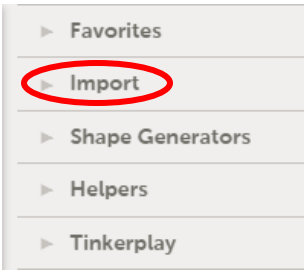
3D Printing

Designing your object:

In order to 3D print an object, first you need to either design it or modify an existing design. The recommended tool for designing a model is TINKERCAD. TinkerCad has an easy tutorial, and is very self-explanatory. To create an account, hit **sign up** on www.tinkercad.com. After this, TinkerCad will offer to walk you through a series of tutorials. The tutorials are helpful, and you can pause them to start creating your own object at any time. The TinkerCad interface is very straightforward, however, so usually won't need the tutorials.

Modifying an Object:

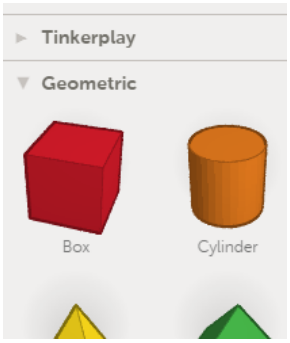
If you want to look for an existing design and modify it, Thingiverse is a great place to look. It has a huge number of high quality, 3D printable objects. To download a file as a file that you can 3D print, be sure to **scroll down to the bottom of the page** and click on a **.STL** file to download it. You can also use TINKERCAD to modify a downloaded file. To do this, click **import** in the toolbar. After this, click **choose file** to choose the **.STL** file that you downloaded. TinkerCad will import this into its interface.



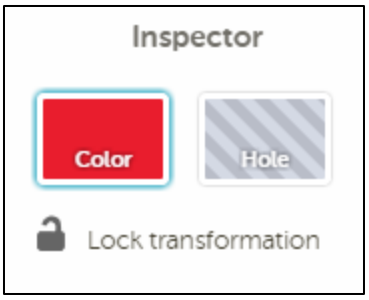
Select import to modify a downloaded object

TinkerCad 101:

In TinkerCad, everything is based on tabs. On the right-hand side, there is a list of expandable tabs. When designing or editing an object, the most important tabs is the **Geometric** tab. This provides basic, drag-and-droppable shapes that can be dragged onto the grid. Another key feature of TinkerCad is the ability to cut out pieces of shapes. If you drag a shape onto the grid and click on it, it will open up a section in the top right of the grid titled **Inspector**. In this panel, you can click **Hole** to set the object to cut out a piece of another object it's placed on to. To download your object, go to the design dropdown in the top left and click on **Download for 3D Printing**. After this, it will bring up a dialog of which file format you want to download in. Click on **.STL**. TinkerCad also has a series of tutorials that are helpful if you wish to explore TinkerCad more.



Drag and droppable objects are under the **Geometric** tab



Select **Hole** to set the object to be a hole

Printing your Object

The 3D printer that is recommended for most students is the **MakerBot Replicator 2**. To print on this printer, you need to install MakerBot Desktop. To print your object, open MakerBot Desktop (MBD) and press **CTRL + O**. Then, navigate to the **.STL** file you downloaded and click on it. It will open up in MBD. Then, click on your object and hit move button. Then, click **On Platform** and **Center**. Then, click the **Export Print File** button in the top right of the page. Once it finishes processing your object, hit export now and save the object to an **SD card**. If you do not have one, the Tech Department has ones you can borrow. After this, eject the SD card and insert it into the 3D printer. Then, use the display to scroll down and select **Utilities**. If the display is not showing anything, then the 3D printer is not turned on. To turn it on, flip the power switch on the back of the printer. After selecting Utilities, select **Level build plate**. The 3D printer will then walk you through the process of calibrating it. If anything confuses you, ask the Tech Department for help. Once you have finished calibrating the 3D printer, press the left arrow **twice**. Then, select **Build from SD** from the dropdown menu. The printer will ask you to choose from the files saved on the SD card. Choose your object and press the large **M** button in the middle to print your object.

Once your object is done printing, you may need to remove excess plastic from the object. A knife is very helpful for this.