



Dinner Robot



There are all sorts of gadgets these days that make life at home easier: Roombas will vacuum your floor, Litter-Robots will take care of your cat, and the WinBot will even clean your windows! But your least favorite chore - setting the table before dinner- is still all up to you. Your goal today will be to write code that you could use to help program a table-setting robot that you may one day build!

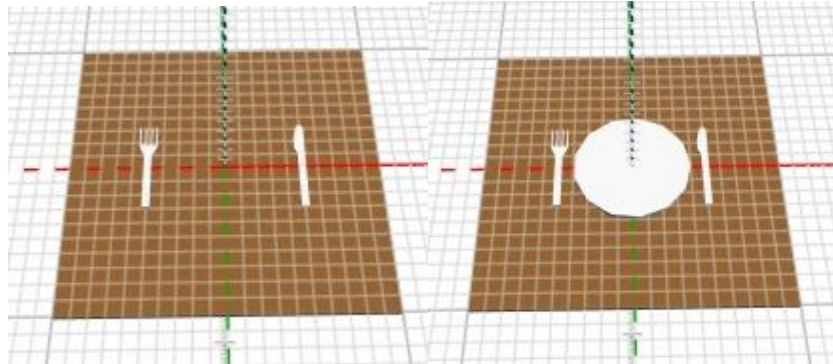
In this exploration you will:

- 1) Build and move a plate to complete a dinner set
- 2) Teach an imaginary "robot" how to set plates on your table for you
- 3) Test your robot by setting up some tricky table arrangements

Check these boxes when you've completed each step:

Part I: Set Up

Open the Dinner Robot BlocksCAD file. You'll see several different labeled blocks in your workspace. You'll need the disabled ones later in the lesson, so leave everything where it is for now. Your first job will be to make a simple plate so that the empty table place you currently see below on the left looks like the table place below on the right:



You'll only need two blocks to make this plate, and they can be found in the 3D Shapes and the Transforms menu. You'll need to change the numbers so it looks like a plate.



Once you've made this first plate to set the first table, **disable** (right click the block → disable) the "First Table" block and **enable** the "Second Table" block that is below it. What do you notice now when you render?



Your plate is still in the middle of the screen, but the table is up and to the right! You'll have to move your plate to its new place on the table, which is exactly what you're hopefully going to teach a robot to do soon!

What are the coordinates, expressed as $(x\text{-coordinate}, y\text{-coordinate})$, of the center of where the plate currently sits?

(____ , ____)

What coordinates would you like the center of the plate to be at for this table?

(____ , ____)

Pick a **translation block** from the Transforms menu and put it around your plate block. Chose the appropriate x and y-transformation distances to move your plate from the middle of the axes (called the *origin*) over to where it belongs between the fork and knife.



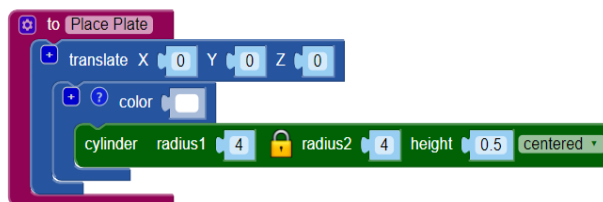
Checkpoint: Show your facilitator that you've successfully made a plate and have moved it to its spot on Table #2.

Part II: Programming

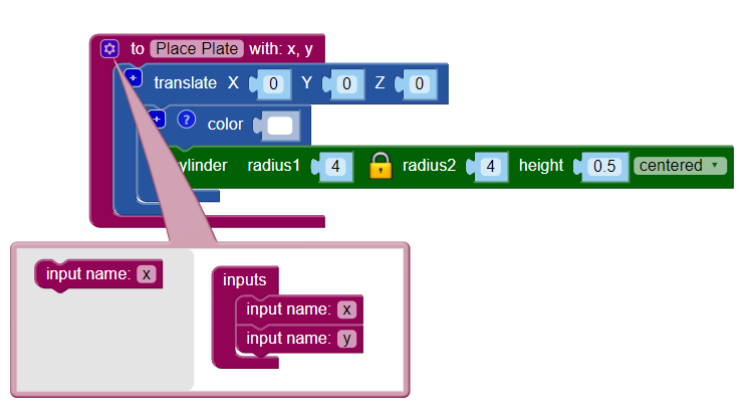
Disable the "Second Table" block and **enable** the "Part II Table" block. When you render you'll see a table with four table spots. The plate you just made and moved won't quite be in the right spot yet, but don't worry; You're going to program your dinner robot to place plates anywhere you want!

To do this, you'll make a **module** that lets you easily tell your robot where to place a plate without requiring that you make tons of new blocks. The module is like an instruction you could give to a robot that tells it what to make and where to make it.

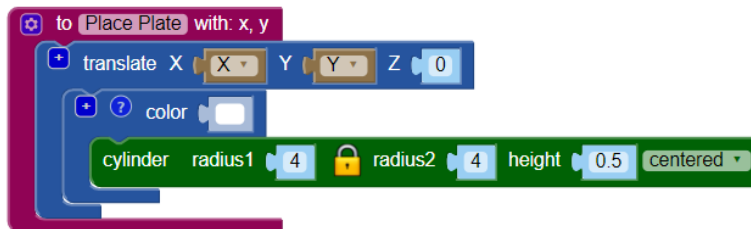
Grab a module block from the Module menu and fill it with the blocks below that give instructions for how to make a plate:



Every time you make this plate, you want to be able to tell your robot exactly where it should go. To do this, you can click the gear on your module and click and drag two **inputs** into your module, which you can call “x” and “y” so that you can tell your robot where to move the plate on the x-axis and where to move it on the y-axis:



Your robot is almost ready! The only thing you have left to do is put the x and y inputs you made into your instructions for how to build a plate. From the Variables menu you’ll find a little x block and a little y block that you can put into the translate block so that your robot knows to move the plate by x-units in the x-direction and y-units in the y-direction:



Once your module is set up, you should be able to find a block in the Modules menu that looks like this:



This is the block that will create a plate that you can see, because the other block you made is just the instructions! Place two **numbers blocks** from the Math menu in those two open spots next to x and y, and you’ll be ready to place the plate wherever you want by typing numbers into the boxes!



Test your robot out by trying to successfully set the table. You'll need to bring out four of those "Place Plate with..." blocks like the one above and you'll have to choose the correct coordinates for each.



Checkpoint: Show your teacher that you have a module that you can use to place four plates where they need to go around your table.

Part III: Testing

Let's see how your robot will do when faced with more challenging table arrangements!

Enable the block called "Challenge Table #1" and use "Place Plate with..." modules to set this table by entering all the appropriate coordinates.

Checkpoint: Show your teacher that your table is set and ready for dinner!

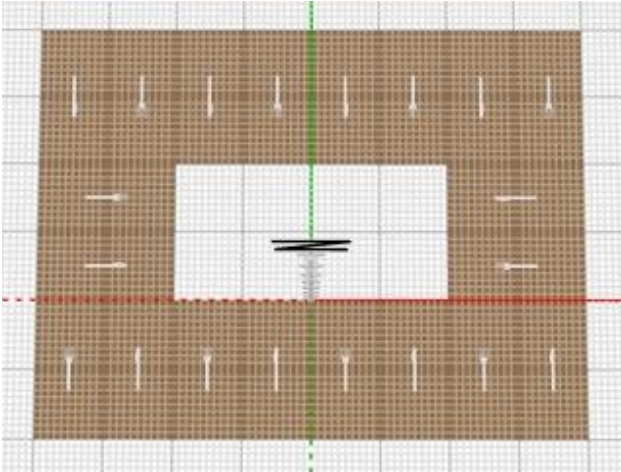


Now enable "Challenge Table #2" and disable #1. Once you've rendered, what do you notice about this table that is different from the others in this activity? Do you think your robot will be able to still place plates at all of these seats? Give it a try!



Checkpoint: Show your teacher that table #2 is set and ready, and then flip to the last page of this worksheet and try to fill in the coordinates that you'd need to give your robot to set the tables pictured.

Reminder: Red is x-axis, green is y-axis. Main grid lines are by ten.



Coordinates, (x , y) of plate locations:

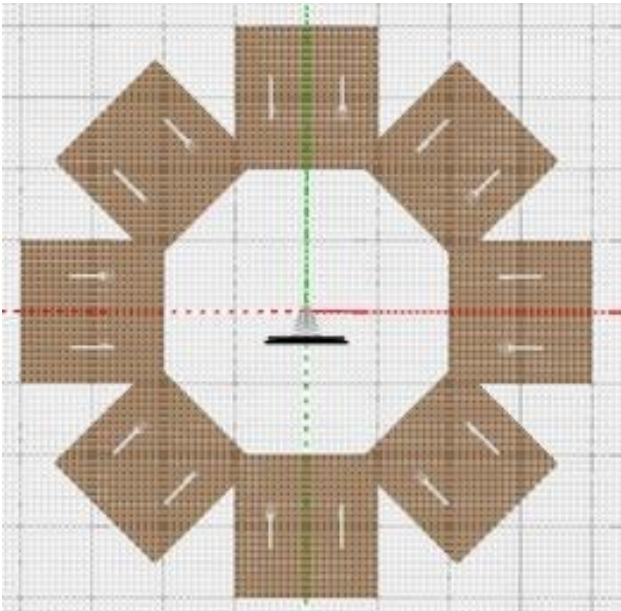
(___ , ___) (___ , ___)

(___ , ___) (___ , ___)

(___ , ___) (___ , ___)

(___ , ___) (___ , ___)

(___ , ___) (___ , ___)



Coordinates, (x , y) of plate locations:

(may need to estimate)

(___ , ___) (___ , ___)

(___ , ___) (___ , ___)

(___ , ___) (___ , ___)

(___ , ___) (___ , ___)