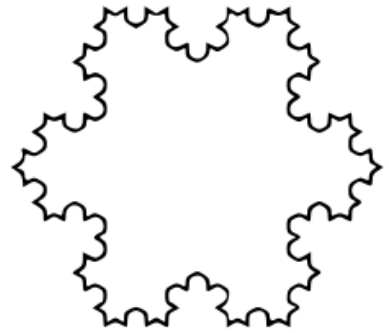


## Laser Cut Holiday Ornament, Make 1 and Make 2

Your task is to create a holiday ornament made of two pieces of wood that interlock together with a slot. You choose the design or theme.

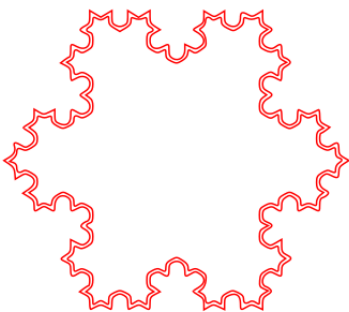
Create an image or find an image online that you think would make a good ornament, a simple, black and drawing will work best. You can even draw it with a sharpie or felt pen then scan or take a picture of it, email it to yourself, then incorporate it into your project. However you get or create the image, import it into Inkscape. For this document I'm using the snowflake image to the right.



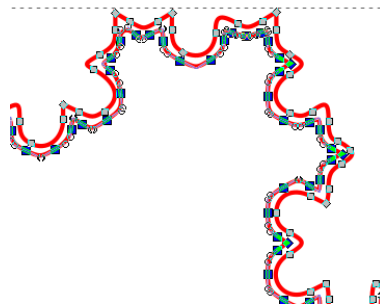
If your image is already a vector image, skip this part. If it is a bitmap image, do the following: Select the image then choose Path>Trace Bitmap. Drag the two images apart so you can edit the vector copy. Delete the bitmap once you can see that you have a good vector image.

In the Object, Fill & Stroke menu, set to no fill, and a stroke size of .1 mm.

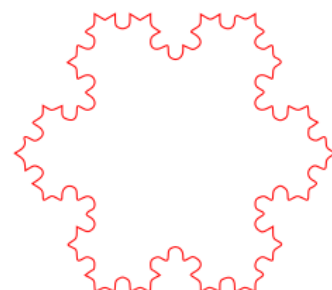
For this project you only want the outline, so you need to delete any doubled inner path. Using the node selector, click on any part of the vector image, then click on any node on the interior path (you might need to zoom in to make sure you're on the right path). Choose Edit, Select All (or Ctrl A) to select all of the nodes on the path, then hit Delete. Choose Undo if your entire image disappears. You might need to repeat the process a time or two, but eventually you should have a clean outline. You may also need to do some fancy node editing to get things right.



After Trace Bitmap

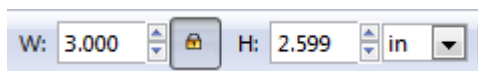


Interior nodes selected



Clean outline

To size the image, select with the arrow selector and drag the corner handles, or type precise values in the W and H boxes in the top toolbar while the image is selected. Set the largest dimension to 3 inches. If you are manually entering the size select the lock to maintain proportions. I'd like your ornament's longest side to be 3 inches. In the example below I set the height to 3 inches and let the width follow because the lock was enabled.



Make a copy of the image by duplicating it. Drag the duplicate copy to the side.

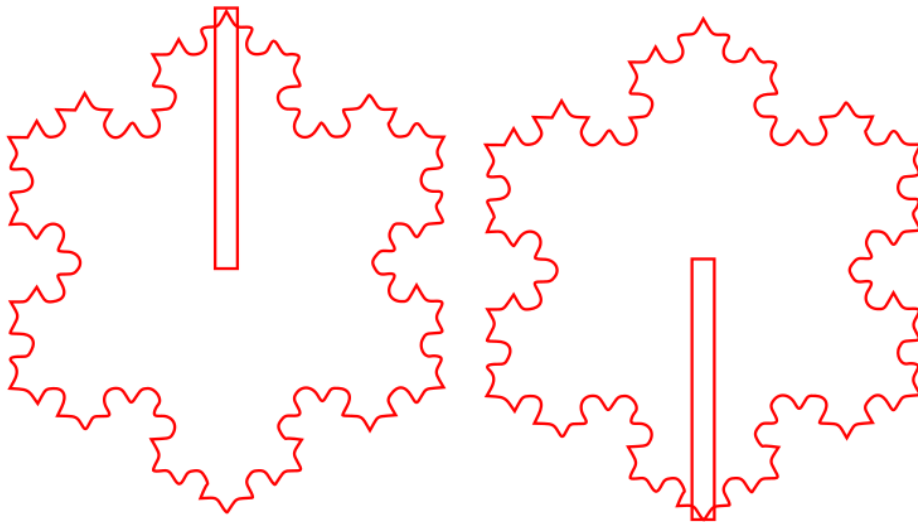
We're going to make notches so the two pieces interlock to make a 3D ornament. To make the notches, choose the Rectangle tool and make a rectangle roughly half the height of the image.

Select the rectangle. It should probably be 1.5 inches tall, and it must be exactly 3.5 mm wide. Type in precise values in the W and H boxes. Unlock the lock if it is locked then change dimensions independently. The height should be half the image height, 1.5 inches in this example, and the width should be exactly 3.5 mm.

The snapping defaults in Inkscape can be annoying for the next steps, you can turn them off by clicking the icon on the far top right of the window that looks like the one to the right.

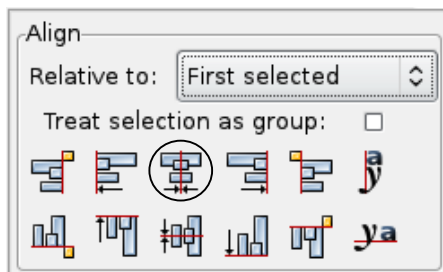


Duplicate the rectangle and put one on the bottom of one image and one on the top of the other.



**DO NOT DO PATH>DIFFERENCE WITH THE RECTANGLES. LEAVE THEM AS RECTANGLES SITTING ON TOP OF THE OBJECT!!!!**

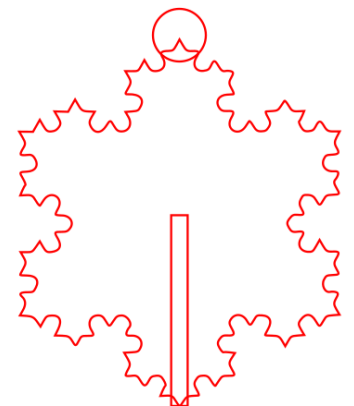
To precisely align the rectangles, select a rectangle and an image (holding the shift key) and choose Object, Align and Distribute. We want the rectangle centered left-right in the image.



Finally we need to add a loop to hang the ornament.

Choose the circle tool and hold the control key while you drag to make a perfect circle at the tip of the image that has the rectangle at the bottom. Align using the Align and Distribute tool. See image to the right.

Select the circle and the shape (hold down shift key) and choose Path, Union.

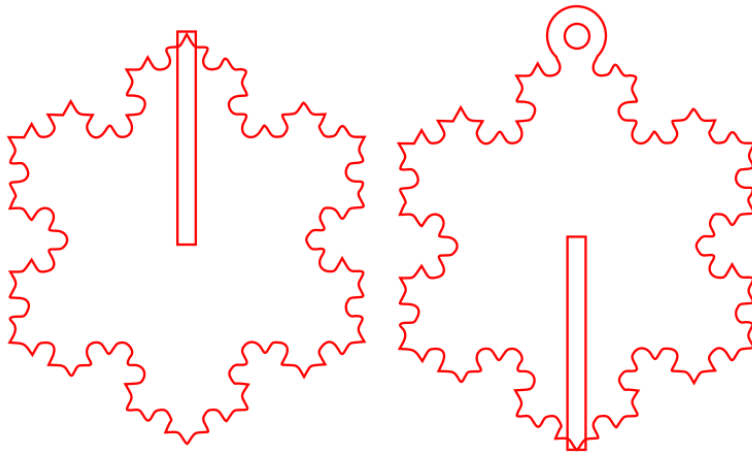


(Continued on next page)

Add a smaller circle inside to form a loop like this:



Here is my final example design:



Note the key elements below. Please review this bullet list before you think you are done.

- One has a rectangle on the top, one has the same rectangle at the bottom.
- The rectangles are separate objects **(Don't do Path>Difference with the rectangles, just leave the rectangle sitting on top of your object, that way we can make adjustments if necessary; if you Path>Difference and make a mistake you have to start over completely.)**
- The rectangles meet in the middle (one goes up to the middle from the bottom, the other goes down to the middle from the top.) If you don't make the rectangles meet in the middle then the ornament does not assemble correctly. Here is an example of one done wrong.



The image on the left shows rectangles that don't "meet in the middle". When you try to assemble these pieces the pieces do not slide together completely.

- The image that has the rectangle at the bottom has a circle unioned with it on the top with a small circle inside for a hanger.
- Select all, turn off all fill, set stroke to red, 255, with stroke style of .1 mm.  
(Continued on next page)

Here is a sample final image:



When you have it all set, turn in the .svg file on the Google classroom and email it to the laser cutter.

We're going to cut these out of cardboard first, to make sure they are working, then we'll cut them out of wood.

Dates:

Inkscape design due Thursday 12/2-Friday 12/3

Final wooden ornament completed by Thursday 12/9-Friday 12/10

And... if you want to paint the ornament, go for it. We've got a bunch of hobby paints back by the hot glue guns.