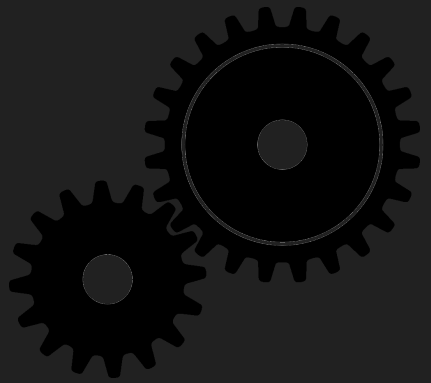
OnShape Workshop

By Engineering Club



What is OnShape and CAD?

CAD

- CAD = Computer Aided Design
- Using any CAD program (like OnShape, SolidWorks, Fusion360, etc.) you can create 3D objects that are parametric Very useful for engineering!
- Paramentic - models are create/defined by parameters, relationships and constraints. (ex. Angles, length, height, other models)

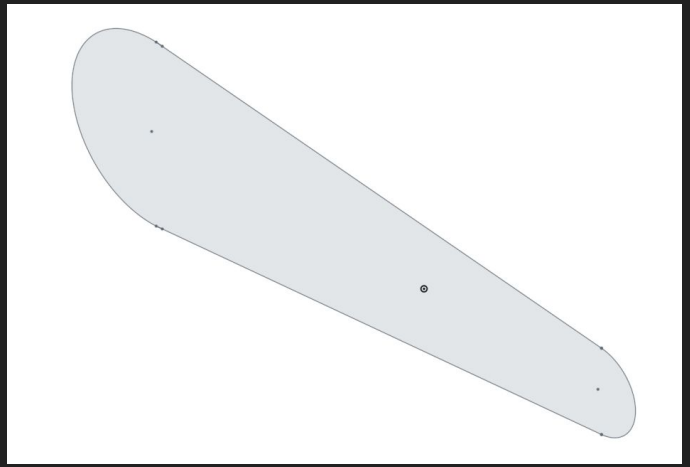
OnShape

- Its a Cloud Based CAD Software.
- It runs on many computers through a browser.

CAD Workflow

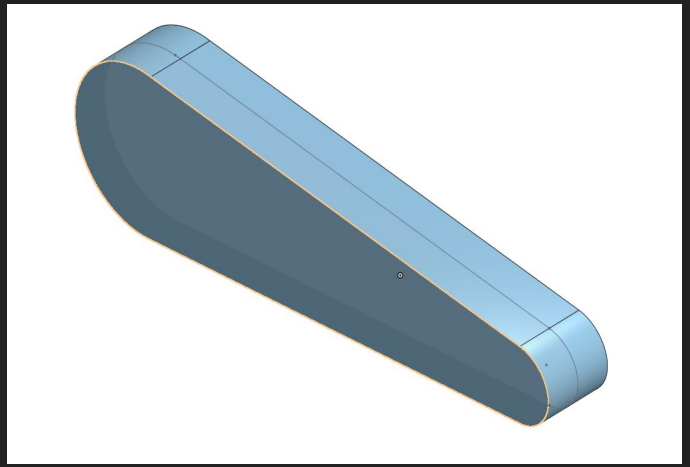
1. Make a 2D-Sketch.
2. Extrude the Sketch
    a. Creates a 3D object
    b. (extrude mean to push out)
3. Modify the object With features

2D Sketch

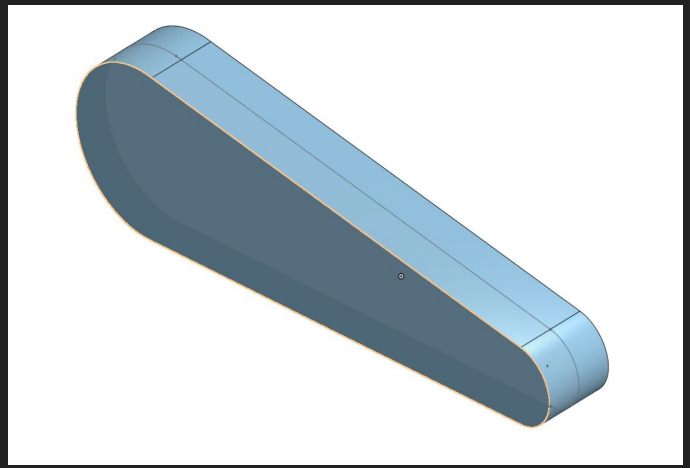


Extrude sketch

3D Object

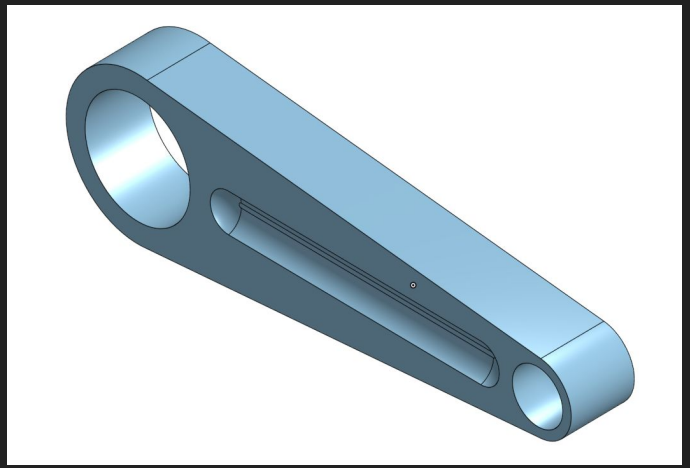


3D Object

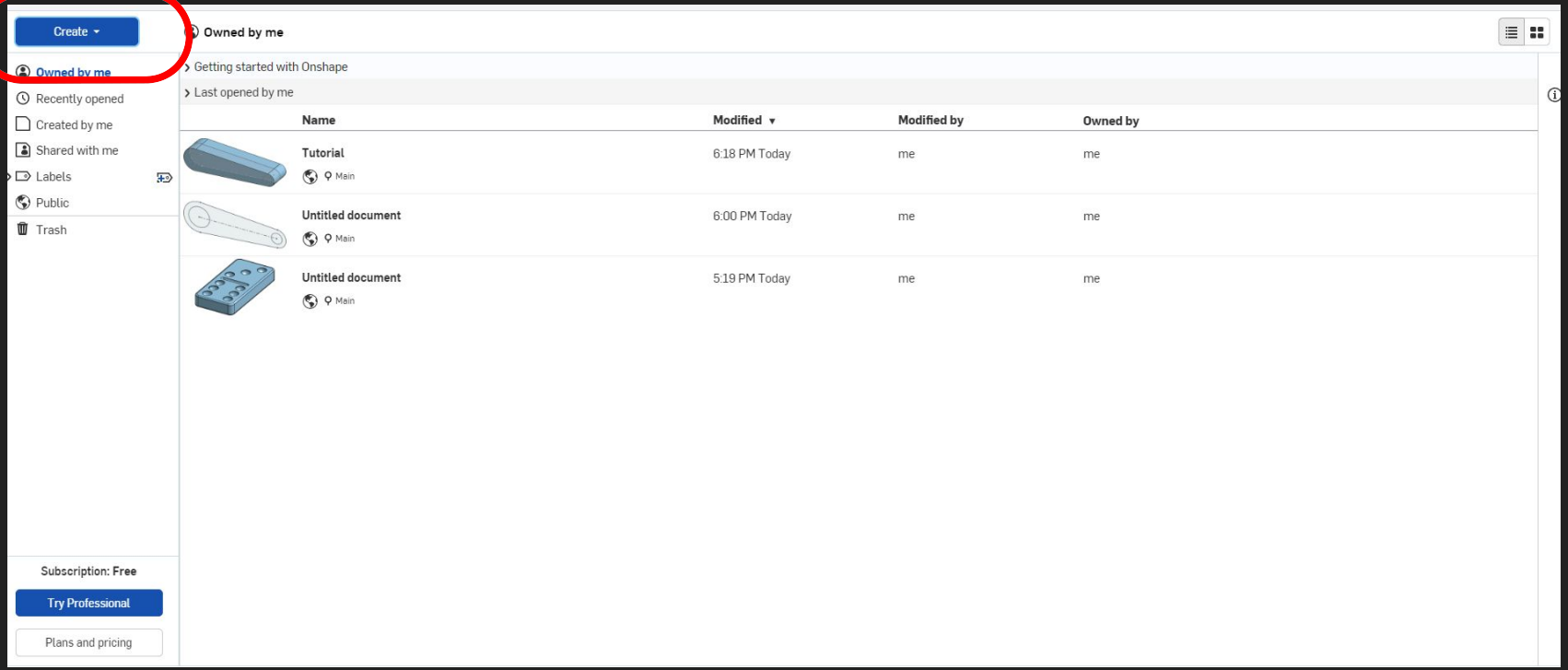


Add Features

3D Object With Features



Create a document

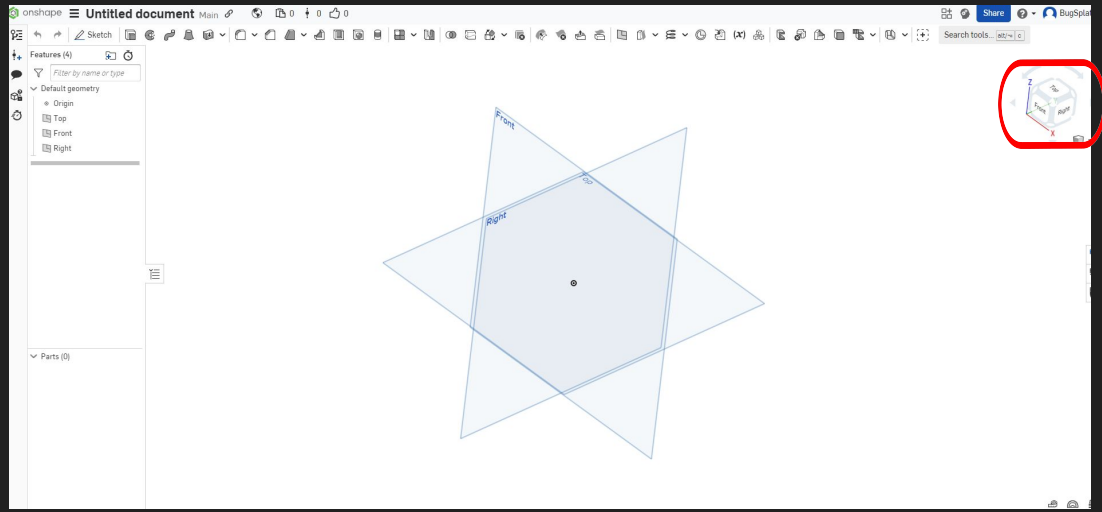


Basic Navigation

- Rotate view with right mouse
- Move view with middle mouse

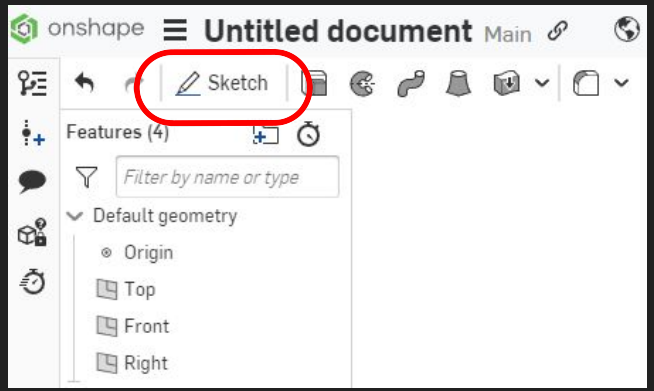
- You can also change your view using the view cube

- You can also return to the default view called isometric through right click

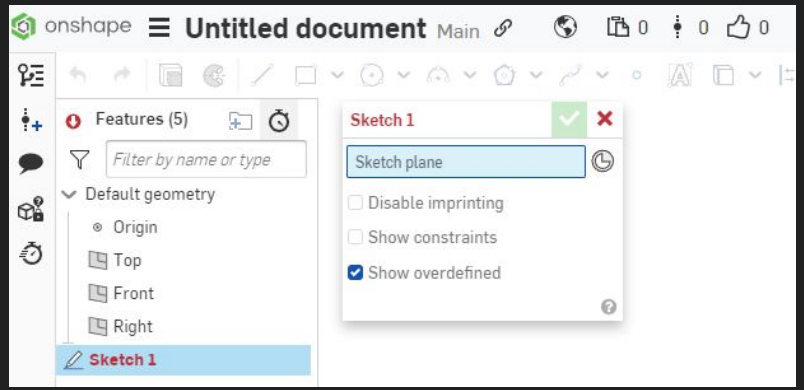


Start your first sketch

Click sketch in the top left of the page



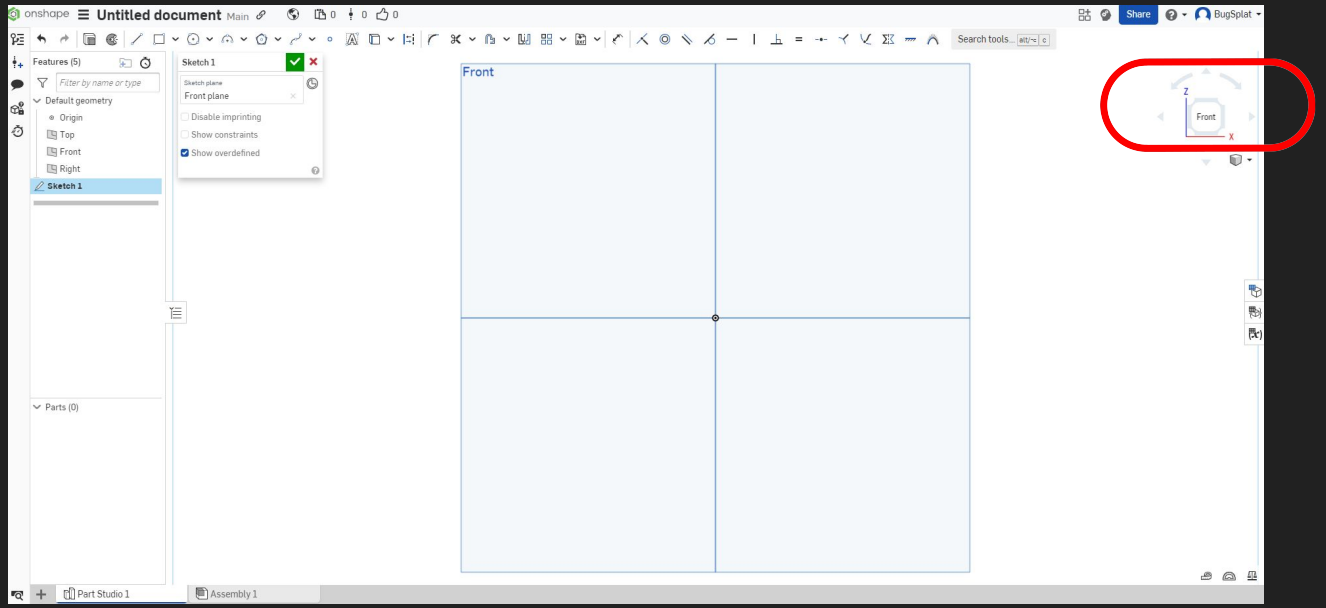
Select the plane you wish to sketch on



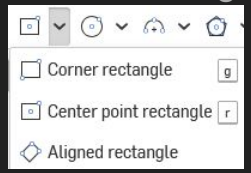
In our case select the Top plane

Orient yourself to the correct view

Click front on the view cube to face the camera
to the front plane

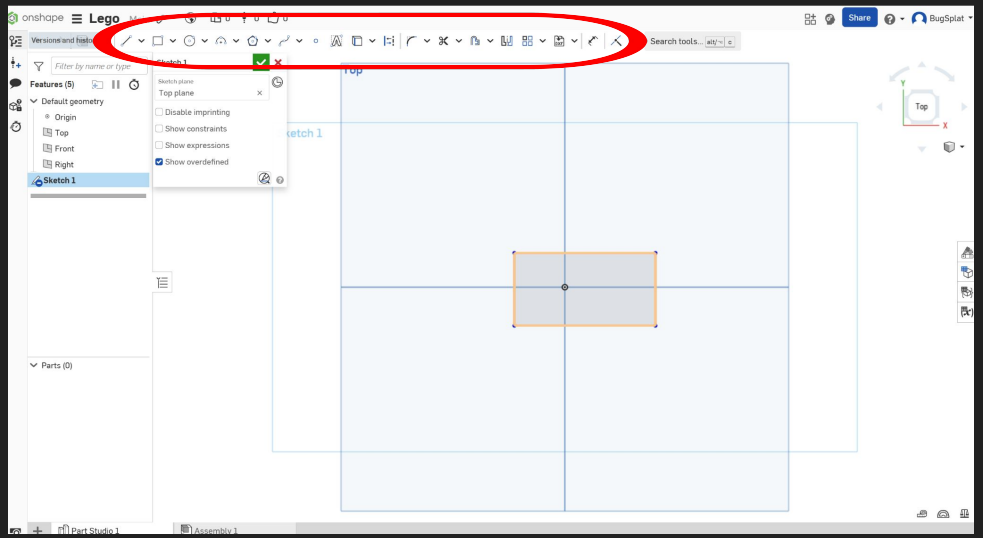


Basic Tools in Sketch

- Line
  - 
- Rectangle (But for this workshop, we'll use the center rectangle.
  - 

- Circle (Which is Center Point by Default)
  - 
- Dimension tool (D shortcut)
  - 
- Constraints (coincident, Parallel, Equal, ect.)
  - 
- Offset Entities
  - 

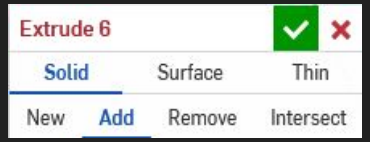
Location:

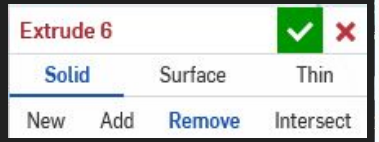


Basic Tools For 3D

- Extrude (Add)

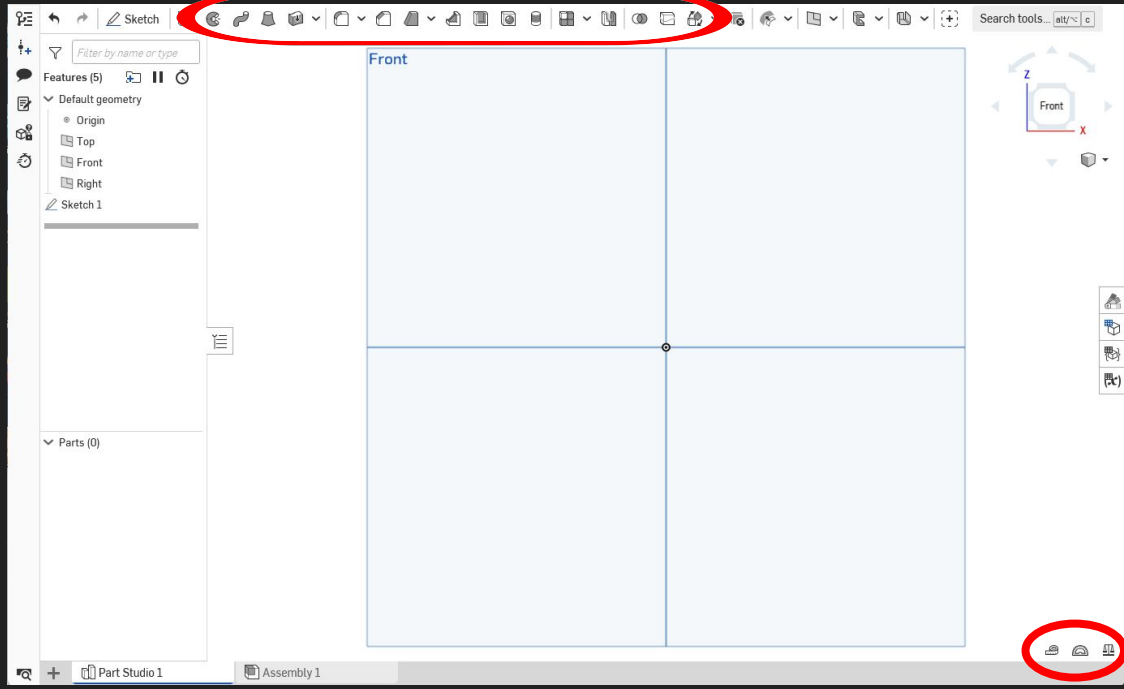
- Extrude (Remove)



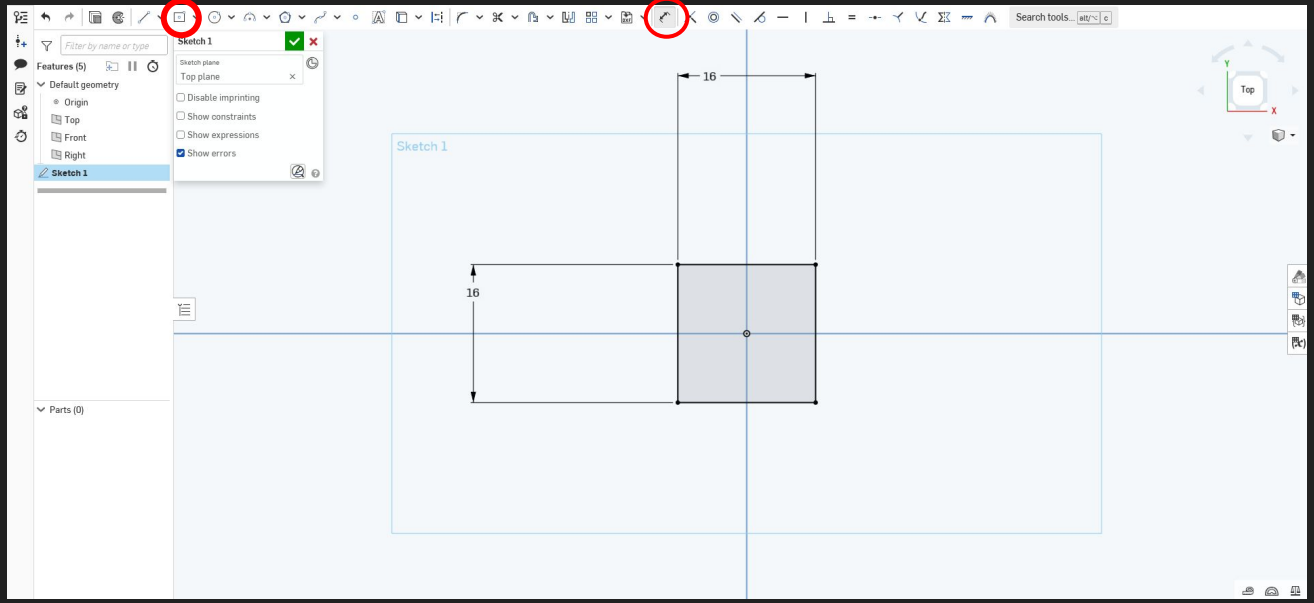


- Measure
  - 
- Mass Properties
  - 

Location:



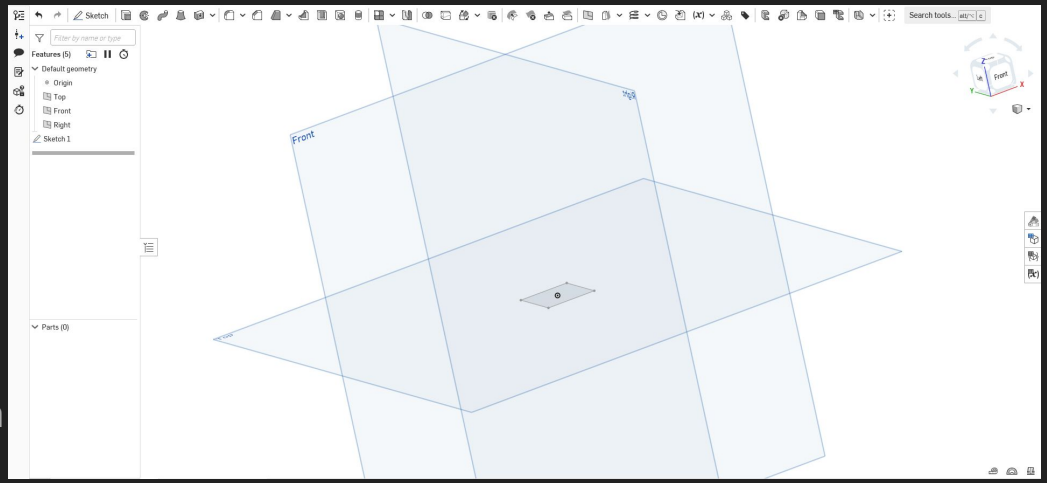
Create Rectangle with Dimensions 16mm on each side.

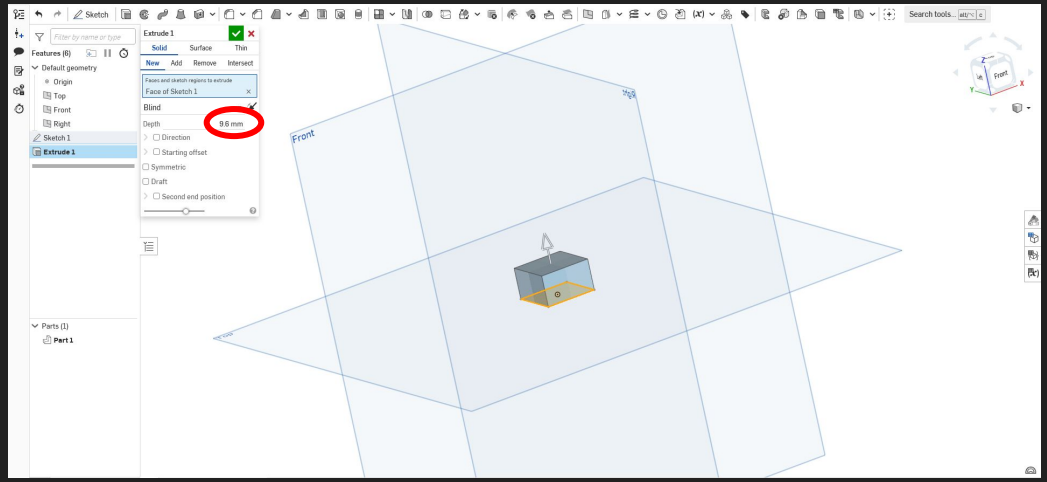


Once you are done Click the green check mark to confirm your sketch

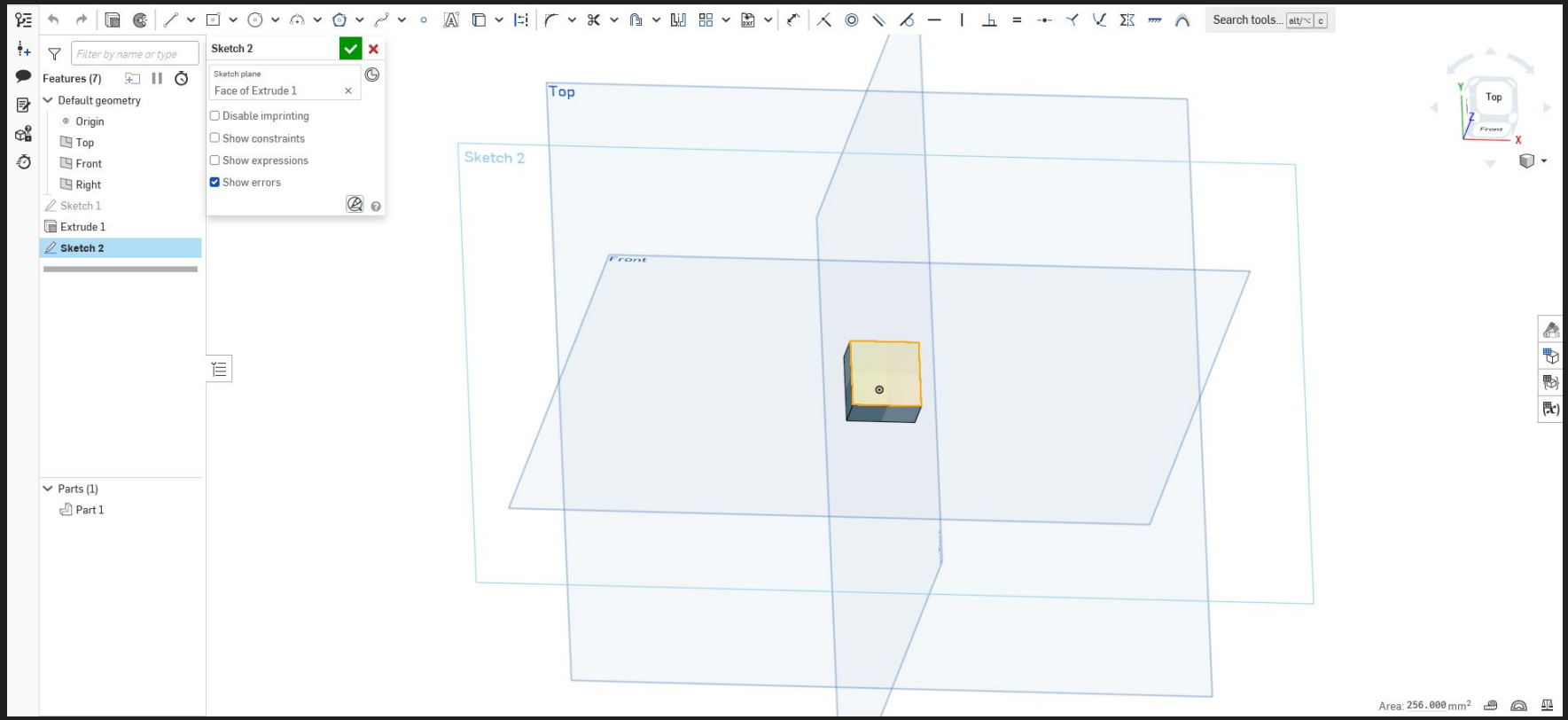
Now We Extrude

- Extrude
  - 
    - Select the Extrude Button then click the sketch we created
    - Ensure it is set to “Add”
    - Set the depth of the extrusion to 9.6 mm

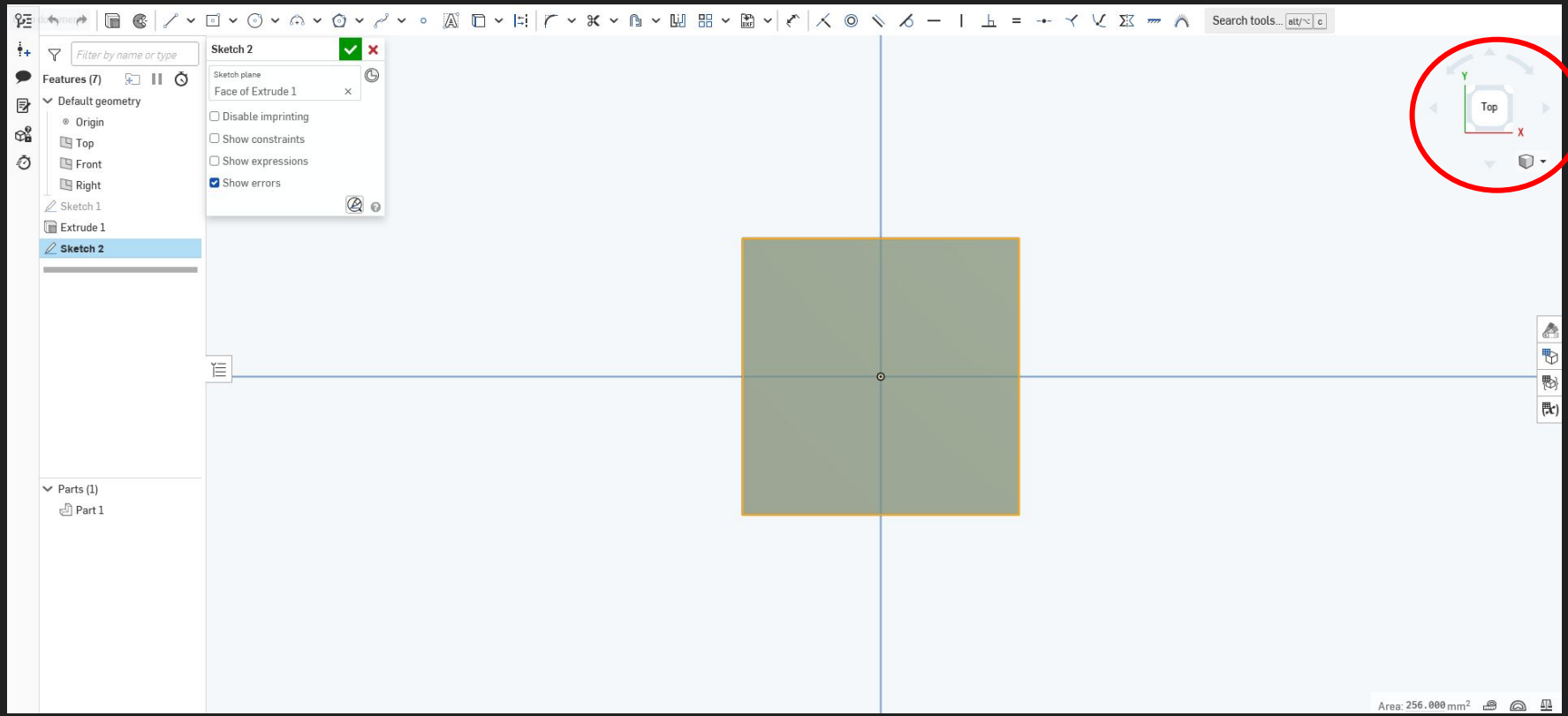




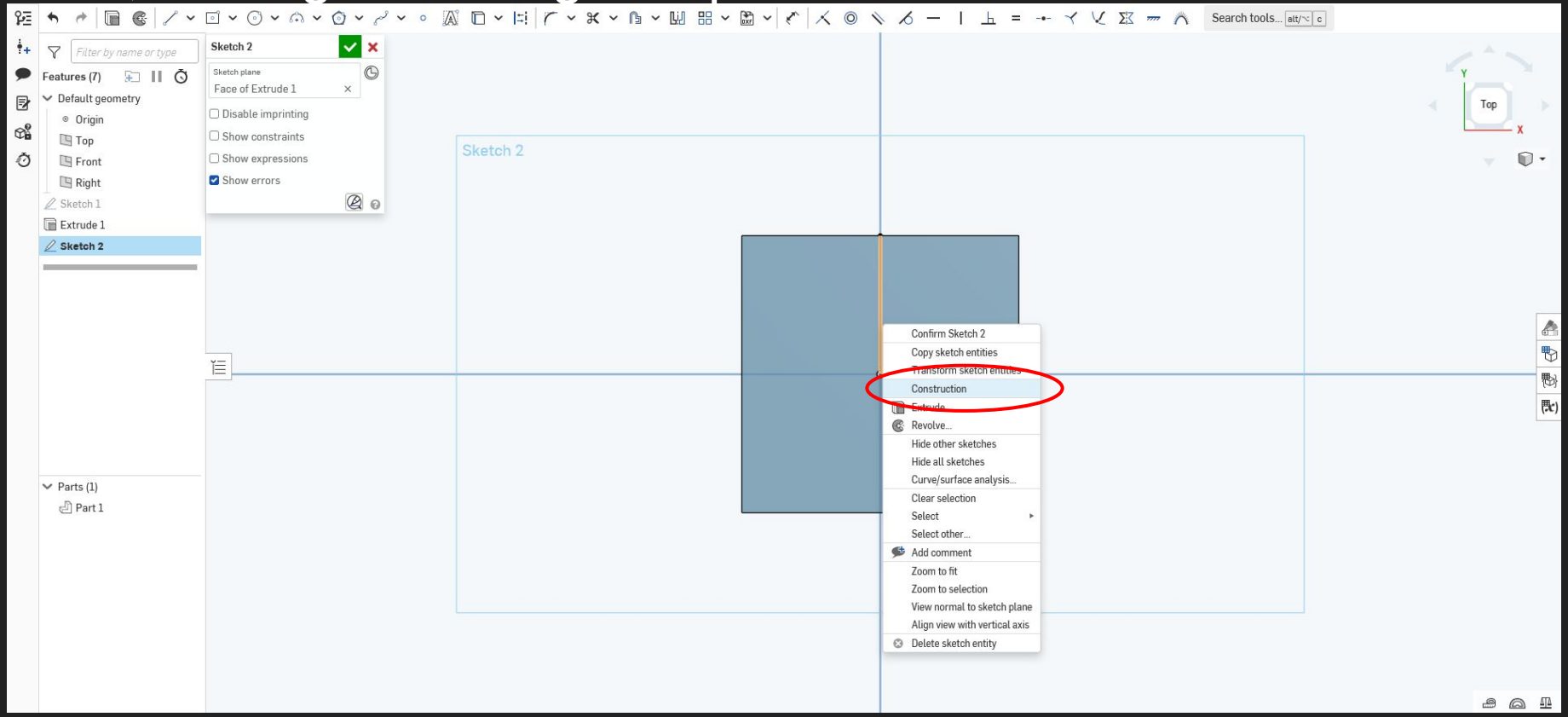
Select the top face and press “Sketch” again.



Press “Top” on the small cube navigator and zoom in.

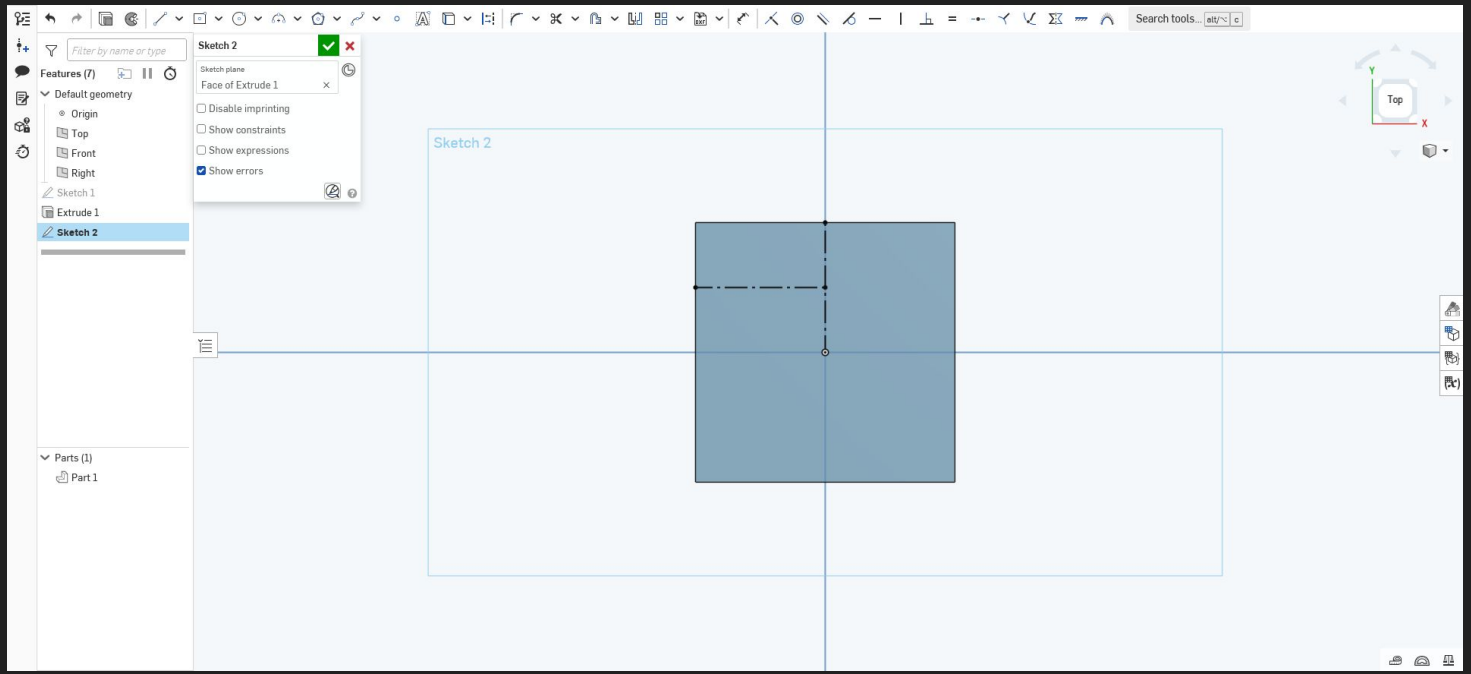


Create a construction line as such, by making a regular line, and right clicking it to press “Construction”

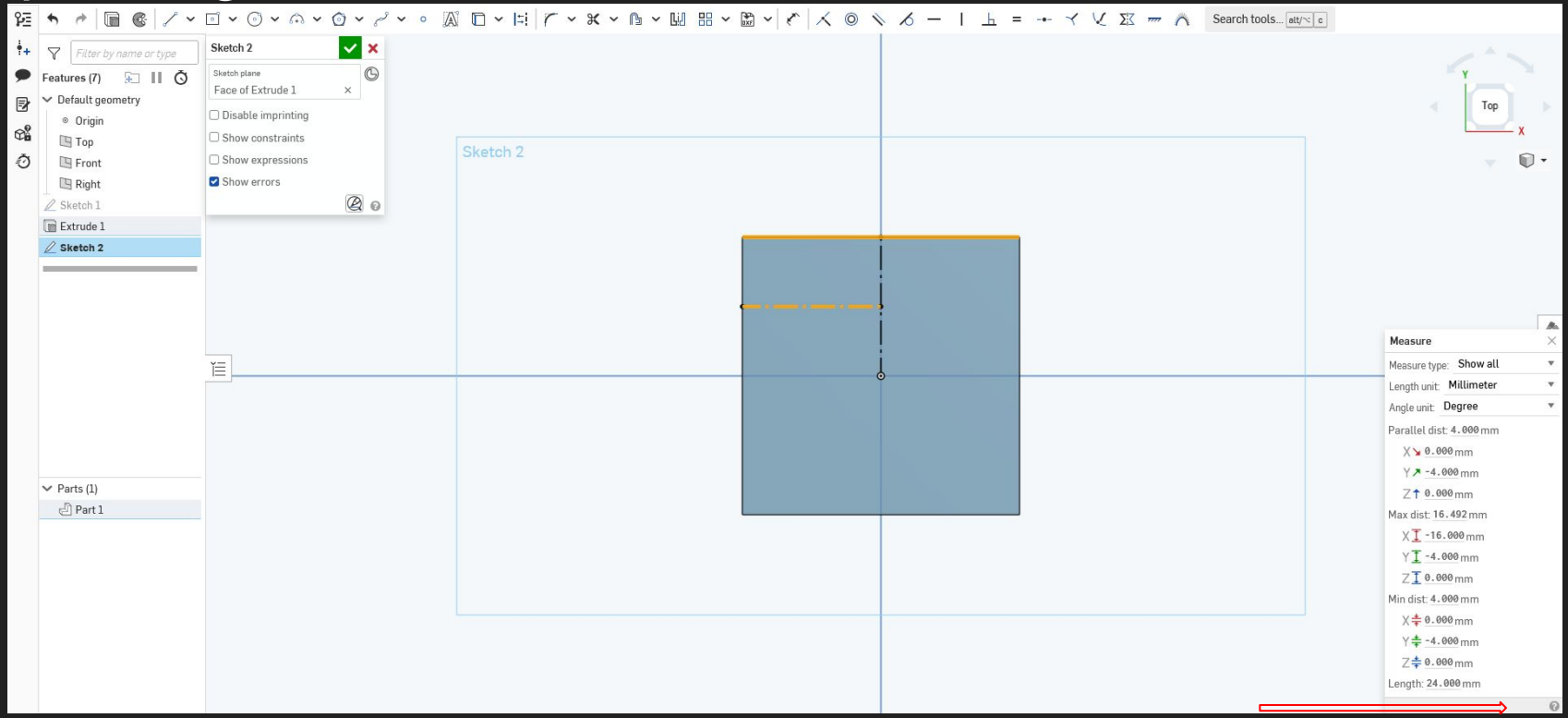


Add another construction line to help find the center of a quadrant

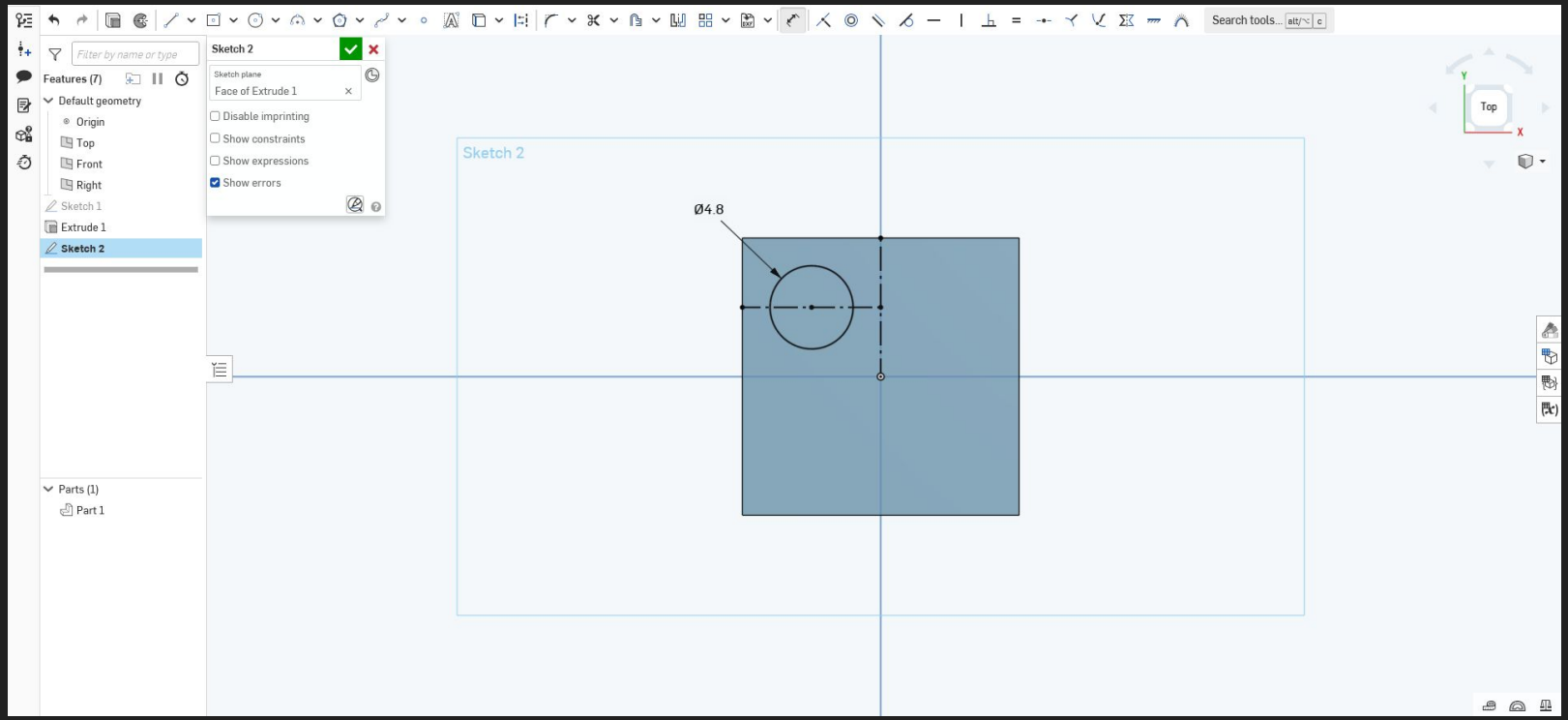
When hovering over the first line, hover over the midpoint and a “phantom point” will show up, allowing you to find the midpoint quickly.



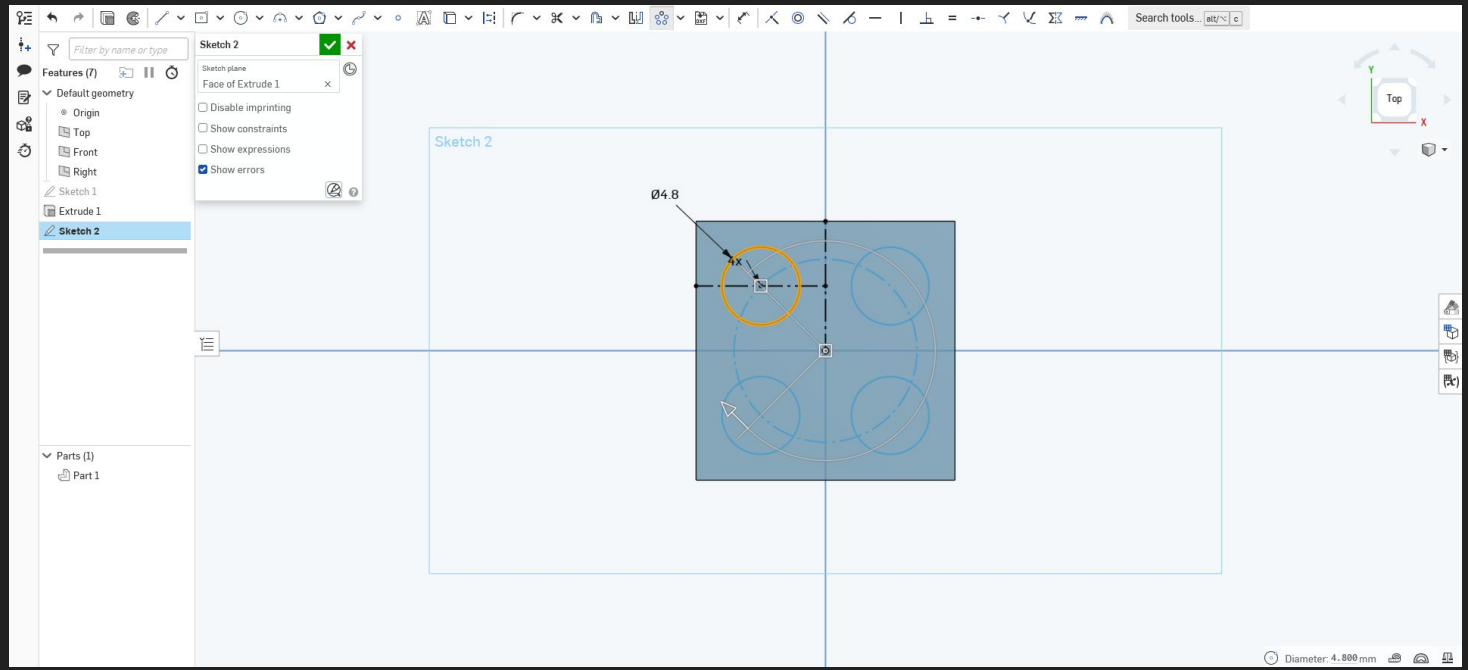
Use the “Measure” tool to ensure that your second construction line is 4mm to the outer wall of the large square right above it.



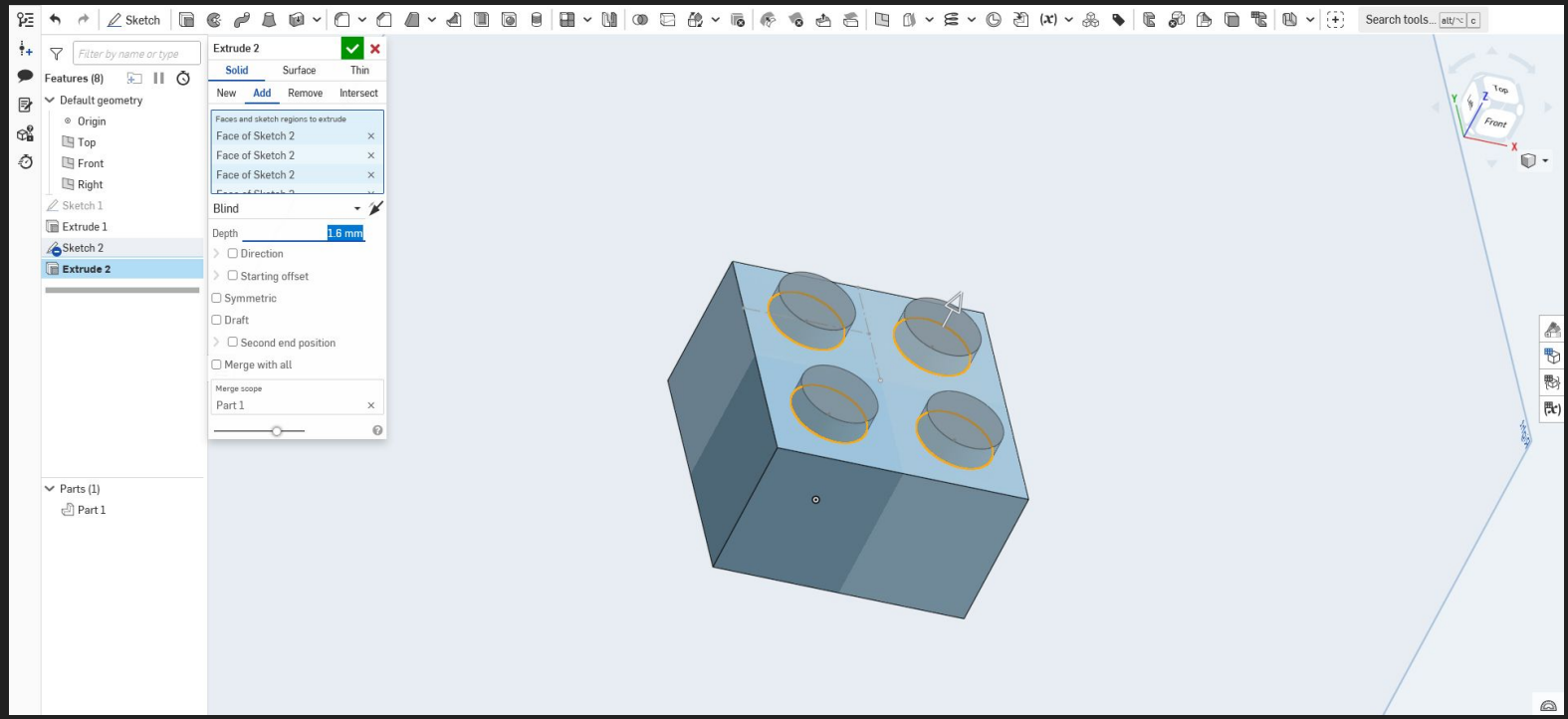
Using the midpoint of a line trick, create a center point circle on the midpoint of the second construction line and dimension it to be 4.8mm in diameter.



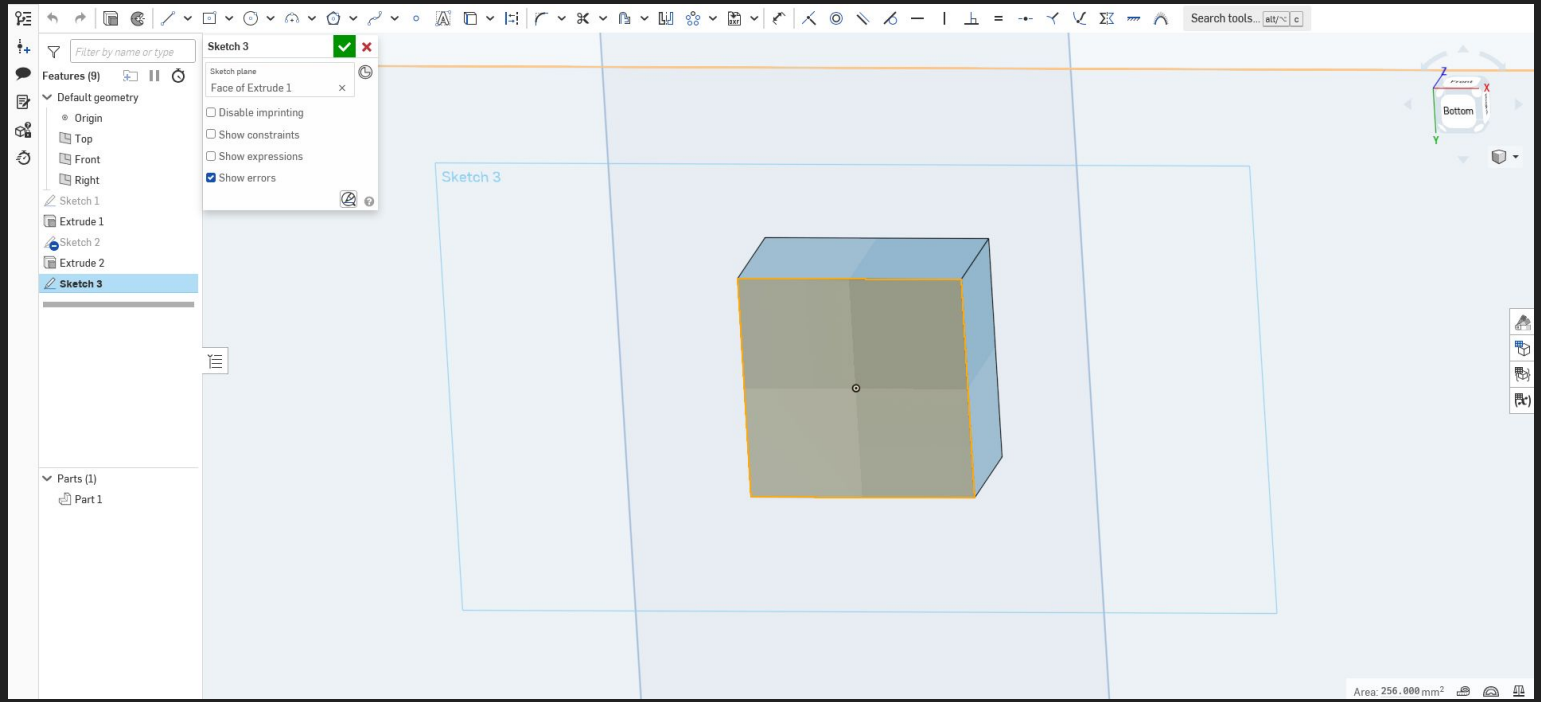
Next, using the circular pattern, click on the circle itself (not inside of it) and it should show 2 phantom circles centered around the origin. Change the number “3” to “4”. Then left click to save.



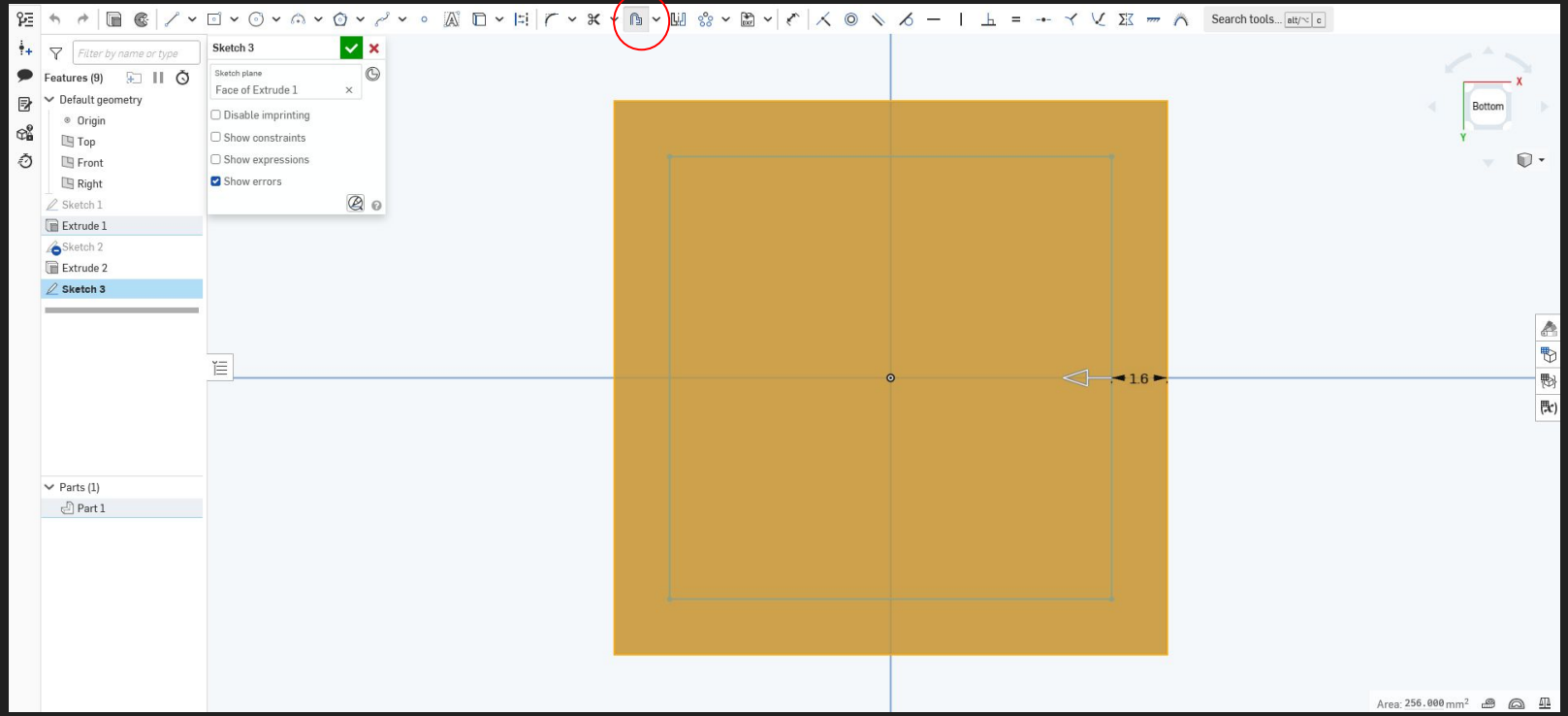
Shift and click all four circles made, then press the extrude button, ensure the setting is on “Add” and then set the depth to 1.6mm.



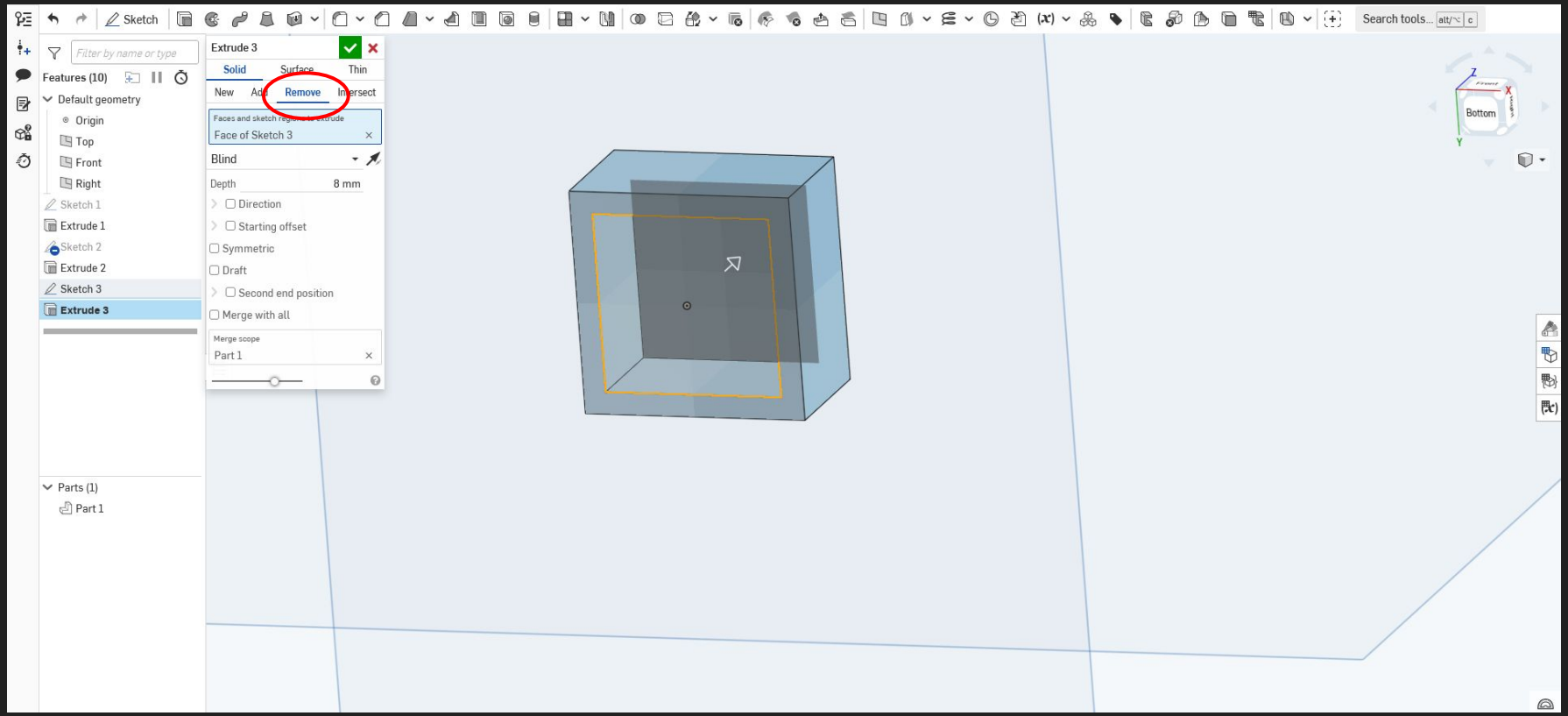
Then, flip over the model, click the bottom face, and press sketch. Use the cube navigation in the top right corner to focus on it and then zoom in.



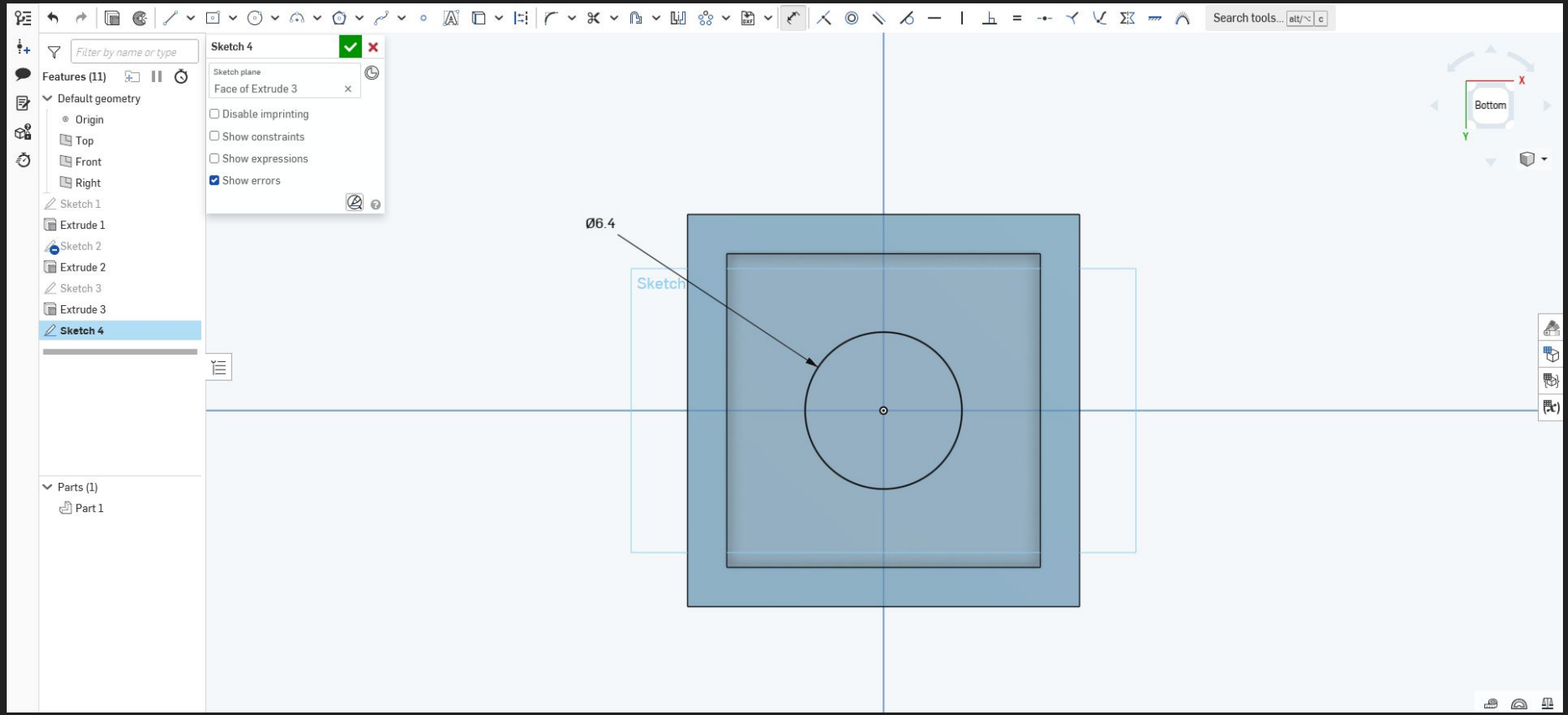
Press on the “Offset” button, then click on the bottom face again. You’ll get a large phantom square surrounding the face. Use the arrow (usually on the right side) and drag it in, so the offset is inside the size of the face. Then, set the number to 1.6mm and left click to save.



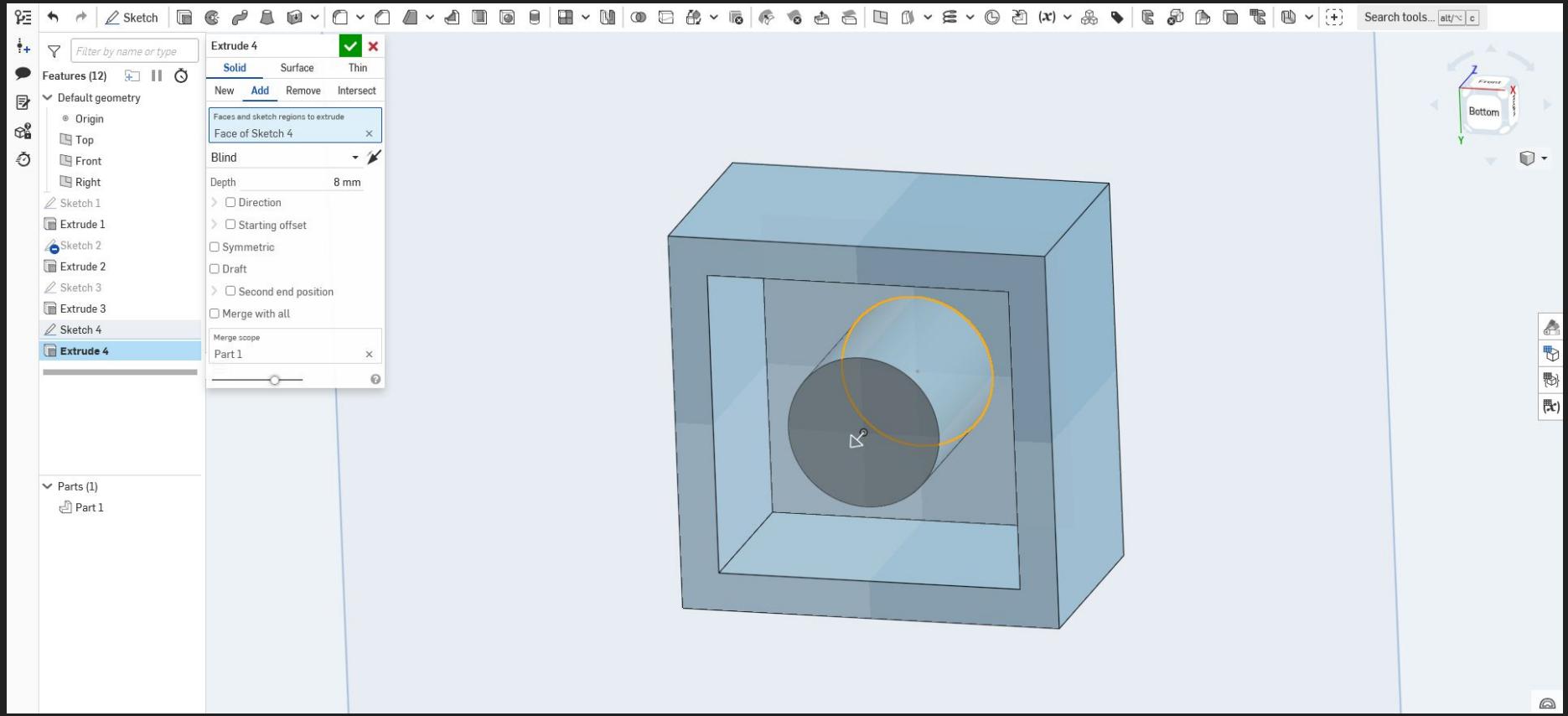
Click on this new square and press the “Extrude” button. Ensure it’s set to the “Remove” setting and make the depth 8mm



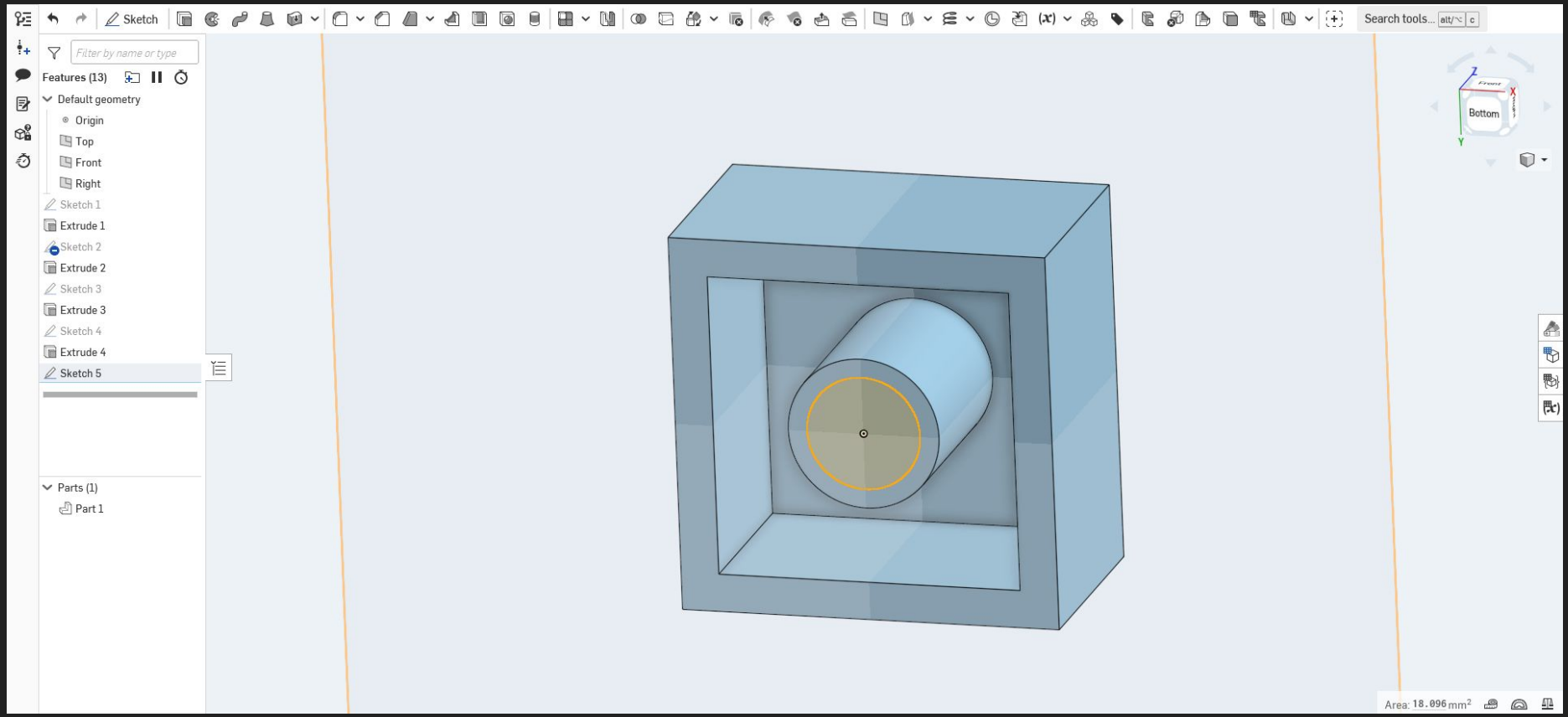
Now, click on the bottom face inside of the object, click on “Sketch” and then create a center circle in the middle with a diameter of 6.4mm



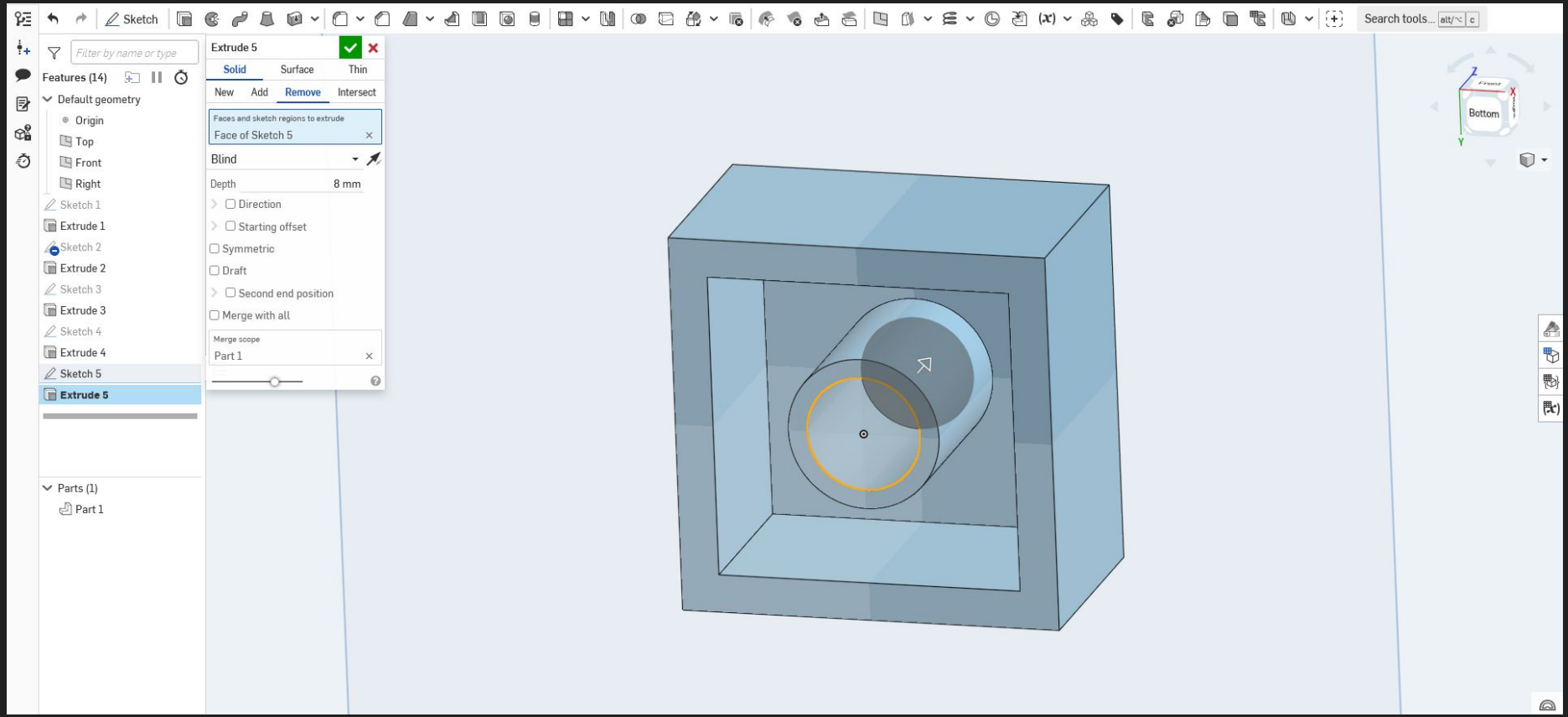
Then, Extrude this circle out by 8mm, to become flush with the walls of the brick.



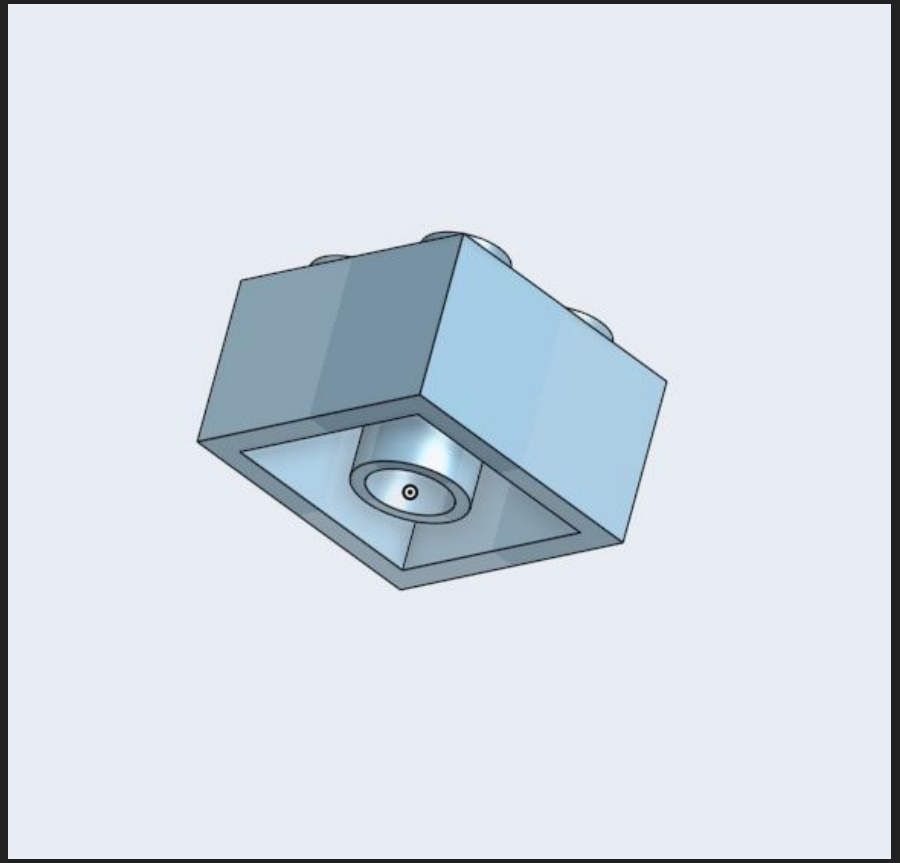
Then, click the center of the end of this extrusion and make a center circle 4.8mm in diameter.

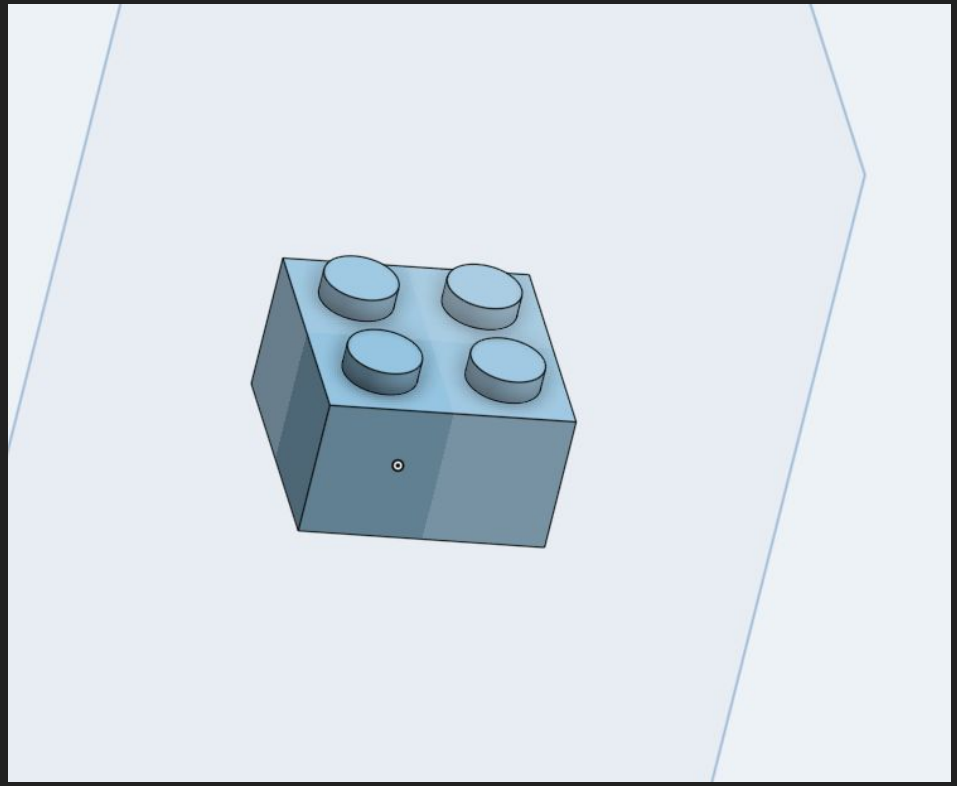


And finally, click on “Extrude,” set the setting to “Remove” and set the depth to 8mm.

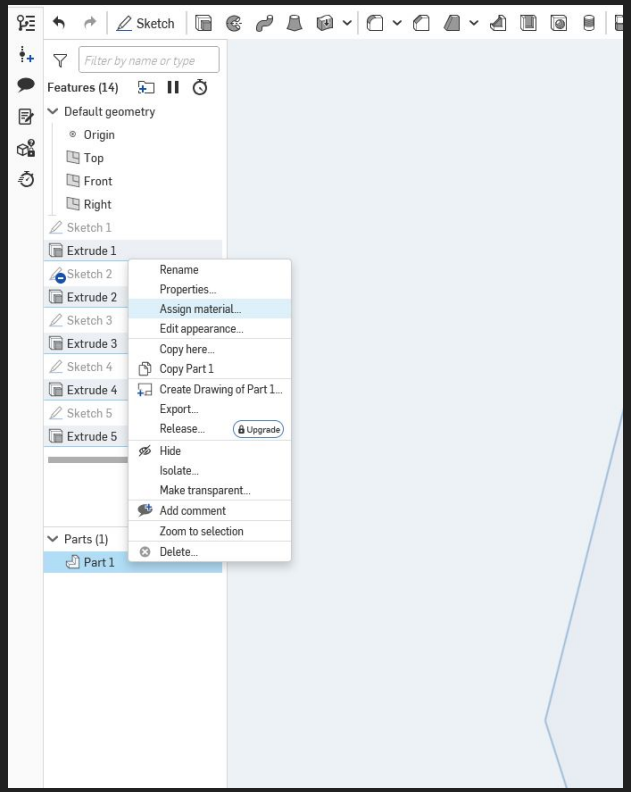


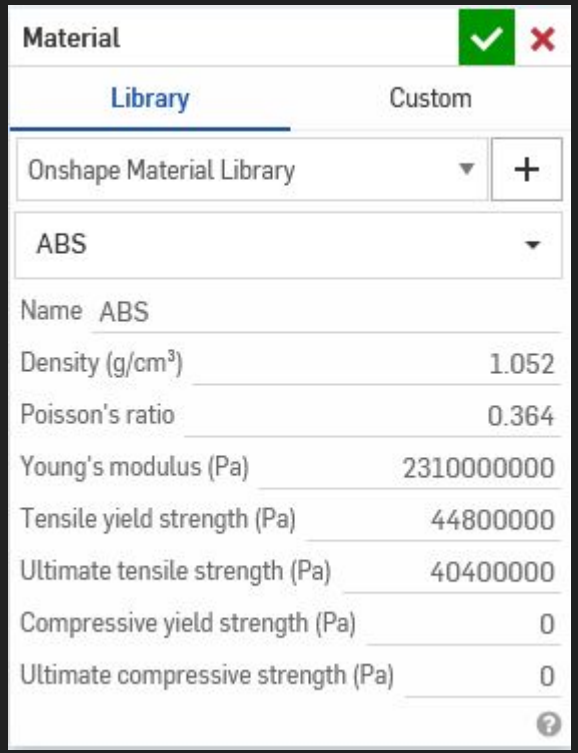
And there you have it, a 2x2 lego brick!



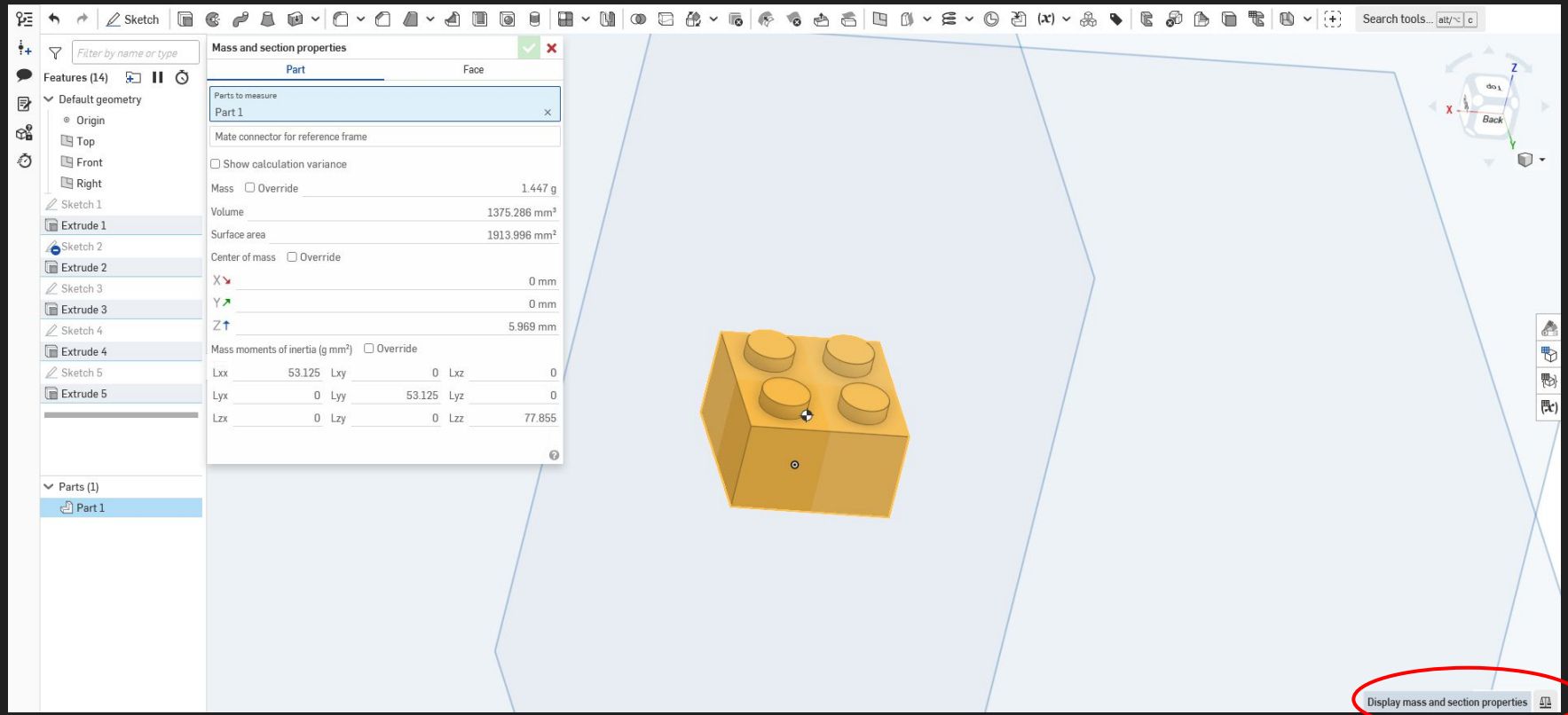


Now, for information about the model, go to the bottom left and right click on your part. Press “Assign material…” and find “ABS” as that’s what Lego has used for its bricks since 1963.





Then, click on the “Display Mass and Section Properties” button in the bottom right corner to display information about the model such as mass, volume, and center of mass.



Congratulations! You've learned the basics of modeling on OnShape! Happy CAD-ing!