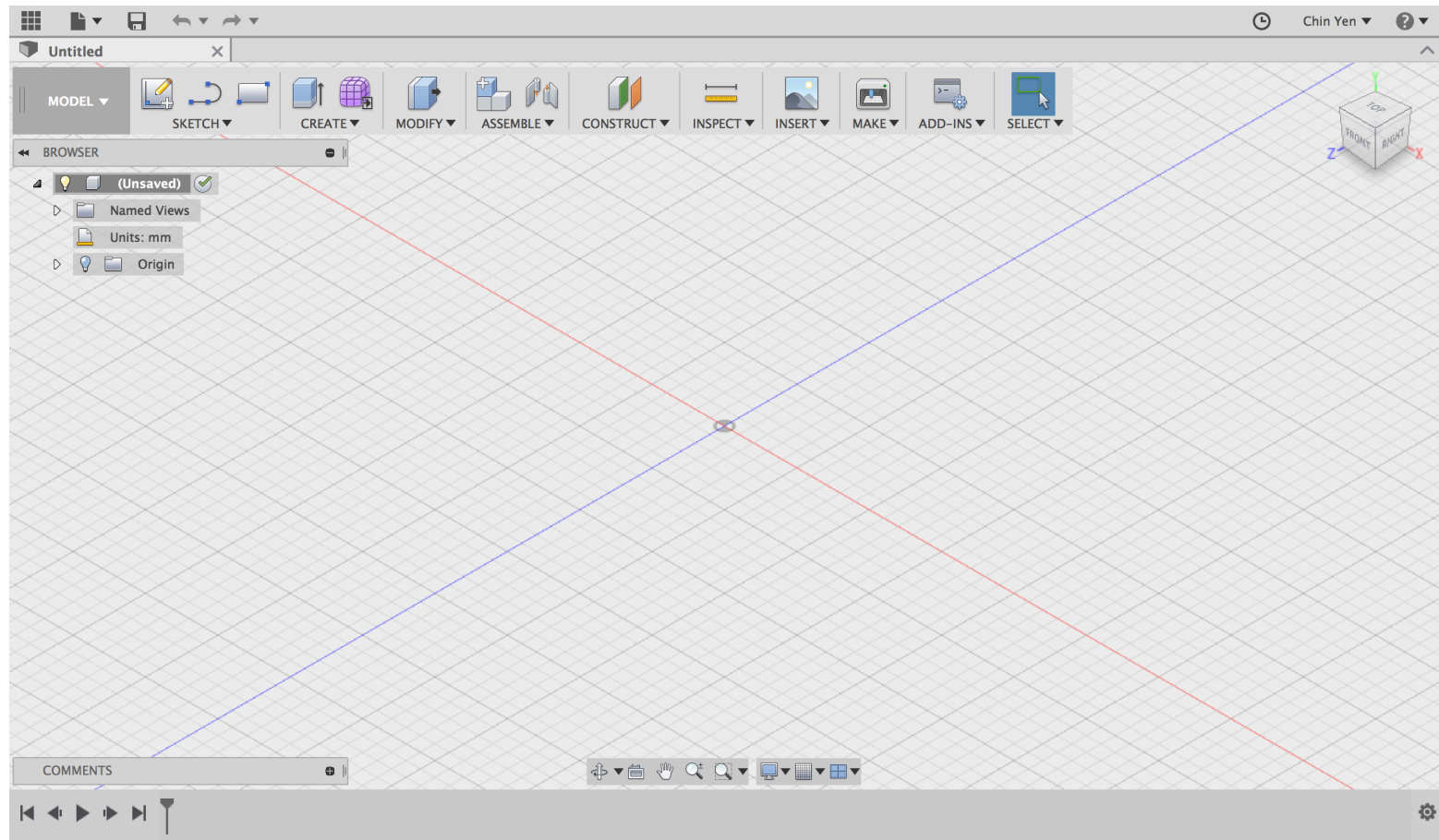




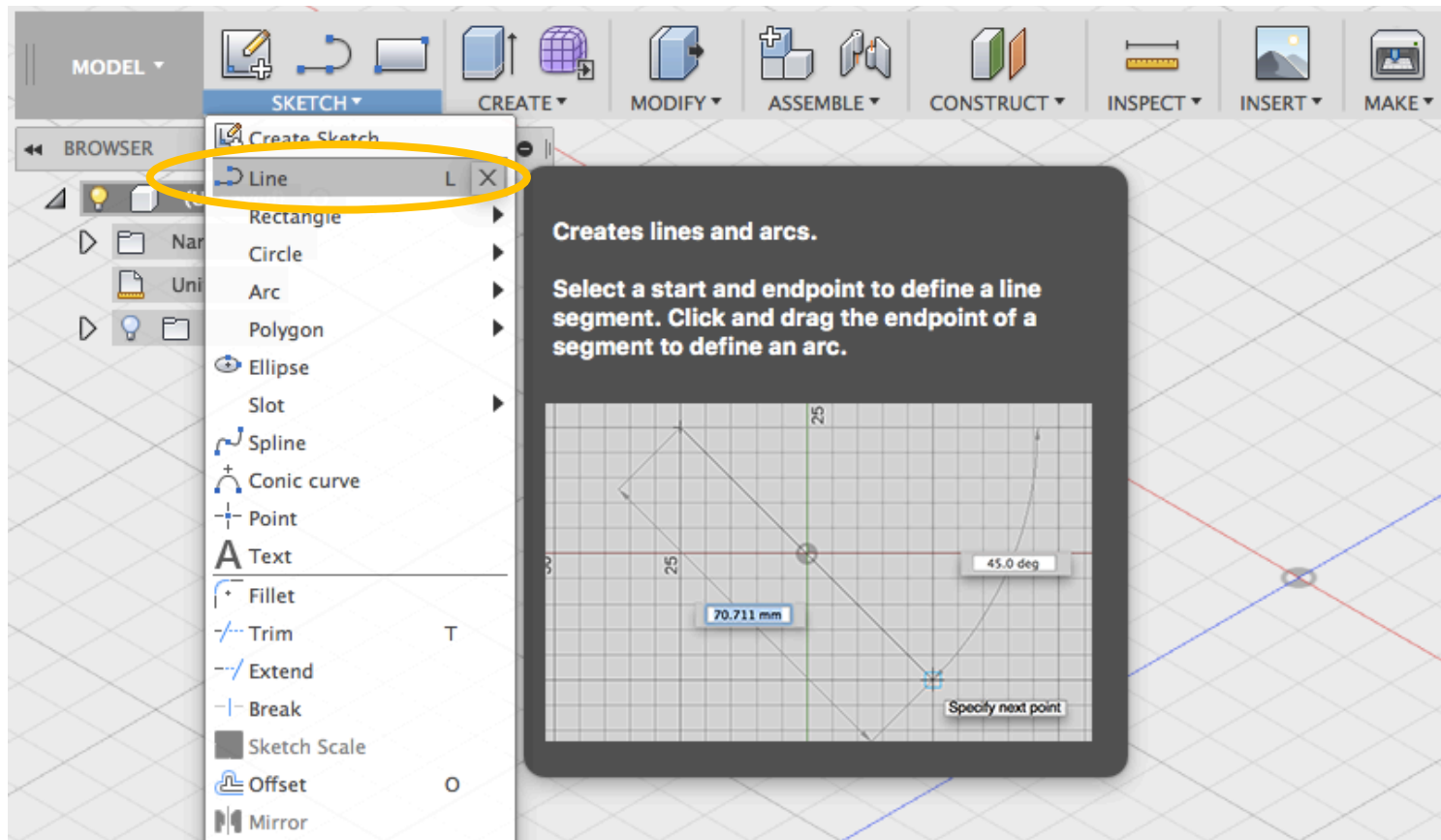
# Lesson 3

Make your own opener

# Step 1: Open 'Fusion 360'.

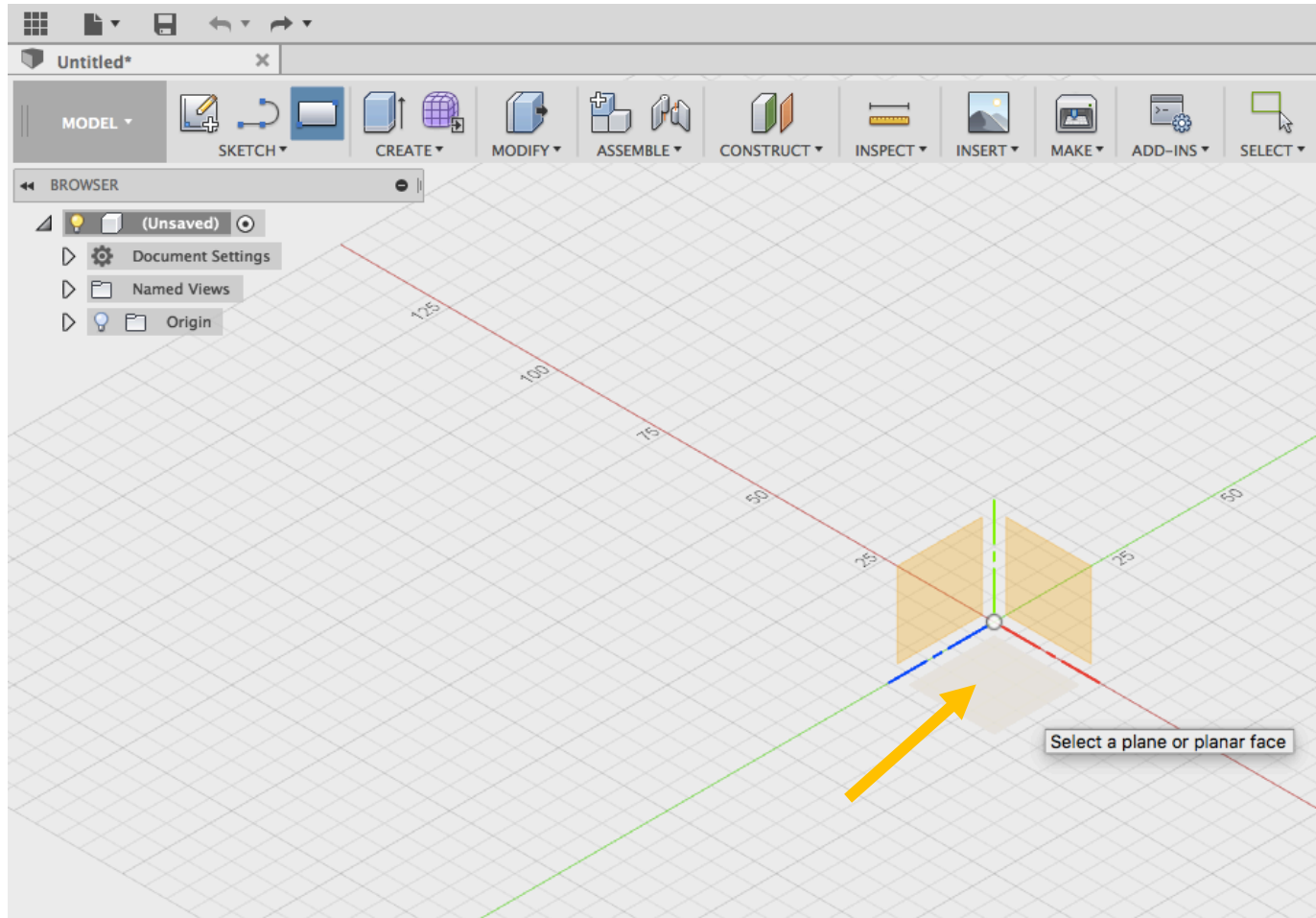


# Step 2: Go to “Sketch” > “Line”.



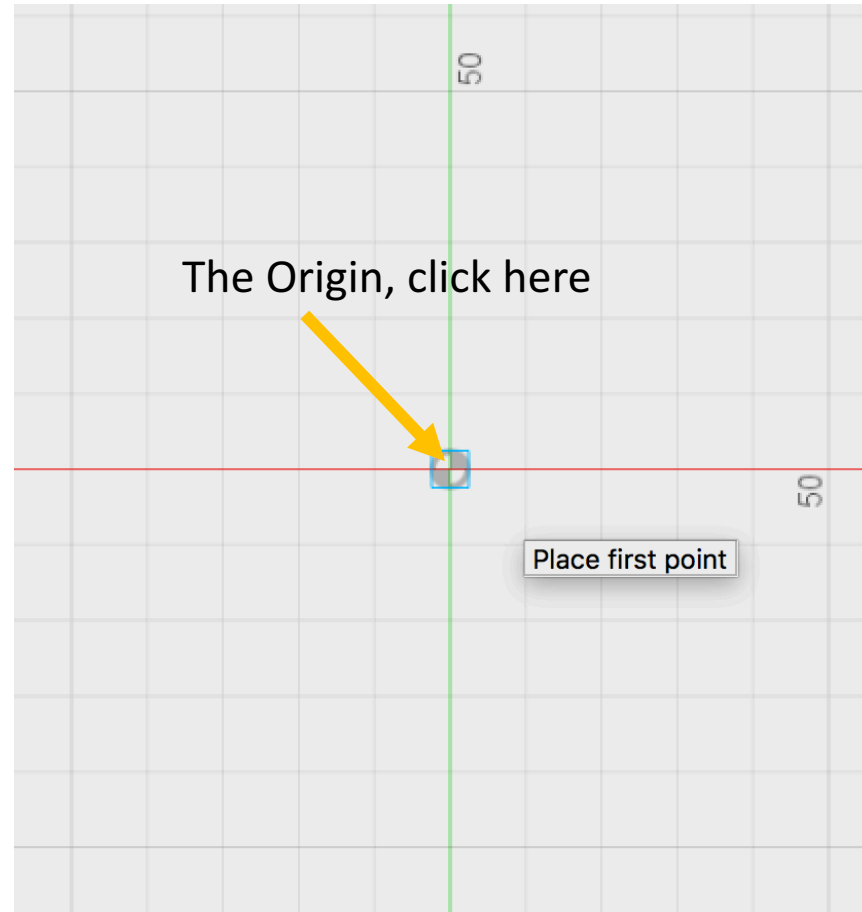
Note: Alternatively, you can hit “L” directly from your keyboard to draw a line.

# Step 3: Click at the base plane as shown below.

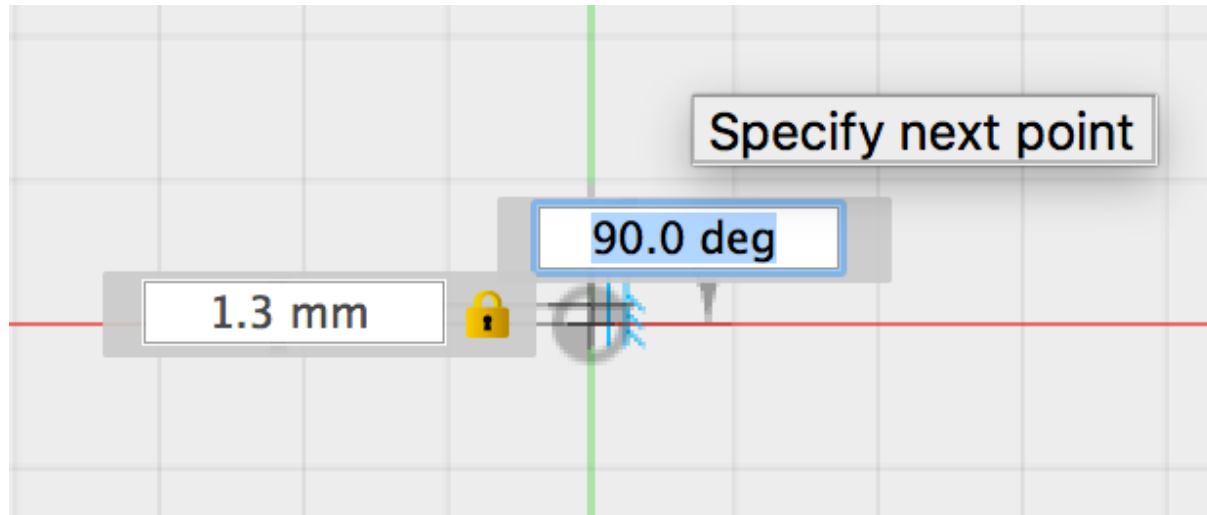




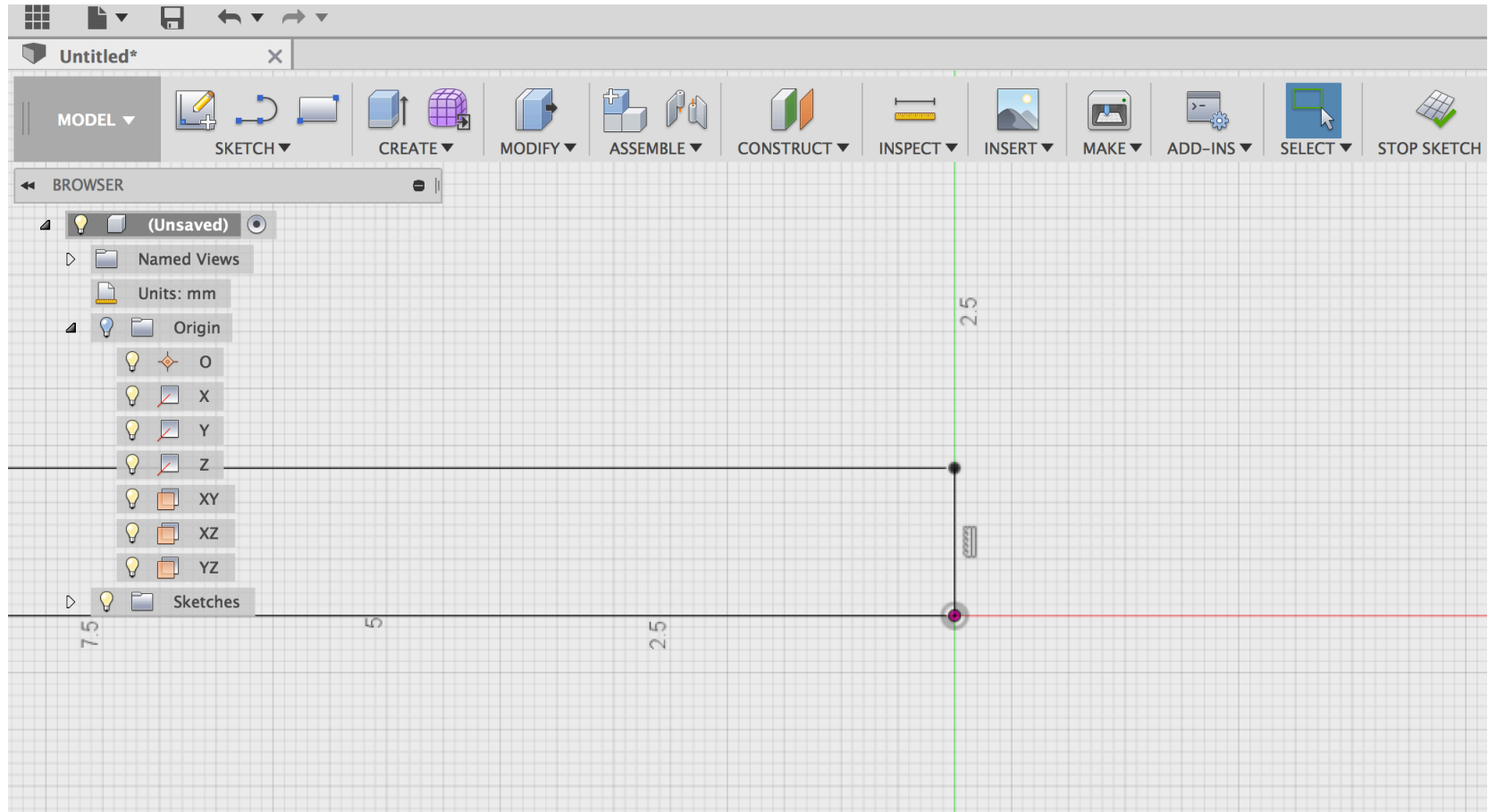
Step 4: Click the 'Origin' point as the first point.



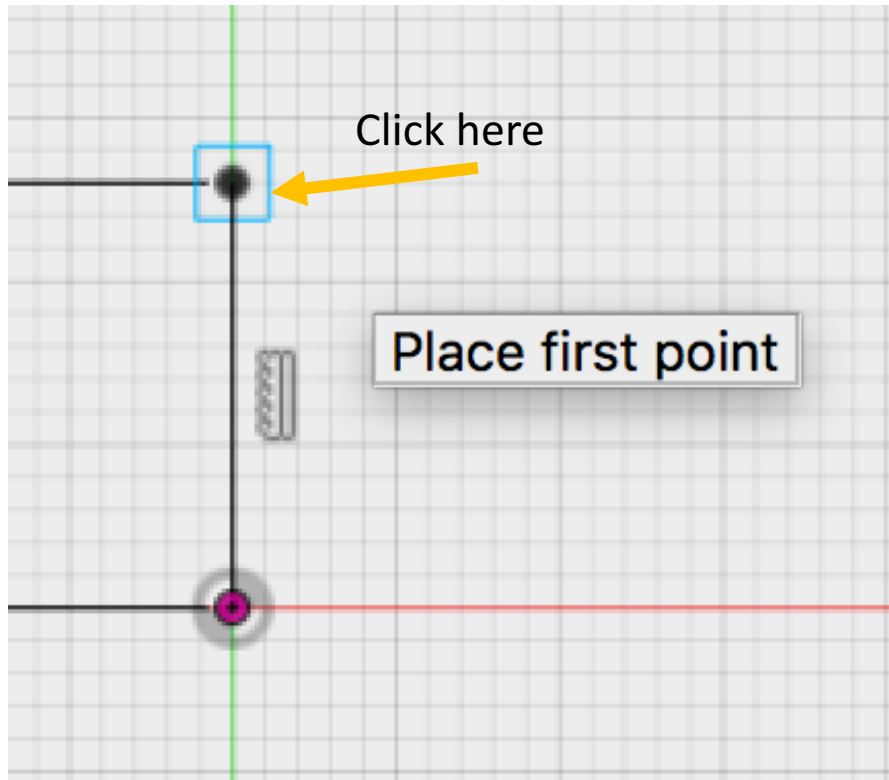
Step 5: Move your mouse to the top.  
Key in “1.3mm”, hit “Tab”, then key  
in “90 deg”. Hit “Enter”.



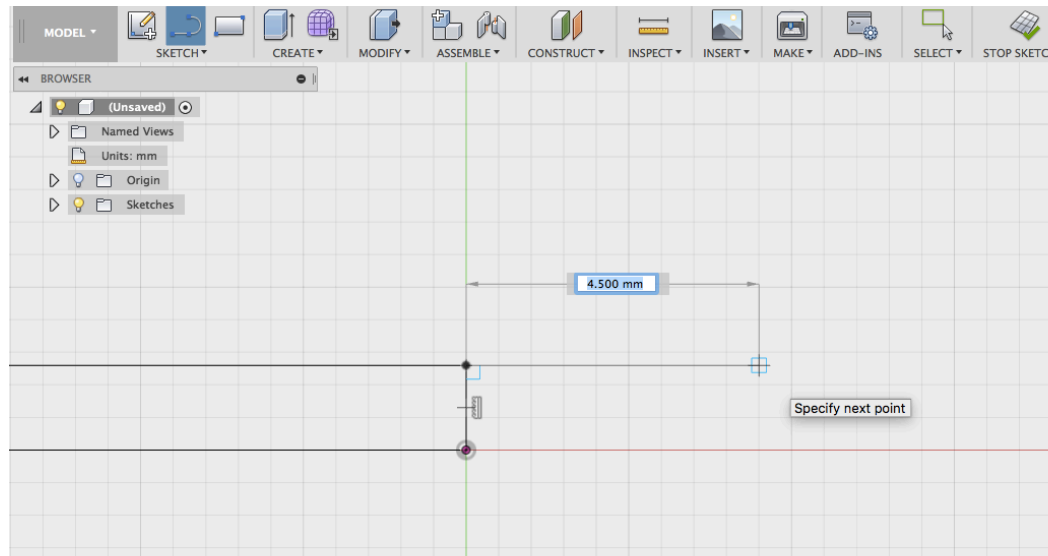
# Step 6: Scroll your mouse to zoom-in the line.



Step 7: Select “Line” again, then click at the ending of the first line.



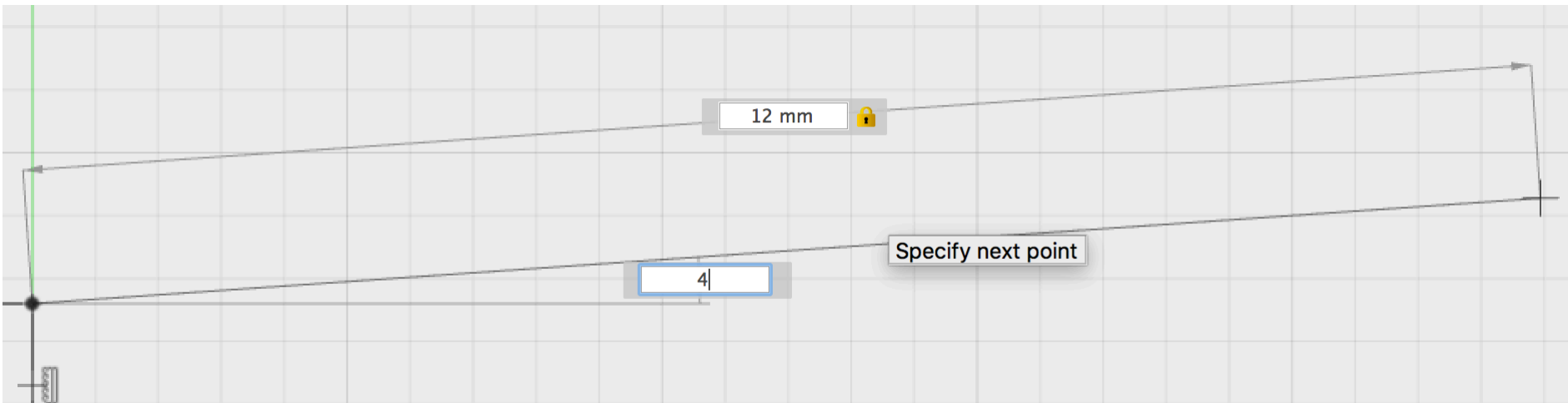
# Step 8: Drag the line toward left hand side.



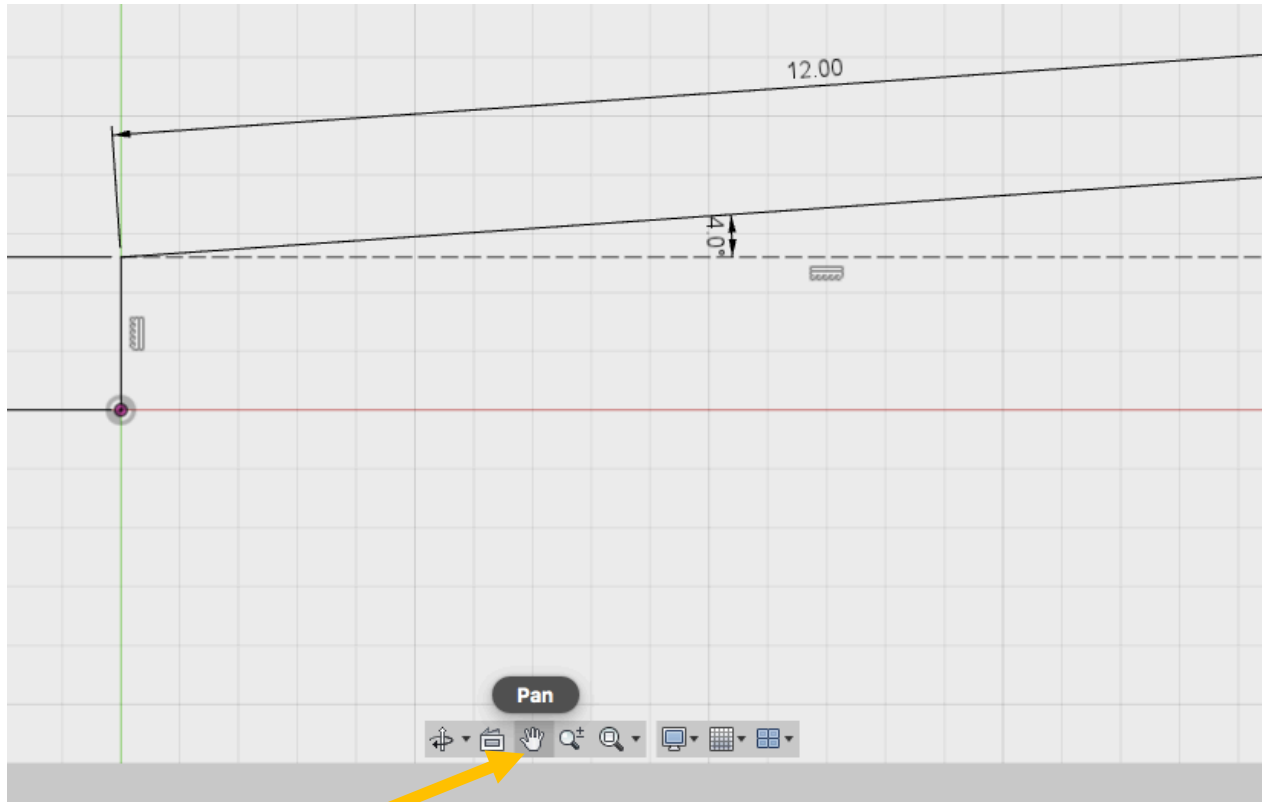
Toward to left hand side



Step 9: Key in “12mm”, hit “Tab”,  
then key in “4 deg” then hit “Enter”.

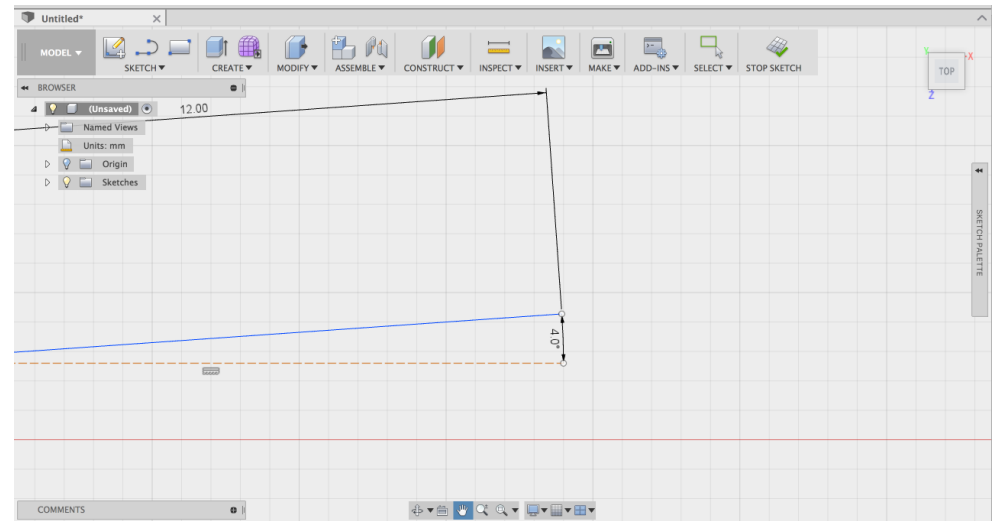
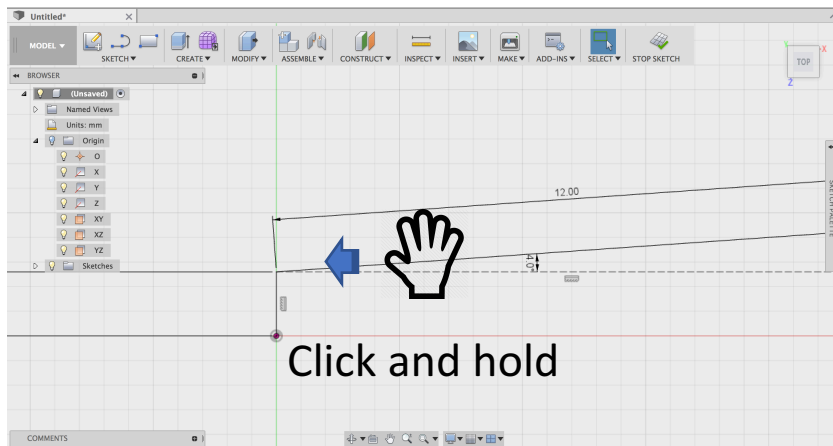


Step 10: Click the 'Pan' icon located at the bottom of the screen.



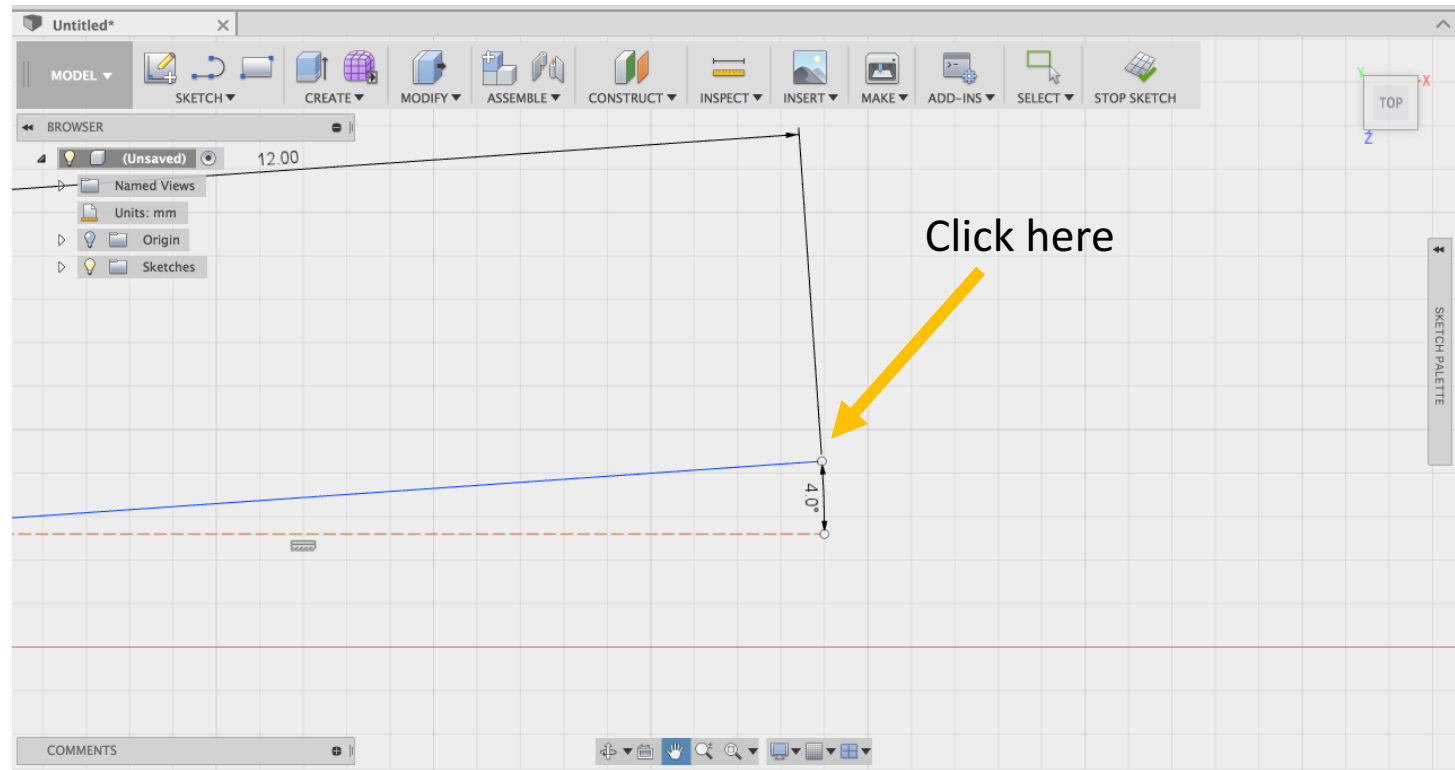
Click here

# Step 11: Hold and drag the sketch to your left hand side until you see the end of the second line.

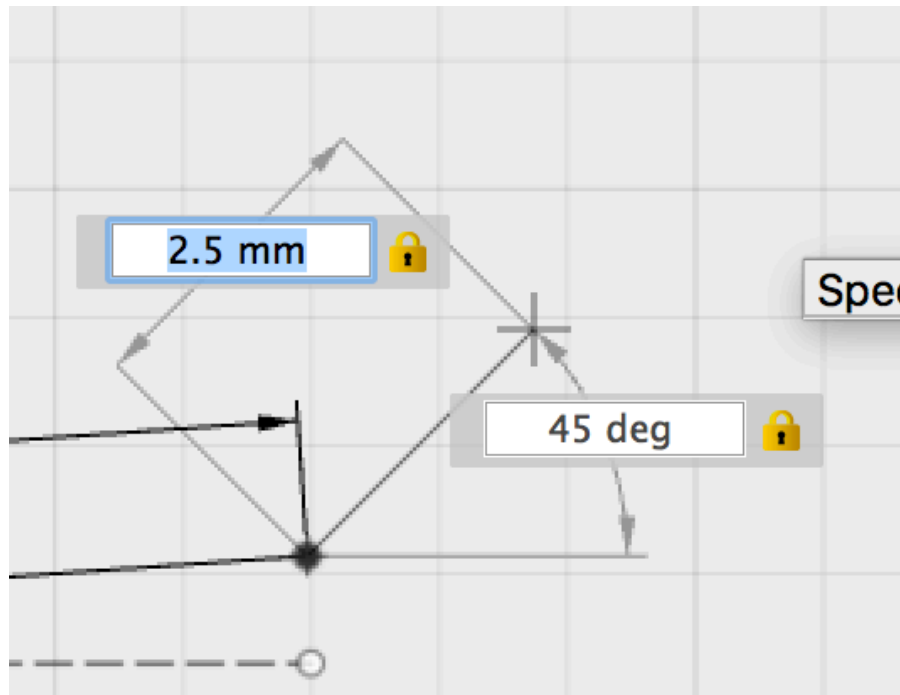




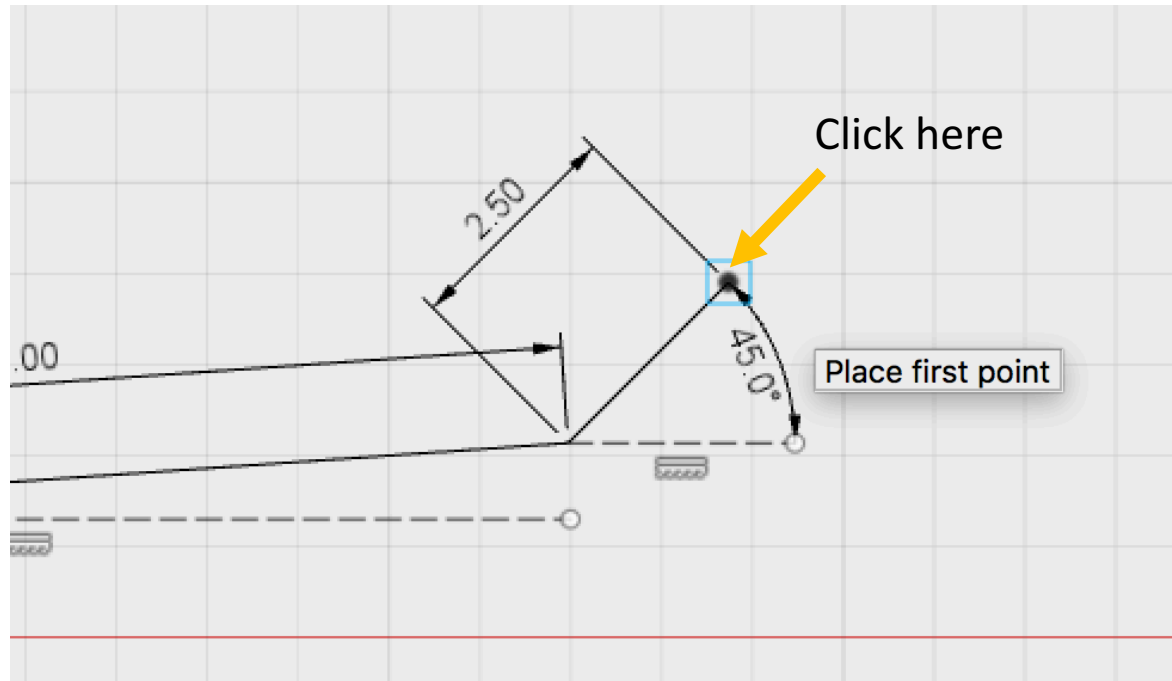
Step 12: Select “Line” again, then click at the end of the second line.




Step 13: Drag your mouse to your right. Then key in “2.5mm”, hit “Tab”, key in “45 deg” then hit “Enter”.

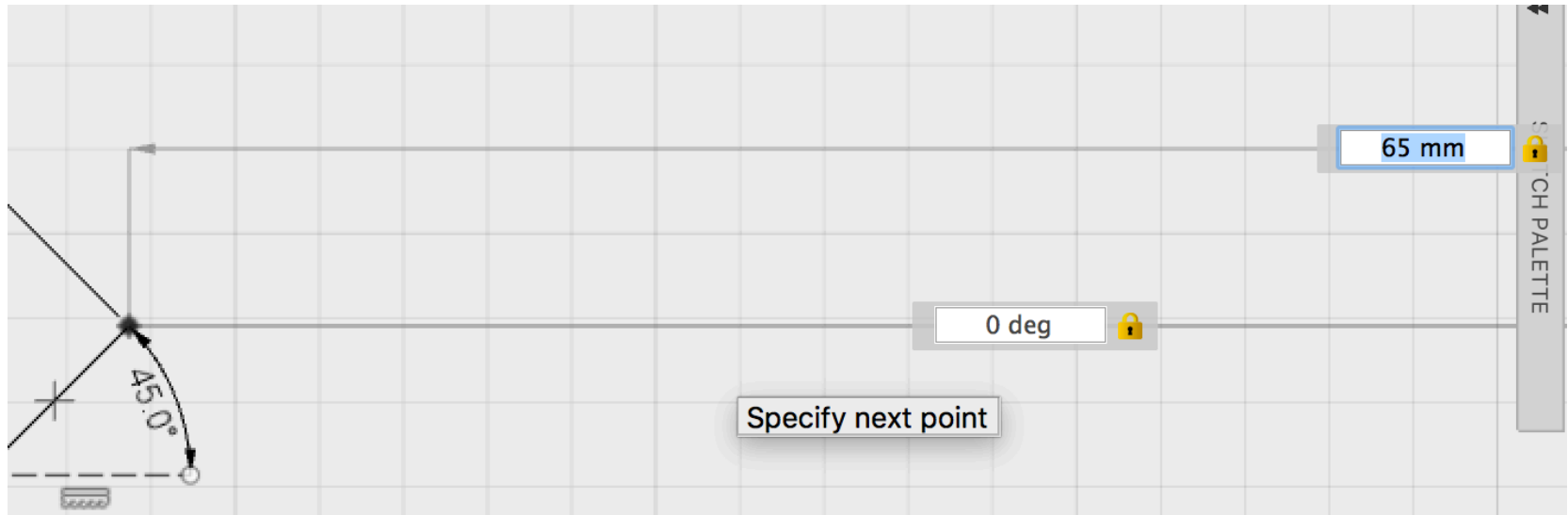


Step 14: Select “Line”, then click at the end of the fourth line.

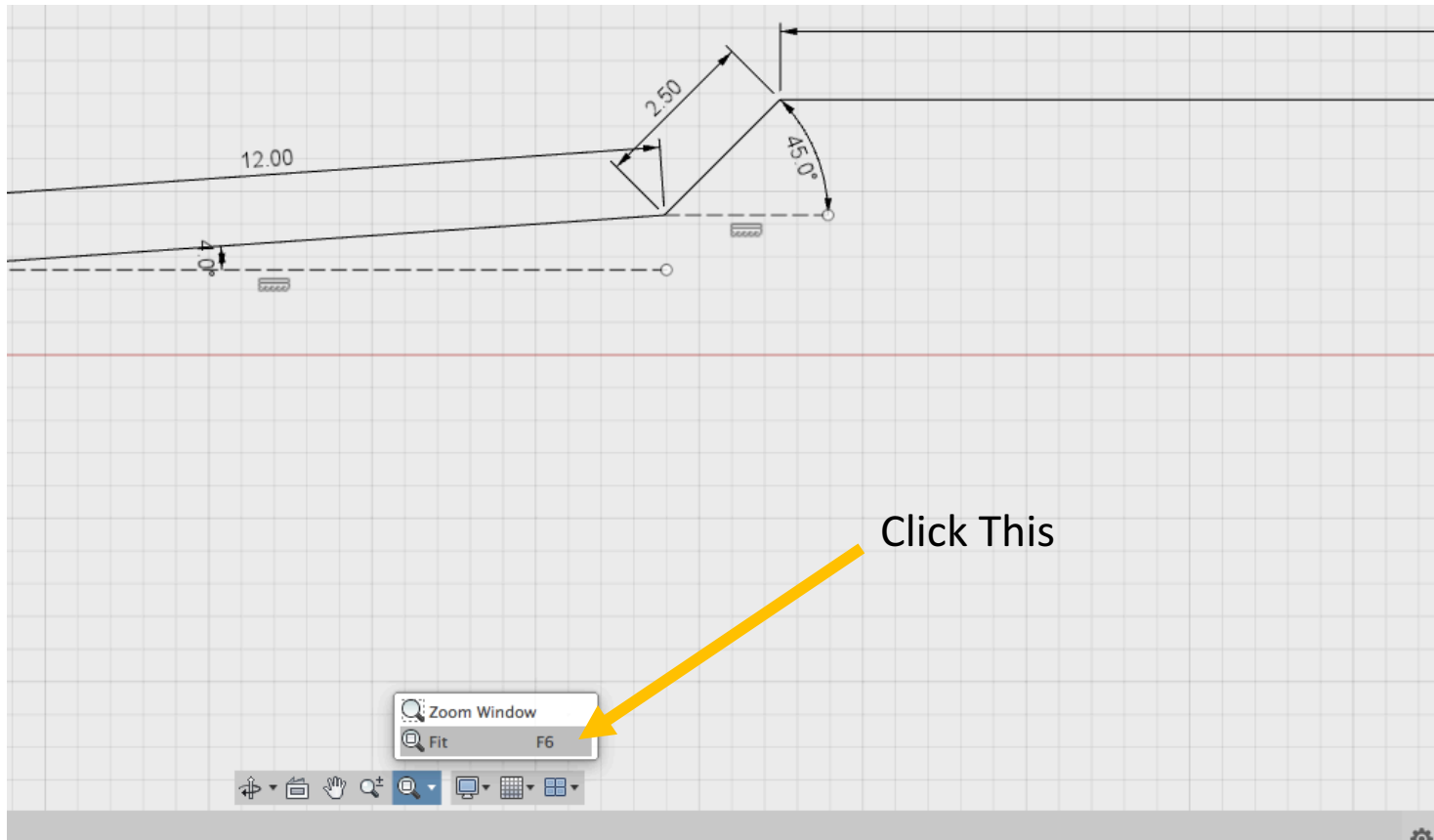


Note: You can scroll your mouse to zoom-in/out if needed

Step 15: Key in “65mm”, hit “Tab”,  rezero  
key in “0 deg”, then hit “Enter”.

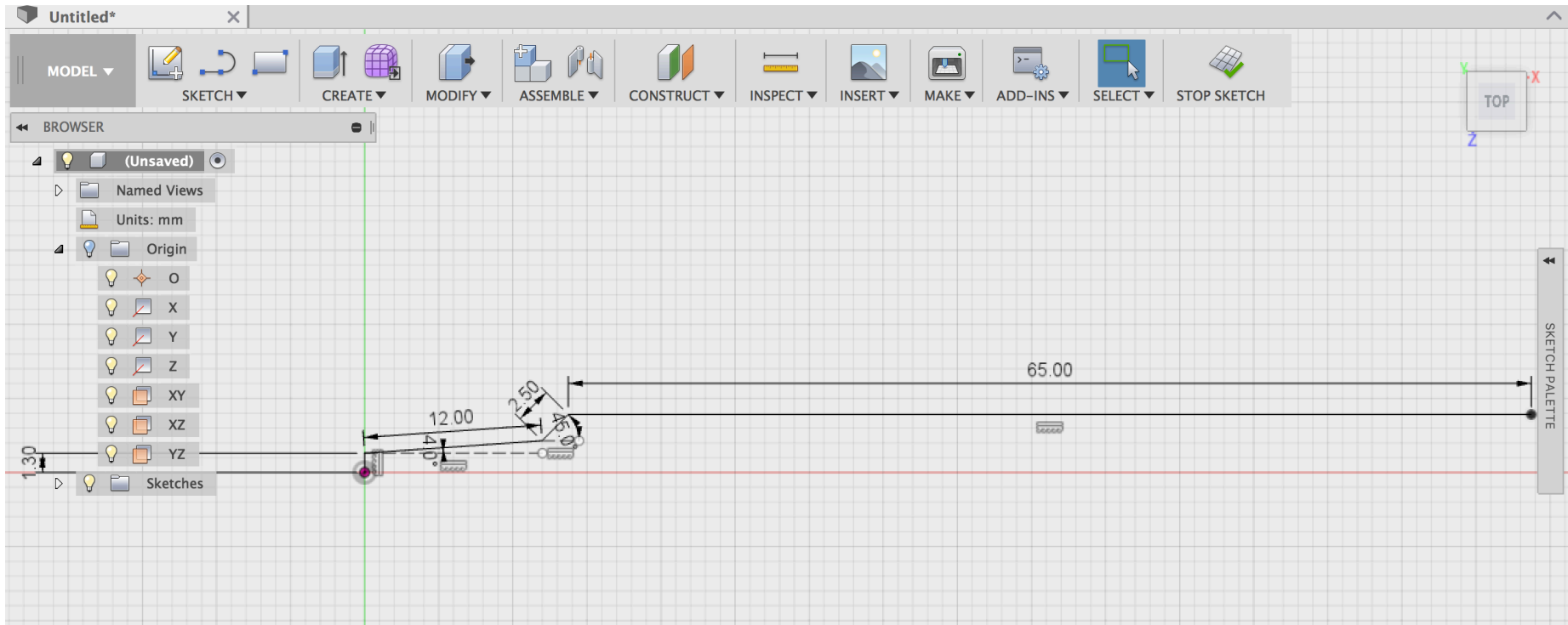


Step 16: Select the 'Fit' icon located at the bottom of the screen.

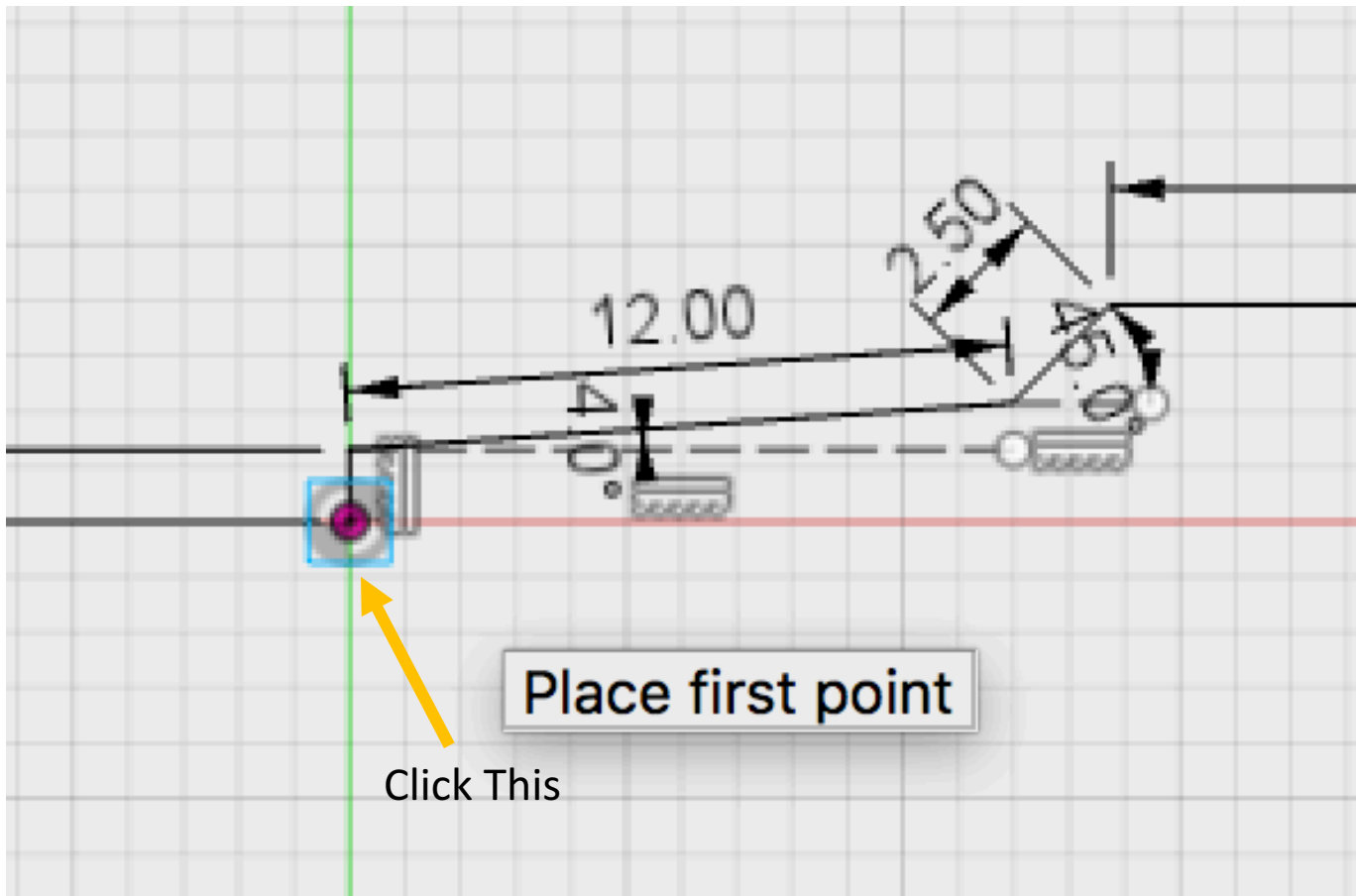


Note: Alternatively, press "F6" on your keyboard

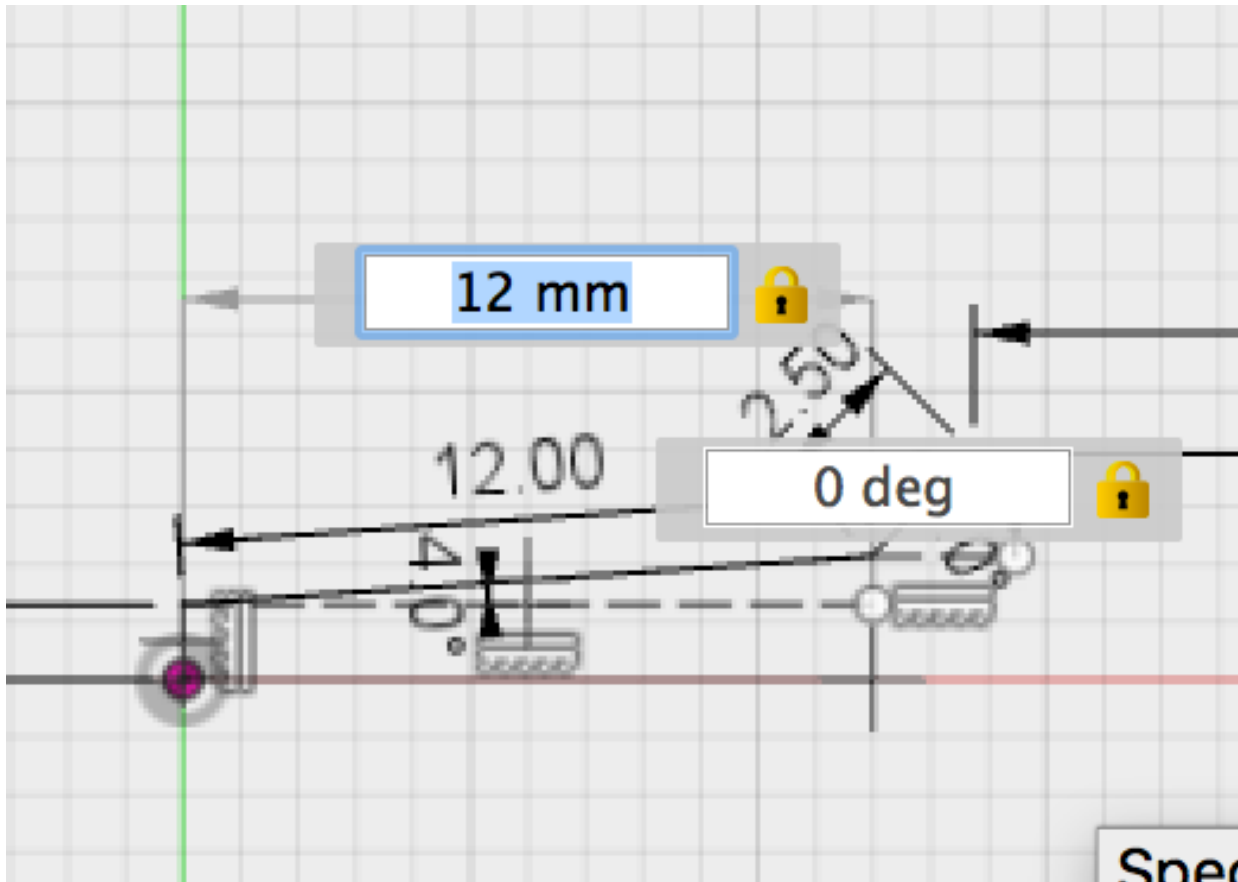
# Step 17: Check your result, it should look like this.



Step 18: Select “Line”, start drawing a new line from the origin.

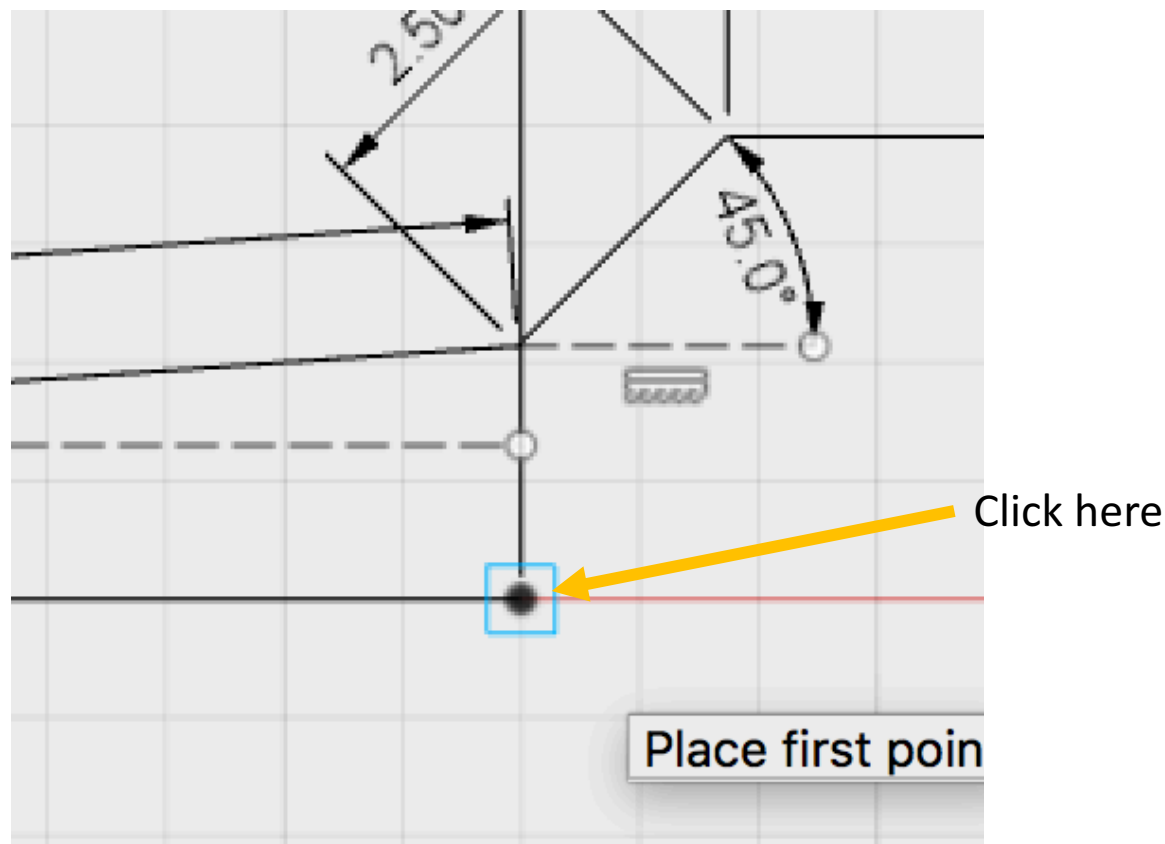


Step 19: Drag your line to right hand side. Key in “12mm” and “0 deg”, then hit “Enter”.

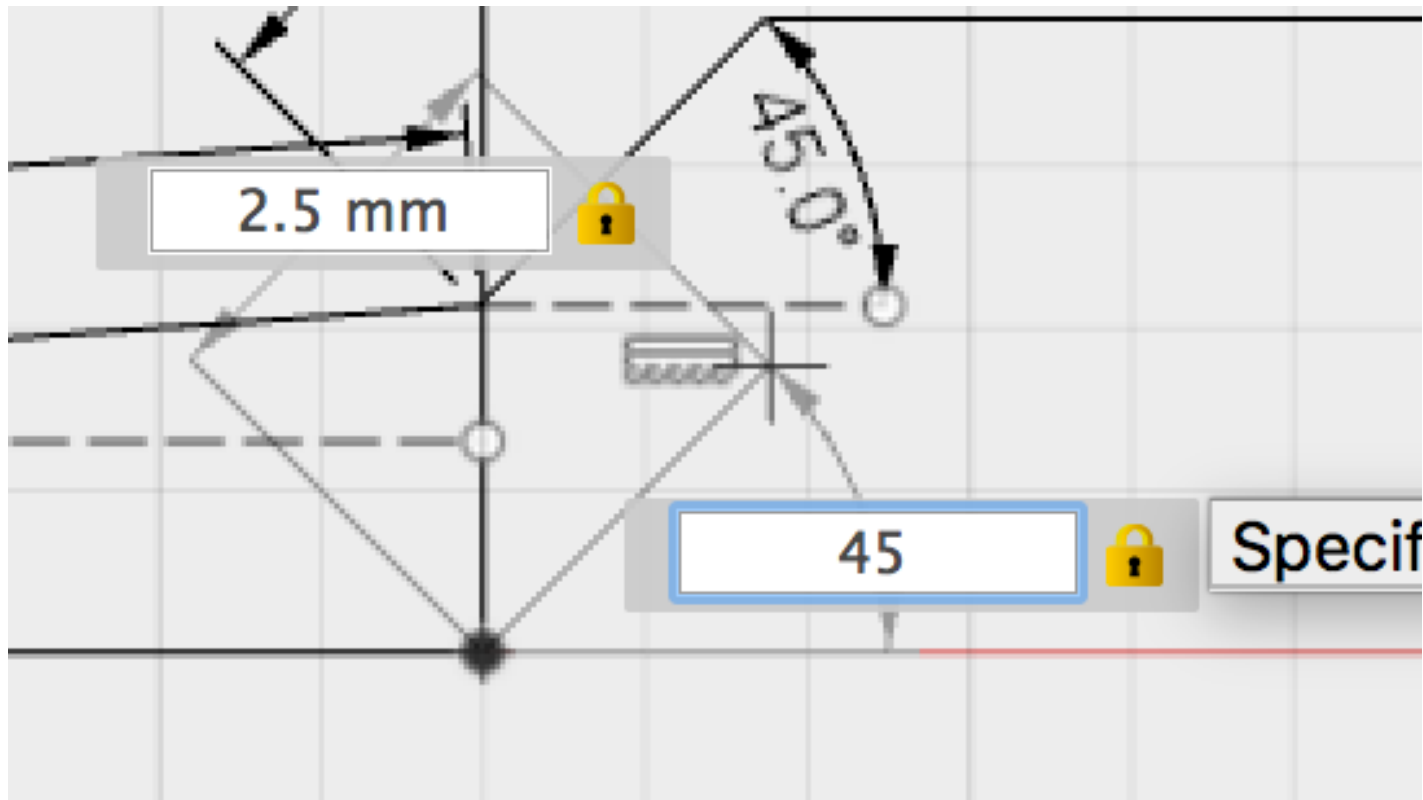




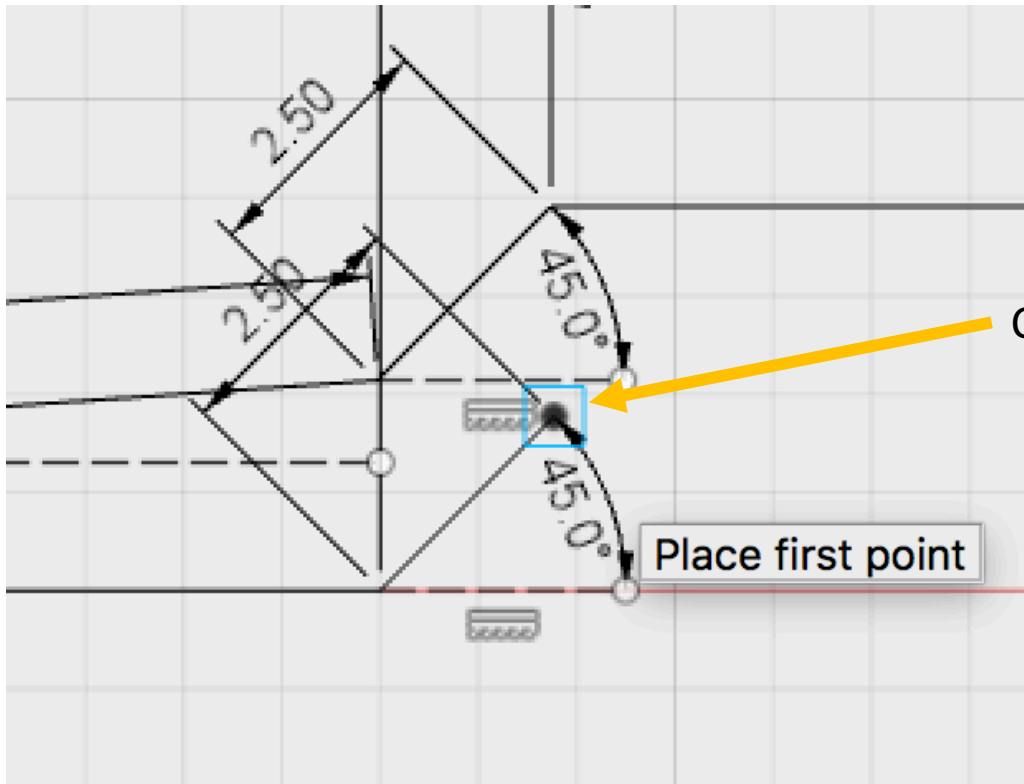
Step 20: Select “Line” again, then click at the end of the previous line.



Step 21: Move the line toward your right. Key in “2.5mm”, “45 deg”, then hit “Enter”.




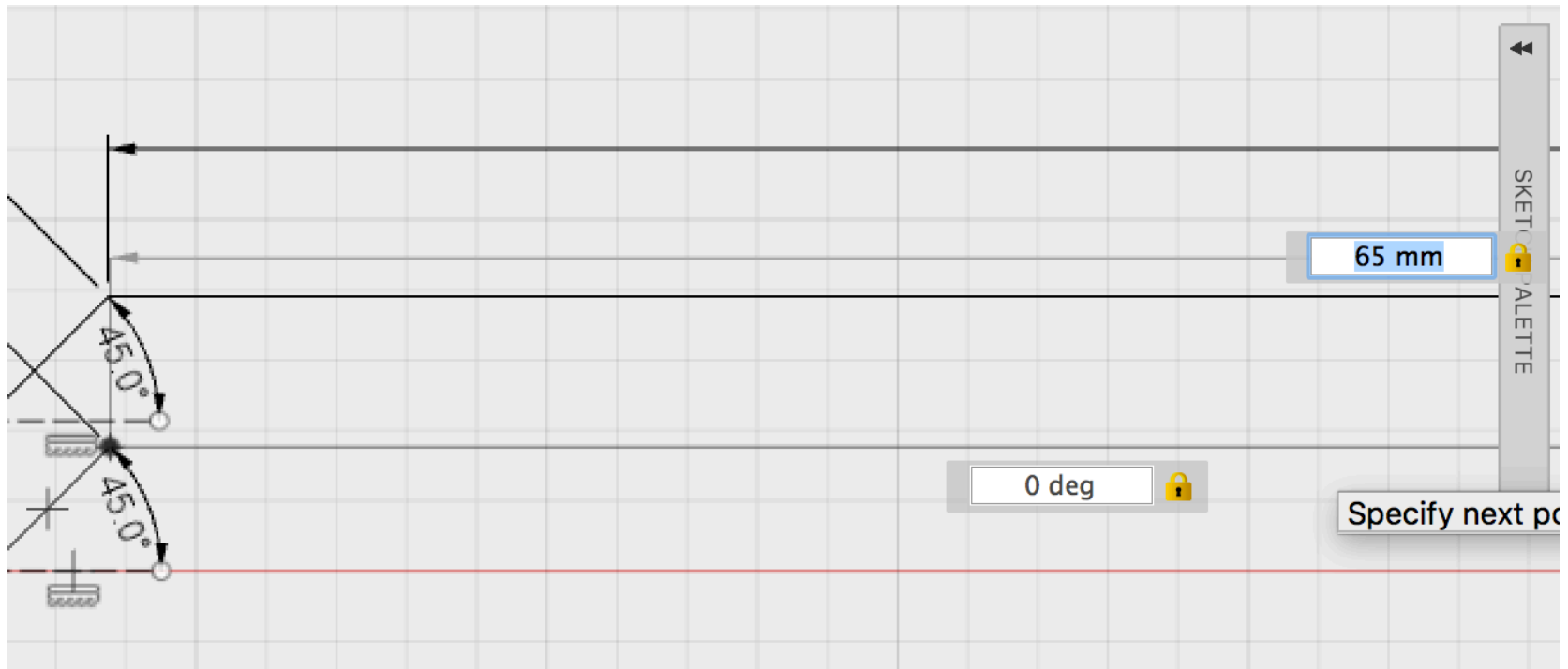
Step 22: Select “Line” again, click at the ending of the previous line.



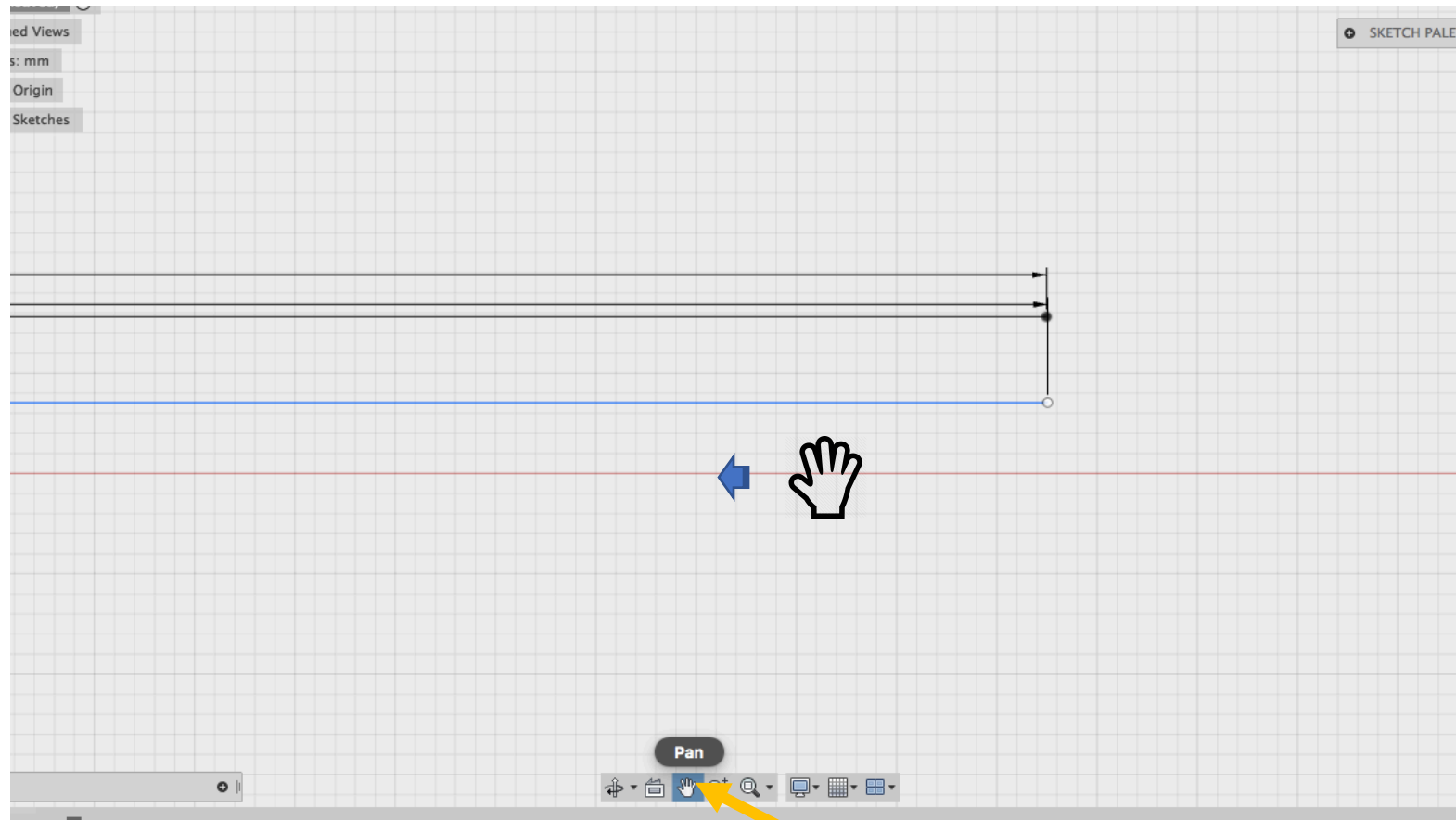
Click here

Place first point

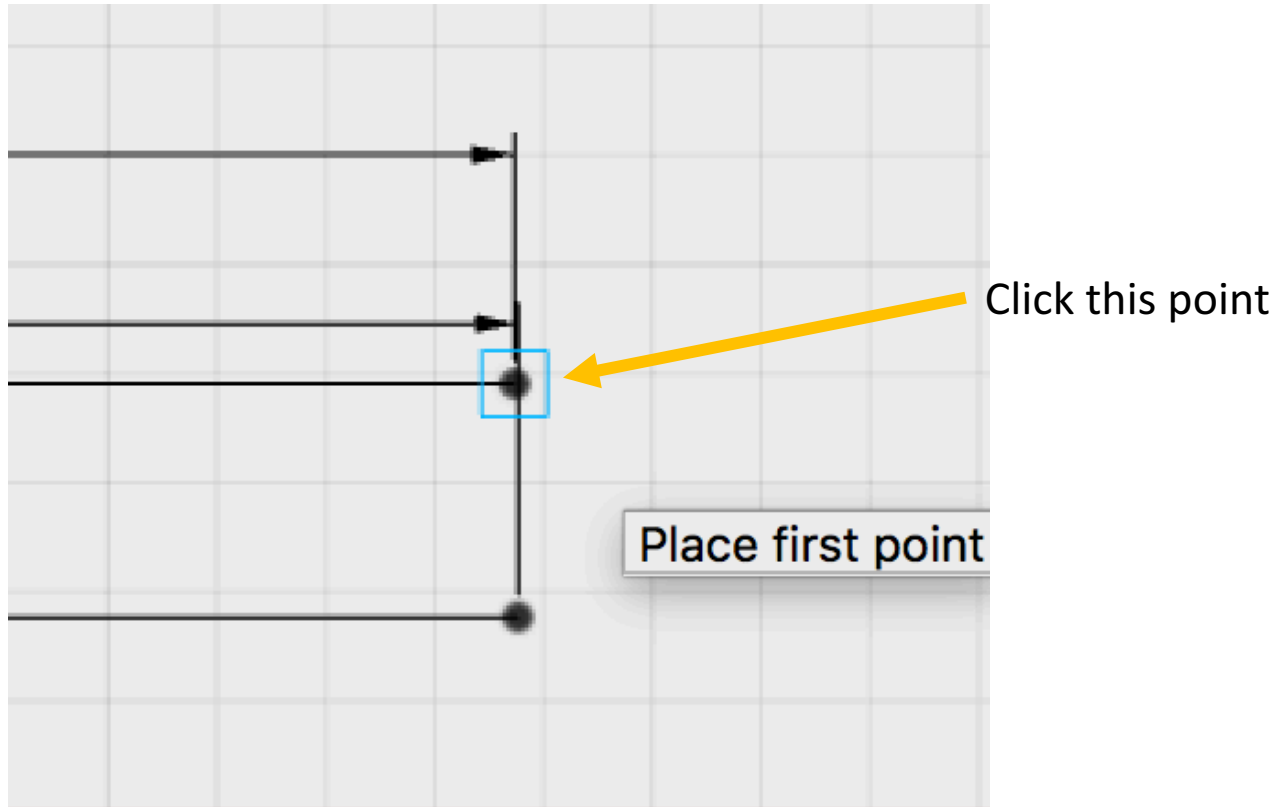
Step 23: Move the line to your right, key in “65mm” and “0 deg”, then hit  “Enter”.



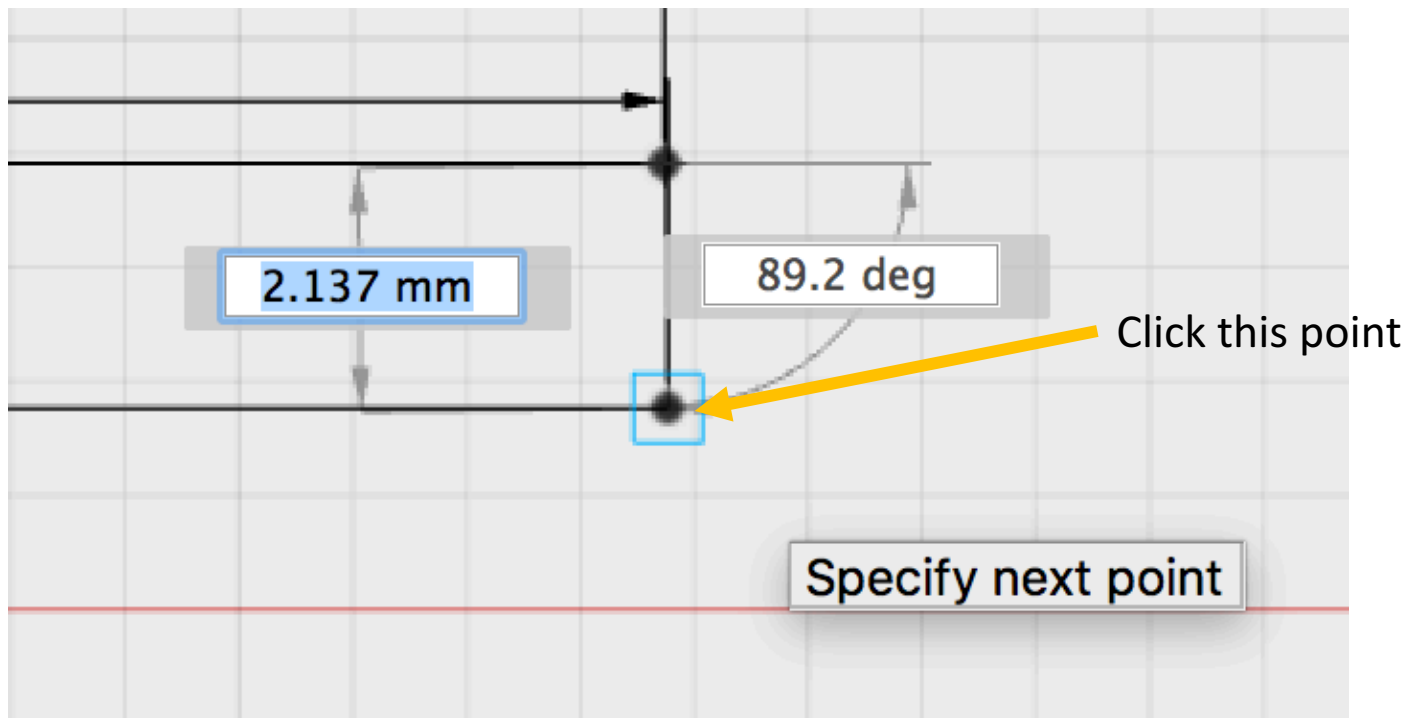
Step 24: Click on the 'Pan' icon to move your sketch to the left until you see the end of the last line.



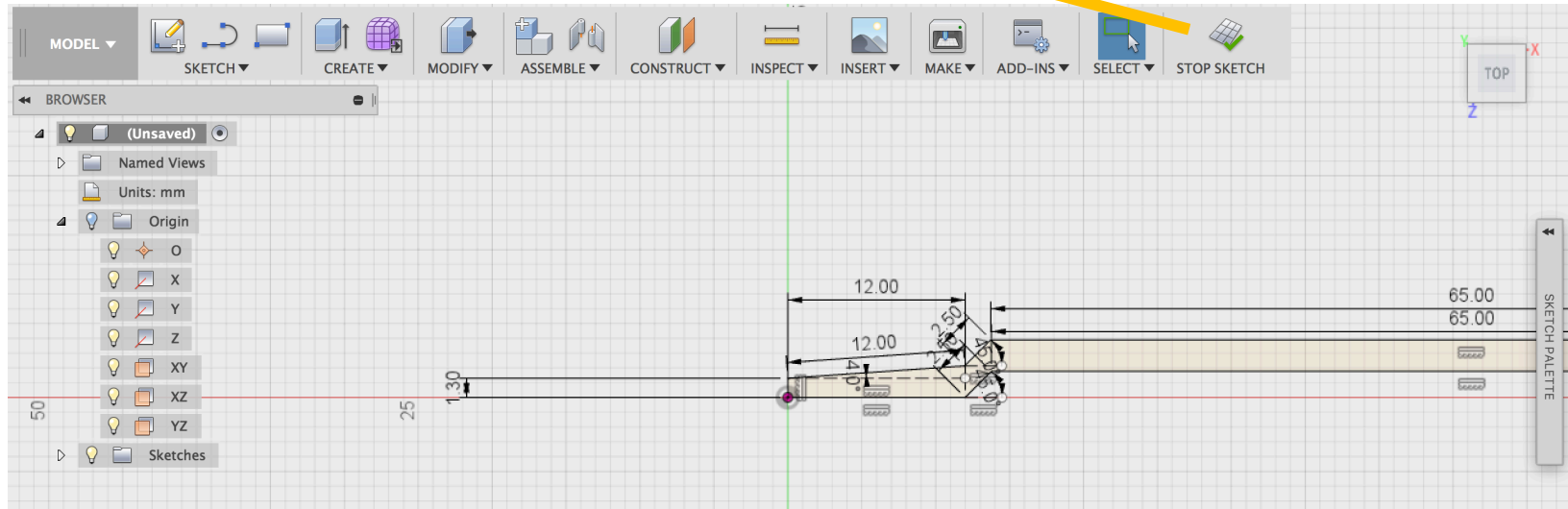
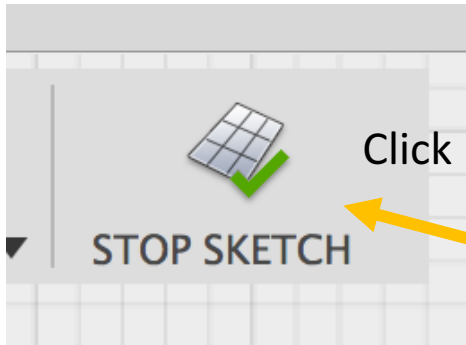
Step 25: Select “Line”, then click the point as shown below.



Step 26: Then click end point shown below as the second point.

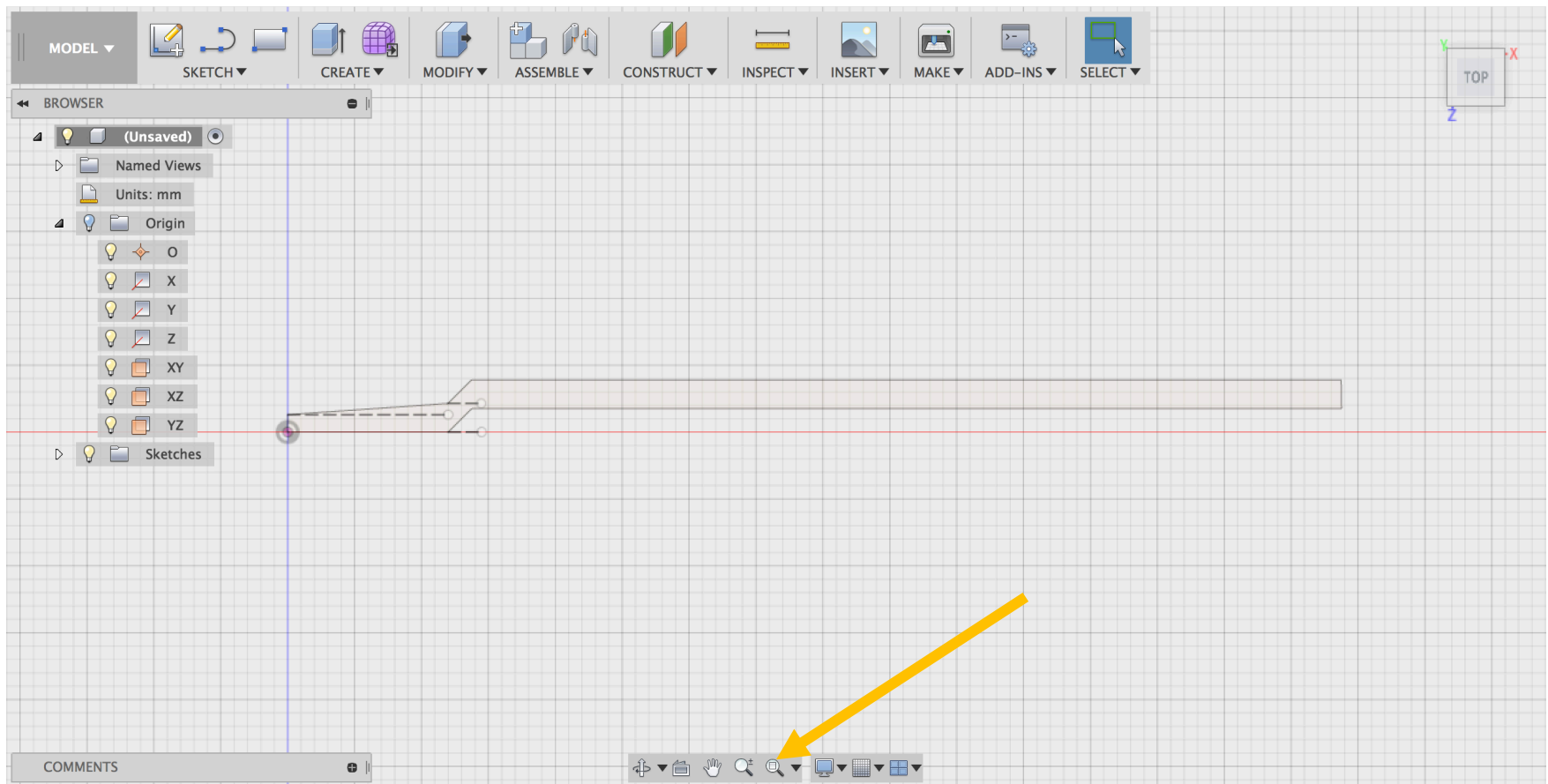


Step 27: Press the “Esc” key, then click the “Stop Sketch” icon.

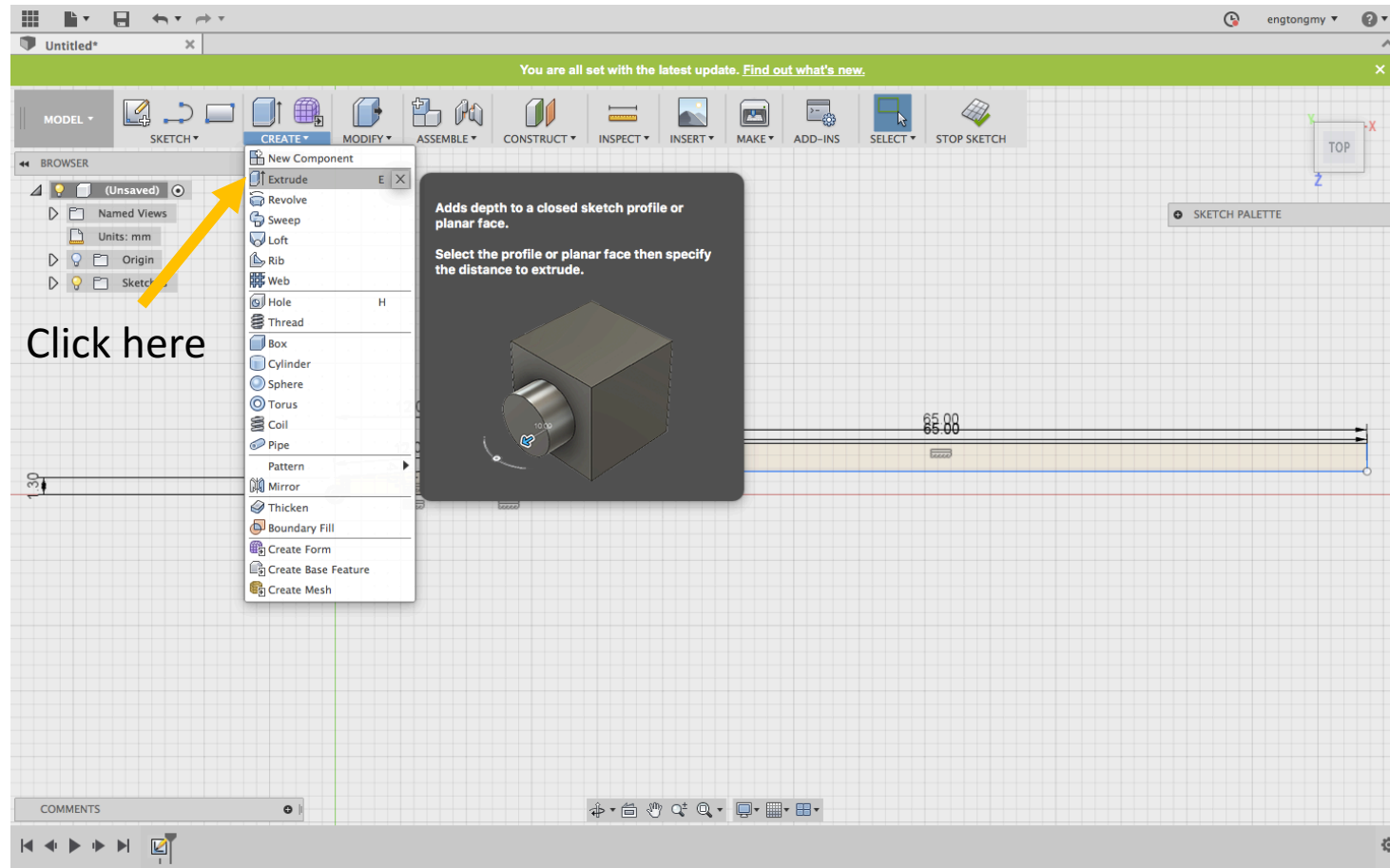




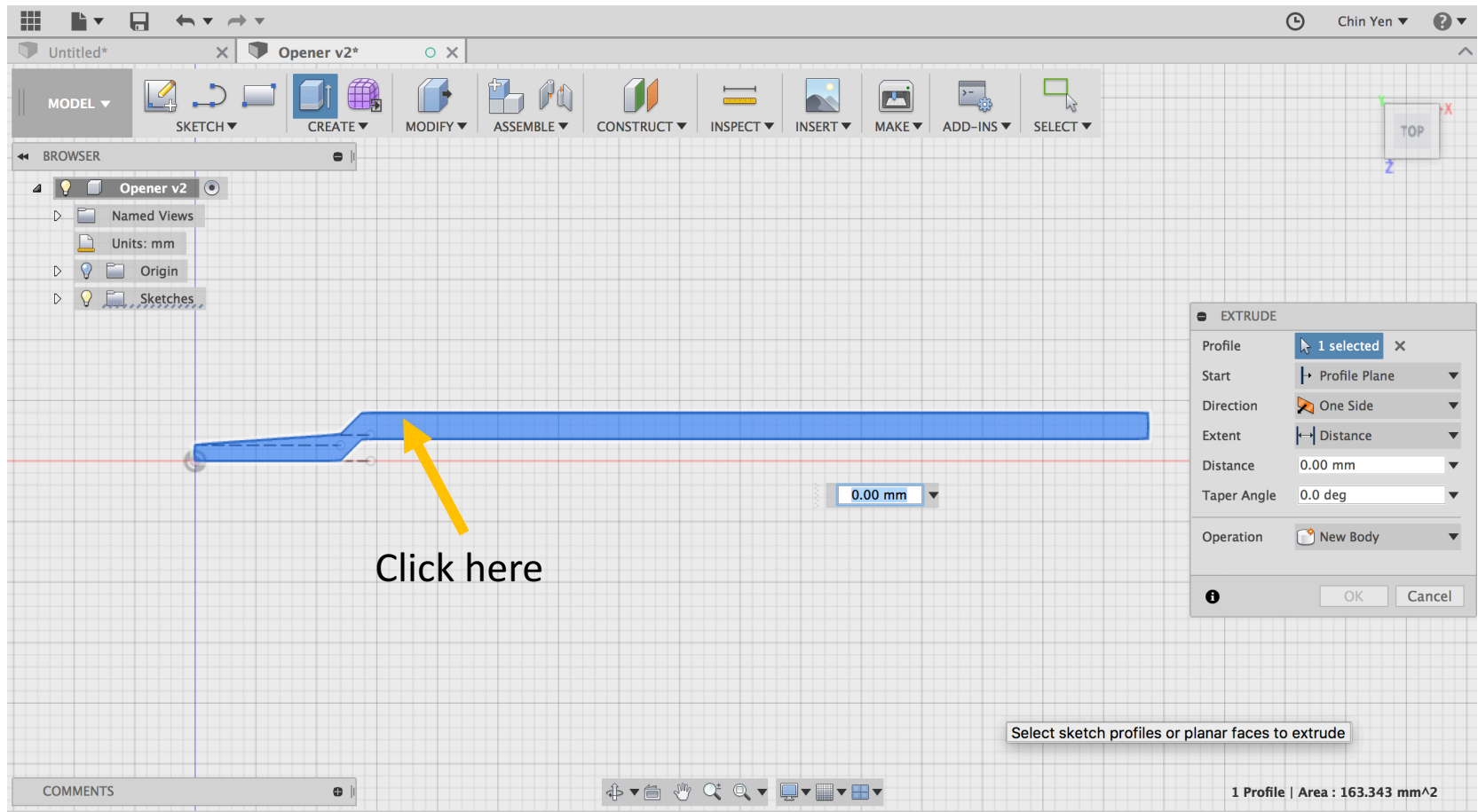
Step 28: Click the “Fit” icon. Check your result, it should look like this.



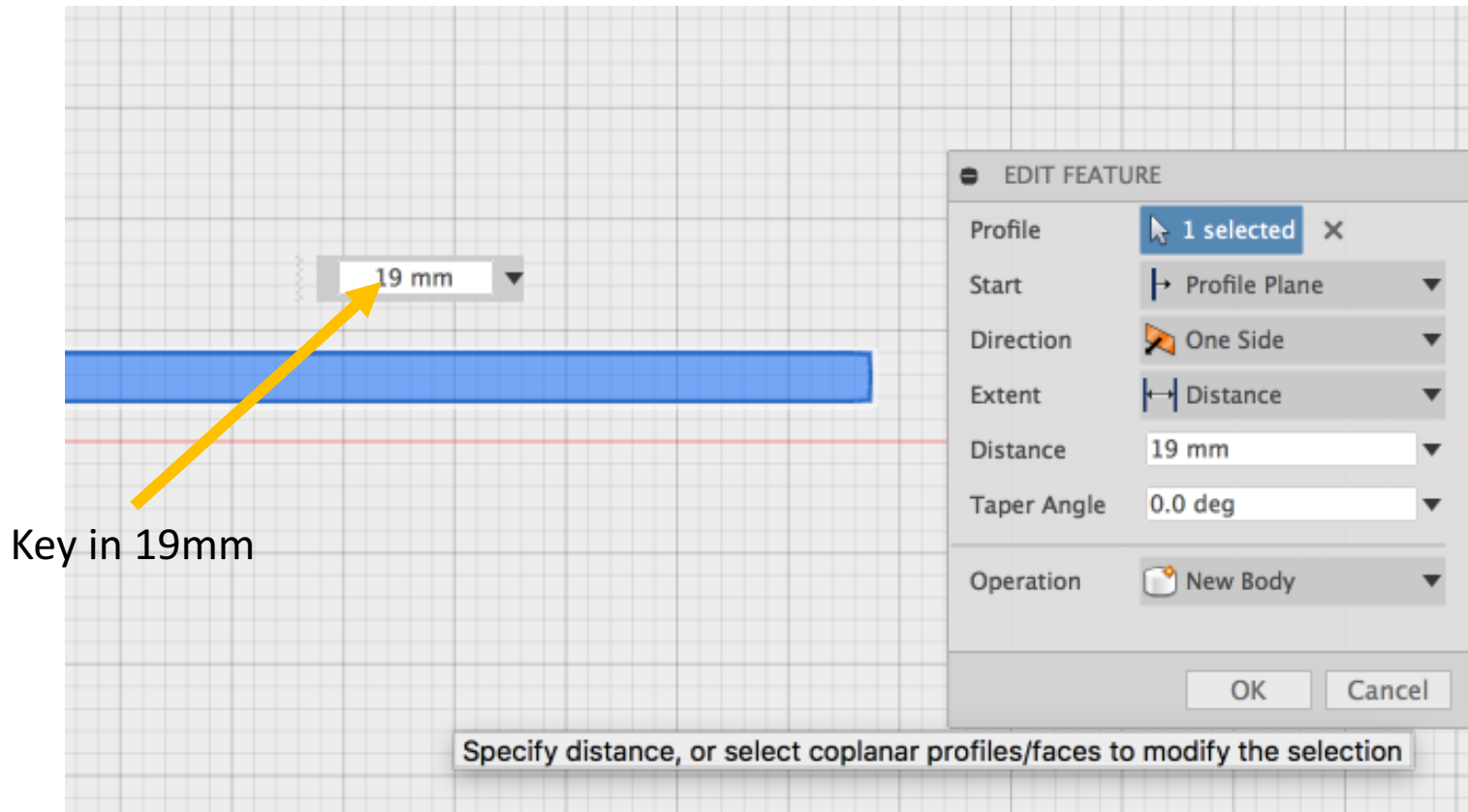
# Step 29: Go to “Create” > “Extrude”.



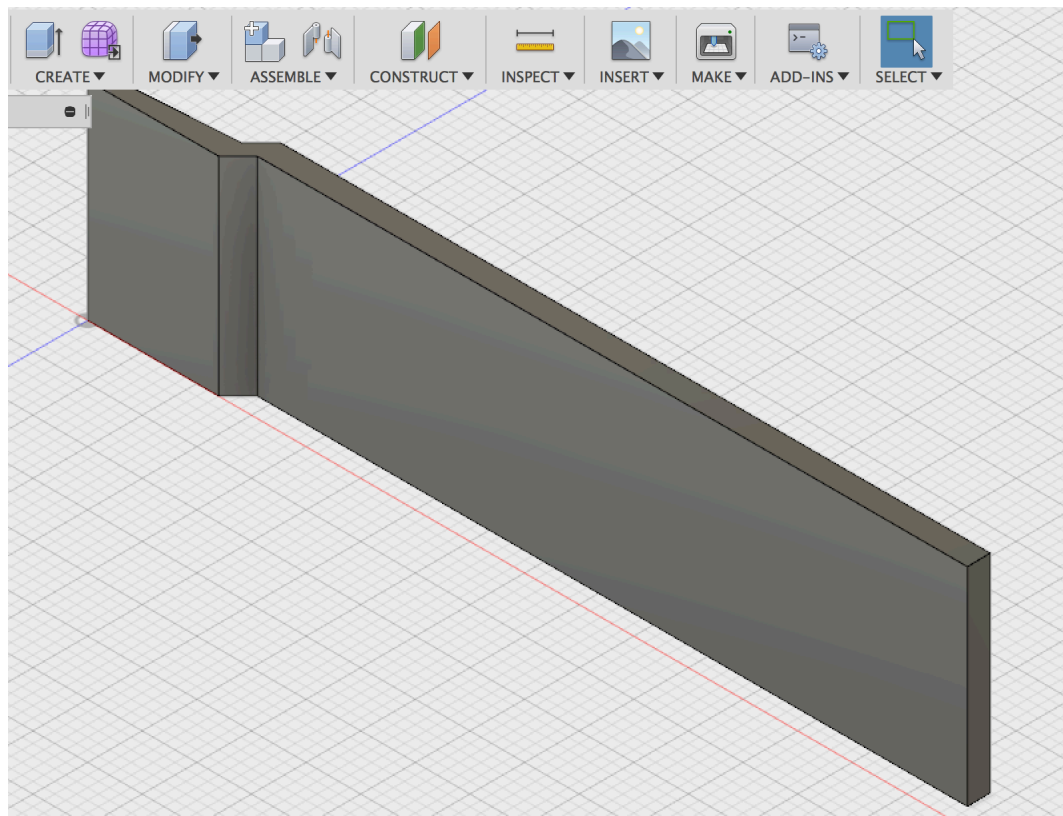
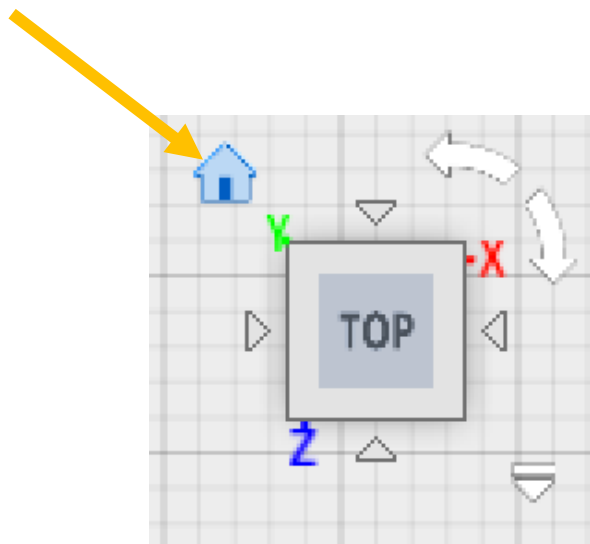
# Step 30: Then click on the highlighted area.



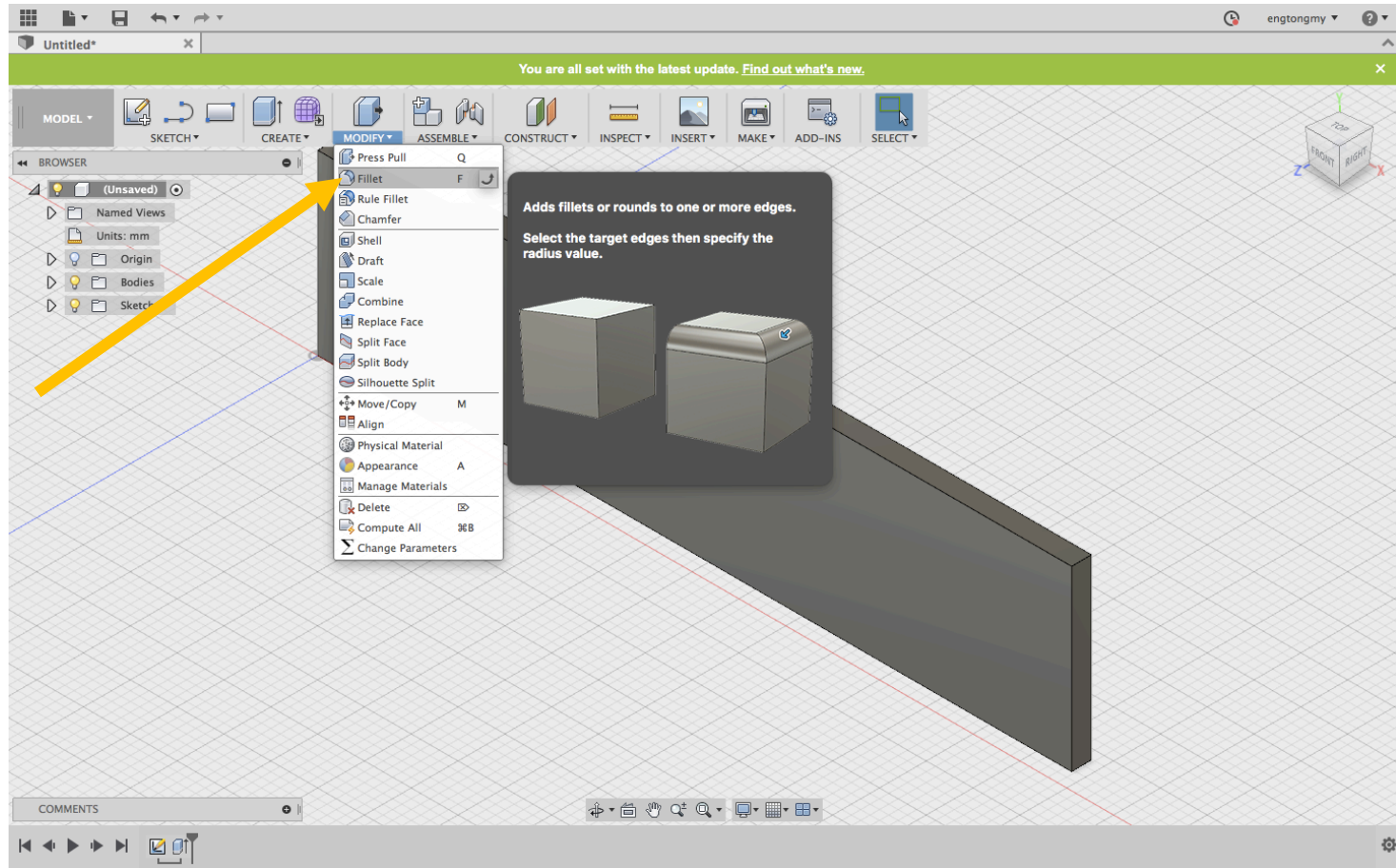
# Step 31: Key in “19mm” then hit “Enter”.



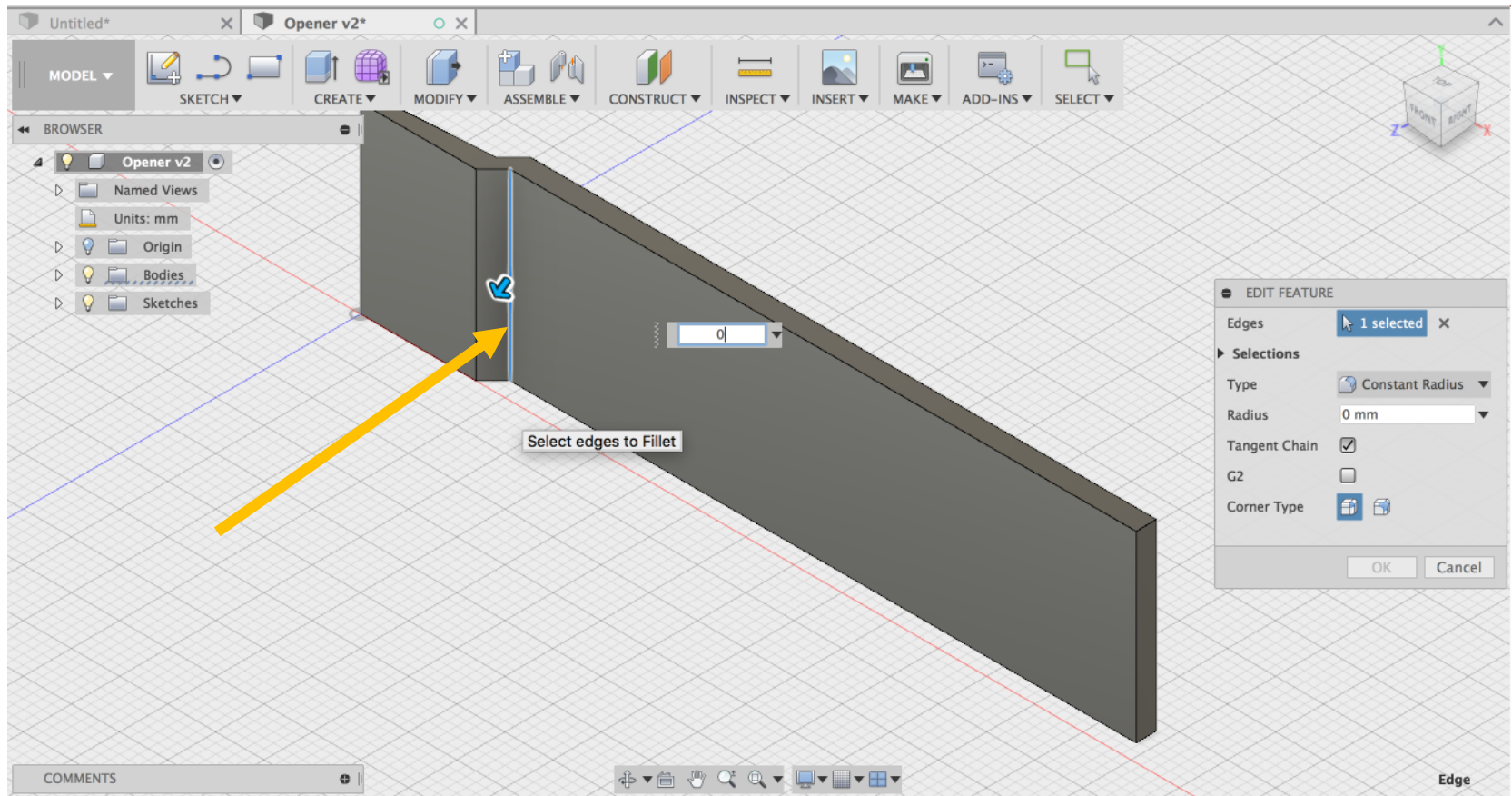
Step 32: Click “” located at top right to change your drawing to isometric view.



# Step 33: Go to “Modify” > “Fillet”.

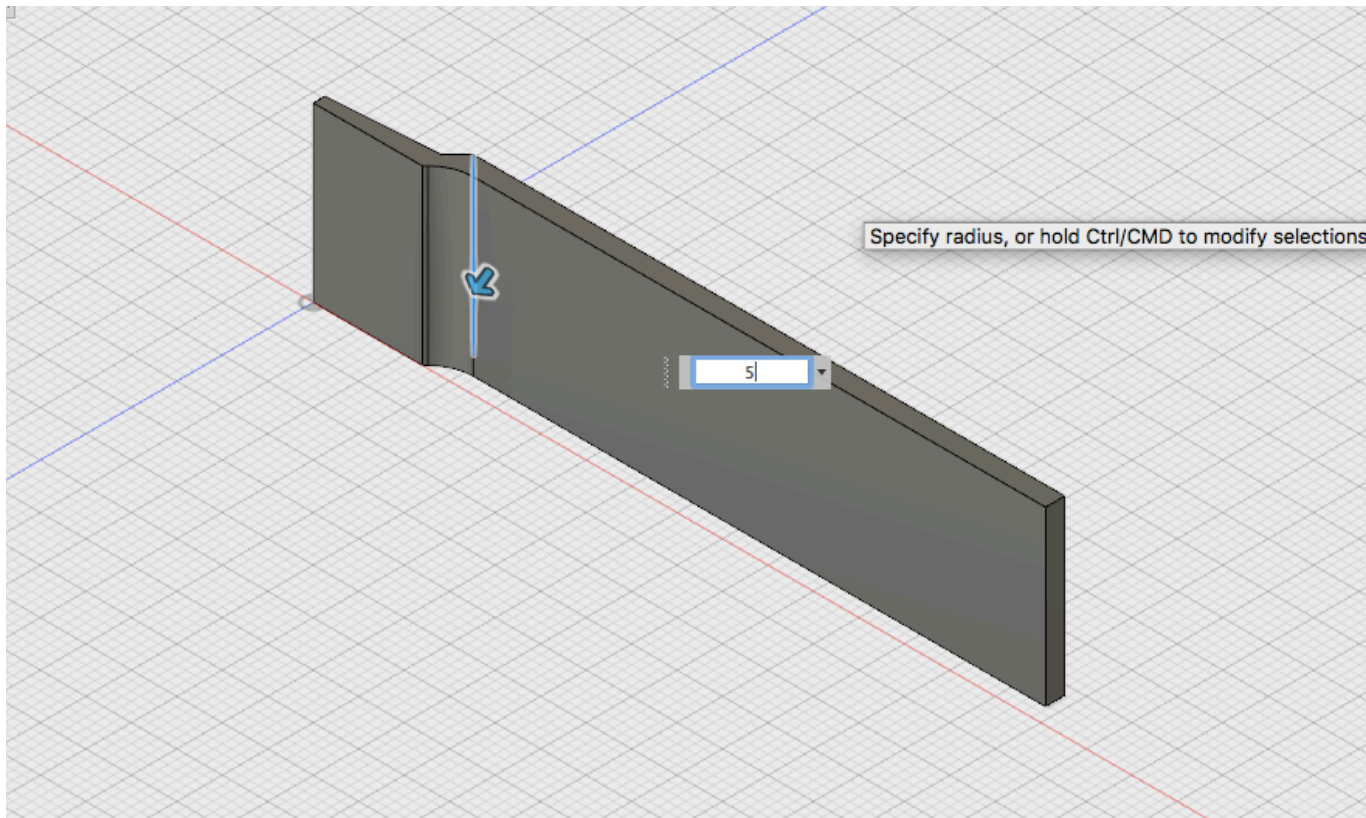


# Step 34: Click the blue line shown.





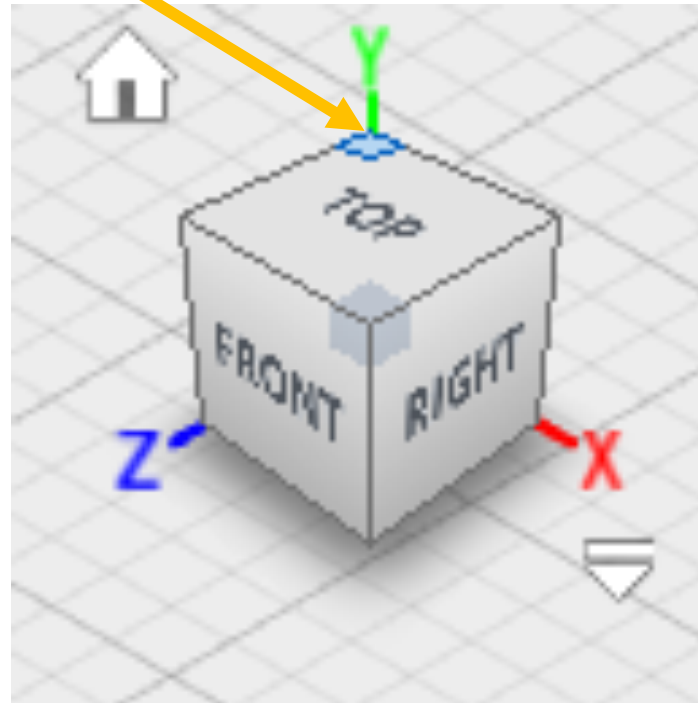
Step 35: Key in “5mm” then hit “Enter”.



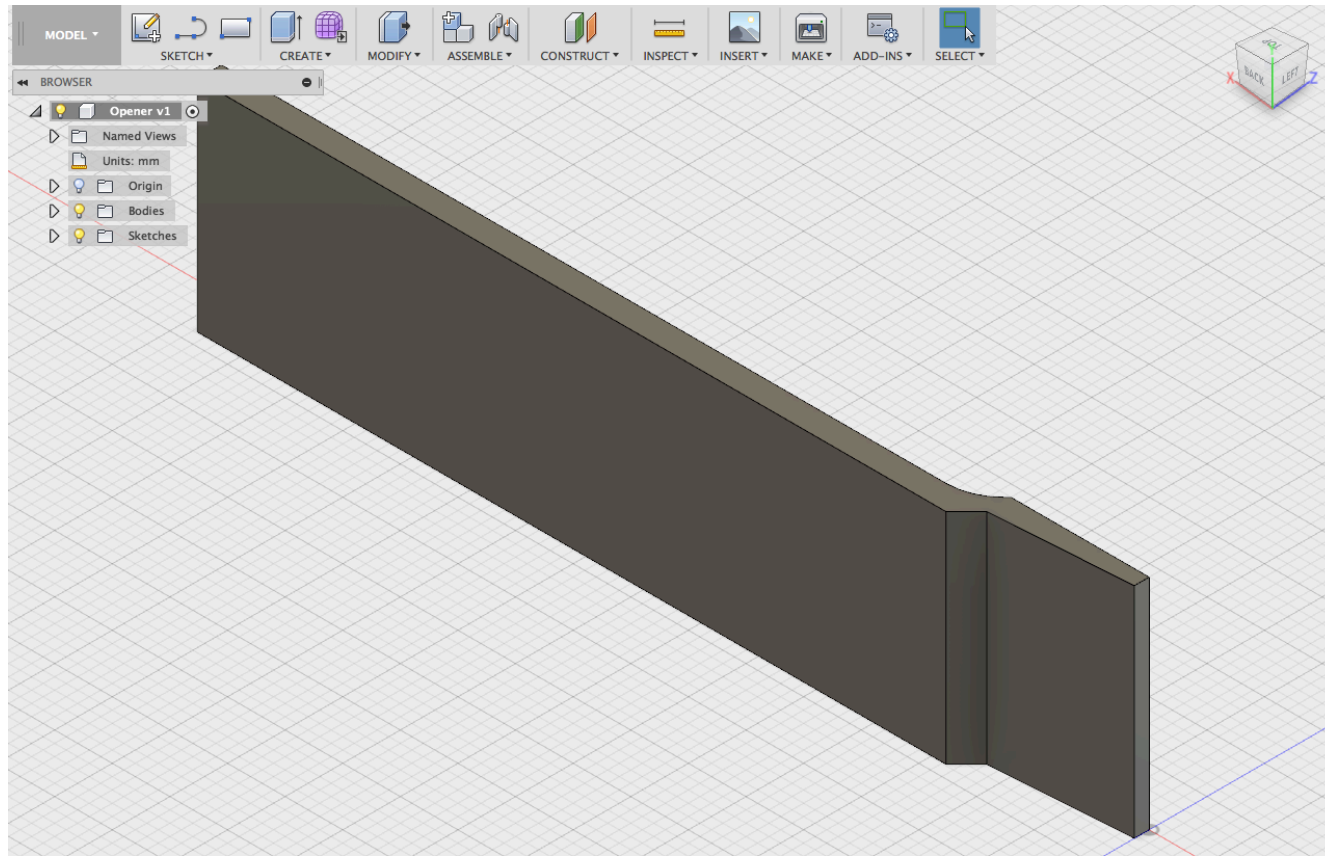


Step 36: Click this corner of the view cube to change view orientation. 

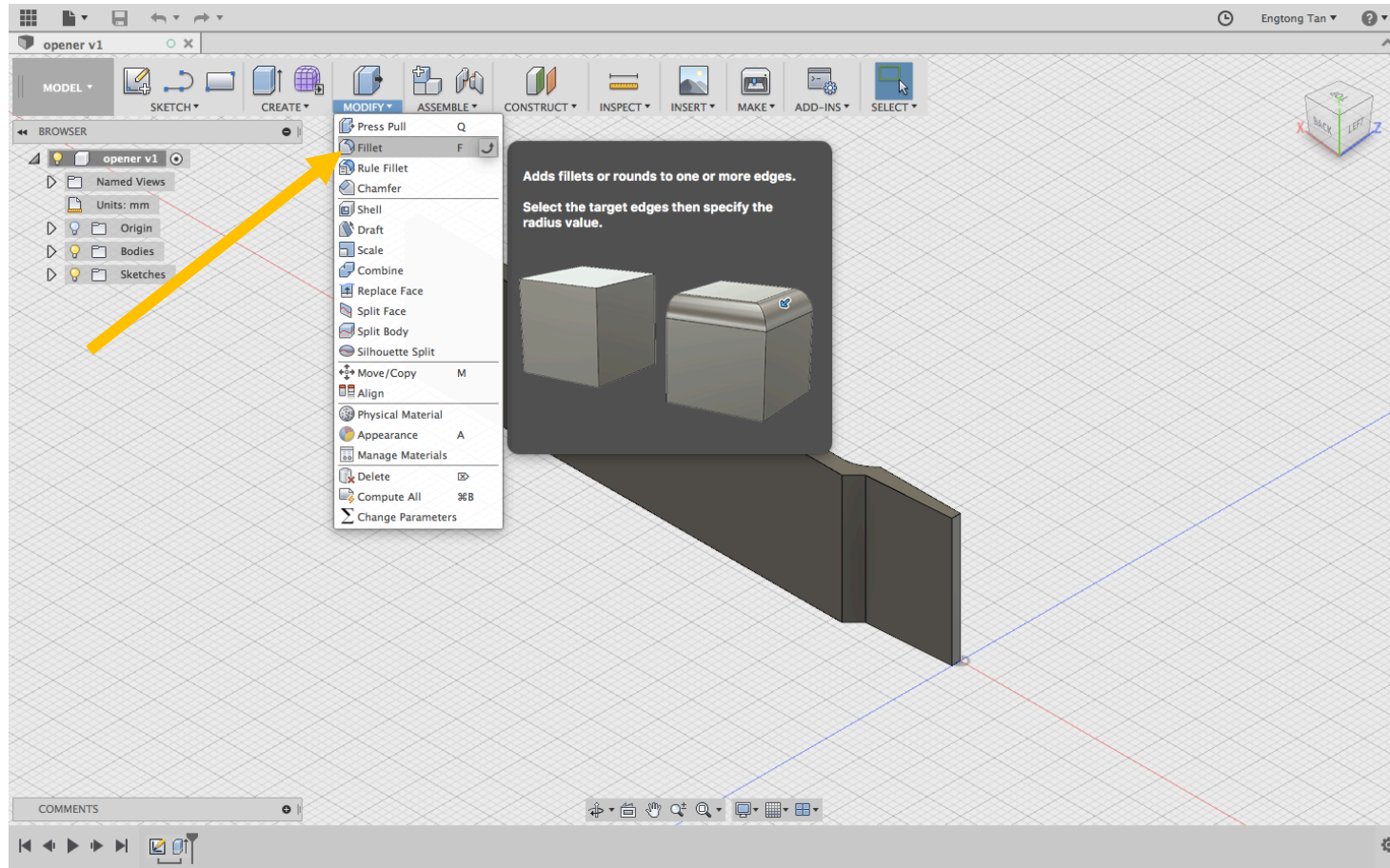
Click here



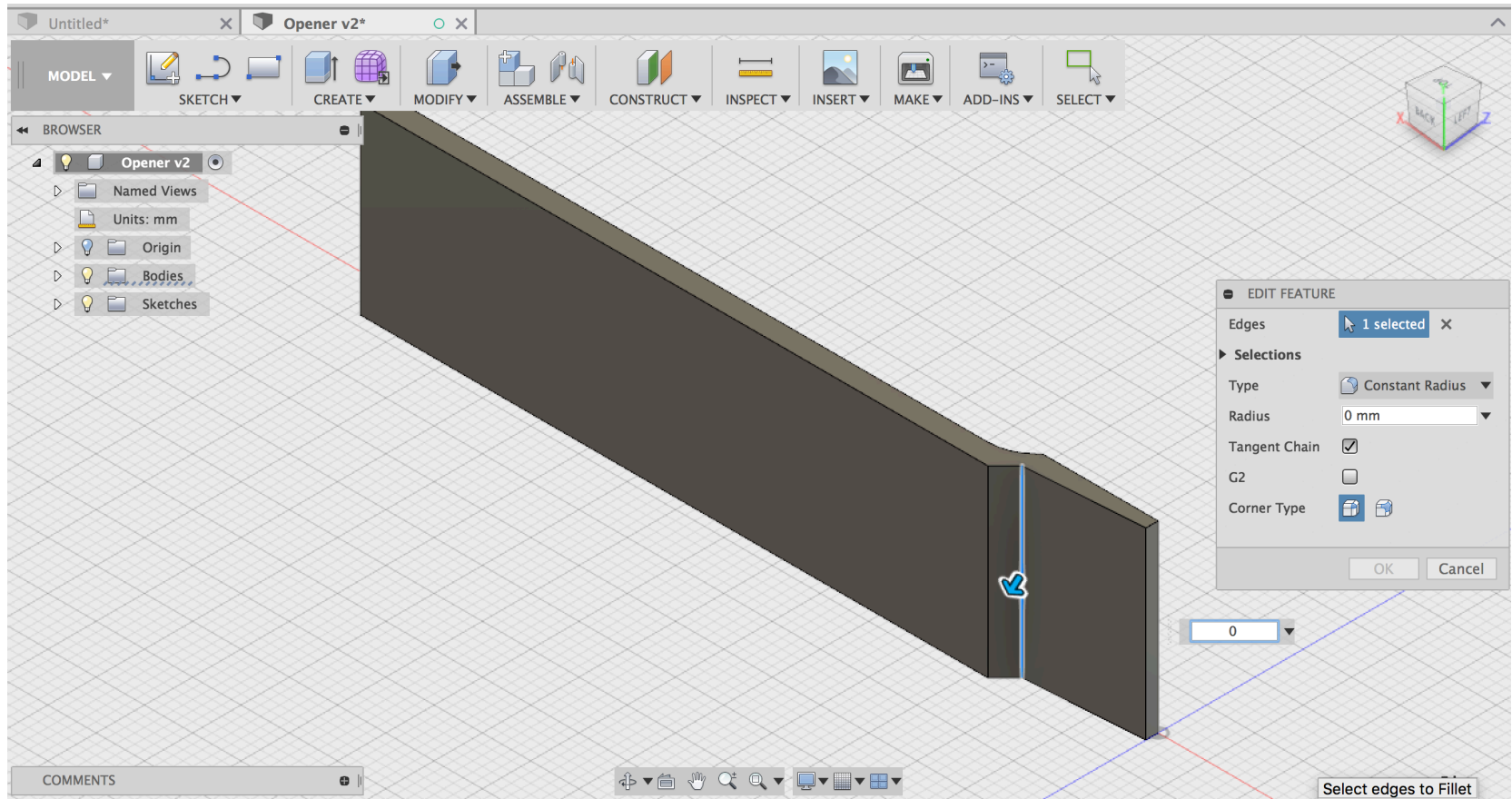
# Step 37: The view will change like this:



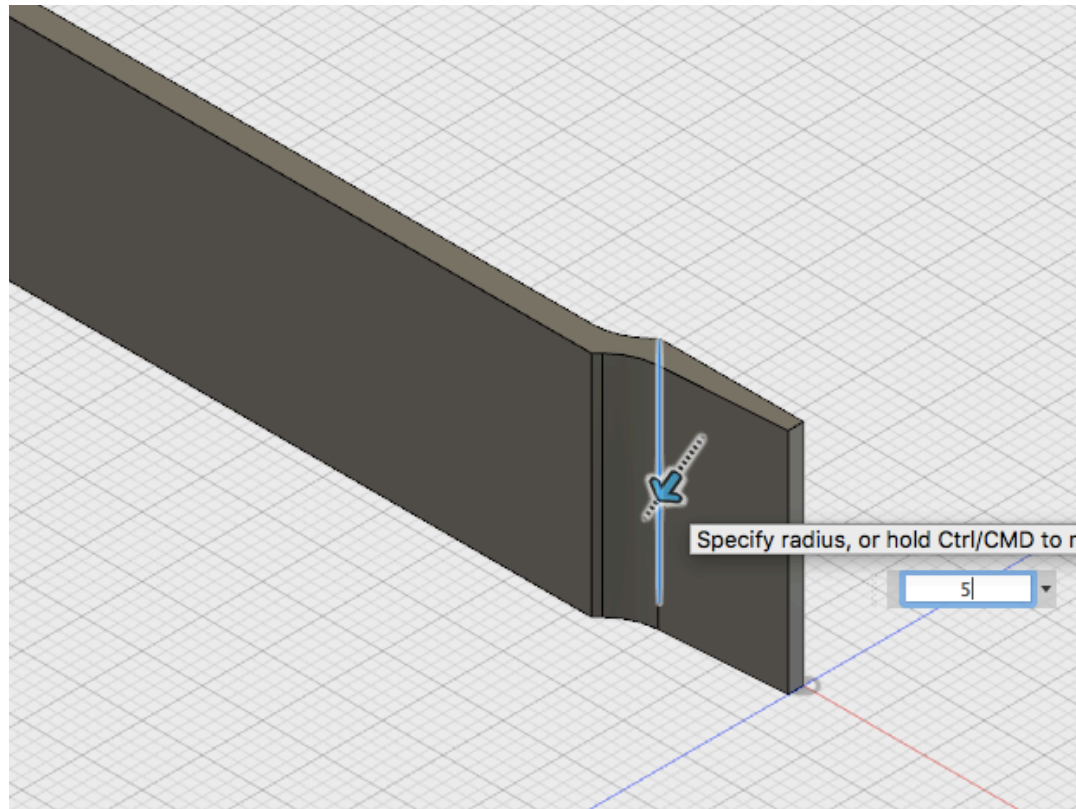
# Step 38: Go to “Modify” > “Fillet”.



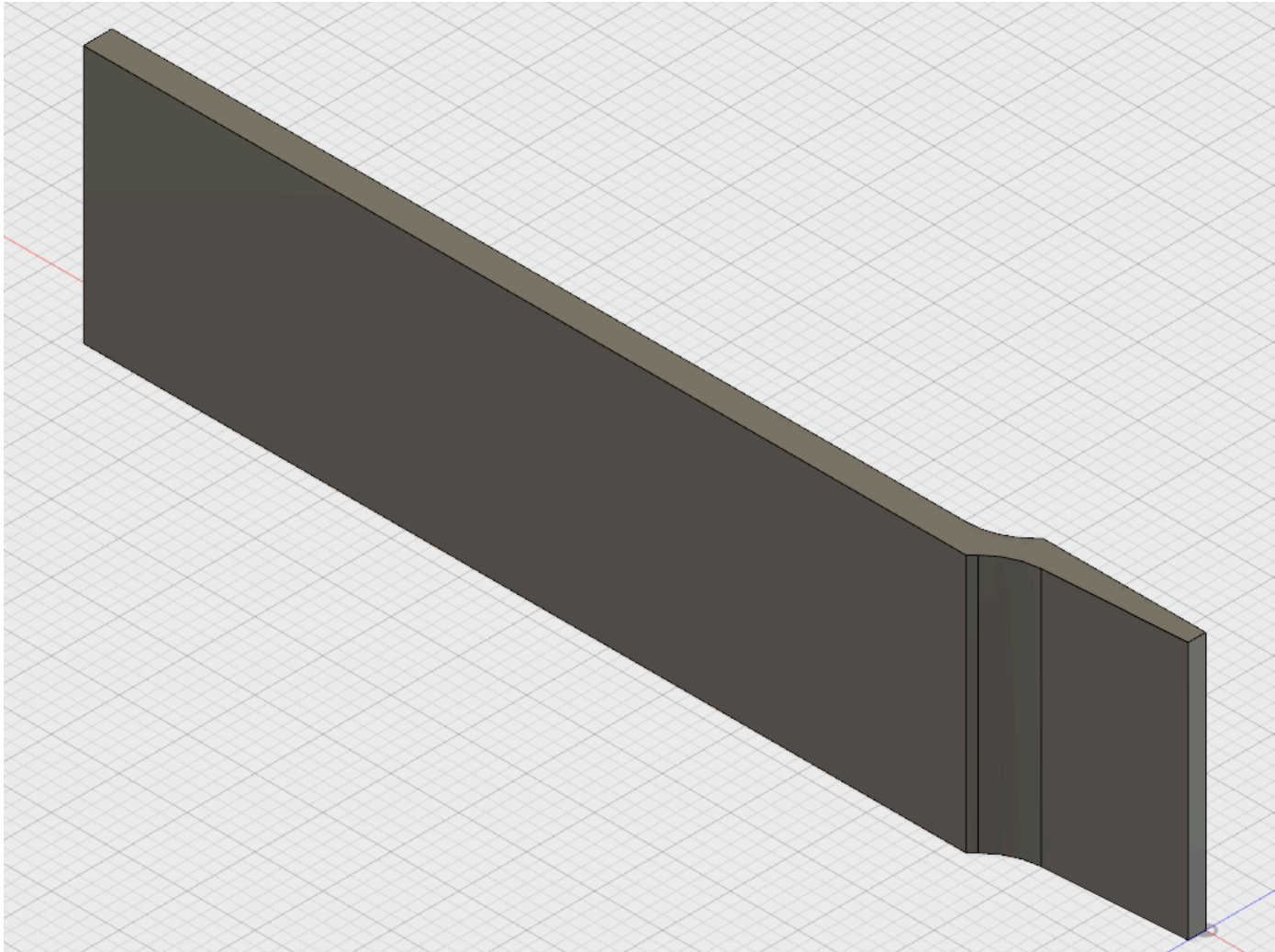
# Step 39: Select the blue line as shown.



Step 40: Key in “5mm”, then hit “Enter”.

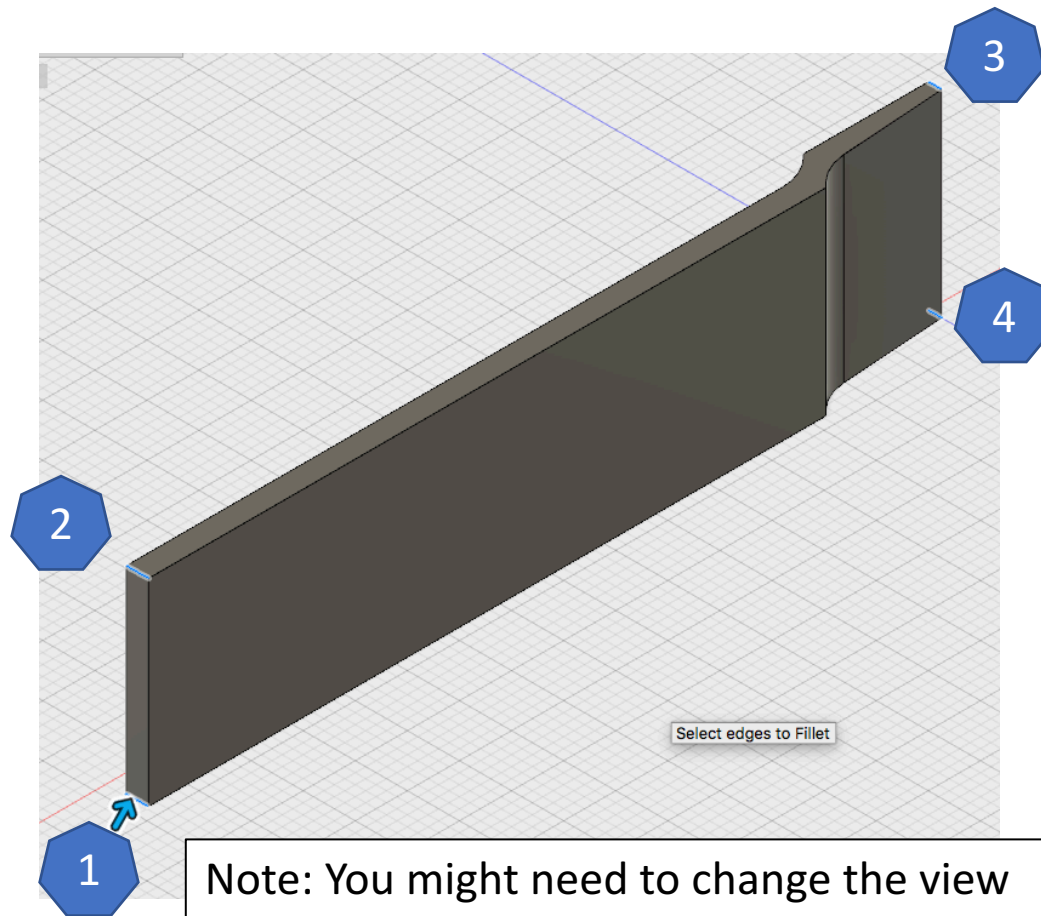


Step 41: Check your result, it should look like this:



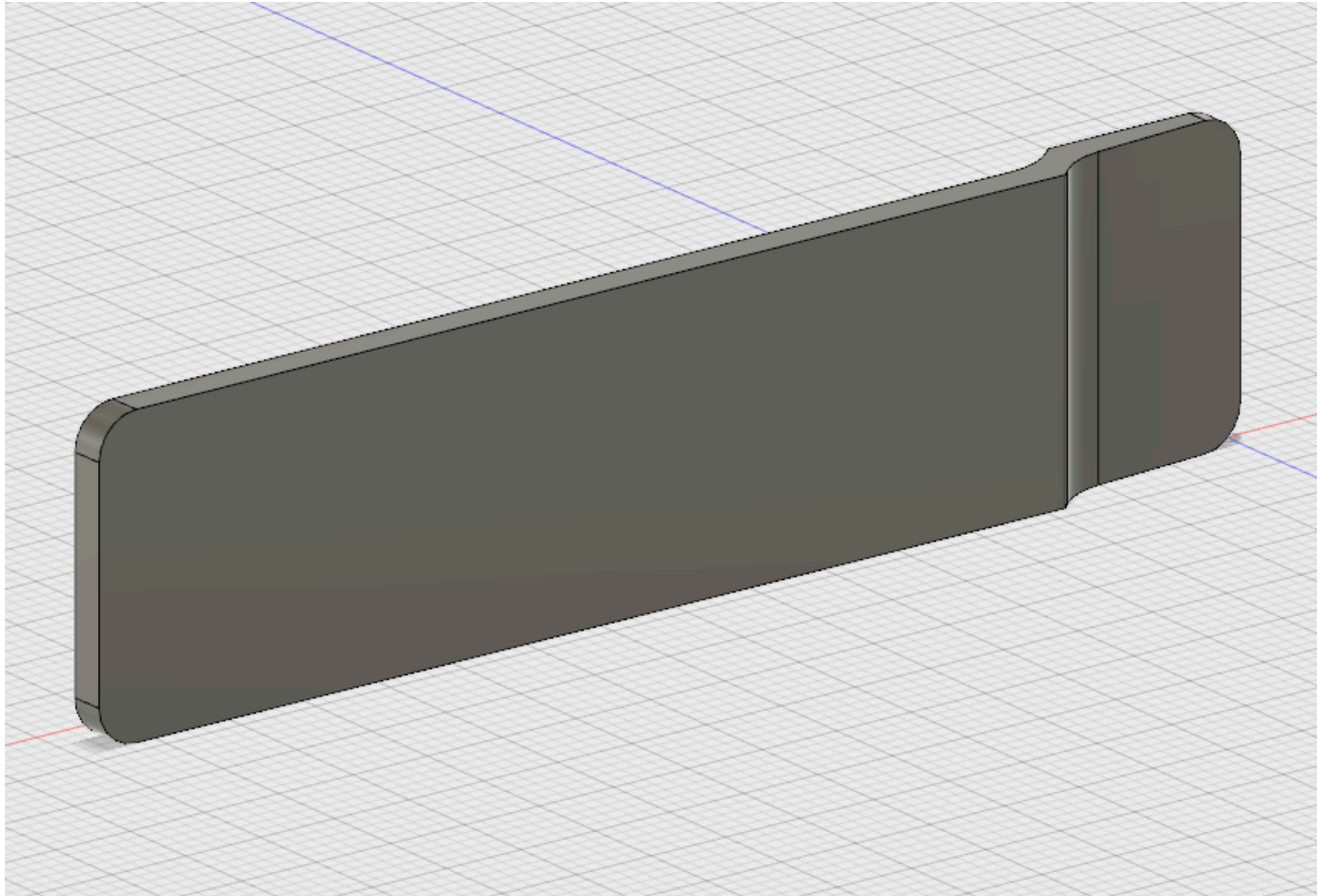


Step 42: Select “Fillet” again to make these 4 corners rounded by 2.5mm.



Note: You might need to change the view orientation to complete this step

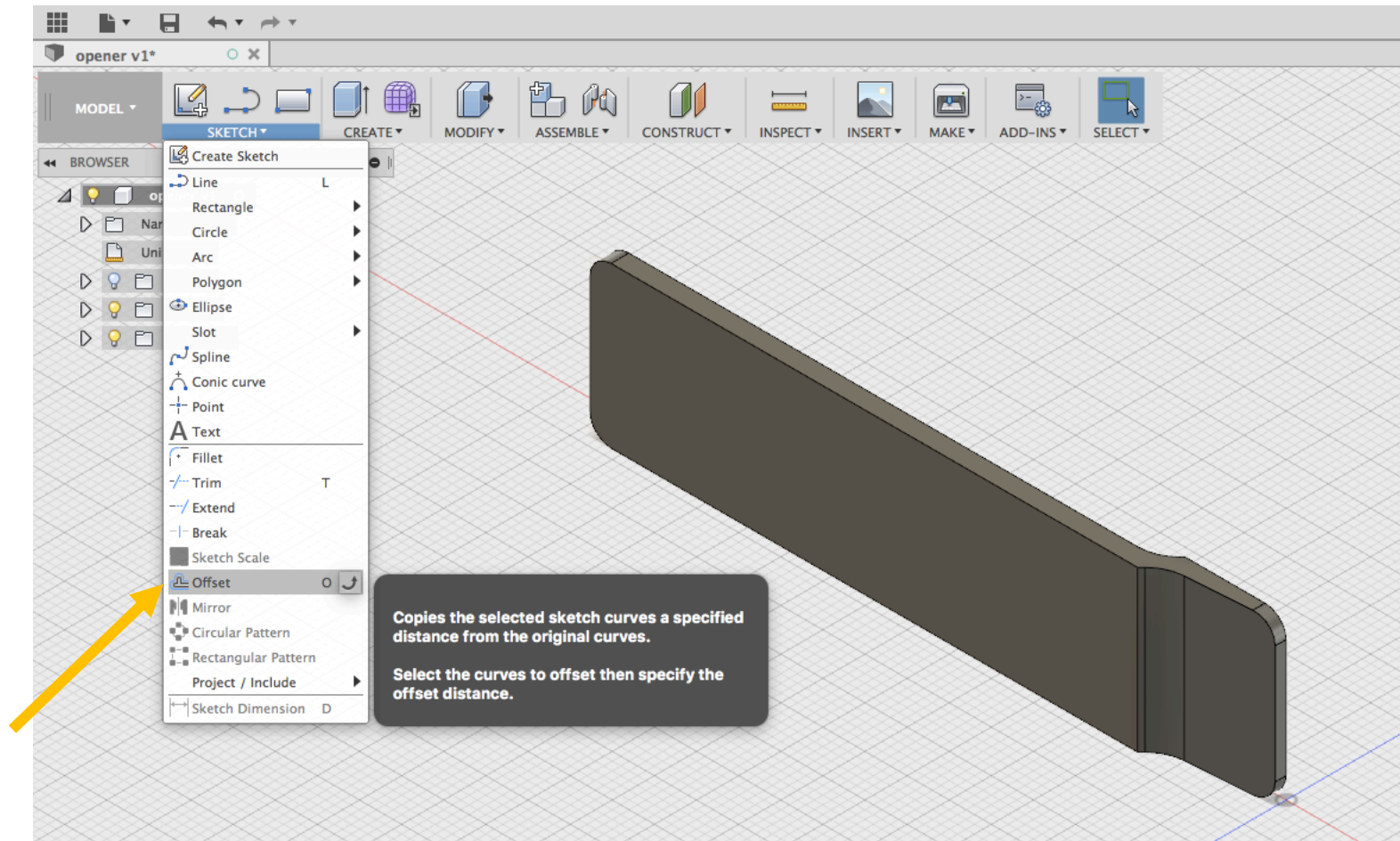
Step 43: Check your result, it should look like this:



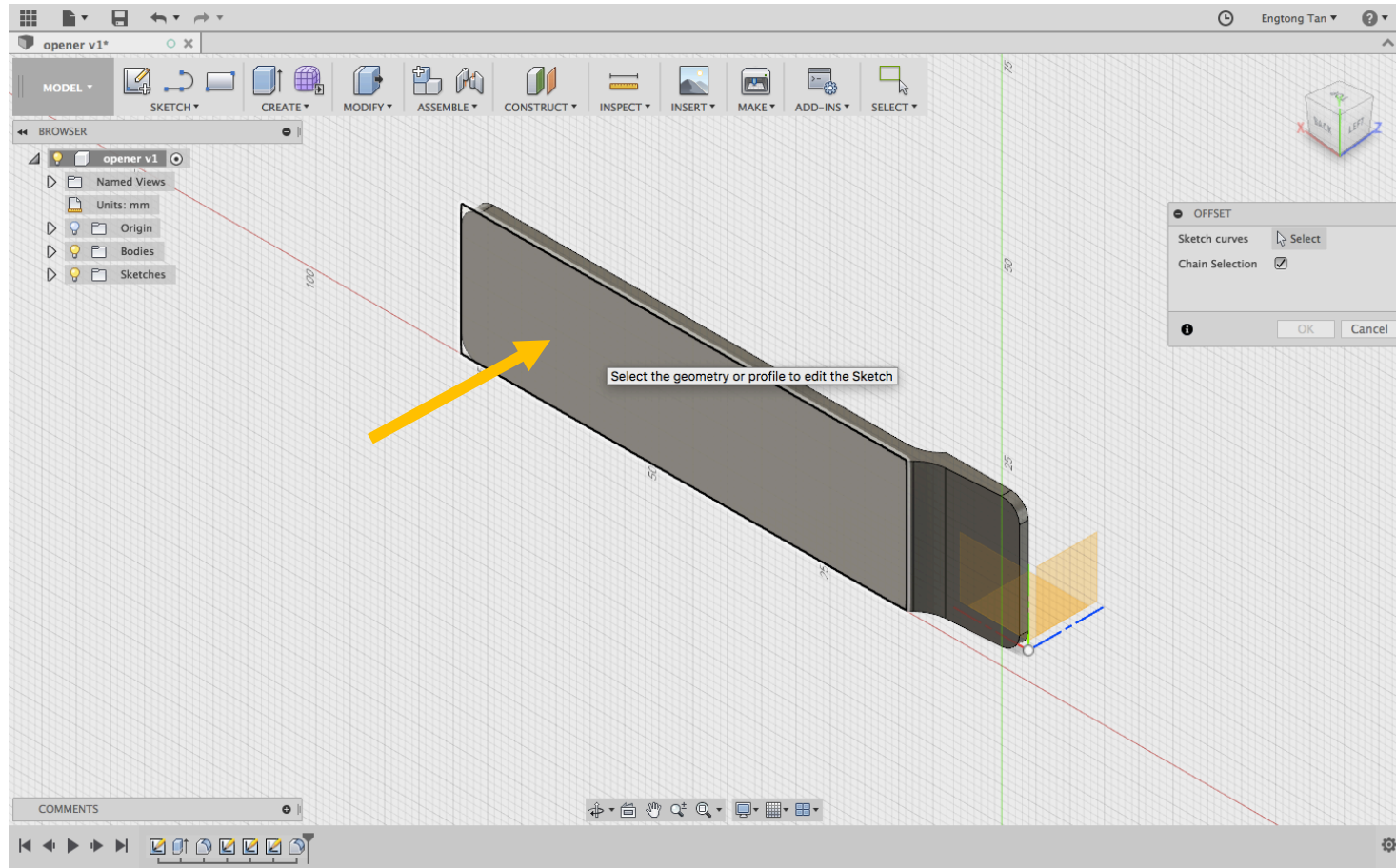




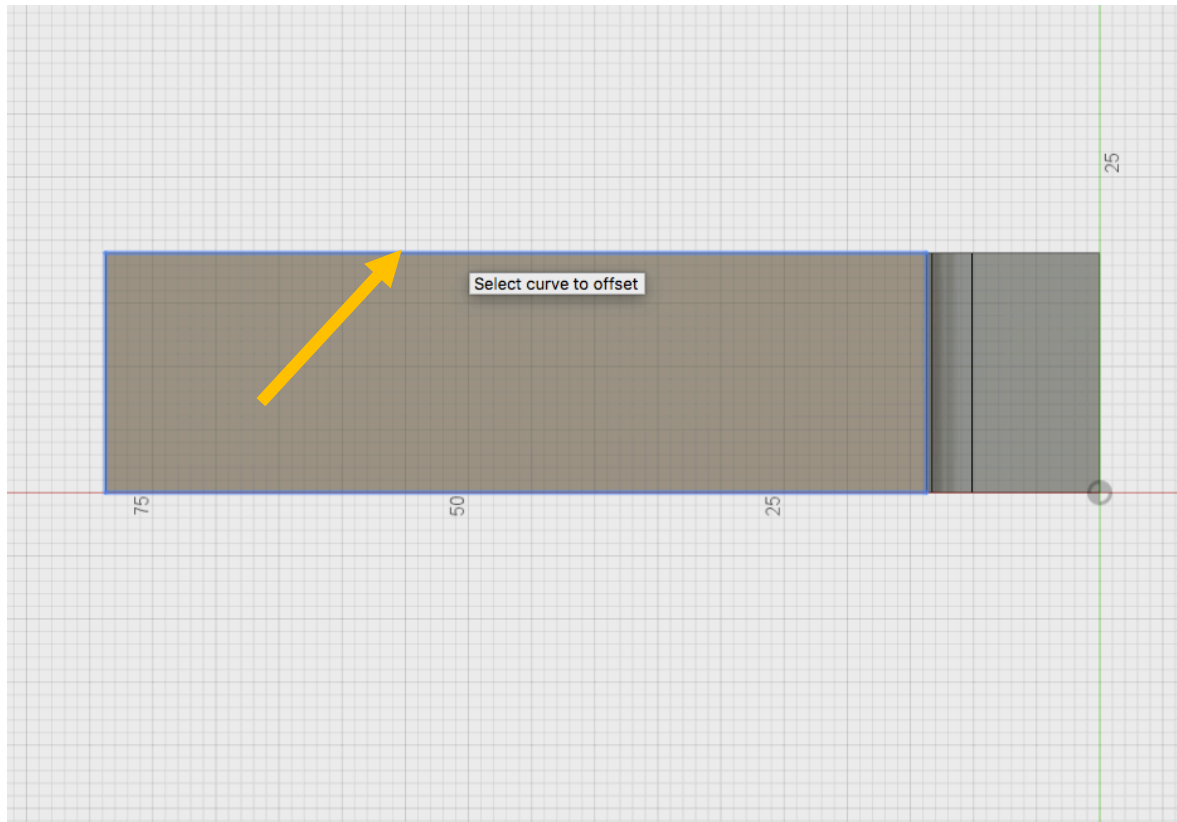
# Step 44: Go to “Sketch” > “Offset”.



# Step 45: Select the surface shown.




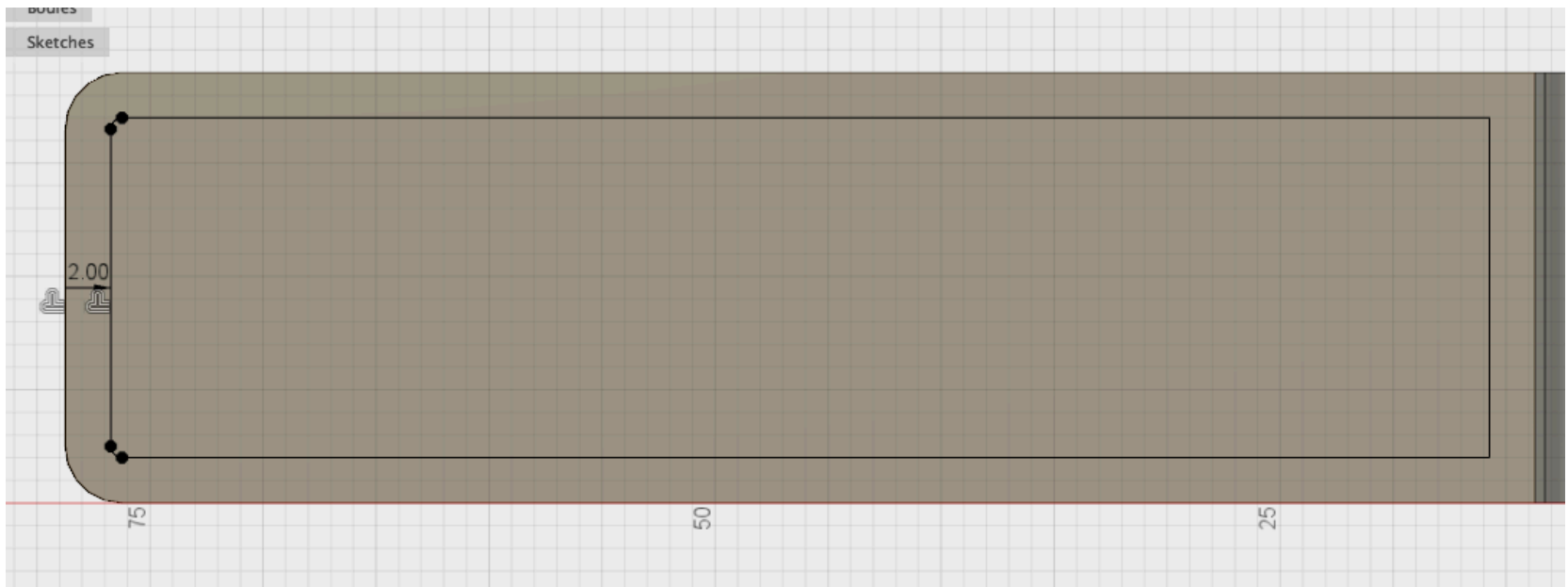
Step 46: Then select the highlighted outline.



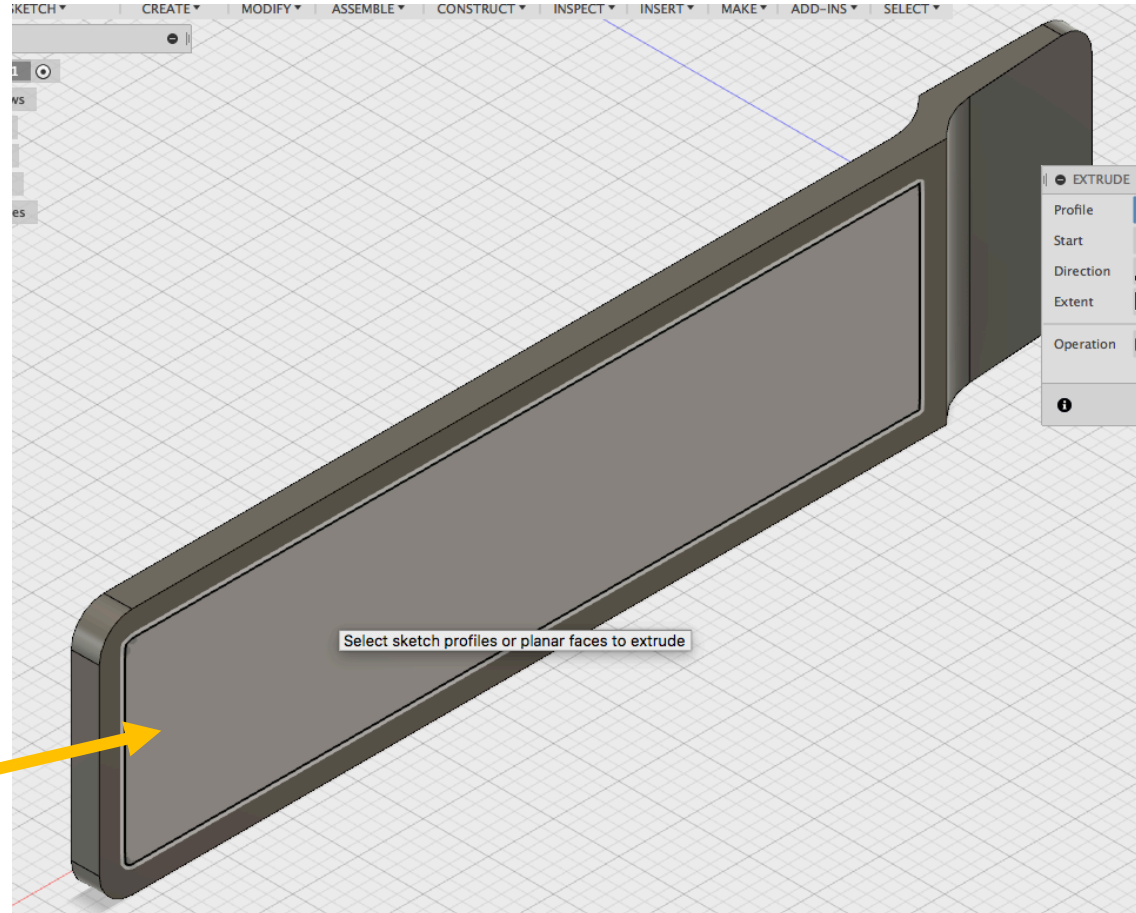
Step 47: Key in “-2mm” then hit  
“Enter”.



Step 48: The result should be like  this:



Step 49: Click “Stop Sketch”. Select “Extrude” then click on the inner surface of the opener.

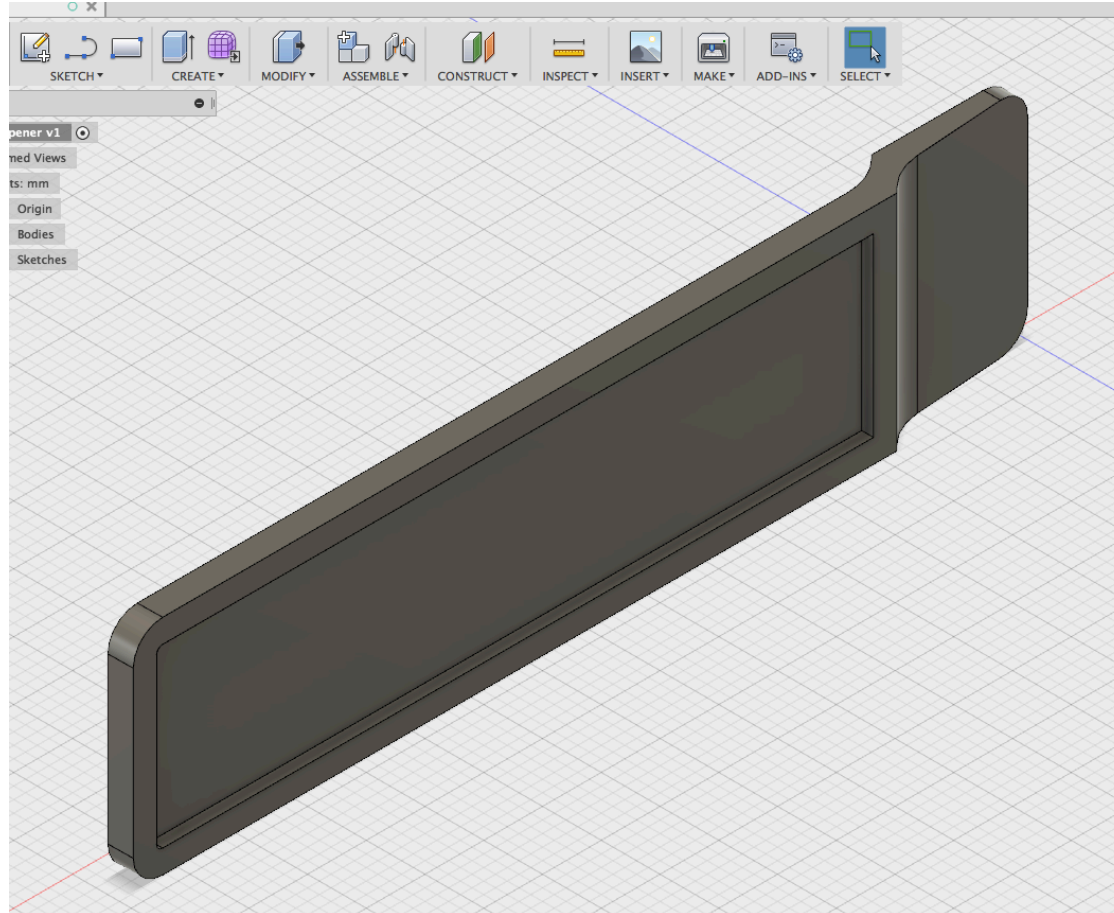


Click this surface with Extrude function

Step 50: key in “-1mm” into the text box, then hit “Enter”.

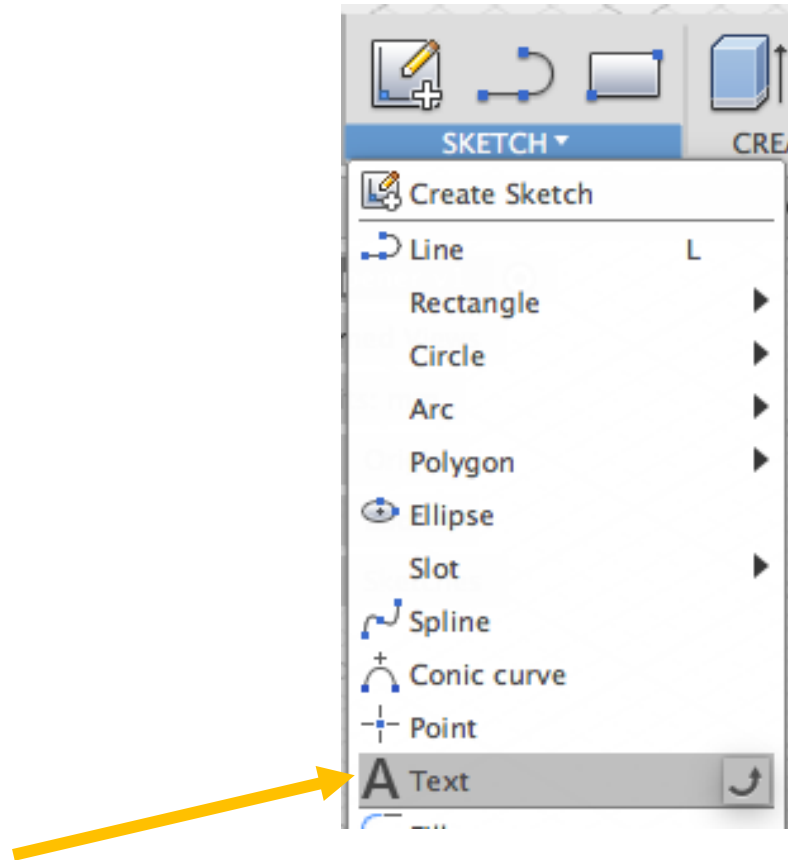


# Step 51: Your result should look like this:

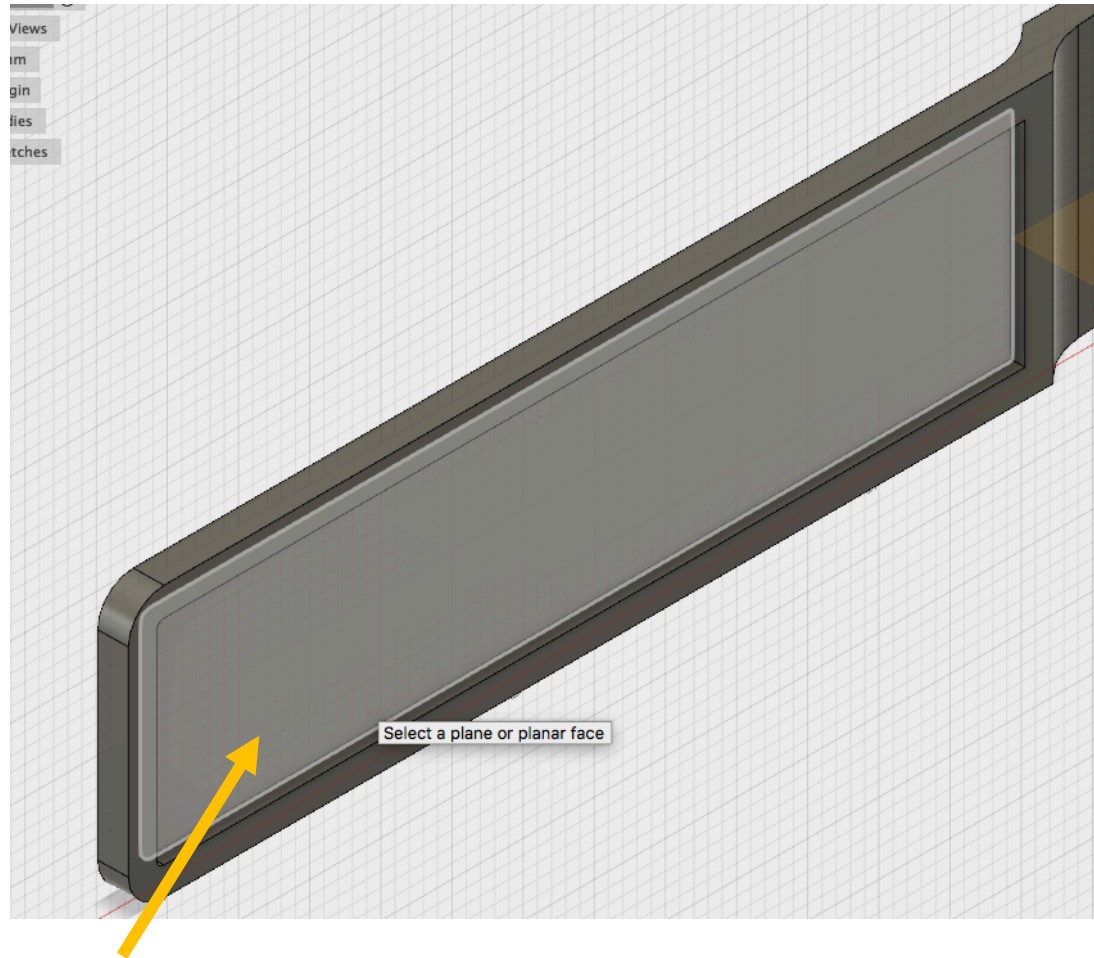




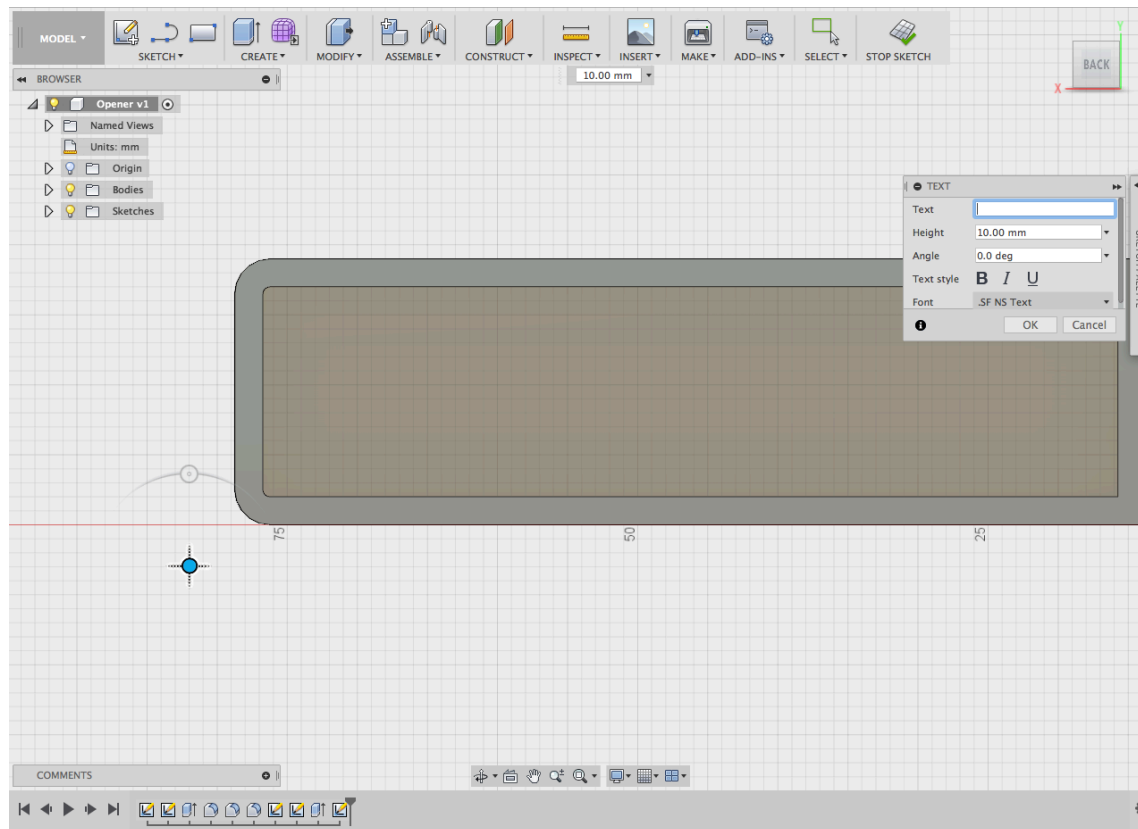
Step 52: Next, go to “Sketch” > “Text”.



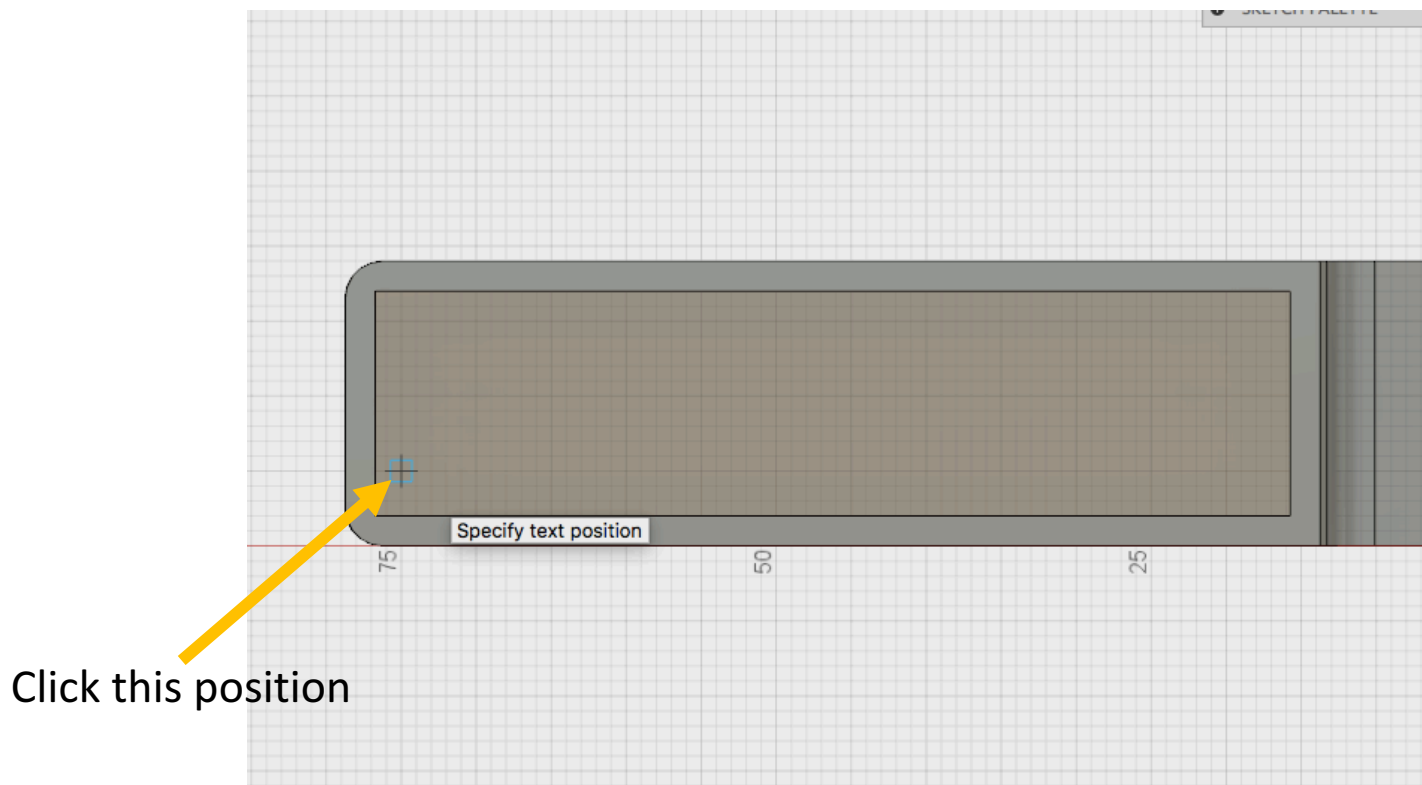
# Step 53: Click on the inner surface of the opener



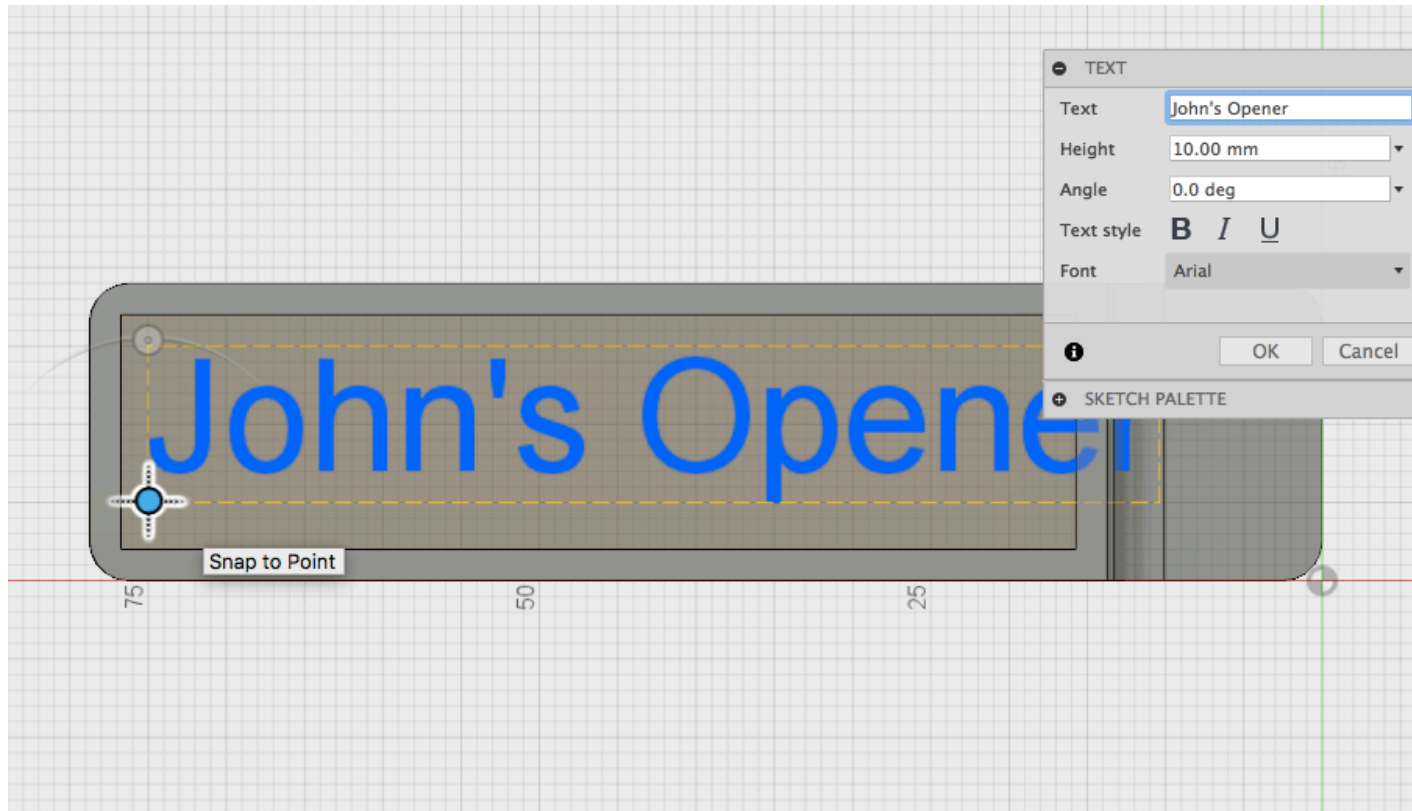
# Step 54: The view will change.



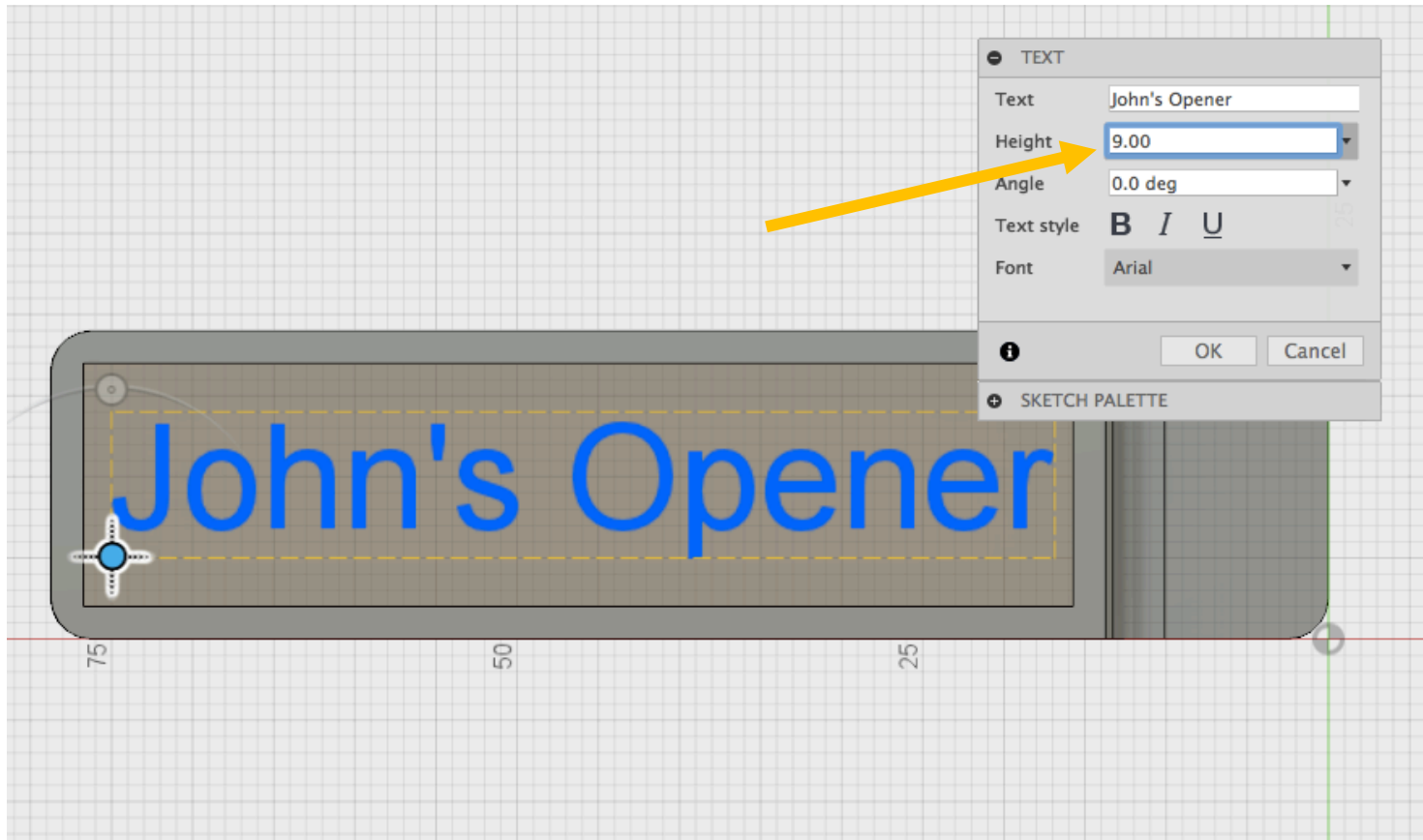
# Step 55: Click on the position shown below.



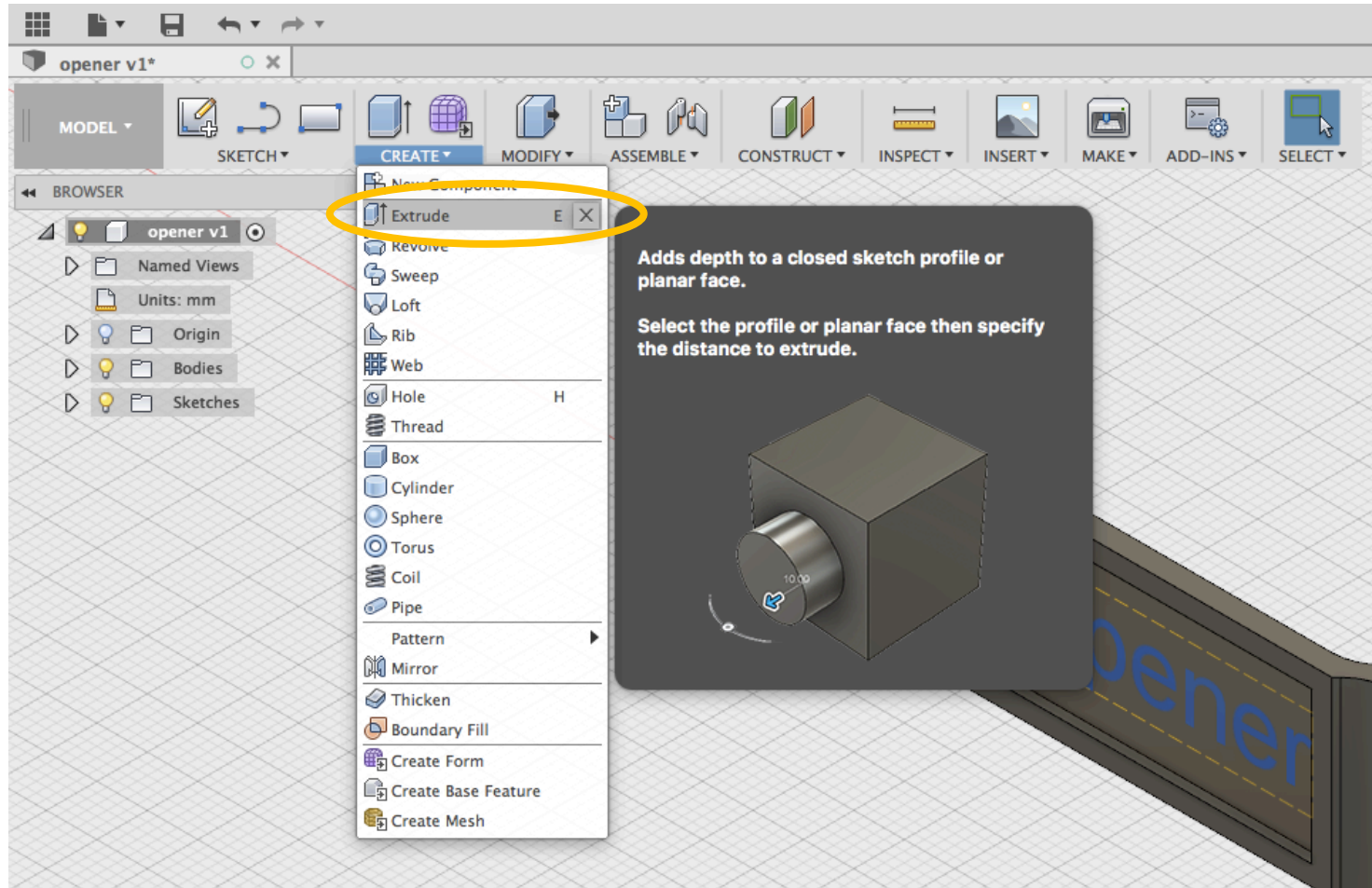
Step 56: Type your name (or any text you want).



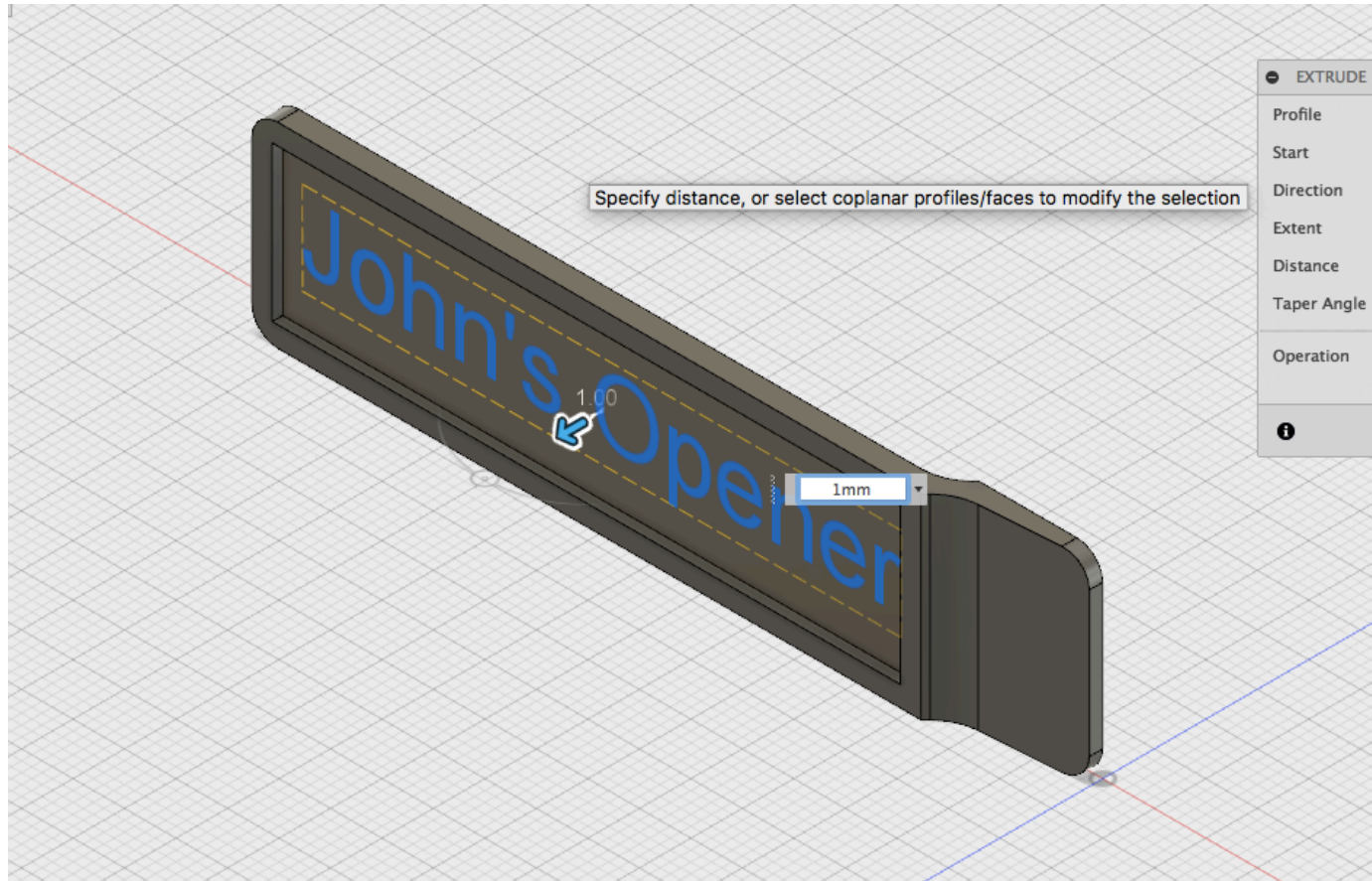
Step 57: Adjust the font's height so that they can fit into the designated area.



# Step 58: Click “Stop Sketch” then select “Extrude”.

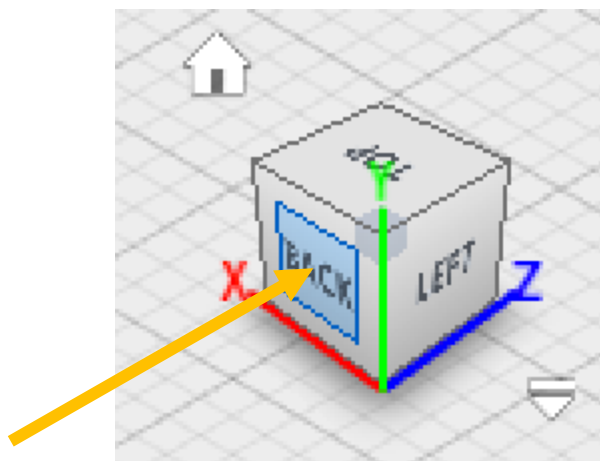


Step 59: Click on the text, key in “1mm”, then hit “Enter”.

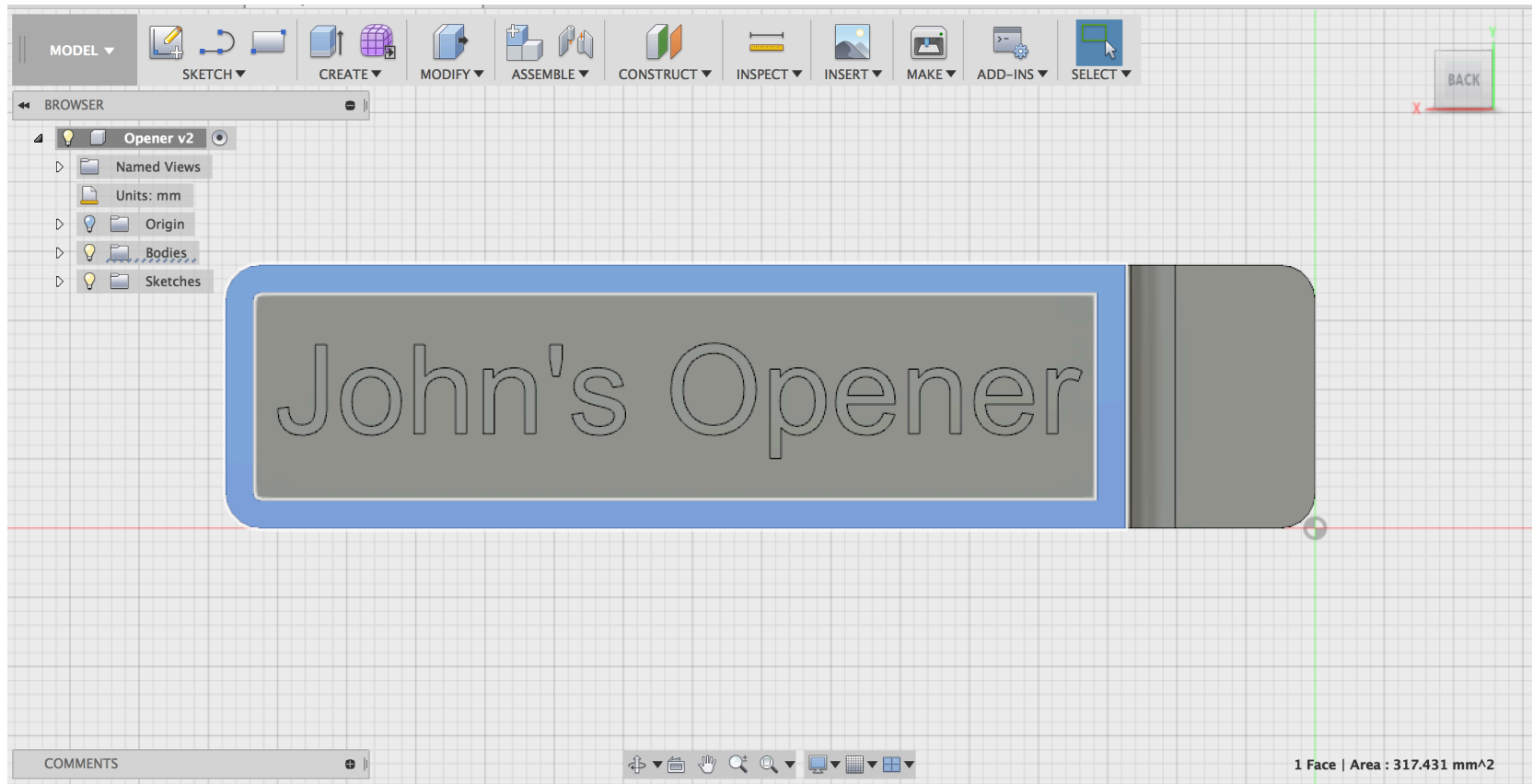




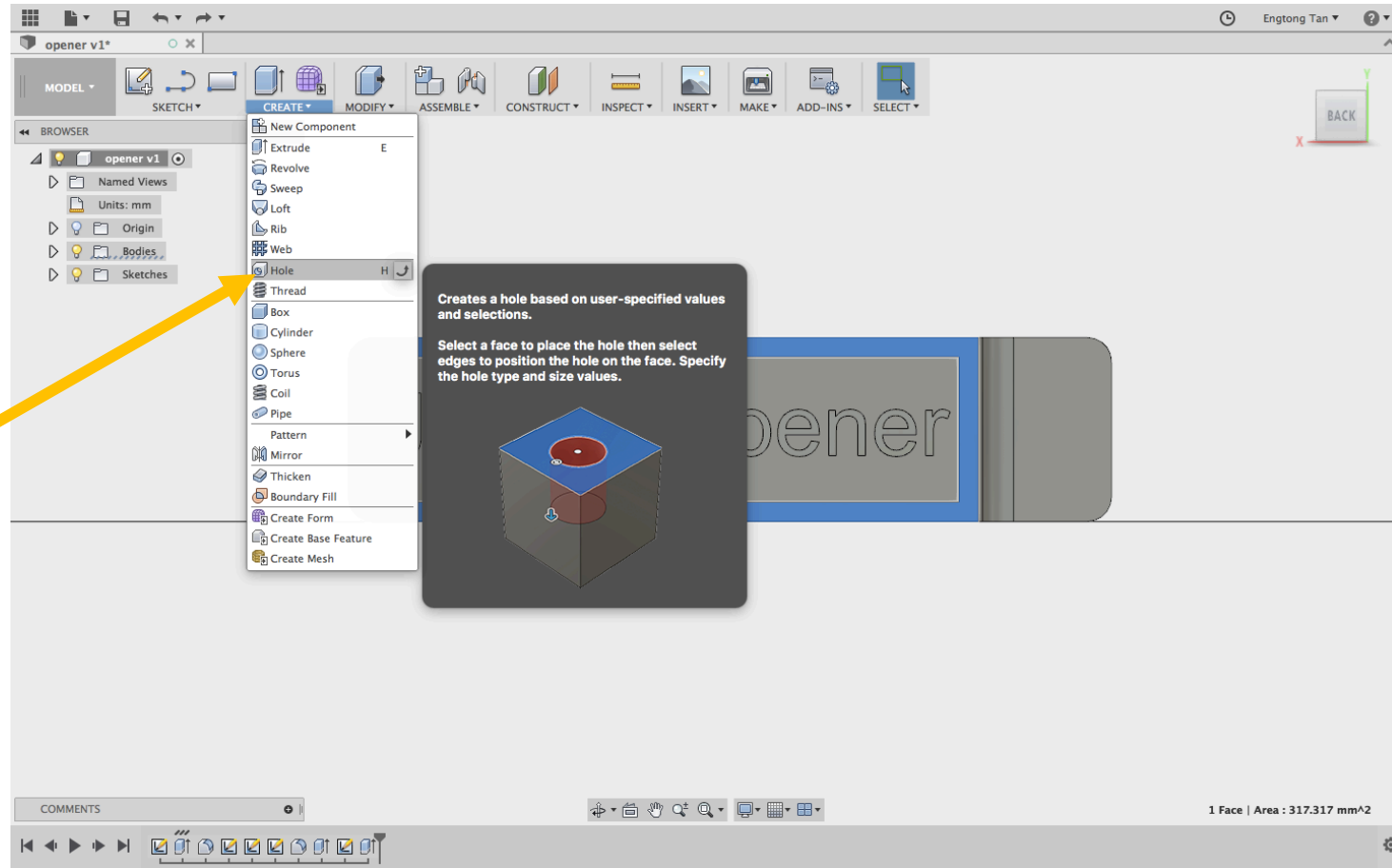
Step 60: Click the “Back” panel.



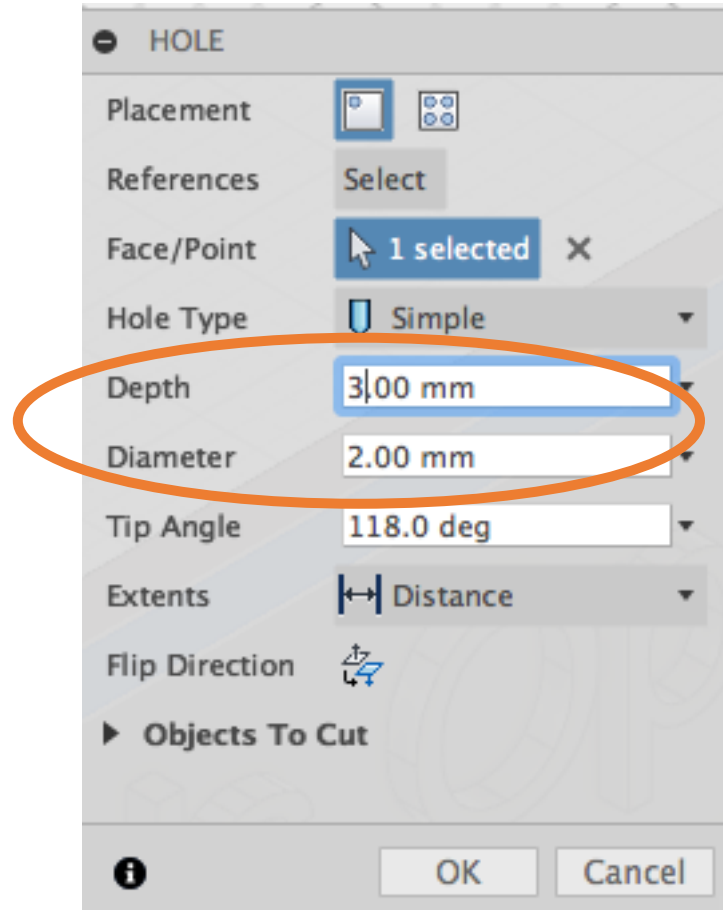
# Step 61: Click on the outer frame surface.



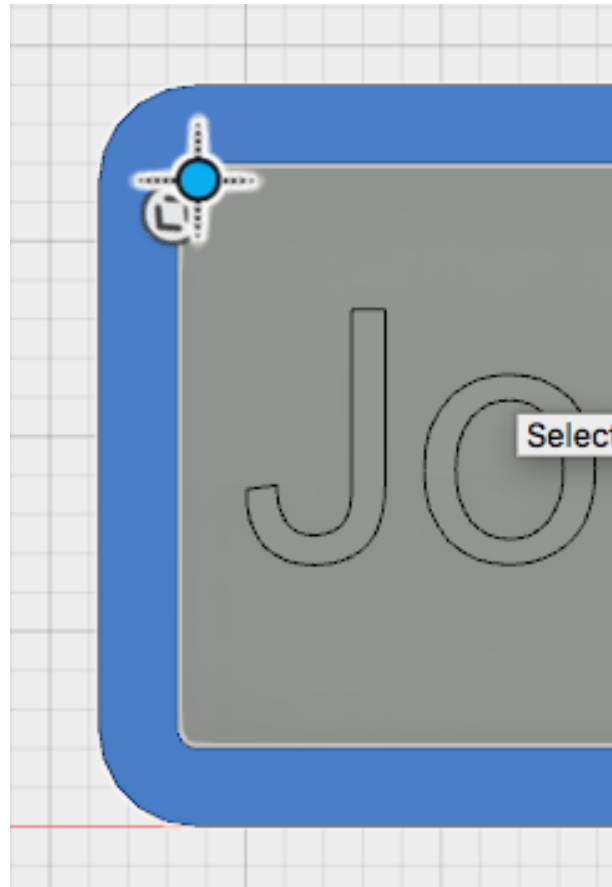
# Step 62: Then go to “Create” > “Hole”.



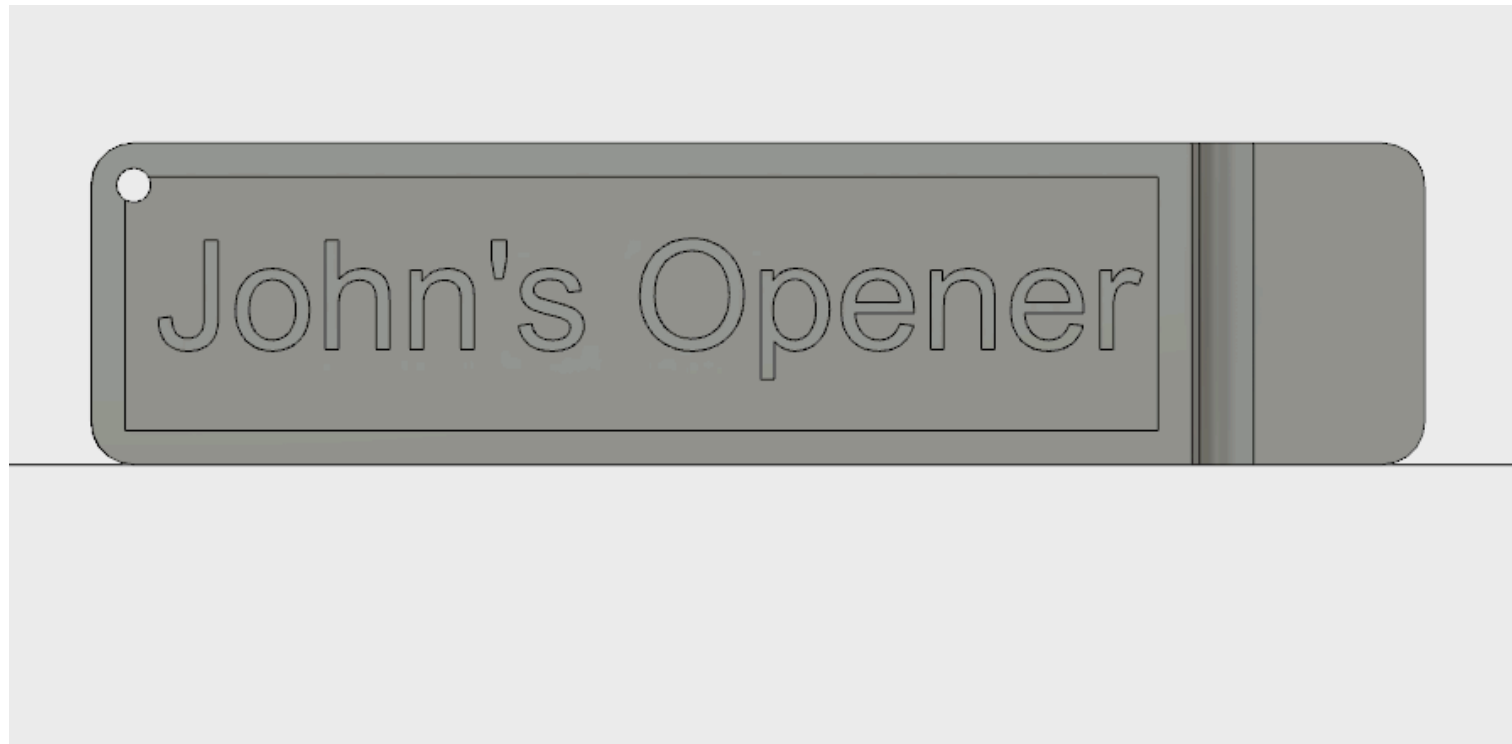
Step 63: Key in “3mm” for depth and “2mm” for diameter.



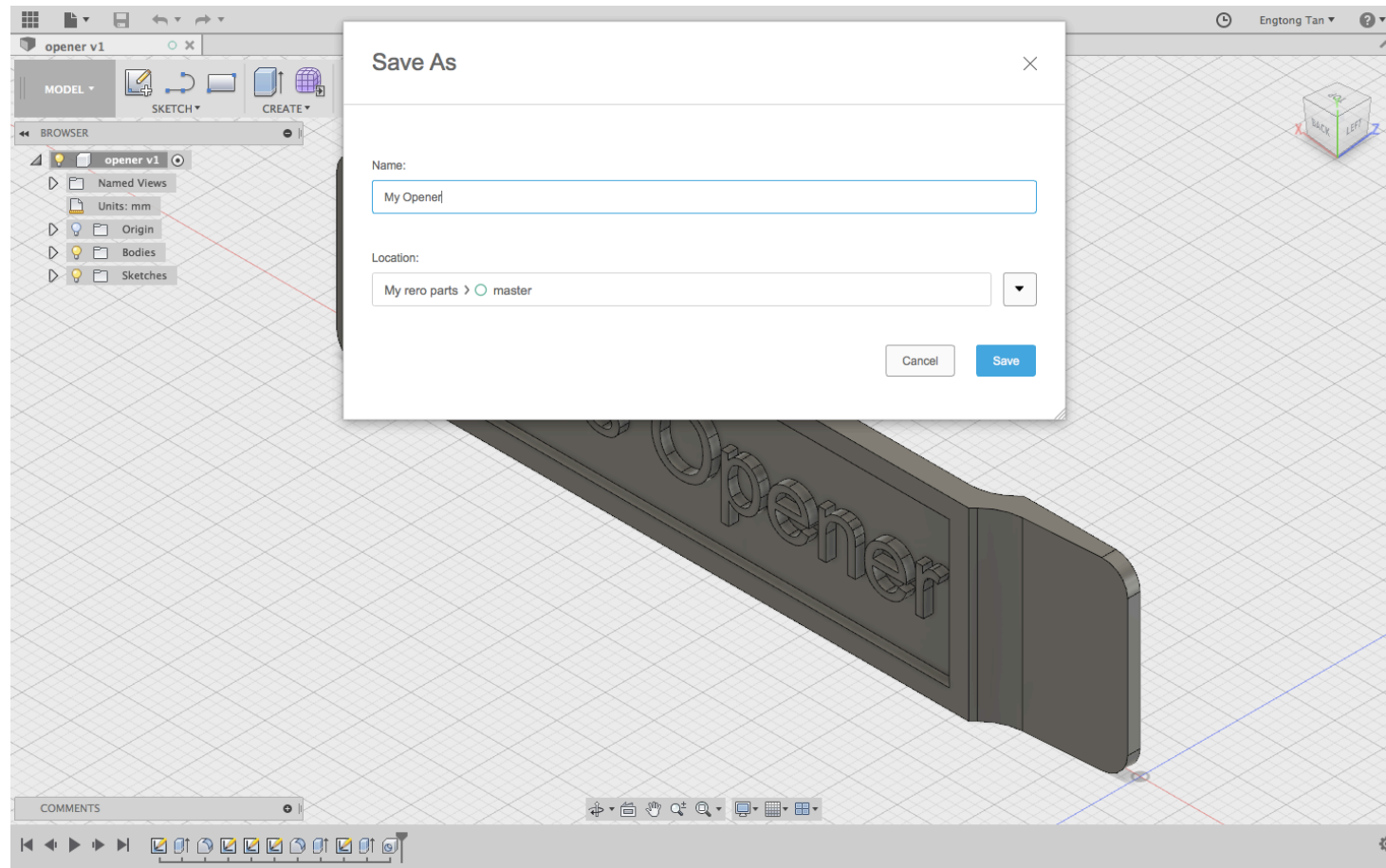
Step 64: Drag the pointer to the upper corner as shown below then hit “Enter”.



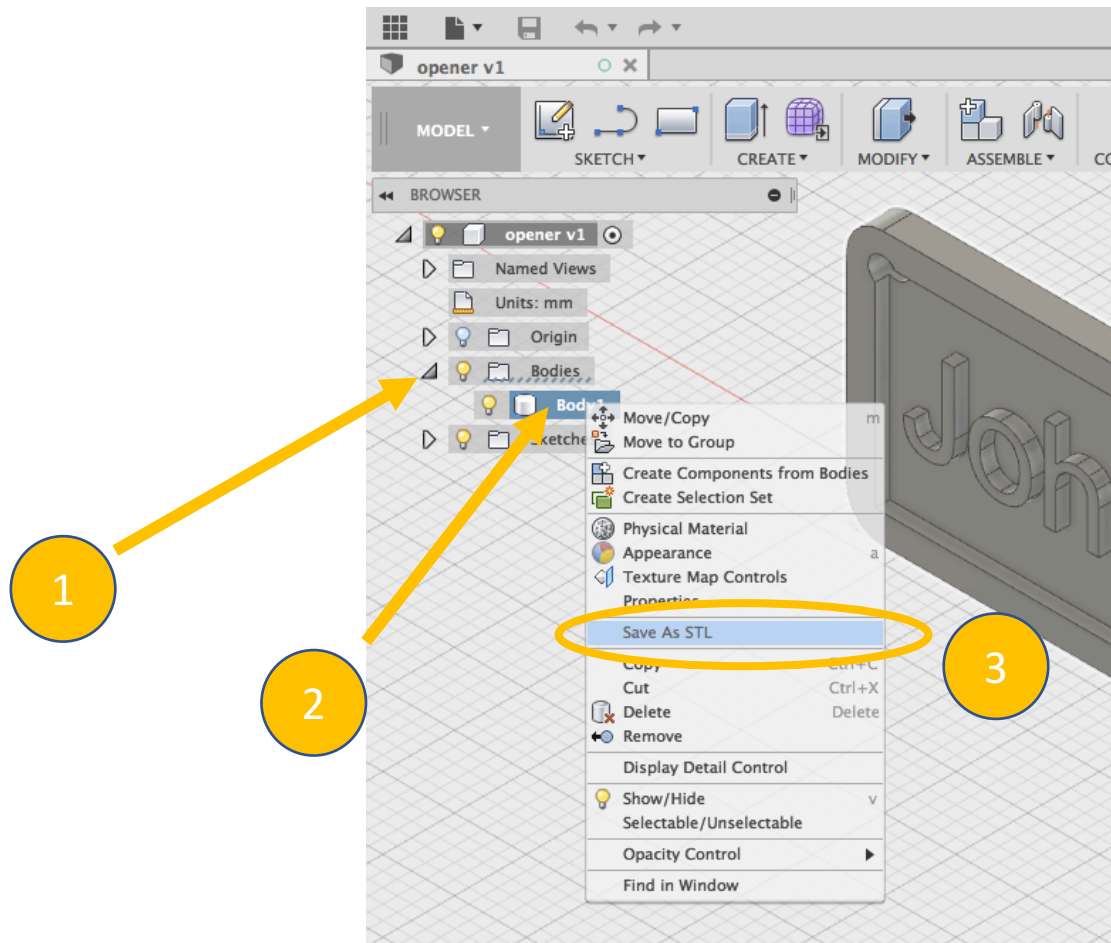
Step 65: Check your result, your opener should look like this:



# Step 66: Save your design.



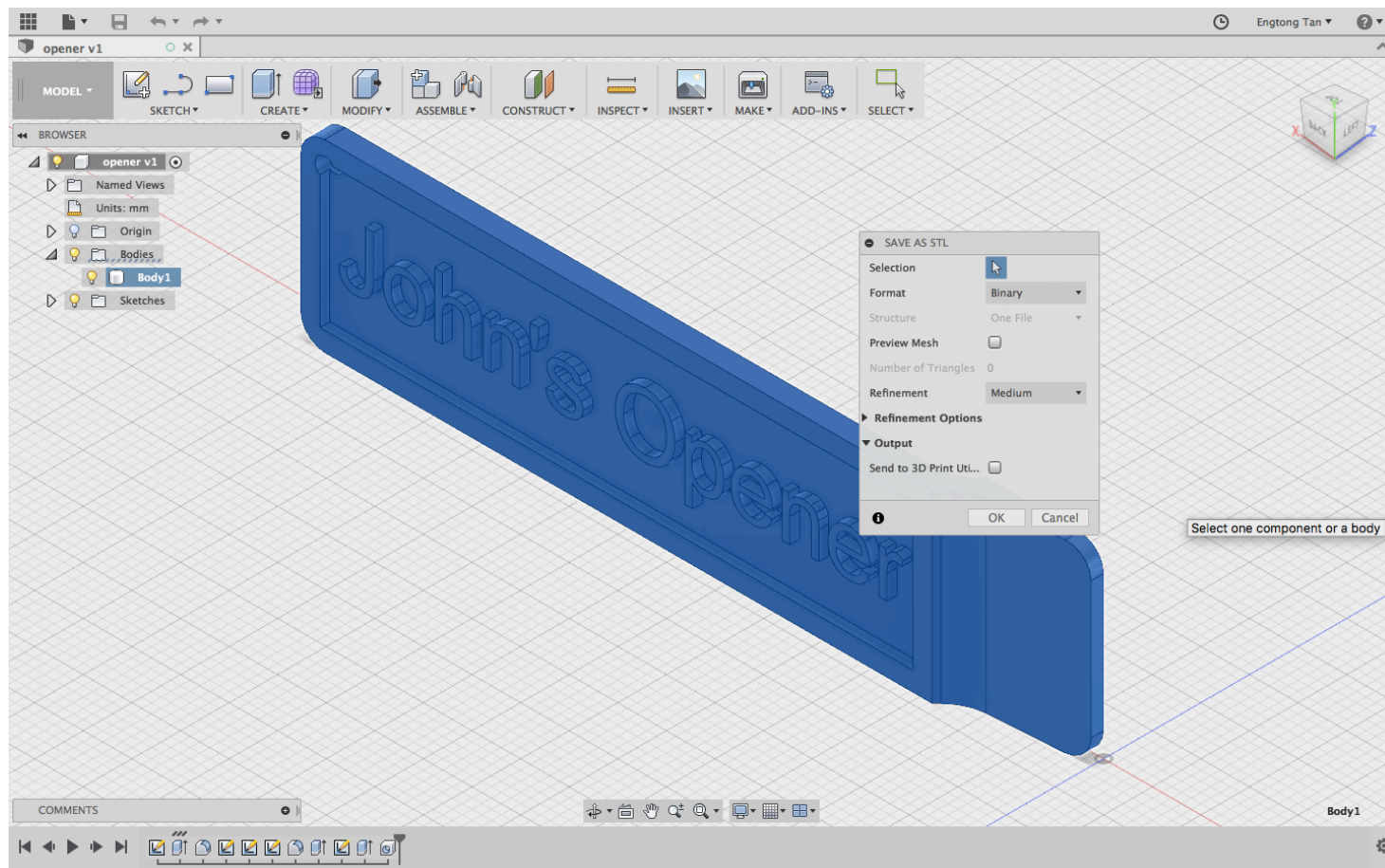
Step 67: Click  to expand the “Bodies”. Right click on “Body 1” then click “Save as STL”.



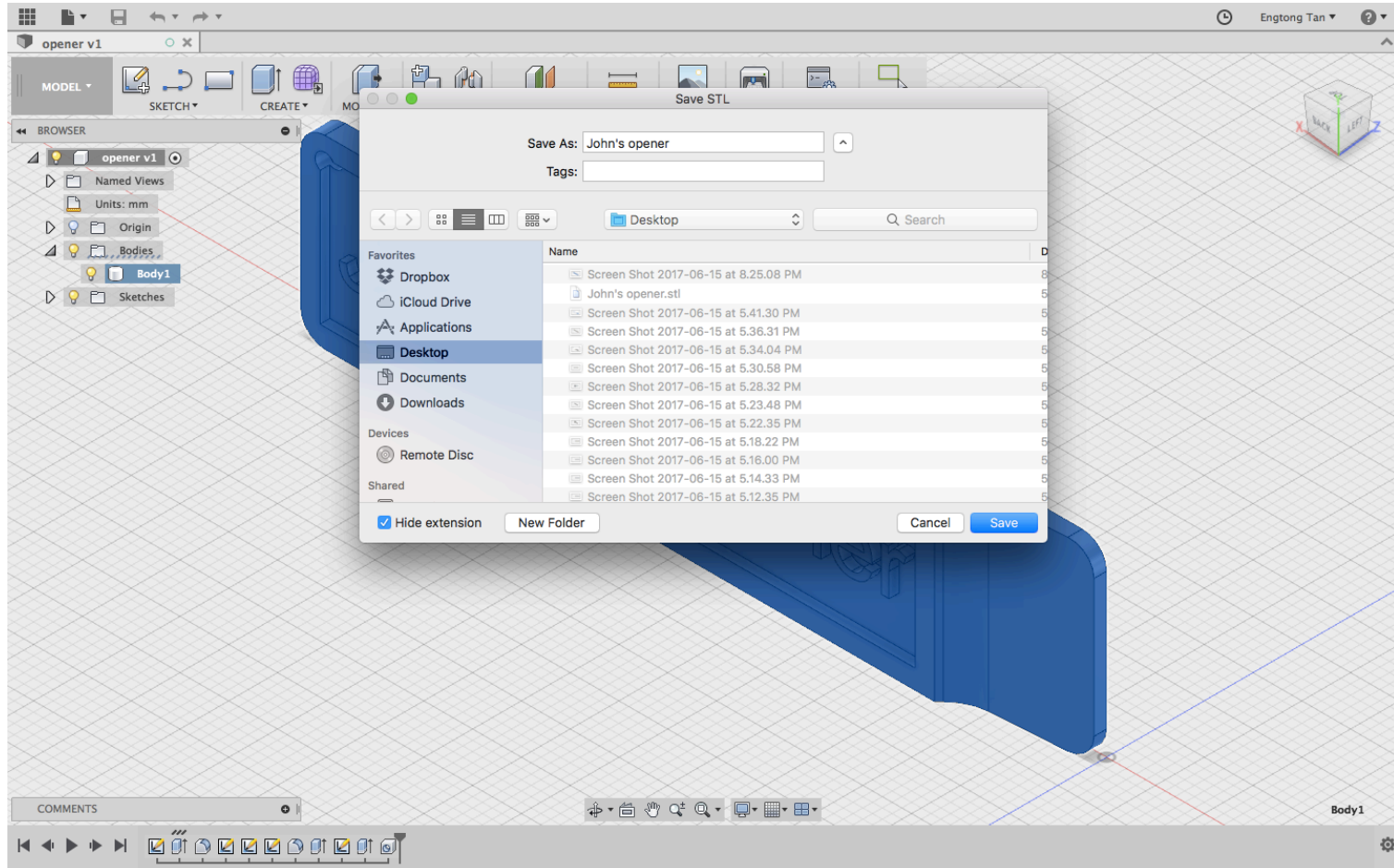




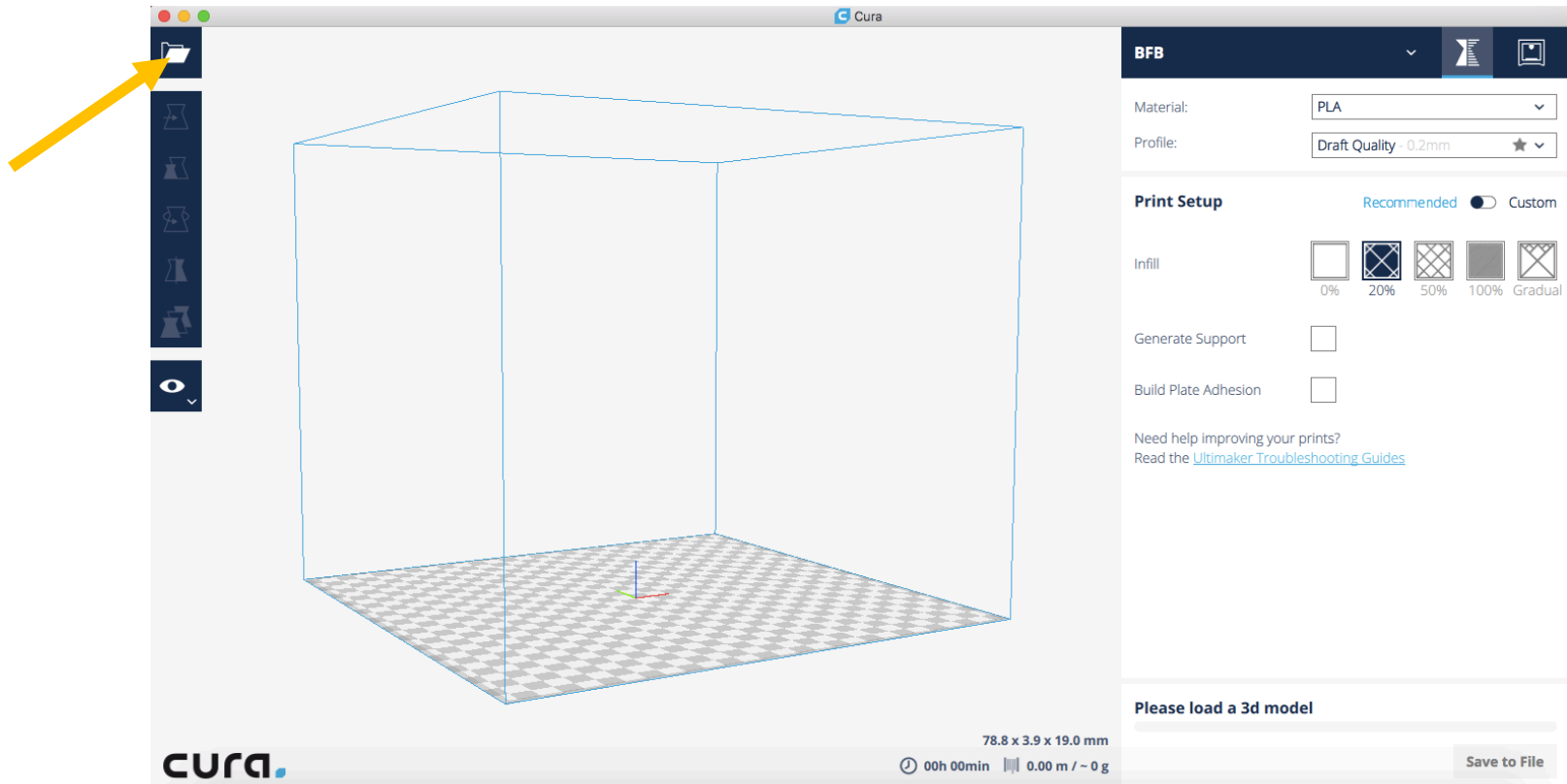
# Step 68: Click “OK” or hit “Enter”.



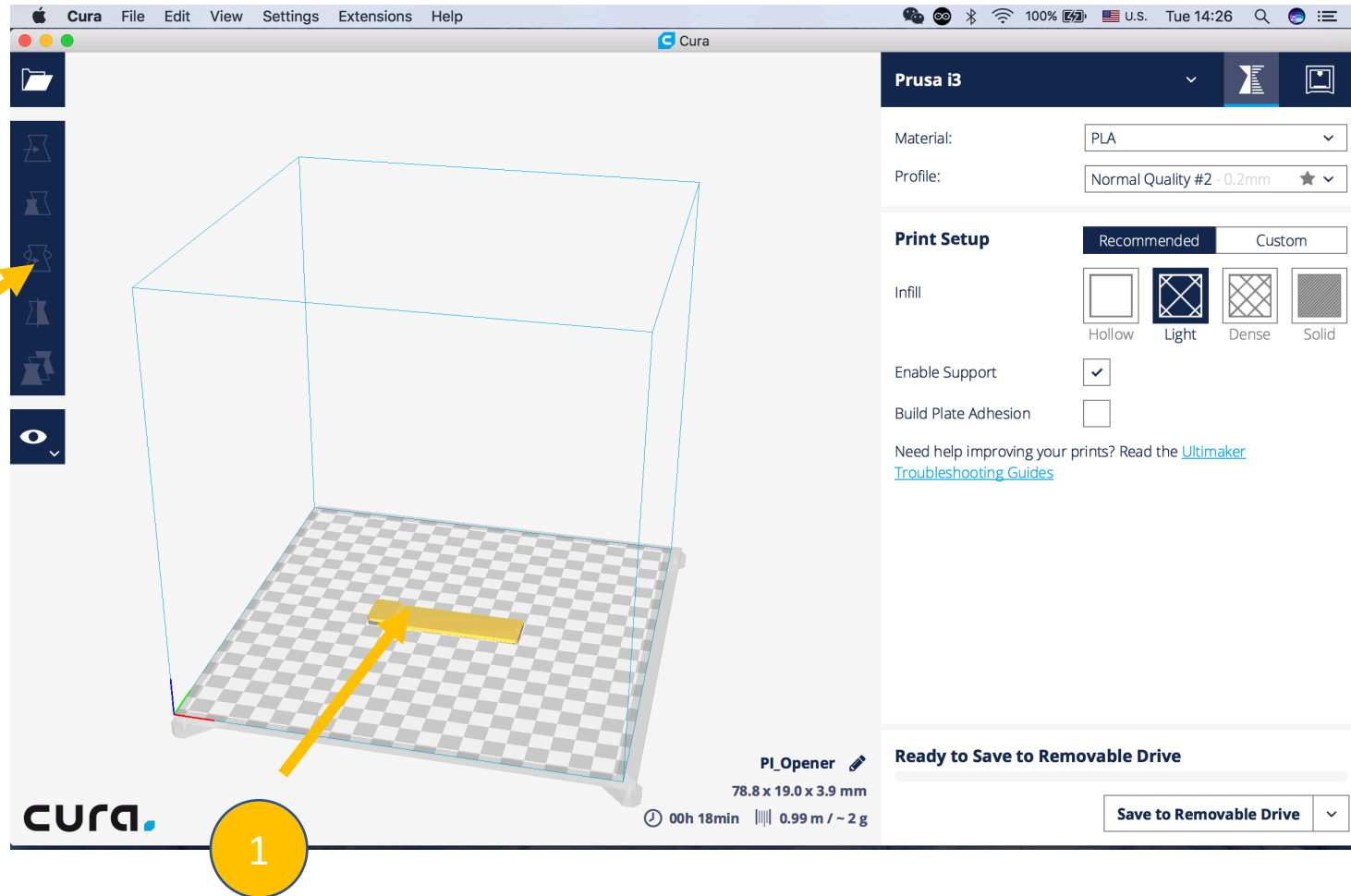
# Step 69: Save the STL file in your computer.



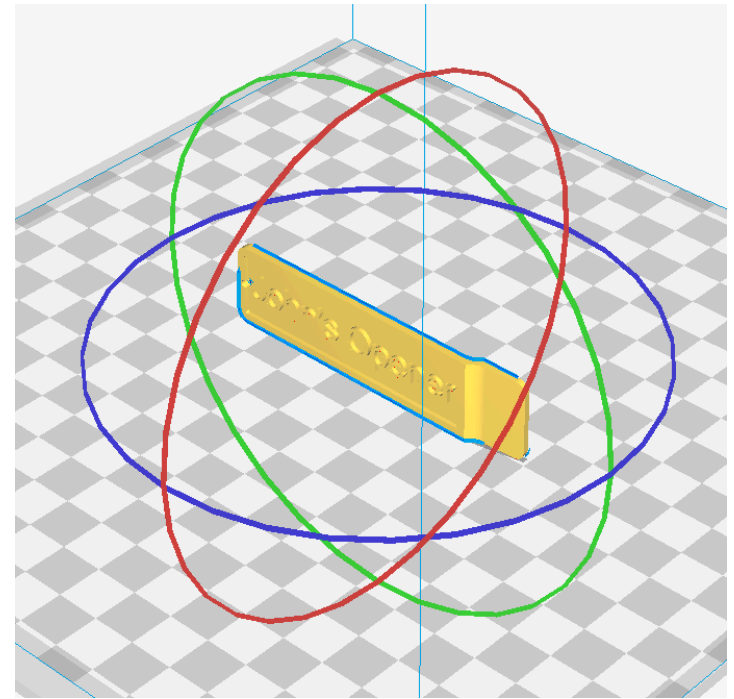
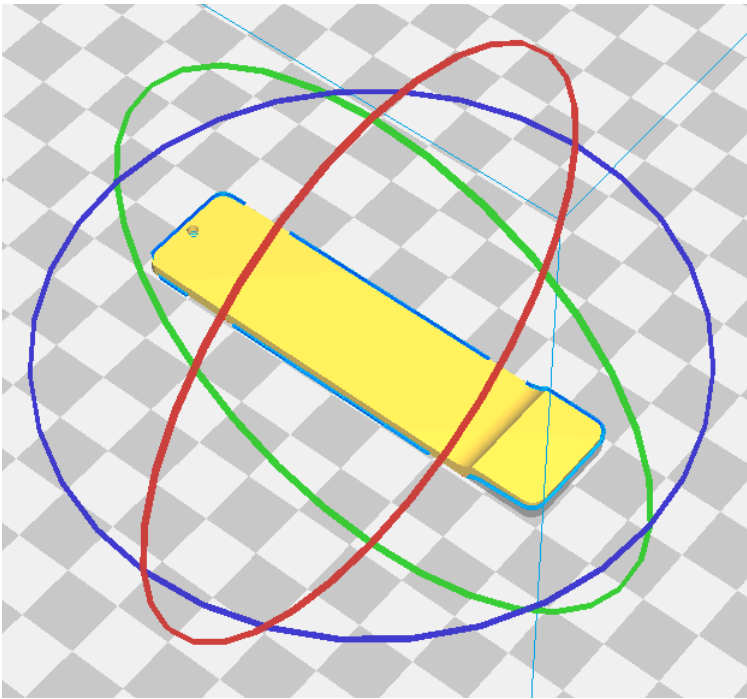
# Step 70: Import your STL file into Cura.



# Step 71: Click the *opener* then click on “Rotate” icon.



Step 72: Click and hold the red ring, then drag it to rotate the opener by 90 degrees.



# Step 73: Follow the printing setup shown below.

Material: PLA 

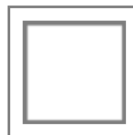
Profile: Normal Quality #2 - 0.2mm  

## Print Setup

Recommended

Custom

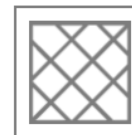
Infill



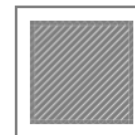
Hollow



Light



Dense



Solid

Enable Support

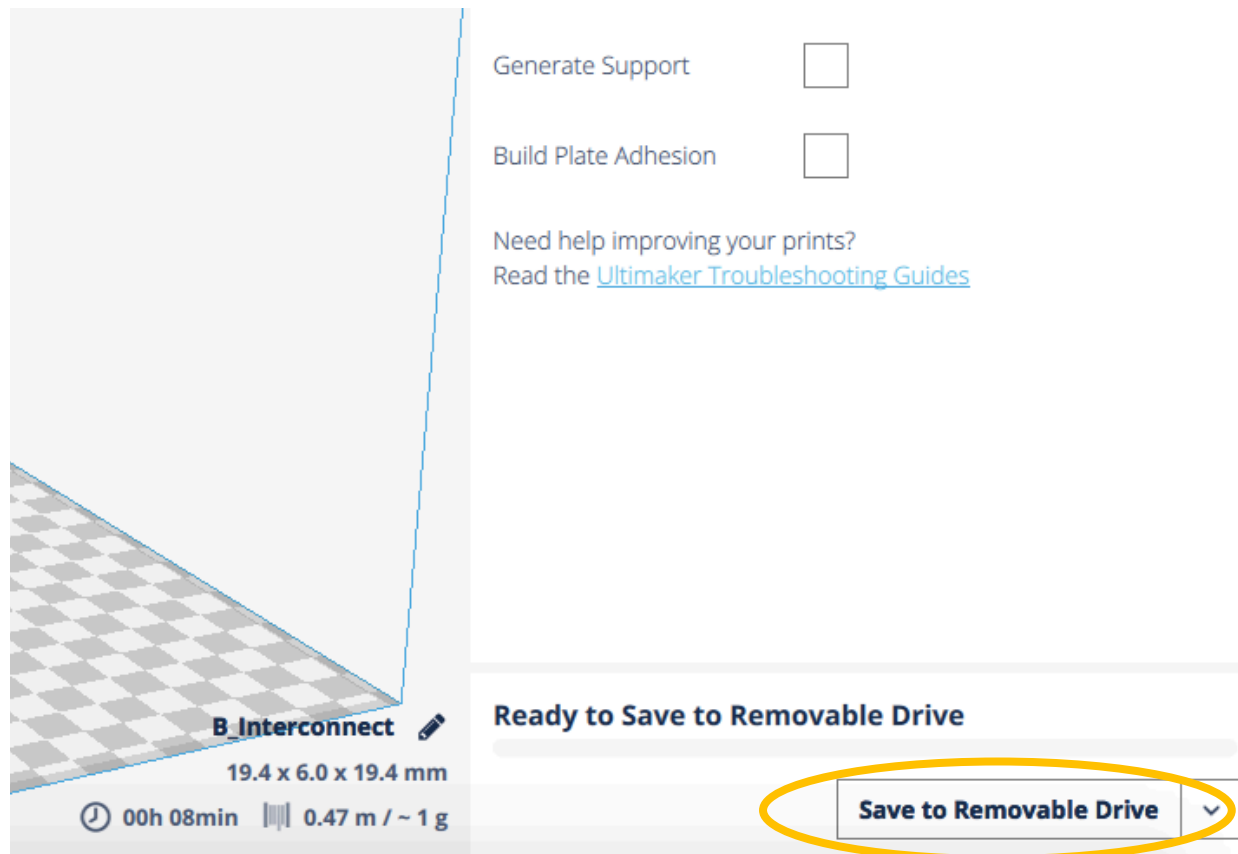
☐

Build Plate Adhesion

☒

Need help improving your prints? Read the [Ultimaker Troubleshooting Guides](#)

# Step 74: Remember to save the file to your SD card before you print with the 3D printer.





Good job!





Challenge: Draw a double ending opener as shown below (both ends can be slid into rero parts).

