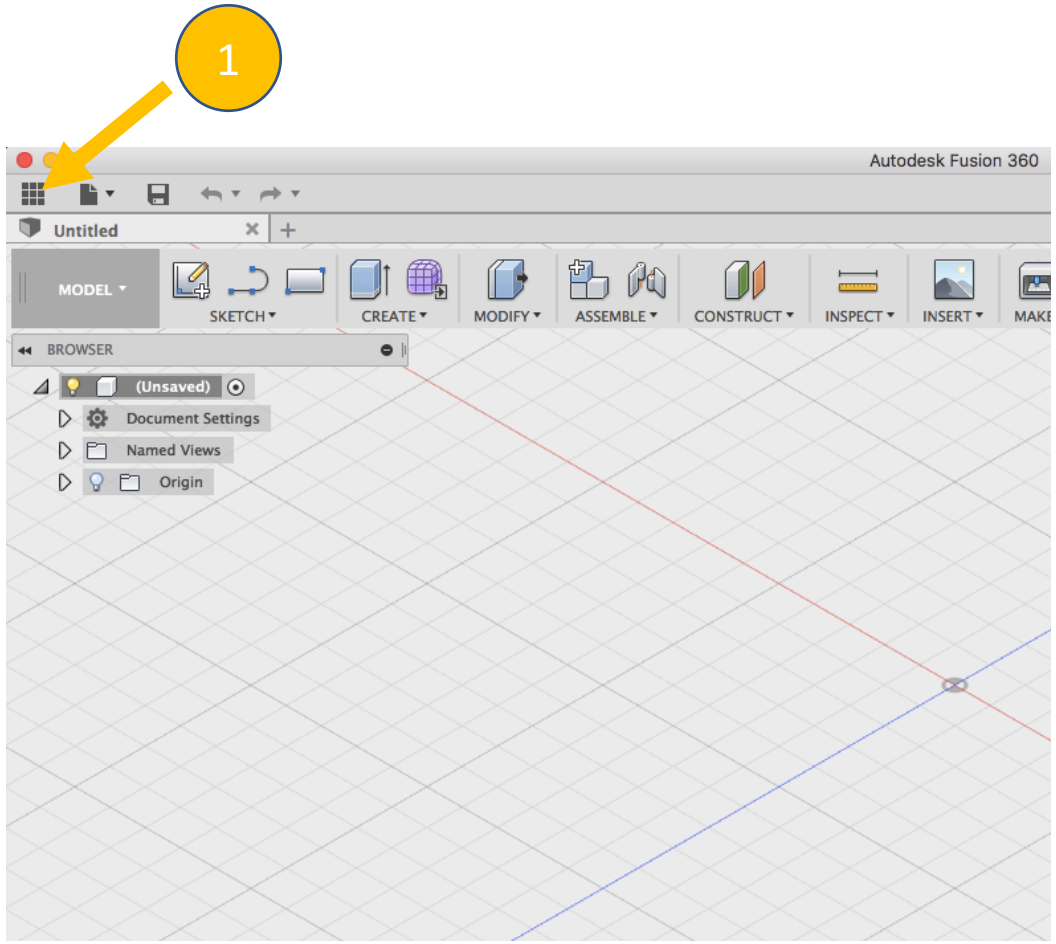
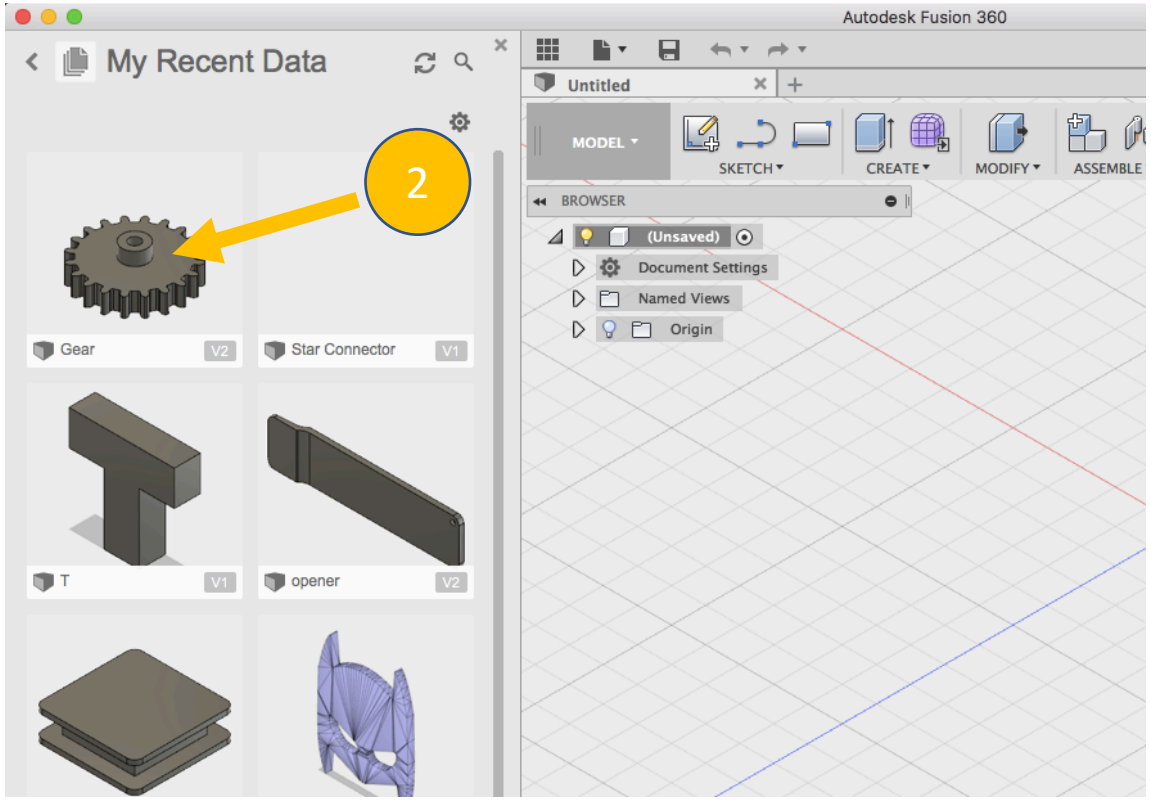
Lesson 9

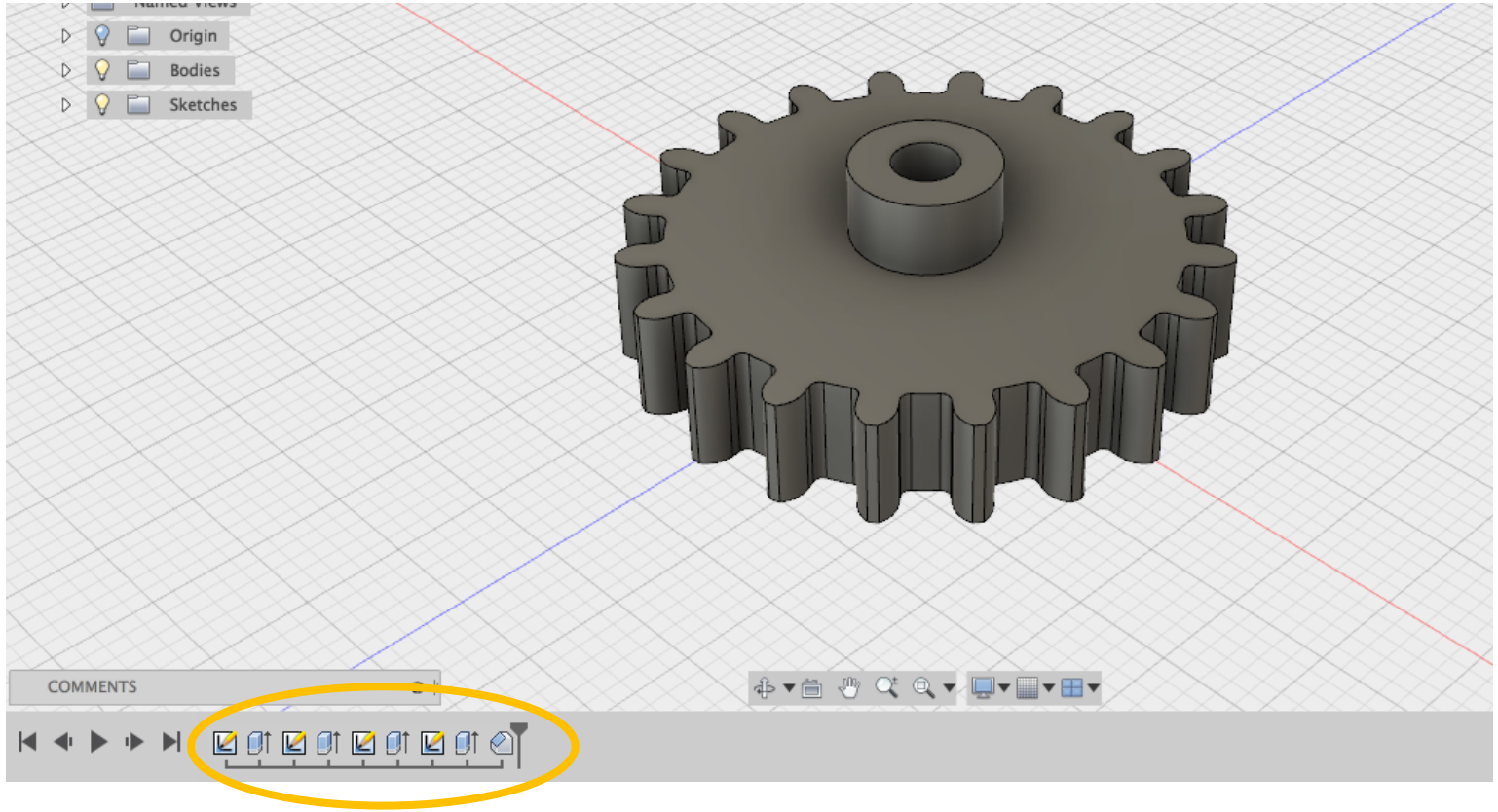
Rack and Pinion Gripper

Step 1: Click to expand ‘Data Panel’ then double-click on the gear design.



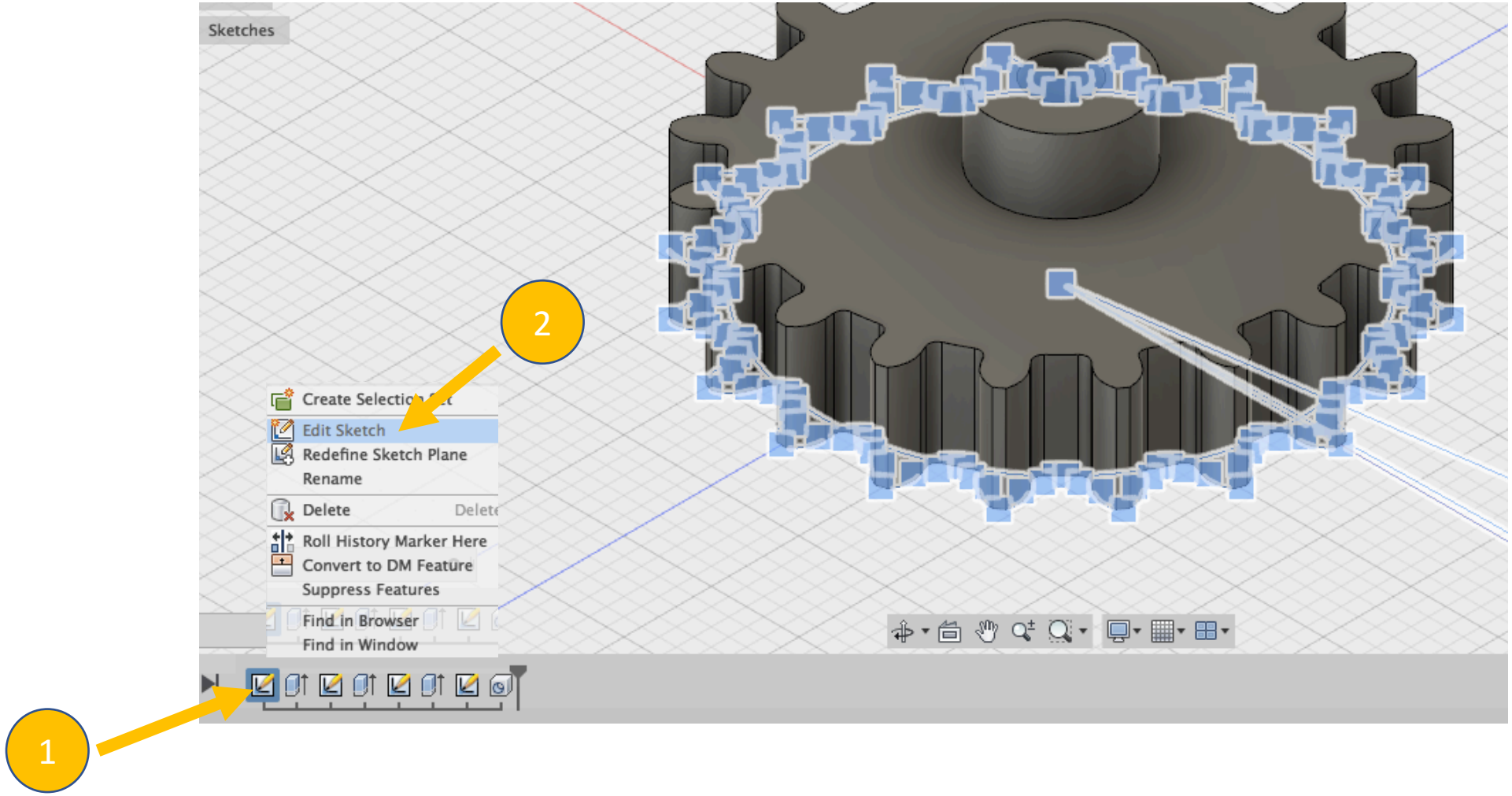


Step 2: Look at the “timeline” located at the bottom of the window.

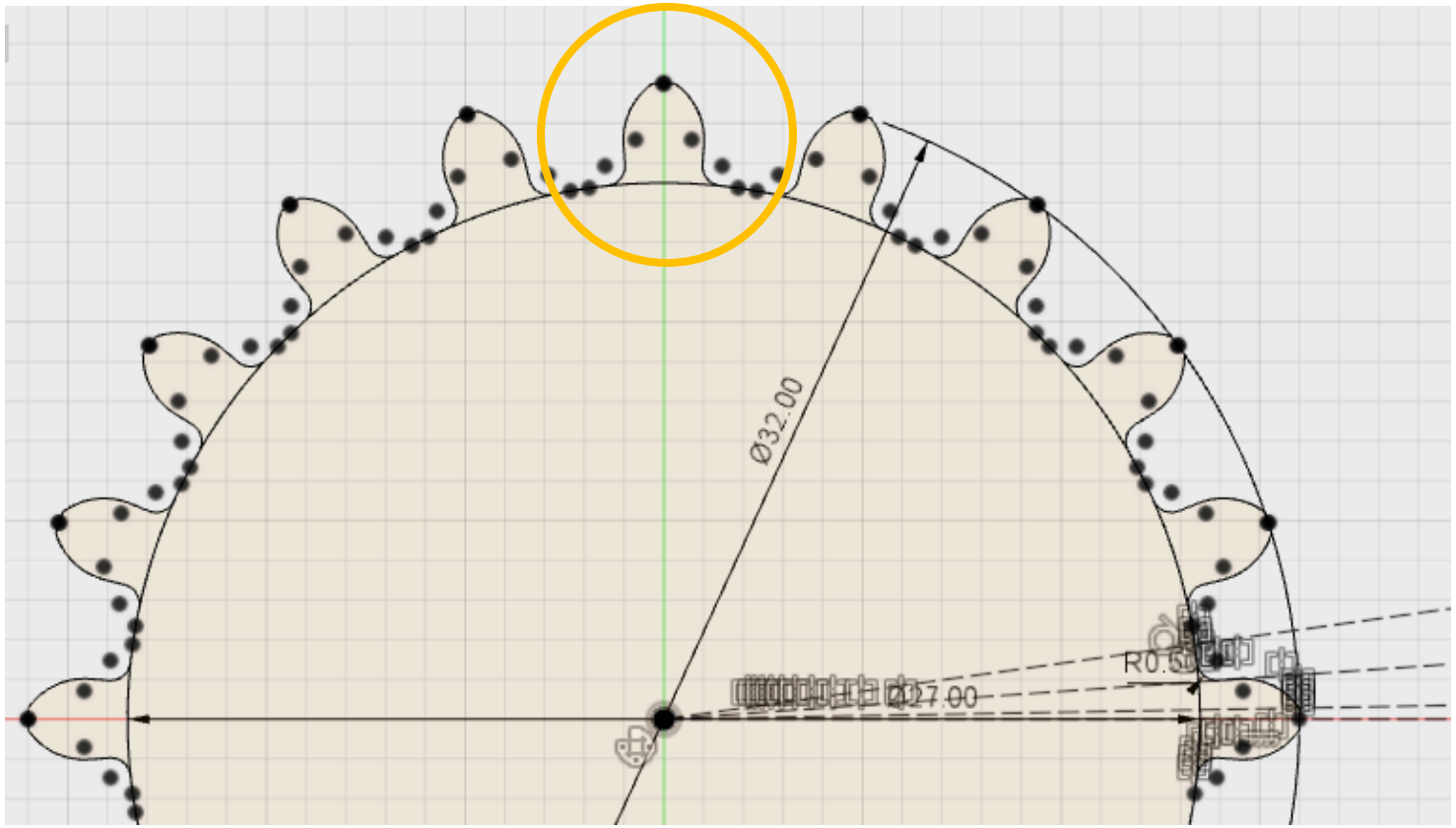


Note: Timeline records every single step you take to draw your part.

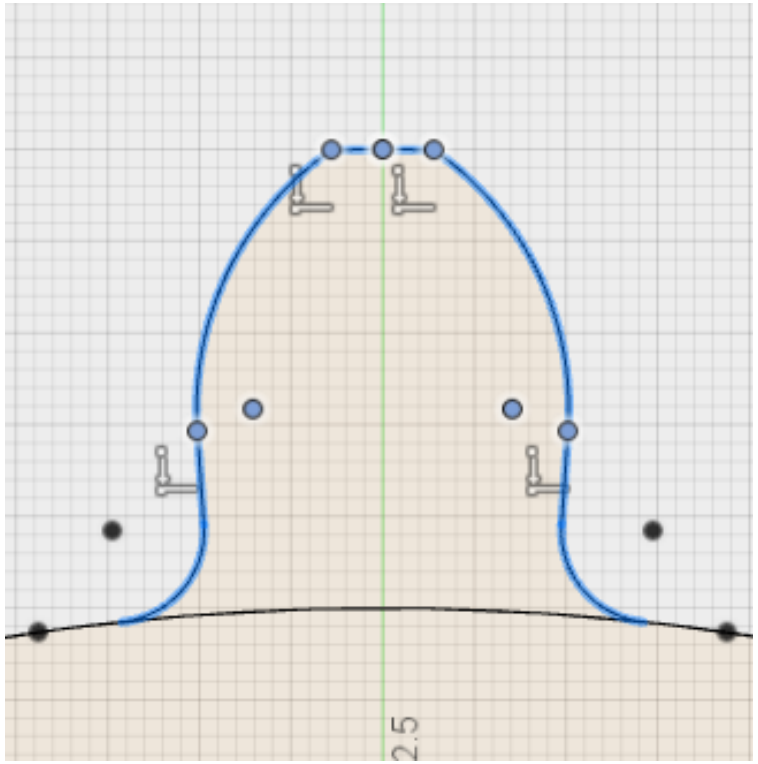
Step 3: Right-click on the first step, then click “Edit Sketch”.



Step 4: Zoom into the top tooth area of the gear.

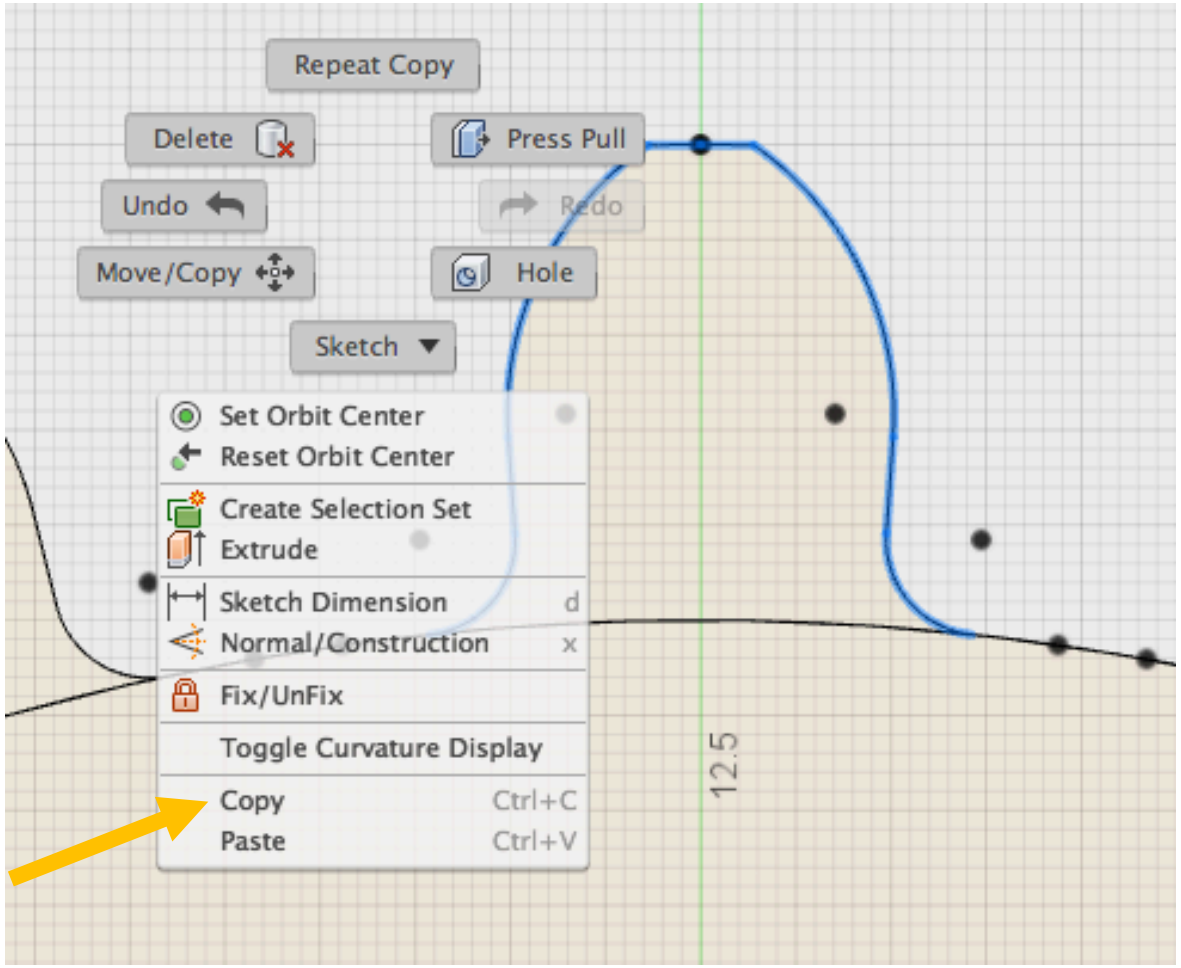


Step 5: Select the entire tooth profile shown below.

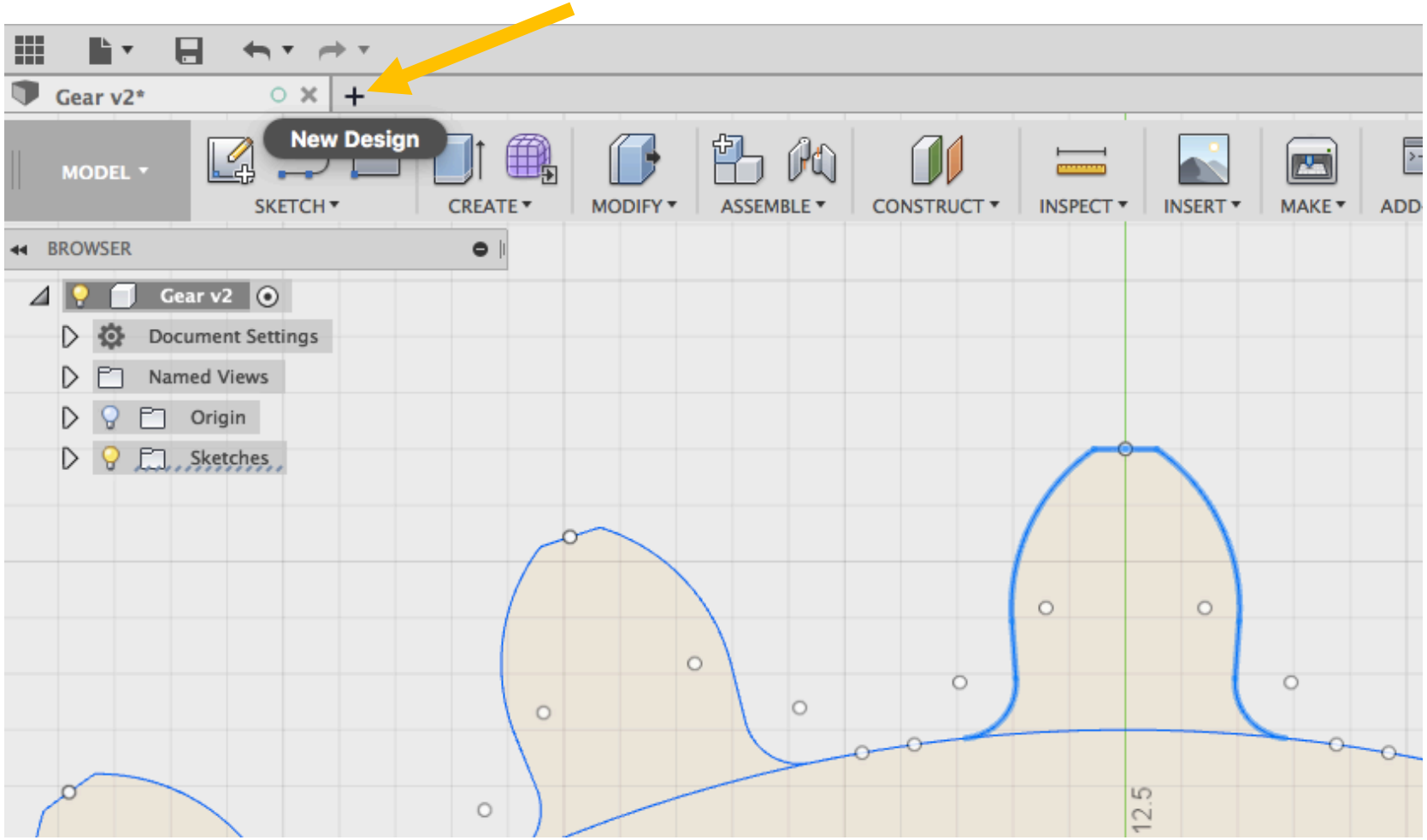


Note: Press & hold the “shift” key then select the lines one by one.

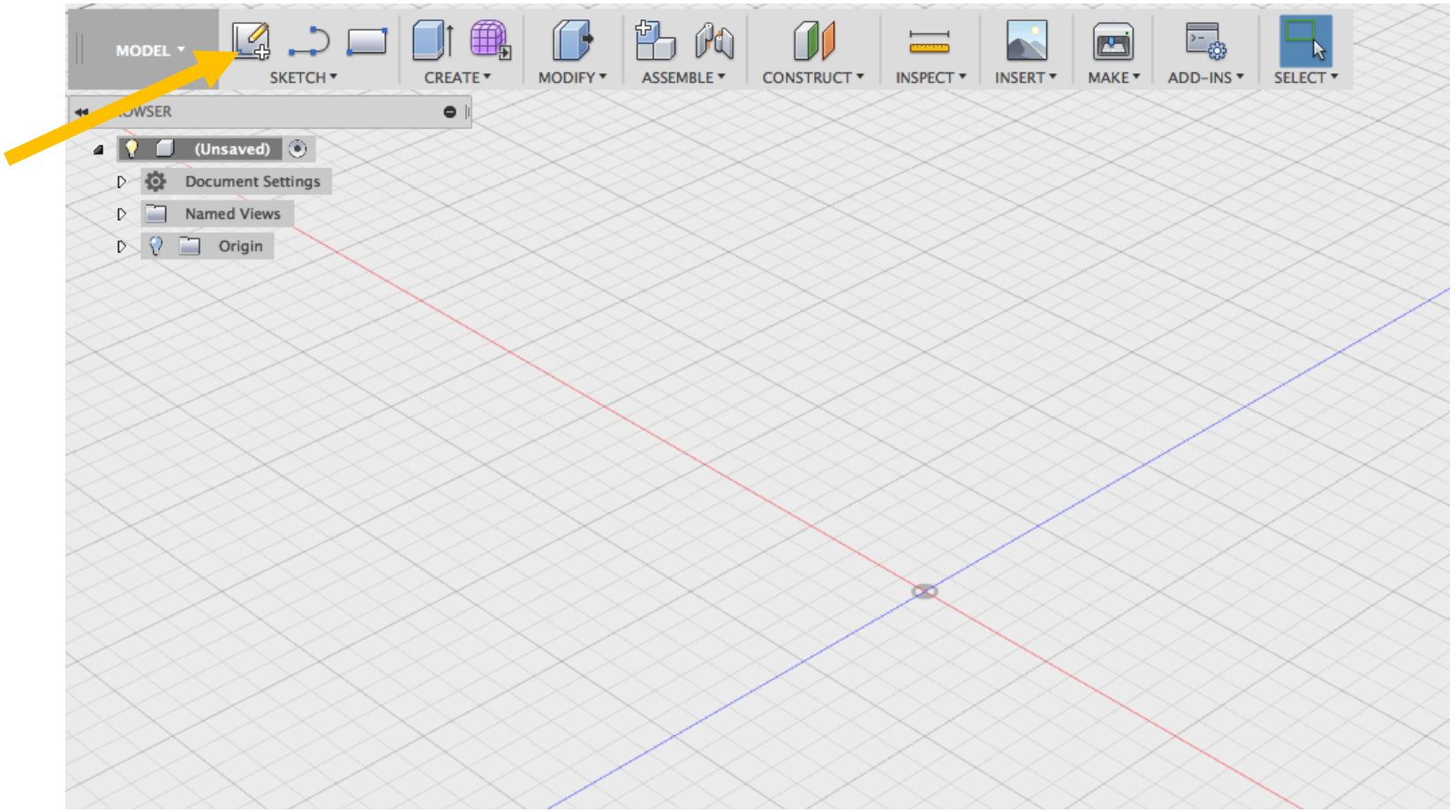
Step 6: Right-click, then click “Copy”.



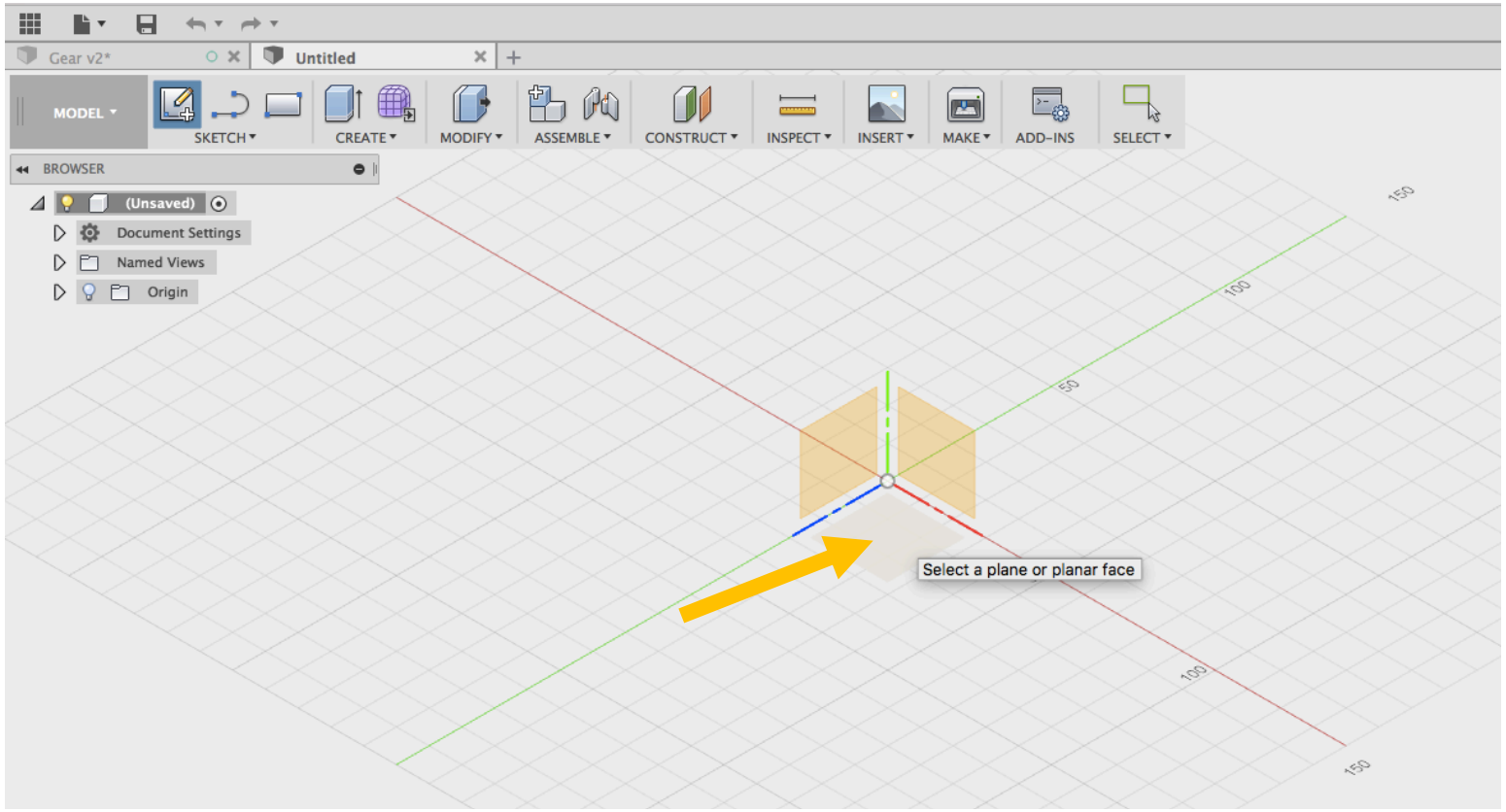
Step 7: Next, click the “+” symbol to open a new design file.



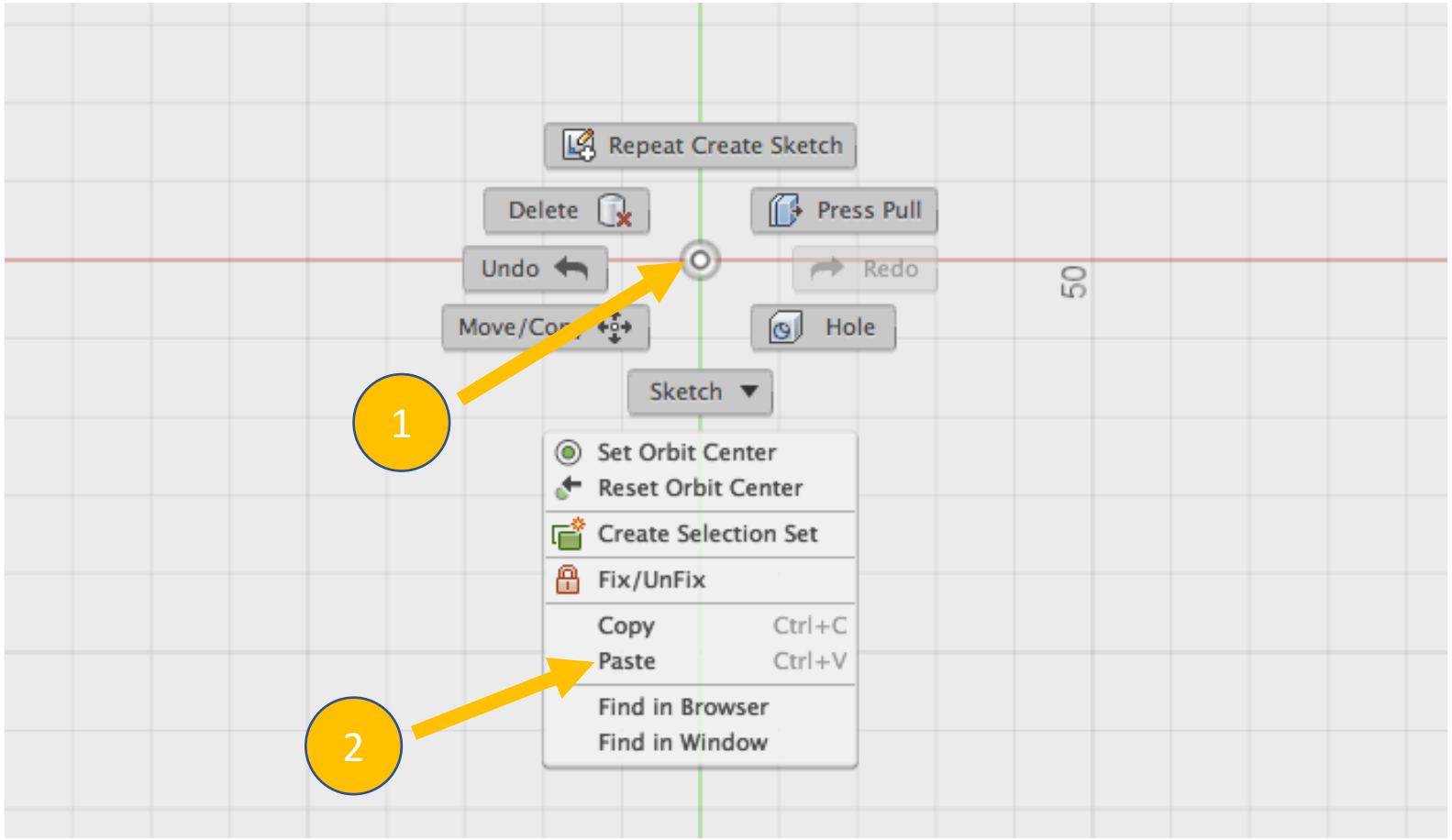
Step 8: At the new file, click “Sketch”.



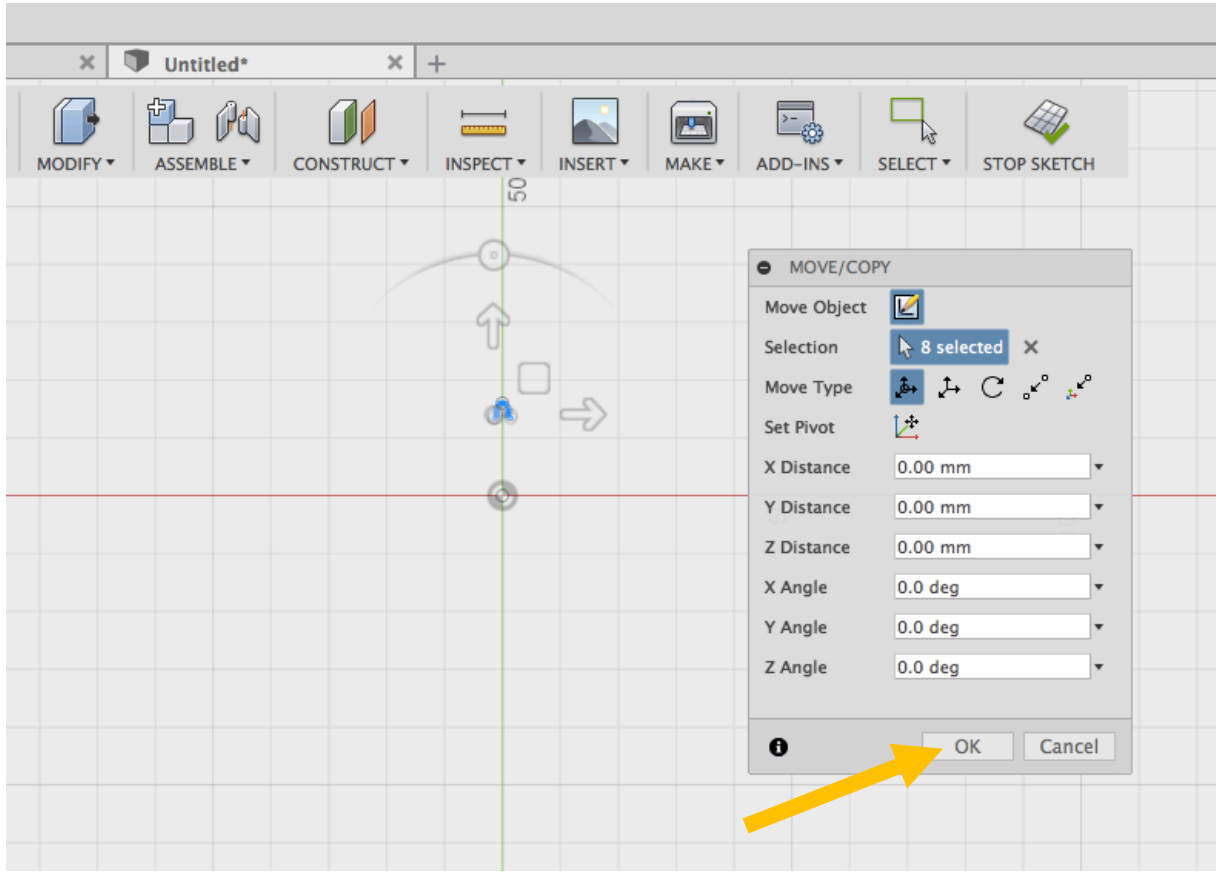
Step 9: Select the top plane as shown below.



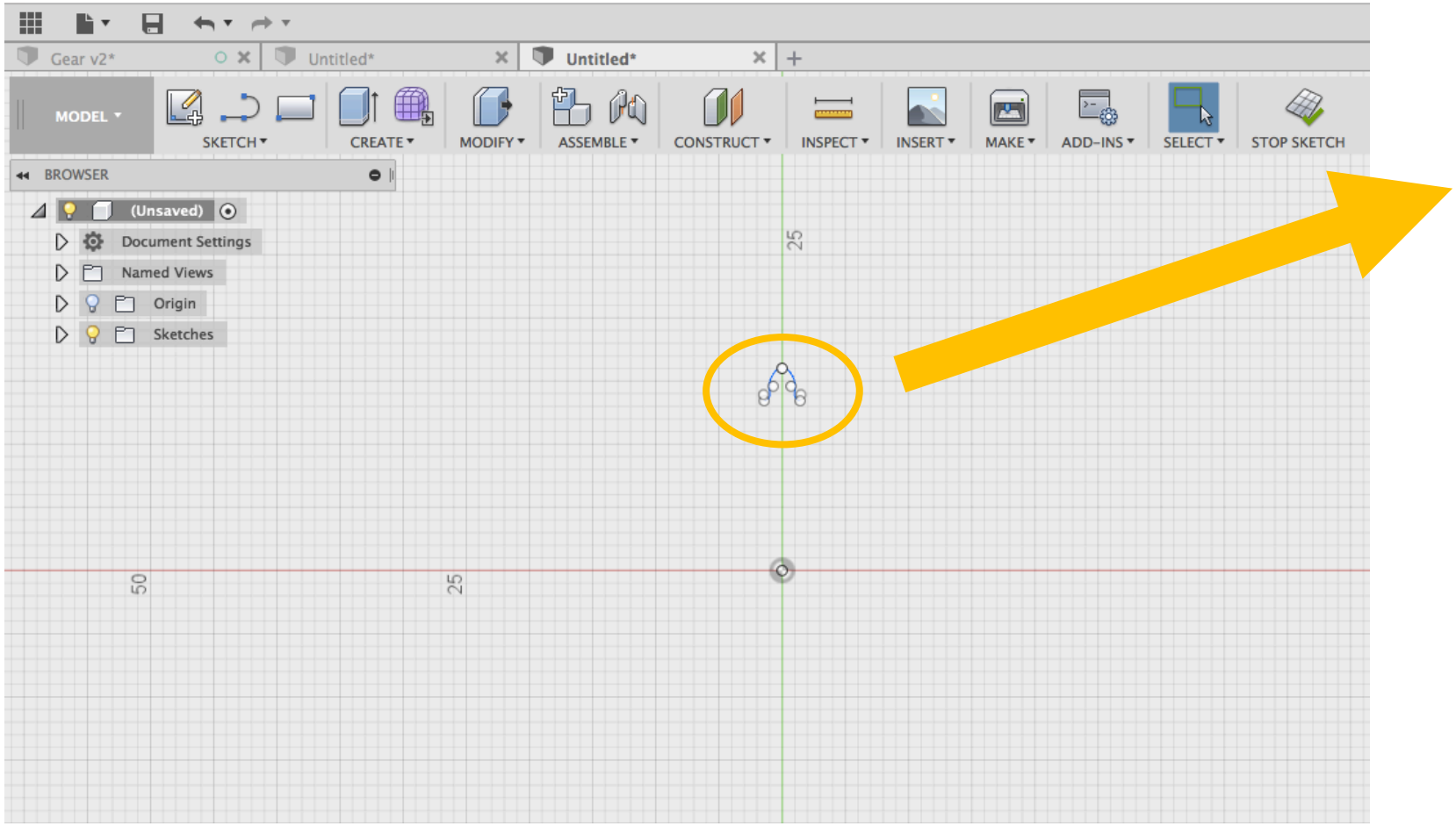
Step 10: Right-click on the origin point then select “Paste”.

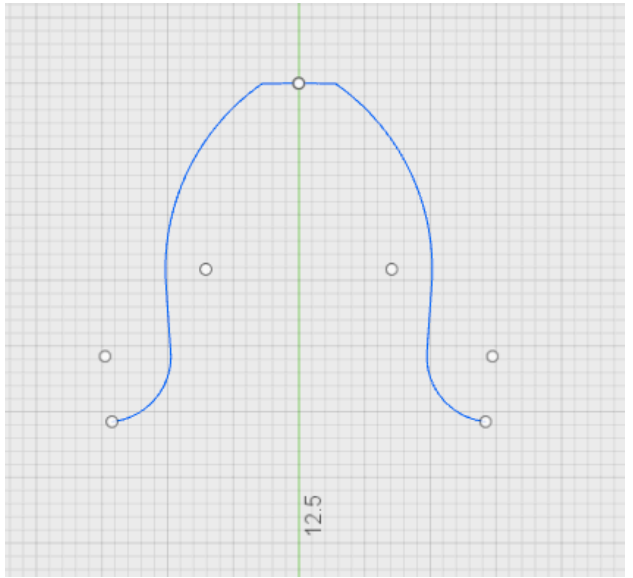


Step 11: Click “OK”.

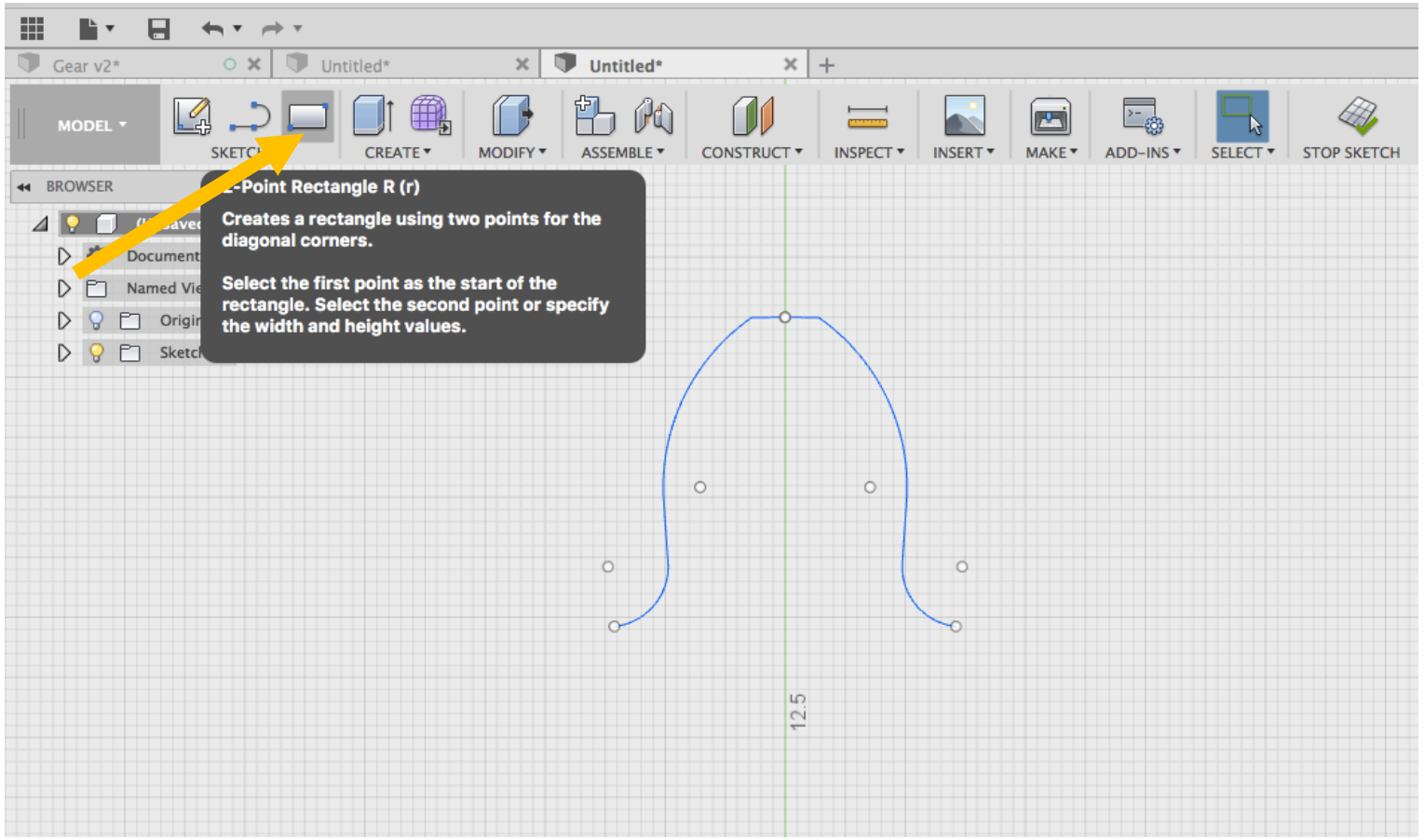


Step 12: Zoom in to the tooth profile.

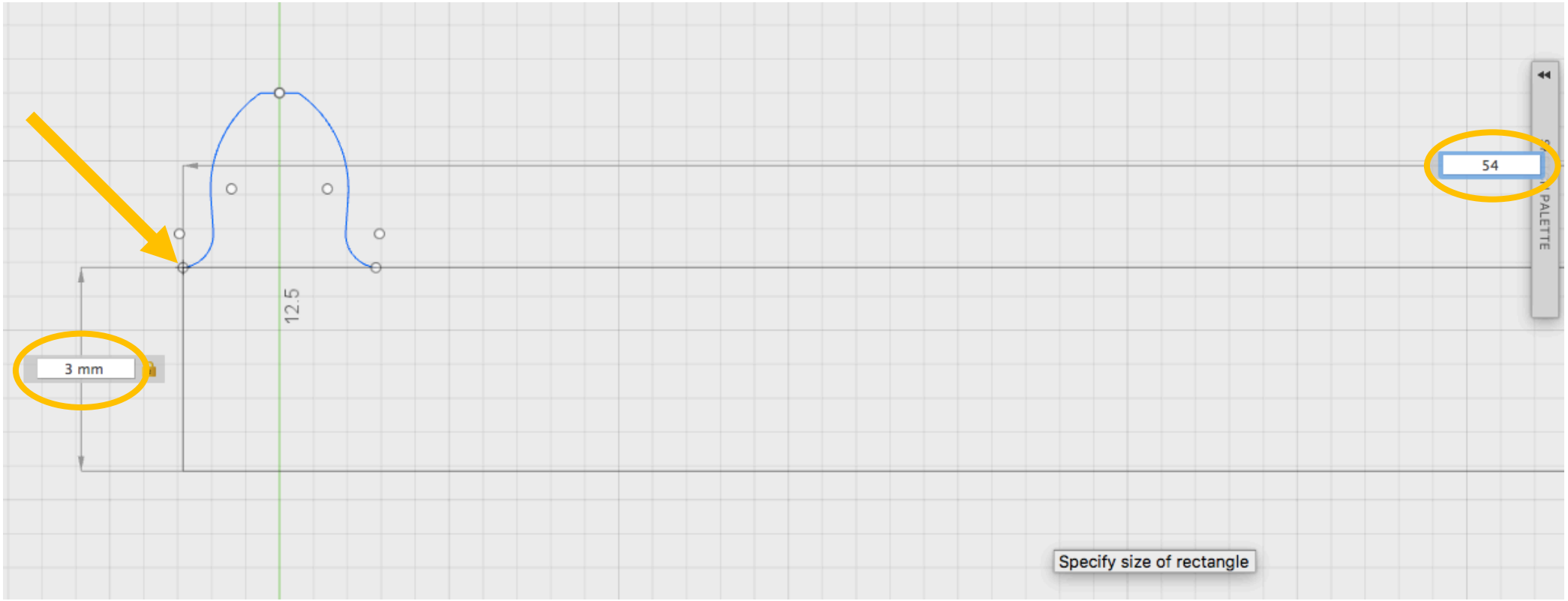




Step 13: Select “2 Points Rectangle”.

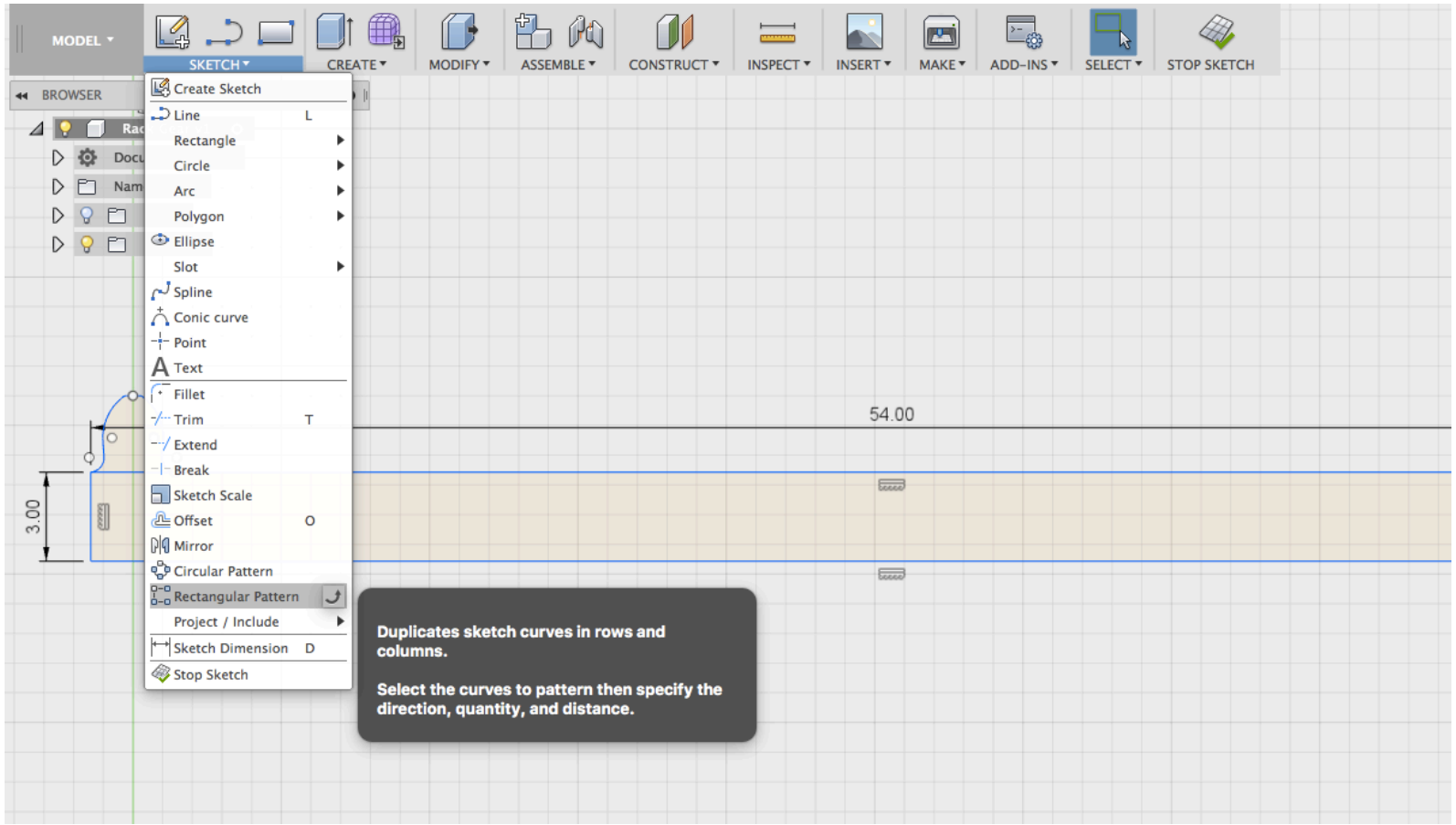


Step 14: Select the tooth's shoulder as the first point. Key in "3mm" for the height and "54mm" for the length of the rectangle.

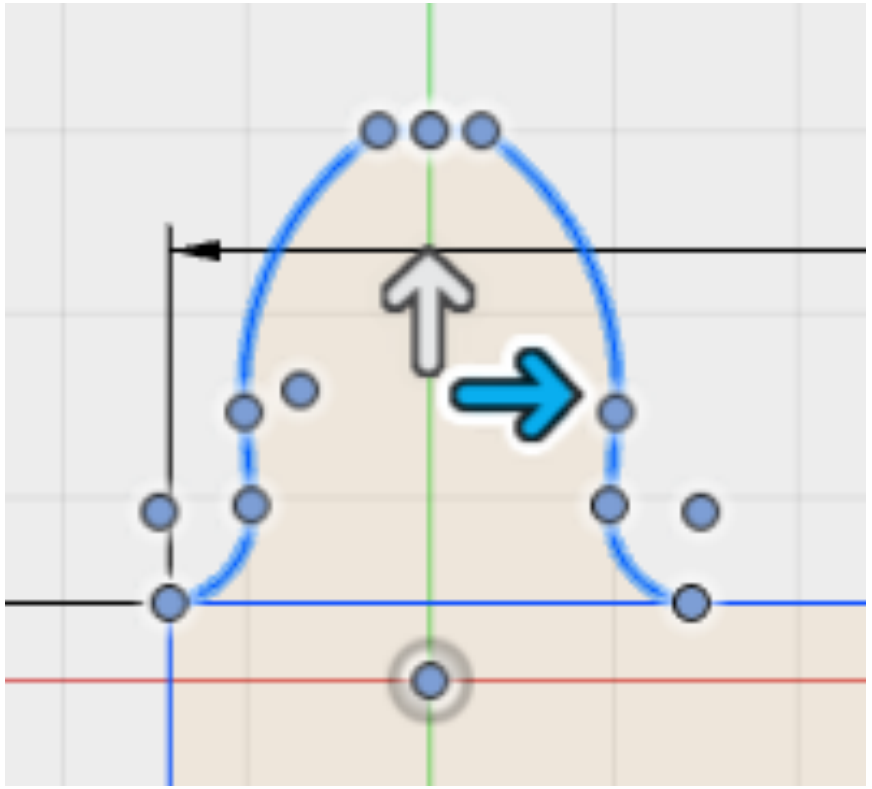


Check your result.

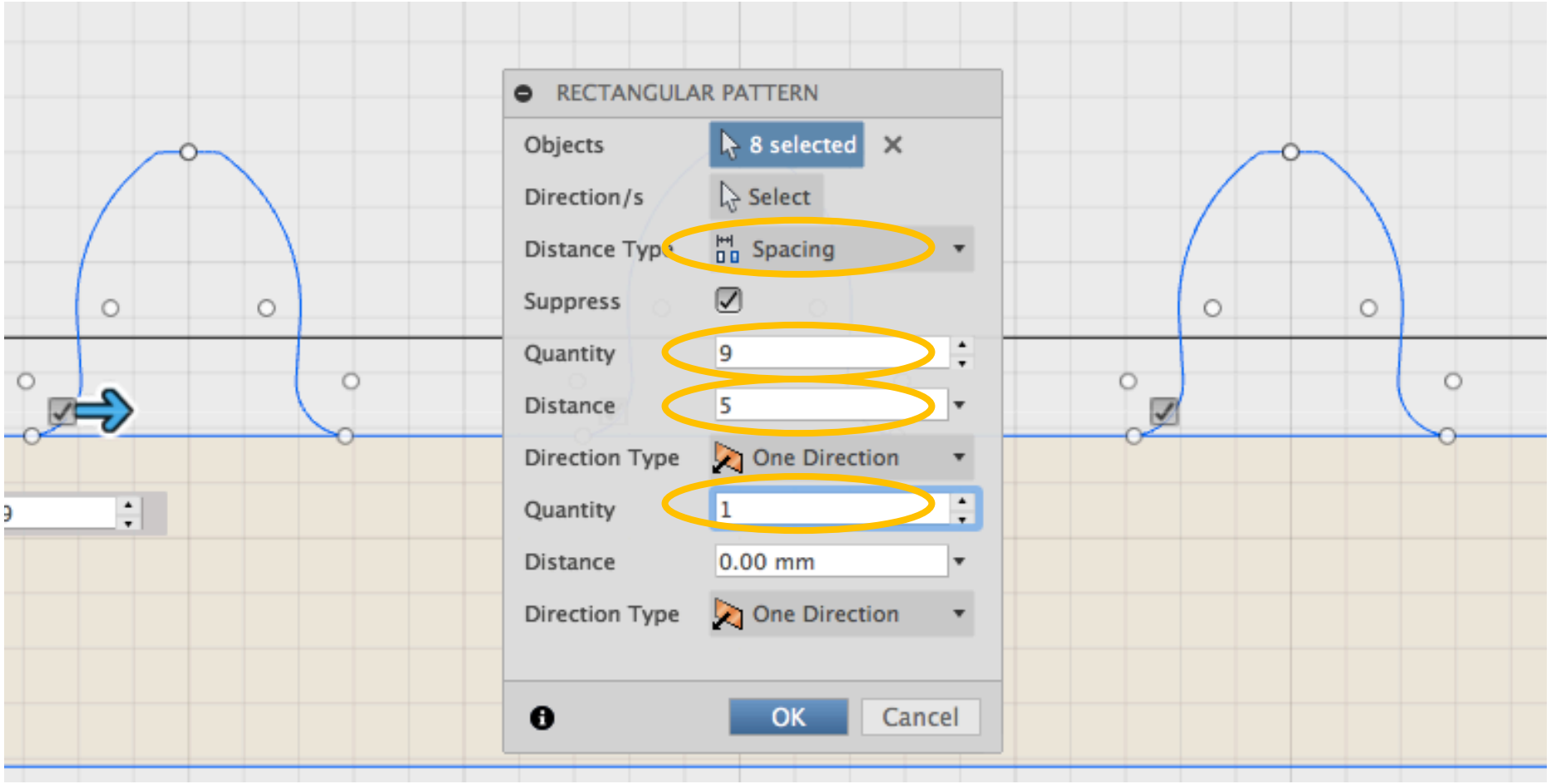
Step 15: Go to “Sketch Menu” > “Rectangular Pattern”.



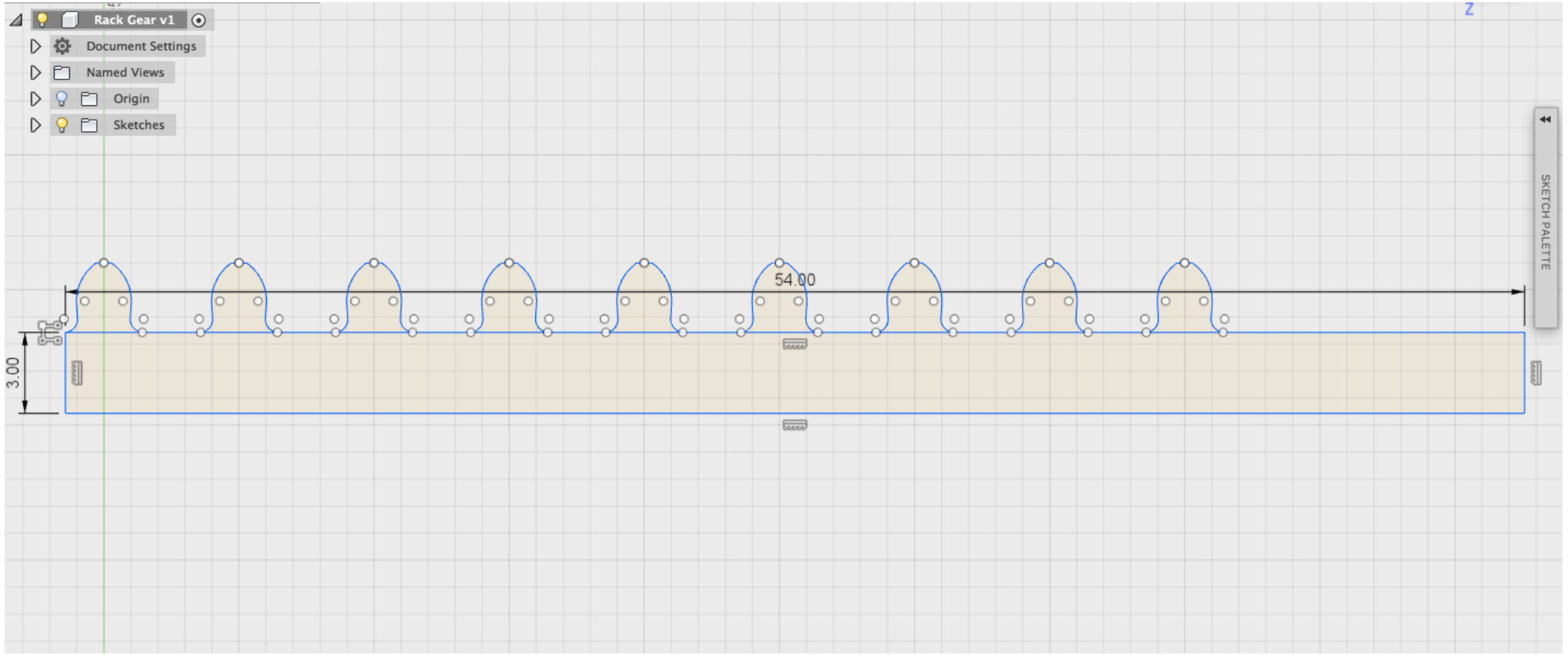
Step 16: Select the entire tooth profile.



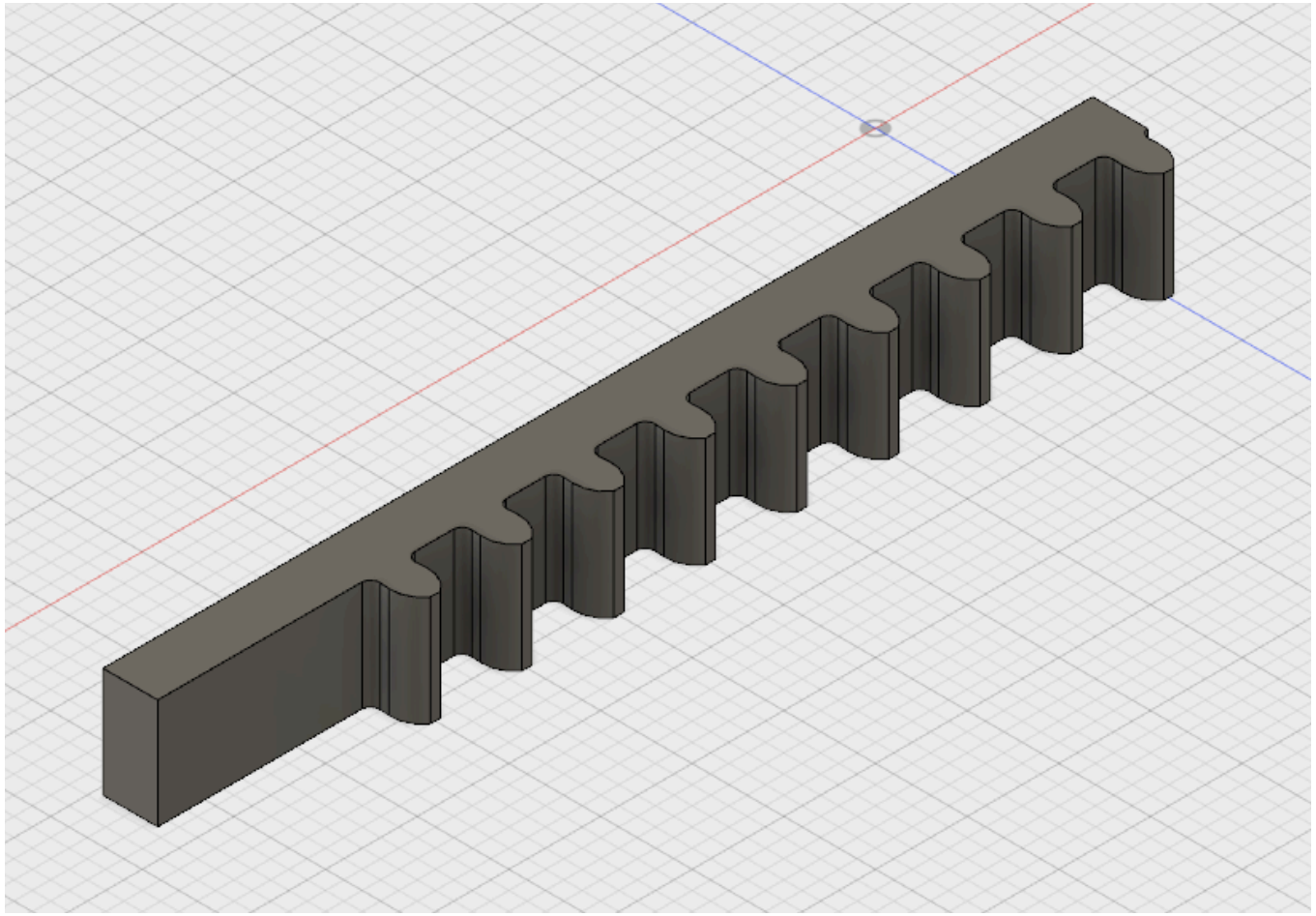
Step 17: Fill up the parameter accordingly in the properties box then click “OK”.



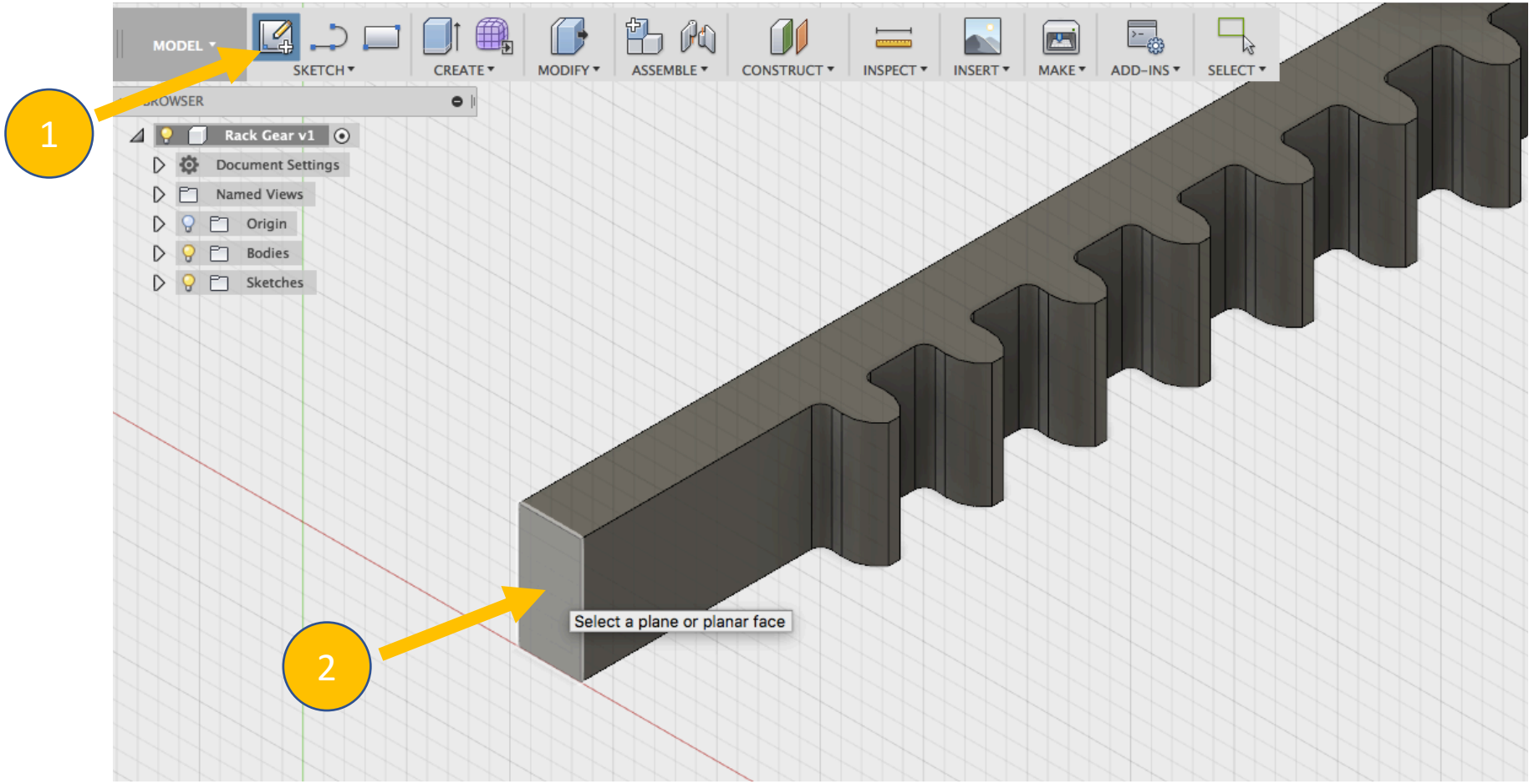
Check your result.



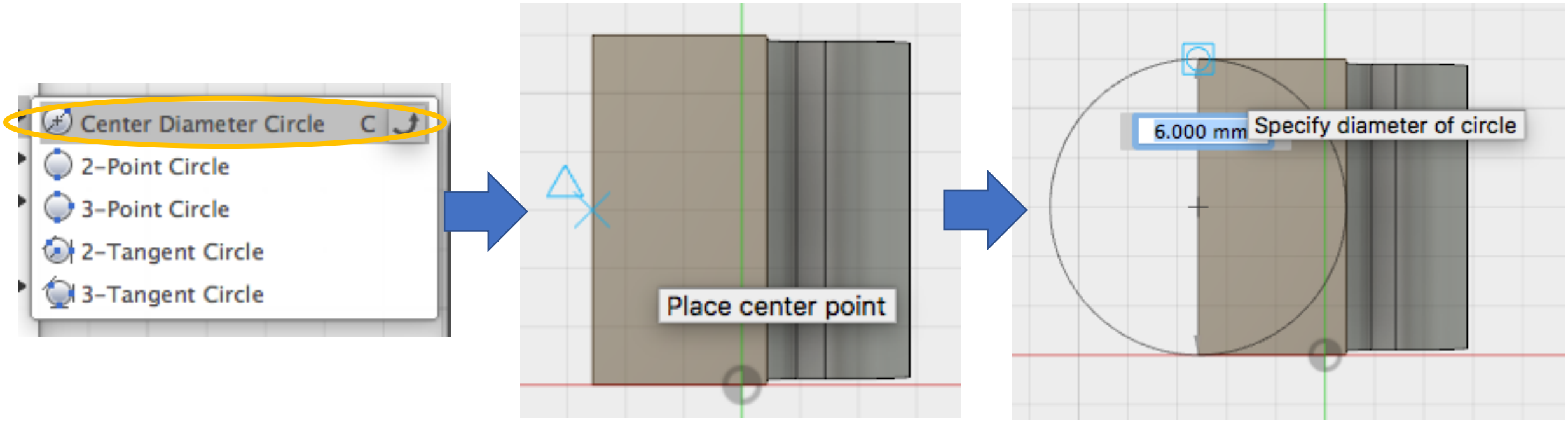
Step 18: Extrude the object by 6mm.



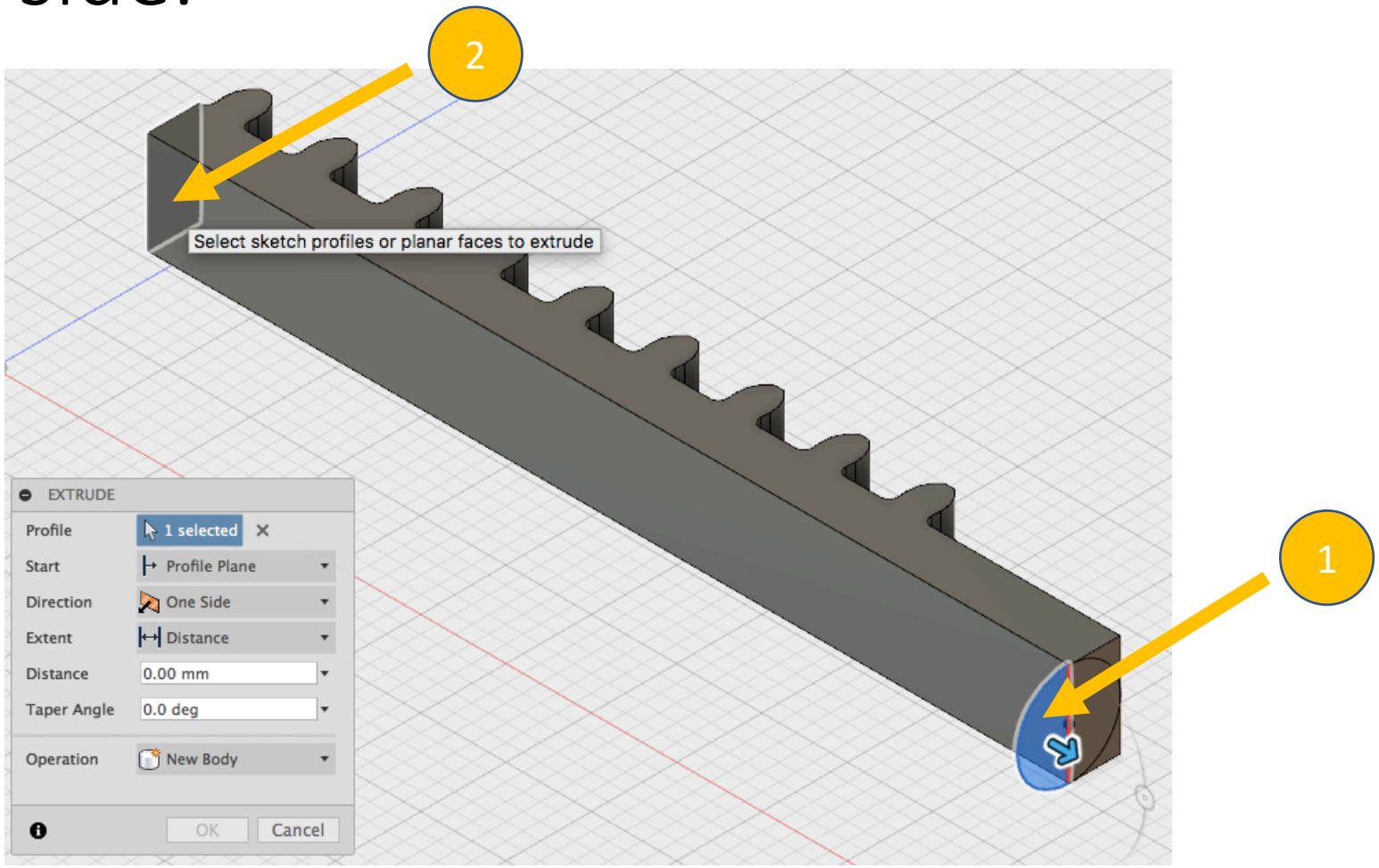
Step 19: Click “create sketch” then click on the rail’s cross section.



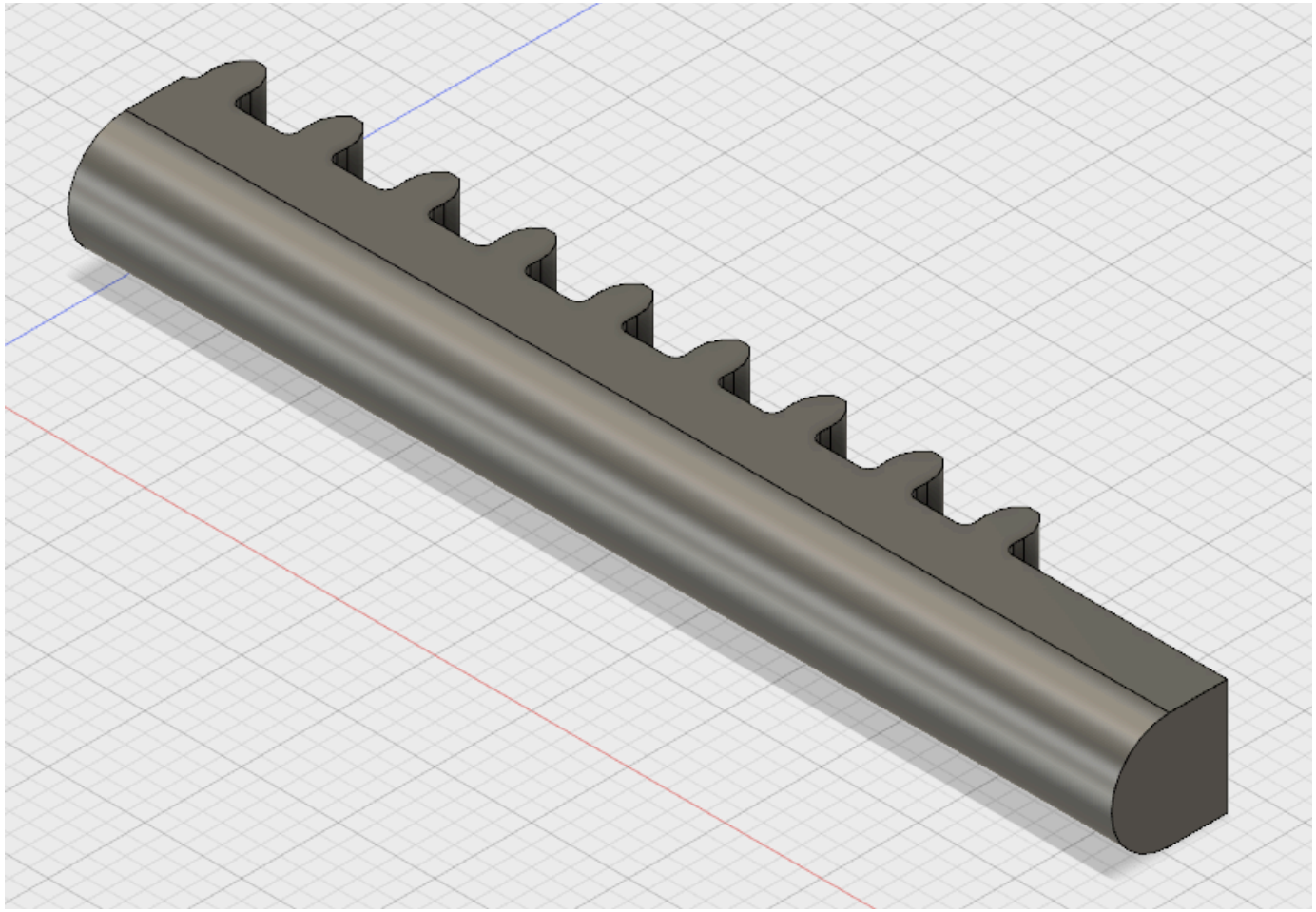
Step 20: Draw a 6mm diameter circle on the cross-section.



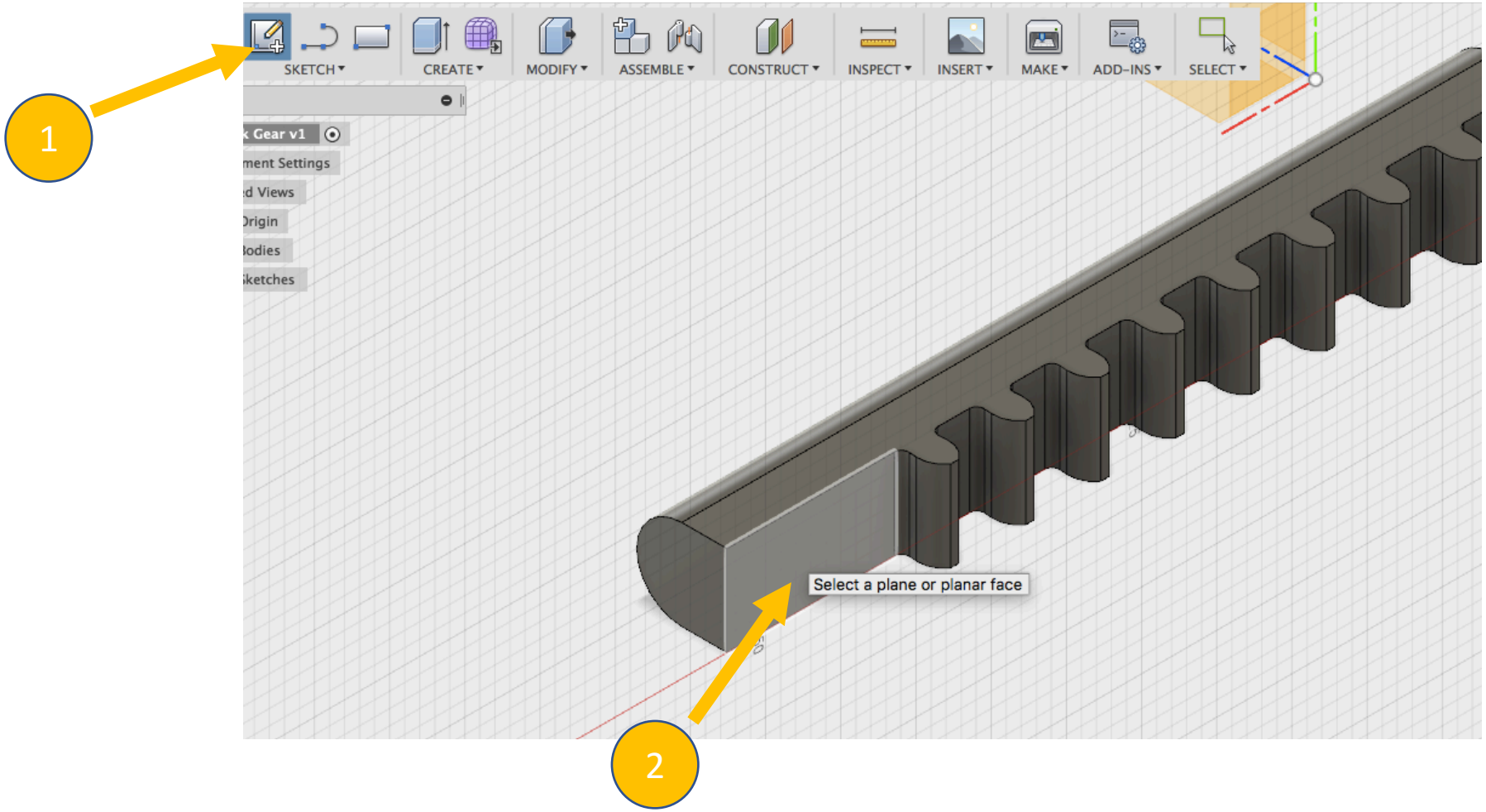
Step 21: Select “Extrude” then click on the semi-circle followed by the cross-section at the opposite side.



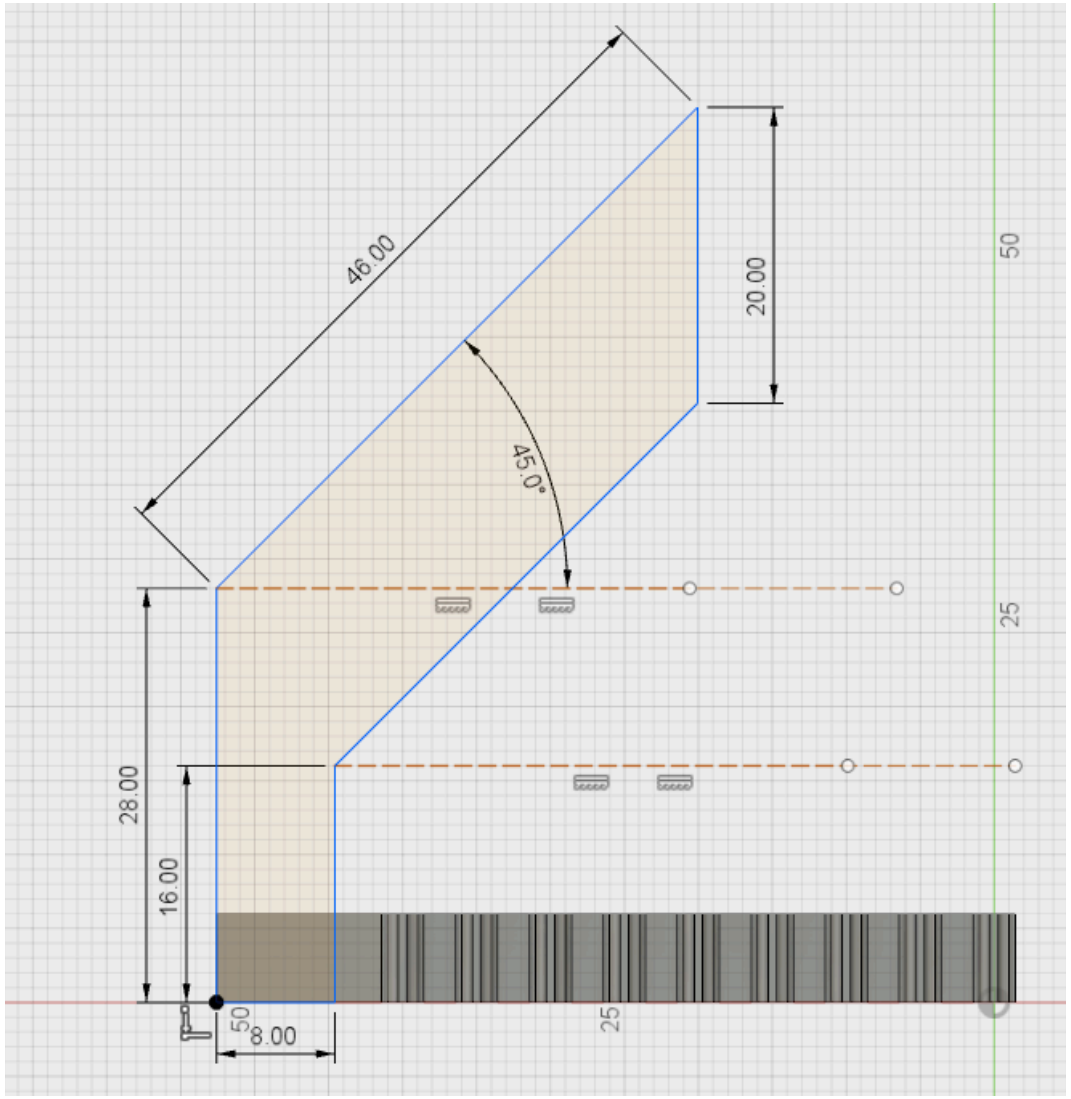
Check your result.



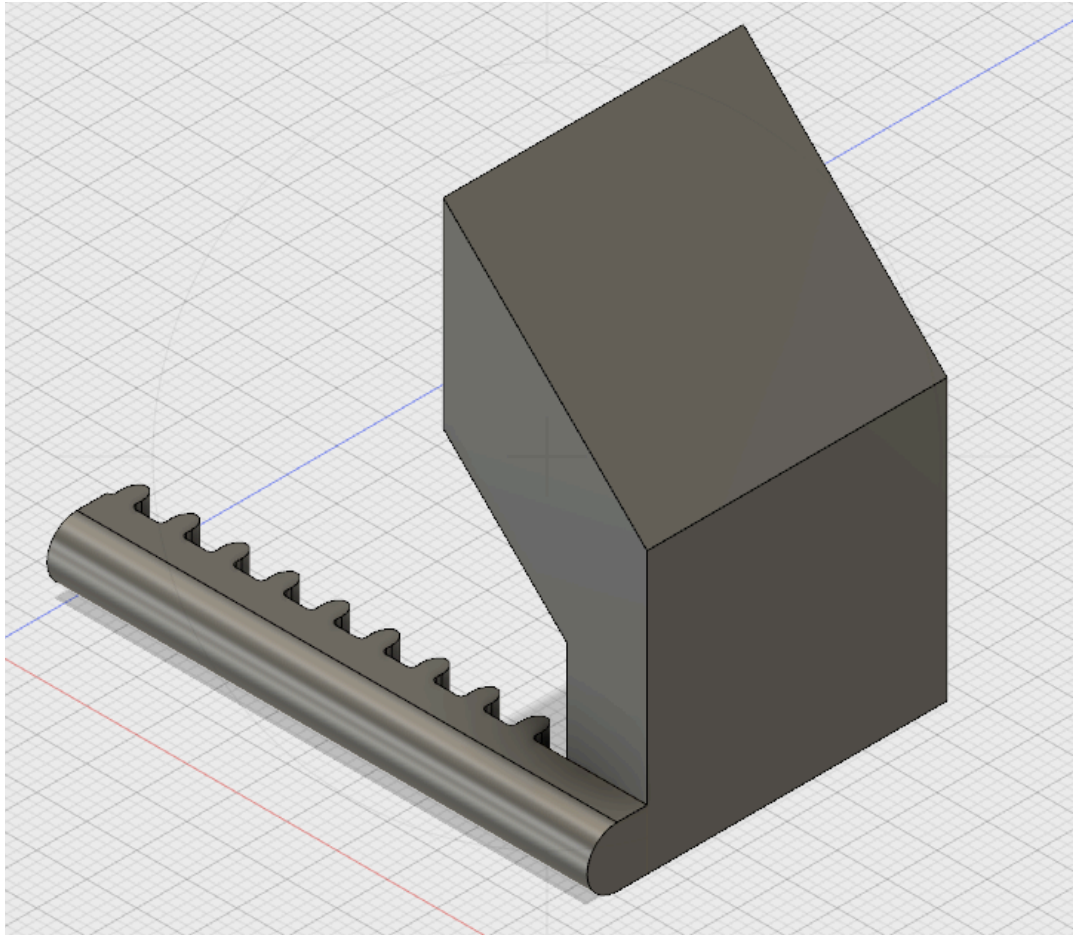
Step 22: Click “create sketch” then click on the area pointed below.



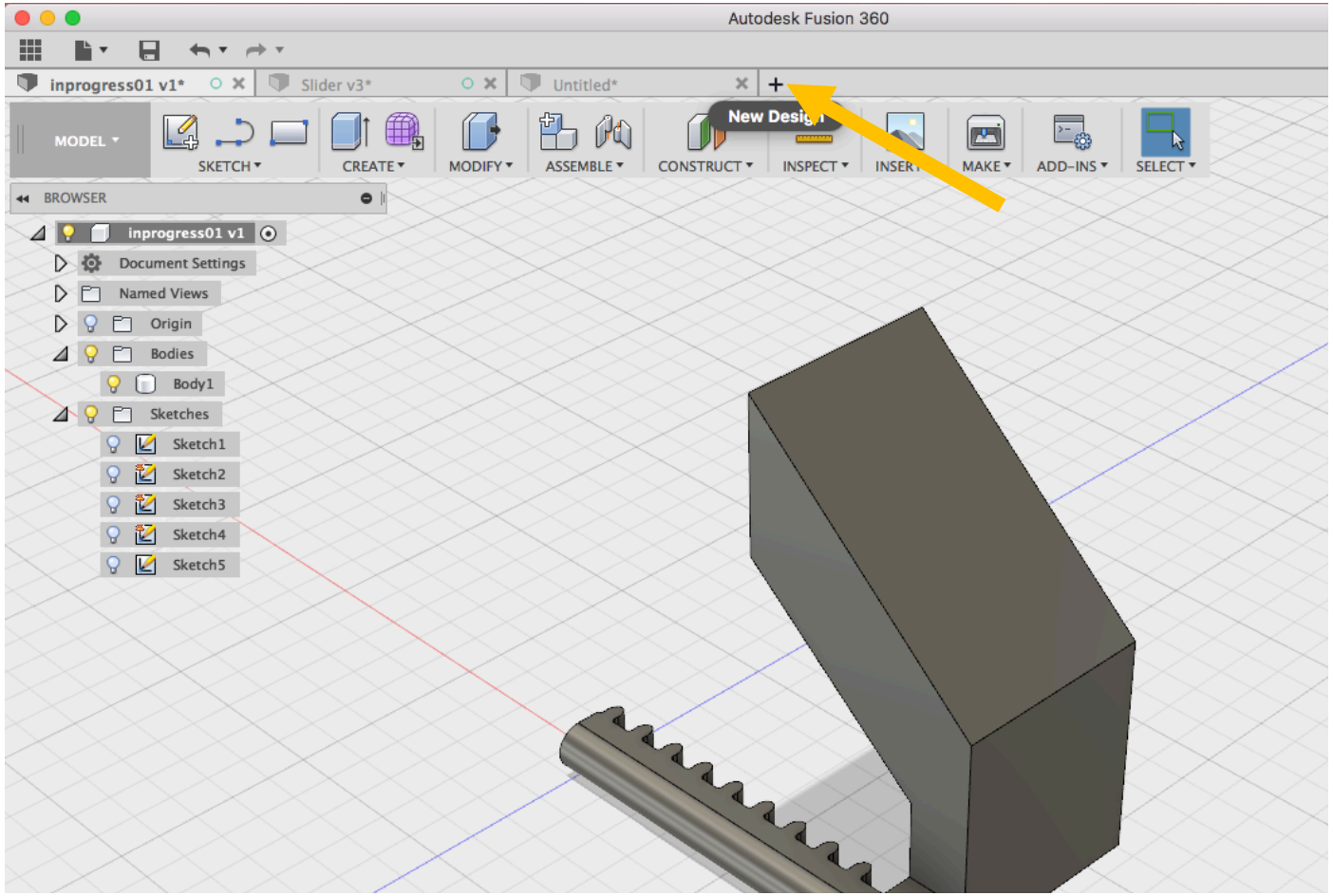
Step 23: Sketch out the shape as shown.



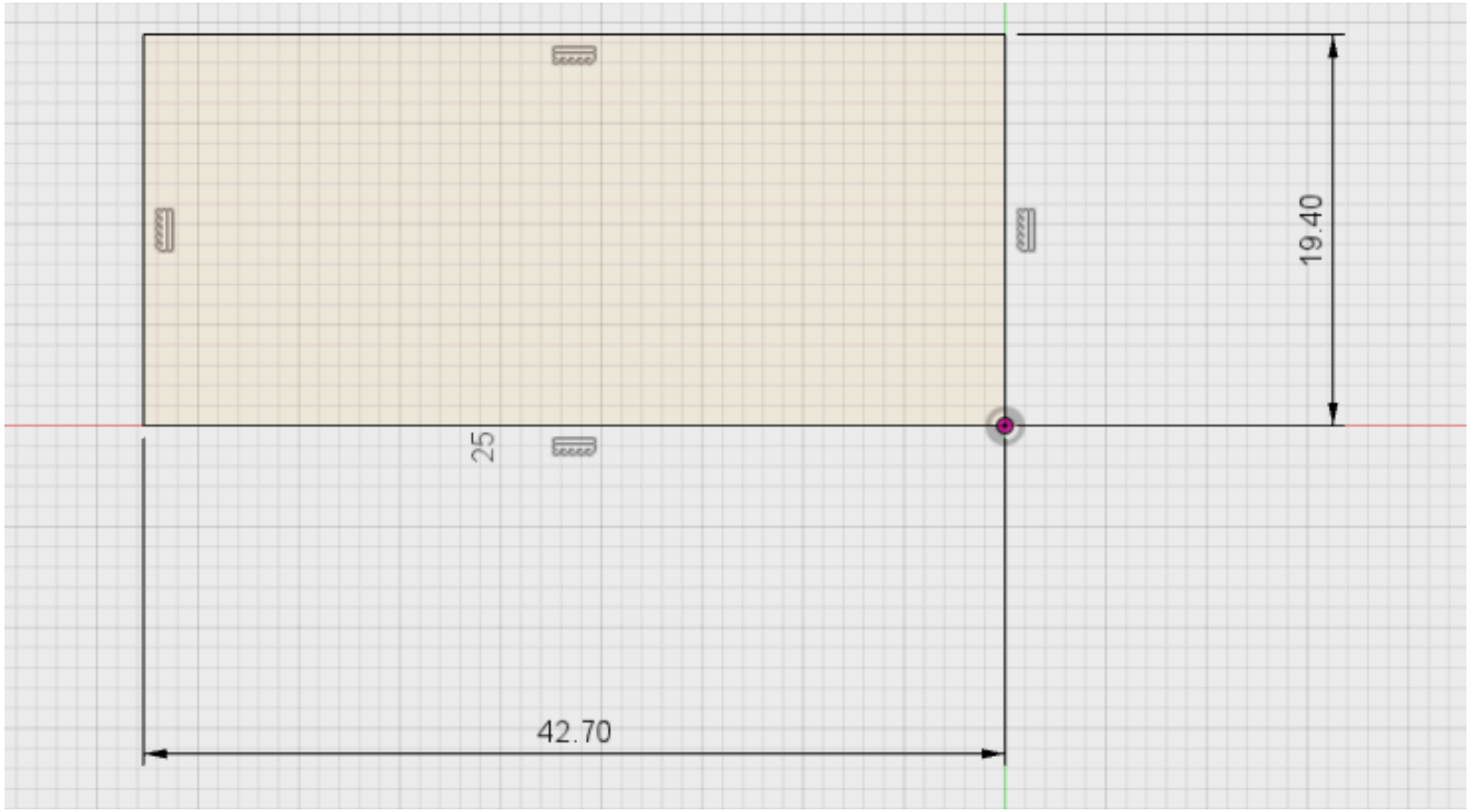
Step 24: Extrude that shape by 30mm, then save it as “STL” file. And you are done for the rack gear.



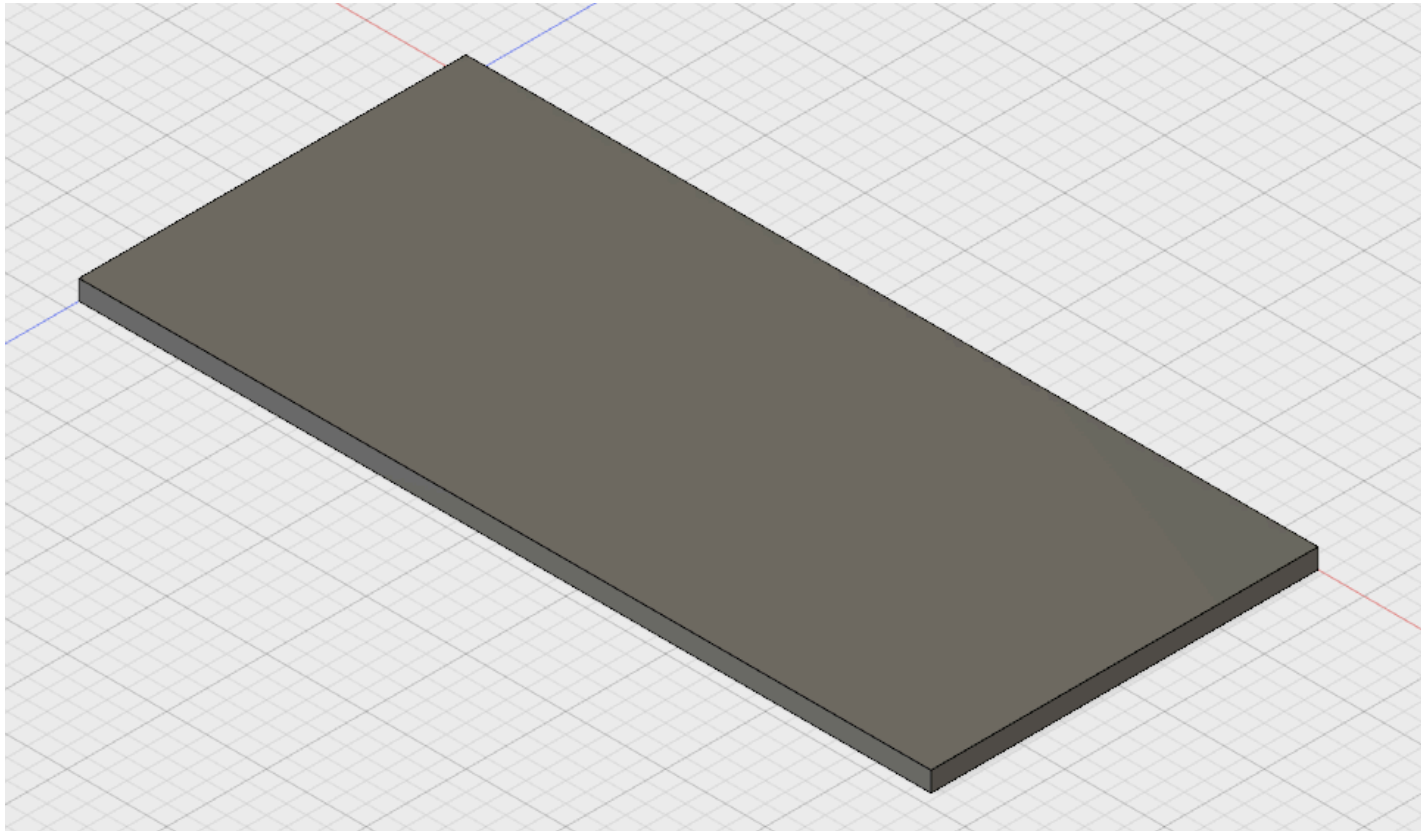
Step 25: Next, we need to create a guide for the rack. Click “+” to open a new file.



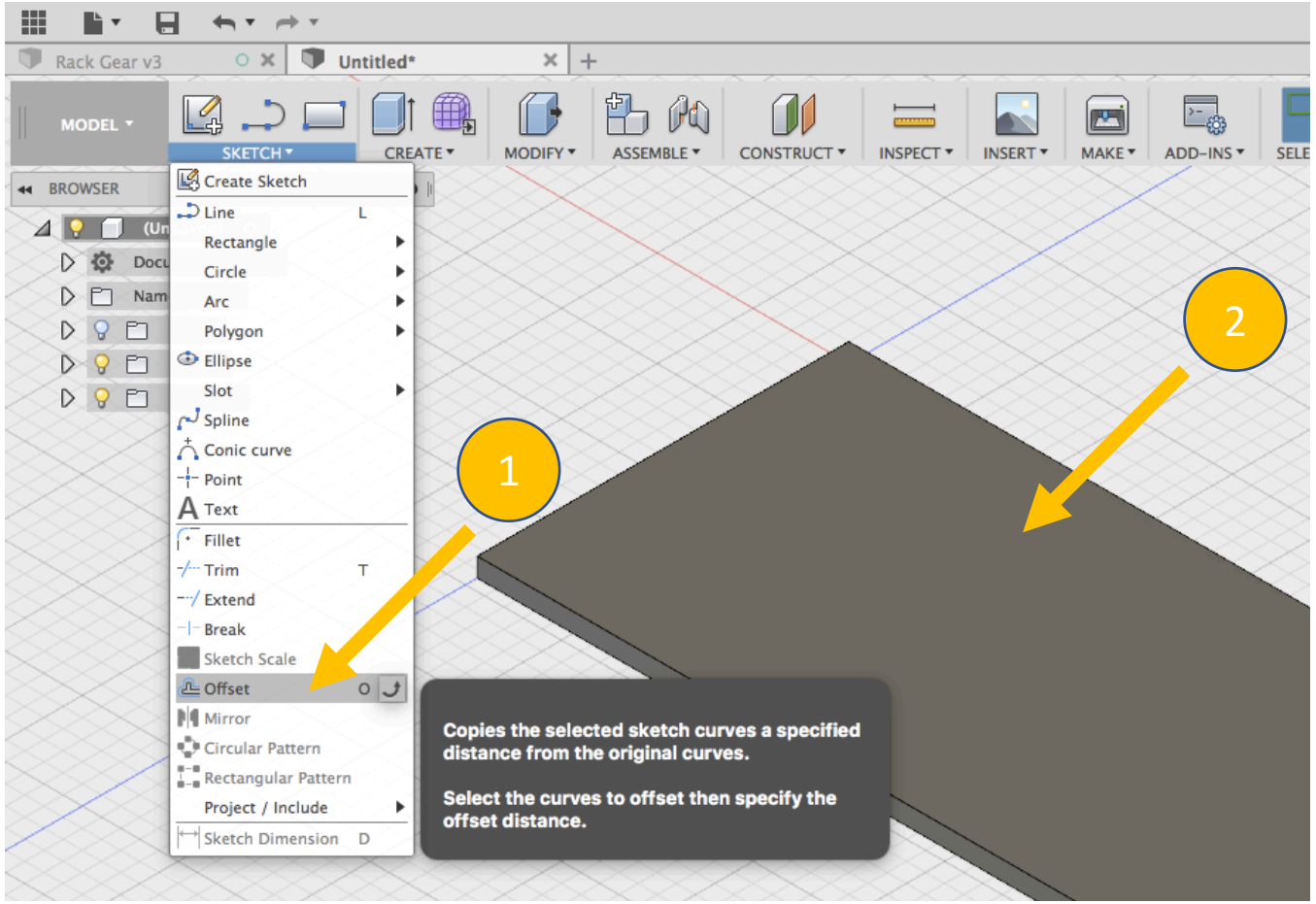
Step 26: Draw a rectangle with the dimension shown below.



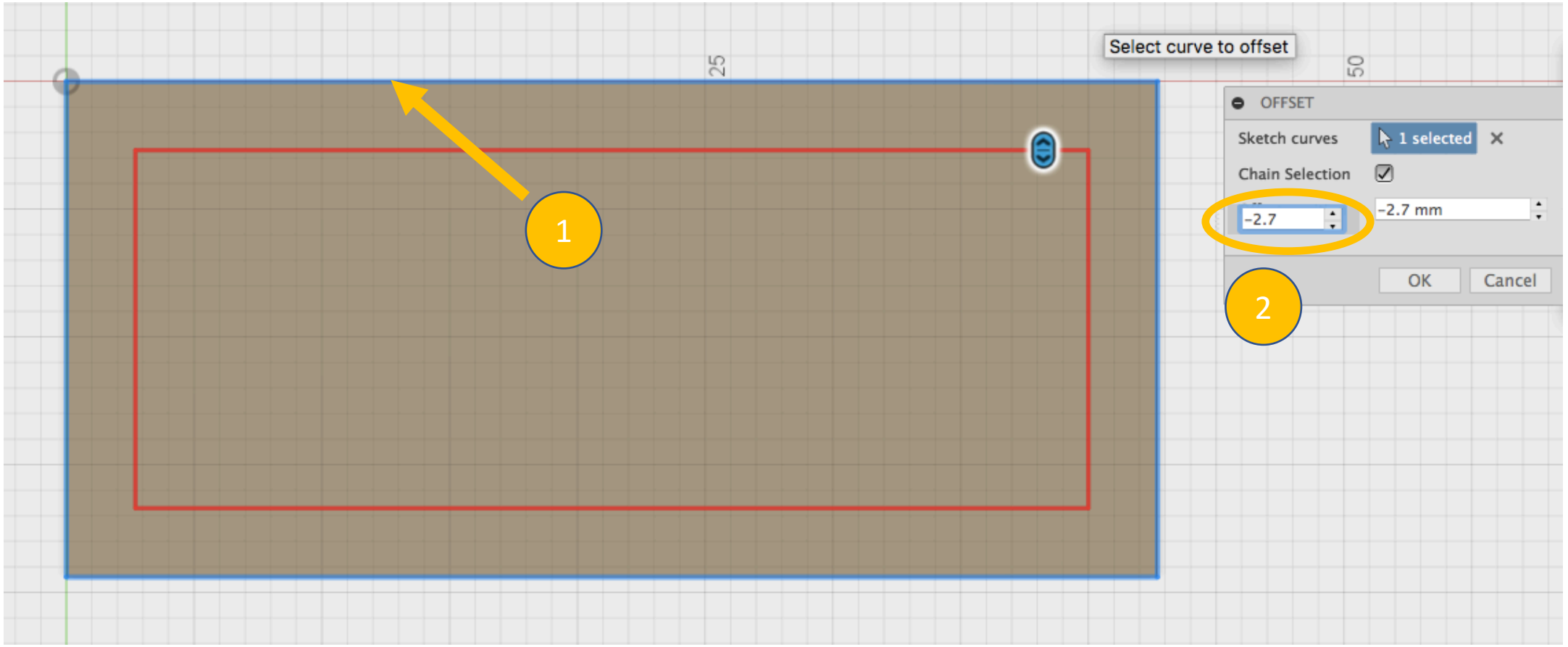
Step 27: Extrude it by 1mm.



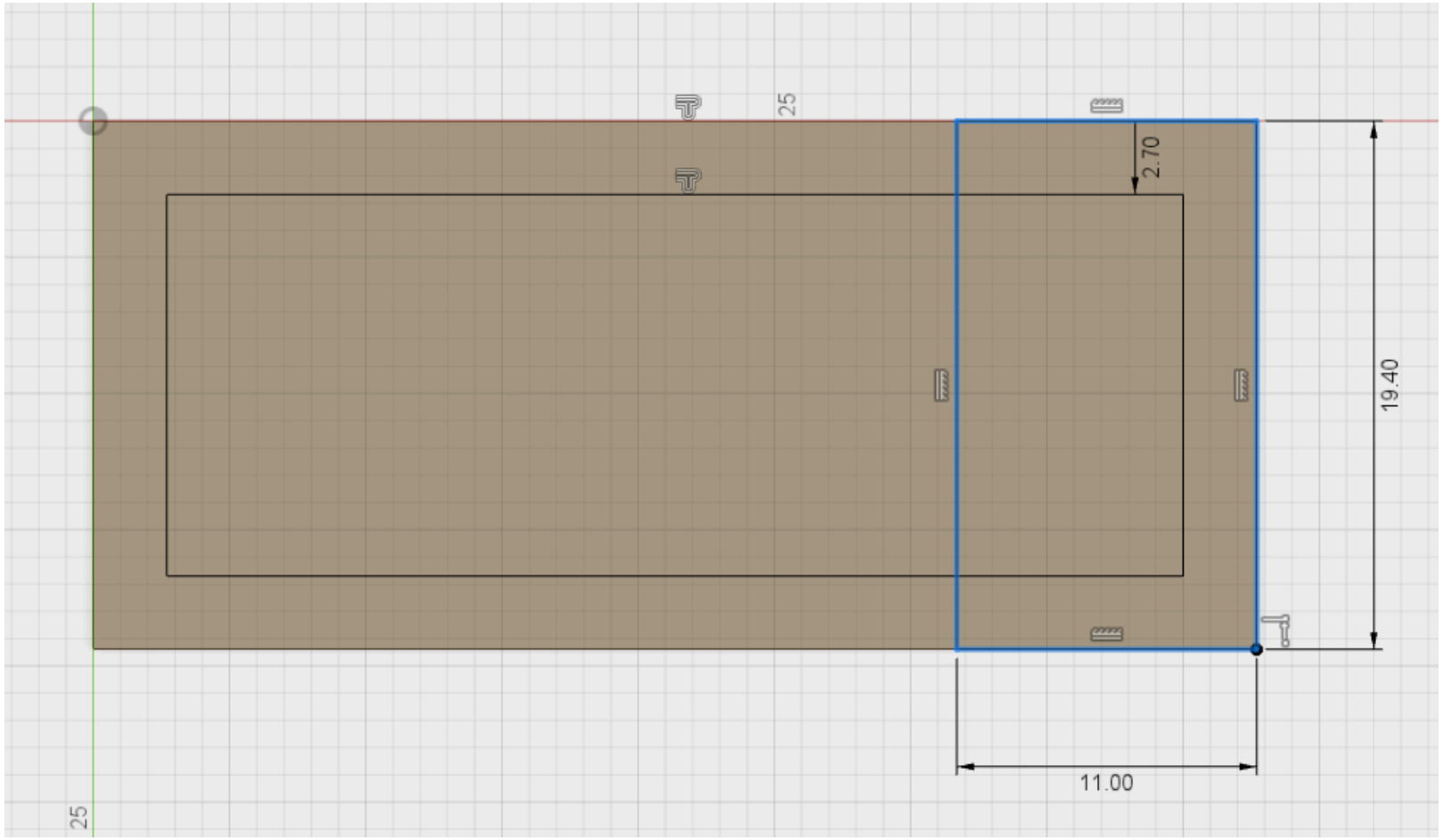
Step 28: Go to “Sketch” > “Offset” then click on the top surface of the object.



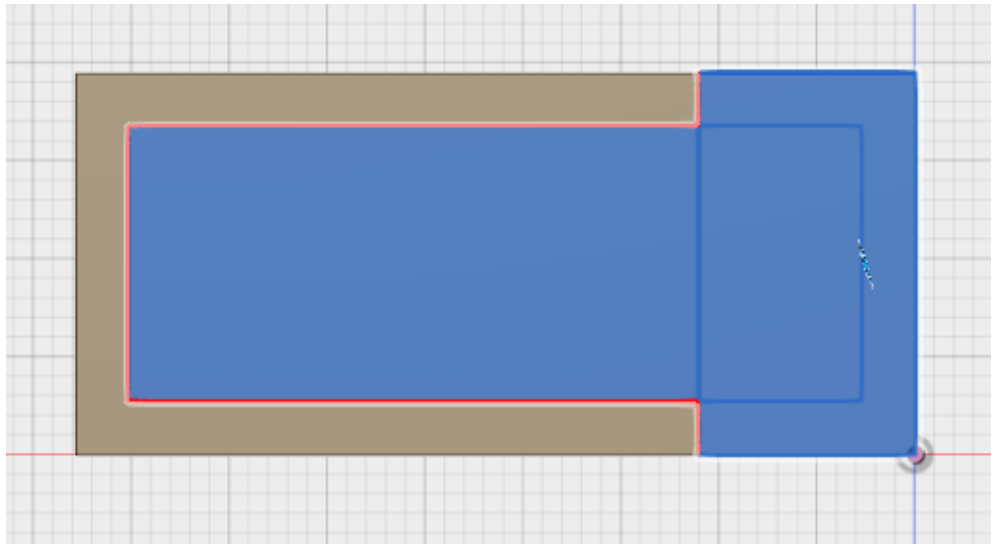
Step 29: Click on the surface's edge, then key in "-2.7mm" and hit "Enter".

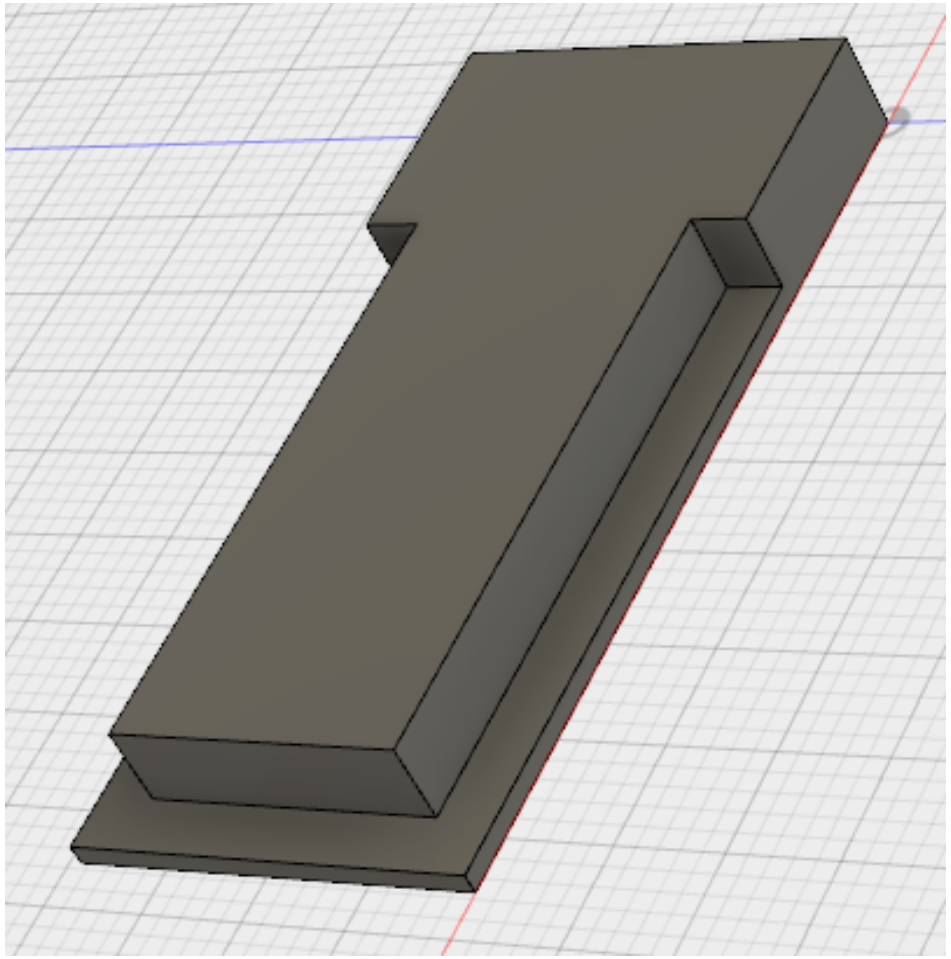


Step 30: Draw a 19.4mm x 11mm rectangle as shown below.

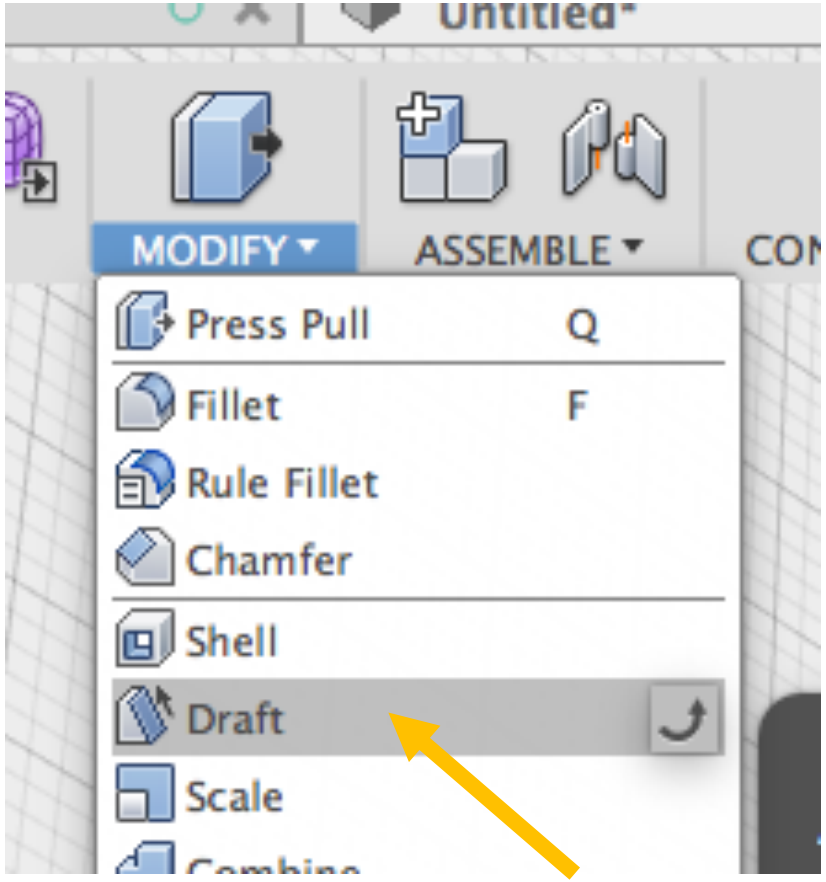


Step 31: Extrude the “T” shape by 3.9mm.

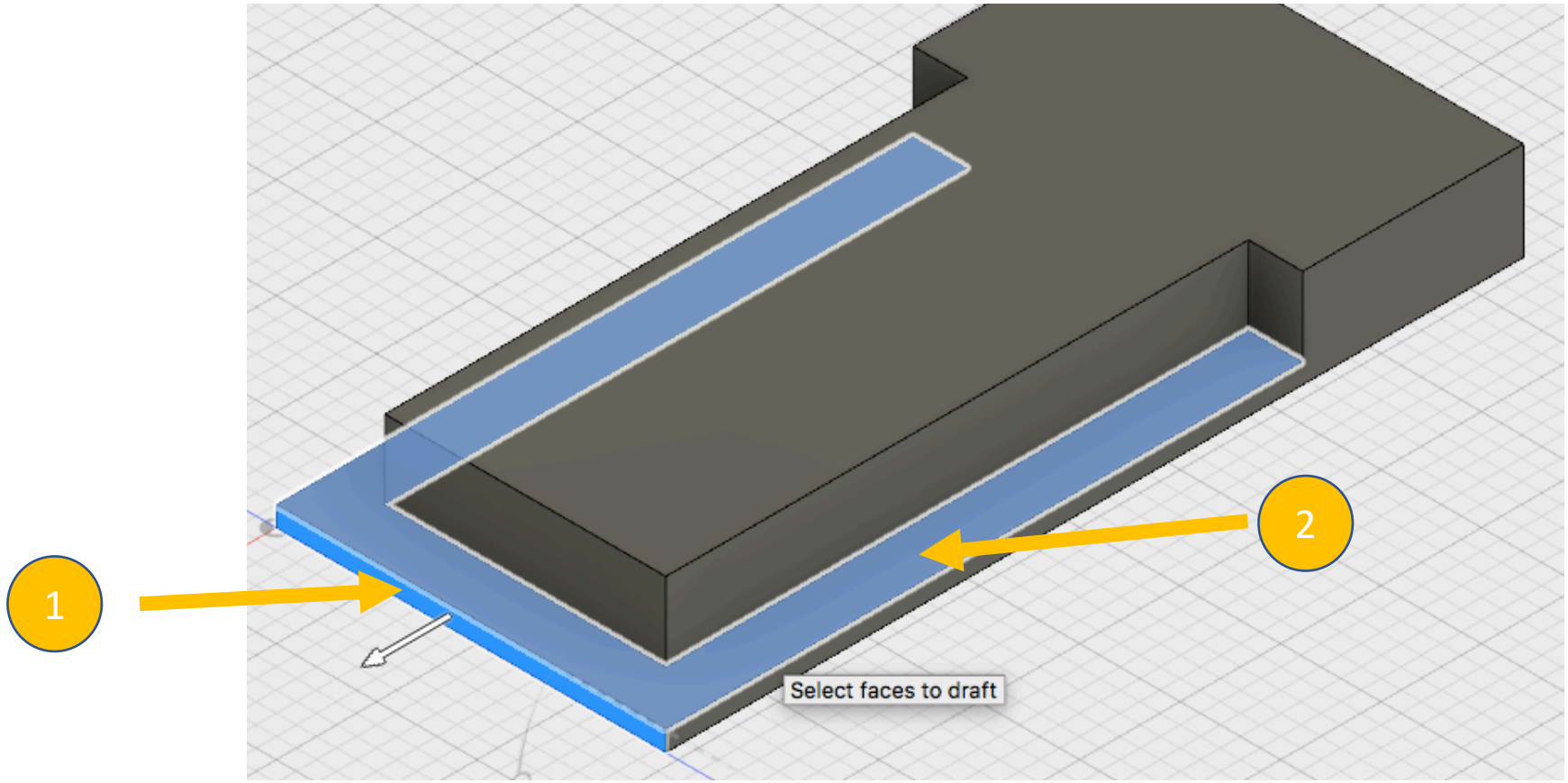




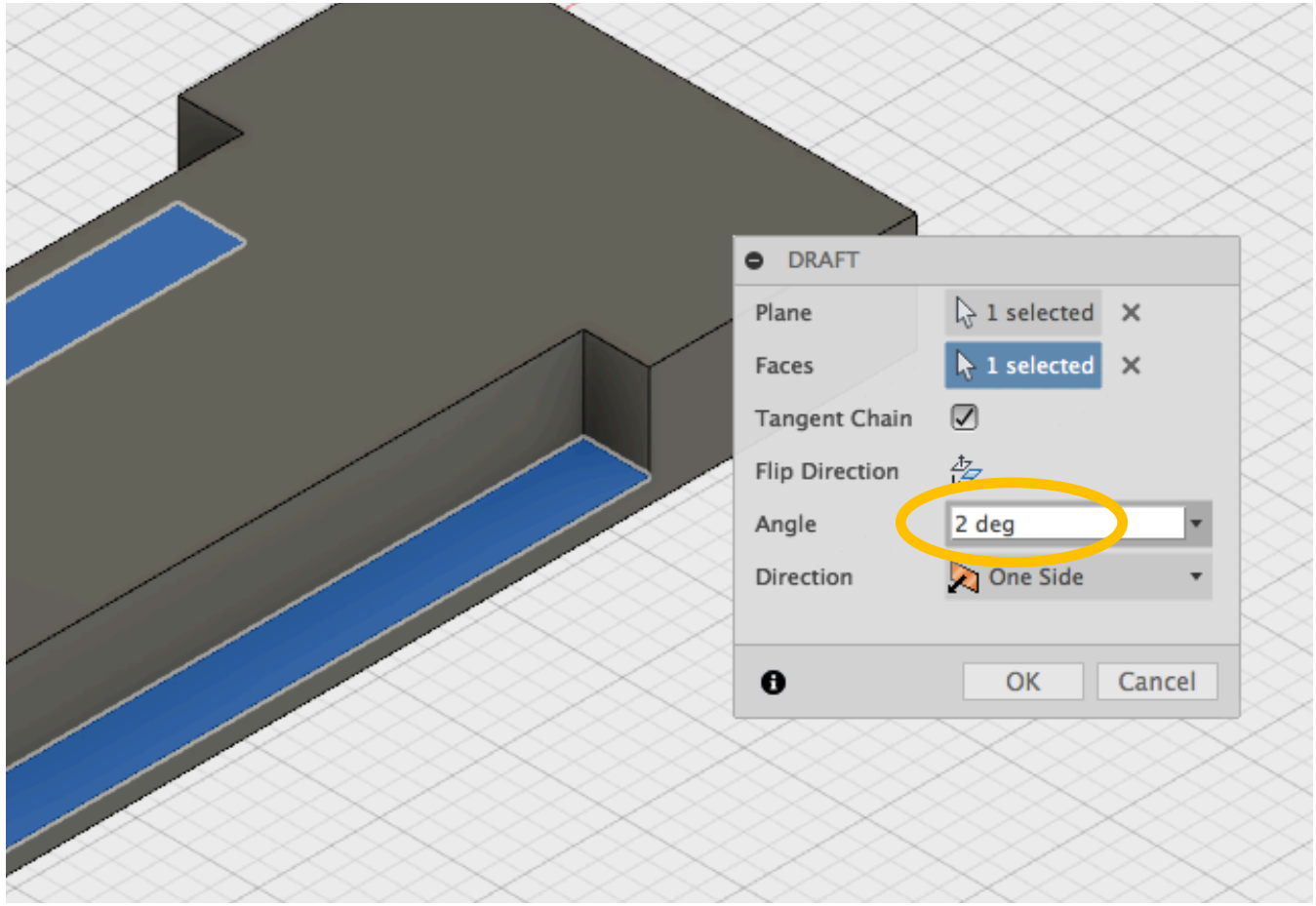
Step 32: Go to “Modify” > “Draft”.



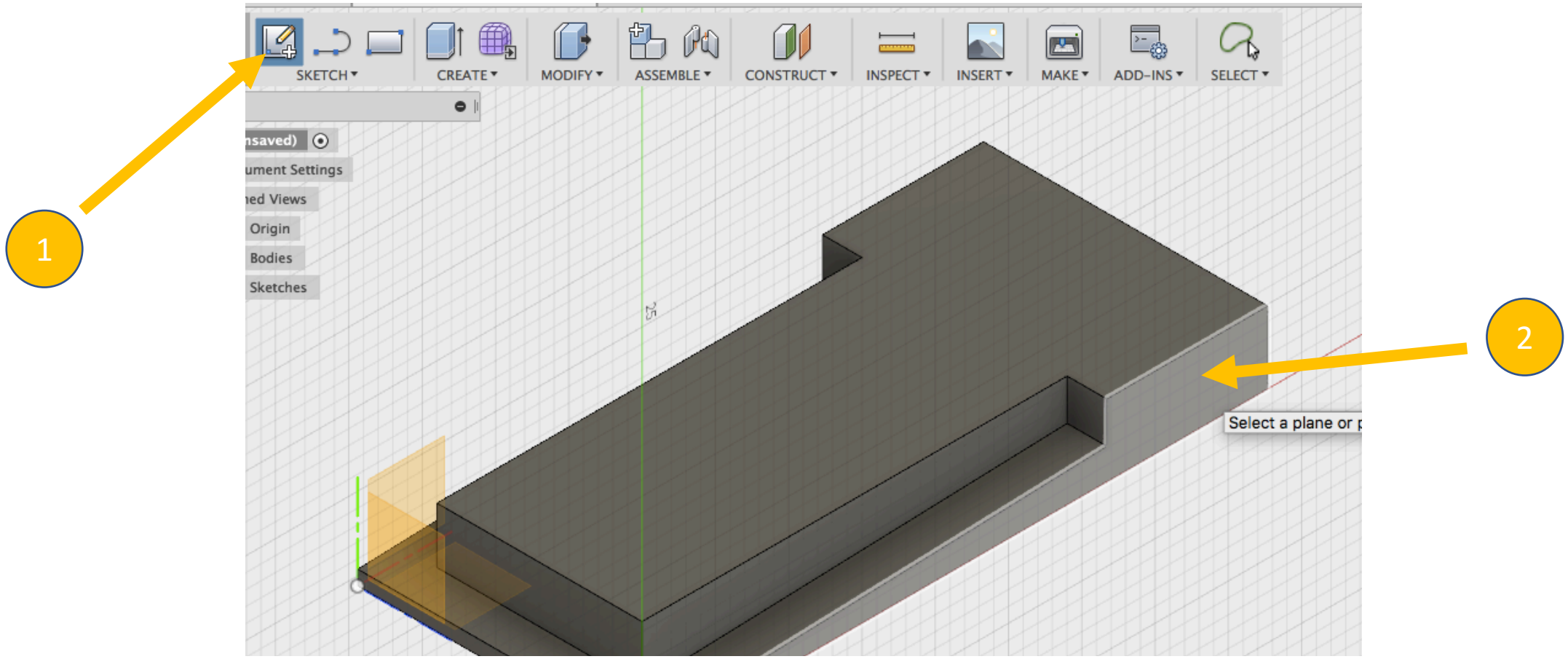
Step 33: Select the side surface then followed by the “U” surface as shown below.



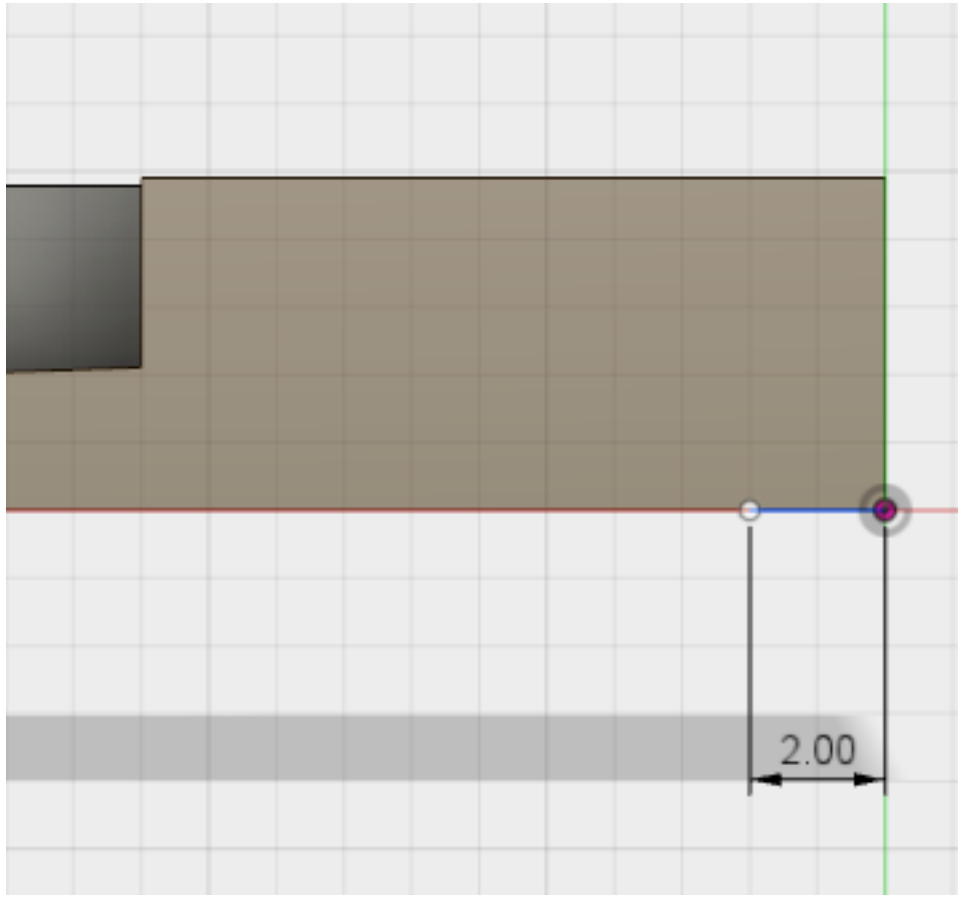
Step 34: Key in “2 deg” then hit “Enter”.



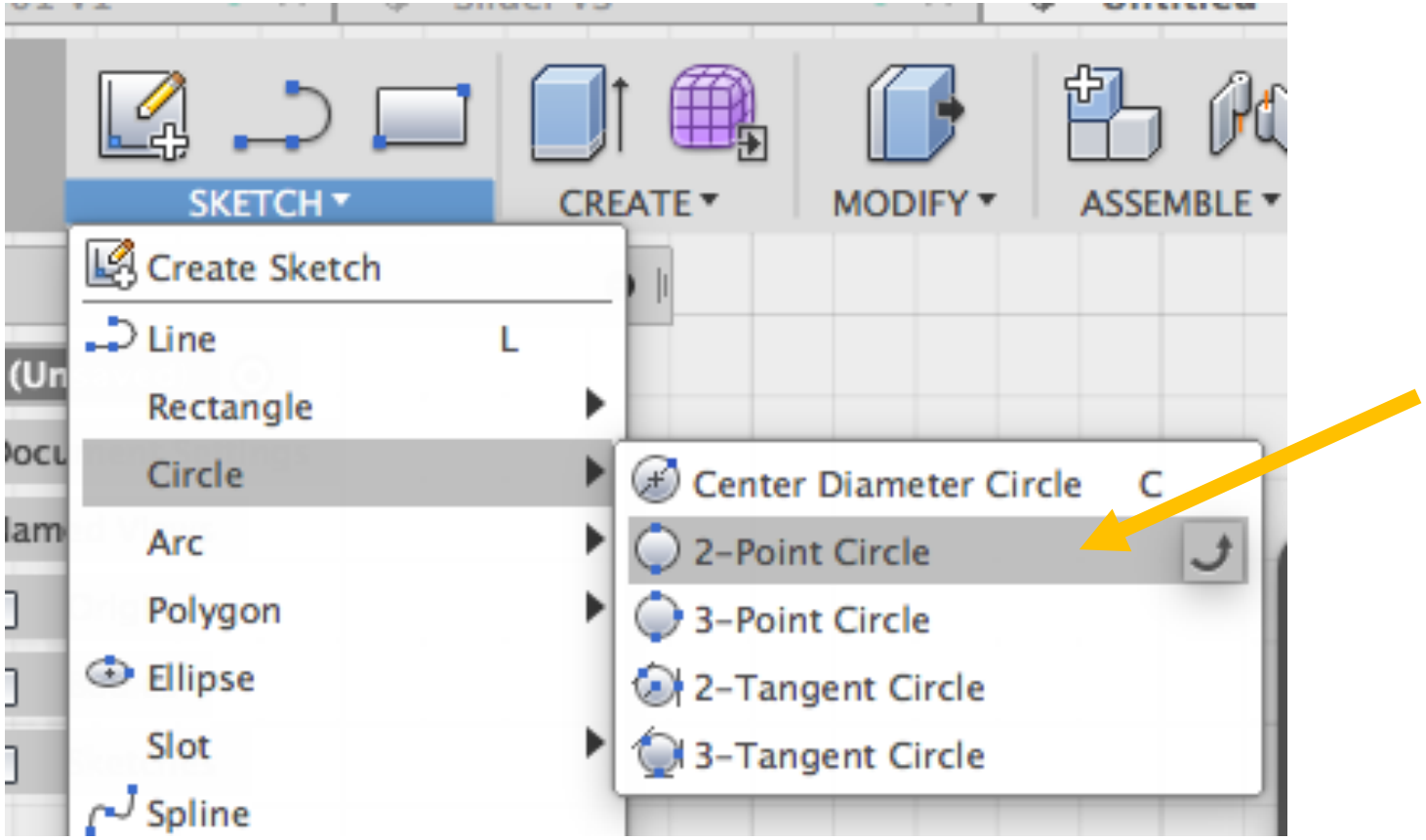
Step 35: Next, click “Create Sketch” then select the side surface as shown below.



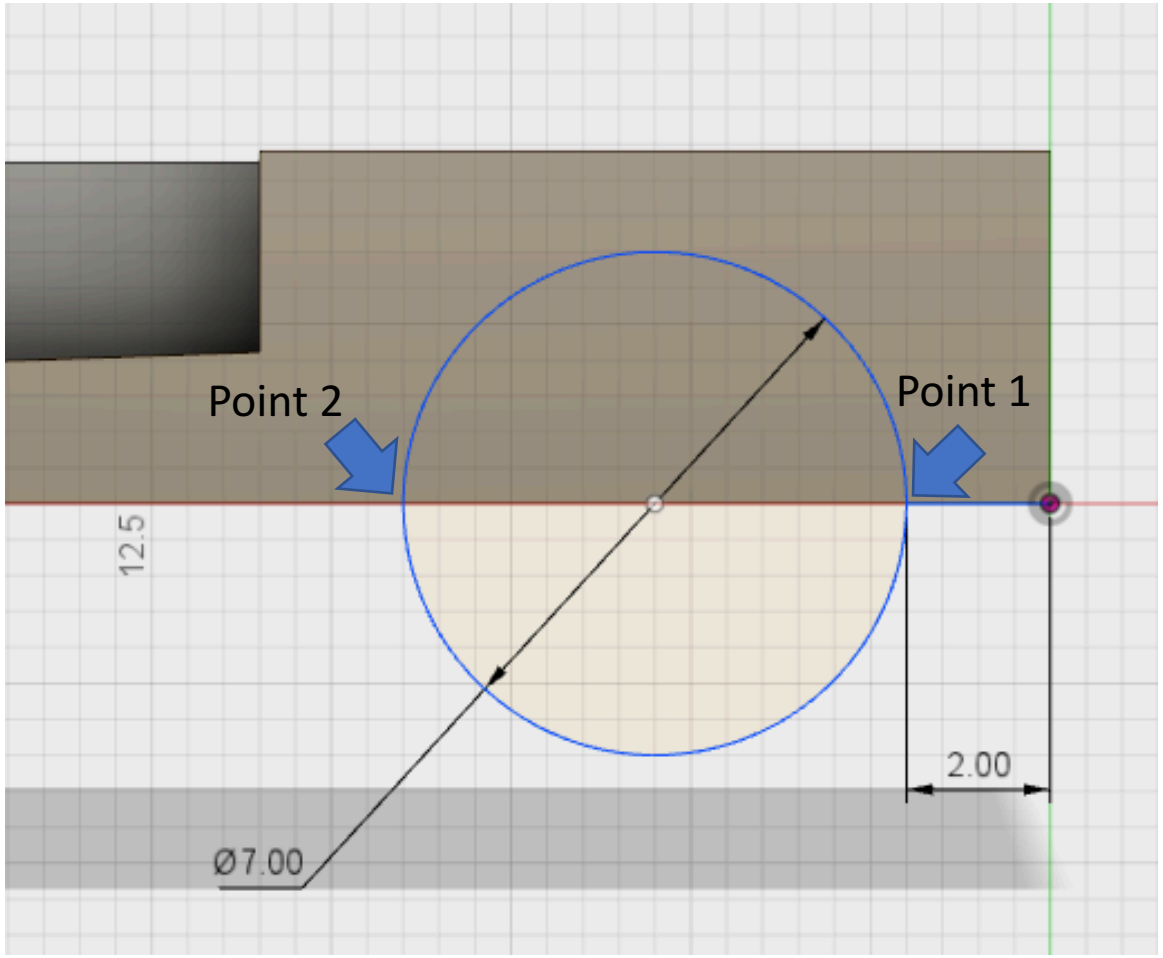
Step 36: Next, draw a 2mm horizontal line at the bottom of that surface.



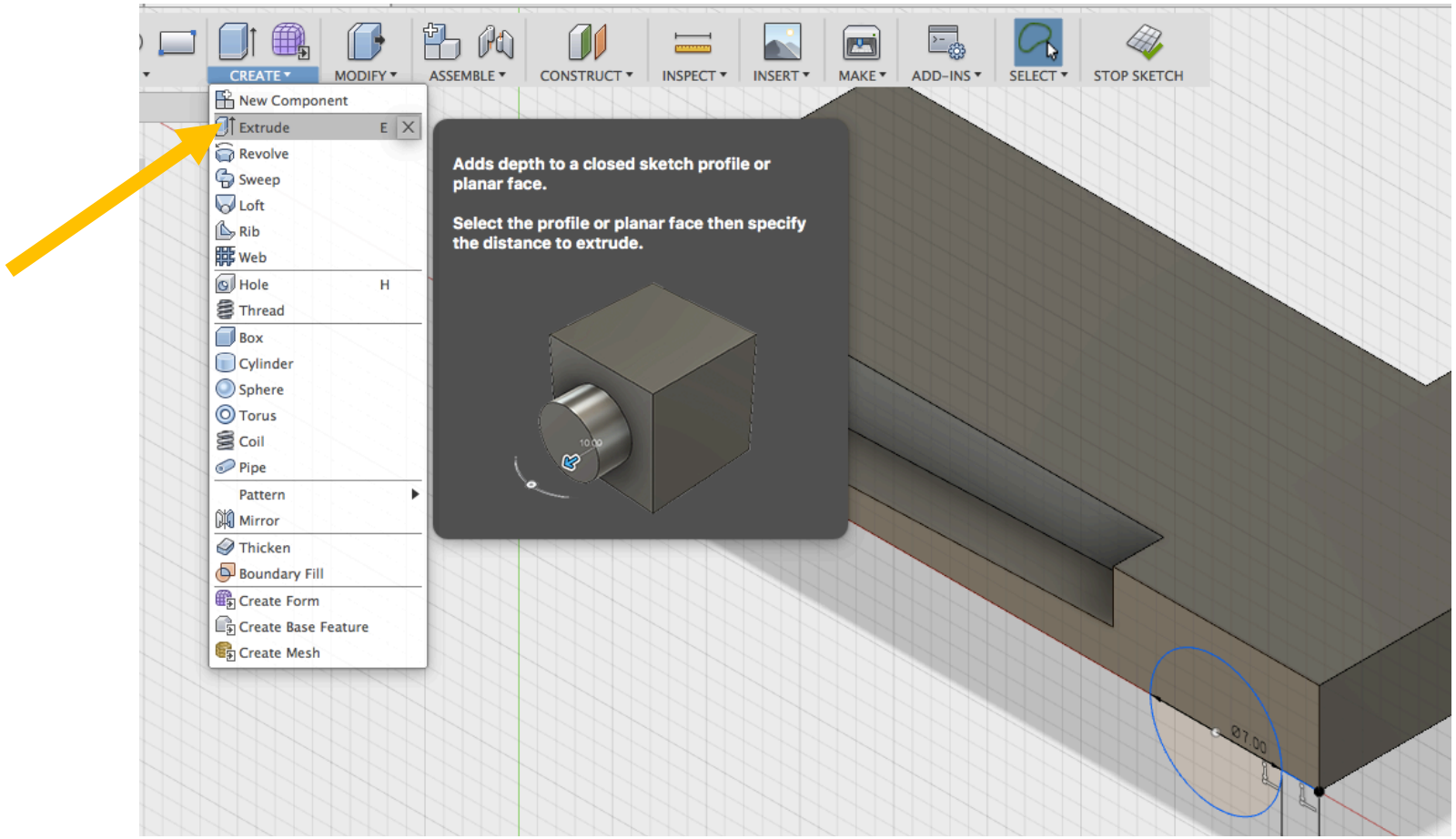
Step 37: Then go to “Sketch” > “Circle” > “2-Points Circle”.



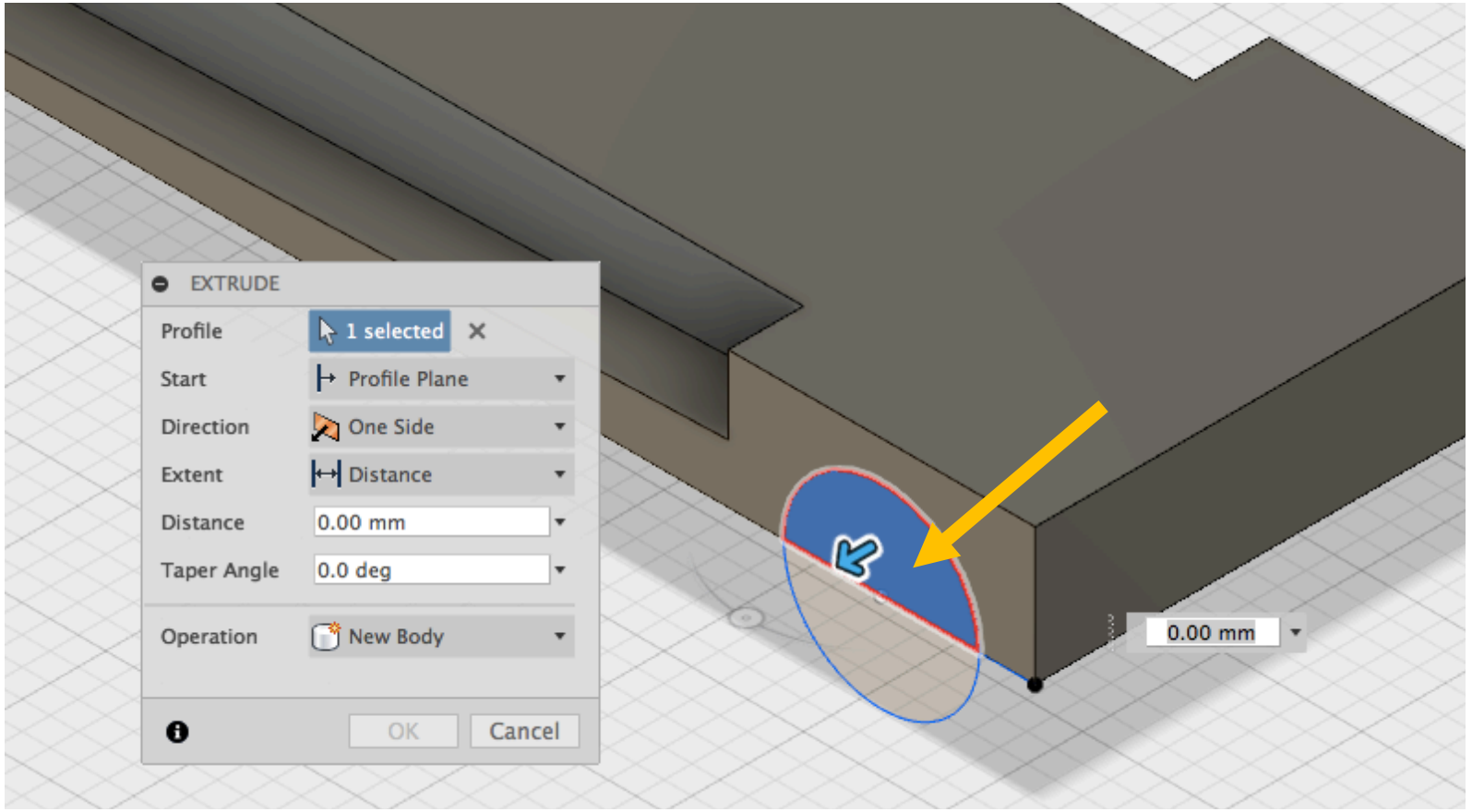
Step 38: Draw a 7mm diameter circle where point 1 & 2 sit on the bottom line of the surface as shown below.



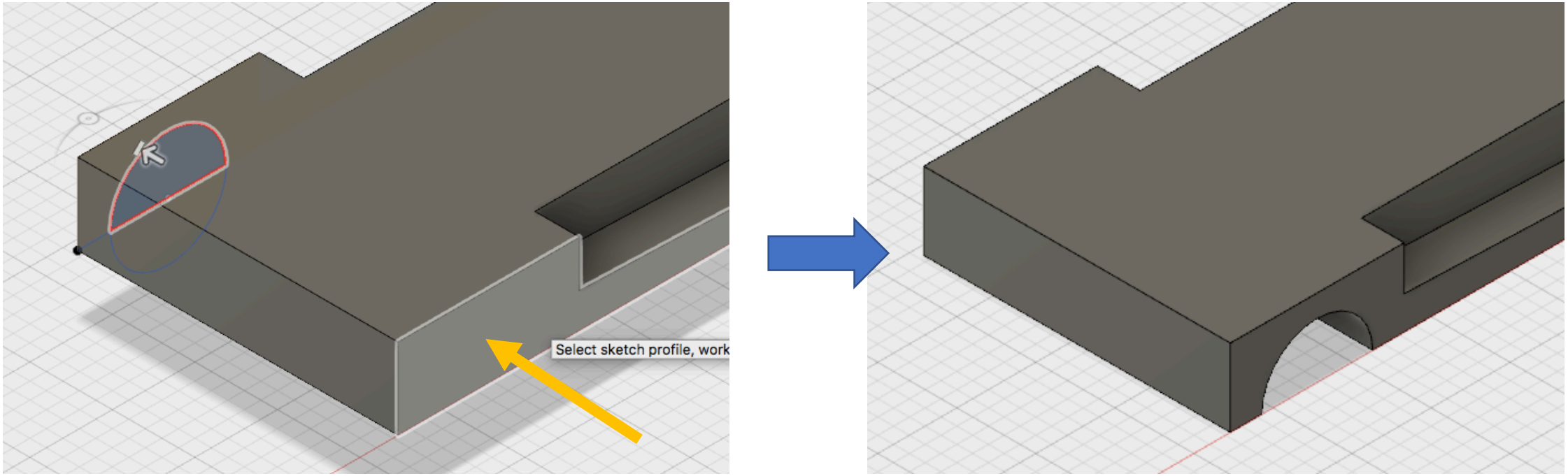
Step 39: Change to isometric view then select “Extrude”.



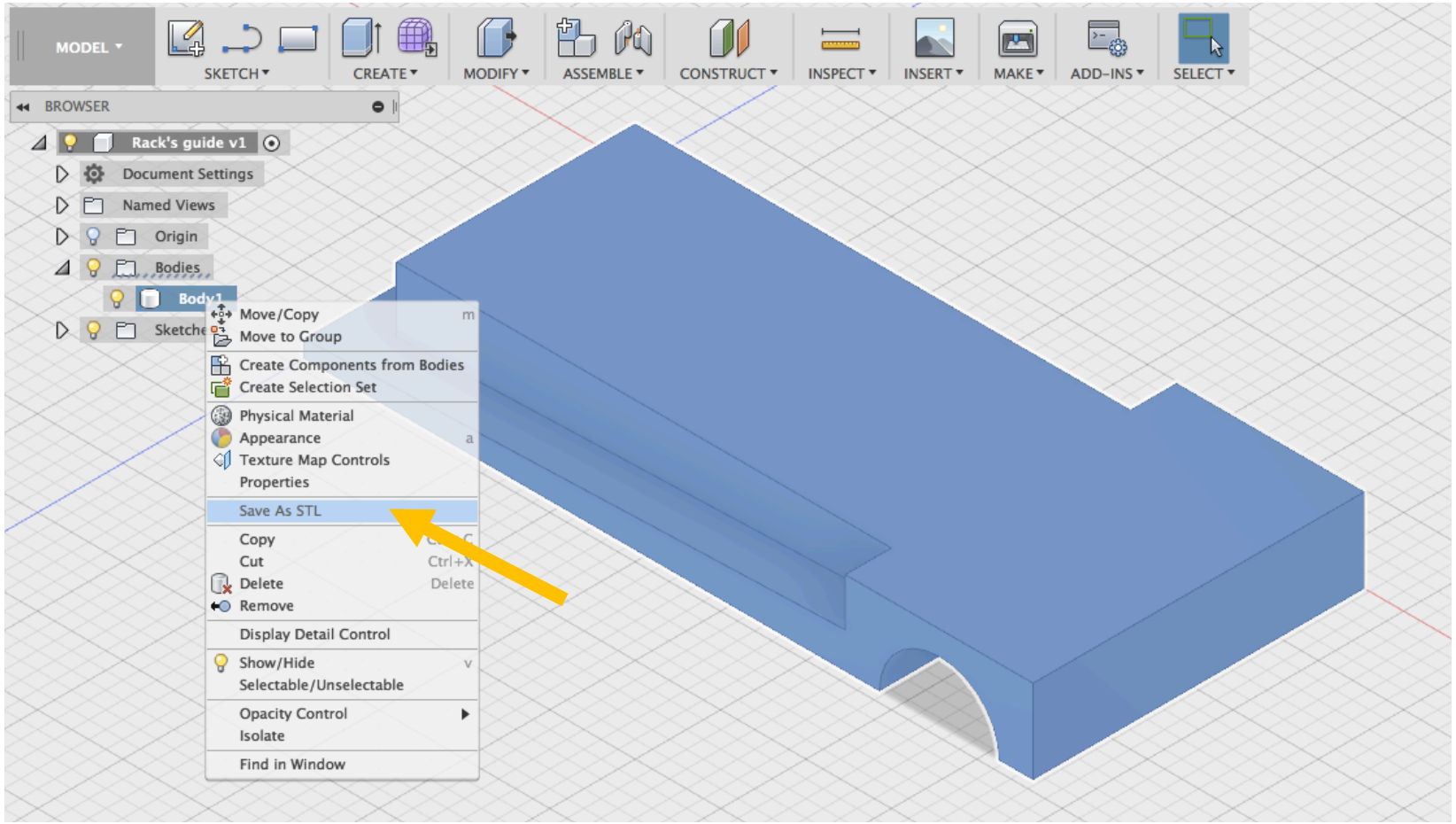
Step 40: Select the upper semicircle.



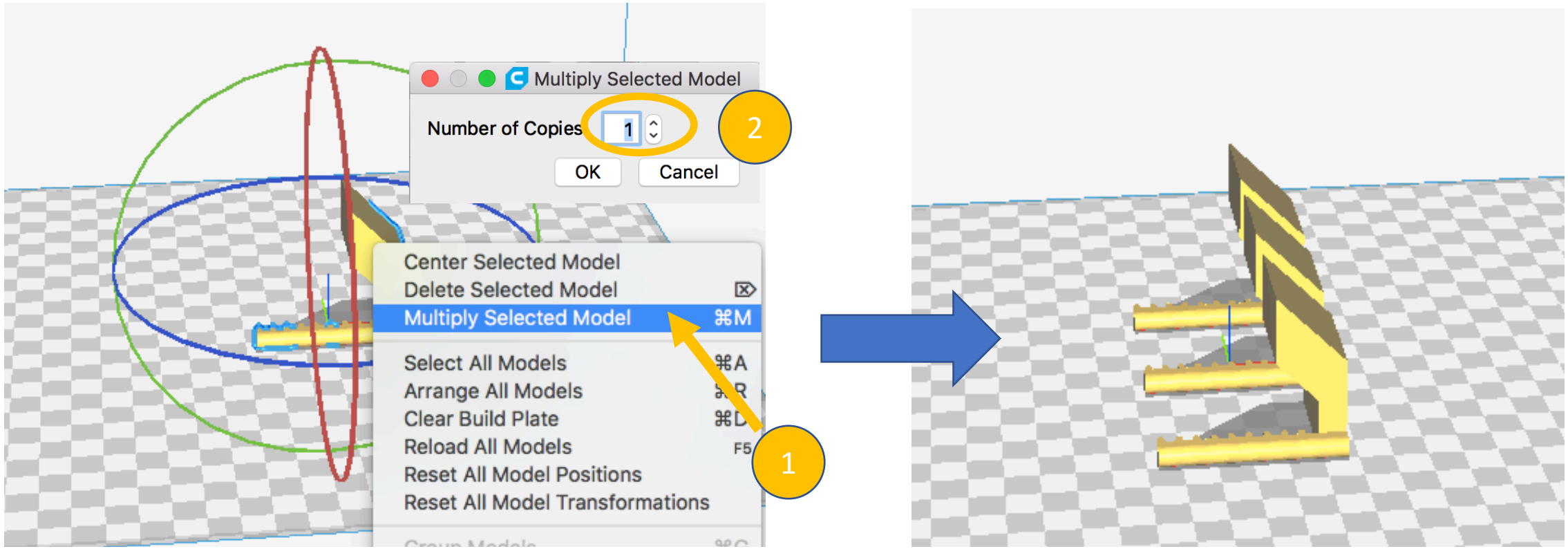
Step 41: Then change the object's view angle so that you can select the opposite surface as pointed out below. Then hit "Enter".



Step 42: Finally, your rack guide is ready. Save it as “STL” file.

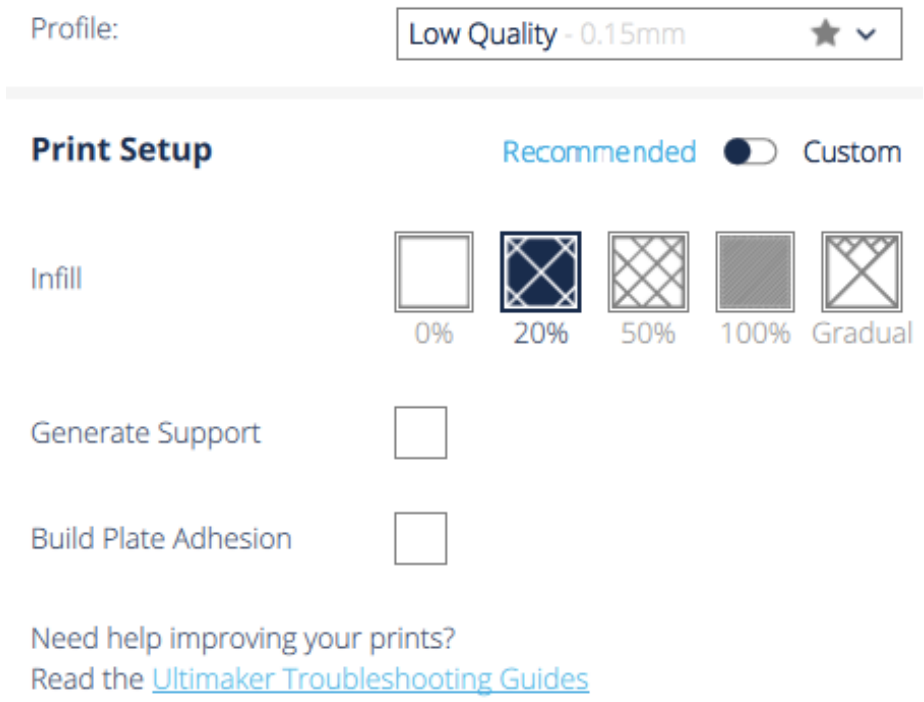


Step 43: Send the rack gear's STL file to Cura. Right-click the part, click "Multiply Selected Model" then key in "1".

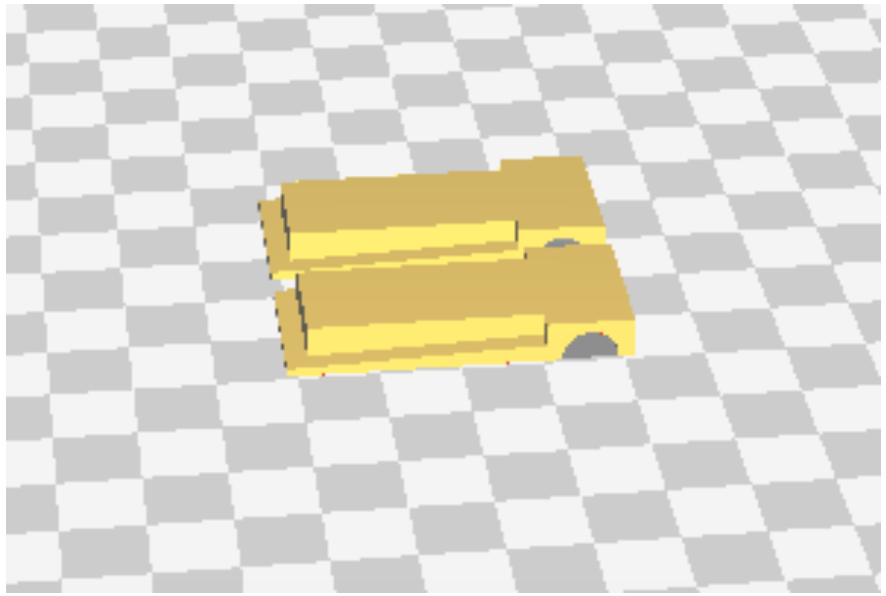


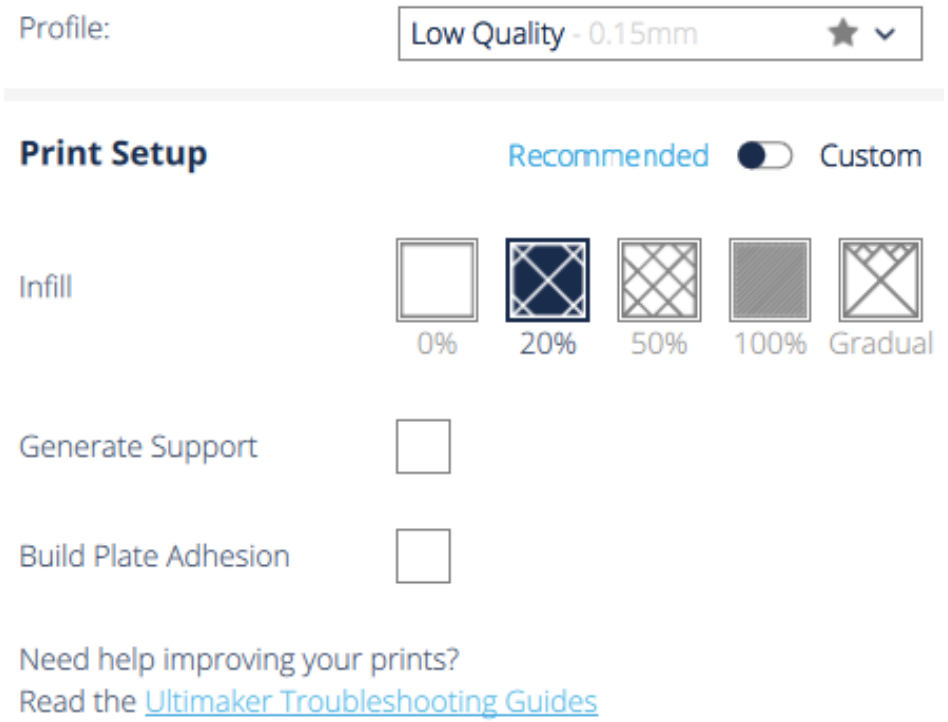
Note: Please ensure your parts are lying at the orientation as show above.

Step 44: Please follow the print setting below. Then save the “G-code” into your SD card.

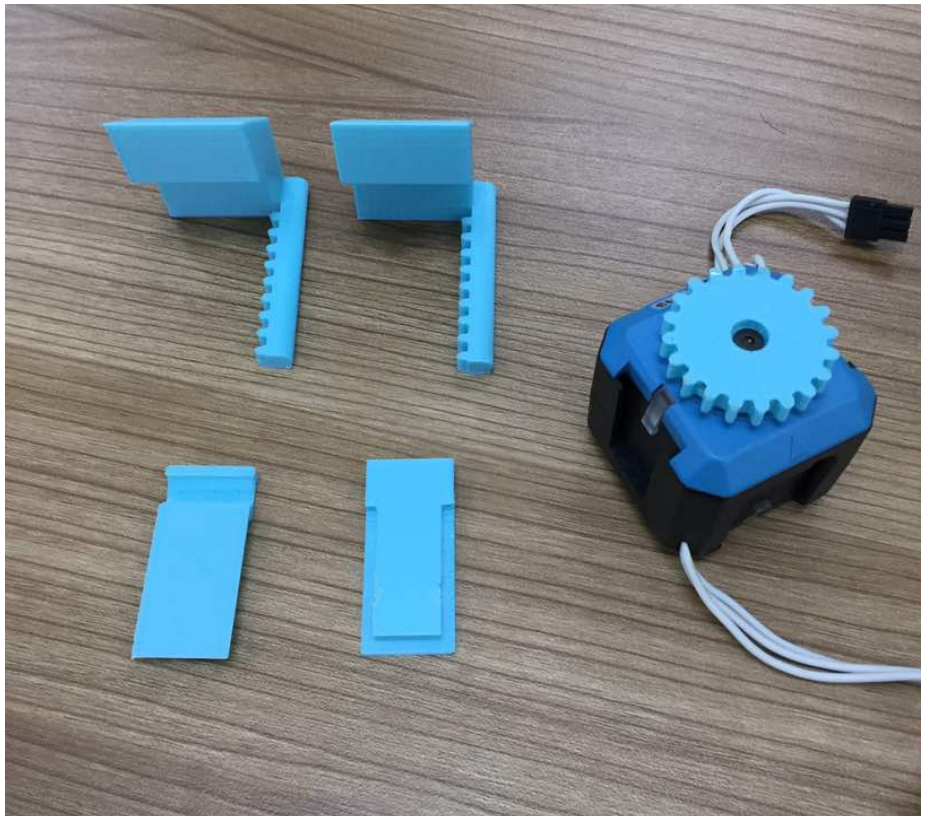


Step 45: Same goes for rack guide. We will need to print 2 pieces with the print setting shown below.

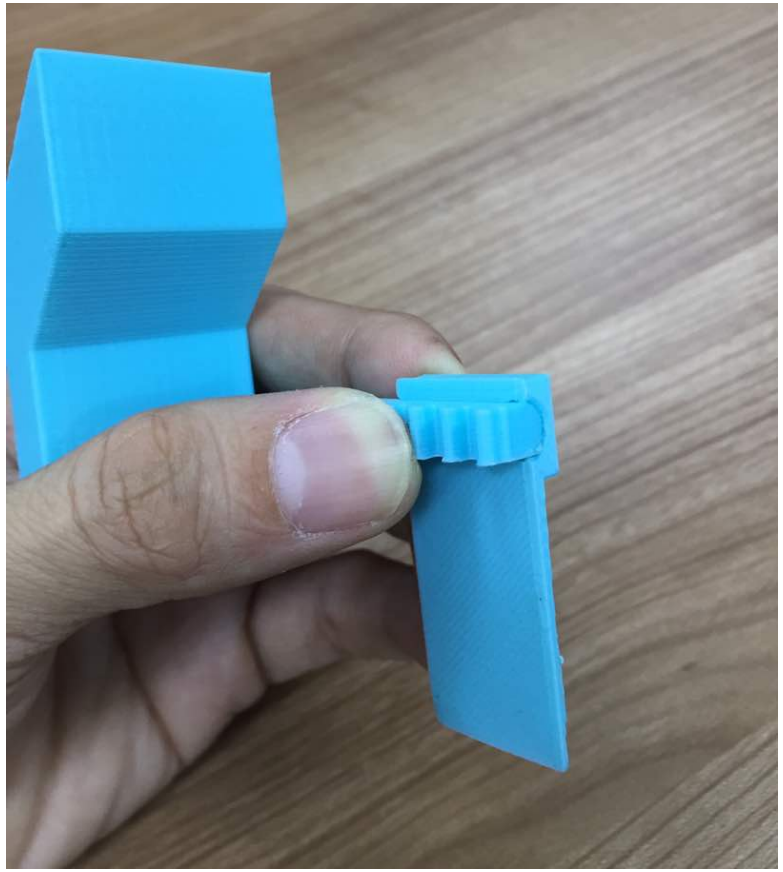




Step 46: Next, we are going to assembly all the parts that we have printed to build a gripper.

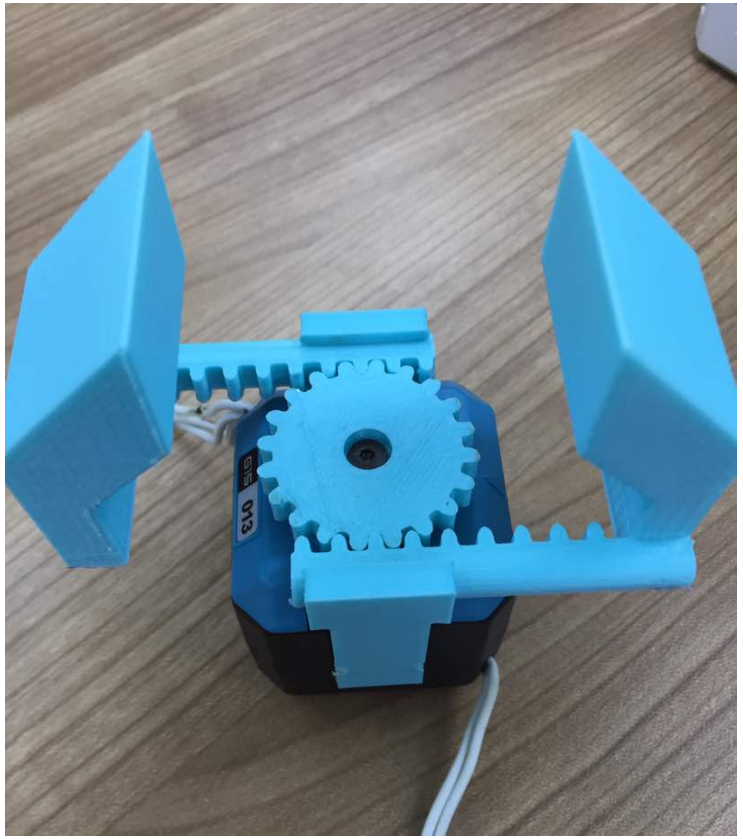


Step 47: To begin, hold the rack gear and the rack guide tightly.



Step 48: Then slide the rack guide into one of the G15’s slot. Make sure the teeth between the rack gear and pinion gear are engaged before you press down.

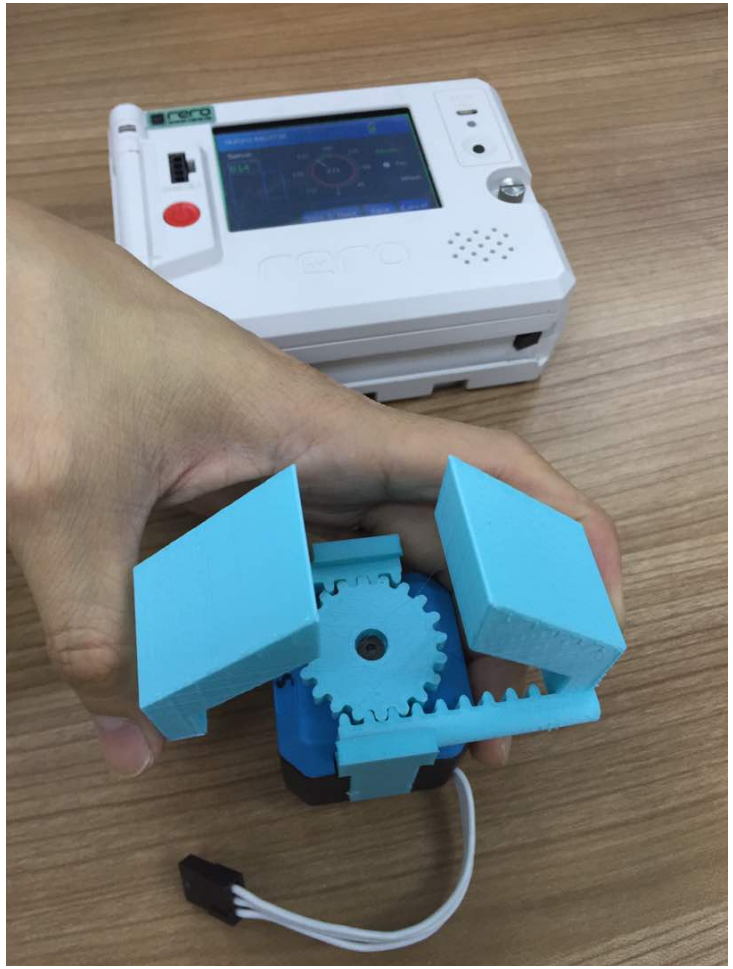
Step 49: Repeat step 47 & 48 for the other side.



Step 50: Connect the G15 to the rero Controller. Then select “Servo”.

Step 51: Select the G15's ID then select "Set Path".

Step 52: Press both rack gears together gently until they touch each other. Then press “save”.



Step 53: Mount it on your rero and you've got a new gripper!