

3D printing workshop 3

By Friend

Workshops

1. Find a model, getting printing profile, slicing, removing item from bed, safety
2. Area explanation, safety, removing support, cleaning bed, changing filament, swapping extruder head, troubleshooting
3. Blender basics, stitching models together

After these three workshops, you should be able to do these by yourself: take the idea you have, make a model, print it out, simple post-process. This should help cut down time in our development cycle from initial ideas discussion, to us starting the discussion iterating from first working prototype you've made.

If there's a word you don't understand in the slide, let me know and I'll add it here

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Note

- If it's a keyboard shortcut, I'll use []
- If it's a mouse click, I'll use “ ”

Agenda

- We'll walk through the process of making something similar to this pencil cup
 - <https://www.thingiverse.com/thing:2143549>
 - <https://www.thingiverse.com/thing:933001>
- You'll learn some Blender basics along the way
- Enough to get you through 90% of 3D printing prototyping

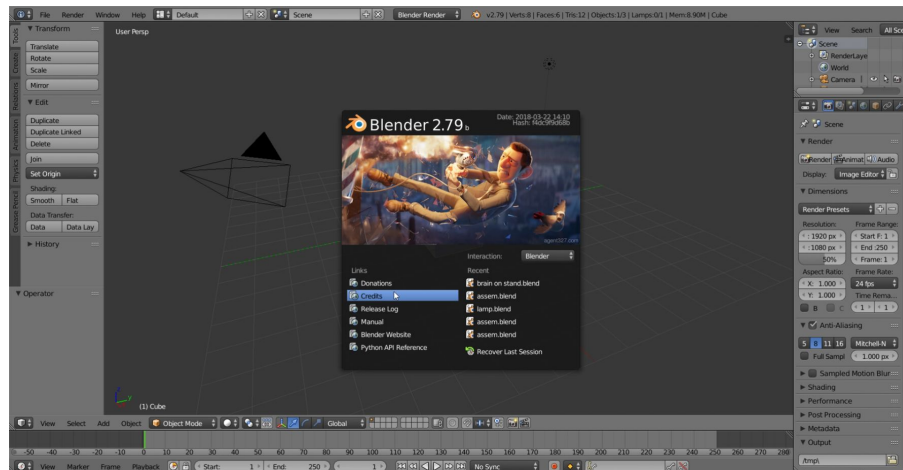


Find models

- The main elements of this project are:
 - A model
 - A hole
 - A bottom plate if the hole cuts through the model, or model doesn't stand on itself
- We can make the hole and the bottom plate in Blender, so for now, find a nice model you want to put a hole through
 - Good if it's solid block that stands on its own
 - Ideas: dogs, cats, skull, moon, globe, turtle, bunny, R2D2, mushroom cloud

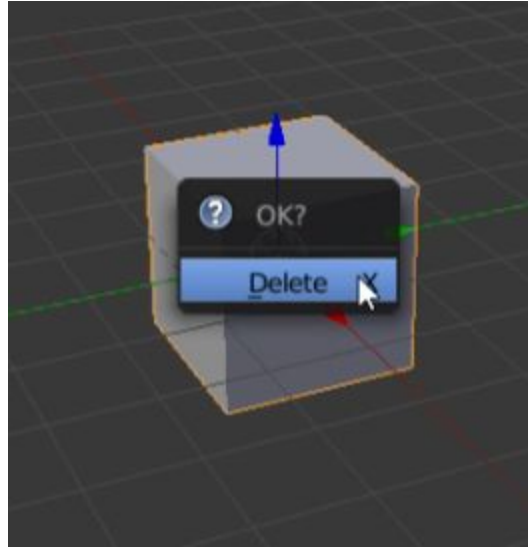
Install and open Blender

- Go to blender.org, download, and install
 - It's a fairly clean website unlike Lulzbot's so I won't go into detail
 - I'll use Blender 2.79 in this workshop, but any version should work fine
- Open it once you're done, click anywhere outside the center to make the middle pop up go away



Install and open Blender

- Get rid of the default cube by pressing [X] and click “Delete”

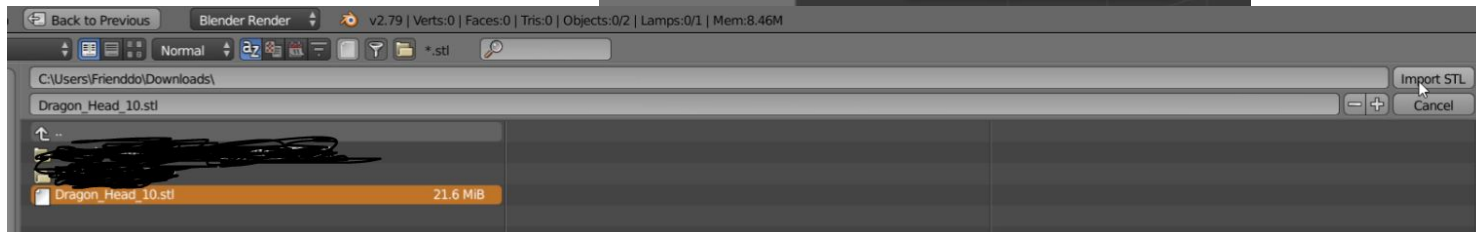
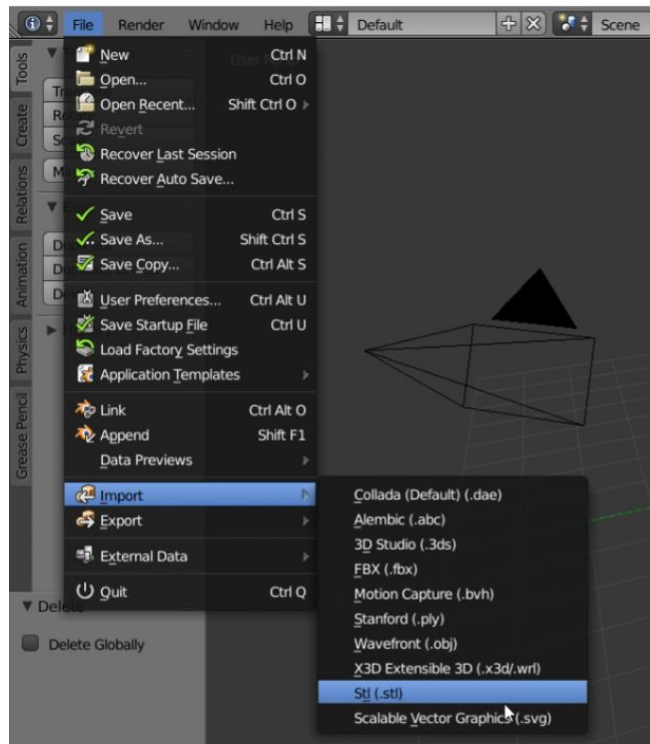


Manipulate your view

- To rotate view, hold middle mouse button, and drag your mouse
- To move view, hold [Shift] and middle mouse button, and drag your mouse

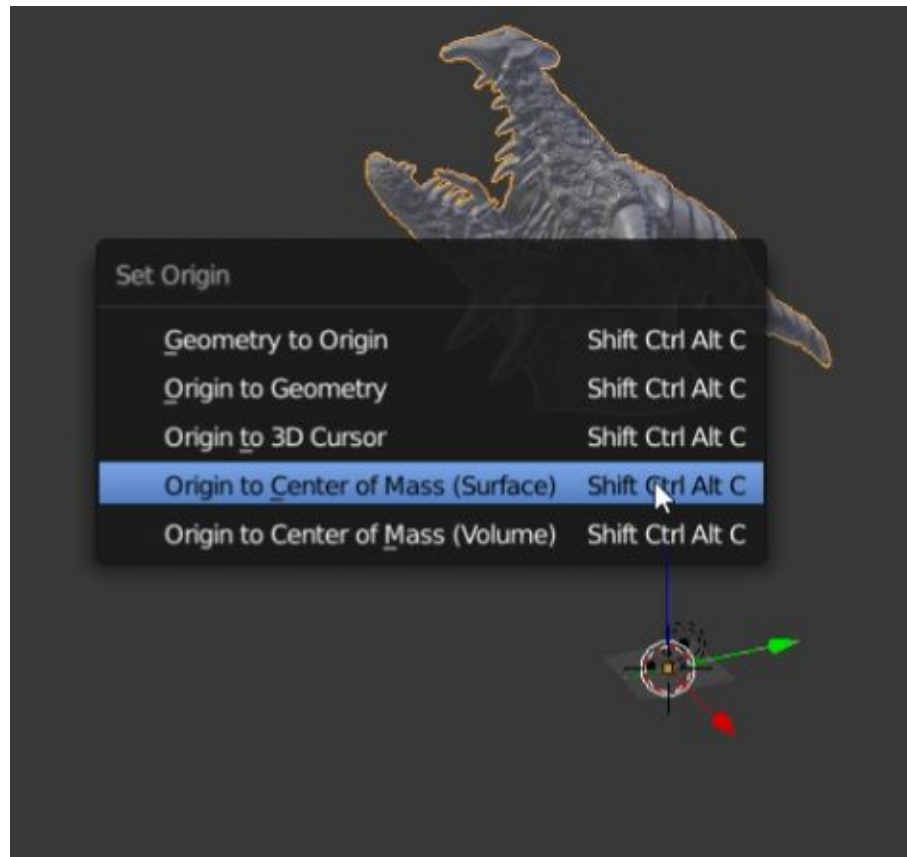
Import and center your model

- To import, click “File” (top left corner) -> “Import” -> “Stl (.stl)”
- Go to the folder, click on the file, then click “Import STL”
- I picked this
<https://www.thingiverse.com/thing:478774>



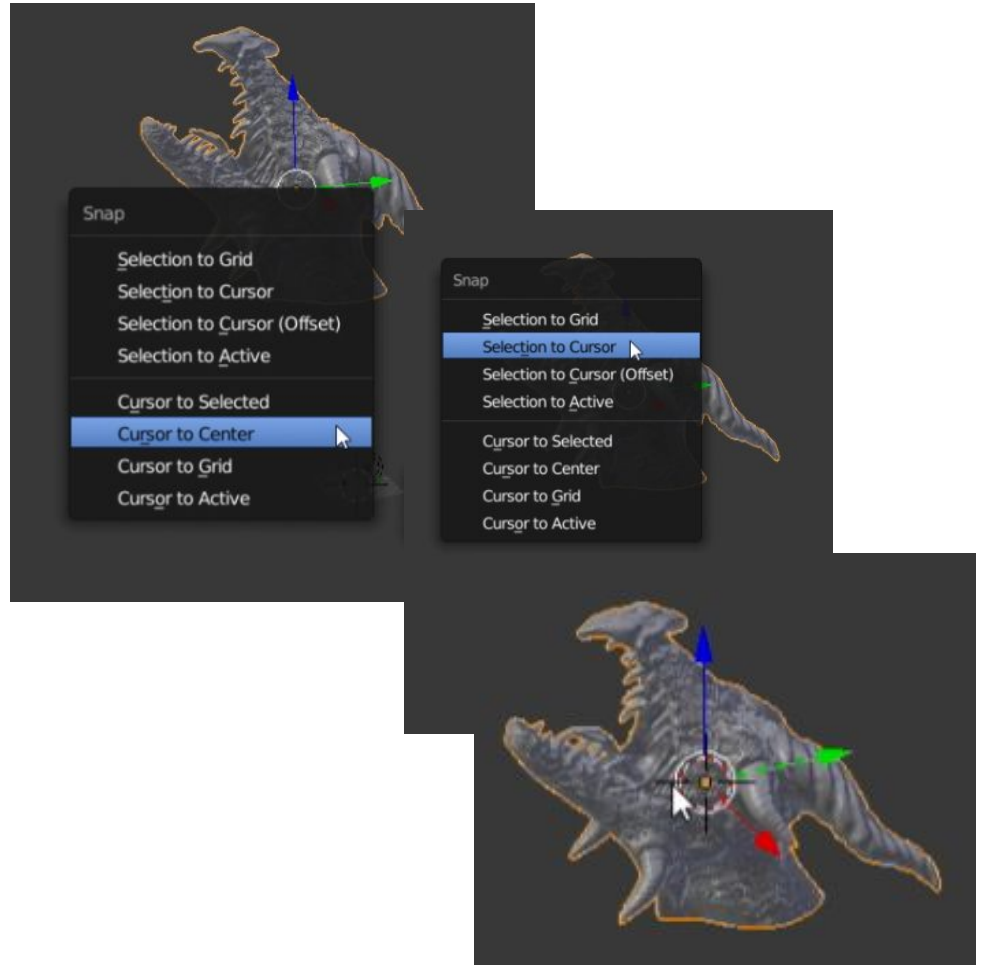
Import and center your model

- STL are sometimes not centered to origin
- If you don't see it, use the middle mouse scroll, and zoom out until you see it
- Press [Shift]+[Ctrl]+[Alt]+[C], then click "Origin to Center of Mass (Surface)"
 - You can use Volume as well; they're approximately the same



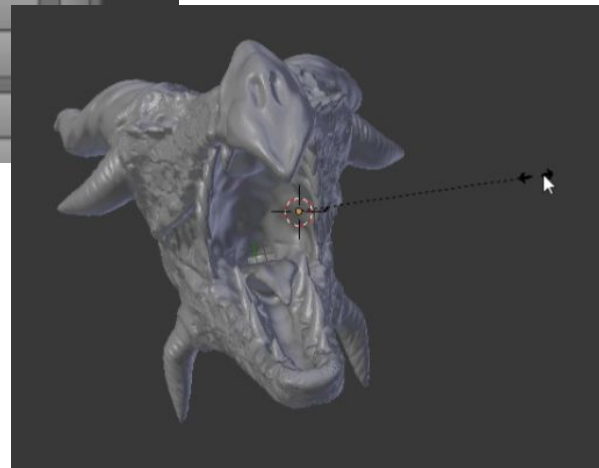
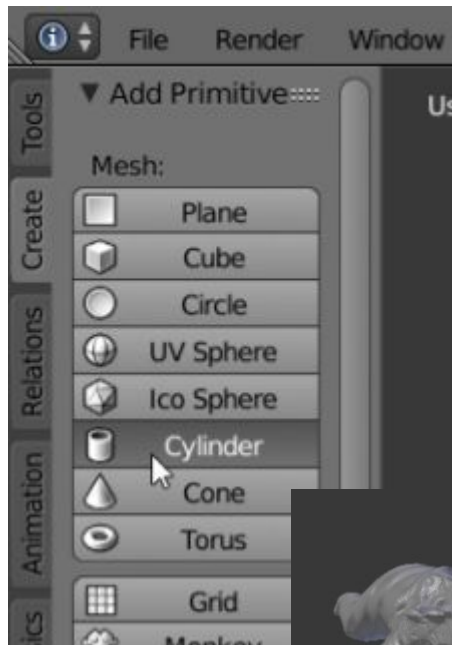
Import and center your model

- Press [Shift]+[S], click “Cursor to Center”
- Click “Selection to Cursor”
- Your model should snap to center of the world now



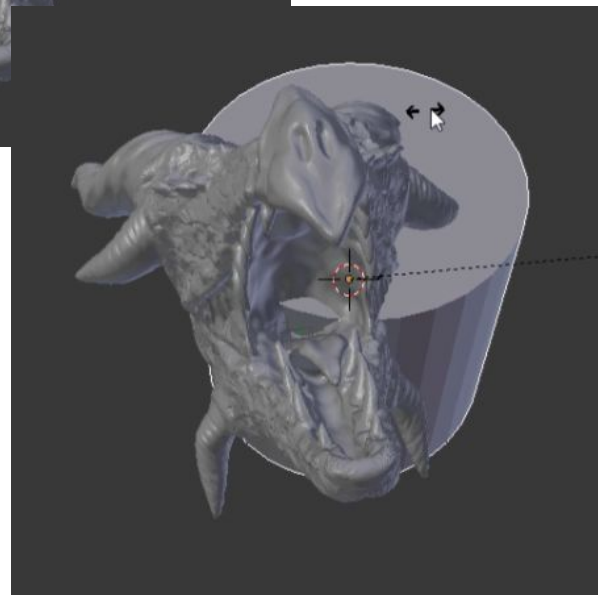
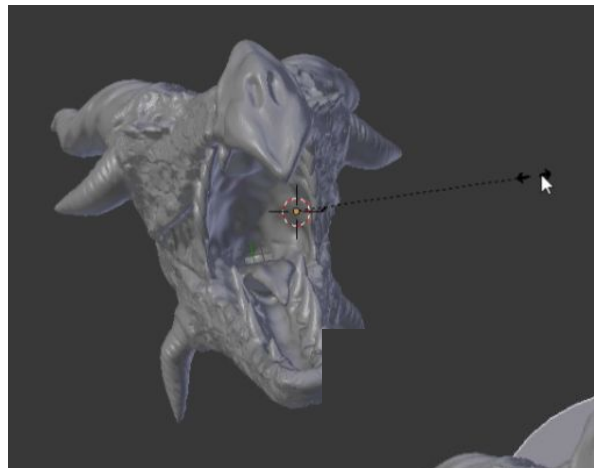
Make a hole

- Click “Create” -> “Cylinder”
- We’ll use this model to as the hole
- You can make a square, or a cone hole too if you want
- Before you click anything else, press [S] and drag your mouse outwards
- This will scale up your cylinder



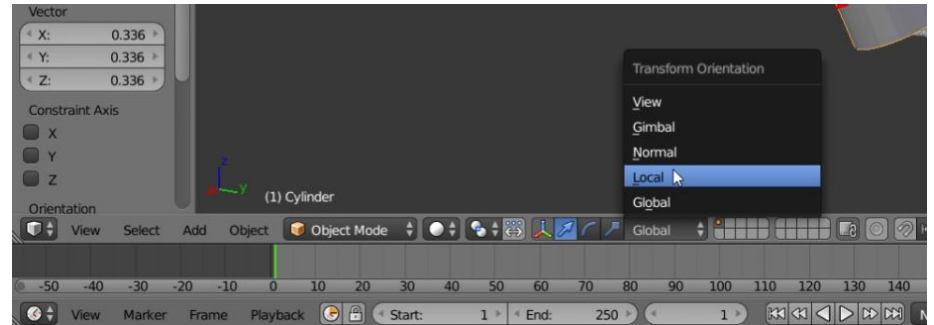
Make a hole

- Once it's to a scale that you can see, stop
- To move the model, click [G]+[x/y/z]
 - To move along the local axis, rather than global axis, click [G]+[x/y/z]+[x/y/z]
- To rotate the model, click [R]+[x/y/z]
 - To rotate along the local axis, rather than global axis, click [R]+[x/y/z]+[x/y/z]
- To scale the model, click [S]+[x/y/z]
 - To scale along the local axis, rather than global axis, click [S]+[x/y/z]+[x/y/z]



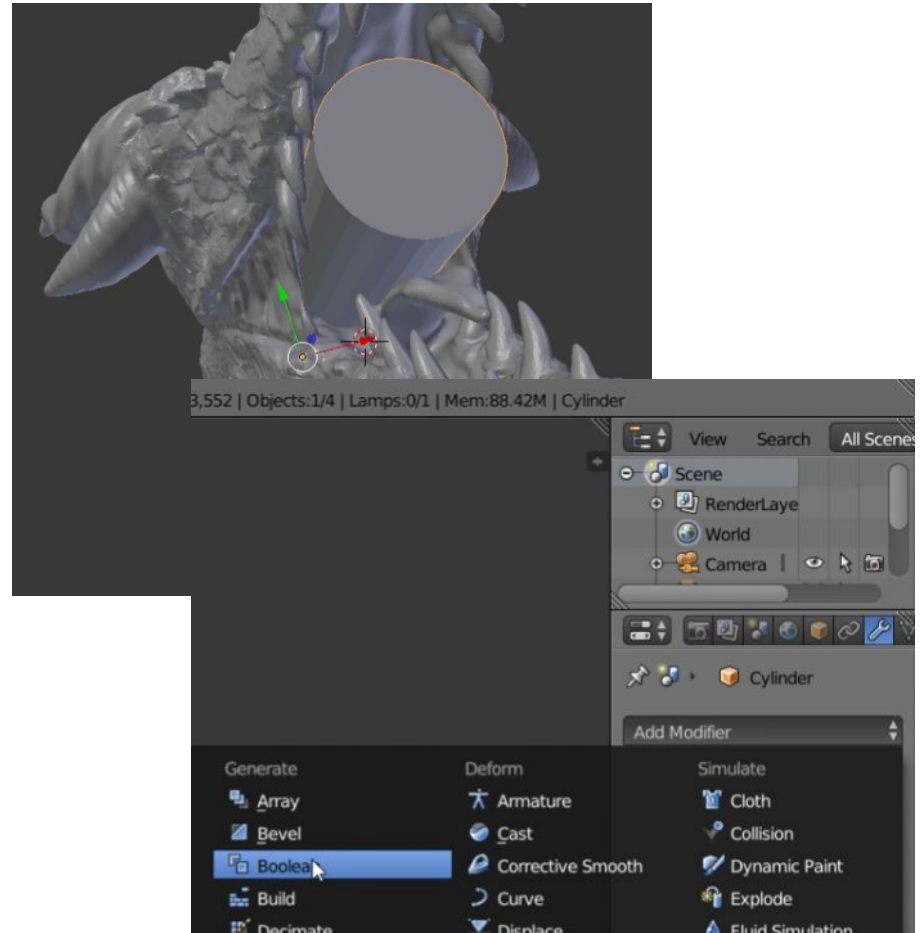
Make a hole

- It might be hard to visualize rotating or scaling along local axis without seeing local axis, so you can change that on the bottom toolbar



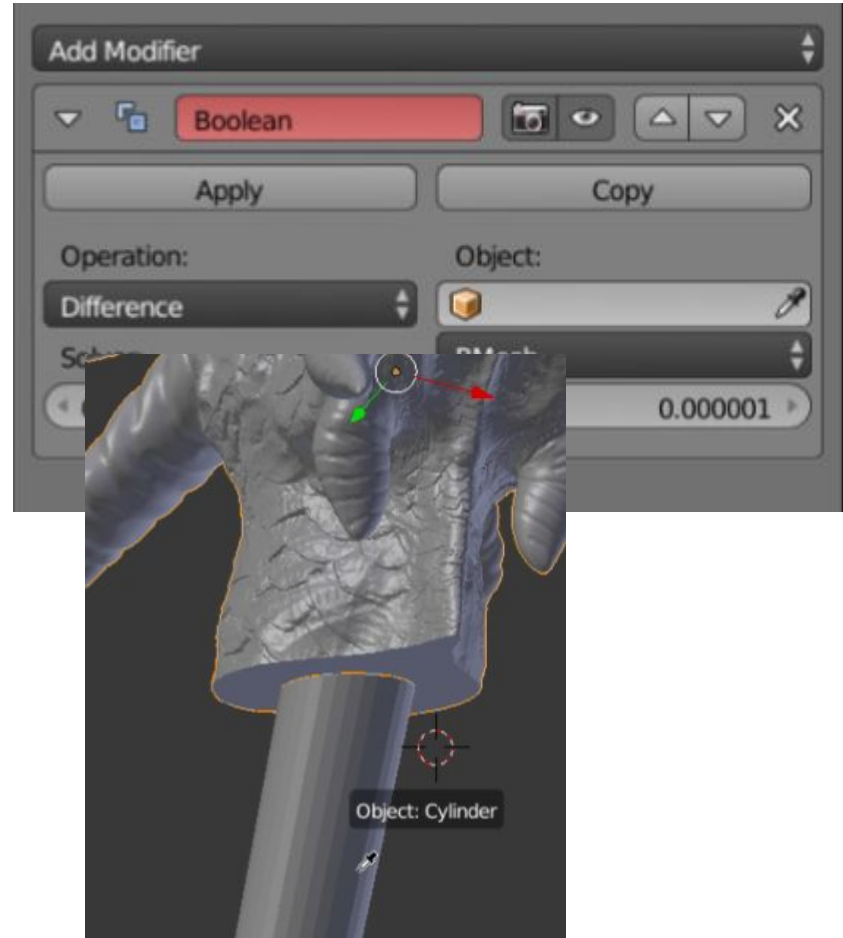
Make a hole

- Once you have put it in the right position, go to the right toolbar, click on the wrench icon -> “Add Modifier” -> “Boolean”



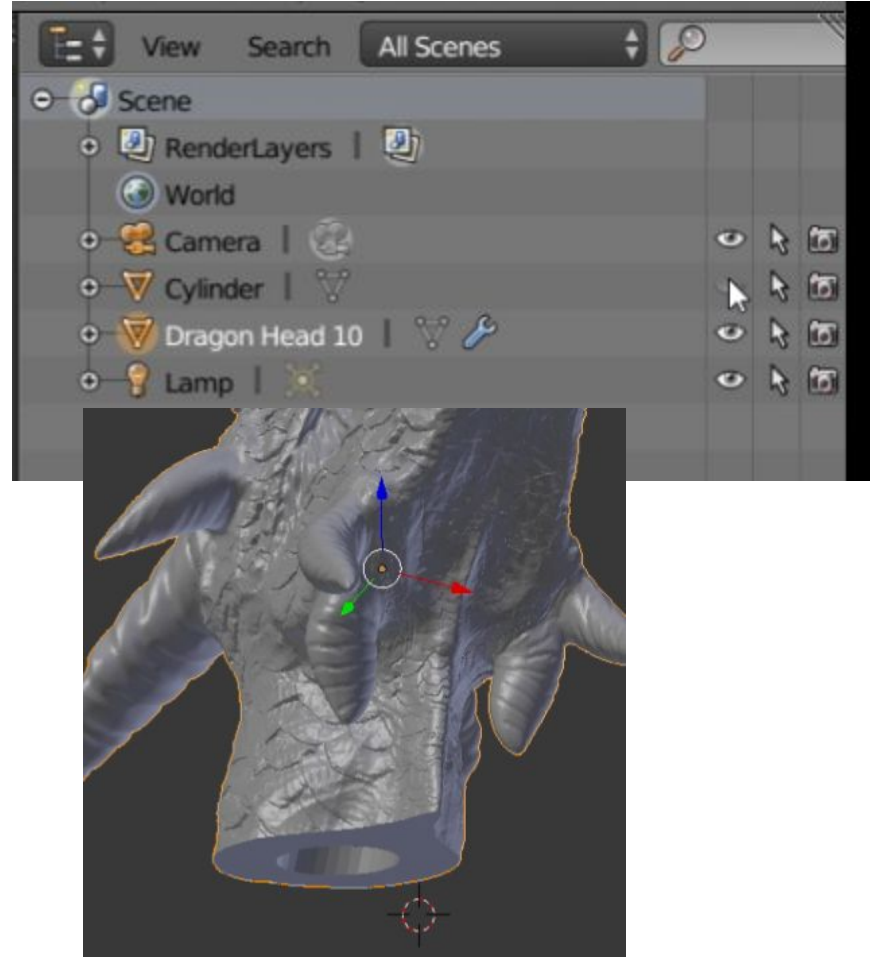
Make a hole

- Change Operation to “Difference” (it’s a drop down menu)
- Use the eyedrop icon near Object to select your cylinder



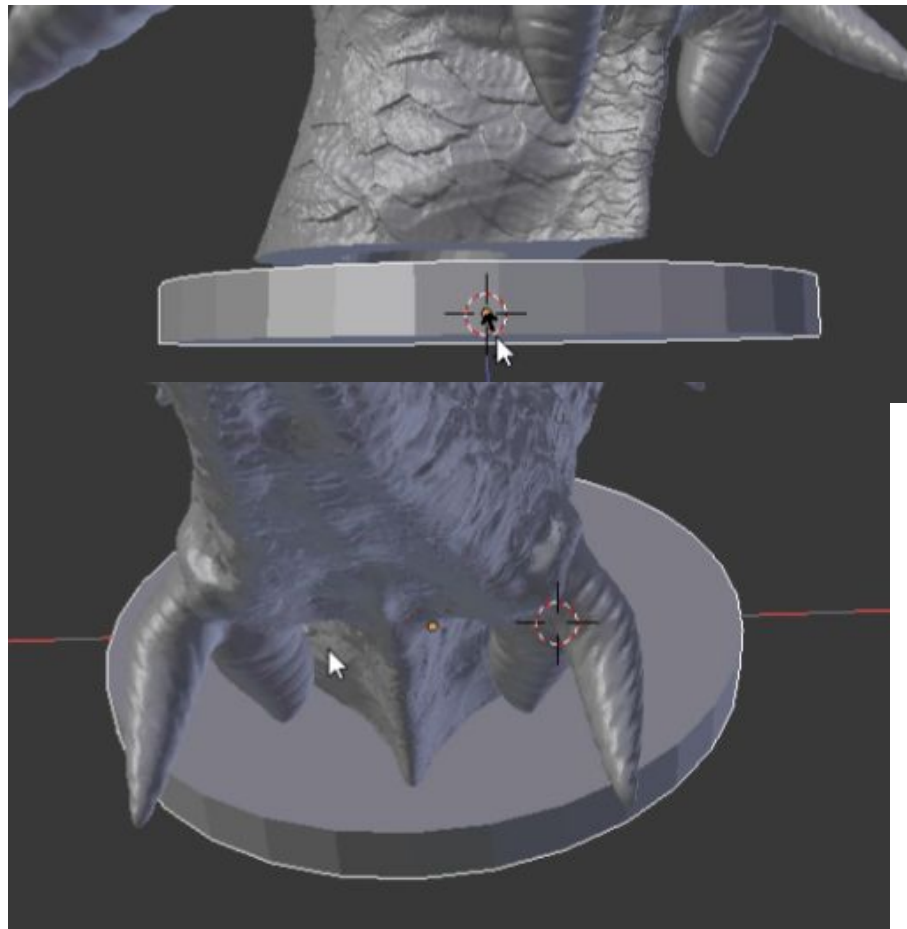
Make a hole

- Click on the eye icon next to the cylinder's name to not see it
- You should be able to see the hole you've made very clearly



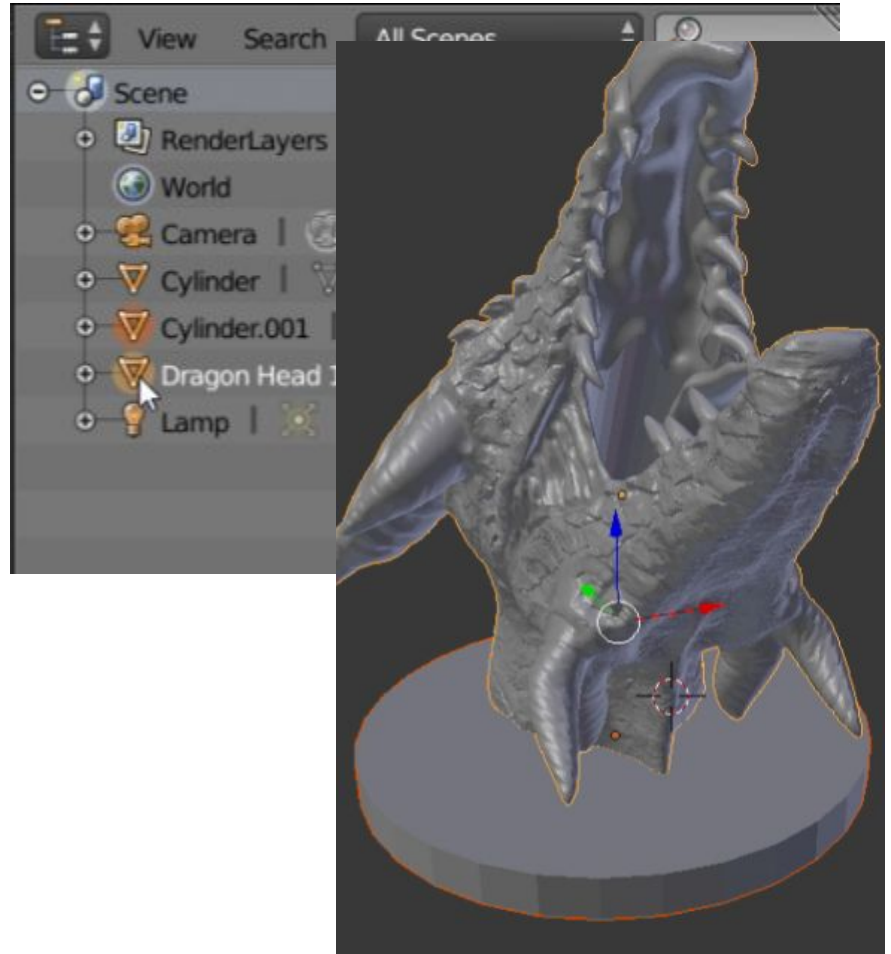
Make a base

- Use the skills you learned when moving, rotating, and scaling a model to make the base
- Make another cylinder and manipulate it into a base
- Make sure the main model (ex: dragon) overlaps a bit with the base so it can become a single solid model



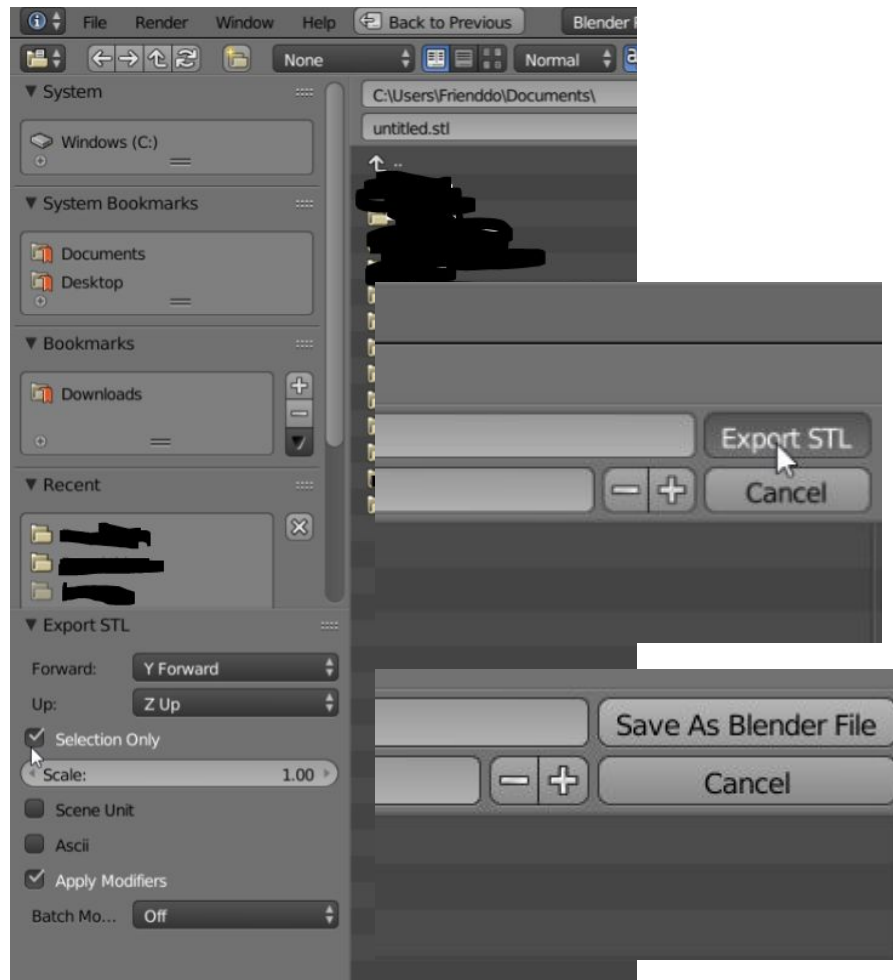
Exporting

- Select only the model you want to export (hold [Shift] to select multiple things at once)
- If you haven't noticed by now, a model that is selected has an orange highlight around it



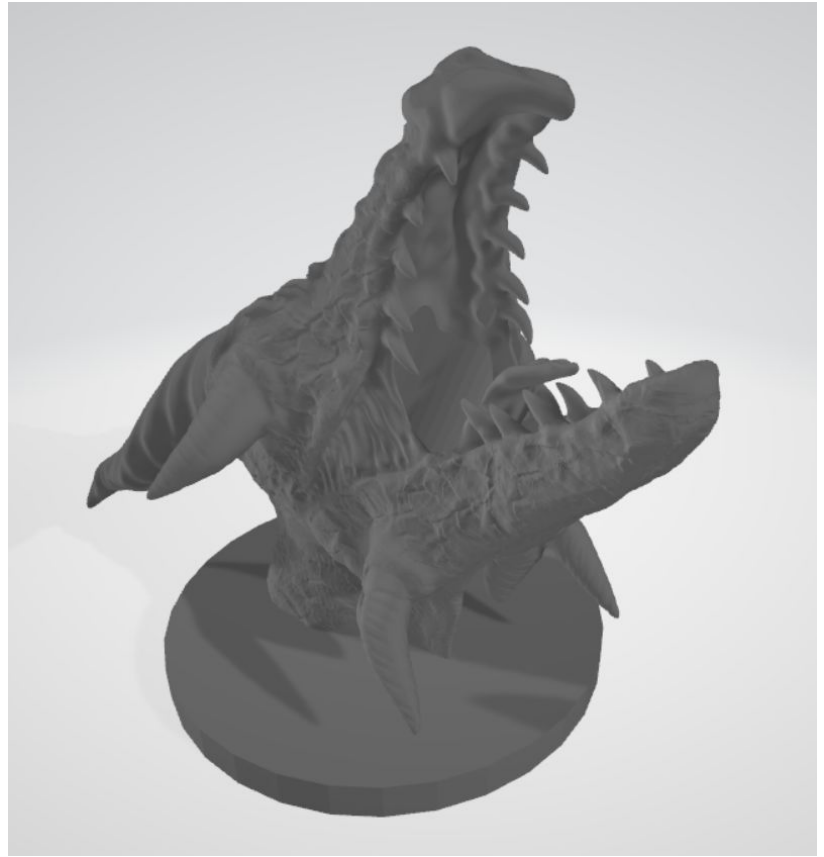
Exporting

- Tick yes on “Selection Only” and “Apply Modifiers”
 - This will make sure only the stuff we’ve selected is exported (so the hole model doesn’t get exported), and the hole is actually cut into the main model
- Save it anywhere you’d like by clicking “Export STL”
- Save the whole Blender project by pressing [Ctrl]+[S], find a good directory, then click “Save As Blender File”
 - It’ll say “Save As” the first time you save



Final product

- Nice
- You can open it with 3D viewer (Windows) or Preview (Mac)
- Import it to Cura to print

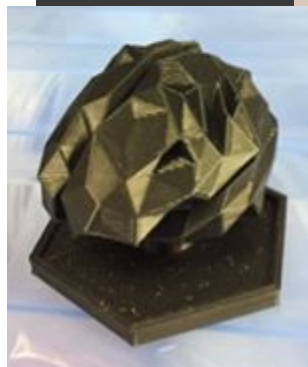
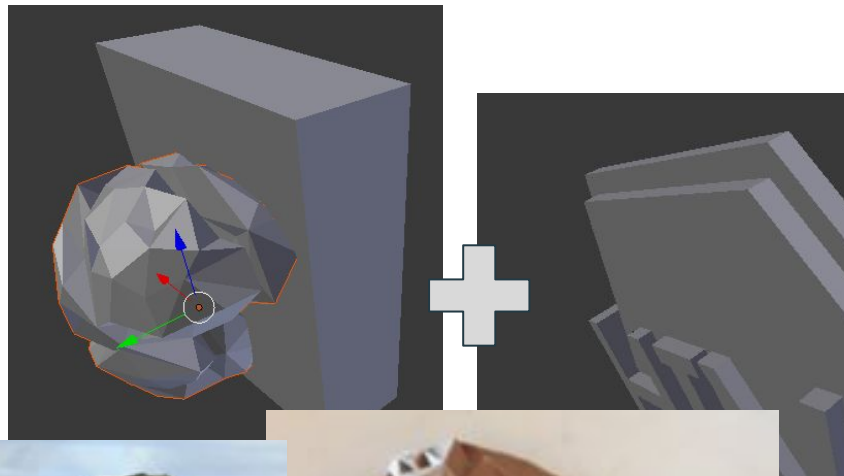


A few examples from what I've made here

- I use the same technique to make a lot of the stuff we have here

Our front door sign

- Decimated brain from the little brain token, cut to flatness using boolean difference
- I modeled the HIVE plate in Inventor (a little too advanced)
- Exported together



SD card holder for our printer

- SD card holder with boolean difference to cut it to have only one SD card slot
 - <https://www.thingiverse.com/thing:56074>
- Spool holder with boolean difference to cut out for only the section to slot into aluminum extrusion
 - <https://www.thingiverse.com/thing:1608830>
- Export them together



Pelvis mount (vertebrae)

- Flex students made the stand
- I made the cube
- Claudia gave me the pelvis
- Thingiverse for ball joint
 - <https://www.thingiverse.com/thing:1194001>
 - It's a GoPro mount
 - You've got to get creative with keywords sometimes

