

3D Printing Tutorial

Level 1

BOOKMARK



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Note:

The following tutorial illustrates how to create a bookmark with a slightly raised design. This will allow you to print the background one color, then change the filament color on your printer, and continue printing the designs in a different color.

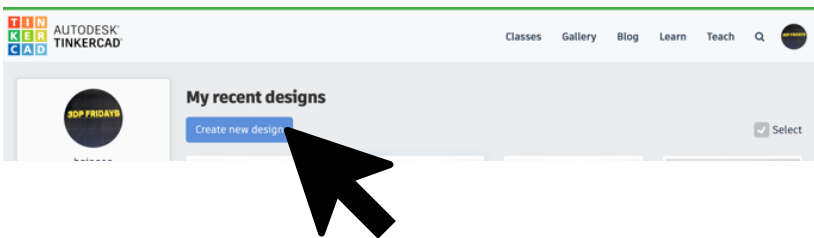
If you have a multi-material printer (a printer that can print multiple colors at the same time), you can follow that tutorial to create a flat bookmark.

Step 1

Go to www.tinkercad.com and log in.

Note: If you do not have an account, you will first need to create one by clicking Join Now and following the instructions. If you are completing this as part of a class, choose the option to Join Your Class.

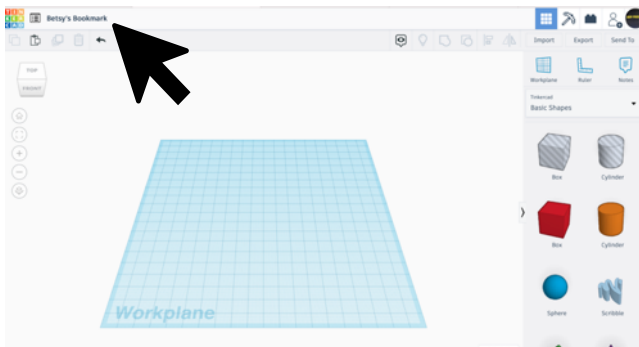
Then click on the button Create New Design.



Step 2

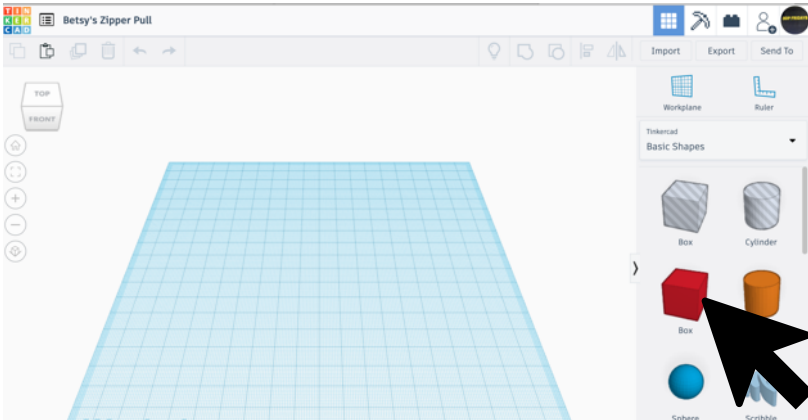
In the top left corner, you will see the name that the computer assigned your project. It will be something crazy. Click on that name. Then give your project a name that will make it easy to identify. For example: John's Bookmark.

Now you have a blank workplane and are ready to begin.



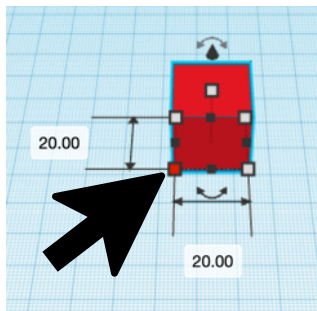
Step 3

We will start by making the basic shape for the bookmark, so we need to use the closest shape. In the side bar you will see several basic shapes. Choose the red box. Click once on the red box. Move your mouse to the blue workplane and click again. Now you have a red cube on your workplane.



Step 4

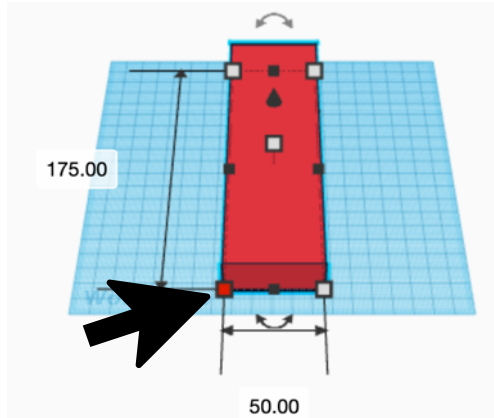
We don't want a cube shape, so we need to change the dimensions of the box. Click on one of the corner squares. This shows me that the cube is 20mm x 20mm.



Step 5

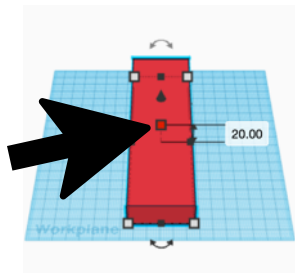
We will make the bookmark 175 mm x 50 mm.

To change the size, you can drag the corner until it is the size you want, or you can click on the dimension you want to change and type the desired size in the box. If your bookmark gets too big for your workplane, click on the shape and drag it back to the middle.



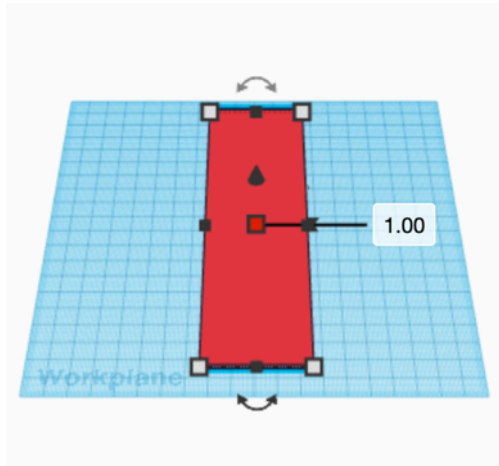
Step 6

Now I have the right shape, but it is too thick! I couldn't close a book! If I click on the center square, it will show me the height of the rectangle.



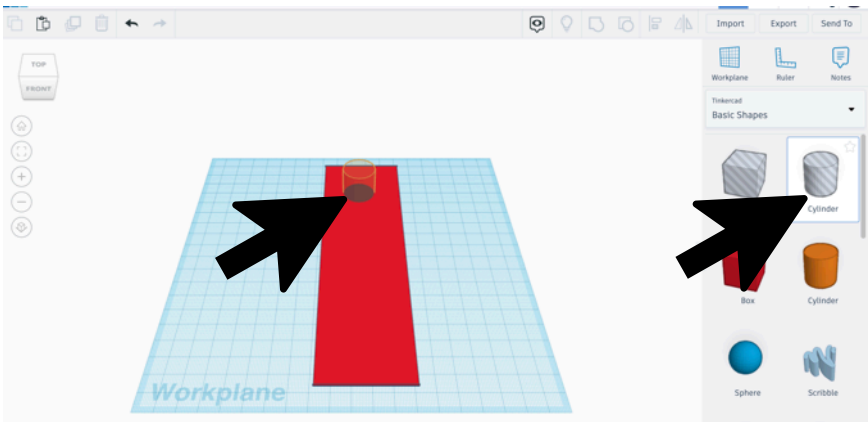
Step 7

It is 20 mm thick. Change it to 1 mm. Again, you can either click on the square and move it until it shows 1.00, or you can click on the number 20.00 and type 1 in the box.



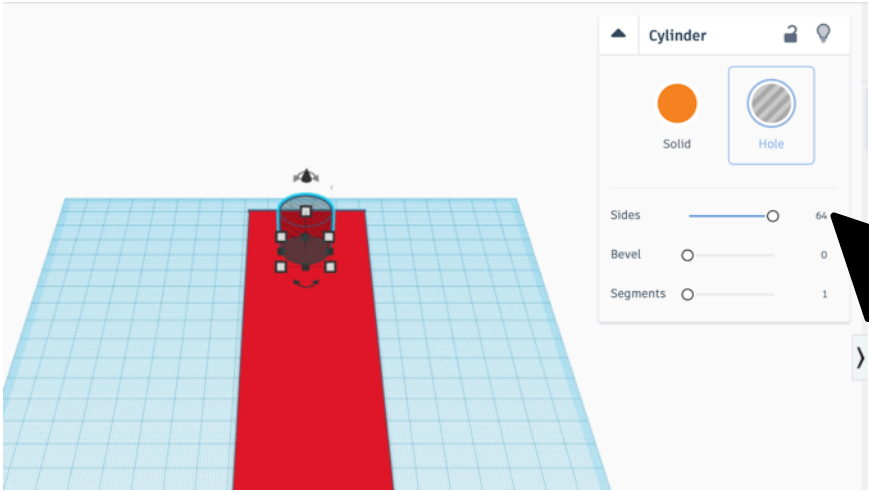
Step 8

In the Shapes sidebar click on the gray striped cylinder. Move your mouse to the workplane and click again to place the cylinder.



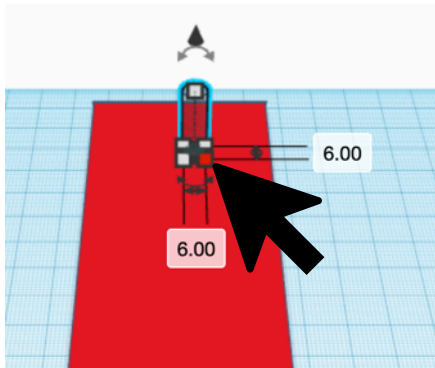
Step 9

Increase the number of sides to 64. This makes the cylinder more round.



Step 10

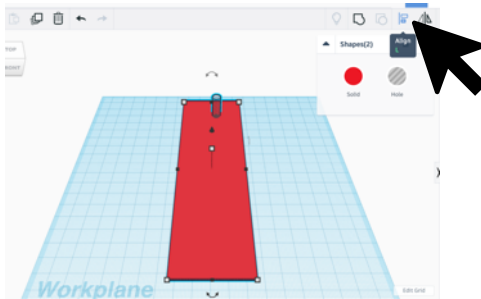
That hole is too big. We want to make the diameter 6 mm. Click on the cylinder to make the squares appear. Click on one of the corner squares. Drag until it is 6 mm x 6 mm or type it in.



Step 11

Now you need to make sure the hole is in the middle. First, you need to select the two objects you want to center align. Select both the red rectangle and the cylinder hole. To select multiple objects, you can hold down the Shift key as you click on each of the shapes or you can click in space and draw a box around the objects you want to include.

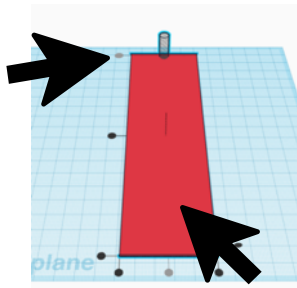
Now click on the Align Tool towards the top right corner.



Step 12

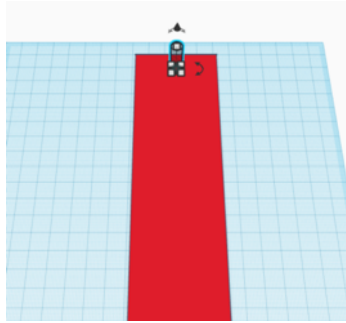
You will now see little “thumbtacks” around the red rectangle. Click on the one you need to center the cylinder horizontally. Then click on the top “thumbtack” to position the cylinder all the way to the top.

Click on the blue workplane to finish using the Align Tool.



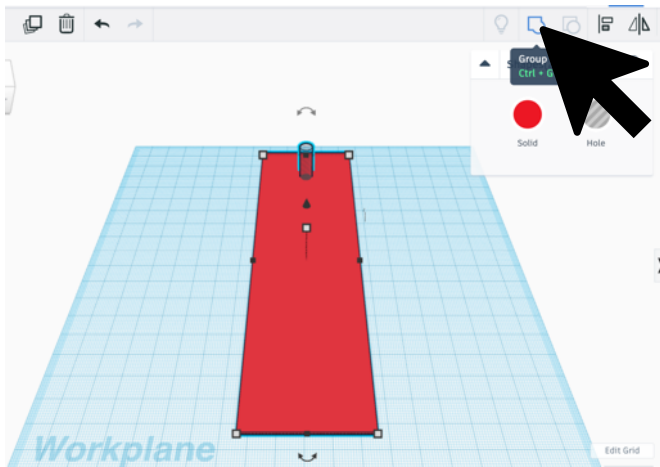
Step 13

Click on the cylinder. Use the down arrow key on the keyboard to position the hole vertically. (Do not use the right or left keys or you will need to re-align it.) Click the down arrow key 7 times to move the hole down 7 mm.



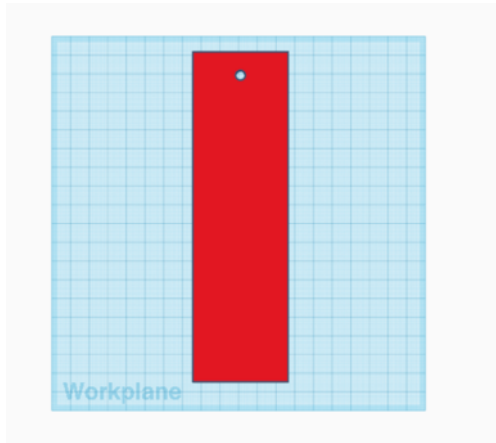
Step 14

Select both the rectangle and the cylinder by holding down the Shift key as you select or by dragging a box around both objects. Then click on the Group Tool.



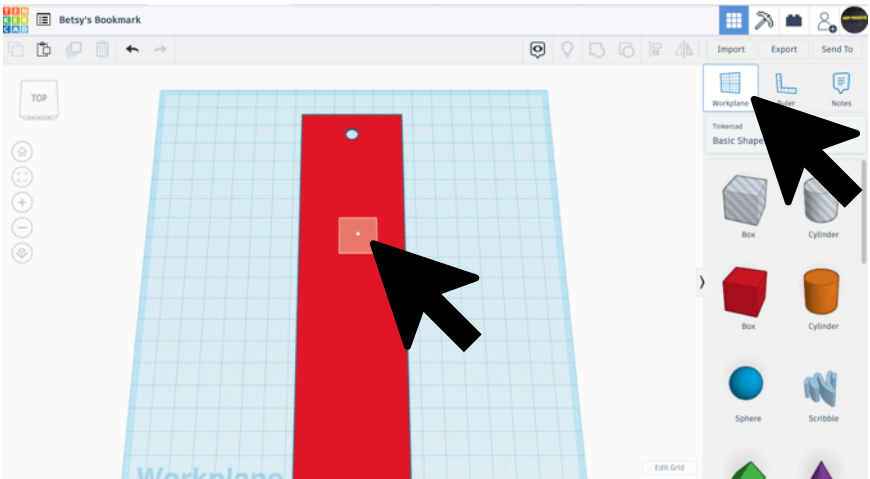
Step 15

Now you should be able to see your bookmark with the hole.



Step 16

You now want to add designs to the top of your bookmark. Click on the Workplane button. Then click the top of your bookmark. Now everything you add will be on top of the bookmark instead of sinking all the way down to the blue workplane.



Step 17

Now it's your turn to be creative. You can design your bookmark using shapes and text. If you are feeling especially adventurous, it is also possible to import images into Tinkercad. Check out the Appendix to learn how to do that.

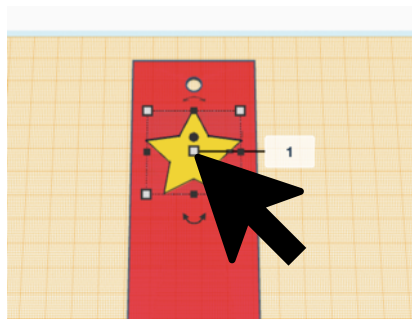
Option 1: Use Shapes within Tinkercad.

Tinkercad has many different shapes in the Shapes area. You can use them as they are, or you can combine and group them to create almost anything you want. There is even a Scribble option.

Once you have selected a shape you want to use, you can make adjustments to it:

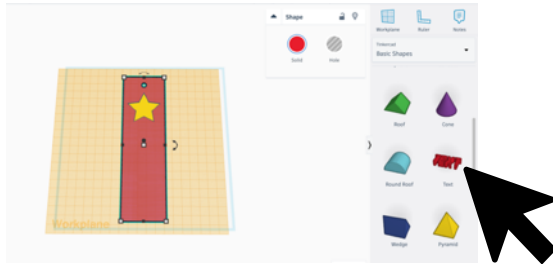
- a) Resize the shapes. You can drag one of the corner squares or type in your desired size.
- b) Move the shapes around. You can click on the shape and drag it around, or you can use the align tool to make sure the shape is centered with the bookmark.
- c) Rotate the shape. Click and drag the curved arrow to rotate your shape.

Once you are happy with your adjustments, change the height to 1 mm.



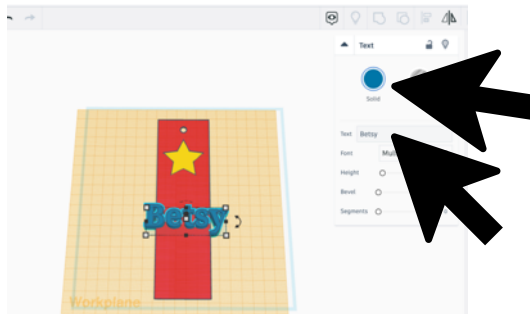
Option 2: Use Text within Tinkercad.

You may have noticed that one of the shapes in Tinkercad is actually Text.



To add text to your bookmark, click on Text and place it on the bookmark.

In the pop-up box change the Text to your desired text. In this box you can also change the font. If you want to change the color to make it easier to see, you can. To change the color, click on the red circle above the word Solid. (But remember, the color on the screen does not affect the color of the print.)

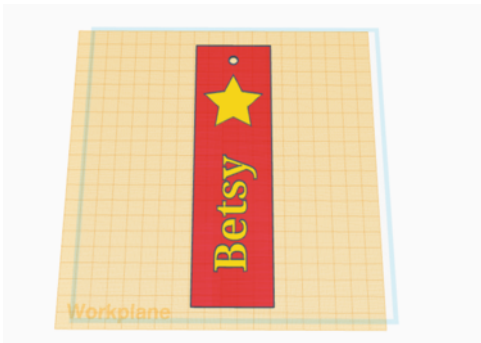


You can make adjustments to your text the same you did to any shapes. Resize it, move it, and/or rotate it until you like the way it looks.

Finally, adjust the height of the text to 1 mm to make the bookmark flat.

Step 18

Use shapes, text and vector files (see Appendix to learn more about vector files) to design your bookmark the way you want it. You can change the colors so that you can better preview it as you are designing. You can use one color for the background and one color for the designs.



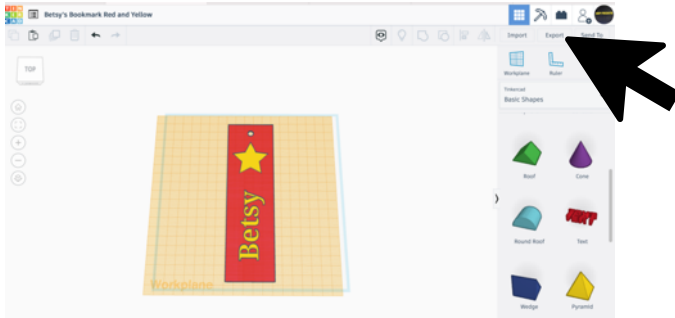
Step 19

Once you have finished designing your file, you are ready to save it for printing. Check the name of your file. Make sure it includes your name and a description of what it is (i.e. Bookmark). Then add the colors that you want to use. For example: Betsy's Bookmark Red and Yellow.



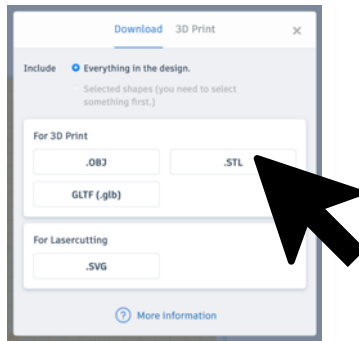
Step 20

Make sure that you don't have any part of your bookmark selected. Then click Export.



Step 21

In the pop-up box, make sure that the option to include everything in the design is selected. Then choose .stl to save the file as an .stl file.

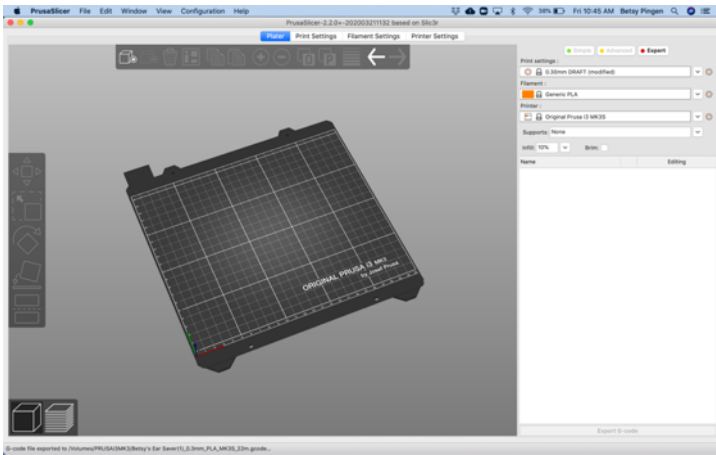


Step 22

If another window pops up, choose "Save File." Your file will be downloaded into your Downloads folder.

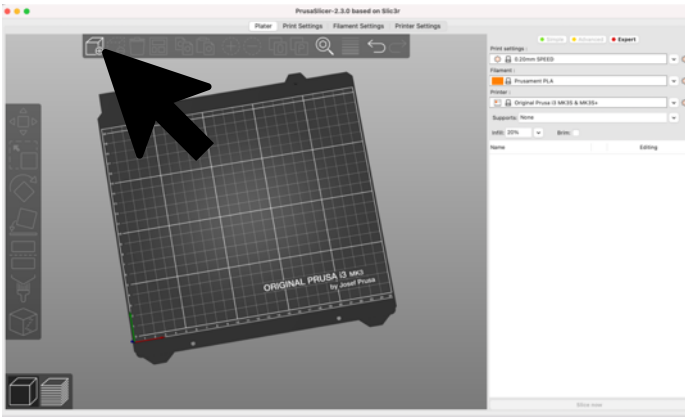
Step 23:

You are now ready to slice your file. Open your slicing program. I am using PrusaSlicer. If you use another slicing program, it may look different than mine, but the process will be similar.



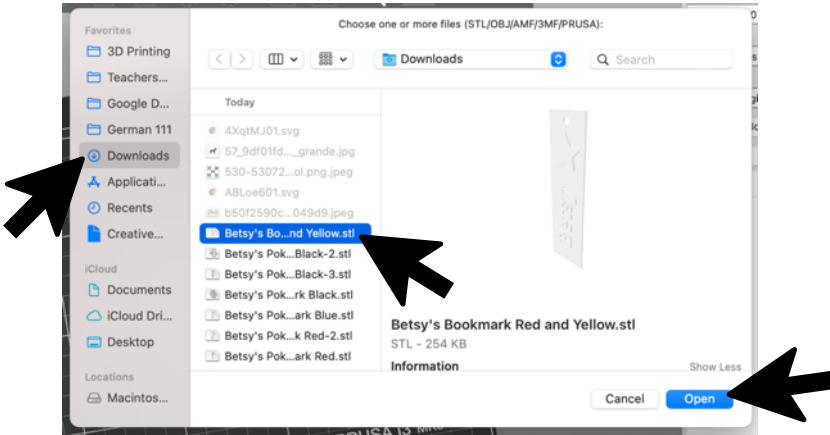
Step 24:

Import your file by clicking on the Add / Import button.



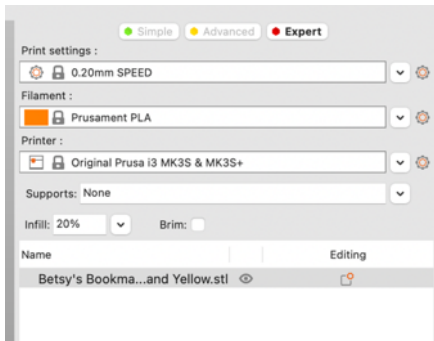
Step 25:

Find the file that you just saved. It should be in your Downloads folder. Then click Open.



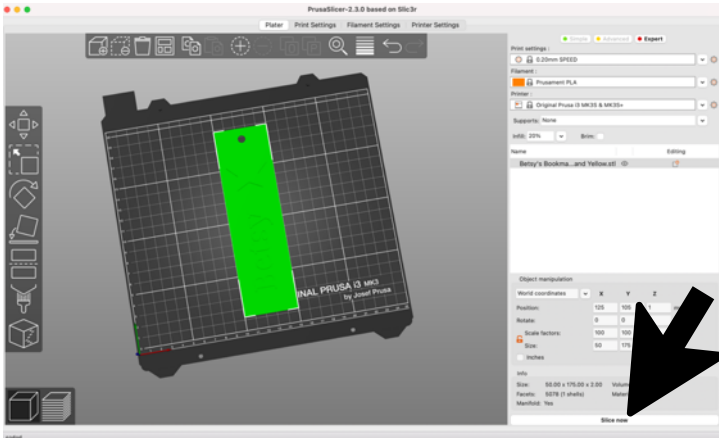
Step 26:

Adjust your print settings. Print at approximately 0.20 layer height. You do not need supports. Use an infill of 20%. Be sure to select the correct filament (probably PLA).



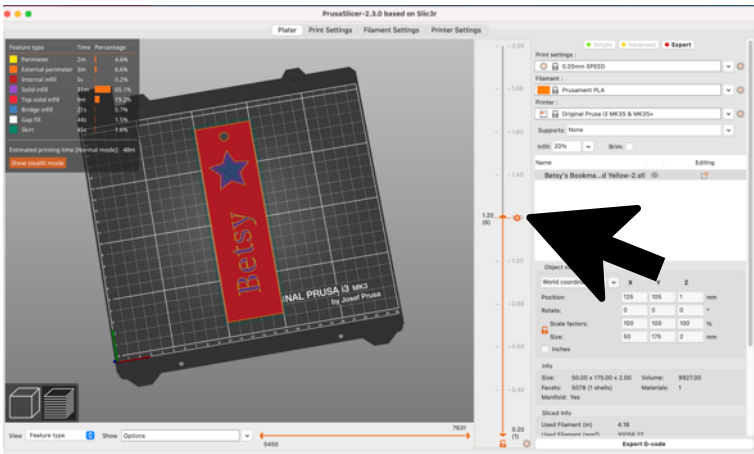
Step 27:

Click Slice Now.



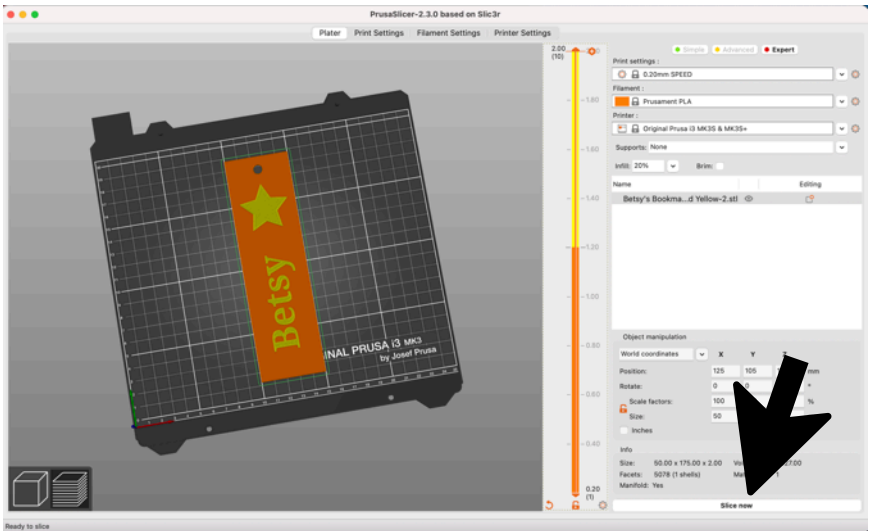
Step 28:

Drag the slider down until you see the first layer where your designs appear. Click on the + button. This will tell your printer to stop at that point to give you a chance to change the filament color.



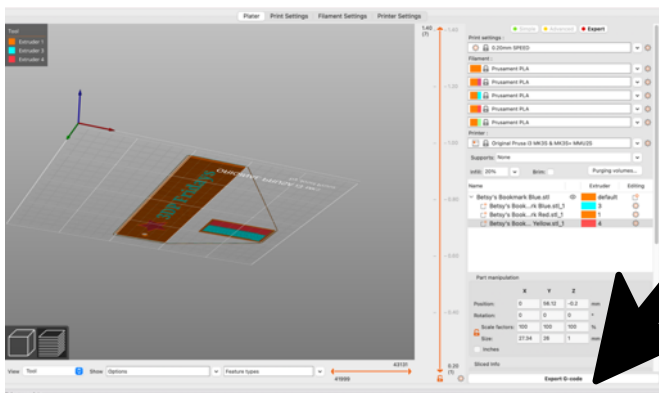
Step 29:

Click Slice Now again.



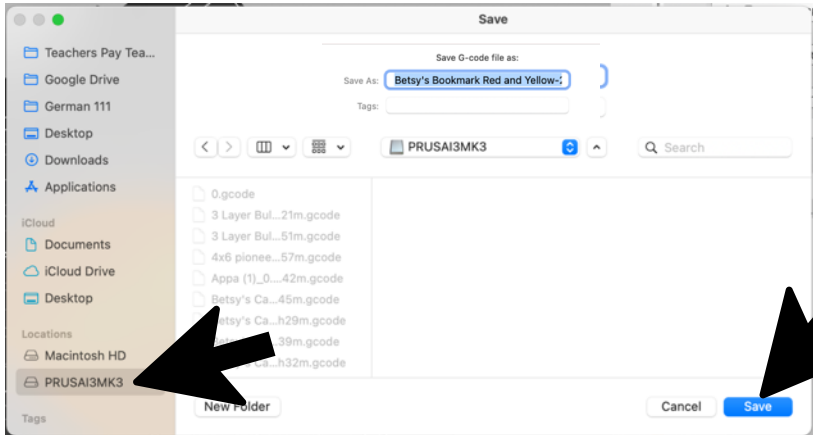
Step 30:

Click Export G-Code to save your file to your SD card or printer.



Step 31:

If your printer uses an SD card, make sure you have the SD card inserted into your computer. Find that SD card on the list of places. Then click Save to save your file to the SD card.



Step 44:

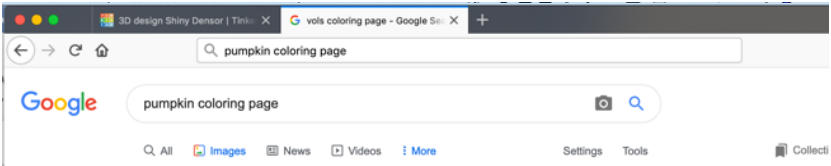
You are now ready to print your bookmark!

When your print is finished, remove it from the printer plate. Attach a tassel. Keep it for yourself or give it as a gift!

Appendix: Use other images

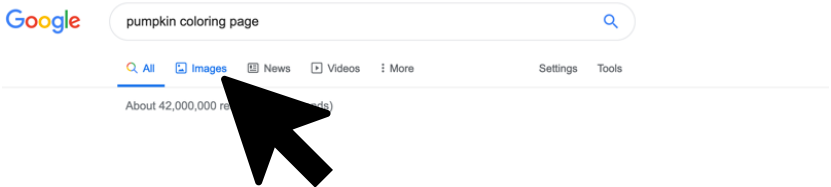
Step 1:

Open a new tab or window. In the search bar type in whatever image you would like to have plus the words “coloring page” or “silhouette” (depending on what type of image you want). This will help make sure you get shapes easier to make into a vector file.



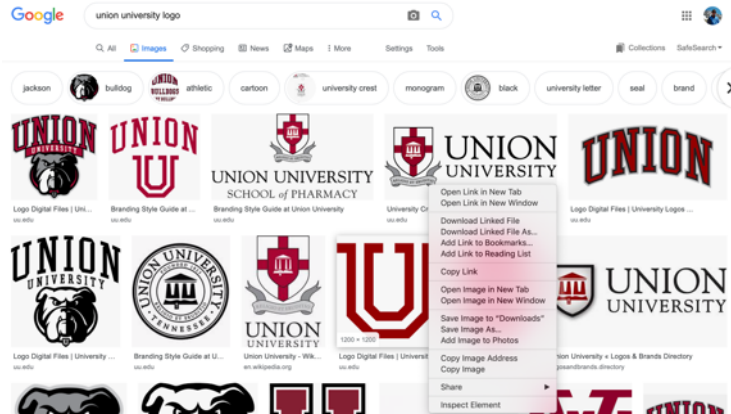
Step 2:

Click on Images.



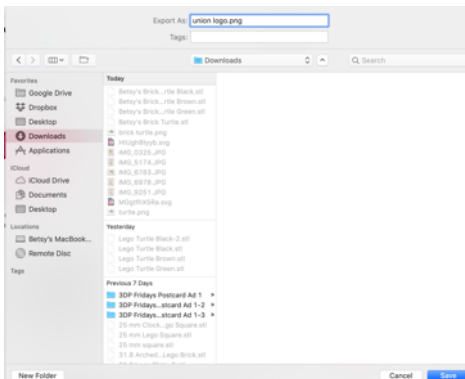
Step 3:

Find an image that you like and that you think will make a good vector file (simple with either very bold lines or a silhouette image). Right click on that image to bring up a menu. Then click on Save Image As...



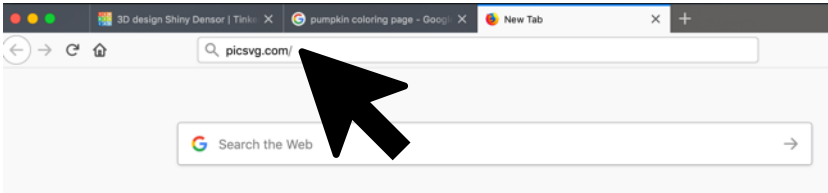
Step 4:

Choose where you want to save the image, probably the Downloads folder. Change the name to something you will recognize.



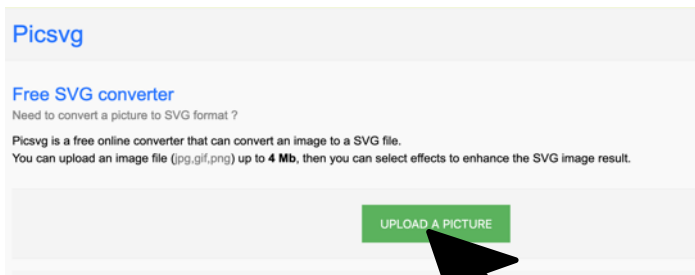
Step 5:

Open another tab. Type in picsvg.com.



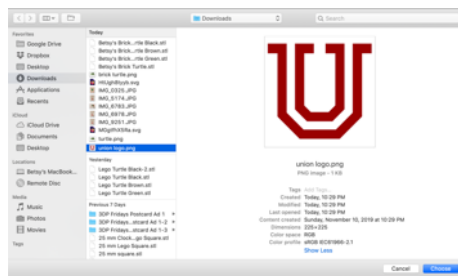
Step 7:

Click the button to Upload a Picture.



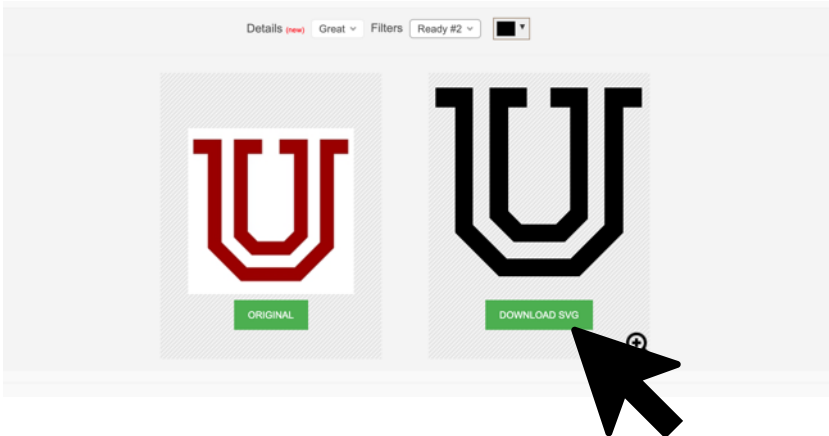
Step 8:

Choose the image that you just saved. Click Open.



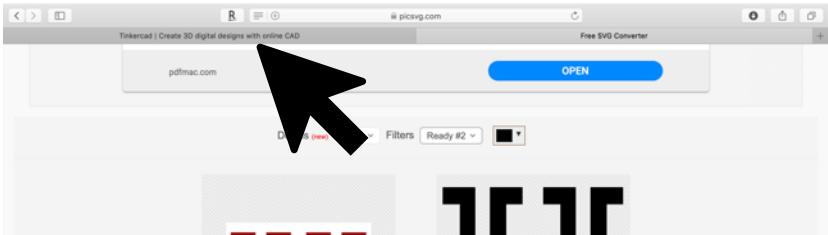
Step 9:

Change the filters as necessary to make sure you have good-looking picture. You will probably want to use a Ready file. Then click Download SVG.



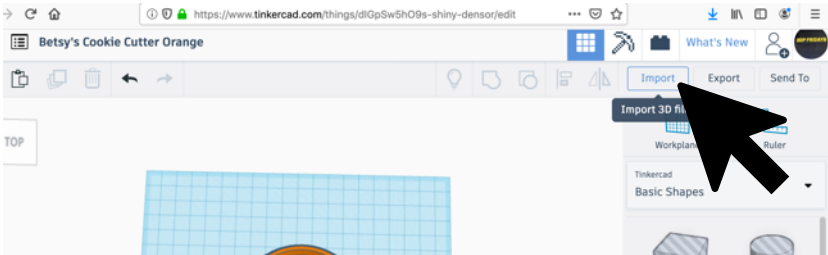
Step 10:

Go back to your Tinkercad file.



Step 11

Click on Import, then Choose a File.



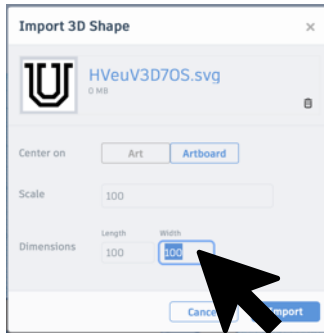
Step 12

Find the file you just downloaded. It should be in your Downloads folder and will have a strange name (combination of letters and numbers) with the suffix .svg.



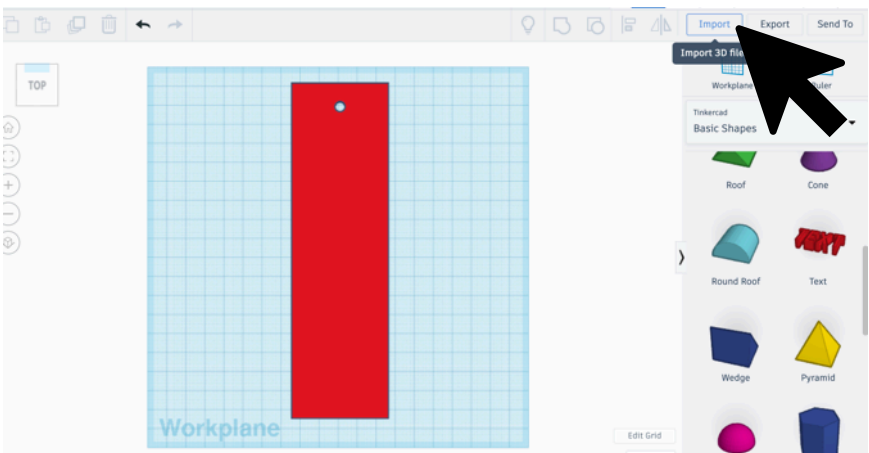
Step 13

In the pop-up window change the largest dimension to 100 mm. Once your file has imported, adjust the dimensions as necessary. Don't forget to adjust the height.



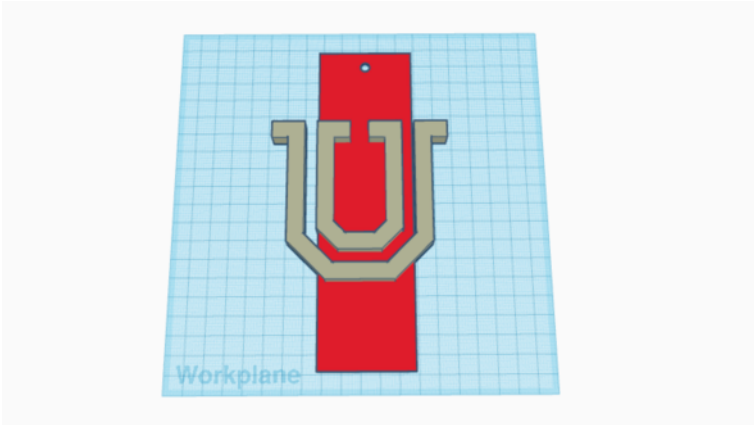
Step 14

Go back to Tinkercad. Click on Import. Click Choose a File. Find your .svg file. You may need to change the size of the file. I usually make the largest dimension 100. The other dimension is then automatically scaled accordingly. Then click Import.



Step 15

Now my vector file should be visible.



Step 16

I can resize it and align it the way I want it. Be sure to change the height to 1 mm. (If you want the image to stick up slightly from the bookmark, you can change the workplane to be the surface of the bookmark before importing your file. See the Raised Option in Step 16 of the main tutorial.)

