The Transformation Turtle:  
 Translating with Code and Making Predictions

**Algebra**

**Unit 3 Line Master 1a**

Click on this link to access the Scratch application:

<https://scratch.mit.edu/projects/708228126/editor/>

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.

**Part 1: Exploring the Code**

Icon

Description automatically generated1. Click on the green flag ( ) to execute the code.

a) How many turtles are stamped on the grid?  
 b) Where does the turtle begin each journey on the grid?   
 How do you know?

c) In which quadrant is the turtle image stamped each time?   
 d) What does each blue line show?

e) What do all the blue lines have in common?

2. In the code, there is a subprogram called translation.

a) What is a translation?

b) Does this subprogram translate the turtle left or right?   
 Which part of the code controls this?

c) Does this subprogram translate the turtle up or down?

Which part of the code controls this?

The Transformation Turtle:  
 Translating with Code and Making Predictions

(cont’d)

**Algebra**

**Unit 3 Line Master 1b**

***Coding Vocabulary Check***

***Pseudocode*** is an informal way of describing a computer program; computer programmers, or coders, often use pseudocode when planning their programs.

A ***subprogram*** is a set of instructions for completing a specific task; a subprogram can be referenced and called to action by the main program to accomplish a large task using small steps.

The pseudocode below explains what is happening in the   
translation subprogram.

start translation subprogram

repeat 10

go to position x:0 y:0

assign xCoordinate random number between 1 and 240

assign yCoordinate random number between 1 and 180

set pen down

go to position xCoordinate, yCoordinate

stamp turtle   
 lift pen up

end repeat

end translation subprogram

For each of Parts 2 and 3, alter the code and predict the output   
when the new code is executed.

The Transformation Turtle:  
 Translating with Code and Making Predictions

(cont’d)

**Algebra**

**Unit 3 Line Master 1c**

**Part 2: Altering the Repeat and the Timing**

1. The **repeat** in the pseudocode is altered from 10 to **5**.   
 It’s your job, as the coder to make this change in the code.

* Alter the Scratch code to reflect this change.
* Before clicking on the **green flag** to execute the code,   
  predict and explain what will happen.
* Was your prediction correct?

2. Alter the repeat in the Scratch code to a value of your choice.

* Before clicking on the **green flag** to execute the code,   
  predict and explain what will happen.
* Was your prediction correct?

3. The **glide** block takes 1 s so you can see the turtle move.   
 Now that you understand how the turtle moves,   
 speed up the process.

Change the number of seconds in the **glide** block to 0.1.

* Before clicking on the **green flag** to execute the code,   
  predict and explain what will happen.
* Was your prediction correct?

The Transformation Turtle:  
 Translating with Code and Making Predictions

(cont’d)

**Algebra**

**Unit 3 Line Master 1d**

**Part 3: Altering the *x*- and *y*-coordinates within Quadrant 1**

Now, you will stamp 5 turtles while exploring the *x*- and   
*y*-coordinate variables.

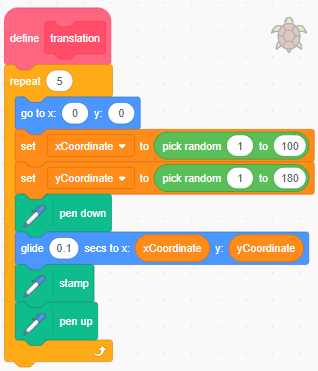
Set the **repeat** in the Scratch code back to **5** before continuing.

The **xCoordinate** variable is a random number between 1 and 240.

Each time the repeat is executed, the random number changes before the turtle moves and is stamped.

1. Why do you think the number 240 was used in the original code   
 as the largest possible number for the random value?

2. a) Alter the random range of the **xCoordinate** variable to **1 to 100**.  
 Your code should look like this:



The Transformation Turtle:  
 Translating with Code and Making Predictions

(cont’d)

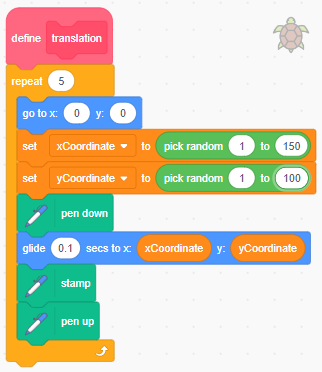
**Algebra**

**Unit 3 Line Master 1e**

b) Click on the **green flag** to execute the code.

What do you notice?

c) Alter the random range of the **xCoordinate** variable to **1 to 150**.  
 d) Before clicking on the **green flag** to execute the code,   
 predict what will happen. Explain your prediction.  
 Was your prediction correct?

3. a) Alter the random range of the **yCoordinate** variable to **1 to 100**.  
 Your code should look like this:  
 

b) Before clicking on the green flag to execute the code,   
 predict what will happen. Explain your prediction.  
 Was your prediction correct?

The Transformation Turtle:  
 Translating with Code and Making Predictions

(cont’d)

**Algebra**

**Unit 3 Line Master 1f**

**Extension**

What else can you change in the code to alter the output?

Experiment with the code and predict what will happen based   
on your changes, before clicking on the green flag to execute   
the code.