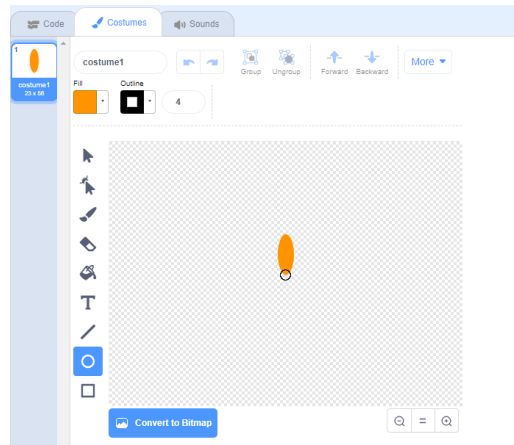


You may find that your petals are arranged in an odd way:



This is because the sprite is being rotated around its centre.

Move your petal so its bottom is in the centre.



Doing this may be easier if you zoom out.

Before you run your code again, you should **erase all** the sprites on the Stage to clear it.

Click on the **erase all** block in the Pen blocks section.



Run your code again to check that the flower's petals are straight now.

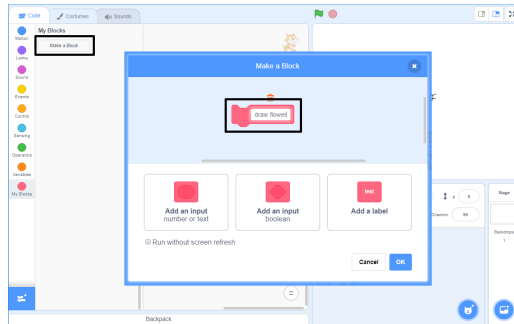


If not, adjust the petal's position until its bottom is in the centre.

### Step 3 Make a custom block to draw flowers

What if you want to draw lots of flowers? Instead of making lots of copies of the code, you will create your own block in Scratch and use it every time you want to draw a flower.

Click on **My Blocks** and then on **Make a Block** to create your own block called 'draw flower'.



There is now a new block called **draw flower** in the **More blocks** section, and a new definition block on the Stage.



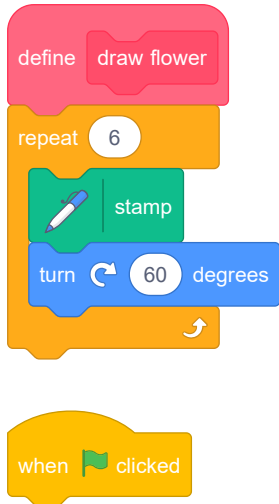
draw flower

define draw flower

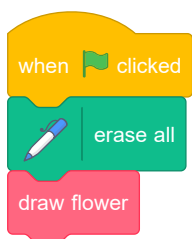
Move your code for drawing the flower from the **when green flag clicked** block to the new **draw flower** definition block.



Your code should look like this:



Add the following code to clear the Stage and to use your new **draw flower** block when the green flag is clicked:



Click the green flag to test your code and check whether you see a flower.

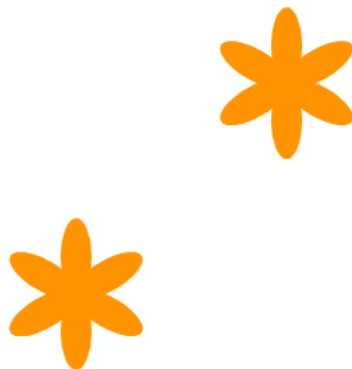


Now change your code to move the sprite and then draw another flower:



```
when green flag clicked
  erase all
  go to x: 75 y: 75
  draw flower
  go to x: -75 y: -75
  draw flower
```

Test your code to check that you now see two flowers.





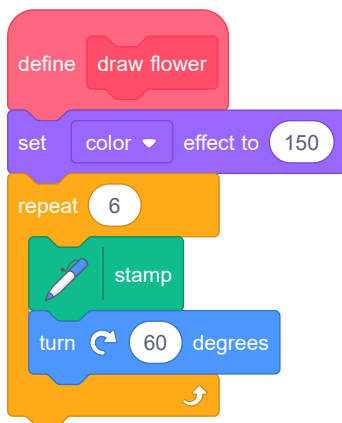
## Step 4 Customise your flowers

At the moment all the flowers you draw are exactly the same. Next you're going to add some inputs to the **draw flower** block so that you can draw flowers with different colours, sizes, and numbers of petals.

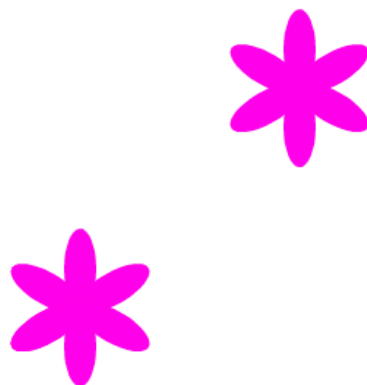
In Scratch you can use the **set colour effect** block to change the colour of a sprite.



Change your 'draw flower' definition to change the colour:



Run your code to see flowers of different colours.



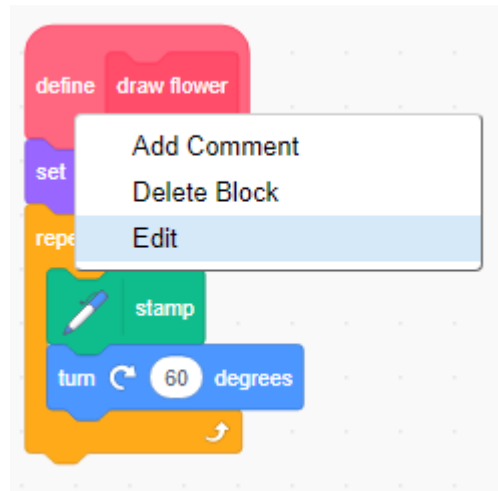
**set colour effect** changes the colour based on the default colour of the sprite, so if your sprite doesn't start out orange, you get different results.

Experiment with using different numbers from 0 to 199 in the **set colour effect** block, and see what different results you get.

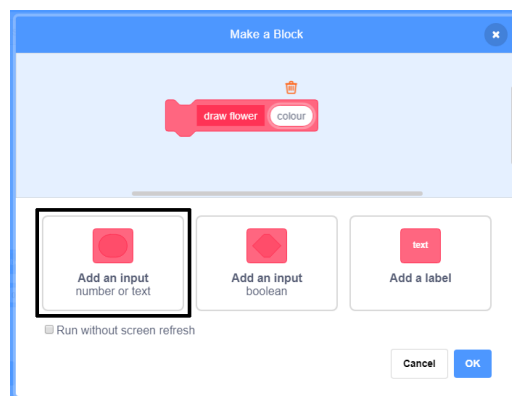


At the moment all flowers are the same colour. To give each flower a different colour, you need to add an **input** to the **draw flower** block.

Right-click on the **draw flower** definition block and choose **edit**:

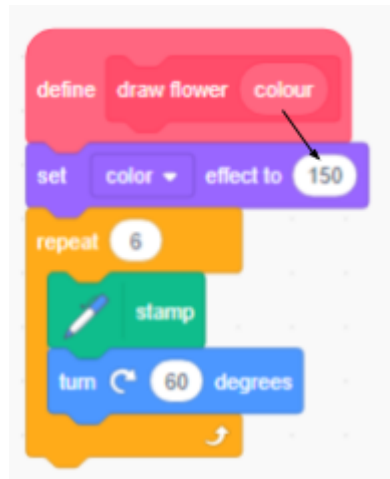


Now add a **input number** called 'colour':

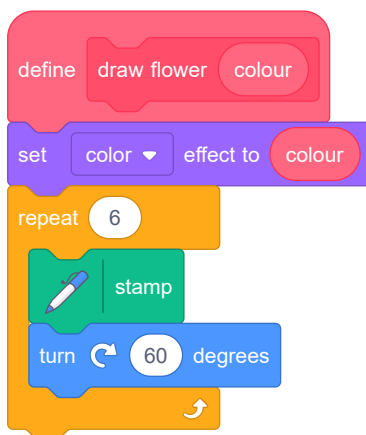


The input appears in the **draw flower** definition, and you can drag it to where you want to use it.

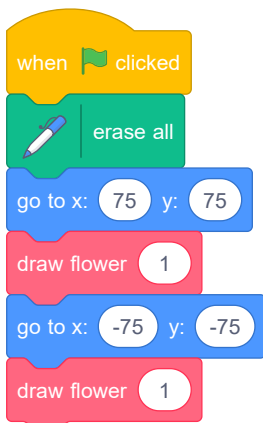
Drag the 'colour' input to the **set colour effect** block:



Your code should look like this:



Notice that your **draw flower** blocks now have a new input that is set to **1**:



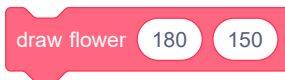
Change the numbers in the **draw flower** blocks so that the two flowers appear in different colours.  
You can pick any numbers between 0 and 200.



Your code should look similar to this:



Now add another input to set the size of the flower, so your **draw flower** block looks like this:



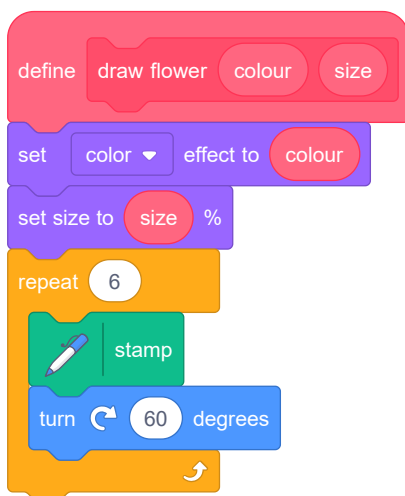
With the block above, you can create flowers with different sizes:



Right-click on the **draw flower** definition block, click on **edit**, and add a number input called 'size'.



Change your **define draw flower** script so it looks like this:



In the **when green flag clicked** script, change the second number in both **draw flower** blocks so that the two flowers appear in different sizes.



Test your code to check whether the flowers have different sizes.



It would be cool to choose the number of petals the flowers have.



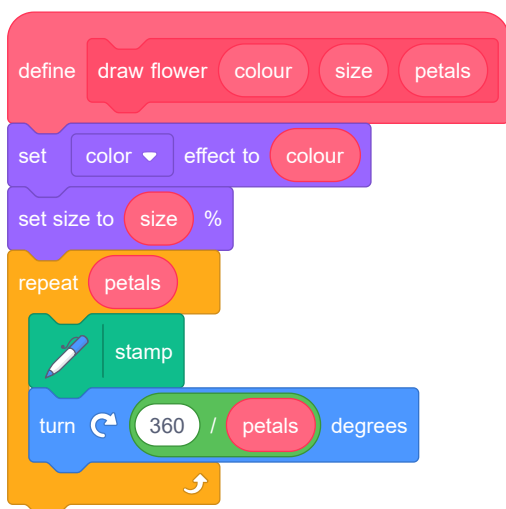
Add another input so that you can draw flowers like this:



Edit your **define draw flower** block and add a new number input called 'petals'.



Your code should look like this:



In the **when green flag clicked** script, change the third number in both **draw flower** blocks so that the two flowers that appear have different numbers of petals.

```
when green flag clicked
  erase all
  go to x: 75 y: 75
  draw flower 180 150 3
  go to x: -75 y: -75
  draw flower 150 50 8
```

Next, edit your code so you can draw different flowers by pressing the **f** key.

Now move your code for drawing flowers away from below the **when green flag clicked** block, and put the code under a **when f key pressed** block.



```
when green flag clicked

when f key pressed
  erase all
  go to x: 75 y: 75
  draw flower 180 150 3
  go to x: -75 y: -75
  draw flower 150 50 8
```

Press **f** to test your code.



Add more **draw flower** blocks to your program to draw flowers with different colours, sizes, and numbers of petals all over the Stage.





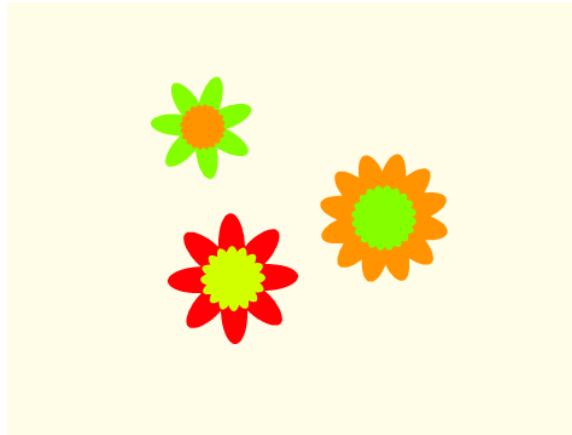


## Challenge!

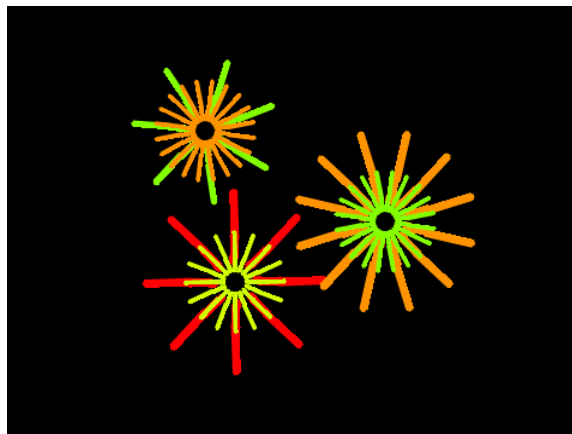
### Challenge: create a flower design

Can you use your **draw flower** block several times to draw more flowers and create an interesting design? Drawing different flowers at the same location creates an interesting effect.

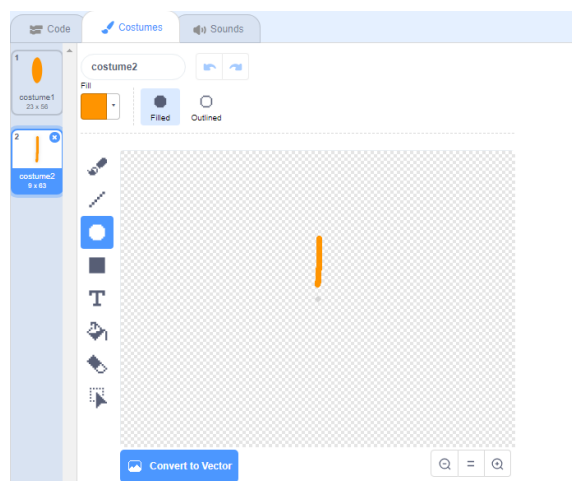
Create a design that you like. Here's an example:



You don't have to use petals shaped like ellipses. For example, you can use thick straight lines and a black backdrop to create a firework pattern like this:

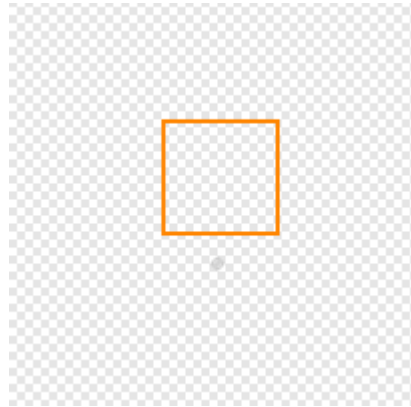


The 'petal' for the firework pattern is just a line:



Add new petal costumes and see what flowers you can come up with.

Try out a sprite shape that is not filled in, such as a square, and see what happens



## Step 5 Save your images

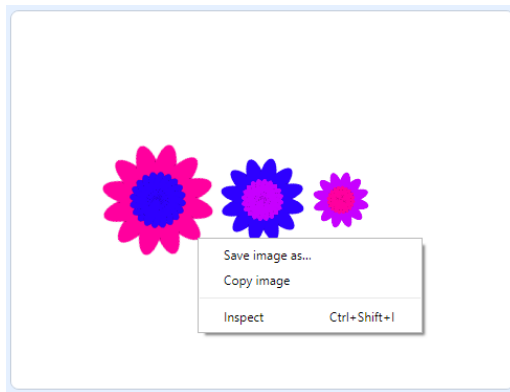
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When you create an image you like, you can save it and use it in another Scratch project, as a screensaver, or on a website.

When there is an image on the Stage that you like, right-click it and then click on **save image as**



**Note:** on some computers or browsers, the menu option for saving your image may be named differently.



Then you can save a PNG image of the Stage.

## Step 6 Random flower generator

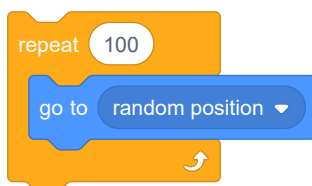
You will now use your **draw flower** block to create a hundred random flowers all over the Stage whenever you press the r.



Add a new Event block to your sprite's code so that **when the r key is pressed**, the screen is **cleared**.



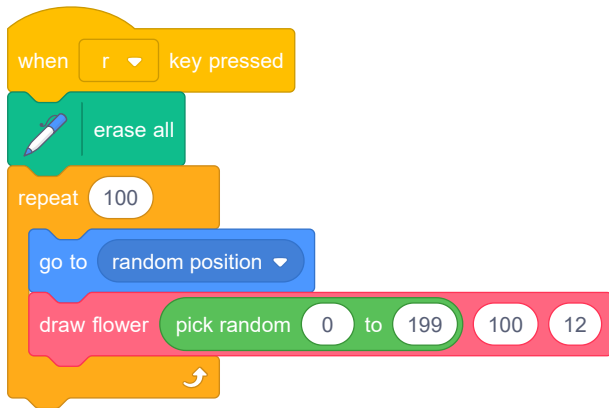
Add in a **repeat** block to go to a **random position** 100 times.



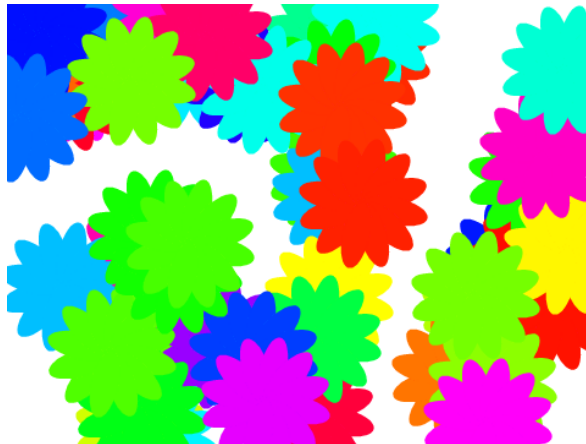
Use the **draw flower** block to create a flower that has a **random** colour between 0 and 199.



Your code should now look like this:



This code creates one hundred flowers with different colours but with the same size and numbers of petals.



Can you modify the **when the r key is pressed** script so the flowers' size and number of petals are also random?



Your code should look like this:



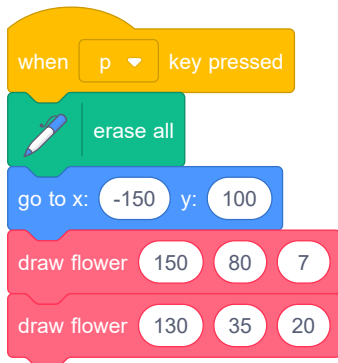
Press **r** to see your random flowers.



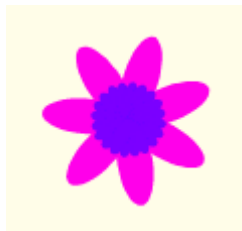
## Step 7 Flower patterns

You can also use your **draw flower** block to create neat flower patterns.

Create a flower or a combination of flowers that you like. Here's an example:

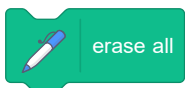


Press p to see your flower. The example looks like this:



Before you can create your pattern, you should clear the Stage of any leftover flowers.

Click on the **erase all** block in the Pen tab.



Right-click on the Flower sprite and **hide** it so it doesn't appear on the Stage. (You can **show** the sprite again if you need to see where it is.)

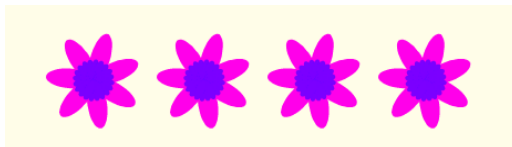


Now draw a row of these flowers across the top of the Stage. Here is some example code, in which you might need to adjust the numbers so it works with your flower:



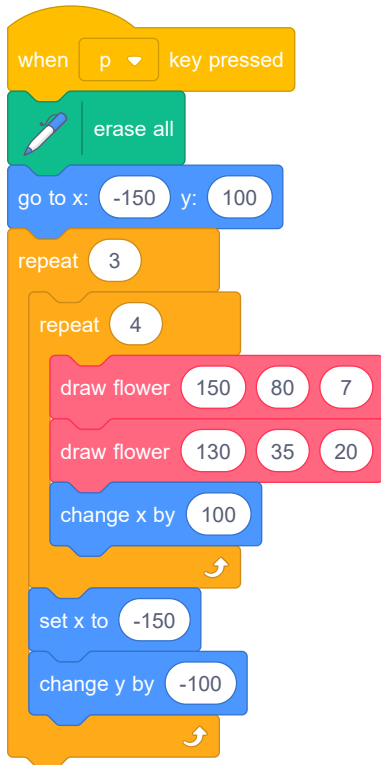
```
when p key pressed
  erase all
  go to x: -150 y: 100
  repeat 4
    draw flower 150 80 7
    draw flower 130 35 20
    change x by 100
```

Press **p** to see a row of flowers:

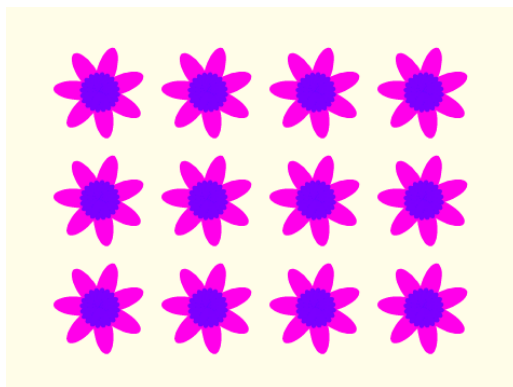




Add another loop to create more rows of flowers. This example adds a **repeat 3** loop to create three rows.

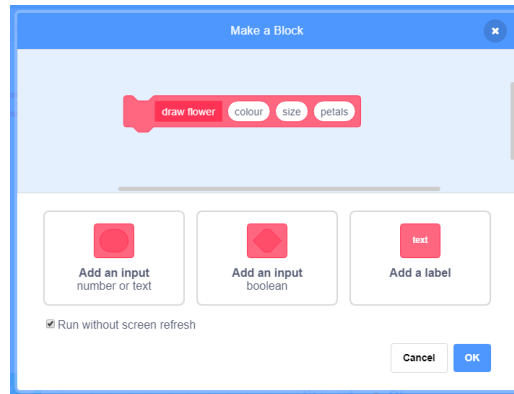


Press p to create a grid of flowers:



Do you want to speed up the drawing of the flowers?

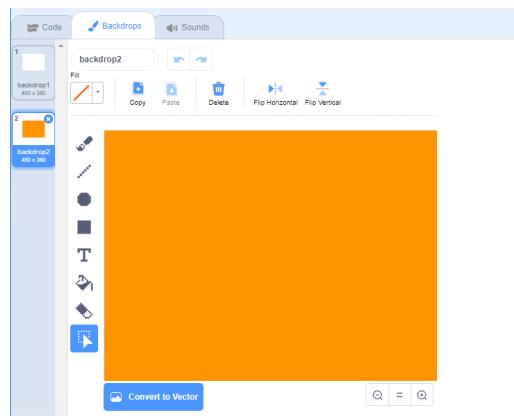
Right-click on the **draw flower** definition block and then click on **edit**. Click on the **Run without screen refresh** box.



Now the flowers get drawn more quickly.

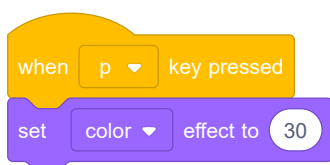
You can also change the colour of the Stage.

Click on **Choose a backdrop**, and then click on **Paint**. Create an orange backdrop by using the Fill tool in Bitmap mode.



If you use orange for the backdrop and the Flower sprite, then the numbers for different colours will match for the sprite and the backdrop.

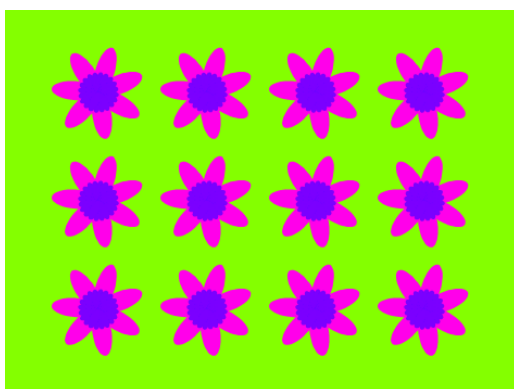
Now you can use the **set colour effect** on the Stage to change the colour of the backdrop.



Try to create a pattern you like.



Here's an example:



When you put it all together, you can create an amazing effect:

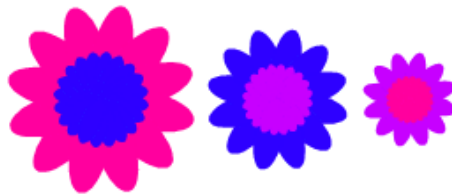




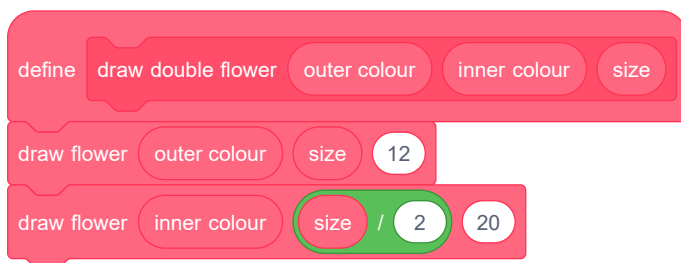
## Challenge!

### Challenge: custom flower blocks

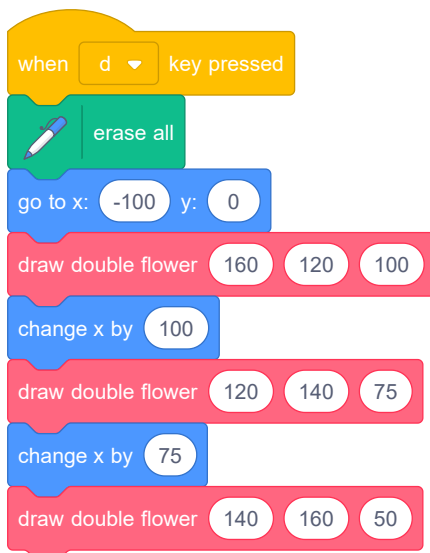
These flowers all have the same number of outer and inner petals, and the size of the inner flower is in proportion to the outer flower:



You can create flowers like this with the help of a **draw double flower** custom block that has inputs for **outer colour**, **inner colour**, and **size**:



The **draw double flower** block can draw lots of flowers in the same style:



Make a new custom block with the necessary inputs that you need to be able to change to create a type of flower that you like.

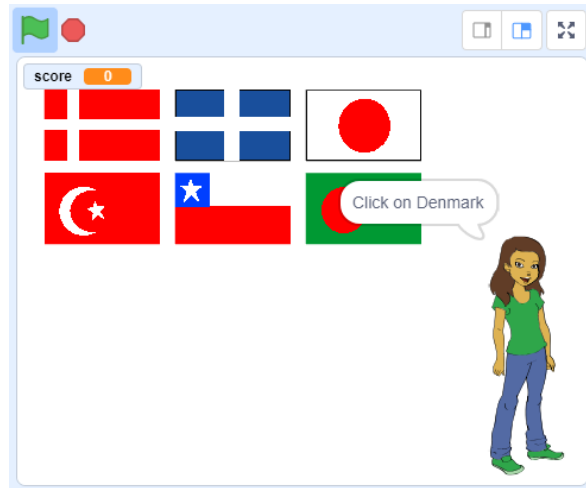
Then use your new block to create a cool design!



## Step 8 What next?

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Try our **Guess the flag** ([https://projects.raspberrypi.org/en/projects/guess-the-flag?utm\\_source=pathway&utm\\_medium=whatnext&utm\\_campaign=projects](https://projects.raspberrypi.org/en/projects/guess-the-flag?utm_source=pathway&utm_medium=whatnext&utm_campaign=projects)) project, where you can create a flag quiz to test yourself and your friends.



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View project & license on GitHub (<https://github.com/RaspberryPiLearning/flower-generator>)