

Altering Code by Creating Subprograms

You will be altering the code you used in Master 4 to incorporate subprograms.

A **subprogram** contains a small set of instructions to complete a task and is referenced and called to action by the main program. In Scratch, when we make a new block, we have made a subprogram.

1. Click on the link to open the Scratch application you used in Master 4.

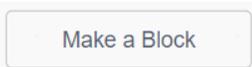
<https://scratch.mit.edu/projects/740509372/editor>

2. Let's start with a block that determines the x and y coordinates for the points at the vertices of the triangle.

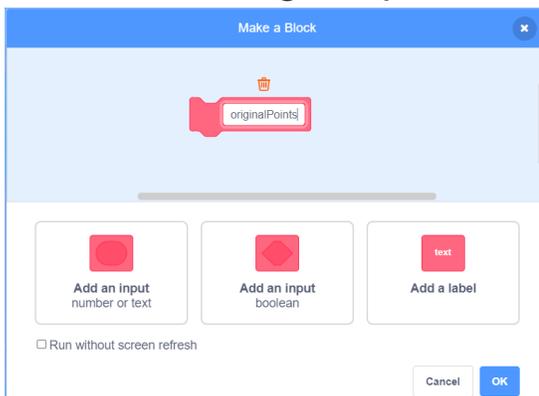
- Select **My Blocks**



- Select Make a Block



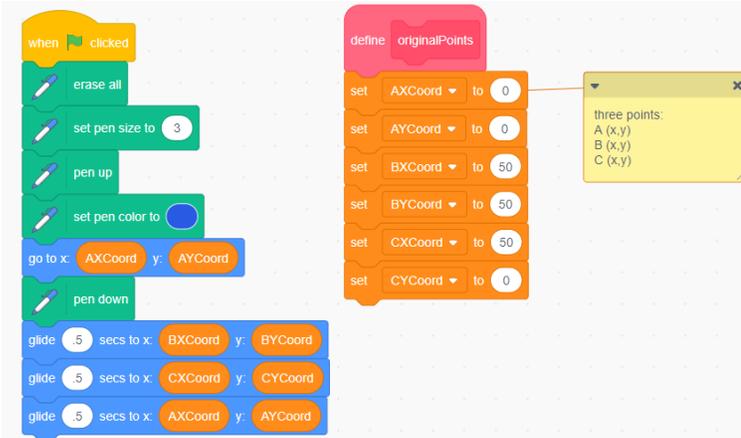
- Name the block **originalPoints**, since you will eventually be transforming the points, and click on **OK**.



If you have a Scratch login, save the project in your Scratch account by selecting **Remix** at the top of the screen. A login is not required to work with the code, but you will not be able to save your changes without it.

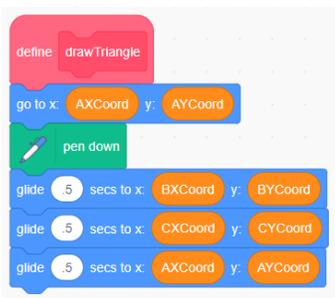
Altering Code by Creating Subprograms (cont'd)

- Drag the 6 **set** blocks from the main code to beneath the **originalPoints** subprogram as shown below.



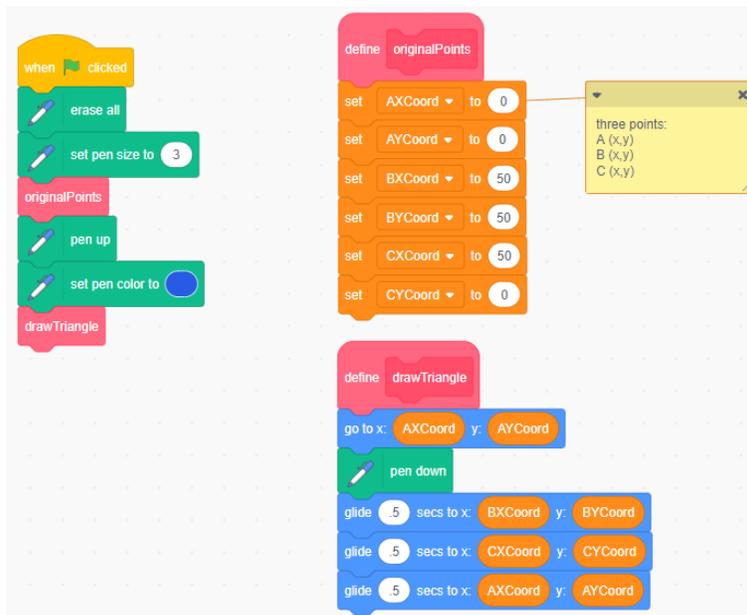
3. You will make one more subprogram, which will contain the code to draw the triangle.

- Make a second block called **drawTriangle** and move the 5 blocks that draw the triangle from the main code to beneath this new block as shown below.



Altering Code by Creating Subprograms (cont'd)

4. Now that the subprograms have been created, you need to call them to action. To do this, you need to go to **My Blocks**, and drag the block with the name of each subprogram to be part of the main program. Make sure you place them in the positions shown below. This will ensure each subprogram is “called to action” at the correct time in the program.



5. Test the program by clicking on the green flag above the stage to be sure it works as it did before.
6. Take a look at the pseudocode for this application, which is shown on the next page. There is one “bug” or error in the pseudocode that will result in output that is not a triangle. Can you find the error?

Altering Code by Creating Subprograms (cont'd)

Pseudocode is an informal way of describing a computer program—it is somewhere between everyday language and programming code. Computer programmers, or coders, often use pseudocode when planning their programs.

originalPoints subprogram

```
subprogram originalPoints
  AXCoord = 0
  AYCoord = 0
  BXCoord = 50
  BYCoord = 50
  CXCoord = 50
  CYCoord = 0
```

drawTriangle subprogram

```
subprogram drawTriangle
  go to (AXCoord, AYCoord)
  pen down
  glide for 0.5 seconds to (BXCoord, AYCoord)
  glide for 0.5 seconds to (CXCoord, CYCoord)
  glide for 0.5 seconds to (AXCoord, AYCoord)
```

Main program

```
erase everything on stage
pen size = 3
run subprogram originalPoints
pen up
pen colour = blue
run subprogram drawTriangle
```

7. Why do you think it can be helpful to create subprograms rather than having all the instructions in the main program?

In Master 6, you will create new subprograms that will perform transformations on the vertices of the triangle.