

## BlockSCAD: A Coin trap

### Learning

In this project you will use what you have learnt about

- Using BlockSCAD
- Making Simple Shapes
- Moving Shapes
- Difference
- Module with inputs

and learn about

- Thingiverse site
- Variables
- Clearance (engineering)

### Customisable Designs

Many useful 3D designs are published and free to use on the Thingiverse site [ <http://www.thingiverse.com/> ] Mathgrll (proper name Laura Talmaan) is one of the best designers and one of her designs is a Coin trap [ <http://www.thingiverse.com/thing:193941> ] . A coin trap imprisons a coin in a printed cage. What use is that? Well as Laura says, it could be a sneaky way of paying back a debt or of saving it for a rainy day or for display of an old coin

The size of the cage will depend on the size of the coin, and coins come in different sizes. The Thingiverse site allows designers to add a Customizer (written in OpenSCAD) so the user can simply input the values for their particular version of the design, and get their own customized object to print. Sadly you need to be registered on the site to use the customizer.

Here is one I made, containing a pound coin. How do you think it got into the box?



For the coin trap There is only one variable to be chosen, the kind of coin. In this project we will make a simpler design, but use two variables – one for the diameter of the coin another for the

thickness.

### Measuring

Choose a coin to use. If you are rich you could choose a 2 pound coin, if not try a penny.

Which coin have you used? \_\_\_\_\_

Using a ruler or better digital calipers, measure (in millimeters) the diameter \_\_\_\_\_ and the thickness \_\_\_\_\_ of the coin.

### Variables

To keep track of these values, create two Variables, one for diameter, the other for thickness. *You create a variable by picking the block "set item to" from the Variable tab, clicking 'item' and renaming it to the name you want to use and giving it the value you measured. To set the value, go to Maths and select the number block, drop it in the slot in the 'set..' block and changing its value.*

So if the diameter was 24.5mm you should have a block like this:



You will see that you now have two new blocks in the Variables tab to use wherever you need them

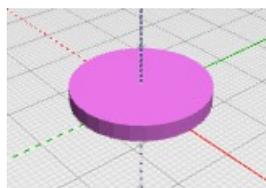
### The coin

It may seem funny to make a shape the same as the coin but we will find it helpful to check that it will fit inside our coin trap.

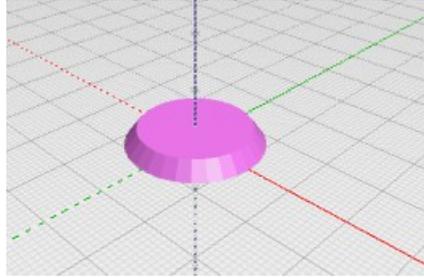
What 3D shape would you use to model a coin? *We just want the basic shape, not all the design on the faces and the edge* \_\_\_\_\_

Create this shape using your variables to set the size *Careful, remember that diameter is not the same as radius – what is the relationship between the two?* \_\_\_\_\_ *You will need to use an expression here.*

It should look like this:



If it look like this:



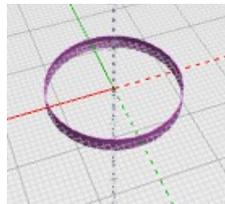
you haven't set the top and bottom radius to the same size *Right button 'duplicate' is useful here.*

- Make the coin centered – this will work better with the sphere we will make

### The hole for the coin

Our coin trap will be made by creating a cube of the right size and then removing a sphere of the right size to create the space for the coin.

- The sphere will have a radius which makes it a bit bigger than the coin so it can fit (remember the coin has thickness too). So create another variable, called `sphere_radius` and set it to the diameter / 2 - *remember duplicate*
- Make a sphere with this radius
- Use the appropriate Set Ops block to find the difference between the coin and the sphere.

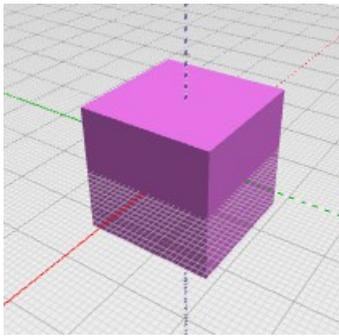


This ring shows where the coin would overlap the sphere, so it wont fit.

- Change your expression for the `sphere_radius` so that the ring disappears *That's changing the number 2 so the radius is bigger -*

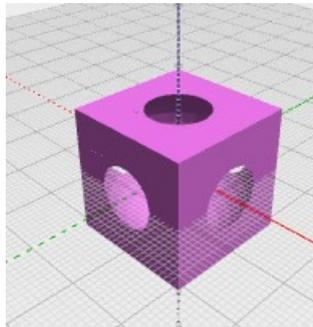
### The Cube

- Make a new variable for the cube size *This may need to vary and in the dimensions of a cube the same number is used in 3 separate places.*
- Make a cube with this size and make it centred - *because the sphere is centred*

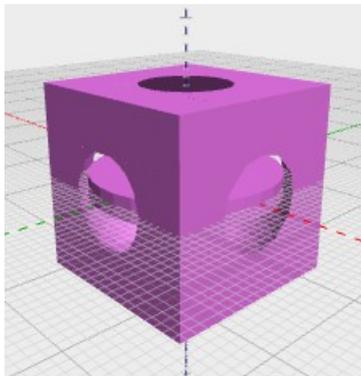


### Coin trap

- To make the coin trap, remove the sphere of the size we have set from the cube



- Add the Coin to check that it still fits:



Disable the coin – *right button* and save the project and the STL file.

### Improvements

This is not a very good object because it has sharp edges round the holes and thin sides.

- Think about how you could make a better trap – see Laura's for inspiration.