Design an ornament

0. Create a Tinkercad account and Create a new design

- On one of the library Macs, single left click one of the icons for Safari, Chrome, or Firefox web browsers in the bottom bar.
- On one of the library PCs, single left click one of the icons for Internet Explorer or Google Chrome in the bottom bar.

- All of the web browsers have a large bar across the top. It should say www.eapl.org. Type Tinkercad.com in that bar instead and then press the Enter key on your keyboard.

- Once it loads, click Sign up (or Sign in if you have an account) in the upper right corner.
- Fill out the information they ask for to create an account.

  Username: _______________    Password: _______________

- On the page that loads, click the multicolor Tinkercad logo in the upper left corner.
- Click the Create new design button in the middle left of the page.
Design an ornament

1. Right side menu
   - The Tinkercad right side menu has lots of the buttons you need for designing objects.

2. Right side menu
   - 6 Shortcuts at the top let you quickly open different groups of buttons, otherwise, you can scroll up and down through the group labels. Click each section label once to open and again to close.

3. Right side menu
   - If you have any shapes you use all the time, you can click the star in the upper right corner of a shape to add it to the Favorites menu.

4. Right side menu
   - Import allows you to import pre-made 3D files to add to a design or modify using Tinkercad.

5. Right side menu
   - Shape generators are fancy custom shape builders made by the Tinkercad community.

6. Right side menu
   - Helpers includes a ruler tool to measure parts of your design and the workplane tool to change the surface where objects are initially placed.

7. Right side menu
   - Geometric has many basic shapes such as boxes, cylinders, pyramids, and more.

8. Right side menu
   - Holes has two premade holes (a box and a cylinder), although any shape can be turned into a hole in Tinkercad

9. Right side menu
   - Letters has pre-made letter shapes.

10. Right side menu
   - Numbers has pre-made number shapes.

11. Right side menu
    - Symbols has shapes including @&!?! and a few others.

12. Right side menu
    - Extras has a few extra shapes like eggs.
2. Pick your ornament shape

- Open the Geometric section of the right side menu.
- Pick one of the following as the main shape for your ornament:
  - box*
  - cylinder*
  - roof
  - round roof
  - wedge
  - hexagonal prism
- Once you’ve picked a shape. **Single left click it.** (Don’t drag and drop!)
- Drag your mouse onto the light blue workplane grid.
- **Single left click to put your ornament shape down.**

3. Moving shapes
It’s easiest to design an object when it is in the middle of the screen.

- Click and hold and drag your ornament shape into the middle of the grid so it will be easier to see for later.
- Labels on the screen will let you know how far left/right and forward/backward you’ve moved the shape.
4. Changing the view

To check to make sure we’re designing our ornaments the way we want them, it’s important to know how to change our view to check everything. A diagonal view showing 3 sides is best.

- Use the **arrows** on the left side to rotate around the center.
- Use the **home** button to return to the default view.
- **Right click anywhere and drag** to rotate around the center.
- Click on a shape and then press the **square button** to automatically zoom in on only that shape.
- Use the + or — to zoom in/out. You can use your scroll wheel as well.

5. Measuring shapes

Let’s see how big our shapes are by default.

- **Single left click on your shape to select it.**
- **Hover over any of the square resize handles and wait (without clicking).** In a few seconds, the measurements of your shape will appear.
- To see the height of the object, hover on the **white resize square at the top.**

6. Resizing shapes etc.

All of our shapes are too small for ornaments! Let’s resize them.

- **Single left click to select your shape.**

  Once you’ve selected it, the resize handles should appear again. These handles work just like resize handles for pictures in other programs.

- **Dragging the side black handles** resizes *either length or width.*
- **Dragging the corner white handles** resizes *both length and width.*
- To increase or decrease the height, **drag the white resize square at the top middle.**

- Let’s use these handles to make our shapes:
  
  **50 mm wide x 50 mm deep x 4 mm tall**
- Certain shapes may work better rotated. Use the **curved arrow rotation handles** to rotate your shape, and the **black up arrows** to raise/lower them if need be.
7. Hollow out your ornament

We’re going to put something on the inside of our ornaments. To do that, we’ll use Tinkercad’s align and hole features.

- From the right side menu, insert another one of the same shape you picked earlier. (If you had to rotate or raise/lower your shape, do that again too.)
- Change its size to **45 mm wide x 45 mm deep**.
- Don’t change its height.
- **Single left click on any of the blank space** not occupied by either of your shapes.
- **Now single left click and drag over both of your shapes and release**.
- In the top menu, find and single left click the Adjust button. Then click Align…
- Depending on where you put your two shapes, different buttons may appear.
- We want to **single left click the flat black lined circle Align Tools** that appear until your shapes look like Picture 3 below.

- **Single left click on any blank space** to dismiss the Align Tool.
• Single left click on your taller shape.
• The **Inspector** tool will appear in the upper right corner.
• In the **Inspector** menu, single left click on the **Hole** button.

• We’ve made our second shape a hole by doing that. Now, we have to remove that hole from our first shape.

• To do that, single left click on any blank space to deselect everything.
• **Drag your mouse over both shapes.**
• Above the inspector, **click the Group button.**
• Wait a moment as Tinkercad thinks and creates the hole for you. Voila!

**8. Fill the ornament center**

• There’s a lot we can do with the center. We’ll show you how to:

  - put your name in the center
  - put a star, heart, or egg in the center
  - import a shape to be in the center

**NOTE:** to print successfully, some part of the center will have to touch ornament perimeter.

• Let’s do our names first as an example.
• From the **right side menu**, click into the **Letters section.**
• **Single click the first letter of your name**, move into the workplane, and **single click to place it**. Do this for each of the other letters of your name.
• If you did two letters twice or typo’d, **single click on the incorrect letter**, and then hit the **Delete** key on your keyboard.
- Make sure that the first and last letters overlap a bit with the edge of your shape outline so your ornament will stay together.

- Also make sure to overlap each letter a bit to make sure they stay together after 3D printing.

- Stars and hearts are in the Symbols section of the right side menu. Insert them into your design just like we have inserted other shapes. Make sure they overlap the edges a bit on at least one side.

- The egg shape is in Extras in the right side menu.

- If your name has lots of letters or only a few, you may need to decrease or increase the size of the letters themselves.

9. Snap to grid (if necessary)

Changing the snap grid setting allows you to move around and place shapes more easily.

- If you’re having trouble getting your letters or shapes to overlap, but you feel they’re the correct size, we can change how we move them.

- By default, each time we’ve moved or increased/decreased the size of a shape, it has been in increments of 1 mm.

- In the far lower right corner of the design area, below Edit grid is a control for Snap grid. This changes how large those movements and size increments are. Single left click the drop down arrow, and then select something lower than 1.0, such as .5 or .25. We do not recommend turning Snap grid off.

10. Import pre-made shapes

- Tinkercad allows you to import premade 3D .STL files.

- These can be shapes you’ve made or shapes you’ve downloaded from sources like Thingiverse.

- In the right side menu, click to open the Import section.

- Click the More button to see a detailed description of this tool.

- The Import tool has the ability to import from 3D files on your local computer or 3D files openly available online (URLs). We recommend using the File function of the Import tool. URLs will have to be direct links to 3D files ending in .STL, otherwise importing will fail.

- If you’d like to put something other than your name or a symbol in the center, we’ve loaded a few other shapes on your computer.
• Click File and then click Browse to pull up the window that helps us find files.
• In that window click Desktop, click on one of the popular pre-made model options we placed there, and then click Open.
• The location of the file will display in the bar to the left of the Browse button. We’ll leave it at a scale of 100% and units of mm. Click Import to actually insert it in your design.
• All imported shapes are put in the middle of the workplane by default. Single left click and hold the imported shape and drag it to move it to where your ornament is.
• You may need to resize the shape you’ve imported as well, increasing its length and/or width to take up the center of your ornament. Make sure to keep its height around 4mm.
• If your center is oval shaped or rectangular instead of circular or square, you can skew the shape of the outside of your ornament using the black resize handles.
• (Any shape you can download from Thingiverse.com can be imported into your 3D design like this.)
• Examples:
11. Download other centers for your ornament from Thingiverse

- Type a search in the upper right and hit enter on your keyboard.
- Scroll through the results and click on a model you would like to look at more.
- Take a look at it. If you actually like it, click the “Thing Files” button.

![Thing Files]

- If the thing has files that end in either .STL or .OBJ, our LulzBot Mini 3d printer can print them.

<table>
<thead>
<tr>
<th>File Name</th>
<th>Downloads</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>yoda_Bust.stl</td>
<td>18148</td>
<td>147mb</td>
</tr>
<tr>
<td>Last updated: 08-10-11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| yodaBust.obj   | 5364      | 91mb   |
| Last updated: 01-05-14 |

- Click on either a .STL or .OBJ file to download it.
- Save it to somewhere on your computer you’ll remember, like your Desktop, Documents, or Downloads folder.

![Save As]

- Now you’re ready to import this center back into your design as shown in #10.
12. Create a string hole for your ornament

- We haven’t designed a specific hole for a string to be tied to our ornament!
  - Let’s do that using a tube.

- From the Geometric section of the right side menu, select the tube (*NOT the “tube thick” or “tube thin”) and insert it near the top of your ornament.
- Resize both its length and width to 7 mm.

- Use the black arrow rotation handles to rotate the tube so the hole is oriented horizontally, not vertically. This will make sure that your ornament hangs nicely with the center facing outward.

- Once you do that, part of the tube will be below the work plane. Use the black up arrow button to raise the tube until its height no longer reads -1.00mm but instead is 0.00mm.

- Now, drag the tube so it overlaps with the frame of your ornament.

- You can eye-ball the alignment of the tube to try to center it or use the Align... tool in the Adjust menu. Or, if your design calls for it, you can put the tube off center. It’s up to you!
12. Rename and Download to your computer

- Once you’ve 100% completed your design, you can download what you’ve created as a 3D file onto your computer.
- In the upper left side, single left click the Design menu.
- Change the name of your design in Properties.
- Then click Download for 3D Printing
- Or click Download for Minecraft to customize it for that game.
- In the menu that appears, choose either STL or OBJ. Either of these two 3D file formats work with Ela Library 3D printers.
- Make sure to save it somewhere you’ll remember. We recommend the Desktop.

13. Upload a model for 3D printing

- Go to http://www.eapl.org/create/forge/3d-print-job-submission in a web browser.
- Scroll down to see the form. Fill out your name, library card #, email address, phone number. We ask for this contact info so we can get back to you with any questions.
- Click the circle button for the single color you would like your object printed in.
- Click Choose File and then find the 3D file you want to submit and click Open.

  ![Choose File](choose_file.png)

- Click Upload to the right once the file name of your 3D model appears. *Uploading may take a while, please be patient.* The file has been successfully uploaded when the Upload button changes to say Remove.

  ![Upload](upload.png)

- Type in any Comments you have, and decide if you’d like us to display your print before you pick it up.
- Click the button pictured right once.
- Our house model is too large to 3D print, models equal to or less than 145 x 145 x 150.7mm (5.7 x 5.7 x 5.9 inches) can be printed.
Recommended Additional Resources:

**Other technology classes**
Go to [http://www.eapl.org/events](http://www.eapl.org/events) to view and signup for other computer classes.

**Class handouts**
Go to [http://eapl.org/events/computer-programs/class-handouts](http://eapl.org/events/computer-programs/class-handouts) to download class handouts.

**Librarians, Computer Aides, and Makerspace Assistants**
We are glad to help you out at the second floor reference desk or in the Makerspace as best we can while helping others.

**Help appointments**
Ela Library cardholders can schedule one-on-one appointments with librarians for further help. We can help with our Digital Media Labs or with general technology questions in our areas of expertise.
Appointments last up to one hour. Paper appointment request forms are available at the 2nd floor reference desk. You can also request appointments online:
- [http://www.eapl.org/DMLhelp](http://www.eapl.org/DMLhelp) to sign up for a Digital Media Lab appointment.

**Tech Tutoring**
The last Wednesday of some months, a tech savvy librarian is available for six 30 minute tech tutoring appointments. Bring a list of questions and we’ll help with as many as possible. Limit one tutoring appointment per month per patron. First registered first served, no library card required. Go to [http://www.eapl.org/events](http://www.eapl.org/events) to register for a session.

**Databases**
The Library offers card holders access to many premium databases. These include two which can help you learn more about technology.
- **Gale Courses** offers a wide range of highly interactive, instructor led courses that you can take entirely online. As an Ela Area Public Library card holder in good standing, you are entitled to these courses at no cost. Courses run for six weeks and new session begin every month.
- **Lynda.com** offers technology training with over 20,000 training videos on over 300 topics with exercise files included. The Library pays for you card holders in good standing to access this resource, however you will be required to create a free account. *Please remember to log out when you are finished.*

Access both of these databases from the library Research page: [http://www.eapl.org/resources](http://www.eapl.org/resources)

**Books**
- **3D modeling and printing with Tinkercad: create and print your own 3D models** by James F. Kelly
  Call Number: 006.686 TINKERCAD
- **3D printing with AutoDesk 123D, Tinkercad, and Makerbot** by Lydia Sloan Cline
  Call Number: 621.988 CLI

**Free online tech training websites**

**Download free models online**