

Lesson 9: Inspection and Logic

Vocabulary

Variable- a variable is a symbol that represents a mathematical object, such as a number.

Conditionals - commands for handling decisions based on different statement conditions.

If Statement - a type of conditional statement that performs a task if a condition is met.

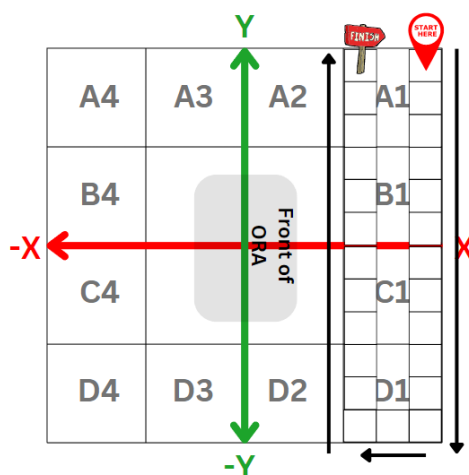
Quality Control - a set of standards that randomly selects samples from a batch to test.

Probability - how often an event is likely to occur.

Direct Instruction

Engage with Super ORA Sweep!

Open the [EngageL9Code](#) (Share Code: ey7dy5r) and have it ready to run on connected ORA and EVO (place EVO to the side). Cut out the ORA Gameboard pieces and arrange them in a long U-shape pattern like the diagram to the right. Tape down squares if needed. As students come in, have each group decorate the cylinders in a non-permanent fashion (tape, rubber bands, etc) and put their cylinders next to the outside corner of A1 where the "start here" square is located.



Each group will roll a die and move their cylinder the appropriate number of spaces ahead. After each group has rolled once, run the ORA code. Ask students to see if they can figure out what code the ORA is running. If a group's cylinder is "swept" off the board, they must start again from the beginning. If a cylinder is not in the direct path of the ORA finger gripper and gets knocked over, that cylinder can be placed back on its square. Repeat this process of rolling, moving, and running the code until one group gets its cylinder to the finish.

Next, show the Lesson 9 video.

Explore Probability and Randomness

In the video, students learn that the Super ORA Sweeper board game is running a code with a random number generator from 1-12. Each number generated has a different outcome based on the if statement tied to that number. How often each number is generated is based on probability.

Give each group a single, 6-sided die. Direct the students to the Explore section of the Student Activity Sheet and have them complete the probability activity.

Explain using Variables, Random Integers, and If Statements.

In the Ozobot Editor, open the [EngageL9Code](#) (Share Code: ey7dy5r).

Give students a brief overview of the code. First, a variable called "Random Number" is set to a random integer from 1-12. Then, while the Evo lights up Red, the If Statement has a particular action (do) for each of the integers that the variable could generate.

To start, students need to create a variable. To do this, open the Ozobot Editor and click on the Variables Tab. Then click "create variable." A pop-up will appear asking for the name of the variable. It is good coding practice to make the variable name reflect what the variable does.

Once a variable is created, new code blocks appear in the variables tab. Add the **Set** block to the workspace and open the Math Tab. Tell students that the variable can be set to any particular number or range of numbers, but today they will use the **Random Integer from ___ to ___** block.

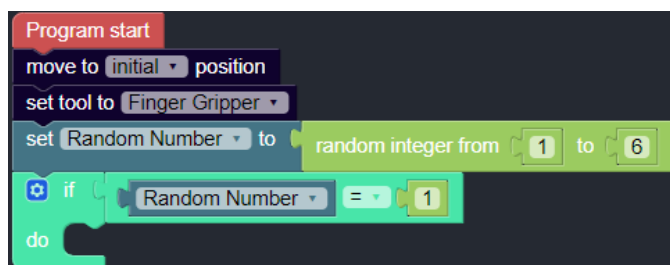
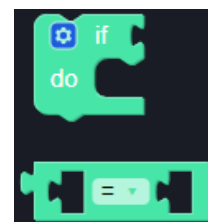
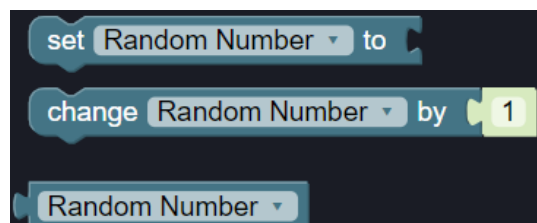
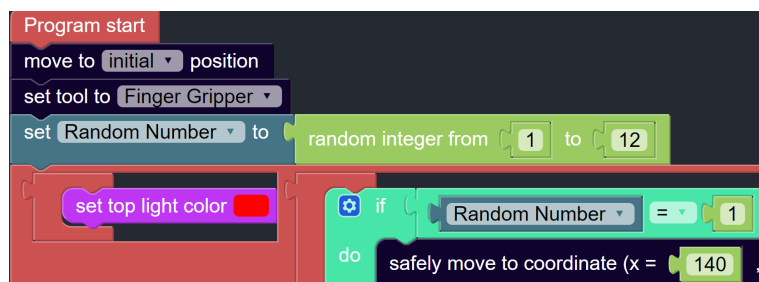
Then, open the Logic Tab and add an **If/Do** and a **_ = _** block to the workspace.

Arrange the blocks and insert **Number** blocks from the math tab similar to the diagram.

If students want to mimic the randomness of the die rolls, they can change the integers from 1 to 6. For each integer, they can create an if statement. So, if the variable is 1, what actions will ORA take? Tell the students those instructions will go into the **do** area of the **if statement**.

Elaborate: ORA-Evo Quality Control

In this challenge, students will use ORA and Evo to perform quality control of product samples on the quadrant map. Quality control includes randomly selecting a single sample out of a batch of products. If the sample passes, the batch continues



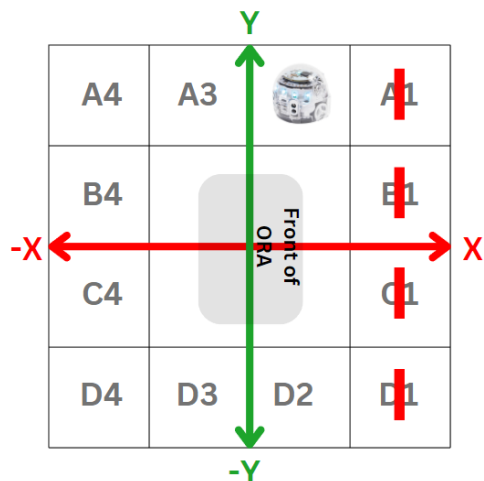
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through the manufacturing process. If the sample fails, the whole batch is rejected or subjected to individual testing.

Setup: Place Evo in A2. Place 4 wooden cylinders in A1-D1 as shown.

Task Requirements:

1. ORA must start in the Initial Position.
2. ORA must use a variable, random integer, and an if statement to randomly pick up a wooden cylinder (sample).
3. ORA must pick up the wooden cylinder and use the Evo to 'scan' the barcode. Barcodes are located on the end of the samples facing in the +Y direction. To activate the scan function, set Evo's top light color to blue.
4. After the barcode is scanned, turn the sample and pass it over Evo so that its length can be scanned.
5. When the scan is complete, ORA will return the sample to its original location.
6. ORA must finish in the Initial Position.



Direct students to plan this code in the Elaborate section of their Student Activity Sheet. After creating the pseudocode and drawing the code, direct them to create this code on their devices in the Ozobot Editor (example of code: [ElaborateL9Solution](#) or Share Code: wgnngz9). Ensure students are connected to your shared workspace.

As students complete their code, they will test their code. Click on a given student's or student group's tab on the ORA Editor. Click "Run" to execute their code. Reset the cylinders between each code run (if needed). Remember to follow the Safety Protocol established in Lesson 1.

If students are waiting for the ORA, they could:

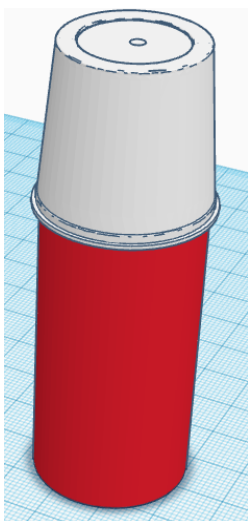
- Answer Questions on the Student Activity Sheets.
- Complete the Elaborate section of the Activity Sheets.

Evaluate: Exit Ticket

Students will fill out and submit the Evaluate section of the Activity Sheets

Optional Extension: Quality Assurance Assembly Building

In this activity, students will program an industrial robot to perform Quality Control as well as Quality Assurance



Source: Canva

In this task, students will build four assemblies in the center of Quadrants A1-D1. The assembly will consist of a wooden cylinder with an inverted Dixie cup on top (see image, left). Then the ORA will pick up Evo and place it randomly in front of an assembly for QC testing.

Note: It is suggested to use the vacuum gripper for this activity, as the finger gripper may crush the cup.

Setup: Place four red cylinders, on end, in the four corners of A4. Place four dixie cups, inverted, in the four corners of D4. Place Evo in B4.

Task Requirements:

1. ORA must start in the Initial Position.
2. ORA must use the supplied cylinders and cups to build an assembly in the middle of A1, B1, C1, and D1.
3. The assembly must resemble the one pictured above left.
4. ORA must use a variable, random integer, and an if statement to randomly select an assembly for inspection.
5. ORA must place Evo next to the selected assembly.
6. After scanning, ORA must place Evo back in B4.
7. ORA must return to the Initial Position when complete.

