

## Wooden Box Project (all students)

Due: Inkscape file due next class

Assembled box due Tue 10/3 – Wed 10/4.

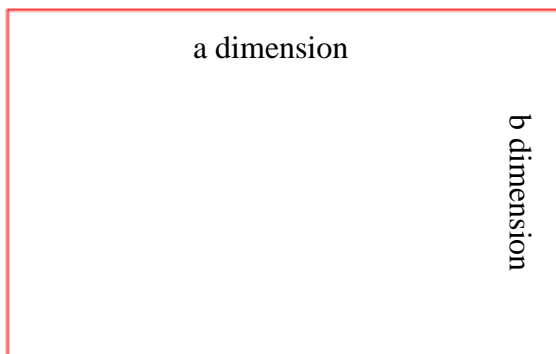
You are going to make a wooden box. Each person will make a box with different dimensions. First we will cut the boxes out of cardboard and when we know they will work we'll cut them out of wood and glue them together.

Here's a sample box over to the right.

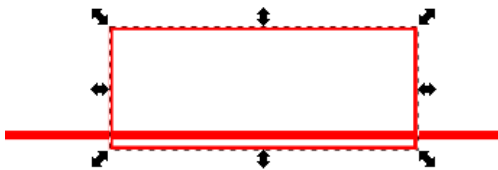


Steps:

1. Get your dimensions from the Google Classroom. They will be in a, b, and c dimensions. This document will use 80 mm for a, 50 mm for b, and 30 mm for c. Yours will likely be different.
2. Start with the bottom of the box. Open Inkscape and create a new document. Make a rectangle that is exactly the dimensions of your a and b in mm. Save your project named "yourname - box". Don't do a bunch of work and then have a problem because you didn't save the file! The rectangle below is 80 mm wide (a) and 50 mm height (b) in Inkscape:

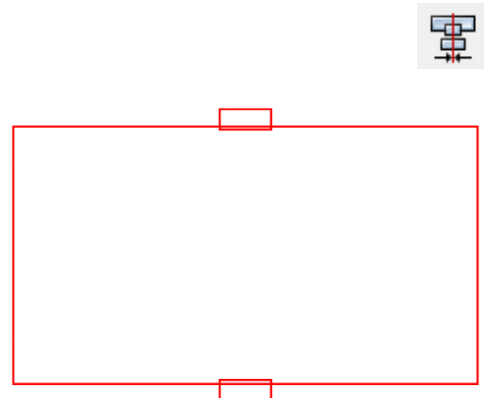


3. Create a rectangle that is 10mm W by 4mm H and place it in the top middle of the big rectangle on the edge like this:

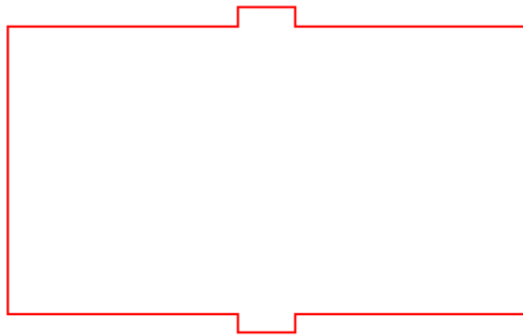
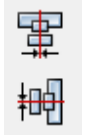


Duplicate the small rectangle to make a copy that you place on the bottom edge.

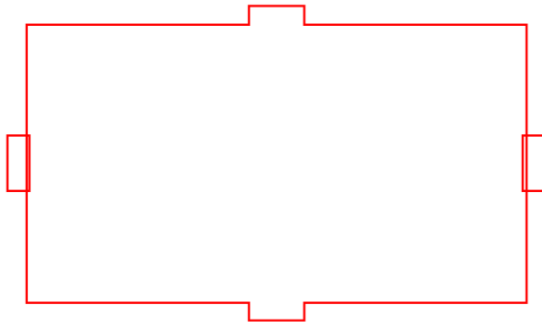
Use the Align and distribute tools to center the pieces on the top and bottom as shown here.



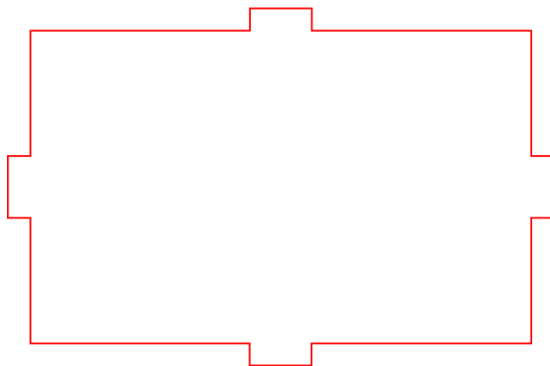
Duplicate another copy of the 10 by 4 rectangle and place it over to the side. Select the three aligned rectangles and choose Path>Union. It should look like this:



4. Rotate the little rectangle you had on the side (10 by 4) so it's vertical. Make another copy of it. Put them on the left and right of your object. Use the align tool to center them vertically. It should look like this:

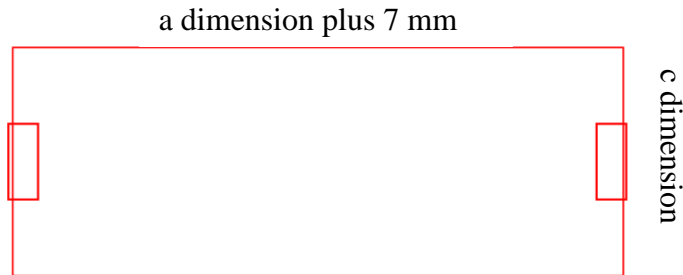


5. Duplicate one of the small rectangles and drag it off to the side for use later. Select all five of the rectangles that you just positioned carefully and choose Path>Union. You end up with this:



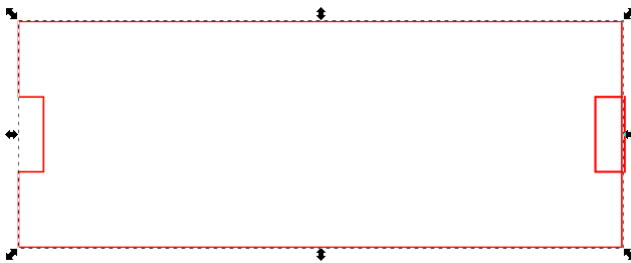
This is the bottom of the box.

6. Create a new rectangle with the main width of your box (**a**) **plus 7 mm** along with how tall your box will be (c). This diagram is showing 87mm width (a) and 30mm tall (c). Duplicate your small box (10mm W by 4mm H) and position one on each side, centered vertically, like this:



Notice how these small boxes are on the **INSIDE** of the box. This is important. Use the align tools to get them centered. Make another duplicate of one of the small boxes and drag it to the side for the next step.

Select the left small box and the large box and do a Path>Difference. It should look like this:



### IMPORTANT!

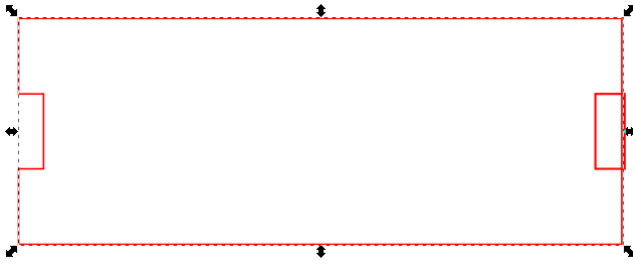
Path>Difference only works with two items selected, so you need to first select the big rectangle and **ONE** of the small rectangles, do a Path>Difference, and then select the big object and the other small box and do a second Path>Difference.

Also, sometimes when you choose "Path>Difference" the wrong thing happens. For example, everything but a tiny piece disappears.

In other words, sometimes the Difference function takes away the big box instead of the small box. Here is why: Inkscape assumes that the most recently created rectangle is the one that needs to be removed or "differenced" away. If this happens, delete the small box, and recreate it, re-center it, and then try again. Now the small one will be the thing that gets "differenced" away. I recommend keeping one copy of the small rectangle over to the side and then duplicating it and using the new copy every time you need one in your box work over the next few pages.

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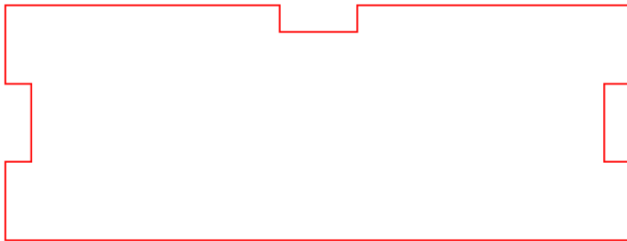
7. Back to our process of making a box. We are right here where we did a Path>Difference on the left side:




Select the remaining small box and the larger rectangle and do another difference. Drag over a copy of the small box and place it centered using the align tool at the top like this:

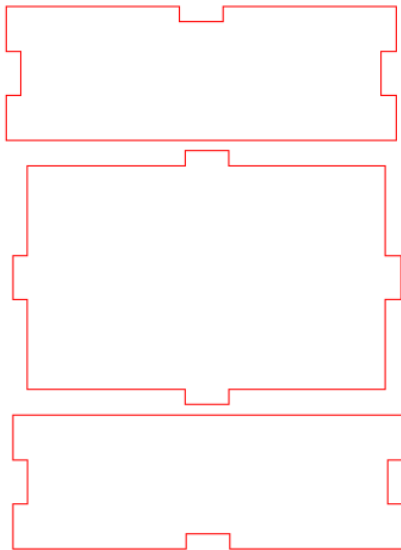


Select both pieces and do a difference to finish this side of the box:

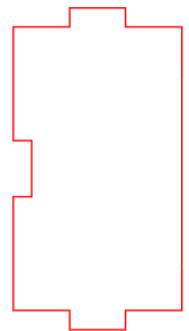


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8. Duplicate this piece, mirror it vertically using the  tool and move it so that your given pieces look like this:




c dimension

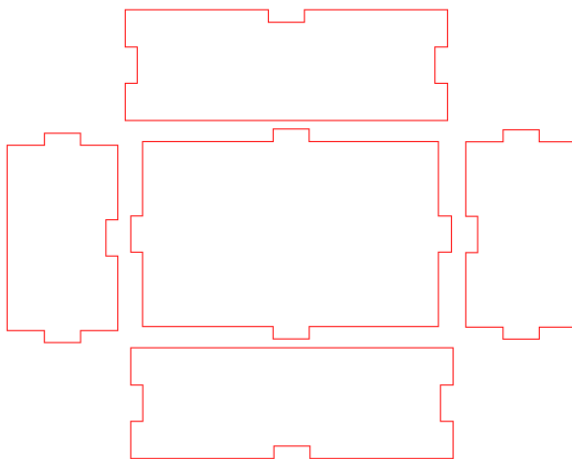


b dimension

9. Make another rectangle, this one with your b and your c. For this example I will use 50 mm (b) by 30 mm (c). Place copies of the small rectangles on three sides just like we did with the last piece to create this thing to the right:

The y dimension shown is how big the large rectangle should be BEFORE you add the tabs on the top and bottom.

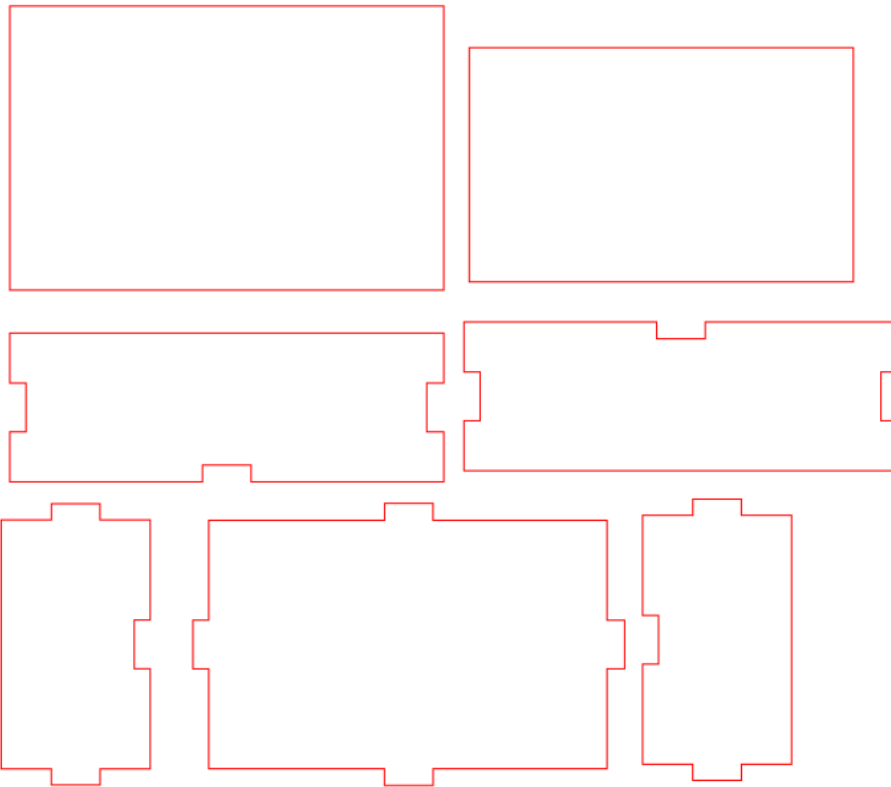
Duplicate this piece and flip it horizontally using the  tool then arrange your five pieces as follows:



Almost done, we just have to make the lid.

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10. The lid is a simple rectangle that is 7 mm longer in both width and height than your original a and b dimensions. So if you were given 80mm (a) by 50mm (b), your lid will be 87mm by 57mm. Make this rectangle and place it near the other shapes.
11. The lid has an inner piece that keeps it from sliding off. Make the inner lid piece by subtracting 3mm from your original a and b. If you were given 80mm by 50mm you would use 77mm and 47mm.
12. **Arrange all of your shapes so that they will efficiently use material when we cut them out on the laser.** They should not be touching, however. I laid mine out like this:



Select all, turn off Fill, set the color to red, and set the stroke to .1 mm. **Turn it in to the Google Classroom and email it to the laser cutter.** We'll cut it out of cardboard first, then when we know it will work, we'll cut it out of wood. Glue the cardboard version together and show me it works, then we'll cut it out of wood.

13. When you have the wooden version, glue the box together with hot glue neatly. (Don't just smother it with glue, make it look nice.)
14. Store the box in your cubby box. We will decorate the lid another day.

Turn your Inkscape file in to the Google Classroom; also email the file to the laser cutter. I'll call you over when it's your turn to cut.