BlocksCAD : Furniture

Learning

In this project you will learn

- Using nested loops
- Using the **Sides** block
- How to create scale models

In this worksheet, read everything. Things you must DO are marked with ☐ to tick when done. *Hints are in italics*

Making a table

☐ Take a look at some of the tables in the room or remember how a table at home looks. Real tables are quite complicated but a simple approach is to take a shallow box and add cylindrical legs.

☐ Use the box module to make the table top – give it a size of 30 wide by 20 deep with a height of 5 and a thickness of 2.

You should see this looking from above:
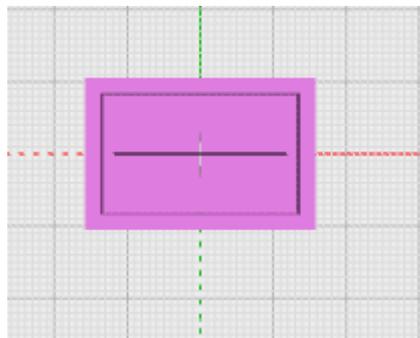
Single Leg

☐ Use a Cylinder block to add a column to the middle of the table. Adjust the radius and the height so it looks right.

The leg don't look very round. That's because a circle is made from a number of straight lines. If you look closely you see there are 8 sides.

☐ Increase this number by finding the Sides block in Transforms, putting it round the Cylinder and setting the number of sides to, say , 24. Render and see that it looks much rounder.

☐ The leg needs a base. A simple way to do this would be to place a thin cylinder on the end of the leg. You will need to to translate the cylinder making the base upwards by the height of the leg.
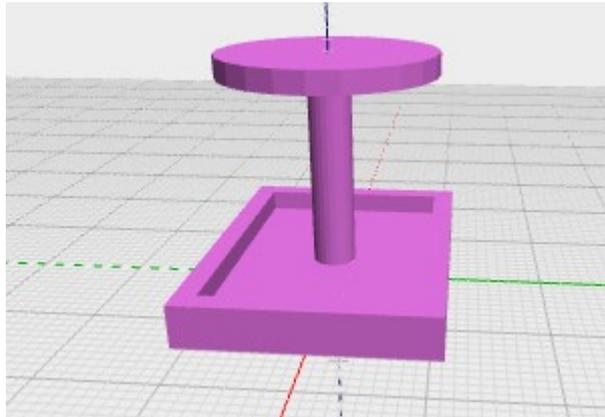
However this would be difficult to print because the base has a big overhang. If we make the base a tapered cylinder we can slant the sides by making $r1 =$ to the leg radius and $r2$ the base radius and the cylinder about a quarter the length of the leg. *You have to unlock the cylinder so r1 and r2 can be different and change how far you move the cylinder up.*
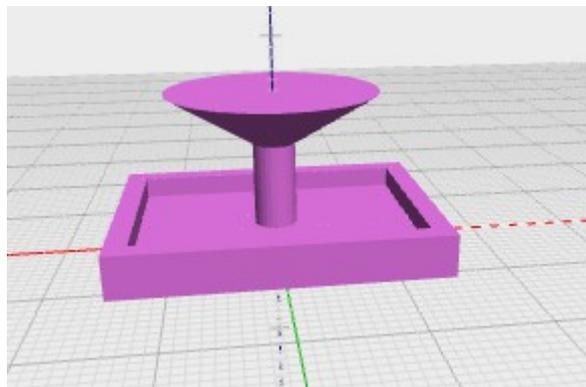
If we want a rectangular base,we can change the number of sides to 4. Here is my one-legged table:
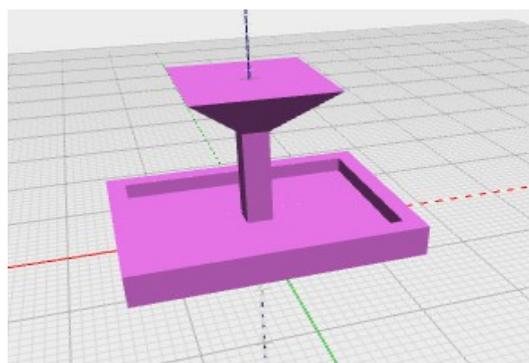
Four legs (harder)

Most tables have 4 legs, one at each corner. We need to work out where the corners are so we can place the legs there.

☐ Look at the graph paper behind the box and write down the position of each corner *Remember the red axis is x, the green one y So for example one corner is at x=15 (= 30/2) y=10 (10/2) . The other corners have negative numbers.*
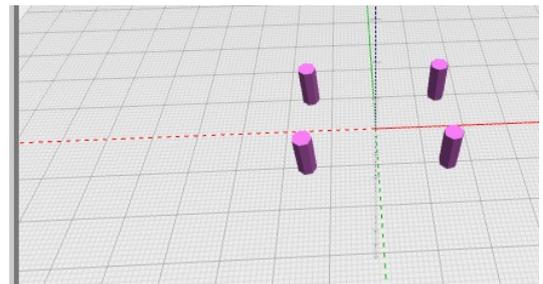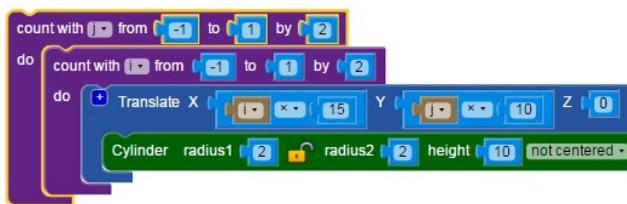
   Corner 1
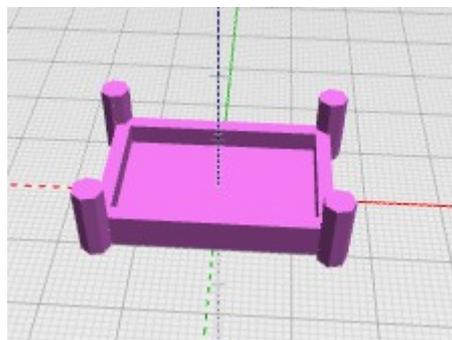   Corner 2
   Corner 3
   Corner 4

We see that the positions are +/- 15, +/- 10. We can use a loop to do the + or 1 by setting from = -1 , to = +1 and by = 2 , so we get -1 , -1 + 2 = +1

This allows us to place the legs with two loops, a loop for x (variable i) and a loop for y (variable j)


☐ Create this code

With the table top it looks like :

☐ Now change the dimensions of the table to your own design. *Don't forget to move the legs too !*

☐ The legs are centred on the corners. A better table would have them inside the table - how much would you change the leg positions to set them just inside the outer edge? Inside the inner edge? Place the legs where they look best.

☐ Maybe the legs would look better if they were tapered? How would you do this?

Save this version with your name in the class account.

Here is my design with tapered legs.
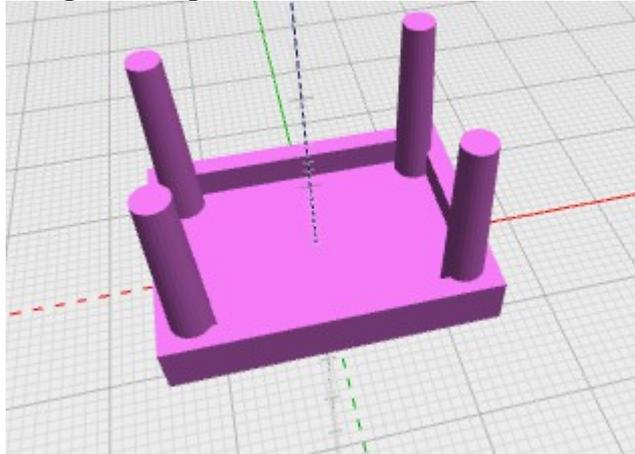
Making toys to scale

Need some furniture for your doll's house? Need to plan a new kitchen? Need some scenic accessories for a model railway? 3D printing is an ideal way of creating small models but you will want the piece to look right amongst the other pieces.

For doll's houses the most popular scale is 1/12 i.e an inch to a foot. So if the table is about 700 mm high, the model height would be 700 / 12 = 58 mm. Our table is 20mm high so the scale is 700/20 = 1

Model railways use a variety of scales but 1 in 76.4 is OO scale. Dinky cars are 1 in 64 scale. A typical scale for farm animals is one in 32. Wargaming sets use different scales like 1/100

☐ Choose a type of model. Find out the scale or work it out from an object whose actual size you know (like the height of a person).

☐ Design a object to fit into this toy set. Make it simple like these pieces of furniture (which are not to scale!) or a shed (how could you do a pitched roof?) Design it with BlocksCAD, save the blocks (not the STL) and send them to me for printing .

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