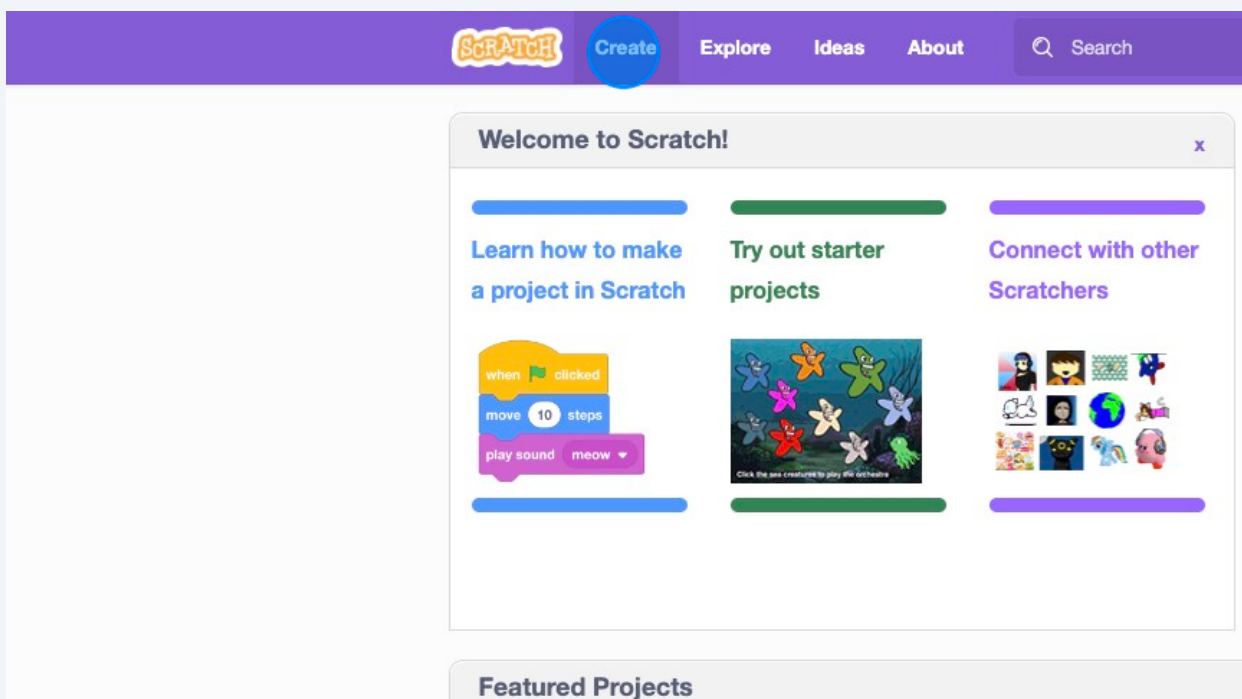


Scratch Spirograph

1 Navigate to <https://scratch.mit.edu/>

2 Click "Create"



3 Click this button that adds extension blocks.

My Blocks

point in direction 90

point towards mouse-pointer

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce

set rotation style left-right

Backpack

4 Click to add Pen blocks

Instruments and drums.

Pen
Draw with your sprites.

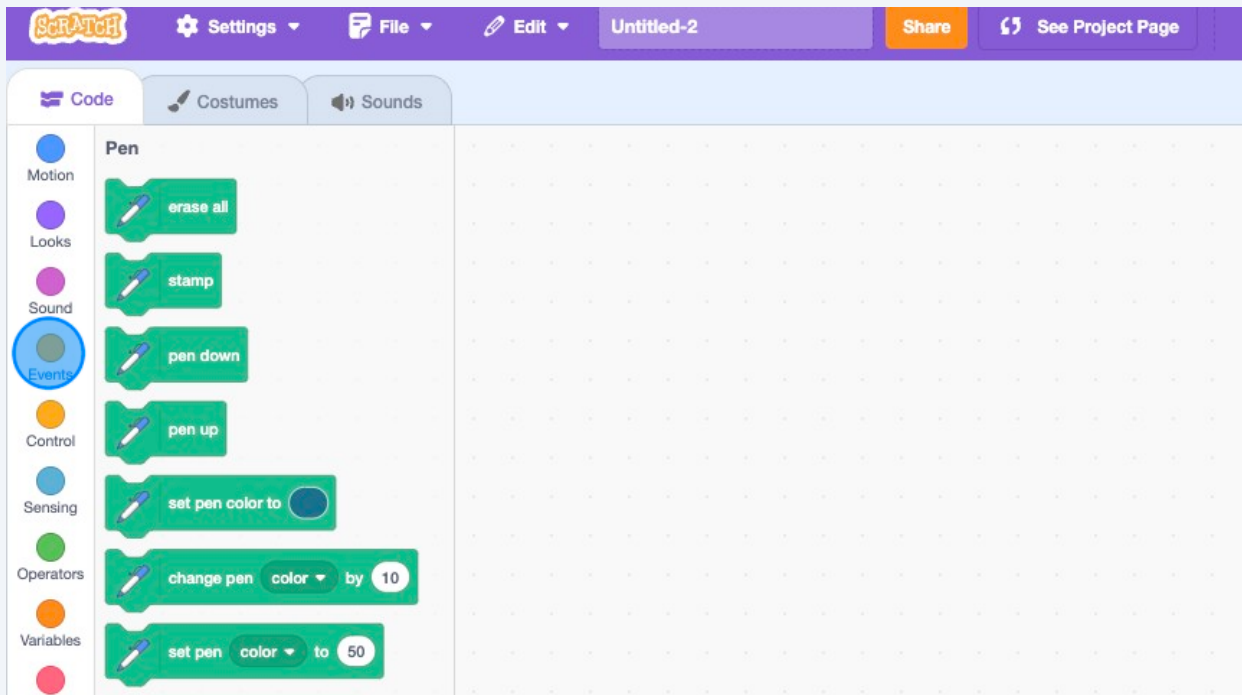
Video Sensing
Sense motion with the camera.

Data

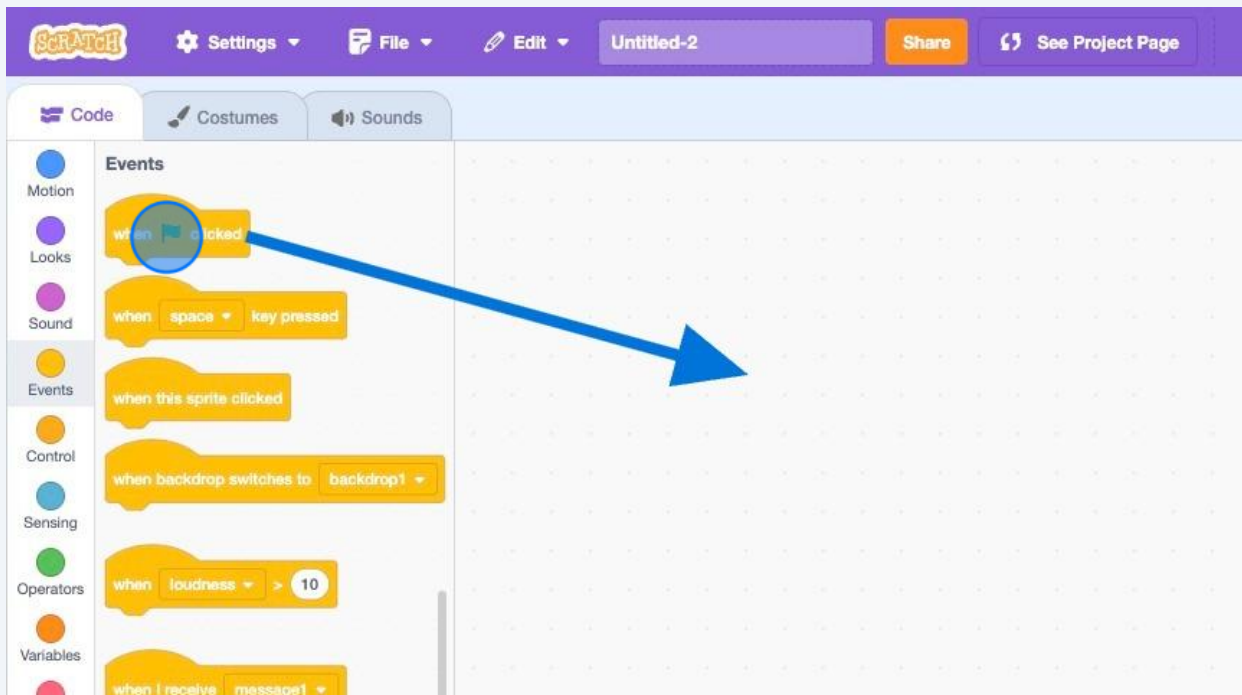
Micro:bit

Gaming

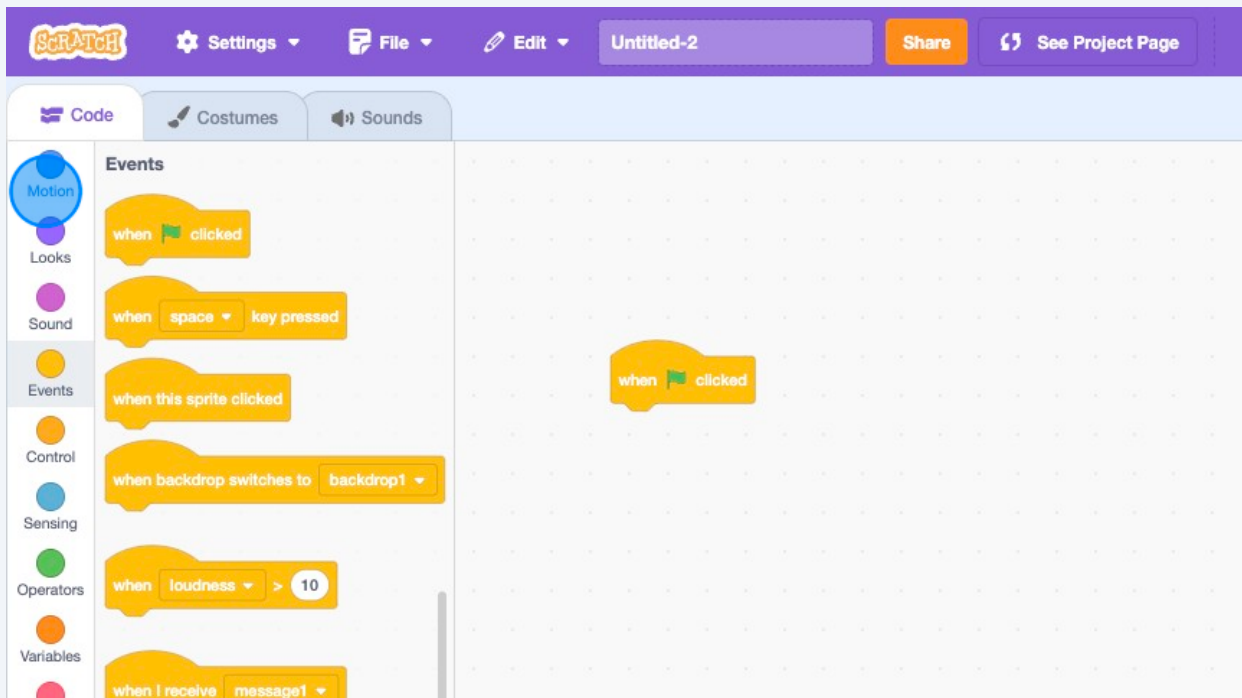
5 Click the "Events" category



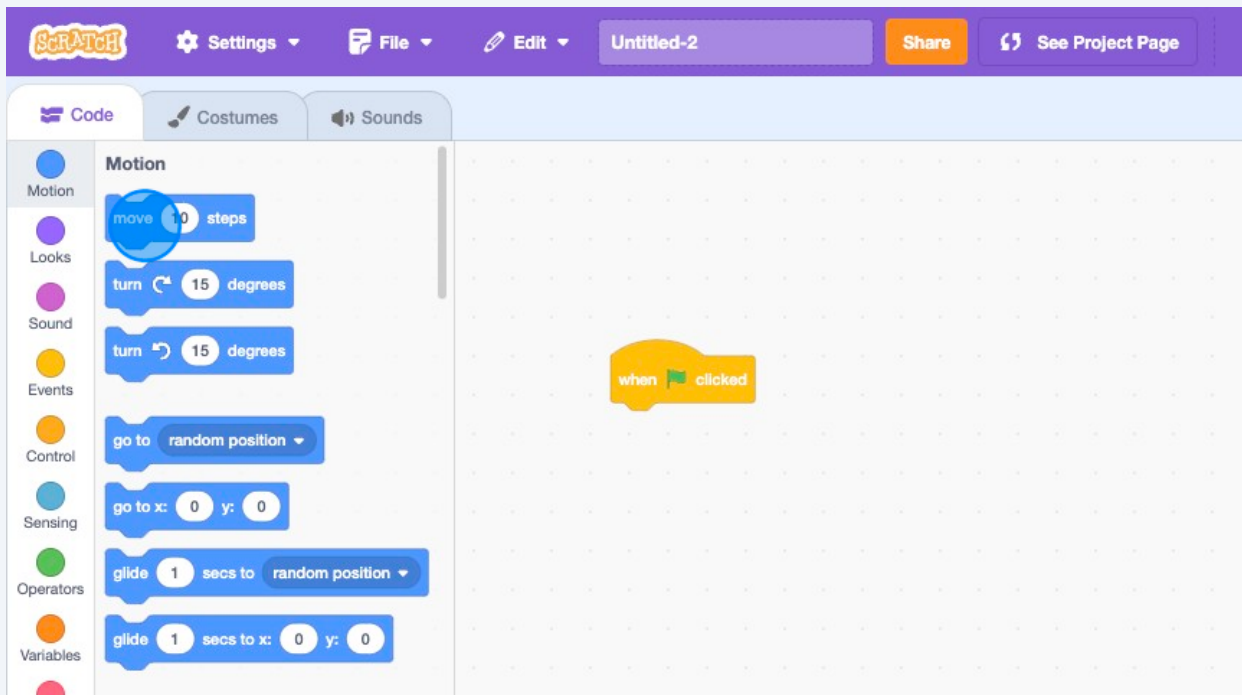
6 Drag the "when Green Flag clicked" block to the script area. This is how we will start our code.



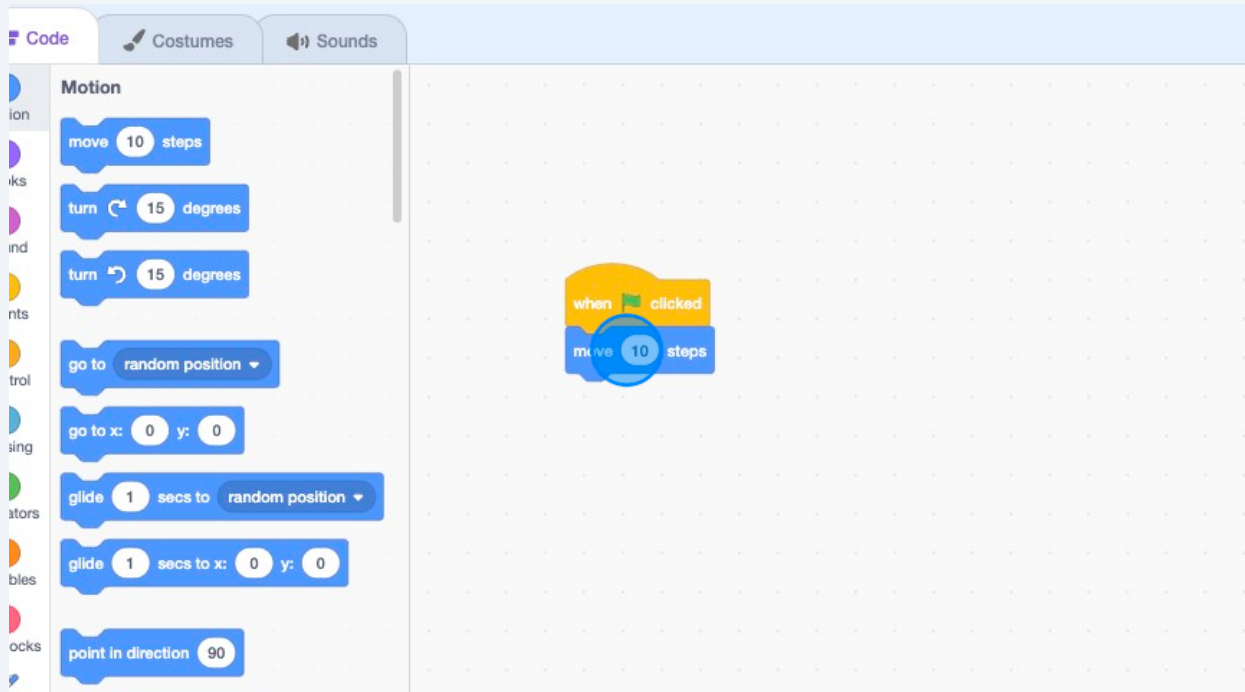
7 Click the "Motion" category



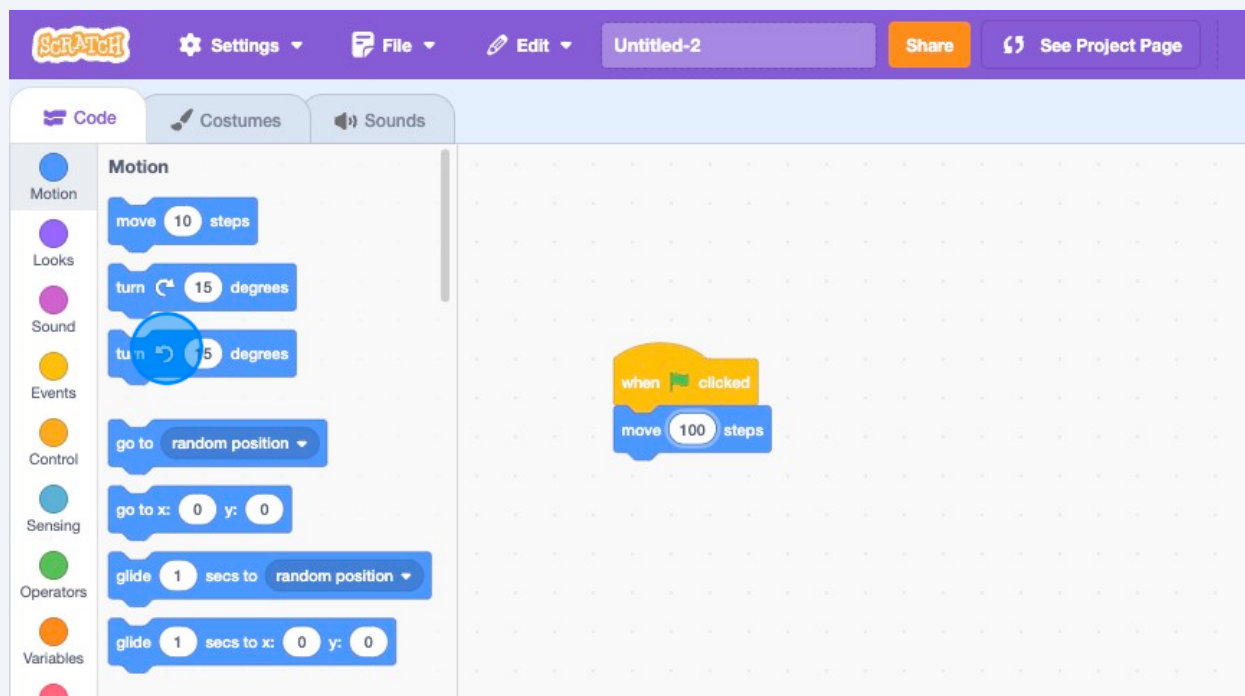
8 Grab the "move 10 steps" block and attached it under the "when Green Flag clicked" block



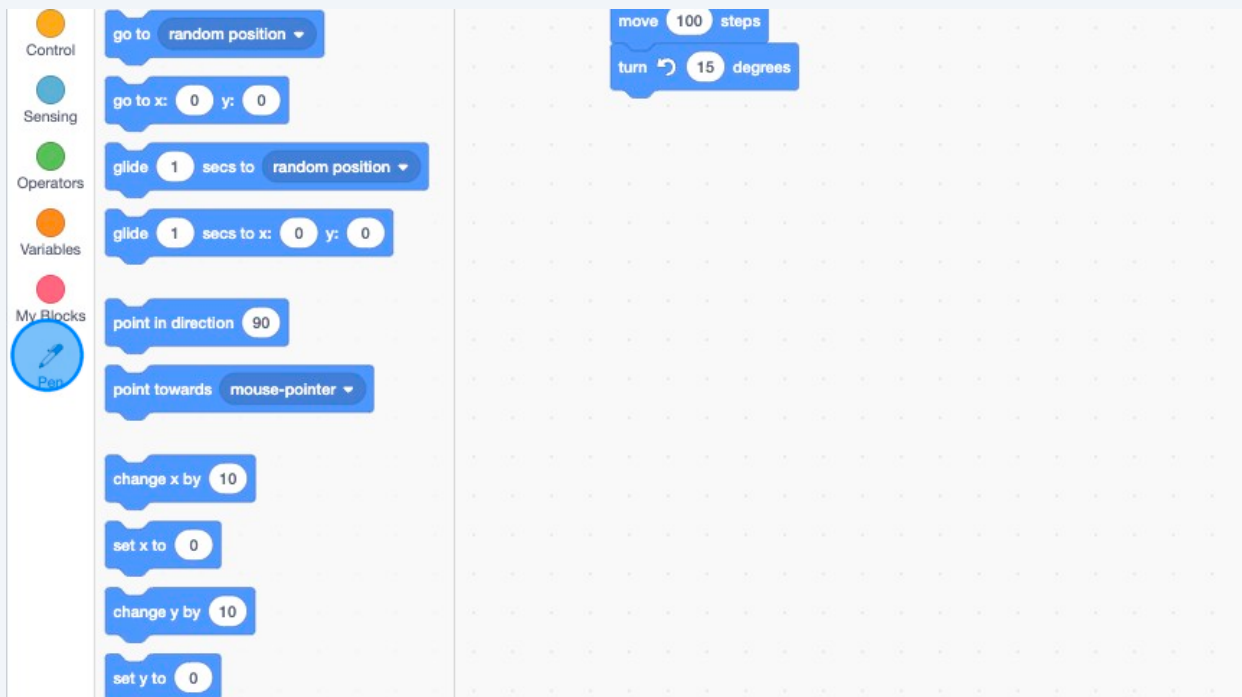
9 Click on the number 10 and change it to 100



10 Grab a "turn 15 degrees" block and attach it under "move 100 steps"

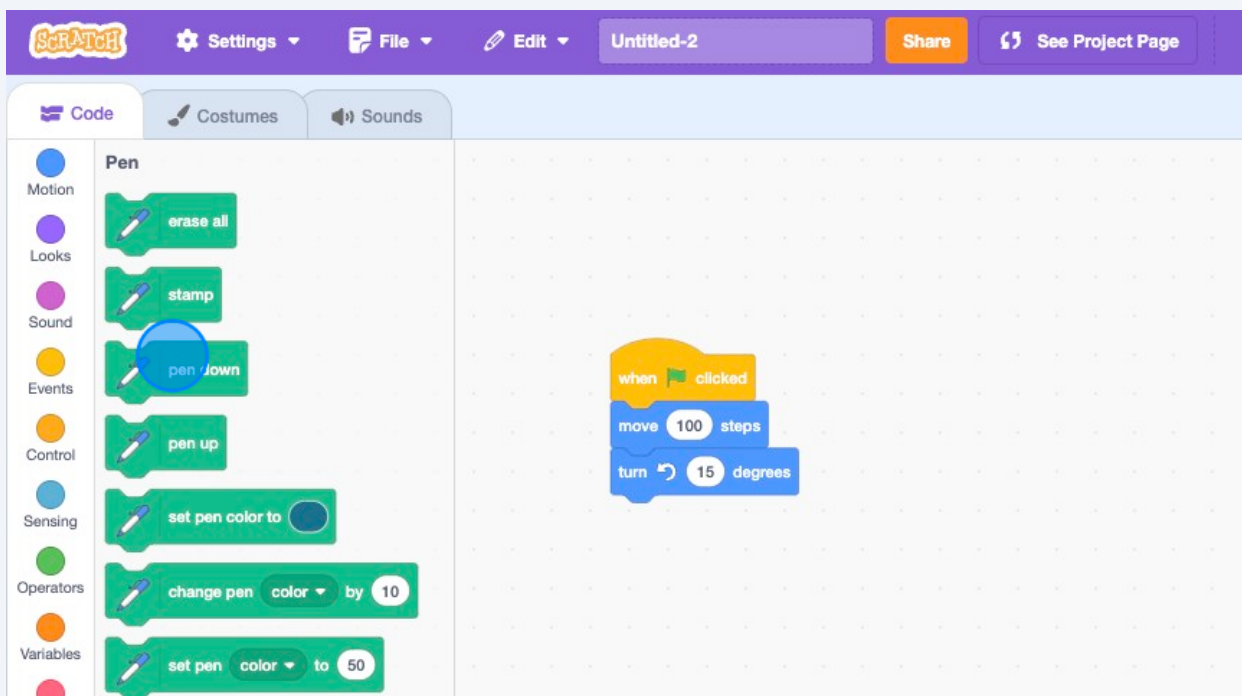


11 Click the Pen category



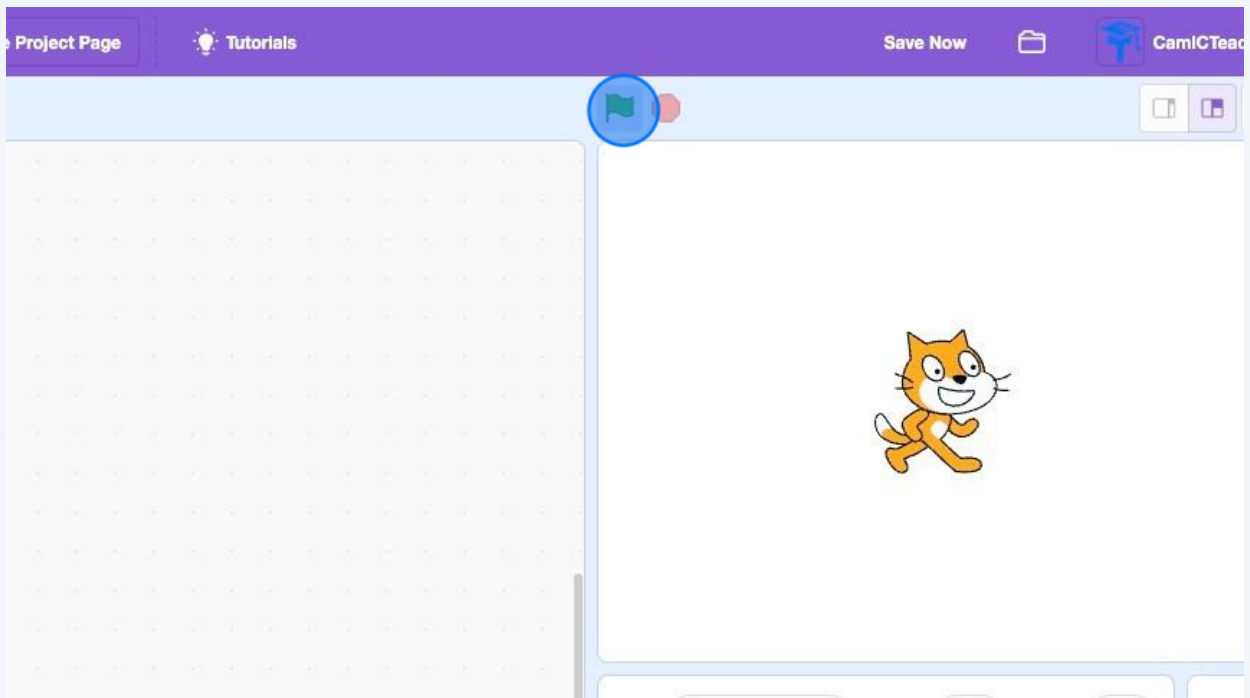
The image shows the Scratch interface with the 'Pen' category selected in the left sidebar. The sidebar categories are: Control (orange), Sensing (light blue), Operators (green), Variables (orange), My Blocks (red), and Pen (blue). The Pen category is highlighted with a blue circle. The main workspace contains a script with two blue blocks: 'move 100 steps' and 'turn 15 degrees'.

12 Attach "pen down" under the turn block

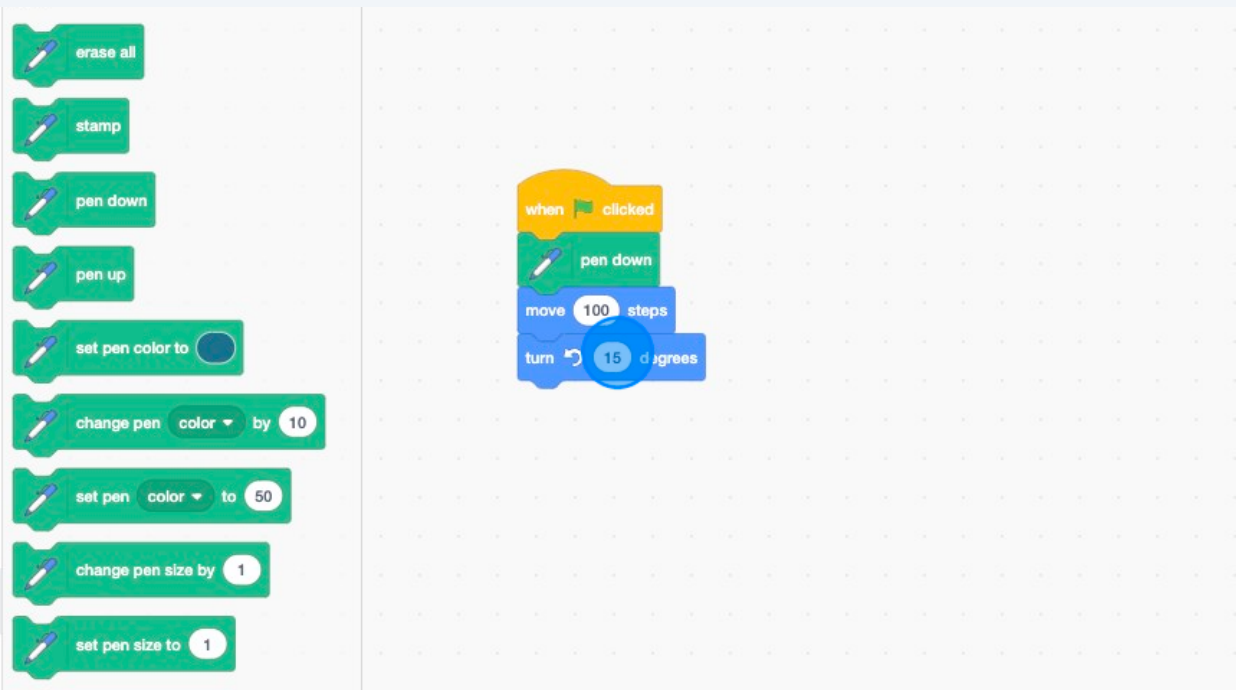


The image shows the Scratch interface with the 'Pen' category selected in the left sidebar. The sidebar categories are: Motion (blue), Looks (purple), Sound (pink), Events (yellow), Control (orange), Sensing (light blue), Operators (green), and Variables (orange). The Pen category is highlighted with a blue circle. The main workspace contains a script with three blocks: 'when clicked' (yellow), 'move 100 steps' (blue), and 'turn 15 degrees' (blue). The 'pen down' block (green) is attached to the 'turn' block.

13 Click the green flag to see what happens

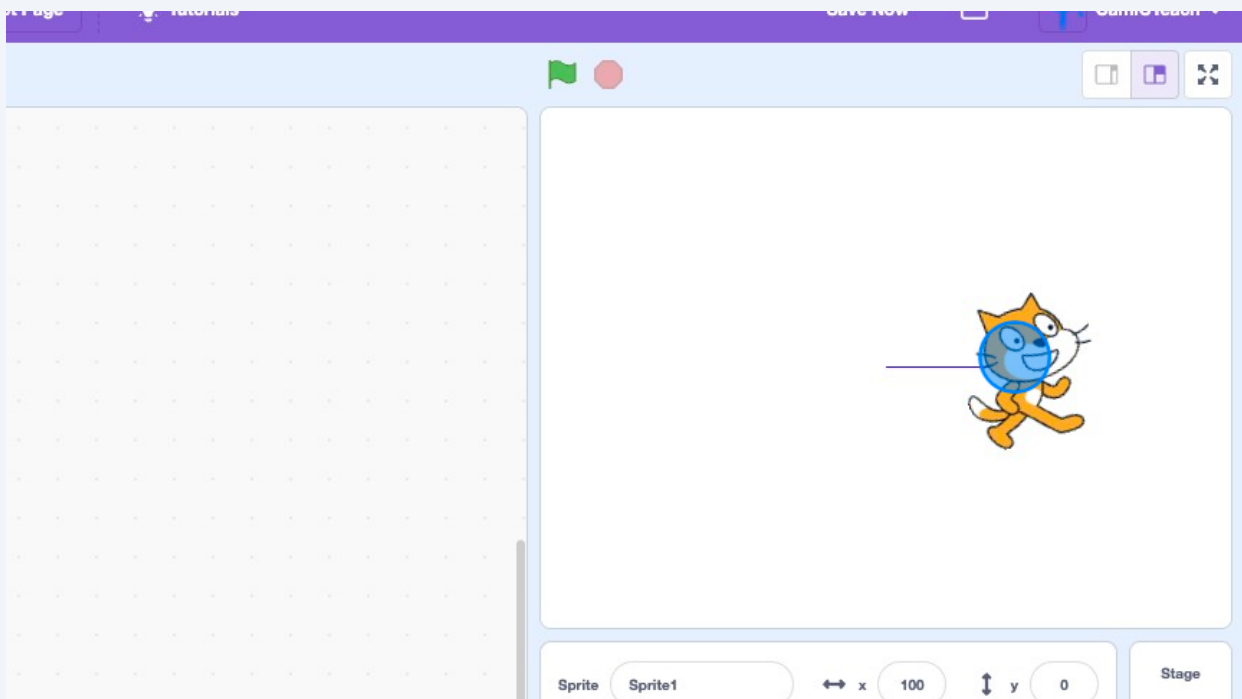


14 Since we are trying to draw a square, we will need to change the angle that the sprite turns. What number does this need to be?



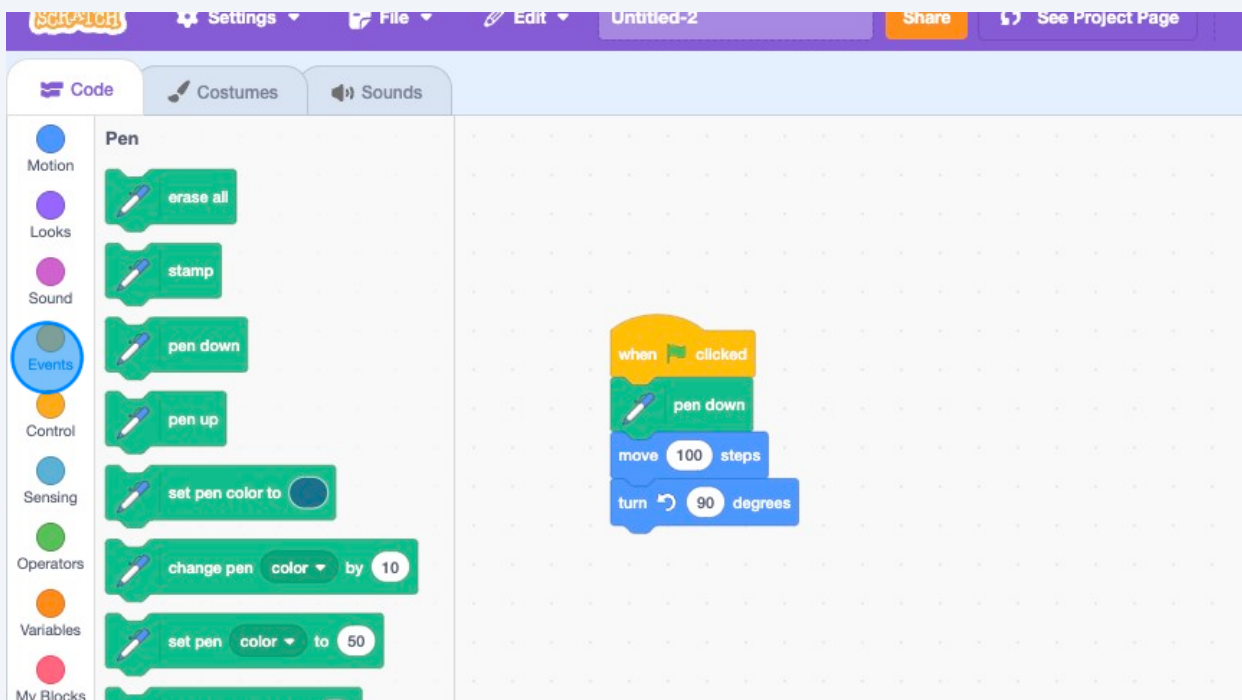
15

We want our sprite to go back to it's starting spot and to clear the pen. So we will need to create a reset button.

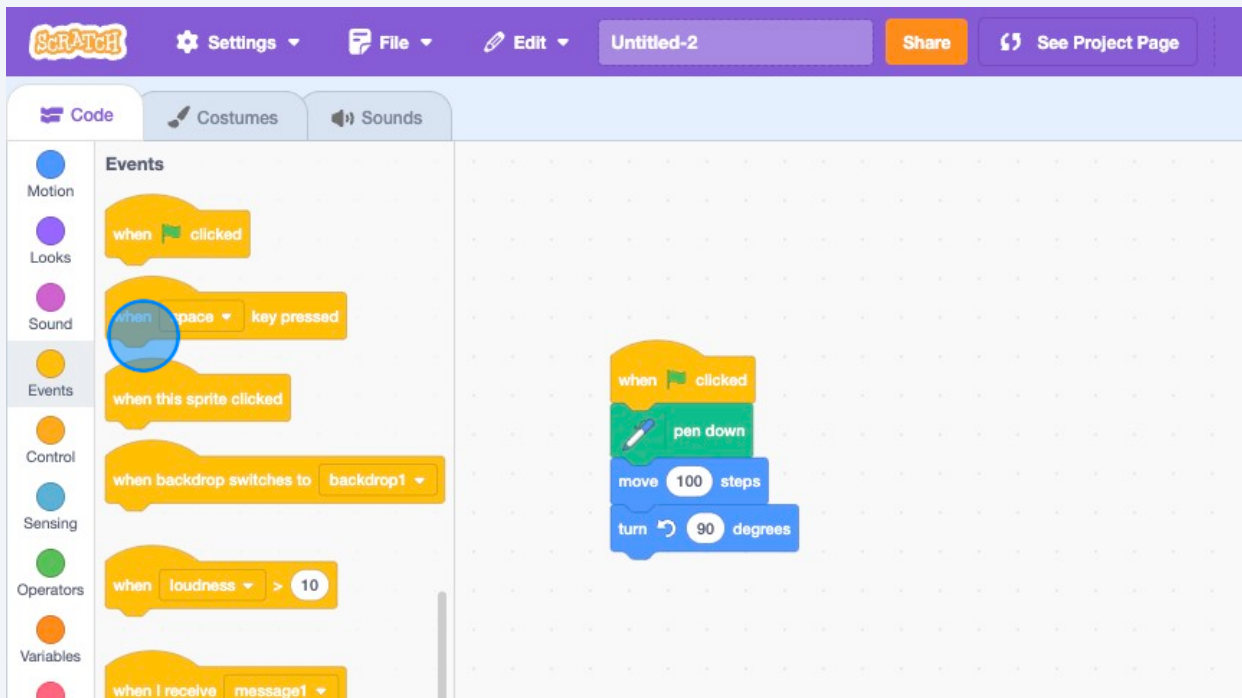


16

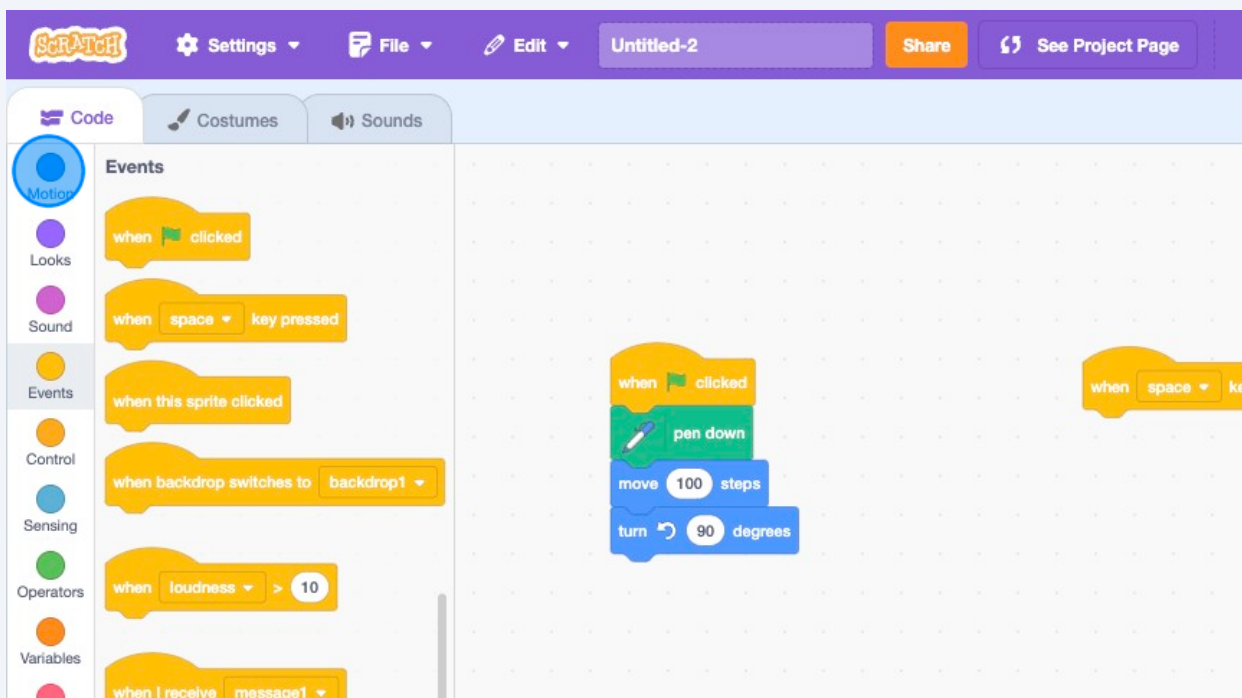
Click "Events"



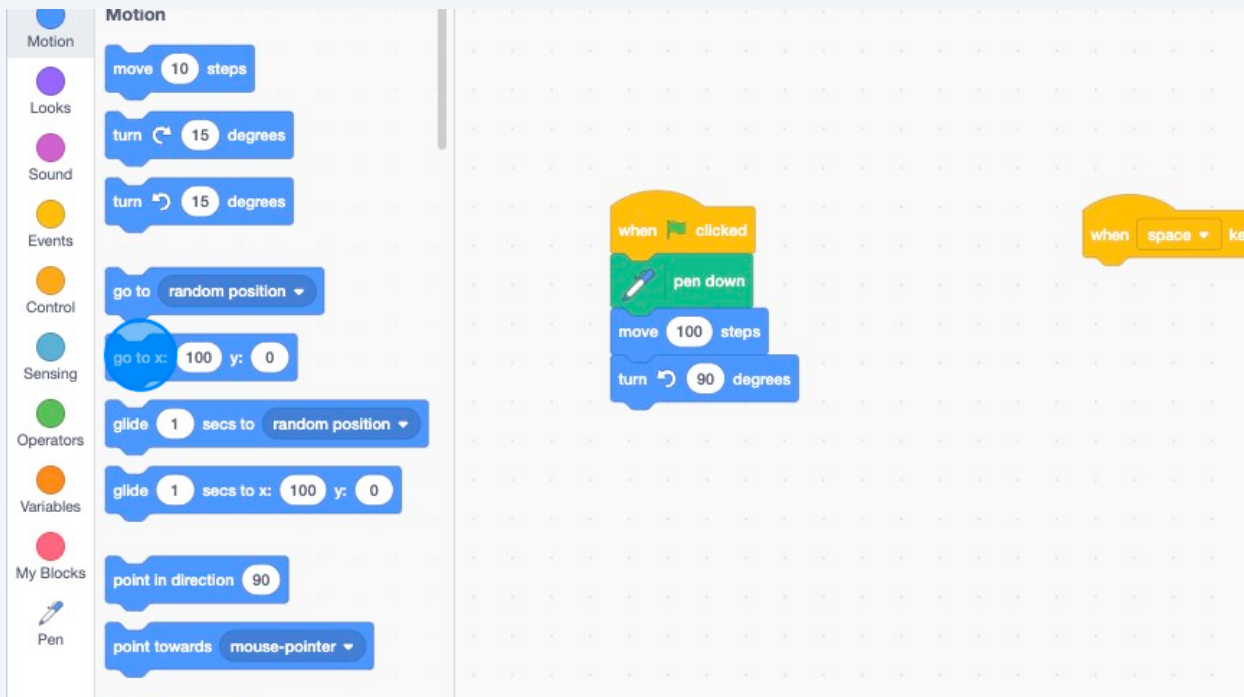
17 Drag "when space key pressed" block into the scripting area.



18 Click "Motion"

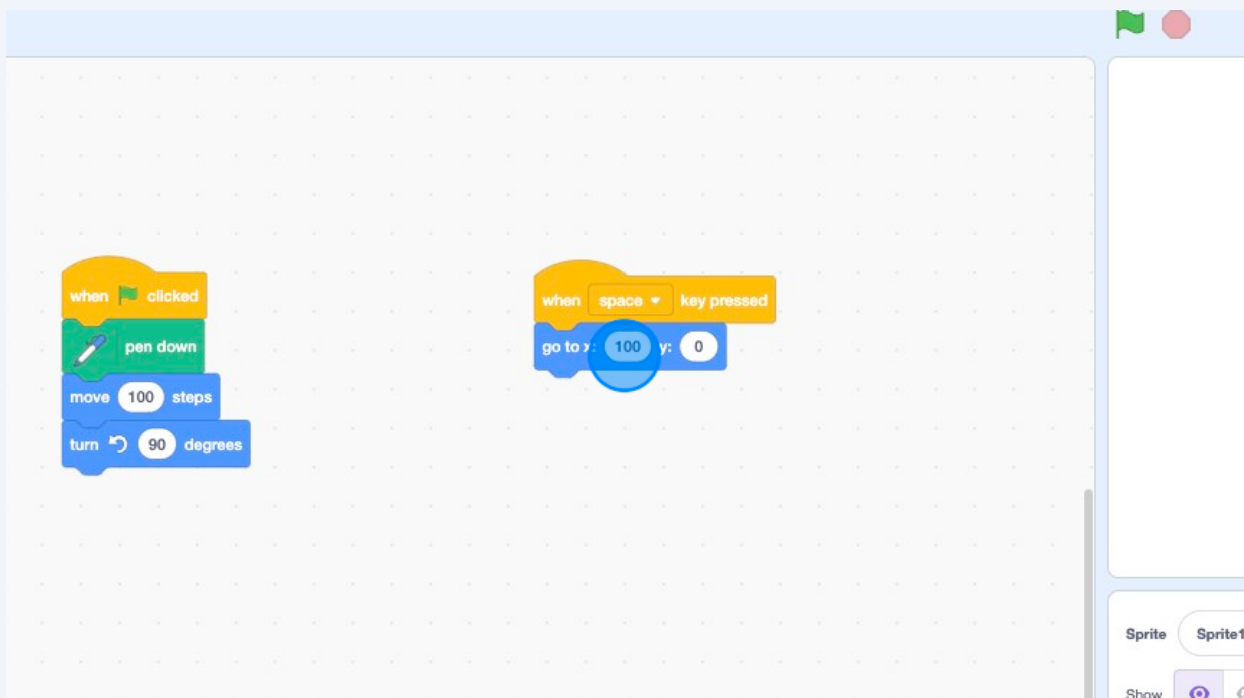


19 Click "go to x: y:"



The Scratch interface shows the 'Motion' category selected in the left sidebar. The 'go to x: 100 y: 0' block is highlighted with a blue circle. On the right, a script area contains two event triggers: 'when clicked' and 'when space key pressed'. The 'when clicked' trigger is connected to a sequence of four blocks: 'pen down', 'move 100 steps', and 'turn 90 degrees'. The 'when space key pressed' trigger is currently empty.

20 Click "100"



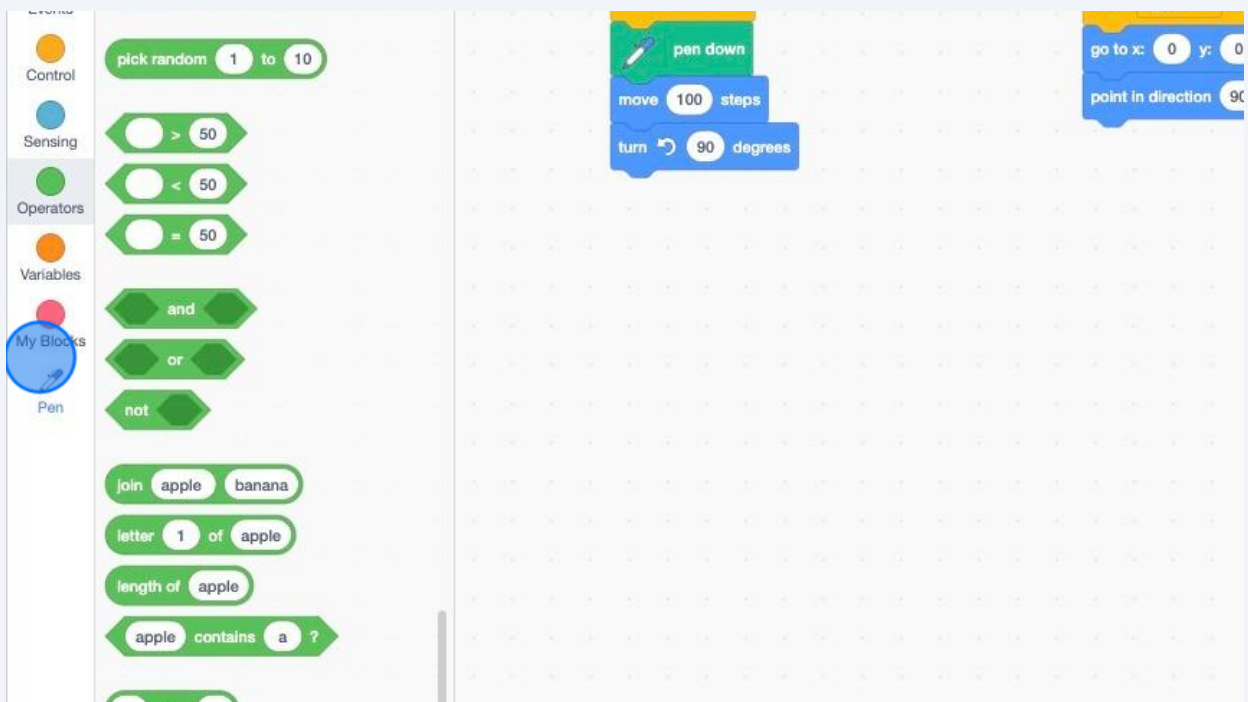
The Scratch interface shows a script area with two event triggers. The 'when clicked' trigger is connected to a sequence of four blocks: 'pen down', 'move 100 steps', and 'turn 90 degrees'. The 'when space key pressed' trigger is connected to a single 'go to x: 100 y: 0' block. The '100' value in the 'go to x: 100 y: 0' block is highlighted with a blue circle. The right sidebar shows the 'Sprite' panel with 'Sprite1' selected and the 'Show' button visible.

21 Type "0". This will make the sprite go back to the centre of the stage

22 Attach "point in direction 90" under "go to x: y:"

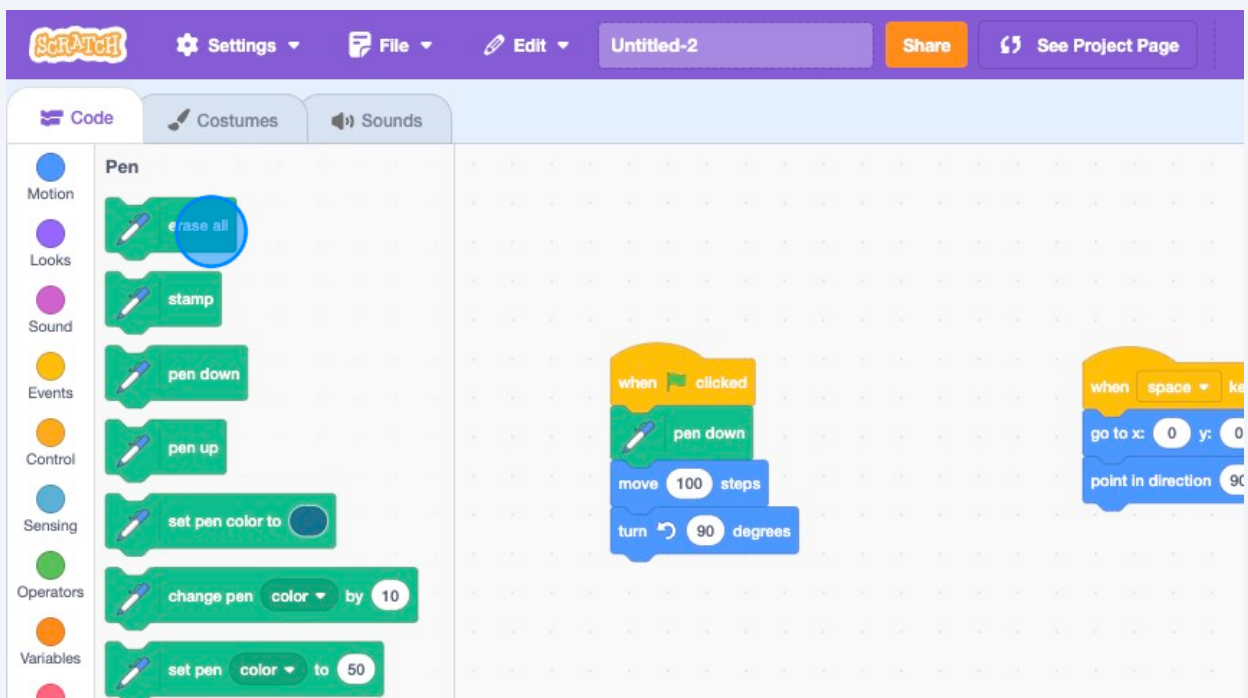
The image shows the Scratch code editor interface. On the left is the 'My Blocks' palette with categories: Control, Sensing, Operators, Variables, and Pen. The 'Control' category is selected, showing blocks like 'go to random position', 'go to x: 100 y: 0', 'glide 1 secs to random position', and 'glide 1 secs to x: 100 y: 0'. The 'Sensing' category shows 'point in direction 90' and 'point towards mouse-pointer'. The 'Operators' category shows 'change x by 10', 'set x to 100', and 'change y by 10'. The 'Variables' category shows 'set y to 0'. The 'Pen' category shows 'pen down'. On the right is the script area with a grid. A script is being built: a 'go to x: 0 y: 0' block is at the top right. Below it, a 'pen down' block is attached. Then, a 'move 100 steps' block is attached to the 'pen down' block. Finally, a 'turn 90 degrees' block is attached to the 'move 100 steps' block.

23 Click "Pen"



The image shows the Scratch code editor interface. On the left, the 'Pen' category is selected in the 'My Blocks' section. The 'Operators' category is expanded, showing various comparison blocks. The main workspace contains a script triggered by a 'when green flag clicked' event. The script consists of three blocks: 'pen down', 'move 100 steps', and 'turn 90 degrees'. To the right, a 'go to x: 0 y: 0' block and a 'point in direction 90' block are visible.

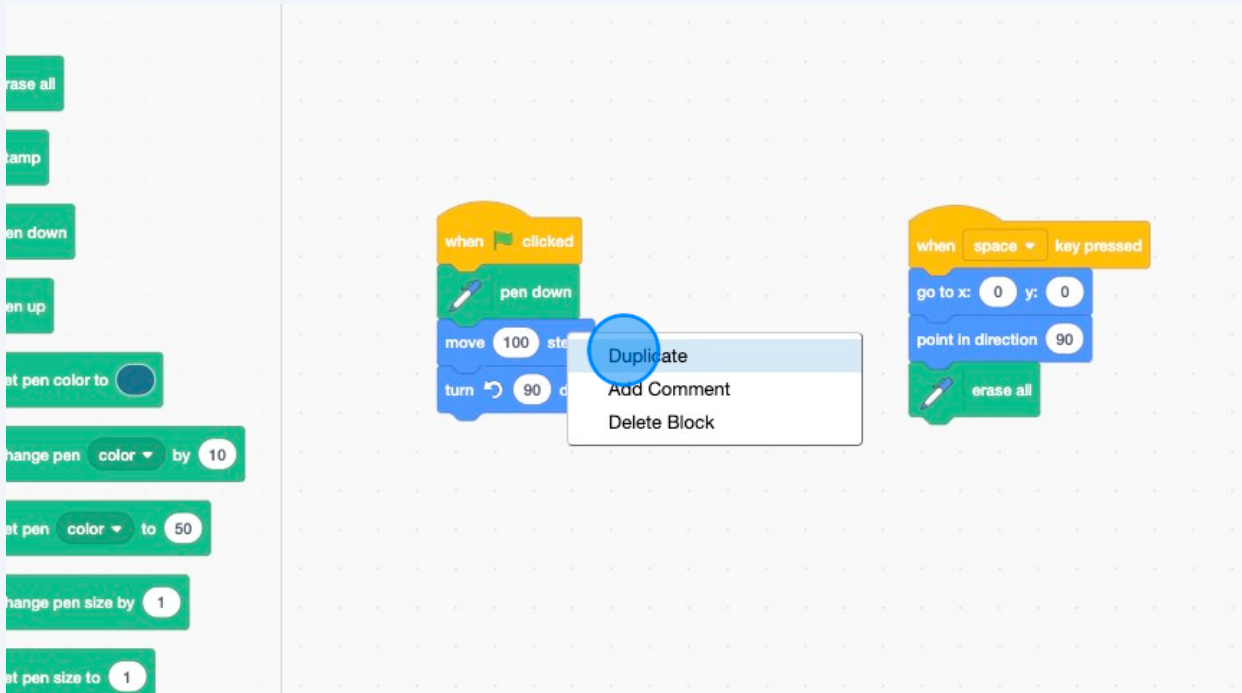
24 Click "erase all"



The image shows the Scratch code editor interface. The 'Pen' category is selected in the 'My Blocks' section. The 'Motion' category is expanded, showing various motion blocks. The main workspace contains a script triggered by a 'when green flag clicked' event. The script consists of four blocks: 'pen down', 'move 100 steps', 'turn 90 degrees', and 'erase all'. To the right, a 'when space key pressed' block and a 'go to x: 0 y: 0' block are visible.

25 Now you can reset your sprite after each test using the "space" key

26 Right-click "move 100 steps" block and select "Duplicate"



27 Attach it to the bottom of the script and repeat twice more.

The image shows a Scratch workspace with a code editor on the left and a stage on the right. The code editor contains the following blocks:

- stamp
- pen down
- pen up
- set pen color to (blue)
- change pen color by 10
- set pen color to 50
- change pen size by 1
- set pen size to 1

The stage shows two scripts:

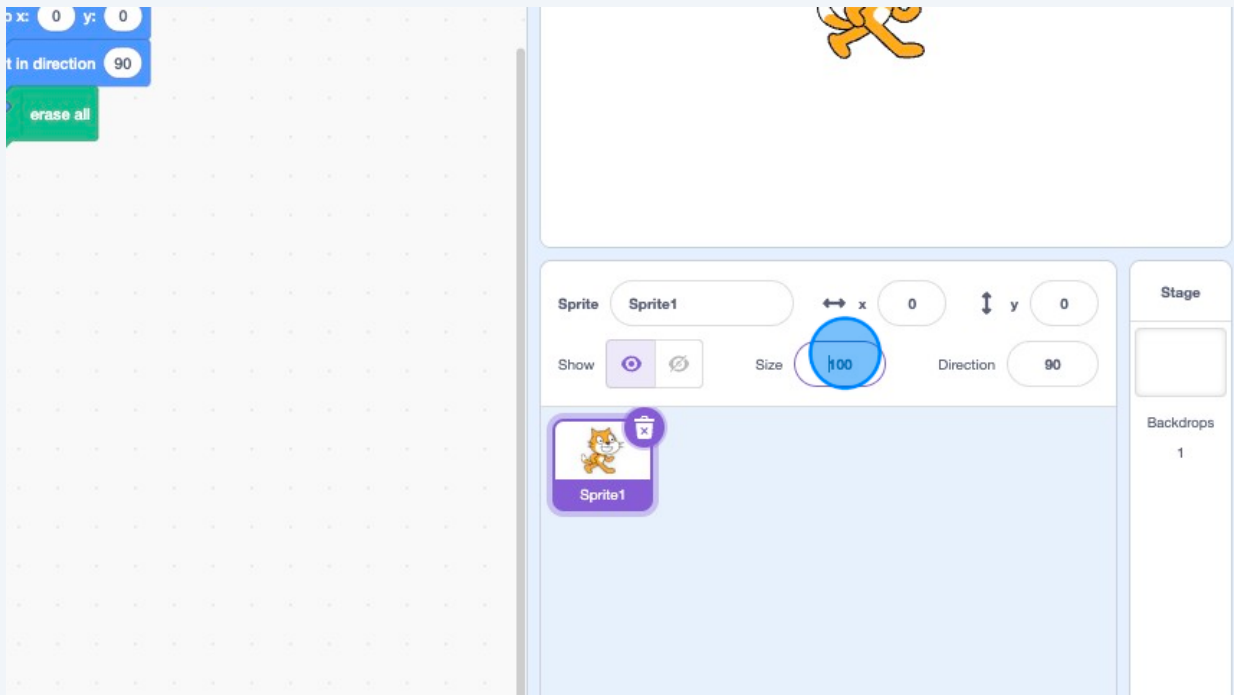
- Script 1: when clicked, pen down, move 100 steps, turn 90 degrees, move 100 steps, turn 90 degrees.
- Script 2: when space key pressed, go to x: 0 y: 0, point in direction 90, erase all.

28 Click the green flag to draw a square.

The image shows the Scratch interface with a purple top bar containing "Project Page", "Tutorials", "Save Now", and "CamICTeach". The stage area shows a white grid with a blue square drawn on it. A Scratch cat character is positioned next to the square. A green flag icon is visible in the top right corner of the stage area.

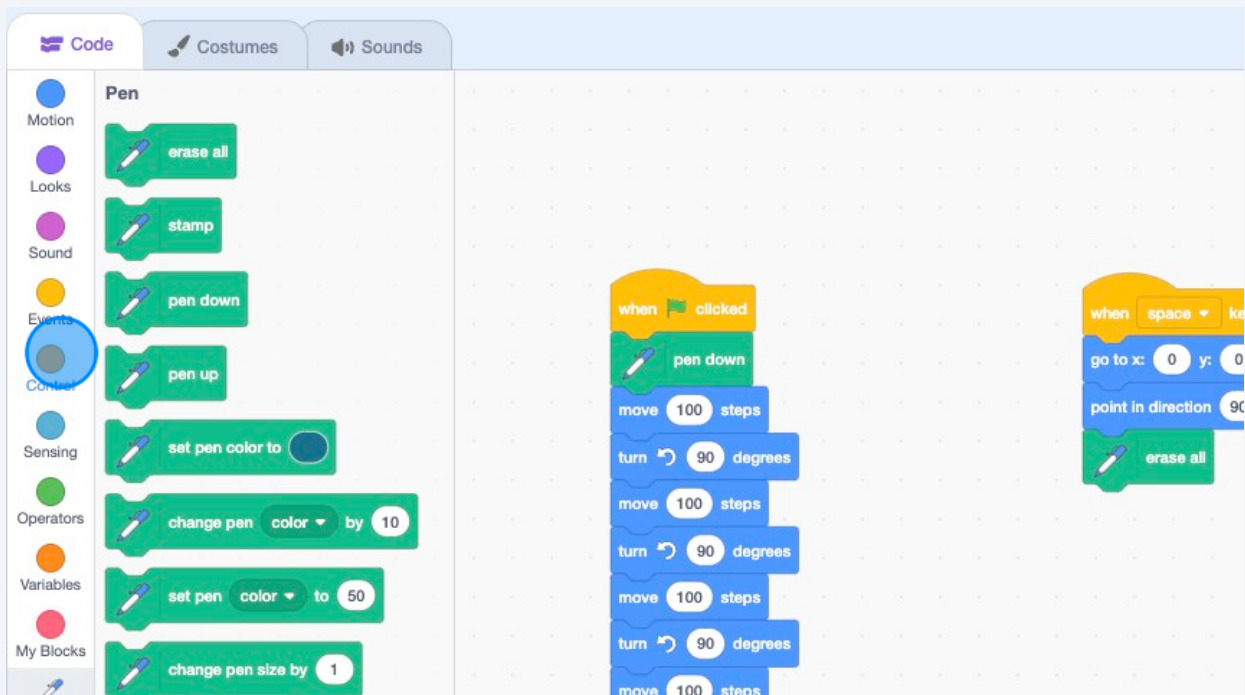
29

If the sprite feels too big for the screen, double-click the "Size" field and change it to 50.

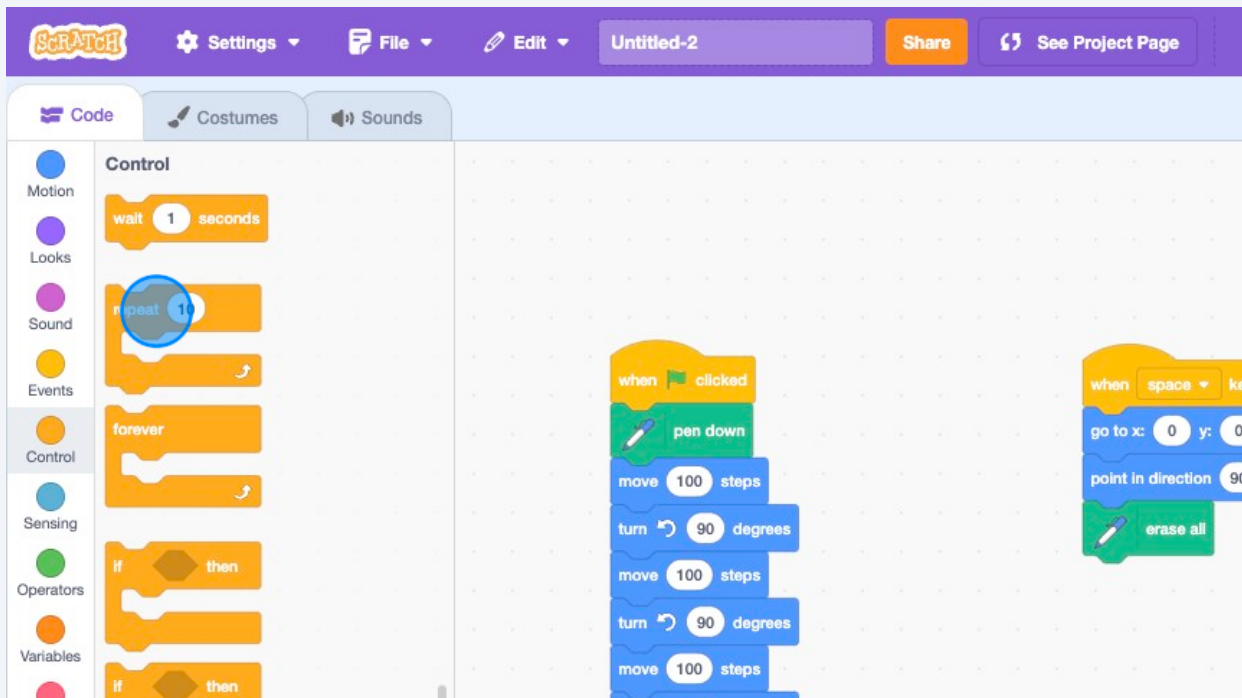


30

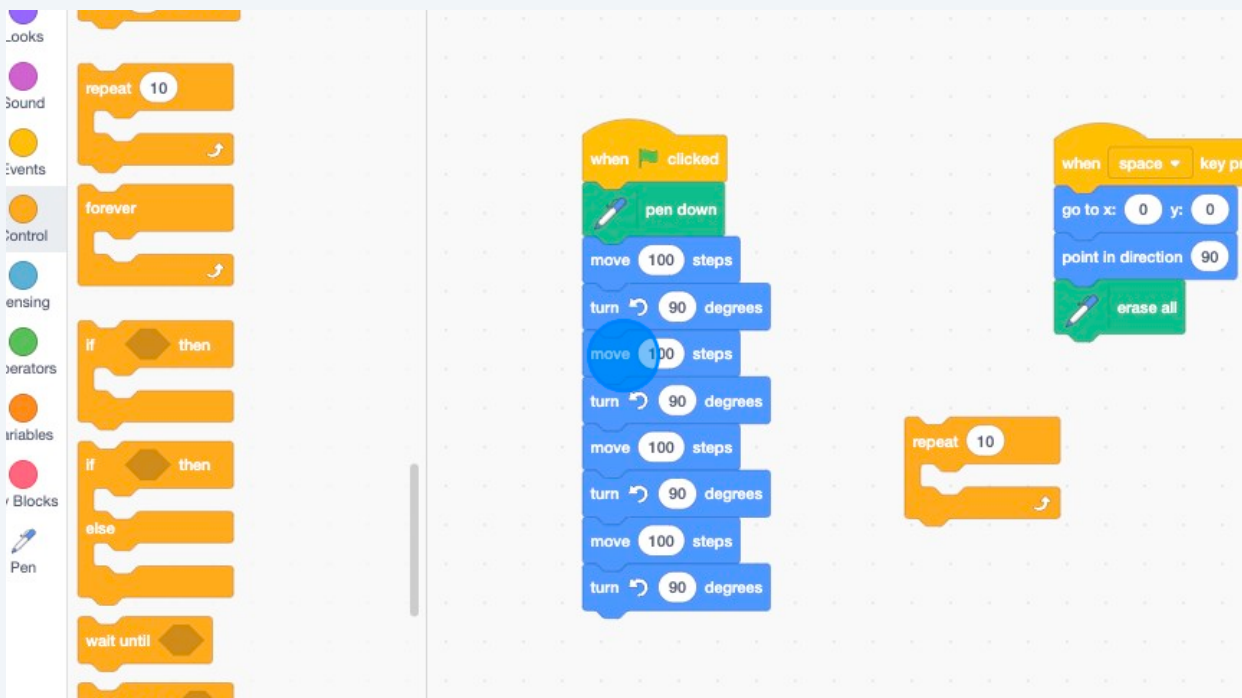
This code works to draw a square but we can make the code more efficient. To start this, click "Control"



31 Click "repeat"



32 Grab the second "move 100 steps" block and drag it and the ones underneath it away from the rest of the code.



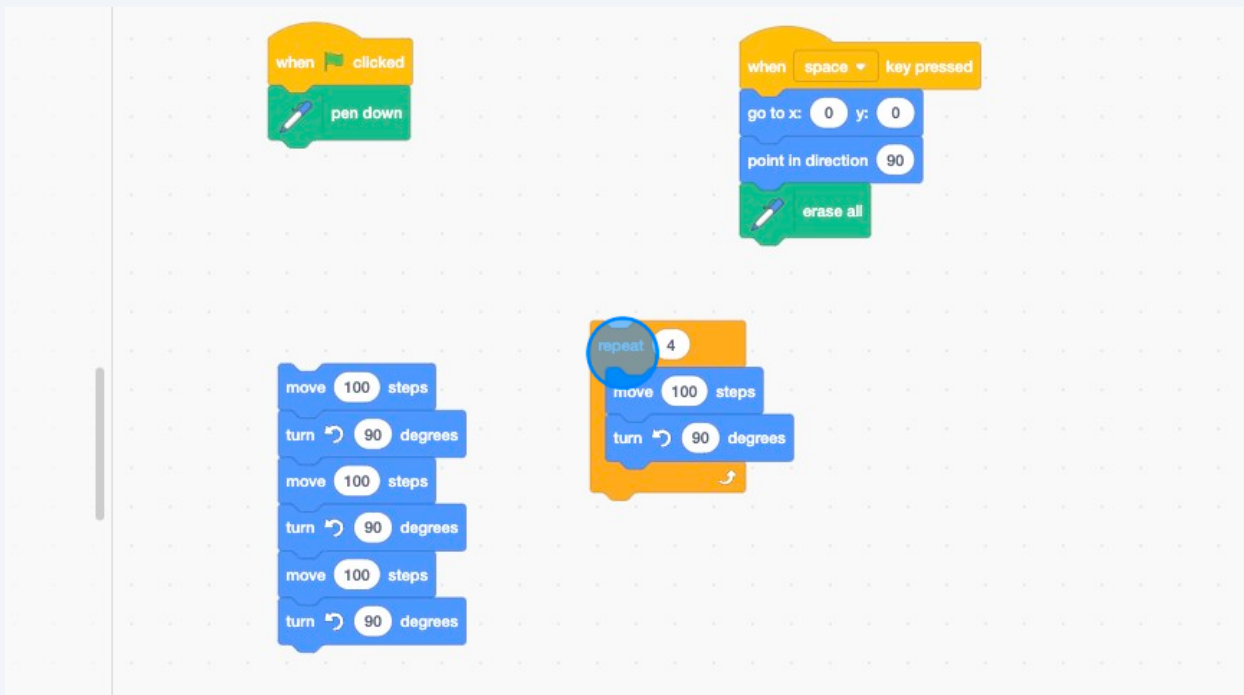
33 Take the top move and turn blocks and drag them inside the "repeat 10" block.

The image shows a Scratch workspace with a block palette on the left and a workspace on the right. The block palette includes categories like Motion, Looks, Sound, Events, Control, Sensing, Operators, Variables, and Pen. In the workspace, there are two event triggers: "when clicked" and "when space key pressed". The "when clicked" trigger is followed by "pen down", "move 100 steps", and "turn 90 degrees". The "when space key pressed" trigger is followed by "go to x: 0 y: 0", "point in direction 90", and "erase all". A "repeat 10" block is also present, and a "move 100 steps" and "turn 90 degrees" block are being dragged into it.

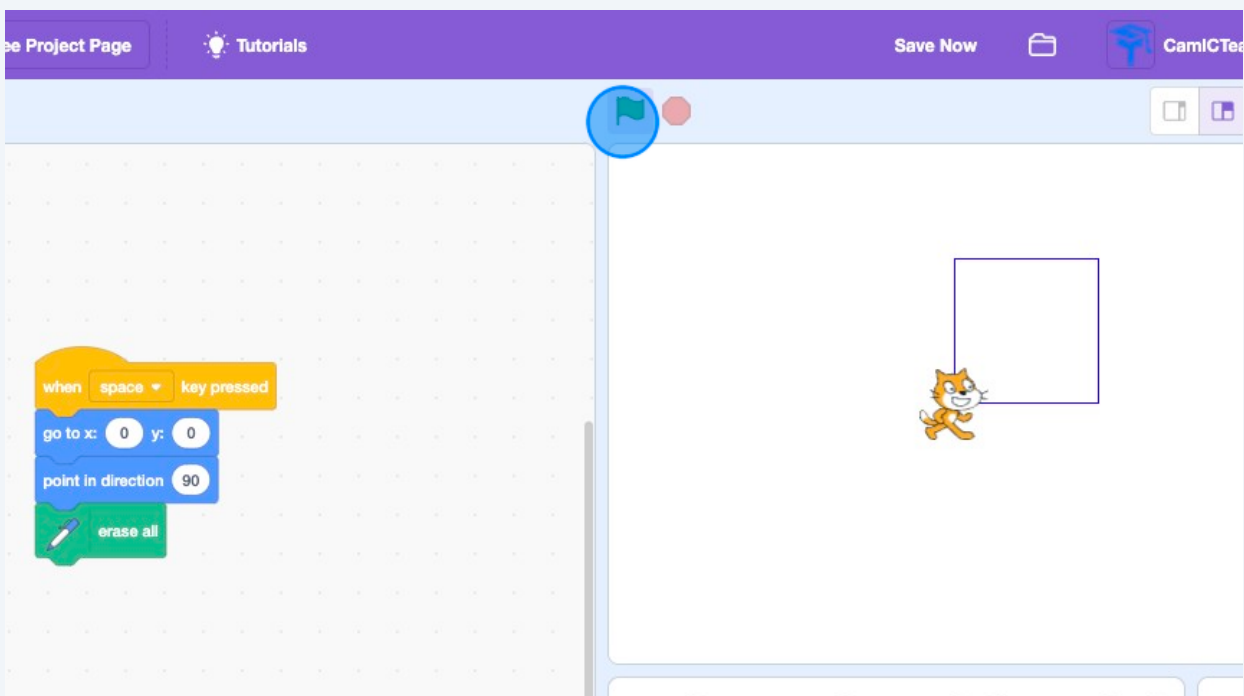
34 Change the 10 to a 4 to draw the four sides of the square.

The image shows the same Scratch workspace as in step 33. The "when clicked" trigger is followed by "pen down". The "when space key pressed" trigger is followed by "go to x: 0 y: 0", "point in direction 90", and "erase all". A "repeat 10" block is present, and it is being modified to repeat 4 times. The "move 100 steps" and "turn 90 degrees" blocks are now inside the "repeat 4" block.

35 Drag the blocks over and reattach to the "when Green Flag clicked" block.

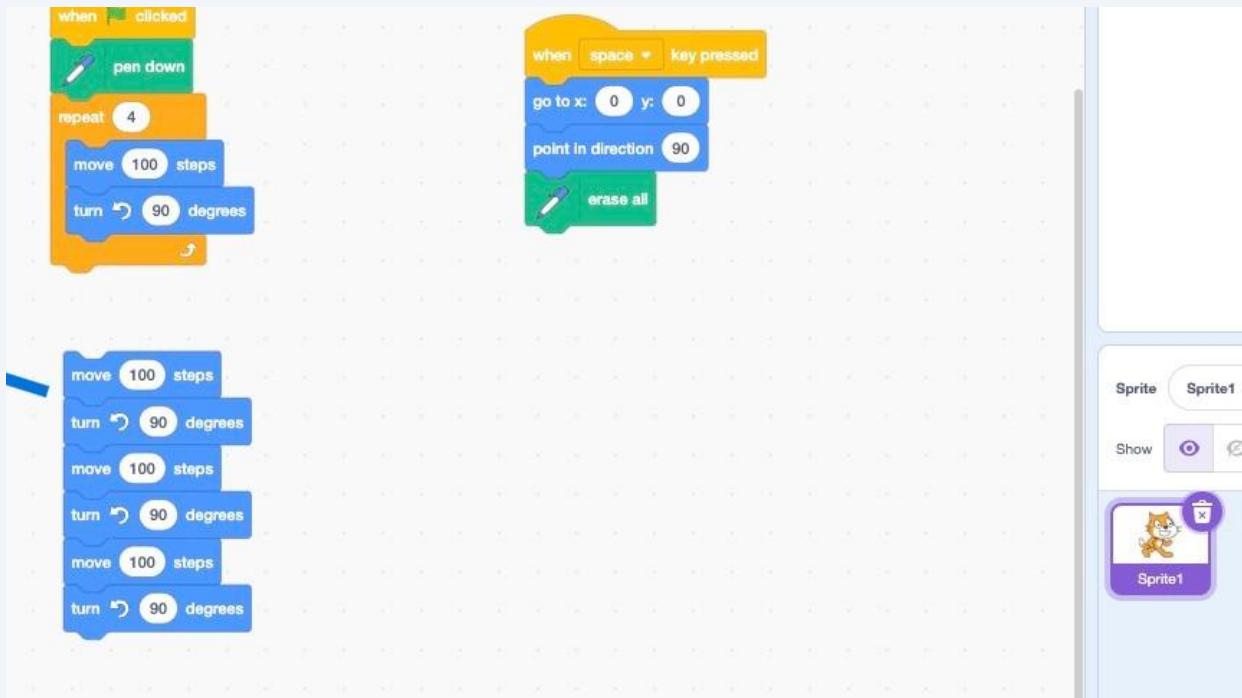


36 Click the green flag and see that it draws a square just like it did before.



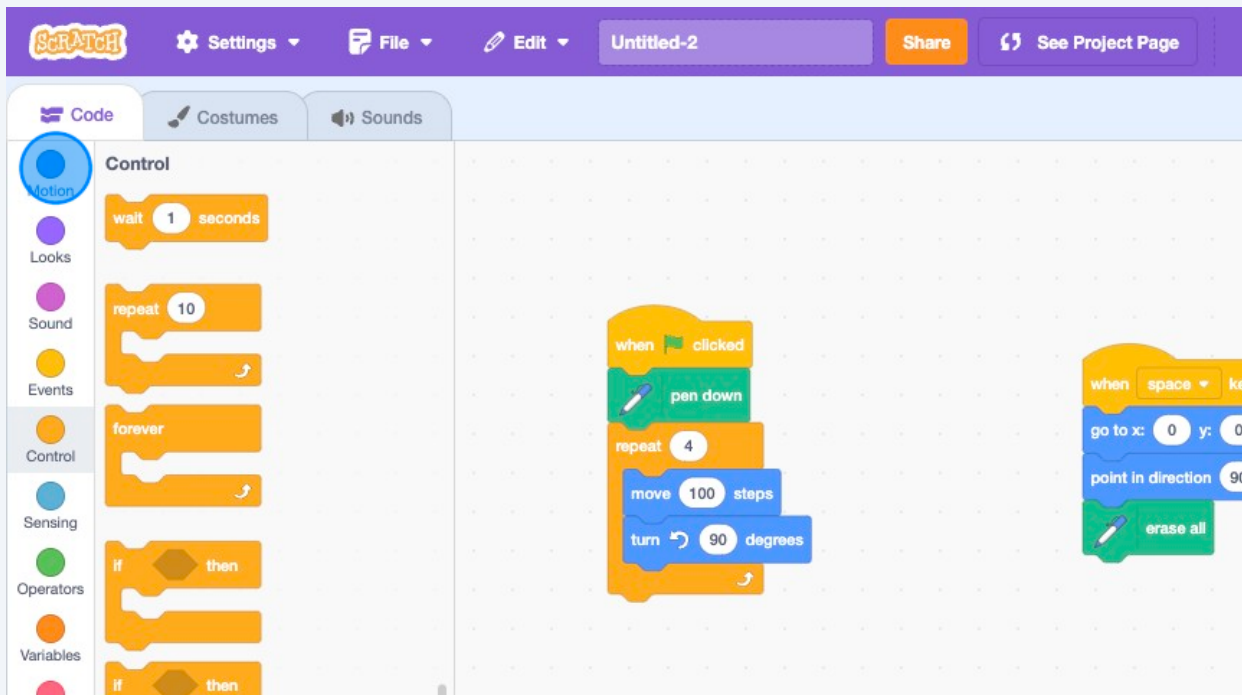
37

Drag the leftover turn and move blocks back into the category area to delete them.



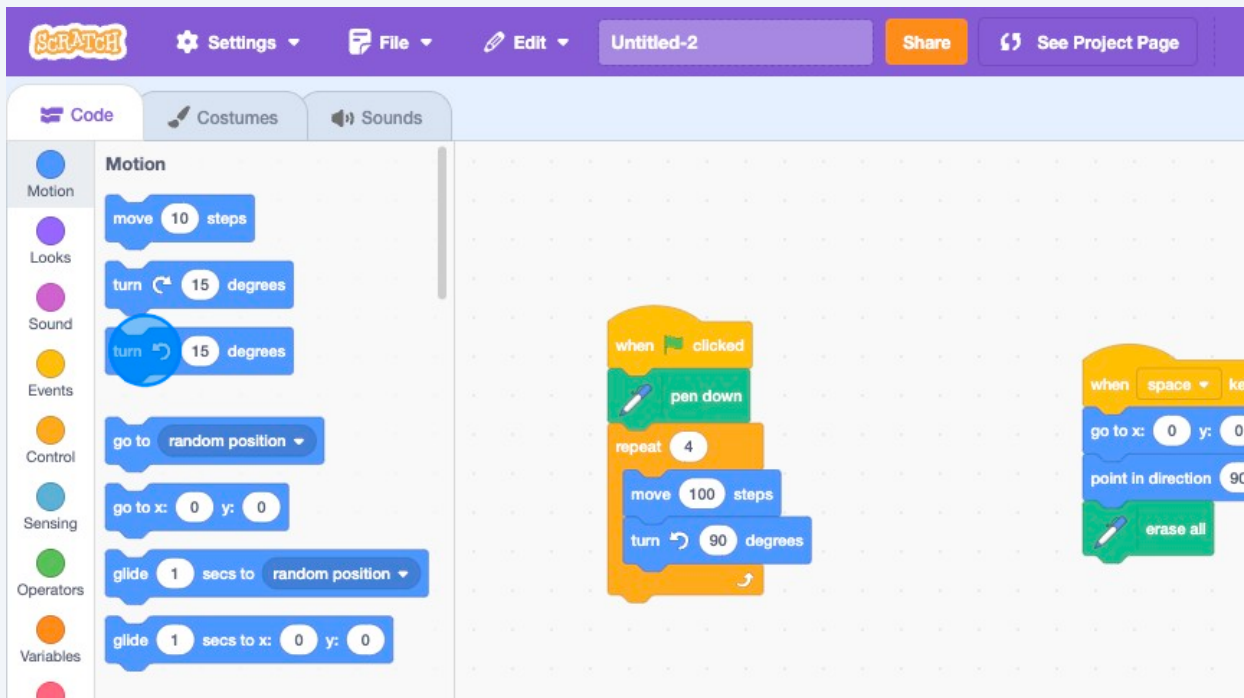
38

Now we need to turn the sprite after it draws a square to start making it into a spirograph. To start, click "Motion"



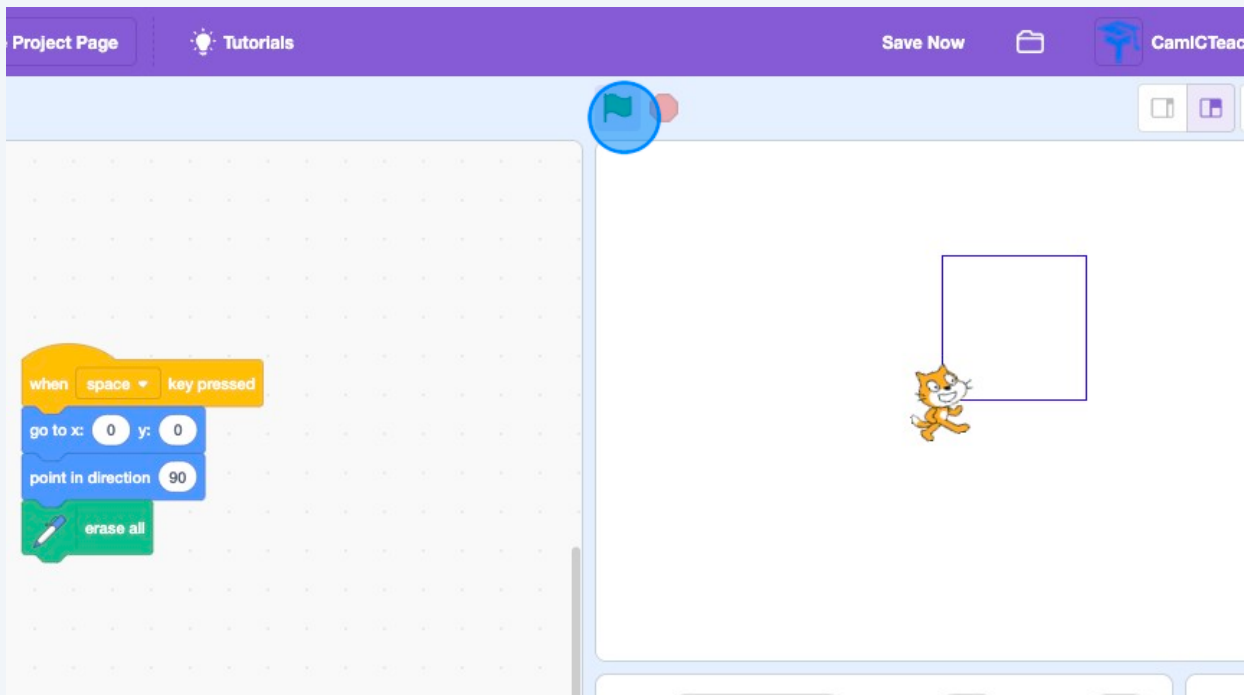
39

Grab another "turn 15 degrees" block and attach it under the "repeat 4" block.

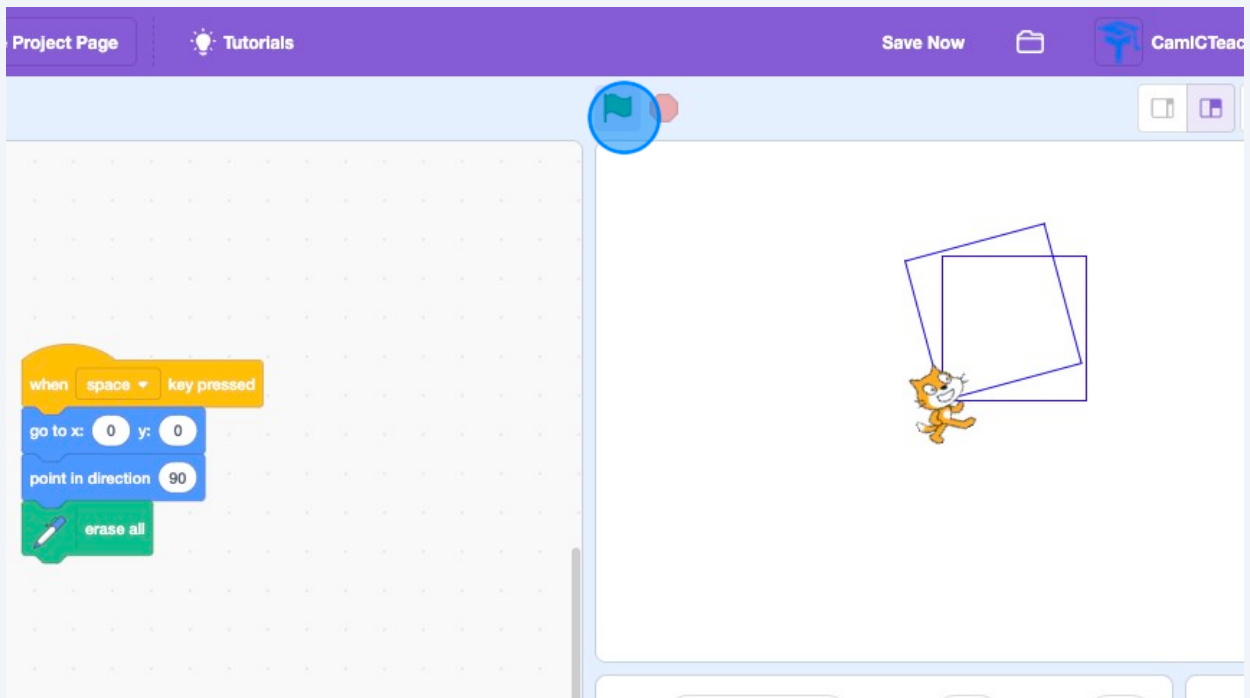


40

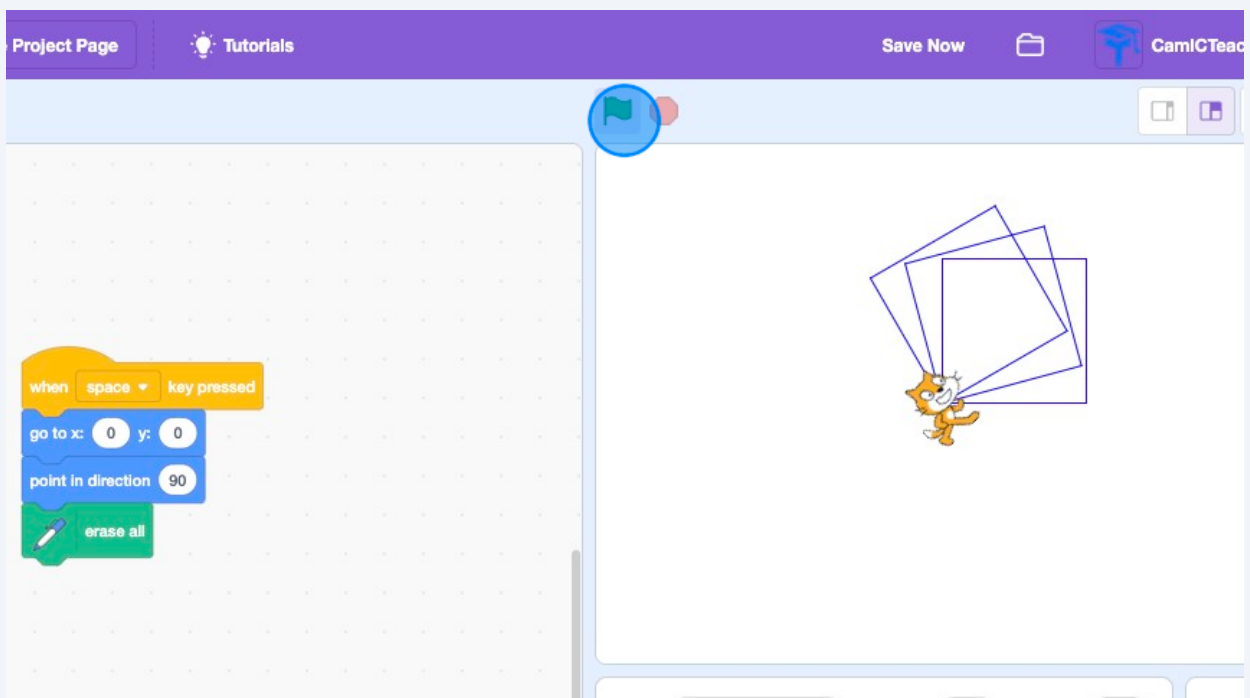
Now when the green flag is clicked, the sprite draws a square and then turns 15 more degrees.



41 Each time it is clicked, it draws the square and then turns a little.

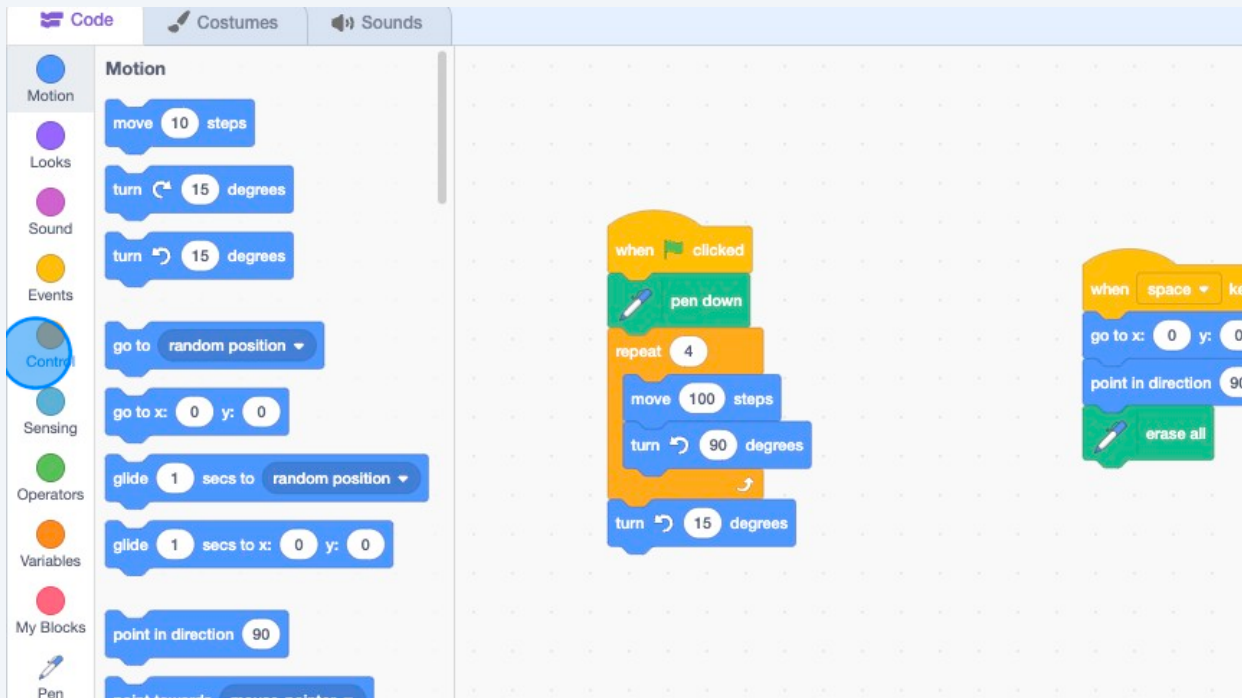


42



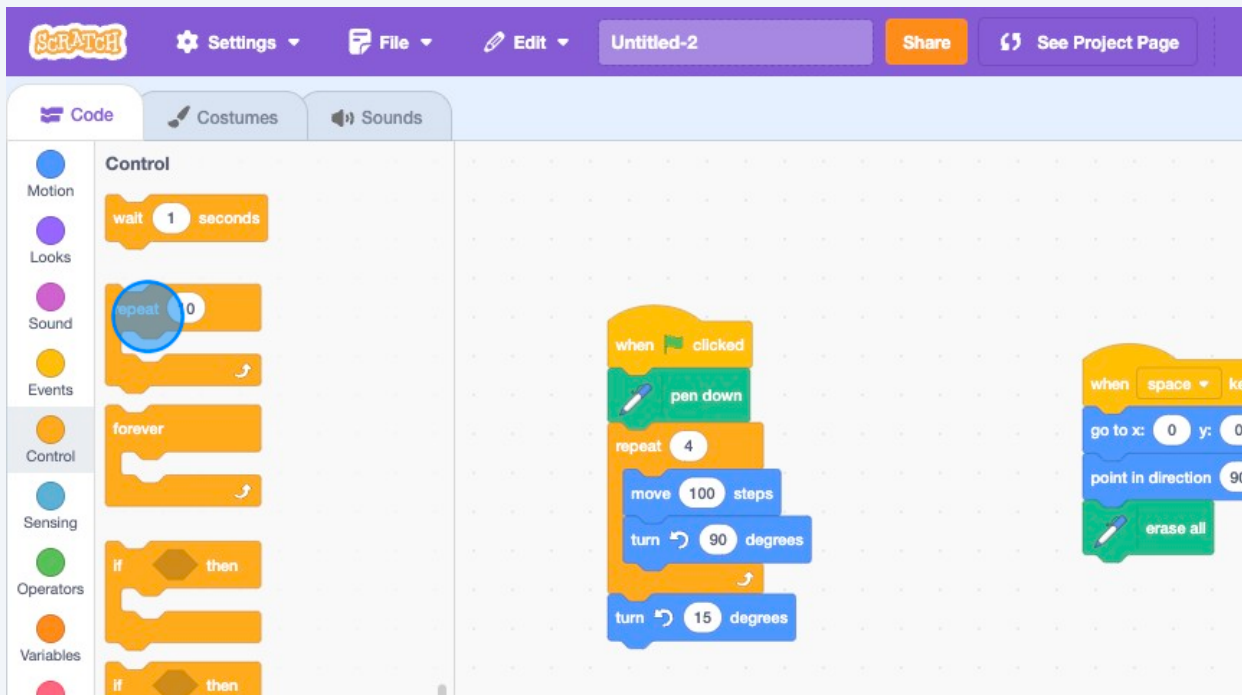
43

We can automate this so we don't have to click the green flag over and over. TO do this, click "Control"



44

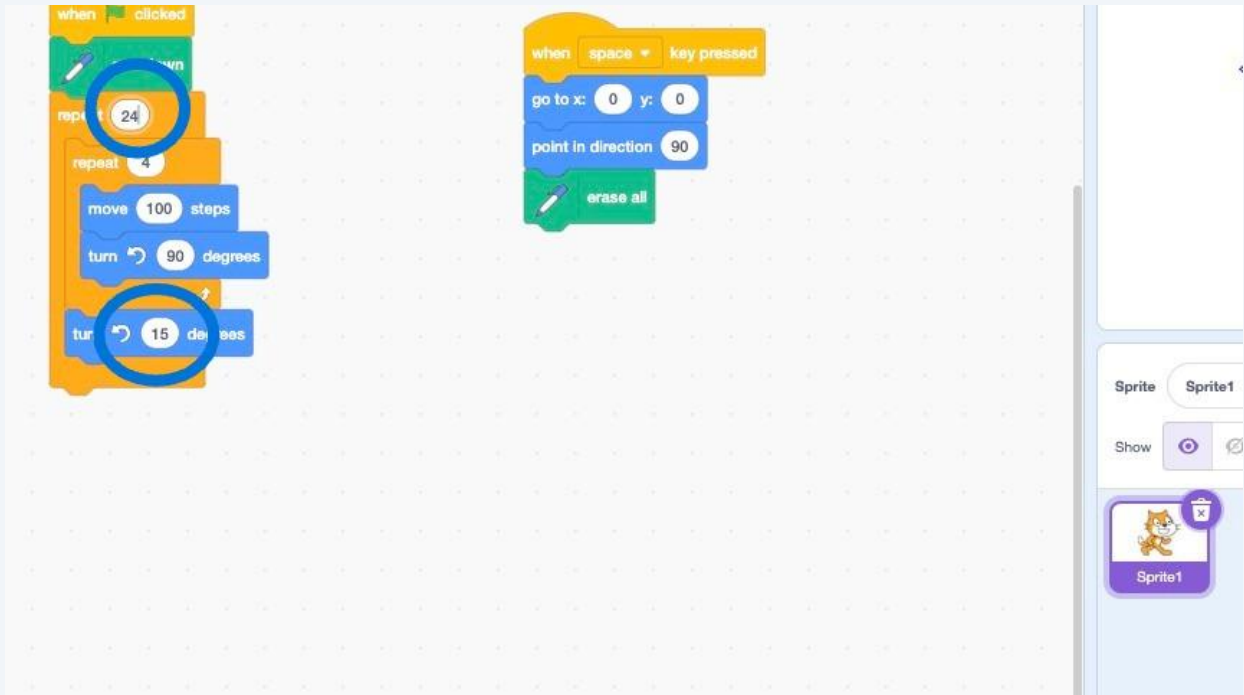
And get another "repeat 10" block



45

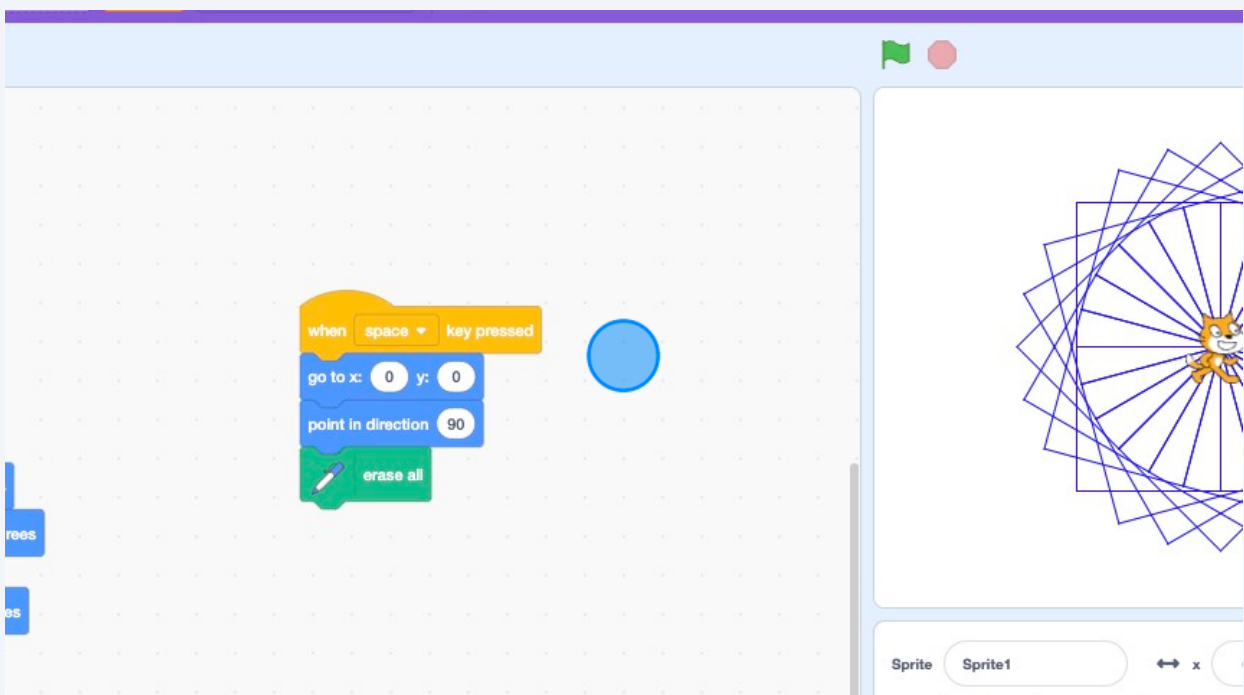
Place the "repeat 4" block and the turn that is attached to it all inside the new "repeat 10"

To make the sprite do a full circle of squares, we need to make the amount of repeats and the degrees turned equal 360 when they are multiplied together.



46

Click the green flag to see it work.



47

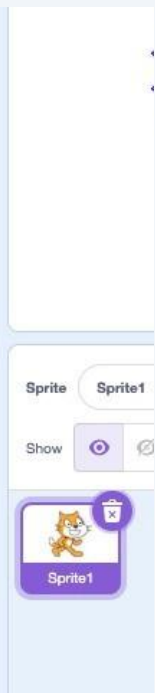
We can play around and change these numbers as long as they still multiply to equal 360.



```
when clicked
  turn 90 degrees
  repeat 10
    repeat 36
      move 100 steps
      turn 90 degrees
      turn 36 degrees
```



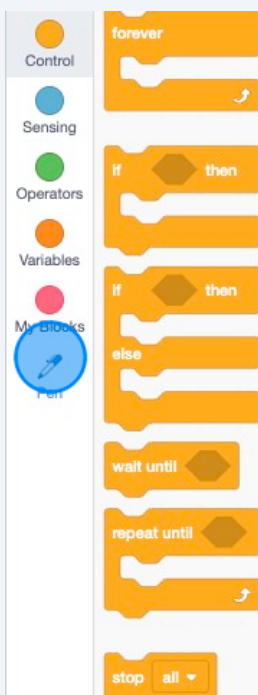
```
when space key pressed
  go to x: 0 y: 0
  point in direction 90
  erase all
```



Sprite Sprite1
Show
Sprite1

48

Now to add some interesting colour effects, click "Pen"

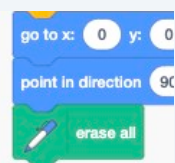


Control
Sensing
Operators
Variables
Mr. Blocks
Pen

- forever
- if then
- if then else
- wait until
- repeat until
- stop all



```
repeat 36
  repeat 4
    move 100 steps
    turn 90 degrees
    turn 10 degrees
```



```
go to x: 0 y: 0
point in direction 90
erase all
```

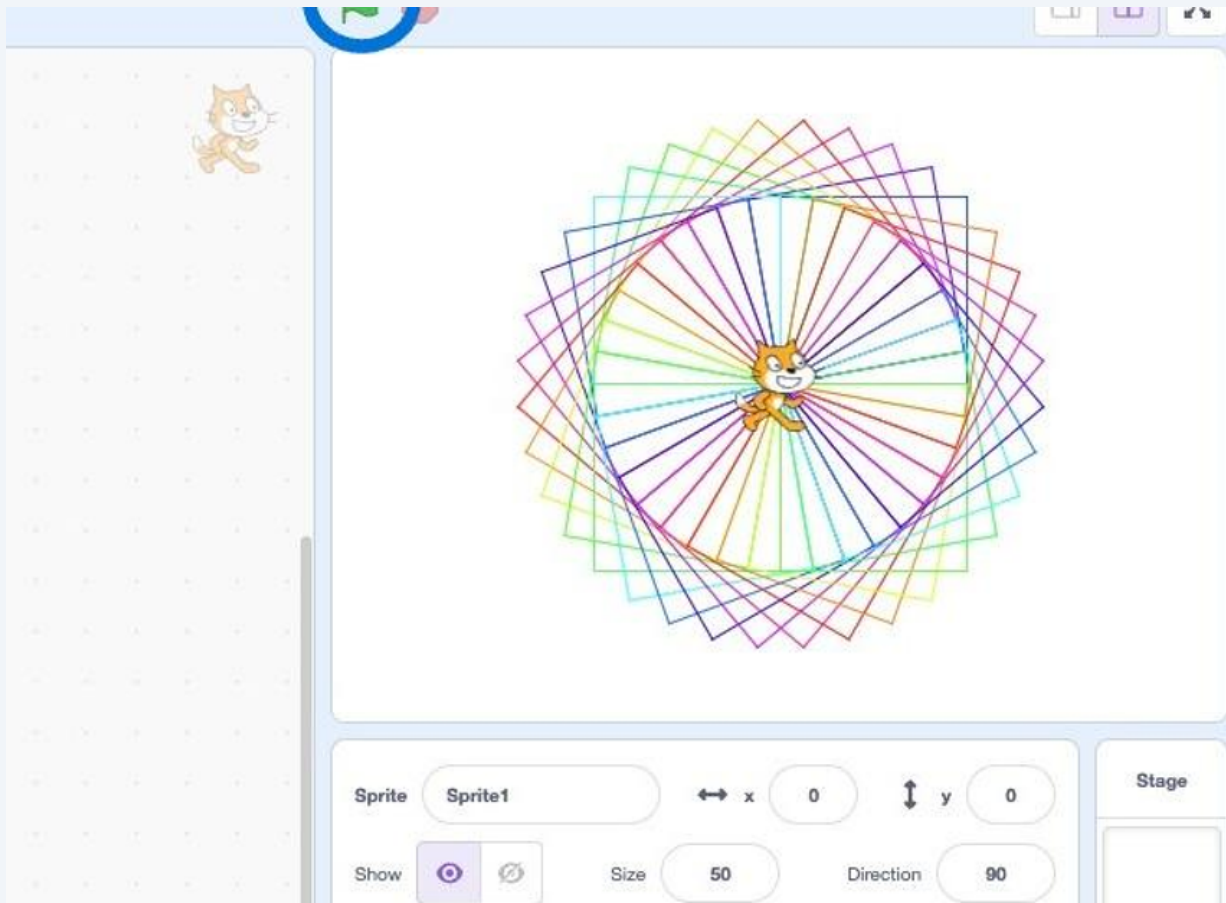
49

Grab the "change pen colour by 10" and add it under "repeat 4"

The image shows a Scratch workspace with a block palette on the left and a workspace on the right. The block palette is organized into categories: Looks, Sound, Events, Control, Sensing, Operators, Variables, My Blocks, and Pen. The Pen category is selected, showing blocks for stamp, pen down, pen up, set pen color to, change pen color by, set pen color to, change pen size by, and set pen size to. The 'change pen color by' block is highlighted with a blue circle. A blue arrow points from this block to the workspace. In the workspace, there is a script starting with 'when clicked', followed by 'pen down', a 'repeat 36' loop containing a 'repeat 4' loop. The inner loop contains 'move 100 steps', 'turn 90 degrees', and 'turn 10 degrees'. The 'change pen color by 10' block is being moved into the inner loop. To the right, another script is partially visible, starting with 'when space key pressed', followed by 'go to x: 0 y: 0', 'point in direction 90 degrees', and 'erase all'.

50

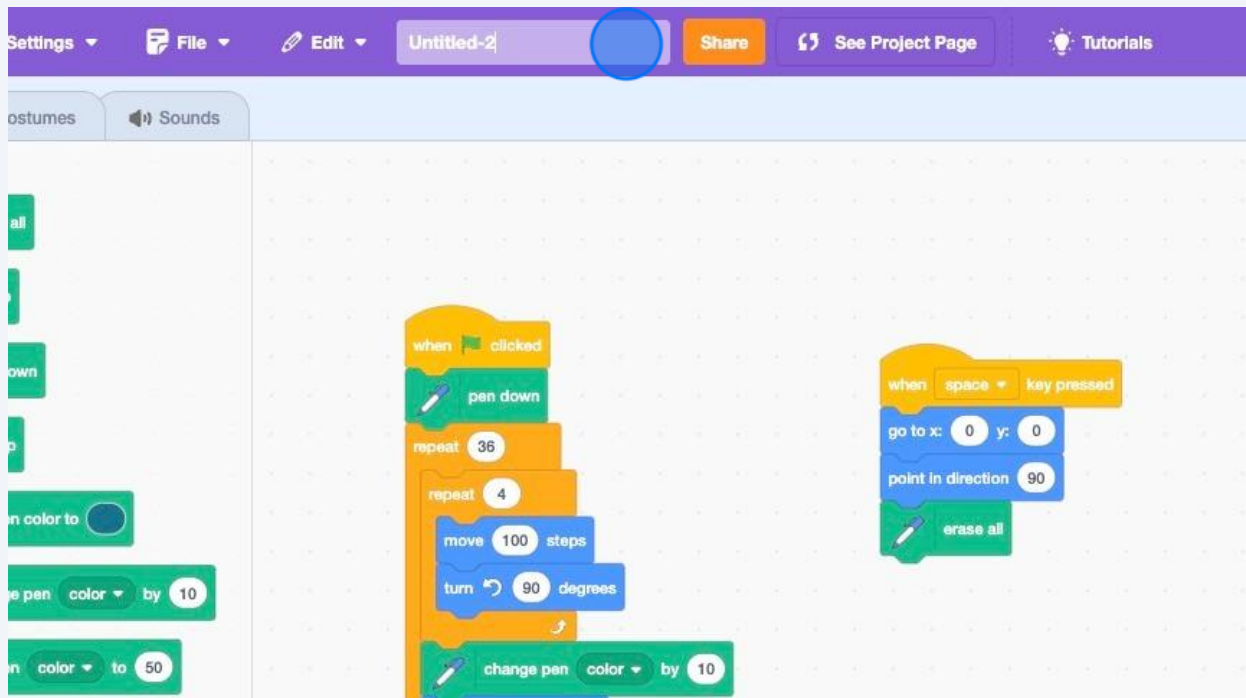
Click the green flag to run the code and create a rainbow spirograph design.



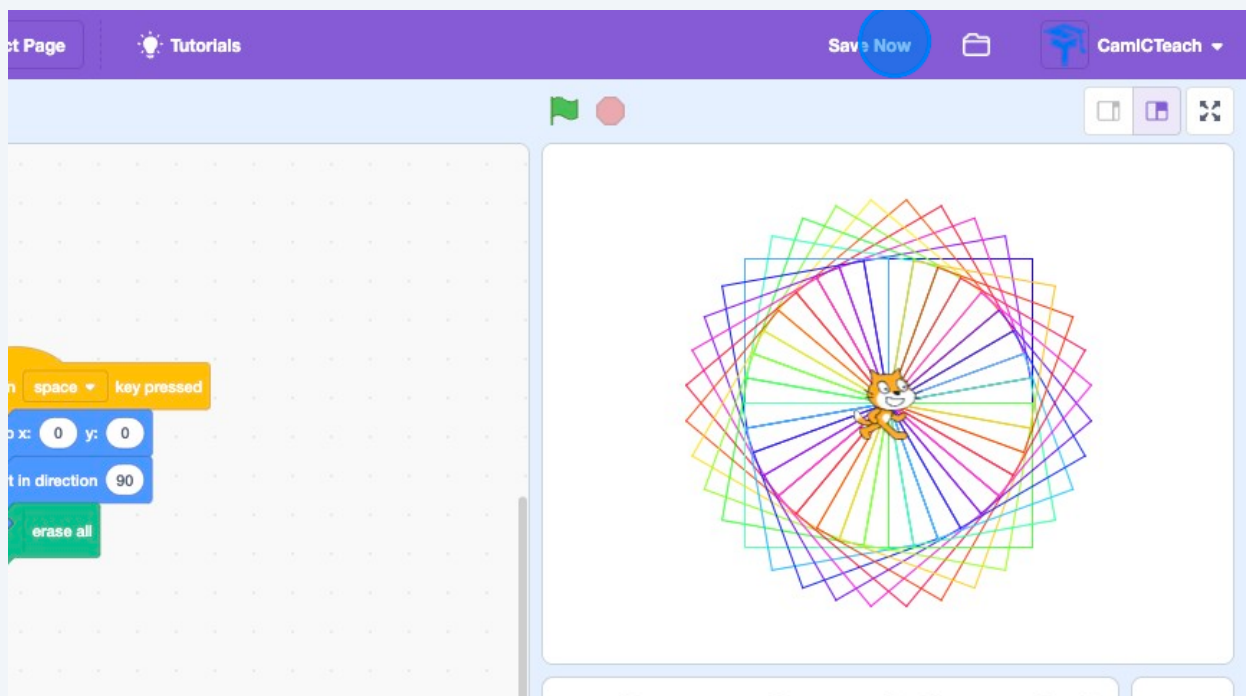
The image shows the Scratch development environment. On the left is the sprite sheet with a cat sprite. The main stage displays a colorful spirograph design consisting of multiple overlapping, concentric, multi-colored lines radiating from the center. The cat sprite is positioned at the center of this design. Below the stage is the property inspector with the following settings:

Property	Value
Sprite	Sprite1
x	0
y	0
Size	50
Direction	90

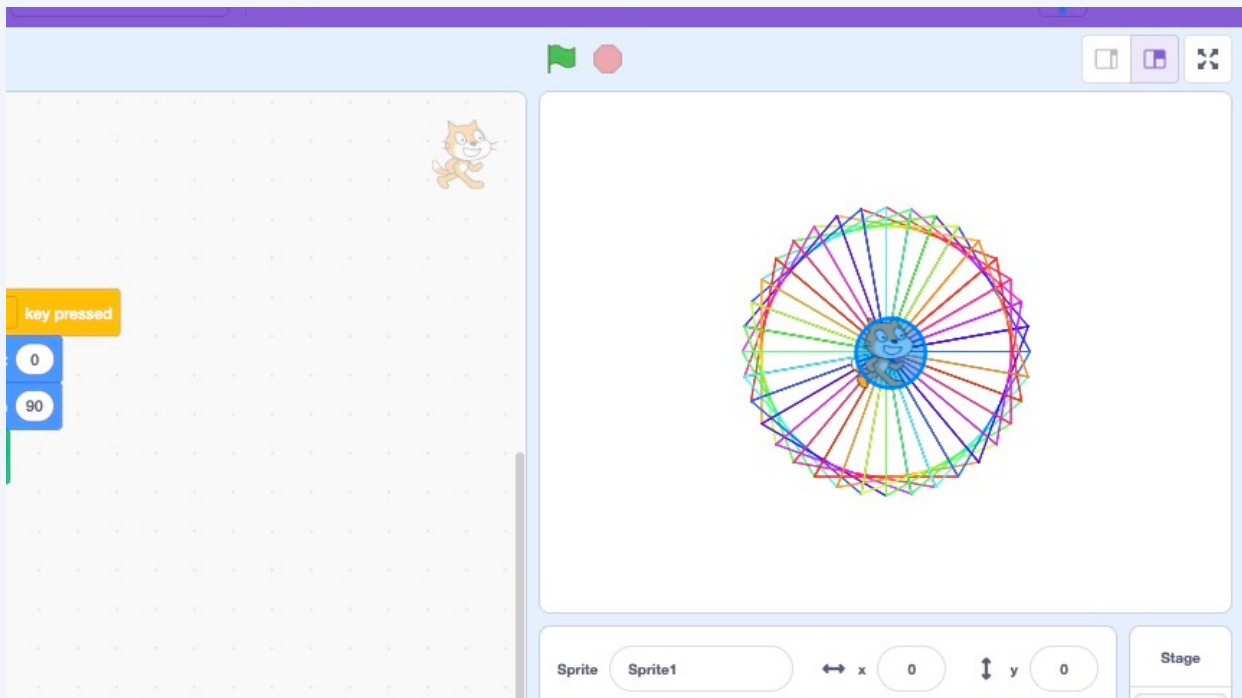
51 Remember to name your project



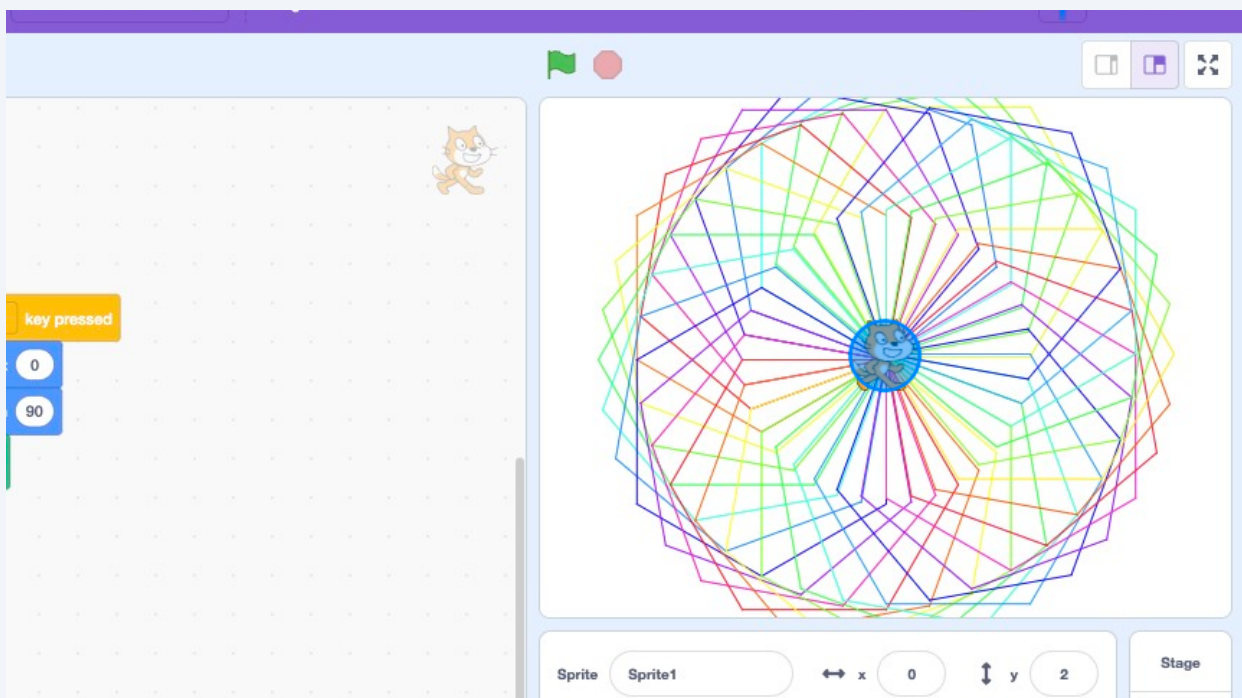
52 And to save it.



53 Can you make the spirograph out of triangles instead of squares?



54 Or hexagons?



55

Have a play with combining different shapes to see what you can make!

