# A Beginner's Guide for creating 3D Printer Designs.
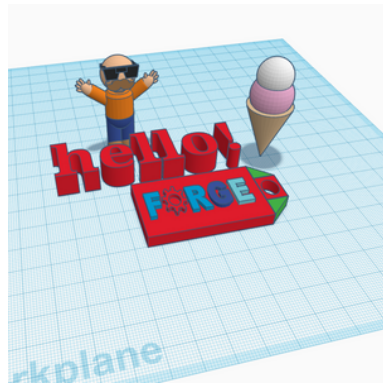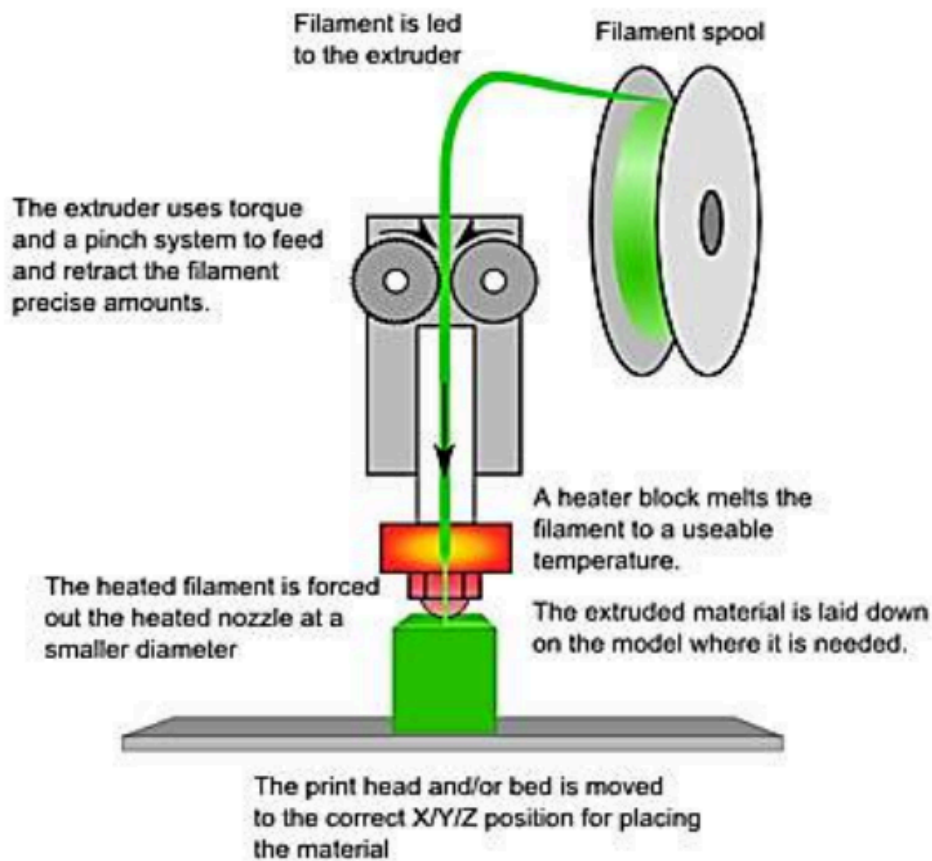


# OVERVIEW

# Welcome!

In this instruction guide, you will get a basic introduction to creating your very own 3D models using Tinkercad. Tinkercad is easy and FREE to use. You will be required to create your own account using an email address. In this guide you will learn what Tinkercad is and how it works. You will also have DIY Projects that you can follow along with and create your own files that you can choose to submit to the Forge for printing. If you have any questions please feel free to reach out to Forge staff via email (forge@eapl.org) or by phone 847-438-3433.

## What is 3D printing?

3D printing is an additive manufacturing process that uses layers of filament to turn digital models into physical objects. The 3D printing process starts with a digital file (.stl) that gets sliced into layers using a slicing software. Then that gets sent to the 3D printer, which begins building from the bottom up, layer by layer. The layers stick together to form a solid object.

**Fun Fact:** World's 1st 3D-printed rocket launched March 22, but did not make orbit. The company, Relativity, created it's rocket from raw material within 60 days.

## Material Extrusion



Filament is led to the extruder

Filament spool

The extruder uses torque and a pinch system to feed and retract the filament precise amounts.

A heater block melts the filament to a useable temperature.

The heated filament is forced out the heated nozzle at a smaller diameter

The extruded material is laid down on the model where it is needed.

The print head and/or bed is moved to the correct X/Y/Z position for placing the material

# How can I create a 3D model?

Generally 3D model files are created with 3D model software. There are a variety of options out there that are either web-based or desktop based. The software we use in the Forge makerspace is Tinkercad, which is web-based and FREE! Tinkercad is really easy to use and offers its own step-by-step tutorials that can help you do a variety of 3D model creating.
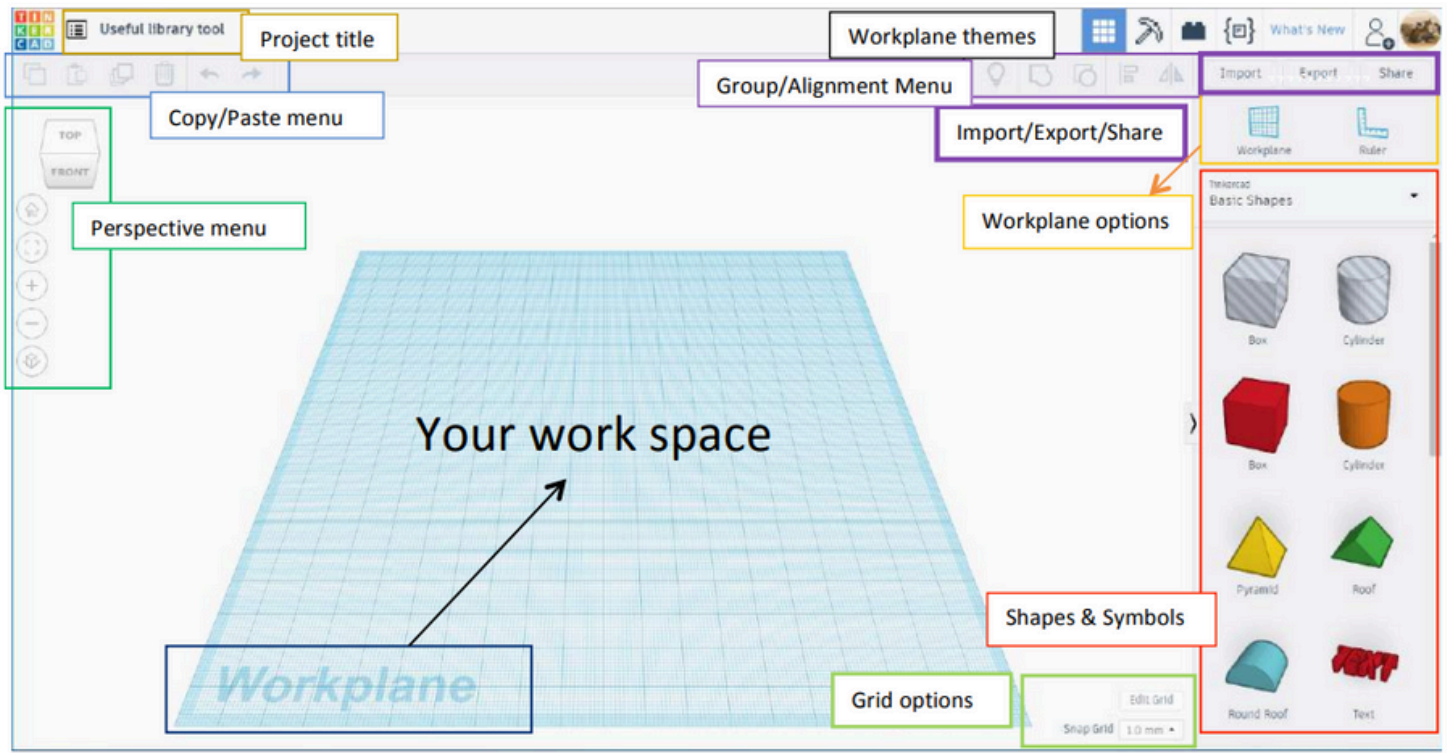


## Getting an Account

1. Open your favorite internet browser and type in : www.tinkercad.com
2. Click on sign up! and follow the steps to create your own account.
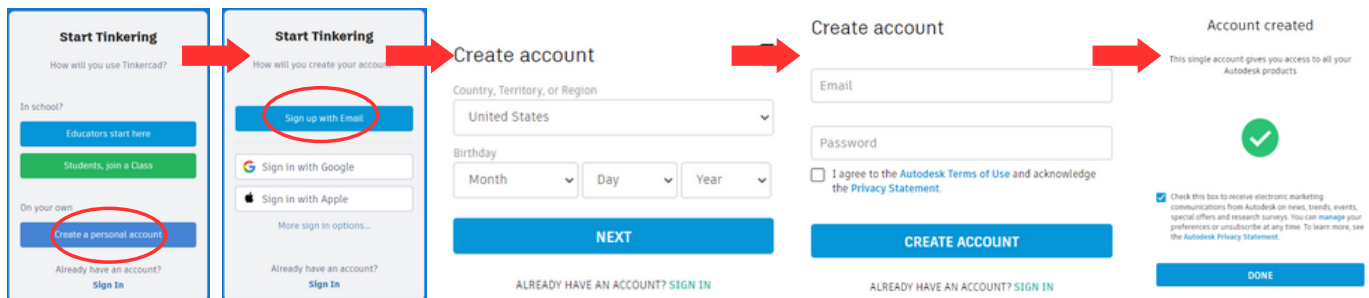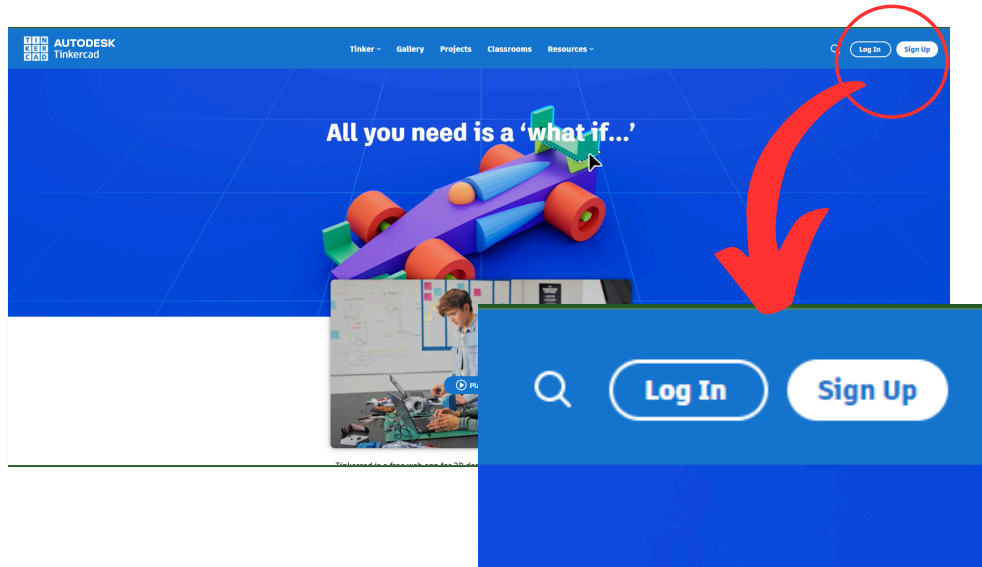
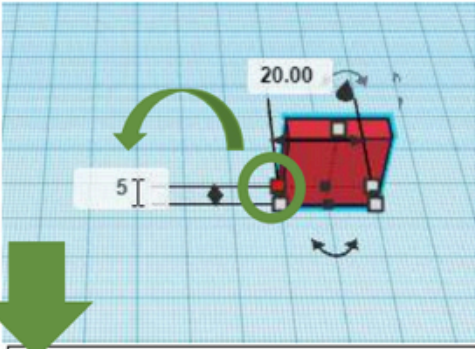# Tinkercad Workspace Overview



# Basic Shape Menu - Drag and Drop

1. Select a shape from the menu that you would like to work with by simply left clicking it once.
2. Move your mouse over the workplane and left click again where ever you would like that shape to be placed.

*NOTE: Alternatively, you can left click and hold the object and then drag and drop it where you would like it placed.
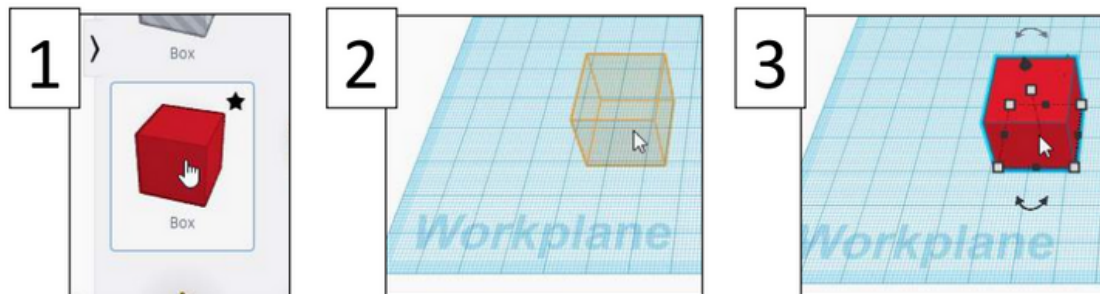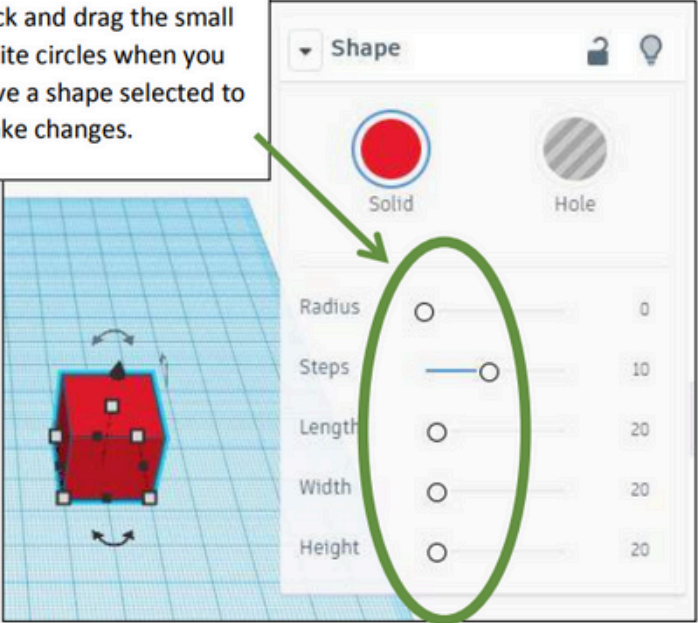
# Resizing your shape

Click and drag the small white circles when you have a shape selected to make changes.

**20.00**

**5**

Once a shape is selected on the workplane, carefully click a small gray box to change a specific measurement of a shape by left clicking within the white text boxes that appear.

*Note: Selected points will change color from gray (unselected) to red (selected).
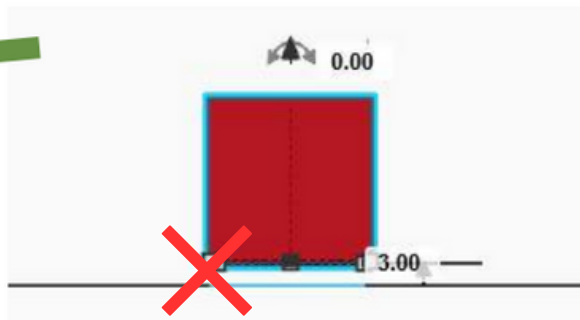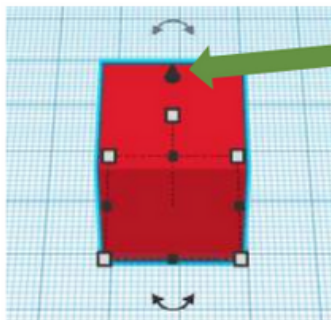
▼ Shape

Solid          Hole

| Radius | ○ | 0 |
| Steps | ○ | 10 |
| Length | ○ | 20 |
| Width | ○ | 20 |
| Height | ○ | 20 |

*Note: Alternatively, you can left click and drag any of the points to change the size/shape of the object selected.

# Z-Axis (above and below workplane)

In order to move your shape below or above the workplan, you need to click and hold the cone-shaped handle above your object. This action allows you to stack objects on top of each other.

*Note: Always view your project from different angles before exporting your project. If your project is not touching the workplane, staff will not be able to print it.

**0.00**

**3.00**

## The Workplane button:

Workplane

If you would like to work or build on the side of a shape, you can change the Workplane to be the surface of a shape side by clicking this button and then clicking the side of a shape.
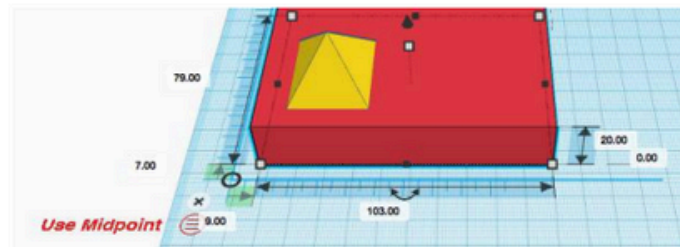
**1**

**2**

**3**

**4**
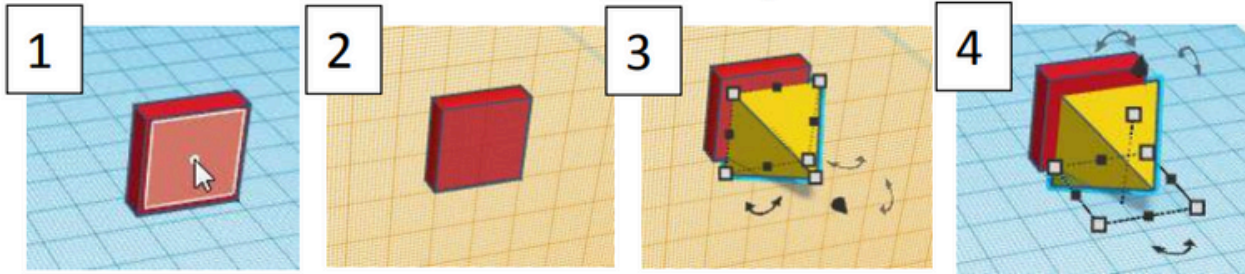
## The Ruler button:

Ruler

To use the ruler, click on the ruler button and then click where you would like the ruler to appear on the Workplane.

Once you have the ruler on the Workplane, you can select an object and then have the option to view the midpoint of the object selected or the endpoint.
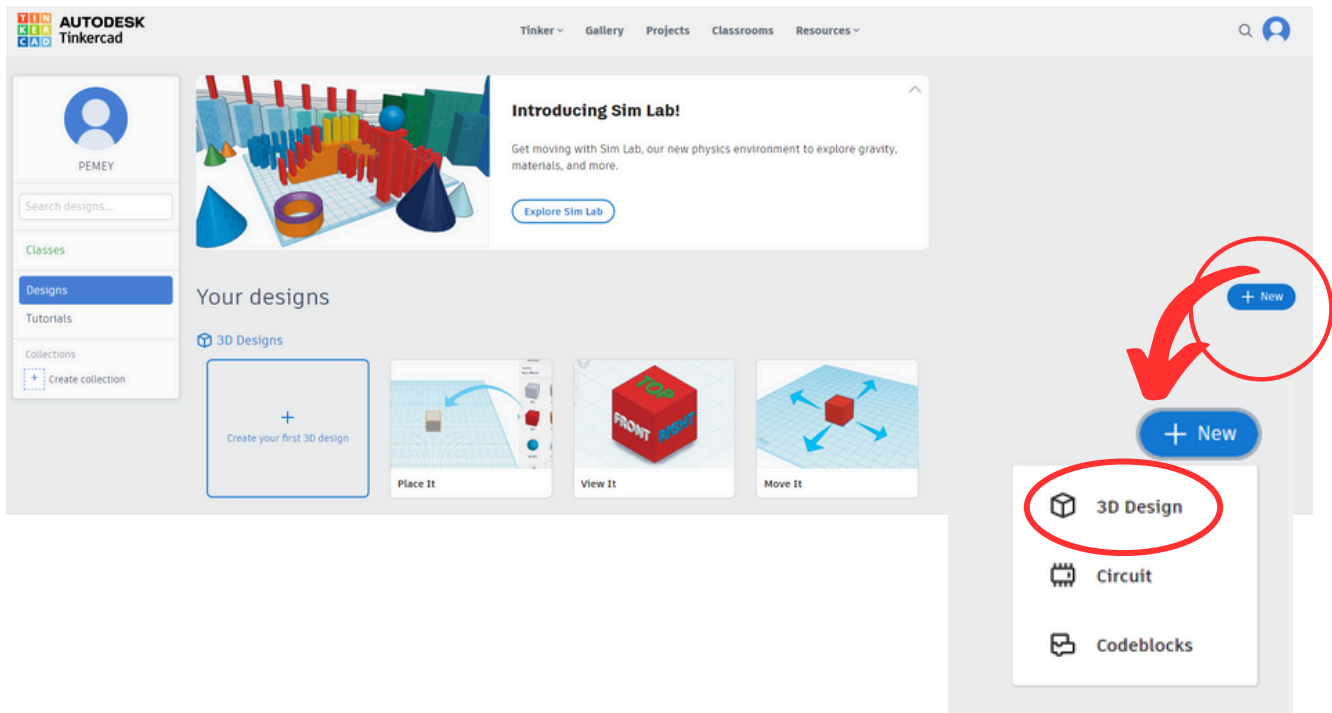
79.00

7.00

20.00

0.00

*Use Midpoint* 9.00

103.00

# DIY Project: Basic House

**1**

**2**

25.00

21.00

**3**

**4**

**5**

Shape
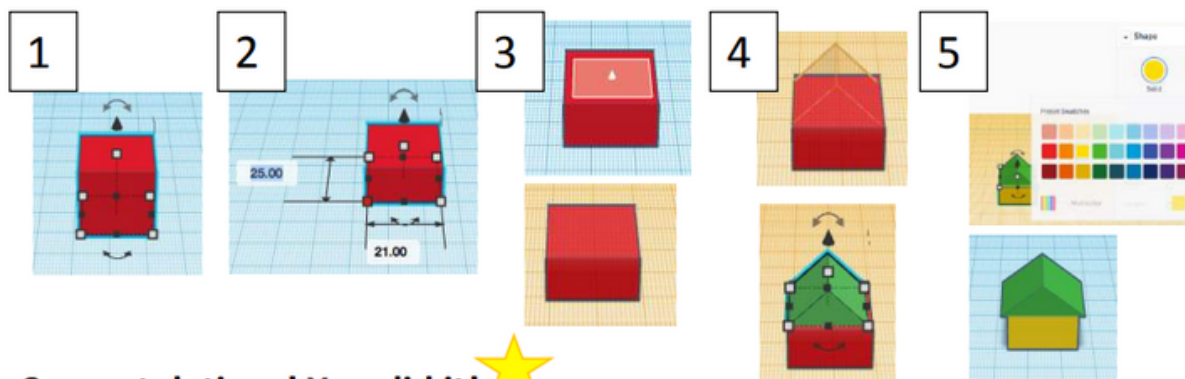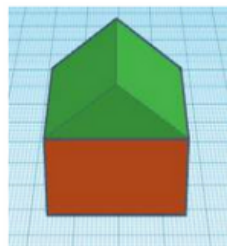
**Congratulations! You did it!** ⭐

FORGE

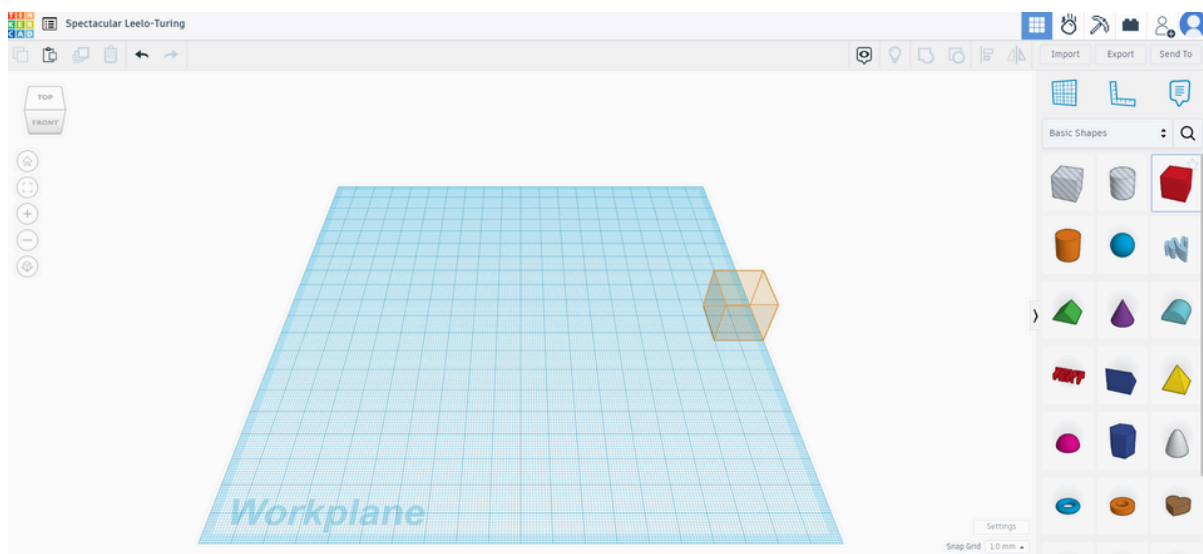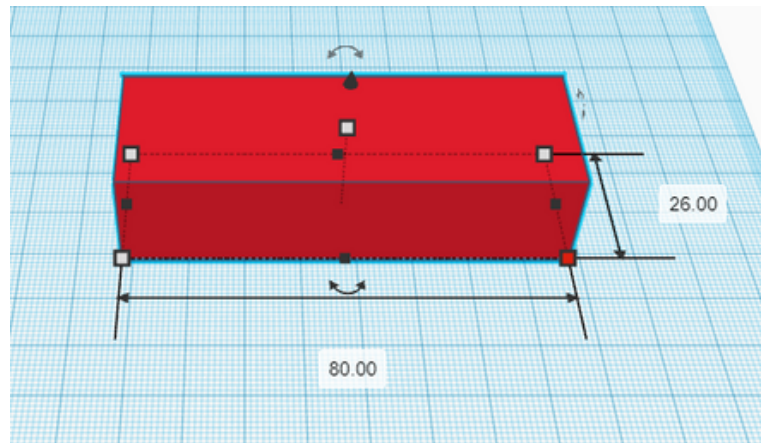# DIY Project: Personalized Keychain
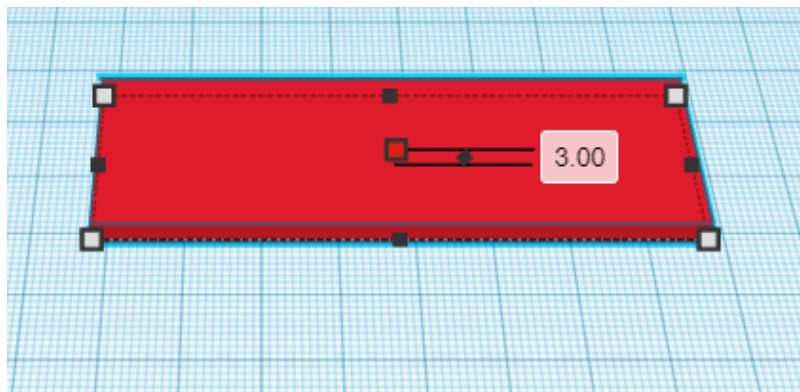
1. Create a new Design.



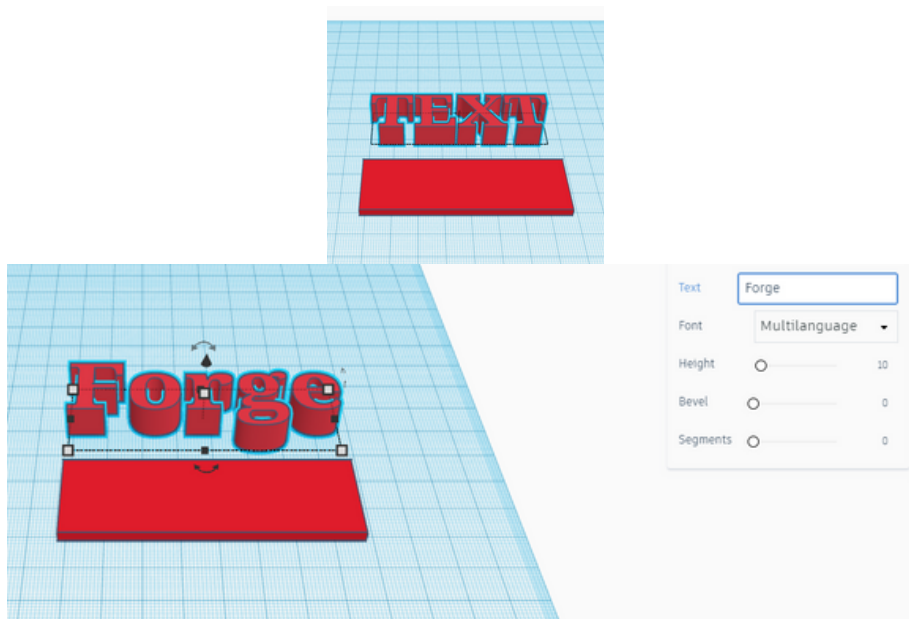2. Click and drag a box onto the workplane.

3. Using the white square corners. Click and drag to create a rectangle that is about 80mm long by 20mm deep.
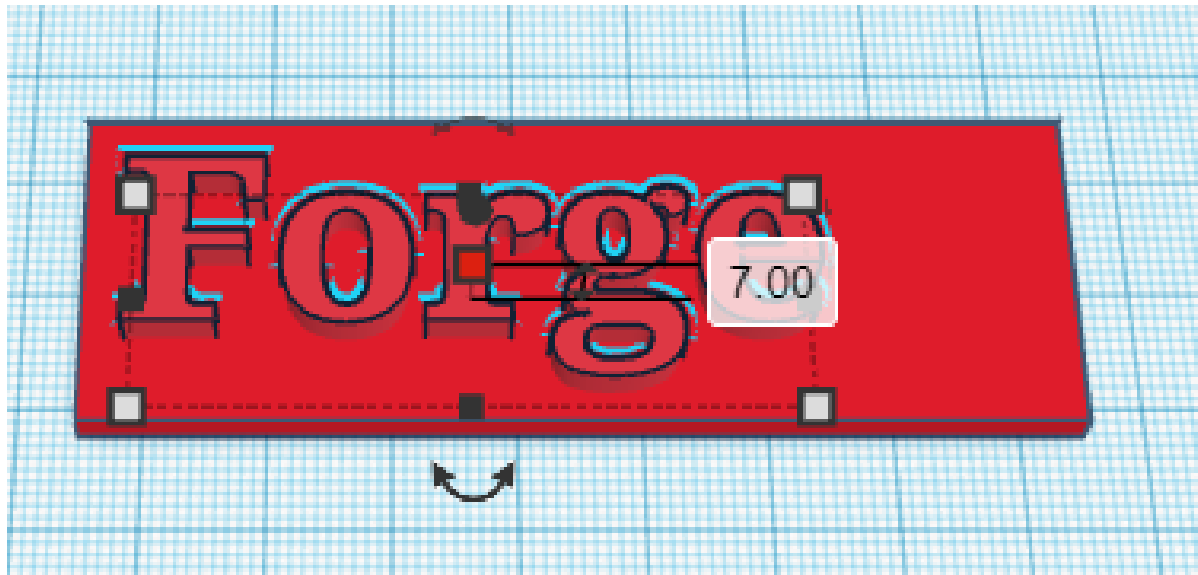


4. Grab the middle white square handle and decrease the thickness of your rectangle to 3mm.



5. Click and drag the TEXT shape onto the workplane and type in your name.

6. Using the square corners adjust the size of your text and then drag it on top of your rectangle. Make sure the thickness of your text is about 7mm.
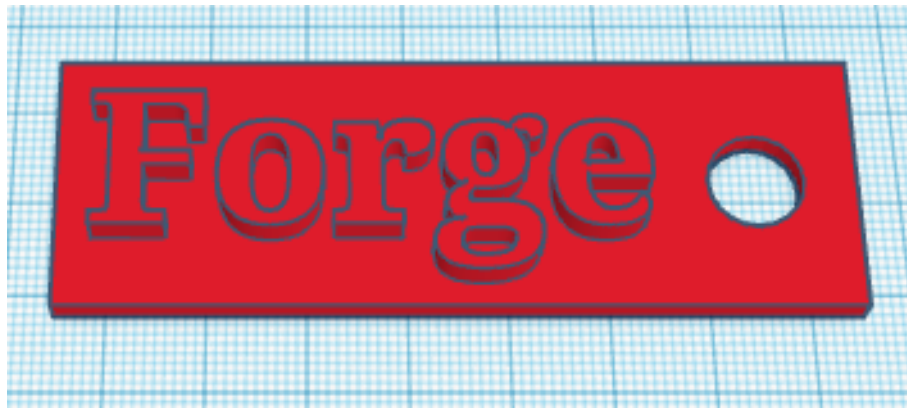


7. Drag and drop a cylinder "hole" shape. It will be grayed and striped which means it can be used to make a cutout of your shape. Adjust the size of the cylinder to 10mm x 10mm and place it on the right side to create a hole for the key ring.



8. Highlight all the components (rectangle, text, and cylindar hole) and press the group tool on the top right.
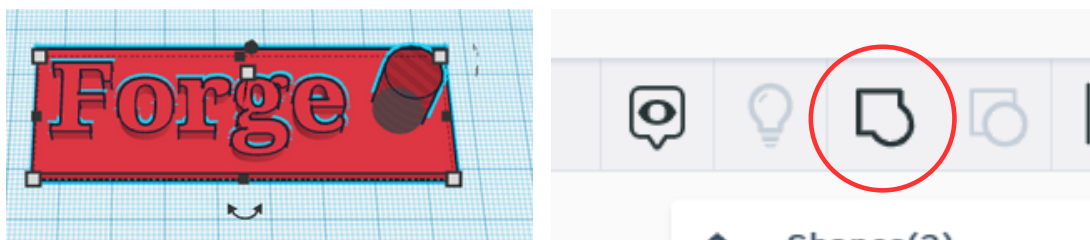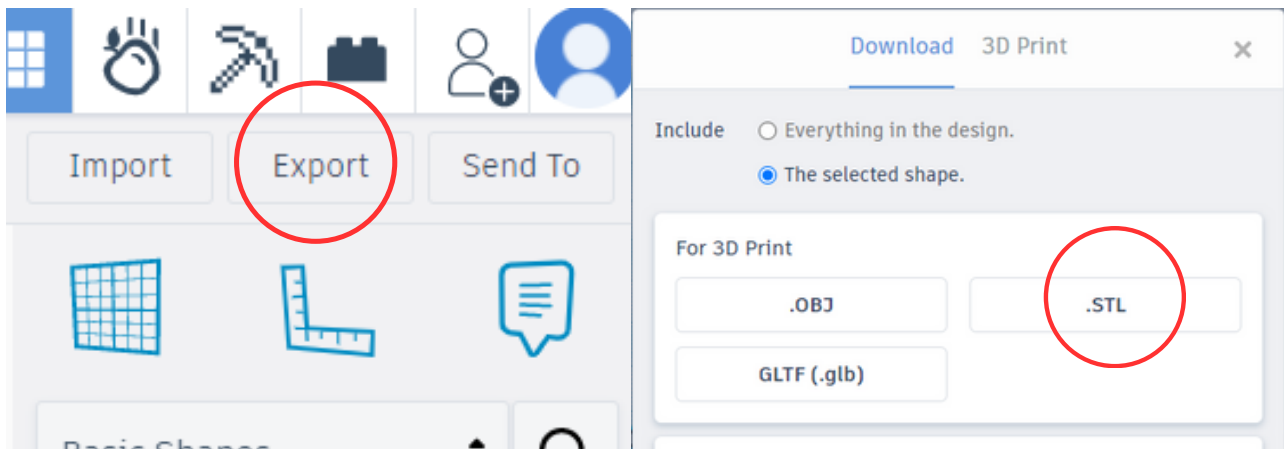
YOU DID IT!!!



## Saving and File Format

Save your project to your computer as an **.stl file**.



When you are ready you can submit it to Forge for printing!



Scan the QR code to fill out a 3D print submission form. Fill out all the necessary information and make sure your library card is in good standing.
Prints cost $0.10/gram

If you have any questions please email us at forge@eapl.org.