iRobot Education

Unit 3

Drawing + Root

Unit 3 demonstrates how to draw with Root. Students are introduced to Root's marker holder and learn how to use the Marker Up Block and Marker Down Block. Editing this block will also allow you to use the eraser, with the Eraser Down Block. To draw with precision, learners will edit the Move and Turn Blocks with specific degrees and distances to draw letters with Root. Practice new coding skills by drawing geometric shapes and writing initials.

The main coding concepts explored include parameters and debugging. Two helpful tools in the app are the Step Tool and the Simulator.

Objectives:

-Code Root to raise and lower its marker and eraser.
-Edit the Move and Turn Blocks with greater precision using specific distances and angles to draw letters with root

Tip: While drawing letters and shapes with Root, it can be challenging to determine which direction Root needs to turn. Have students draw out their letters or shapes, adding turn arrows at each corner. Or, have students mimic Root's drawing path with their own bodies.

Code Blocks Introduced:

Marker Block
Eraser Block

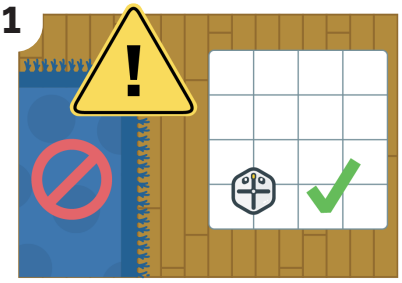
Coding Concepts:

Actuator
Parameter
Test
Debug (Debugging)
Localization
Simulator

Drawing with Root

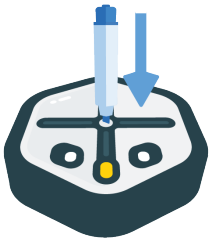
LESSON 3.1

1



Place Root at the bottom of your fold-out whiteboard.

2

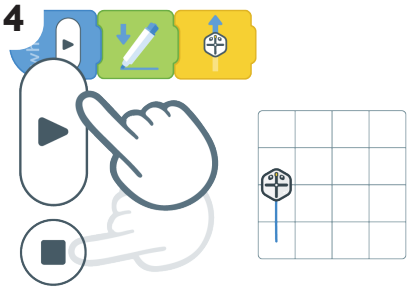


Take the cap off a dry erase marker and place it firmly in the center of Root.

3

Drag out a Marker Block.

4



Add a Move Block, then press Play to watch Root draw a line. Press Stop to lift the marker up.

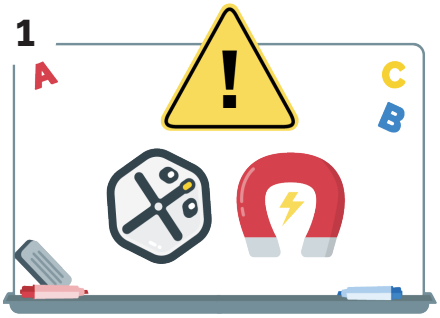
5

You earned the Marker Block.

Cover Your Tracks

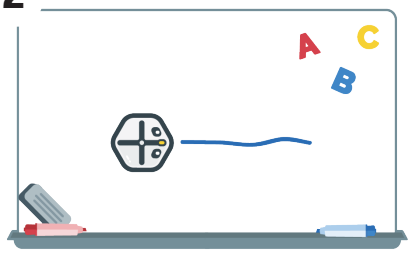
PROJECT 3.1

1



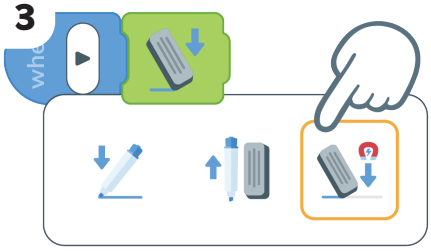
Root needs a magnetic whiteboard to use its eraser as intended.

2



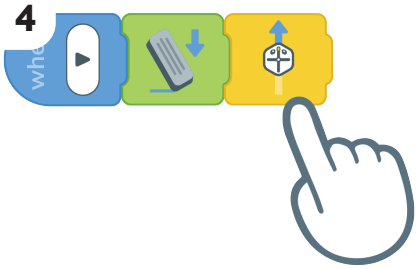
Place Root on a whiteboard and draw a line in front of Root.

3



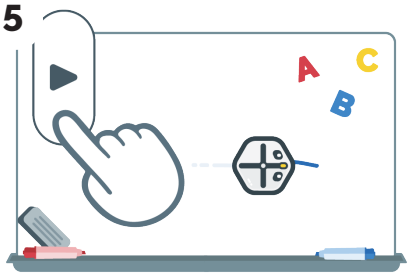
Drag out a Marker Block. Set it to eraser-down. Remember, the eraser only works on a magnetic whiteboard.

4



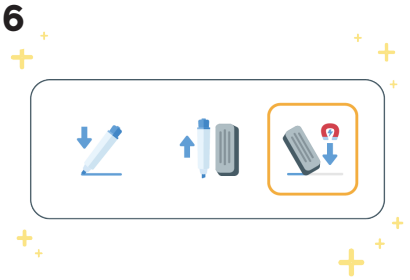
Now add a Move Block.

5



Press Play to watch Root erase.

6



You learned how to erase by editing the Marker Block.

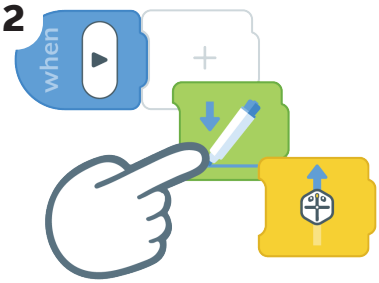
Marker Up

LESSON 3.2

1

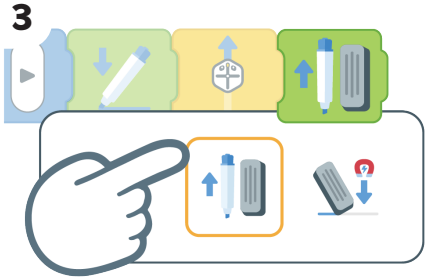
Place Root with a marker in it at the bottom of your whiteboard or another drawing surface.

2



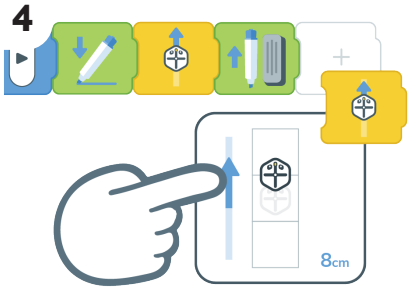
Drag out a Marker Block and a Move Block.

3



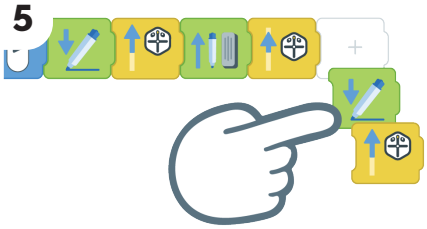
Drag out another Marker Block and edit it so that it is on the marker-up setting to lift the marker.

4



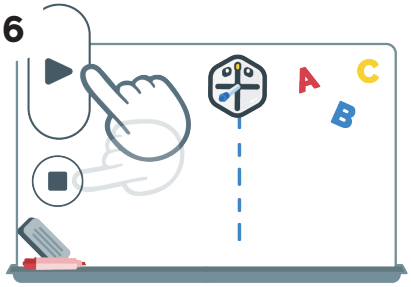
Place another Move Block right after. Edit it to move forward 8cm.

5



Next, drag out another Marker Block and a Move Block.

6



Press Play and see what happens. Press Stop when you're done.

7

Repeat to add as many dashes to your line as you would like. Make sure not to drive off your whiteboard!

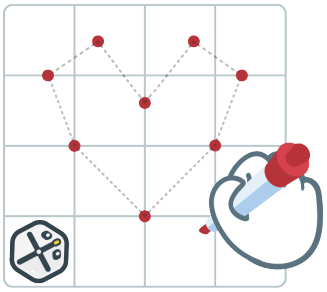
8

You learned how to make dashed lines by editing the Marker Block.

Connect the Dots

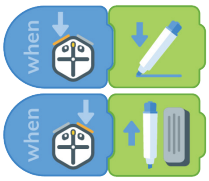
PROJECT 3.2

1



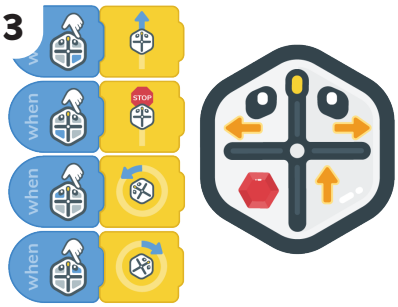
Draw a dot design on your whiteboard.

2



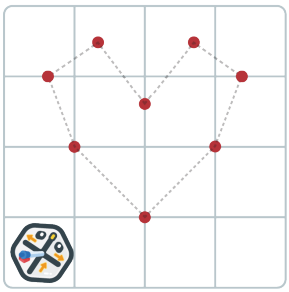
Program Root's bumpers to make the marker go up and down.

3



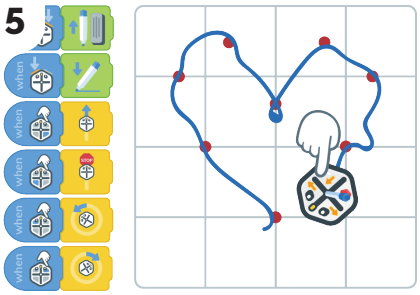
Program Root's touch sensors to drive forward, turn slightly left, turn slightly right, and stop.

4



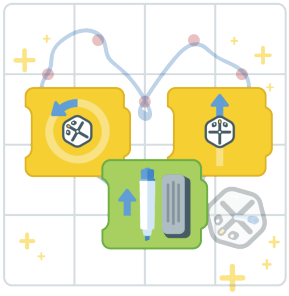
Place a marker in Root, then put Root on your whiteboard. You've made a Connect-the-Dot Bot!

5



Use the touch sensors and bumpers on your Connect-the-Dot Bot to connect the dots in your drawing.

6

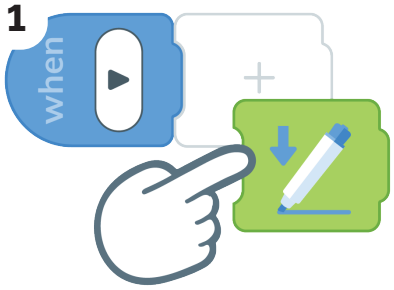


You used the Move, Turn, and Marker Blocks to complete your connect-the-dots drawing!

Draw a Square

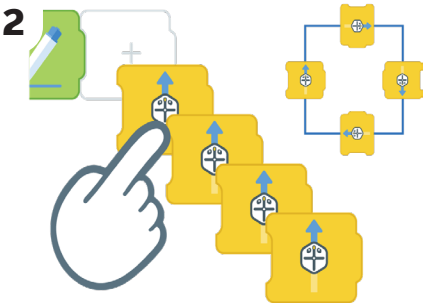
LESSON 3.3

1



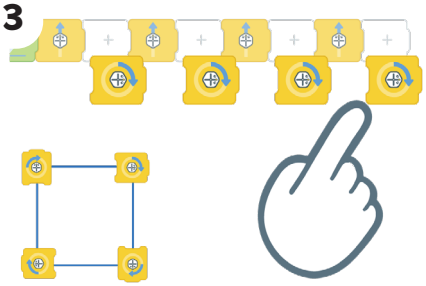
Drag out a Marker Block.

2



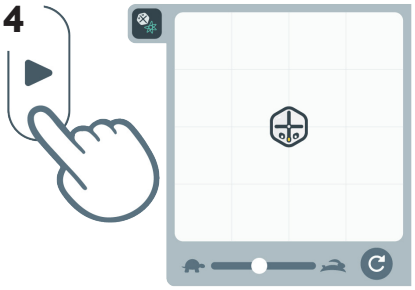
Add four Move Blocks, one for each side of the square.

3



Add a Turn Block after each Move Block. Make sure each one is set at 90° to the right.

4



Pull out the simulator tab and press Play to test your code. Did Root draw what you expected it to?

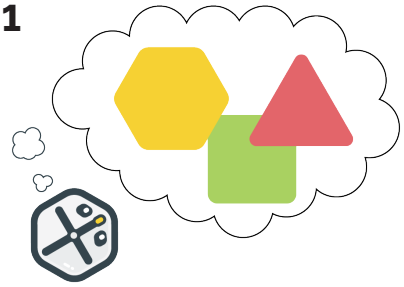
5

You learned how to use the simulator to test your code.

Drawing Shapes

PROJECT 3.3

1

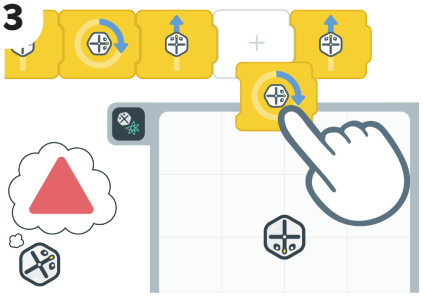


Think of a shape to code Root to draw.

2

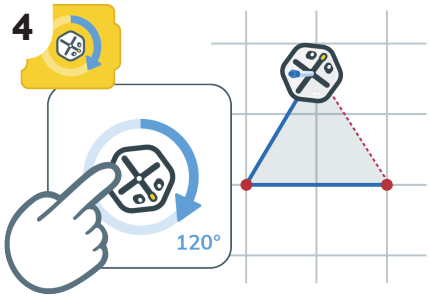
How many sides does your shape have? Drag out a Move Block for each side.

3



Add a Turn Block between each pair of Move Blocks. Experiment with changing your angle until Root draws your shape correctly. Test your code using the simulator.

4



For your turn angle, think about the direction Root is facing before it turns and the direction it needs to head next.

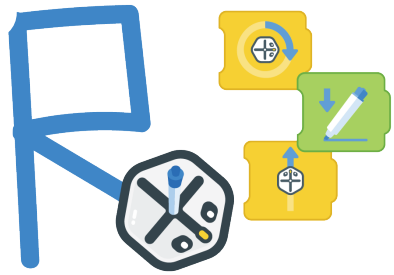
5

You can code Root to draw a shape using the Move, Turn, and Marker Blocks.

Write an Initial

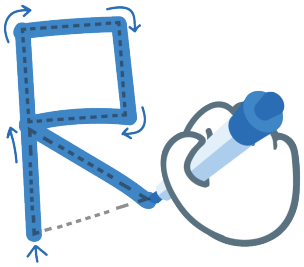
PROJECT 3.4

1



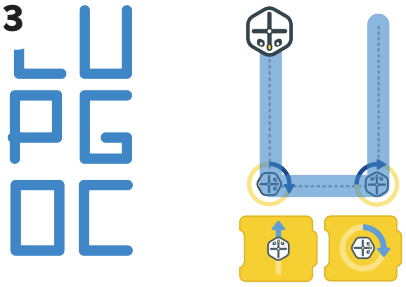
Use the Turn, Move, and Marker Blocks to code Root to draw the first letter of your name.

2



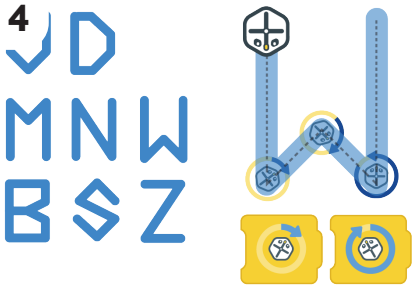
Writing letters is a lot like drawing shapes.

3



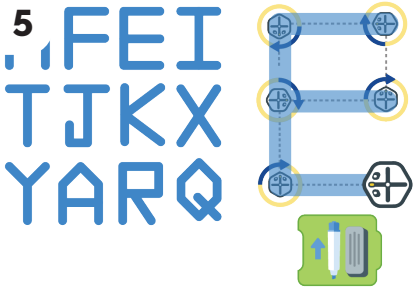
Simple letters like these can be made with Move Blocks and Turn Blocks set to 90 degrees.

4



These letters can be made by editing the Turn Blocks to turn Root different angles.

5

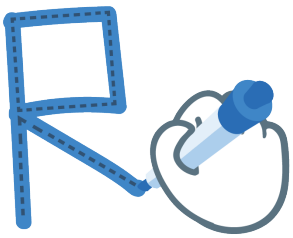


For these letters, you might need to edit the Marker Block to raise the marker in between some lines.

6

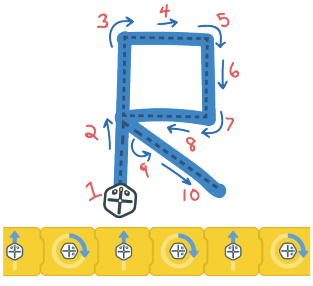
Pick which letter you want to draw.

7



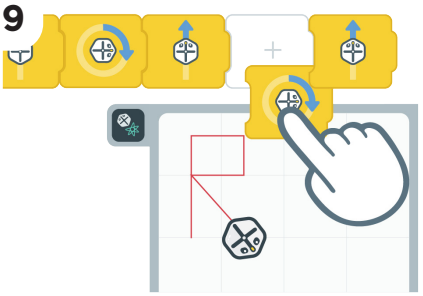
Draw out your letter by hand first. You can copy from the last page if you want!

8



Next, plan where Root will start and when it needs to turn.

9



Code Root to draw your letter with Marker, Move and Turn Blocks. Use the simulator to test as you go.