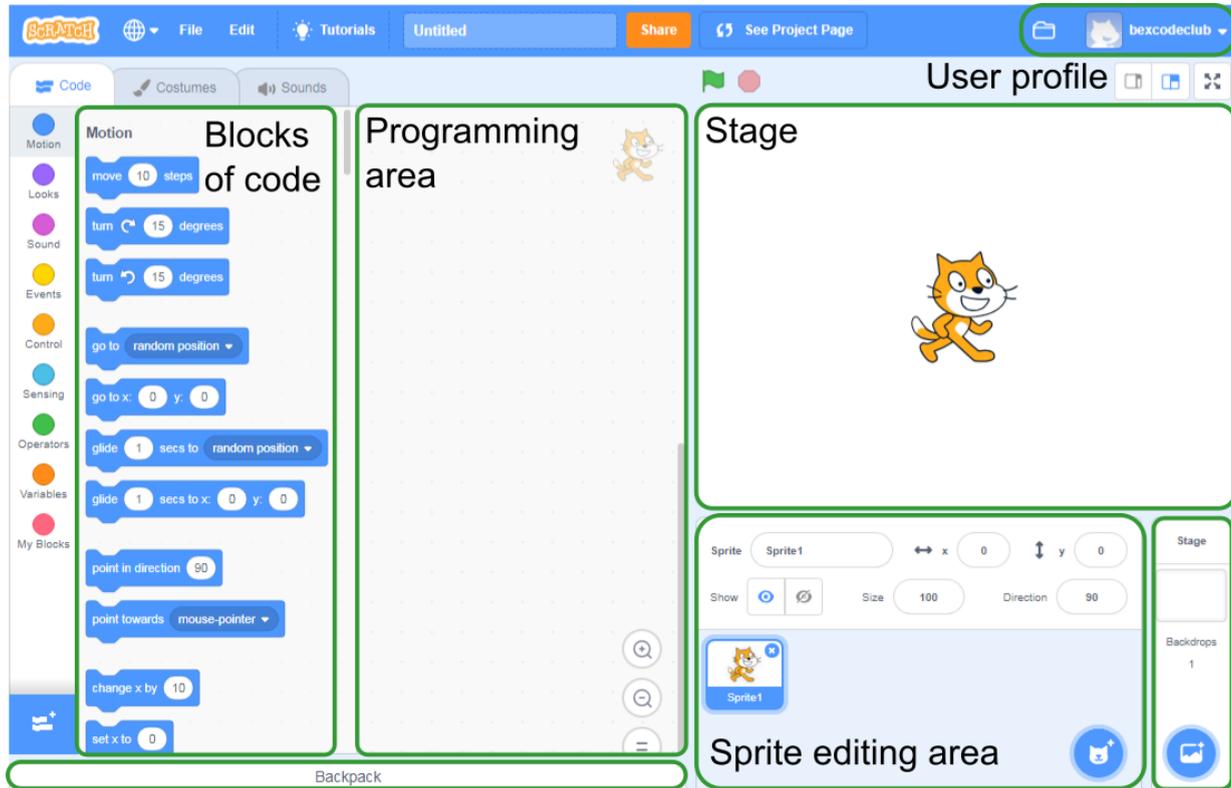




We can use Scratch to recreate the patterned fields that can be seen from the air when flying over areas that use central pivot irrigators.

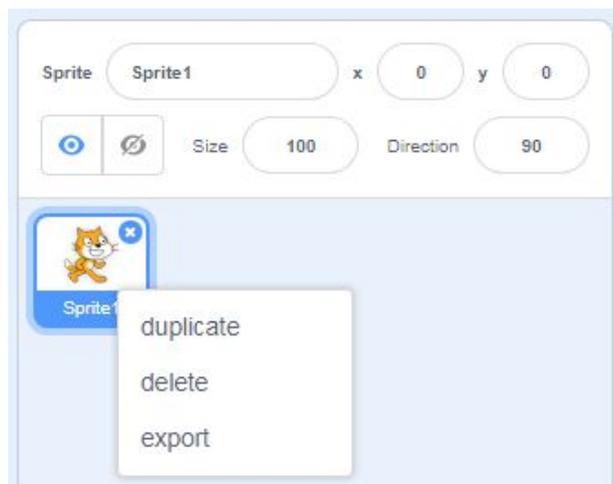
Head to scratch.mit.edu and create a new project. The cat is called a 'sprite.' This is a little character that we will be able to control with our code. The coding blocks are on the left and they can be dragged and dropped into the central programming area.



Storage area for code

Background editing area

You may want to change the sprite to a different character.



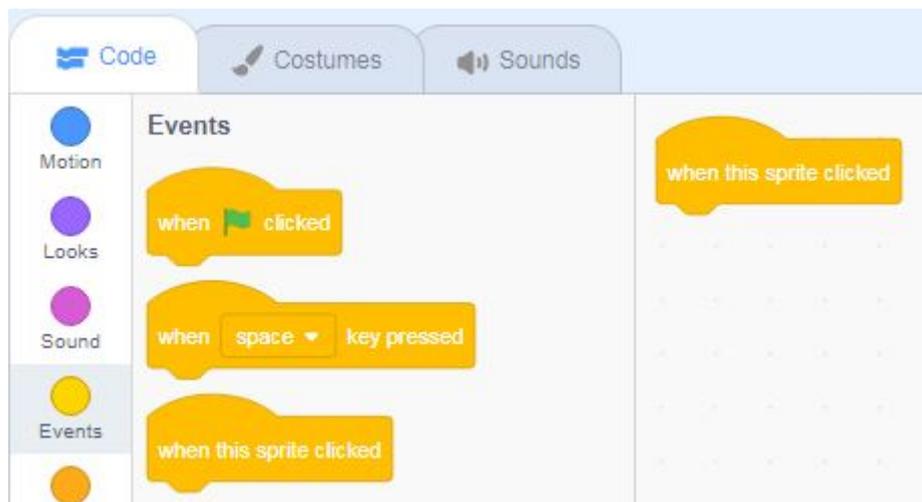
To add a new sprite, we click the sprite icon to open the sprite library.



We can filter the sprite types using the categories along the top. Click on the sprite you want to use, and click OK.



We need to use a block to signify when our program will start. These can be found in **Events**. From **Events**, find the 'when this sprite clicked' block. Drag and drop the block into the programming area.

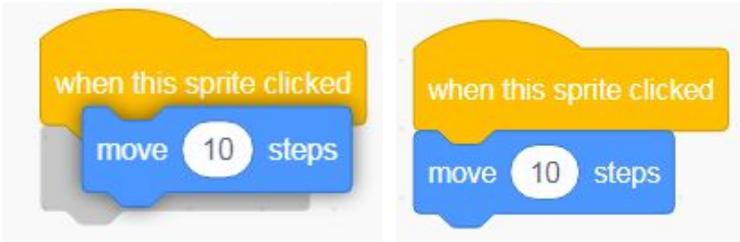


We can also make our sprites move. In **Motion**, there are two ways we can make a sprite move across the screen, 'move __ steps' and 'change x by __'.

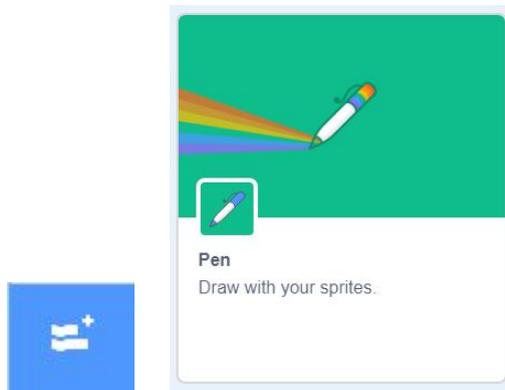
The 'move __ steps' block will move the sprite half the number of specified pixels in the direction that the sprite is facing (each step is half a pixel), while 'change x by __' will move the sprite the specified number of spaces along the x axis (the x axis ranges from -240 to 240, the y axis ranges -180 to 180).

Try dragging a 'move __ steps' block into the programming area and attach it to the 'when this Sprite clicked' block. What happens when you click on the cartoon sprite? Can you make it go backwards?

What is a pixel? A pixel is the smallest unit of a digital display. An image displayed on a computer screen is made up of grid of tiny squares. Each square will be a different colour and together this makes up an image. In the scratch, the display area is 480x360 pixels.



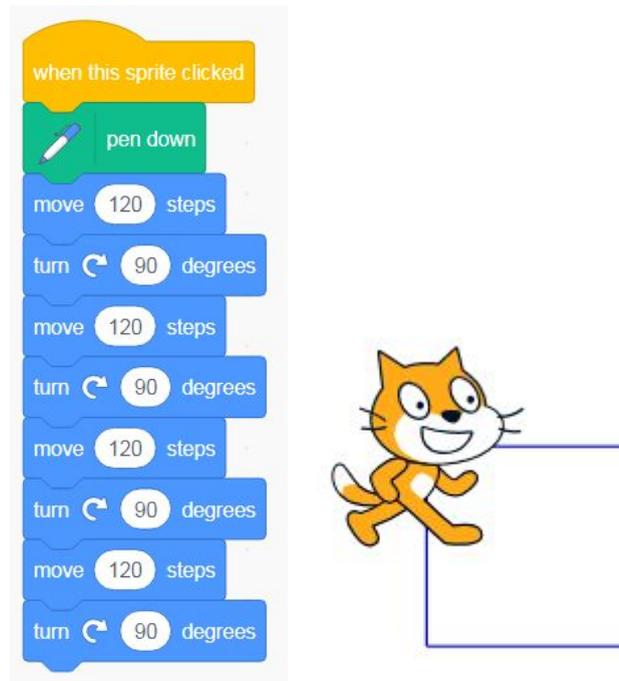
To draw shapes in Scratch, we need to add the pen extension. Click on the blue icon at the bottom of the code blocks, then select 'Pen.'



Delete the 'move __ steps' block by dragging it back into the block area or by right clicking and selecting delete. From the pen blocks, find 'pen down' and drop it under the 'when this sprite clicked' block. Now when we move, the sprite will draw a line.

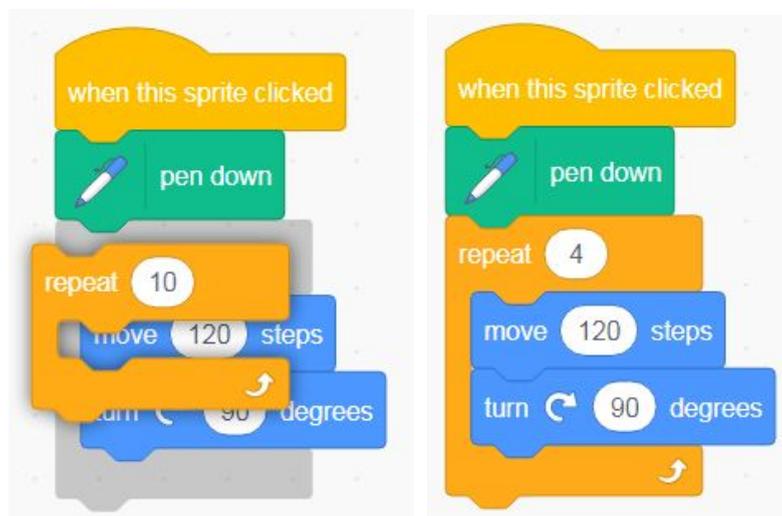


The first shape we will create is a square. To do this, we need to use a combination of 4 'move __ steps' blocks and 4 'rotate __ degrees' blocks. Add them to your code, change the numbers, and click on your sprite. What happens?



We have been able to create a square, however our code is inefficient. Rather using eight blocks to get our sprite to make a square, it is possible to do this with only three blocks.

A repeat loop allows us to repeat a group of instructions a set number of times. Delete the bottom six 'move' and 'turn' blocks, and find the 'repeat' block from **Control** and drag it out to your code. The 'repeat' block will automatically expand to fit your existing code blocks.



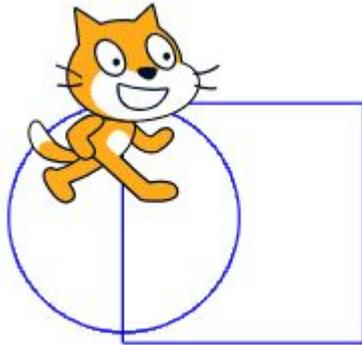
Click on your sprite to check that it creates the same shape.

We next want to draw a circle. Scratch cannot draw true circles, but we can make a close approximation by moving one step and rotating one degree 360 times. Add the following blocks to your code.

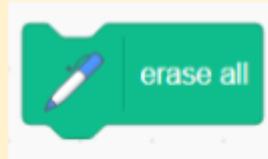
```

repeat 360
  move 1 steps
  turn 1 degrees

```



The pen blocks contain an 'erase all' block. Add this to your code to delete existing lines or drag into the programming area and double click when you want to clear the stage of lines



Click on your sprite to see your program run. Does it have the correct set of shapes? What do we need to add to our code so that the circle is fully inside the square?

```

when this sprite clicked
  pen down
  repeat 4
    move 120 steps
    turn 90 degrees
  move 60 steps
  repeat 360
    move 1 steps
    turn 1 degrees

```