Altering Code by   
 Creating Subprograms

**Algebra**

**Unit 3 Line Master 5a**

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.

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.

* Select **My Blocks**

Logo

Description automatically generated with medium confidence

* Select Make a Block

Graphical user interface, application

Description automatically generated

* Name the block**originalPoints**, since you will eventually   
  be transforming the points, and click on **OK**.  
  Graphical user interface, application, website, Teams

  Description automatically generated

Altering Code by   
 Creating Subprograms (cont’d)

**Algebra**

**Unit 3 Line Master 5b**

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

Diagram

Description automatically generated

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.

Graphical user interface

Description automatically generated

Altering Code by   
 Creating Subprograms (cont’d)

**Algebra**

**Unit 3 Line Master 5c**

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.  
 Diagram

Description automatically generated

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)

**Algebra**

**Unit 3 Line Master 5d**

***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.