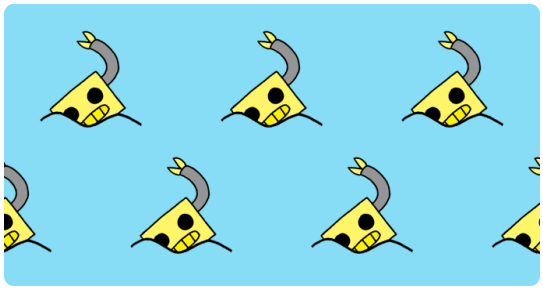
Projects

Synchronised swimming

Celebrate the Olympics by programming a synchronised swimming routine.

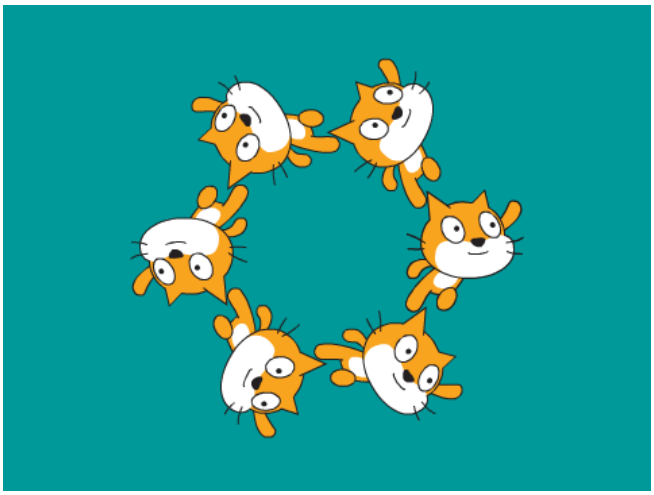
Scratch



Step 1 Introduction

You are going to learn how to program a synchronised swimming routine for Scratch the cat by using loops and creating clones.

What you will make



What you will need

Hardware

- A computer capable of running Scratch

Software

- Scratch 3 (either **online** (http://rpf.io/scratchon) or **offline** (http://rpf.io/scratchoff))

What you will learn

- Use clones to create many sprites all the same
- Use key pressed events to move sprites

Additional information for educators

You can **find the solution for this project here** (http://rpf.io/p/en/synchronised-swimming-get).

Step 2 Swimming left and right

In synchronised swimming a team of swimmers perform a coordinated routine of moves to music.

Let's start by getting one cat swimming.

Open a new Scratch project.

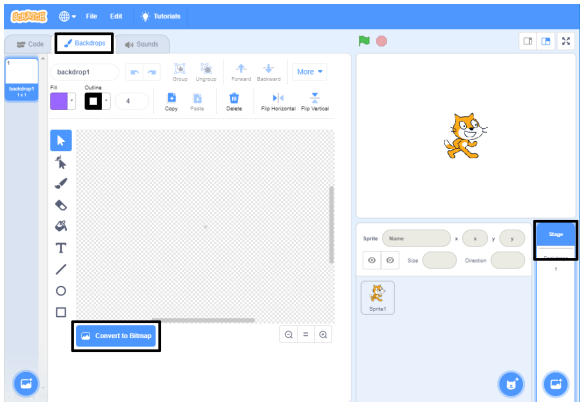
Online: open a **new online Scratch project** (http://rpf.io/scratchnew).

Offline: open a new project in the offline editor.

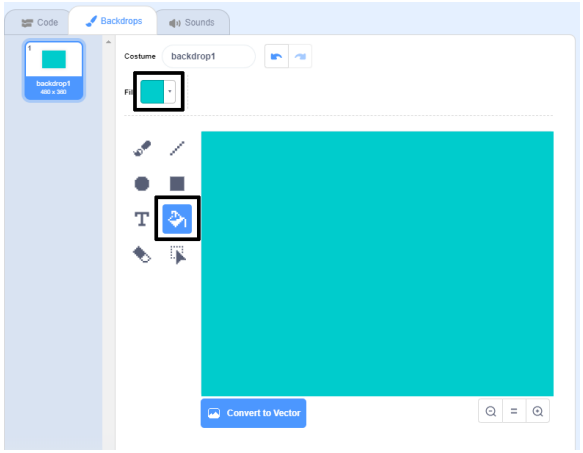
If you need to download and install the Scratch offline editor, you can find it at **rpf.io/scratchoff** (http://rpf.io/scratchoff).

First let's turn the stage blue so it looks like a swimming pool.

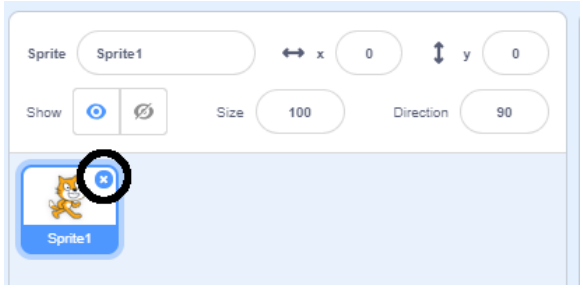
Click on the 'Stage' and then the 'Backdrops' Tab and 'Convert to Bitmap'.



Select a blue colour and the ‘Fill with color’ tool and then click on the backdrop.



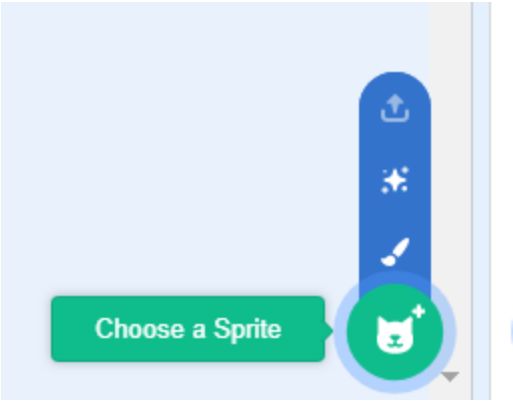
You’re going to use a different cat sprite so click on the cross on the walking cat to delete it.



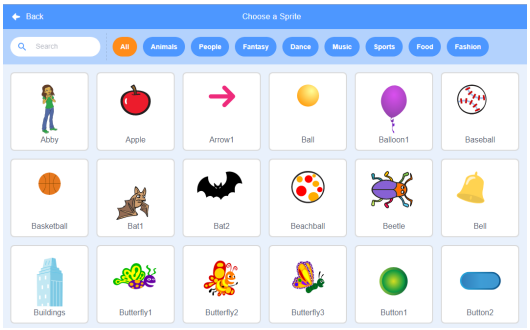
Choose the `Cat Flying` sprite from the library and add it to your project.

Adding a Scratch sprite from the Library

- Click **Choose a sprite** to see the library of all Scratch sprites.



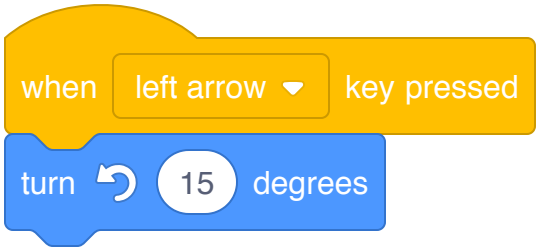
- You can search or browse sprites by theme. Click on a sprite to add it to your project.

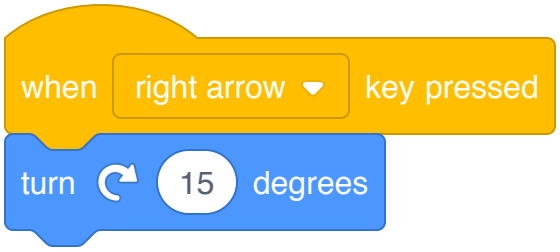


The flying cat looks like it could be swimming.

Now let's get the cat swimming.

Select the 'Cat flying' sprite, click 'Code' and add the code to make the cat rotate left and right when you press the left and right arrow keys.





Test your code by pressing the left and right arrow keys on the keyboard.

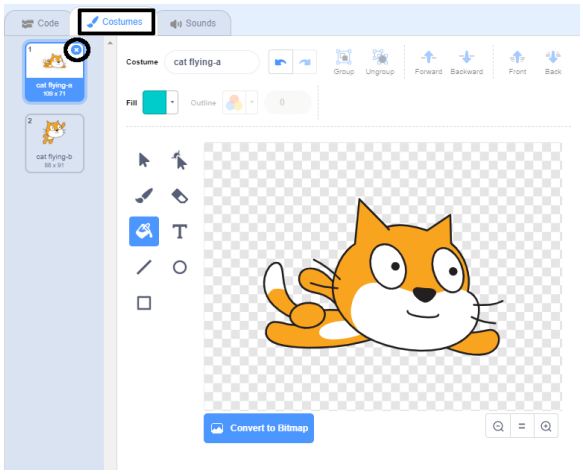
And add the code for the forward and backward movement.

Test your code by swimming around the stage using the arrow keys.

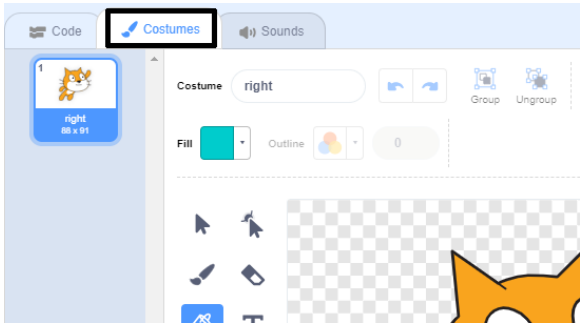
Step 3 Changing costume

Hmm, this would look better if the cat sprite changed direction when it turns left.

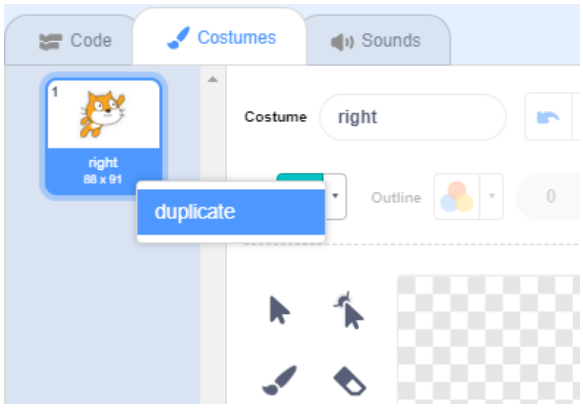
Click on ‘Costumes’ and delete the ‘cat flying-a’ costume.



Rename the remaining costume from ‘cat flying-b’ to ‘right’.

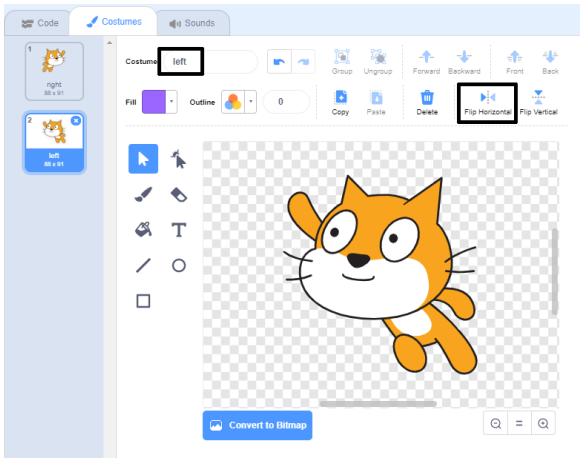


Right-click on the costume and choose duplicate to create a copy.

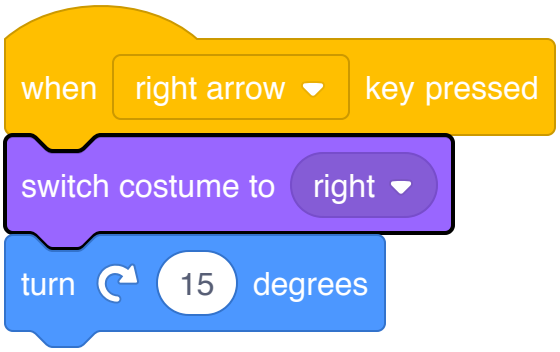


Click ‘Flip Horizontal’ to reverse the copy and then name it ‘left’.

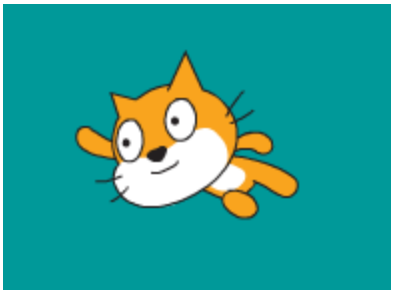
Your costumes should look like this:



Click ‘Code’ to return to your code and add blocks to change the costume when the direction is changed.



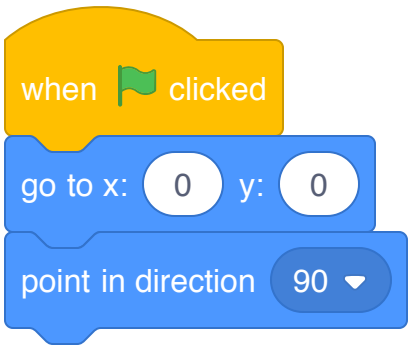
Test your code by swimming around the stage using the arrow keys.



Step 4 Create the team

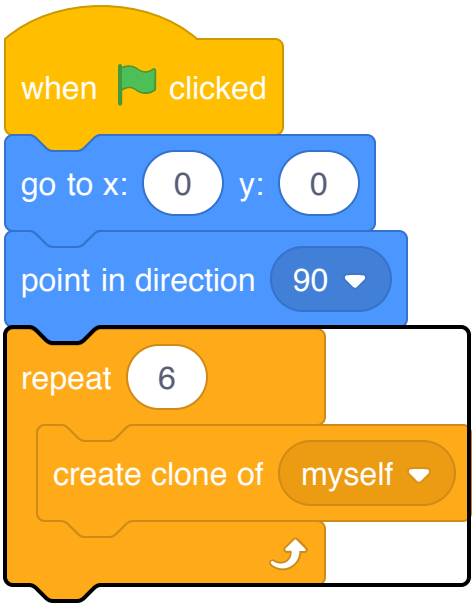
Synchronised swimming needs more than one cat! We can use `create clone of` to create copies that behave in the same way.

First let's add code to make sure the cat always starts in the same position when you click the green flag.



Test your code by pressing some arrow keys and then clicking the green flag to return to the start position.

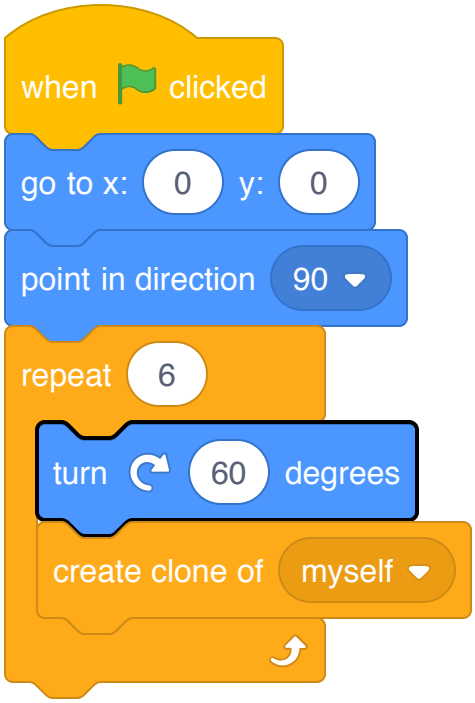
Now we can use a `repeat` loop to create 6 clones (copies) of the cat.



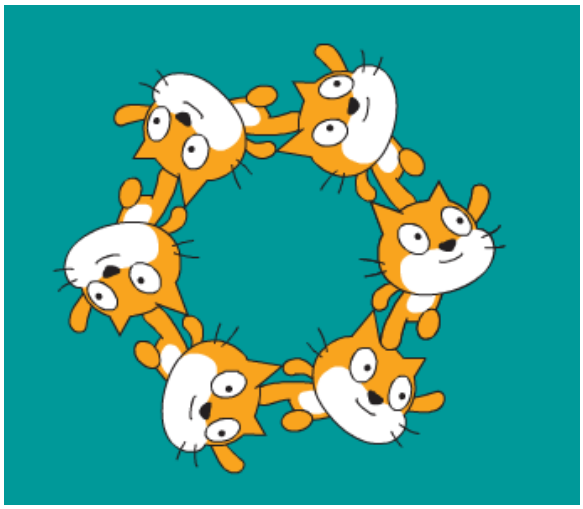
Loops are used to do the same thing multiple times.

You don't want all the cats to be in the same position!

Add code to rotate 60 degrees before creating each clone.



Test your code by using the arrow keys. You should be able to create some amazing synchronised swimming patterns!



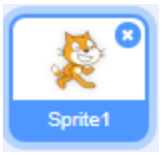
Step 5 Music!

A synchronised swimming routine needs music. (But, if you can't play sound then you can skip this step.)

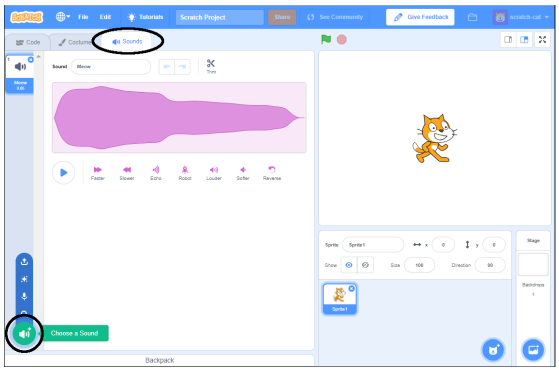
Choose a sound from the `Loops` category and add it to your sprite.

Adding a sound from the library

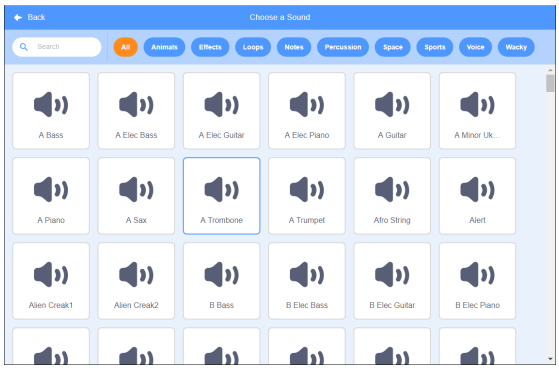
- Select the sprite you want to add the sound to.



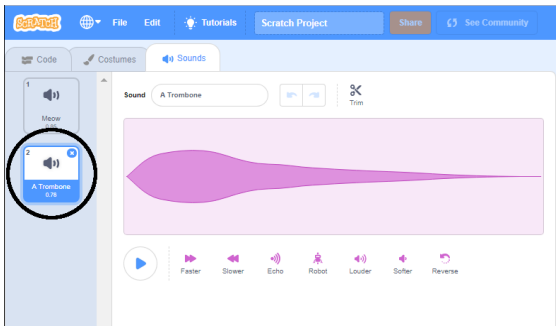
- Click the **Sounds** tab, and click **Choose a Sound**:

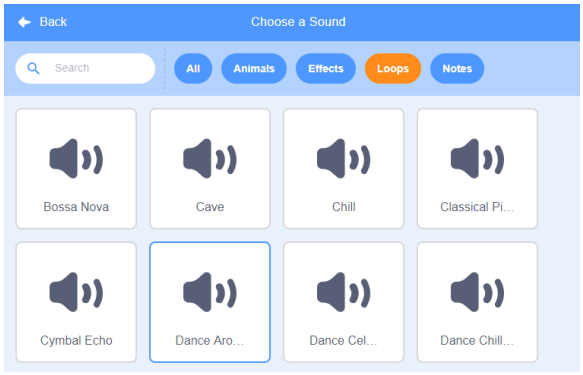


- Sounds are organised by category, and you can hover over the icon to hear a sound. Choose a suitable sound.

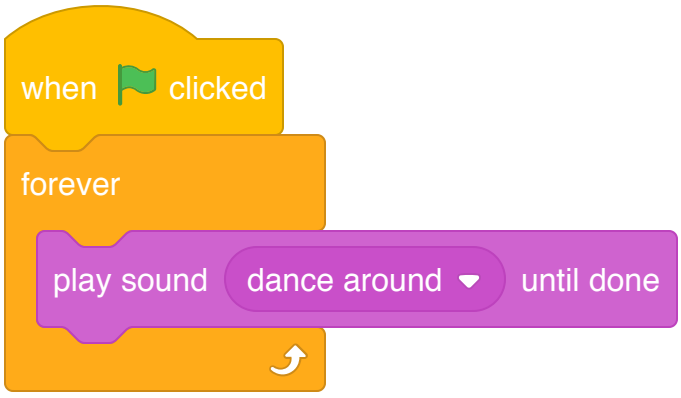


- You should then see that your sprite has your chosen sound.





Now go back to 'Code' and add the blocks to play your music:



Putting the `play sound` inside a `forever` loop means the music will keep repeating.

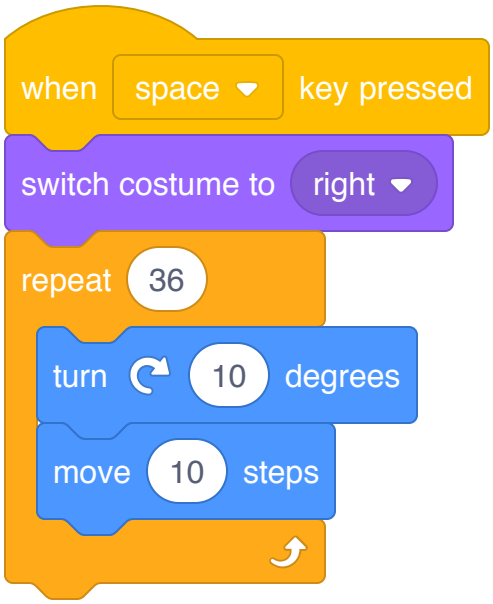
Test your project.

You can click on the red stop button to stop the music playing!

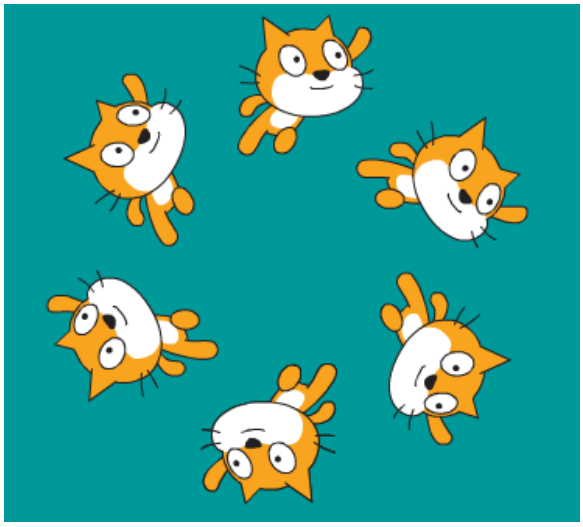
Step 6 Programmed routines

Would you like to be able to perfect a routine and easily repeat it?

Let's add some moves to be performed when the space key is pressed.



Run your project and press the space key to test the new routine.



Try using the arrow keys to move to a different position before pressing space.

Challenge!

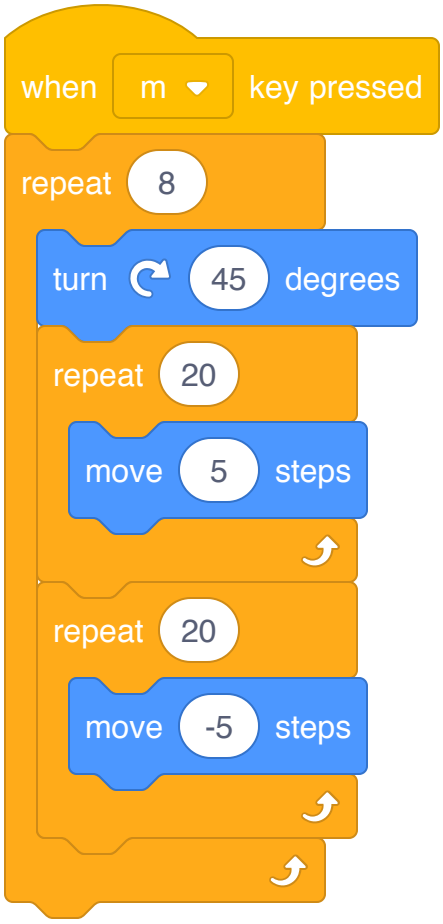
Challenge: code your own routine

Can you write your own synchronised swimming routine to be performed when you press the space key or another key?

Try working out a routine using the arrow keys first.

Use `repeat` loops to perform the same actions multiple times.

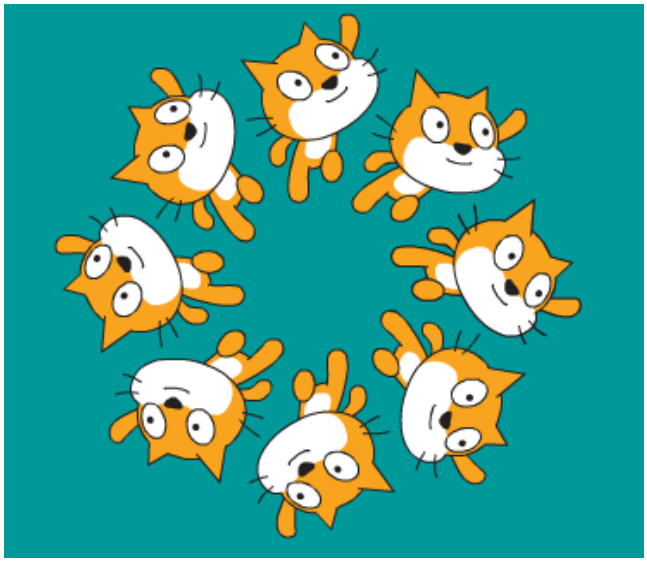
Here's an example:



Challenge!

Challenge: change the team

Can you change the number of swimmers in the team? Synchronised swimming teams usually have eight members but can have as few as four.



360 divided by 8 is 45; 360 divided by 4 is 90.

You could also change the sprite that you use.

Step 7 What next?

Take a look at the **Archery** [(https://projects.raspberrypi.org/en/projects/archery)](https://projects.raspberrypi.org/en/projects/archery) Scratch project.