

This is the start of a double-nested loop. The bottom row has the highest row number, with each successive row having a row number that is 1 less than the row below. For example, if the Number of Rows in Pyramid is 5 then the variable row will vary from 5 to 1.

The z-coordinate or height is set for the current row

The number of cubes to be placed in the current row is the same as the row number. Thus, the loop variable cube varies from 1 to the row number.

This function makes ORA pick up the cube from the cube holder.

This function makes ORA place the cube on the pyramid.

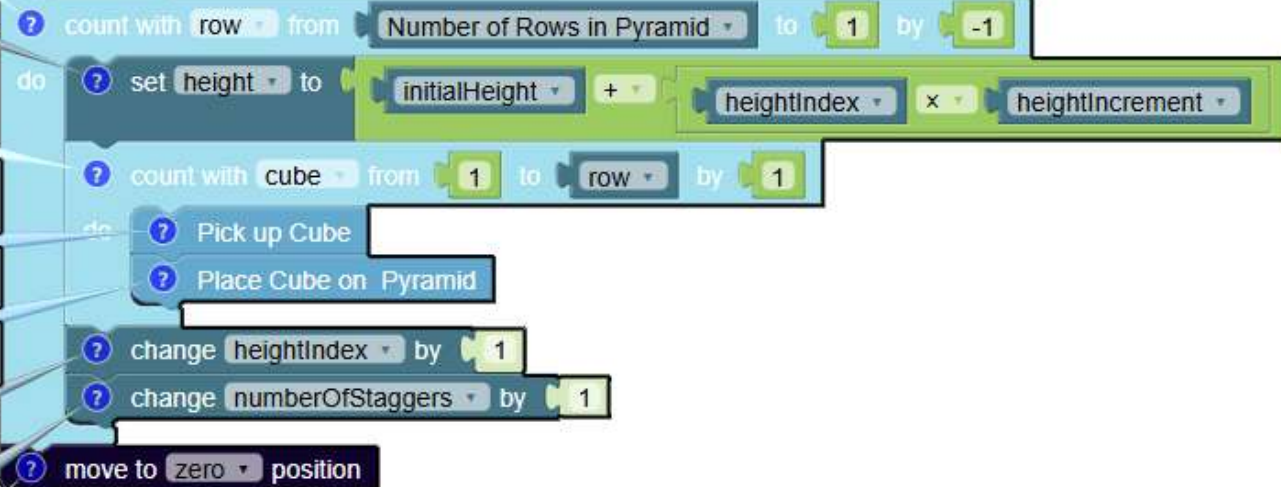
With the current row in the pyramid placed, the height index is increased by 1 for the next row.

With the current row in the pyramid placed, the number of staggers is increased by 1 for the next row.

The pyramid is now complete. ORA's arm is moved to the ZERO position and the program ends.

Program start

Initialization



5 rows is the maximum. 1 row is the minimum.

Slow speed for safety.

ORA's position at program start.

0 for bottom layer. Increased by 1 for each additional layer of cubes.

Set so that the bottom of the cube is 1 mm above the tabletop.

Each cube is 1" = 25.4mm in size.

The y-coordinate for the leftmost cube on the bottom row.

Each cube is 1" = 25.4mm in size. Setting to 26mm provides a little buffer between adjacent cubes on any given row.

This sets YplaceLoc for the leftmost cube on the bottom row.

Adjacent rows are staggered by 1/2 the size of a cube, i.e., $0.5 \times 26\text{mm} = 13\text{mm}$.

The first row has 0 staggers. Each successive row, one more stagger.

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? to Initialization
? set Number of Rows in Pyramid to 5
? set speed to 20 %
set tool to Vacuum Gripper
set vacuum gripper OFF
? move safely to user point HOME
? set heightIndex to 0
? set initialHeight to 20
? set heightIncrement to 26
? set initialYplaceLoc to 150
? set YplaceIncrement to 26
? set YplaceLoc to initialYplaceLoc
? set stagger to 13
? set numberOfStaggers to 0
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ORA's arm is moved to a height of 135mm above the cube that is to be picked from the cube holder. The center of the cube holder is located at (x,y) = (199, -149).

ORA's arm is lowered to 21mm so that the vacuum gripper contacts the cube

The vacuum gripper is turned ON.

ORA's arm with the cube is raised back to a height of 135 mm.

to Pick up Cube

move to coordinate (x = 199 , y = -149 , z = 135) [mm]

with tool angle (roll = -180 , pitch = 0 , yaw =) [°]

movement type: linear

move to coordinate (x = 199 , y = -149 , z = 21) [mm]

with tool angle (roll = -180 , pitch = 0 , yaw =) [°]

movement type: linear

set vacuum gripper ON

move to coordinate (x = 199 , y = -149 , z = 135) [mm]

with tool angle (roll = -180 , pitch = 0 , yaw =) [°]

movement type: linear

The YplaceLoc is adjusted based upon which cube in the row is to be placed.

The YplaceLoc is adjusted to reflect the number of staggers, which is dependent upon which row the cube is to be placed.

ORA's arm is moved so that it is 135mm above the location where the cube is to be placed.

The cube is lowered to the desired height at the location where it is to be placed.

The vacuum gripper is turned off to release the cube.

ORA's arm is raised back to the 135mm height.

