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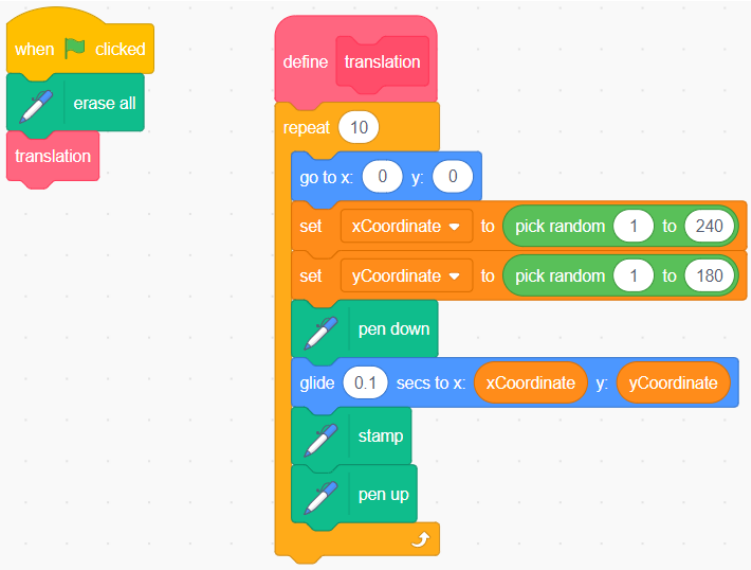
Algebra
Unit 3 Line Master 2a

The Transformation Turtle:
Translating to All Four Quadrants

Click on this link to access the Scratch application:
https://scratch.mit.edu/projects/708228126/editor/

Remember: You must be logged in if you want to save your work in your Scratch account.
A login is not required to work with the code, but you will not be able to save your changes without it.

Look at the code in the original application, shown below.
In the **translation** subprogram, the turtle starts at the point (0, 0), since the **go to** block contains the values 0 for *x* and 0 for *y*.
This is the centre of the stage.
The translation subprogram then translates the turtle to various random positions on the Cartesian plane.



The range values for both the **xCoordinate** and **yCoordinate** variables are positive integers.
This means that the turtle will always move to the right and up from the starting point (0, 0) to a point in Quadrant 1.

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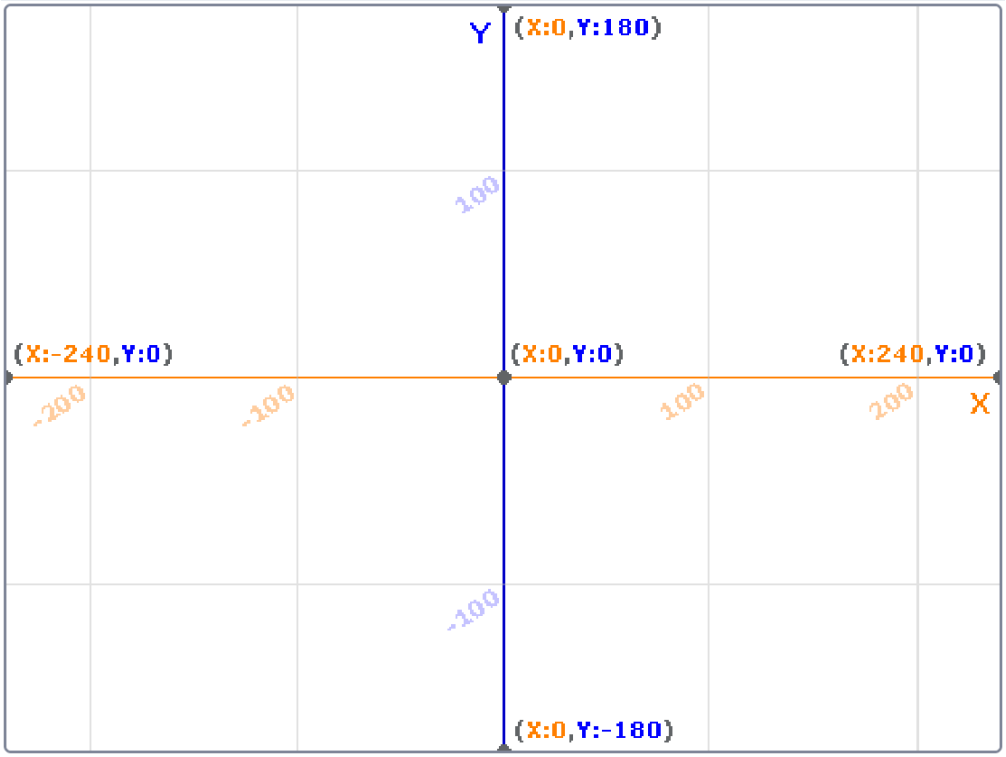
Click on the **green flag** a few times to execute the code to see where the turtles are stamped each time.
They should always be stamped in Quadrant 1.

Change the number of seconds in the **glide** block to 0.1.
Follow the instructions below to alter the code to translate the turtle to Quadrants 2, 3, and 4.

1. Label each quadrant as Q1, Q2, Q3, and Q4 on the image below.
   Hint: Start by labelling the upper right quadrant as Q1 and moving counterclockwise to each of the other quadrants.



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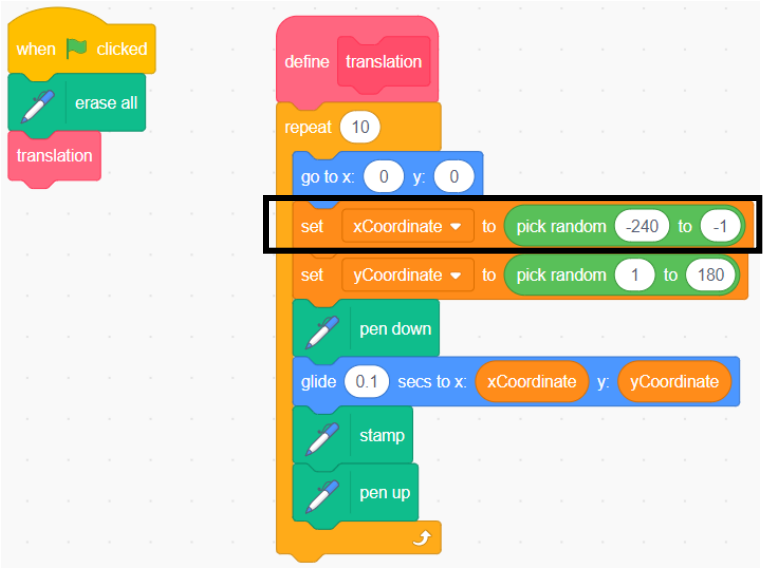
2. Alter the code as shown below by changing the random value range for the **xCoordinate** variable to **–240 to –1**.

   a) Before clicking on the **green flag** to execute the code, predict how the turtles will move.
   Will they move left or right?
   Will they move up or down?
   In which quadrant will the turtles be stamped?
   Explain your predictions.



   b) Were your predictions correct? Explain.

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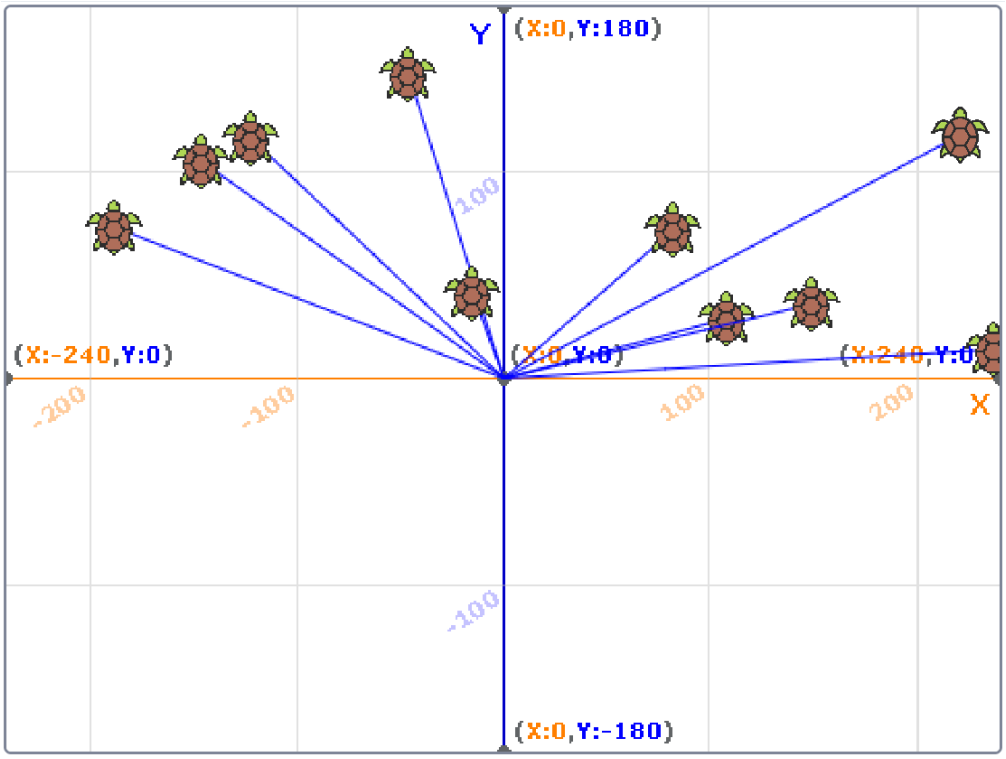
3. Alter the code so the turtle will be translated to and stamped anywhere in Quadrant 1 *or* 2, as shown below.



Try a few times. If you get stuck, use the hint below.

Hint: Change the random value range of the **xCoordinate** variable to **–240 to 240**. This assigns random numbers between –240 and 240 to the **xCoordinate**—a range that includes the whole *x*-axis of this grid.

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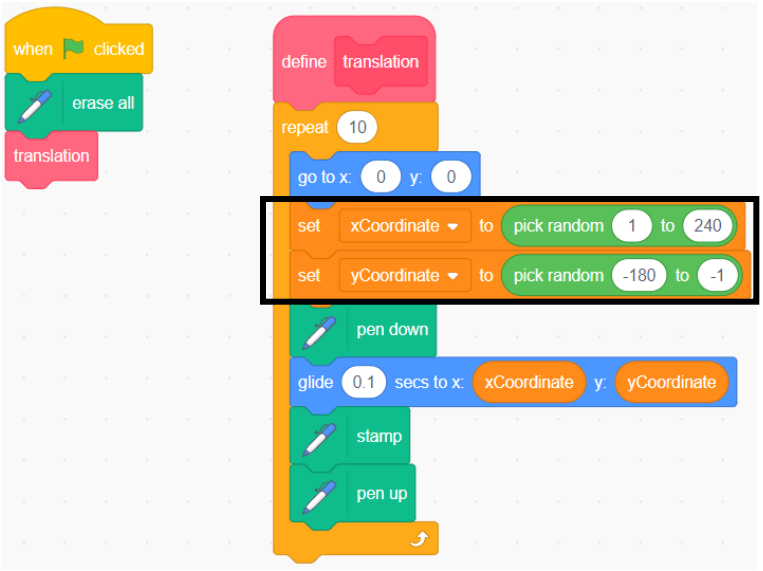
4. Alter the code as shown below.
   The random value range for the **xCoordinate** variable is **1 to 240**.
   The **yCoordinate** variable random value range is **–180 to –1**.
   a) Before clicking on the **green flag** to execute the code, predict how the turtles will move.
   Will they move left or right?
   Will they move up or down?
   In which quadrant will the turtles be stamped?
   Explain your predictions.



   b) Were your predictions correct? Explain.

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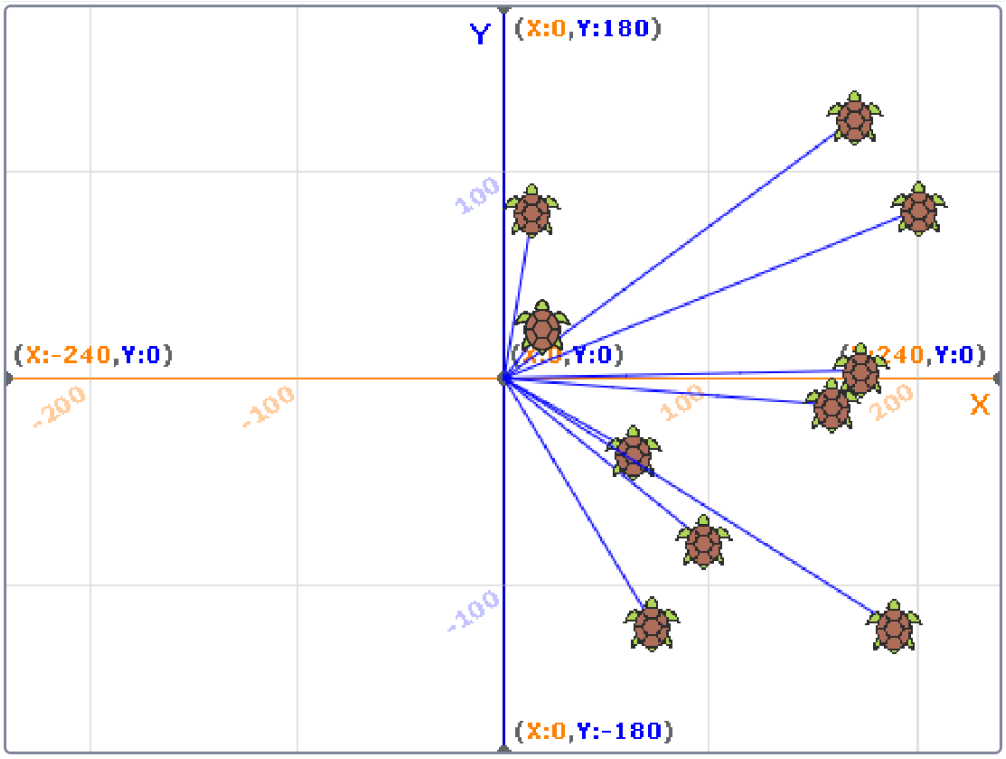
5. Alter the code so the turtles will be translated to and stamped in Quadrant 1 *or* 4, as shown below.



Try a few times. If you get stuck, use the hint below.

Hint: Change the random value range of the **yCoordinate** variable to **–180 to 180**. This assigns random numbers between −180 and 180 to the **yCoordinate**—a range that includes the whole *y*-axis of this grid.

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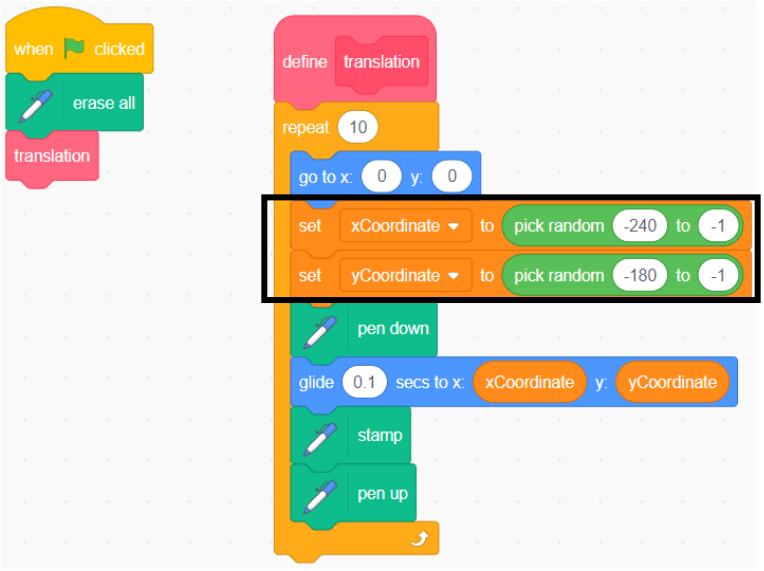
6. Alter the code as shown below.
   The random value range for the **xCoordinate** variable is **–240 to –1**.
   The **yCoordinate** variable random value range is **–180 to –1**.
   a) Before clicking on the **green flag** to execute the code, predict how the turtles will move.
   Will they move left or right?
   Will they move up or down?
   In which quadrant will the turtles be stamped?
   Explain your predictions.



   b) Were your predictions correct? Explain.

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7. Alter the code so the turtle is translated to and stamped in any of the four quadrants.
   Change the repeat to 40 so more turtles are stamped, as shown below.