

The Transformation Turtle: Translating with Code and Making Predictions

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

1. 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?

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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.

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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?

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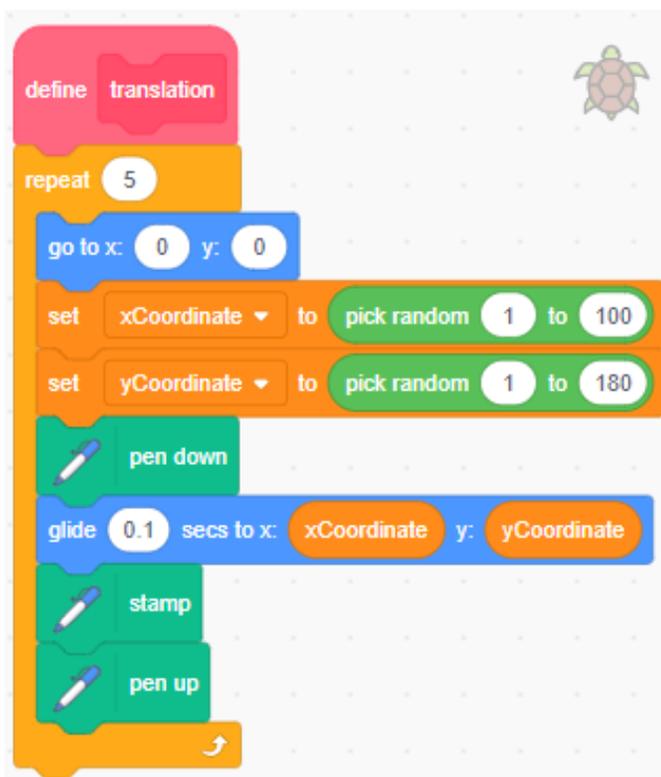
Part 3: Altering the x- and y-coordinates within Quadrant 1

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.

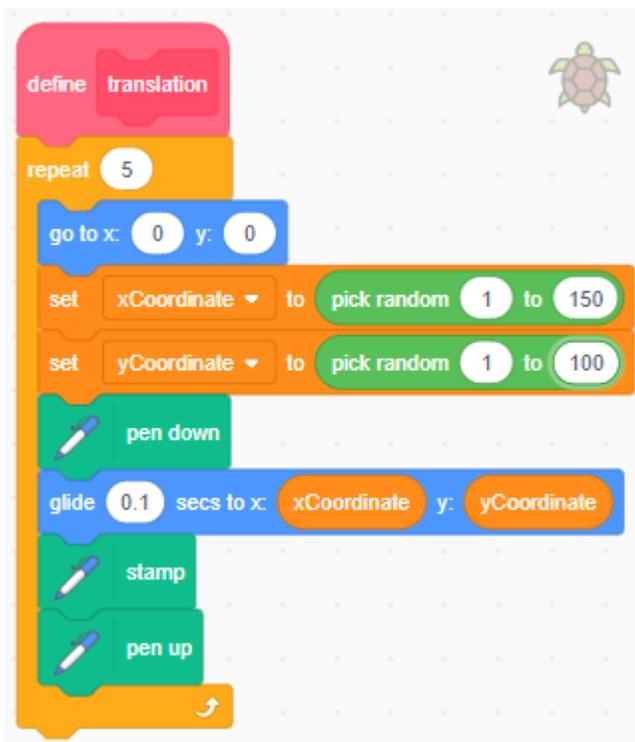
1. Why do you think the number 240 was used in the original code as the largest possible number for the random value?
2. a) Alter the random range of the **xCoordinate** variable to **1 to 100**.
Your code should look like this:



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- 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?

Name _____ Date _____

Algebra
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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.