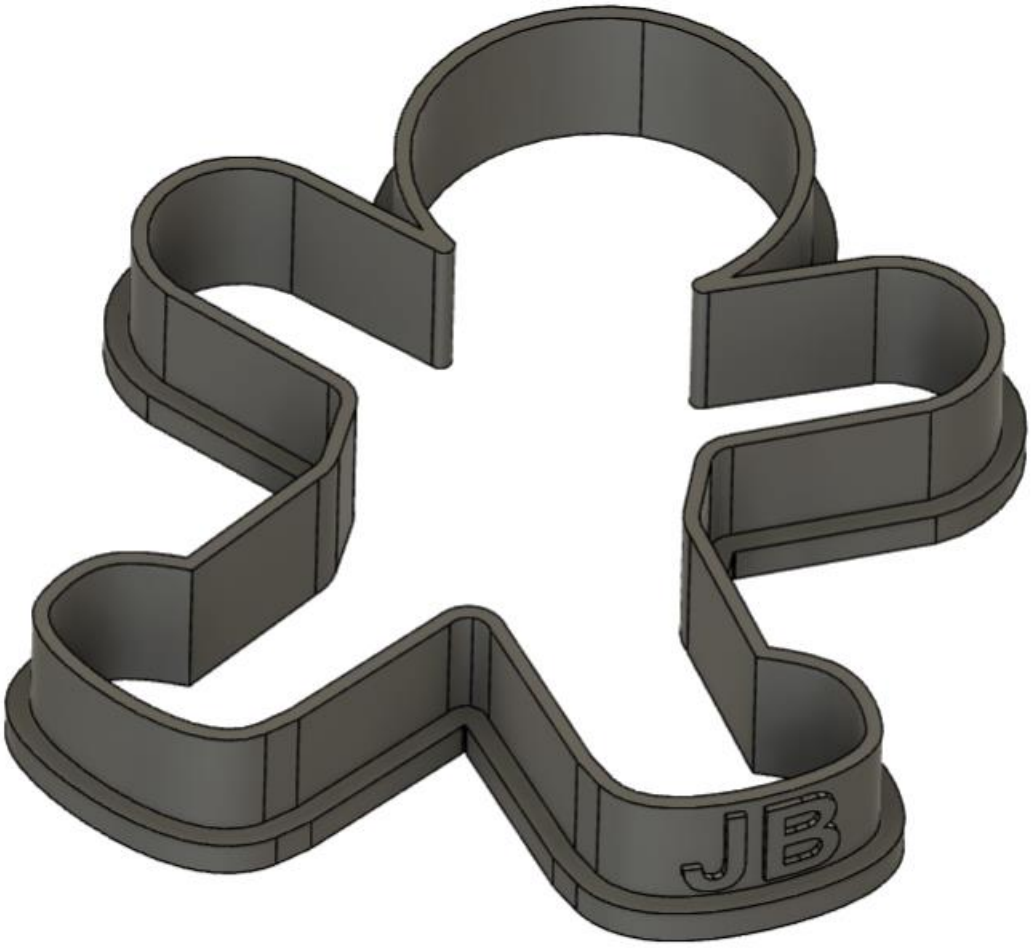
Mr. Barbetta's *"I don't care about 3D Printing. I just want the art credit."* class

Have fun baking with a

3D Printed Cookie Cutter



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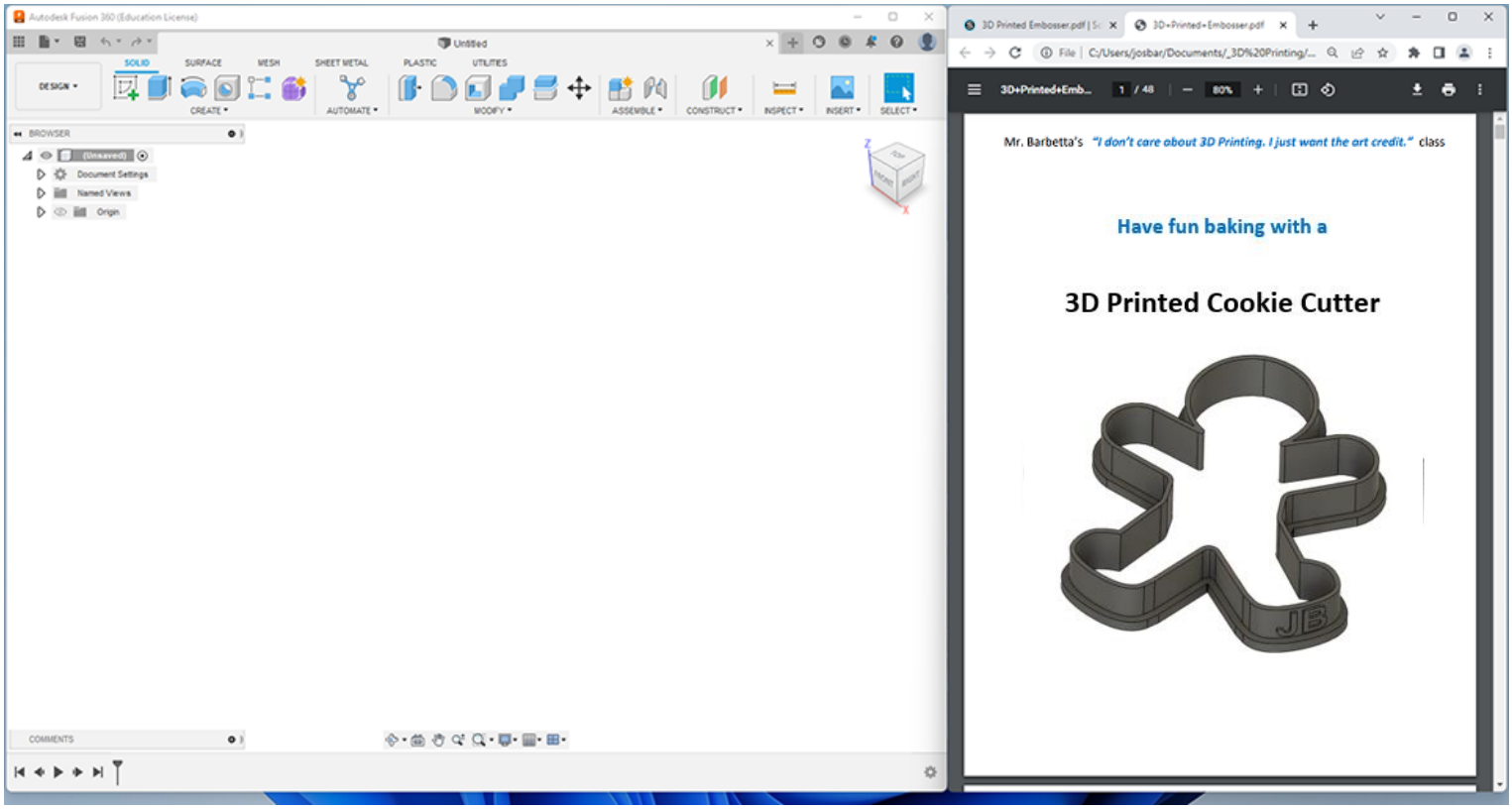
SNO-GO BIKES

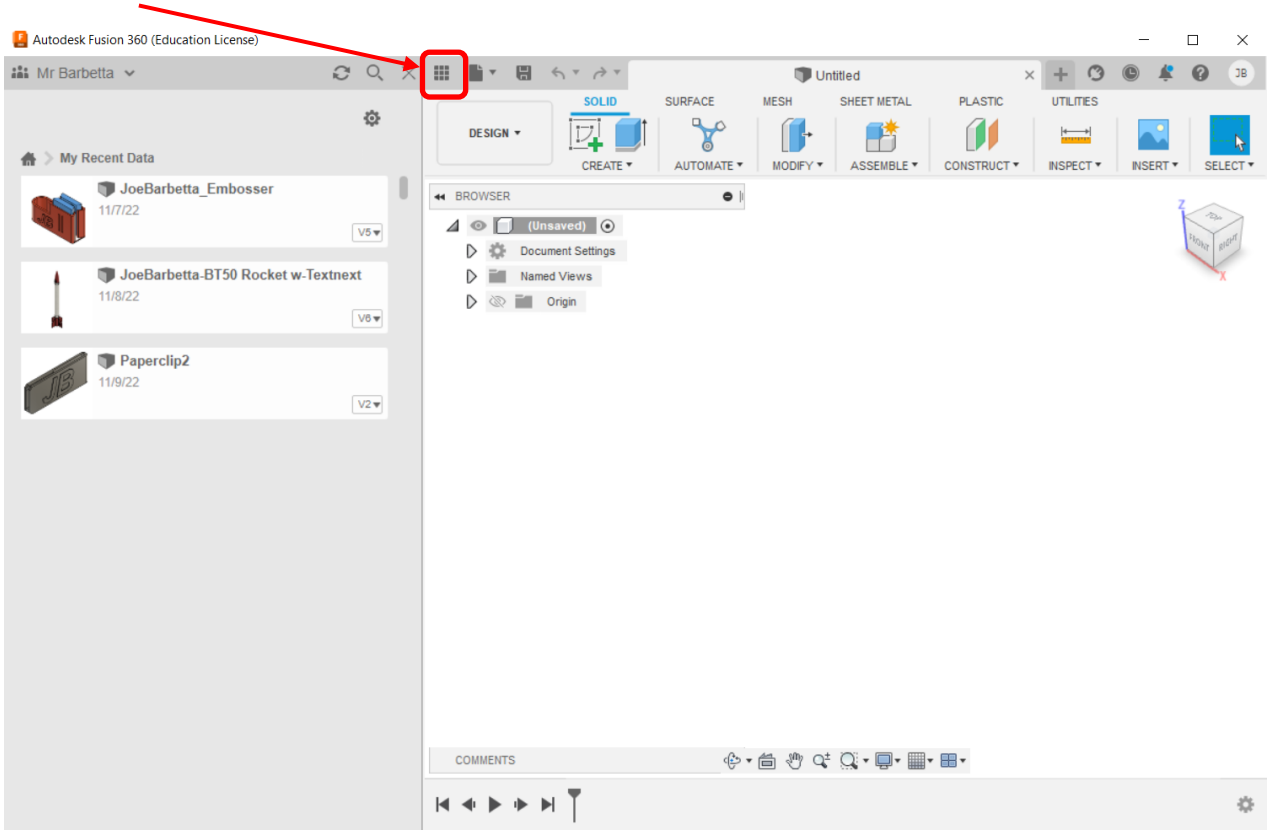
Contents

Using This Document

The best way to follow this document is to **reduce the width of the Fusion 360 window** and have this pdf document open in Chrome browser as shown below. This document can be **downloaded from Schoology and then dragged into Chrome** and scaled down to 80%.



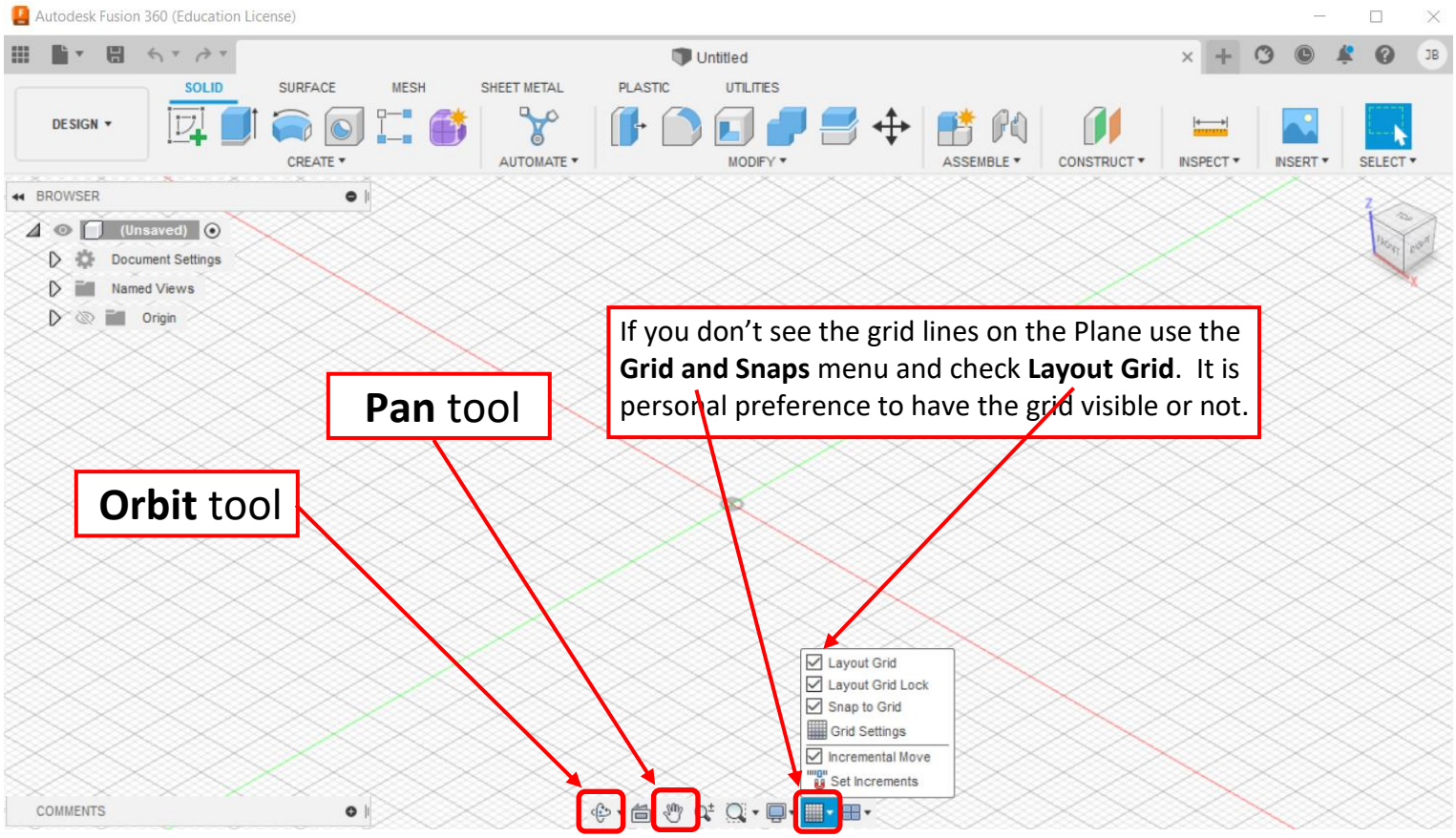
The Fusion 360 window will not allow its width to be reduced much so for smaller computer screens a trick is to click on the **Data Panel icon** and then move the window to the left with the Data Panel off the screen.



Changing the View of a Design (information only)

- if you don't see a grid in the Fusion 360 window, as shown below, click on **Grid and Snaps** and check **Layout Grid**. Displaying the *Layout Grid* is a matter of preference. When designing for 3D printing, it can be used to represent the *build plate*.

- click on the **Orbit** tool and click somewhere on the **Grid** to practice rotating and changing the angle of the view.
- click on the **Pan** tool and then on the **Grid** to practice moving the view laterally.
- after using the *Orbit* or *Pan* tool one must press the **Esc key** to exit that mode.
- use the **Mouse Wheel** to practice Zooming in and out.



Here is a close-up of the View Cube at the top right of the window.

- click on the **View Cube** and move the cube while holding the mouse button down. This is another way to rotate the view.
- click on the Top of the View Cube and note how the view just jumped to a Top View.

The View Cube now resembles that on the right.

- click on the **Curved Arrows** at the upper right of the View Cube and practice Rotating the View.
- click on the **Arrows** at the sides of the View Cube to practice jumping to various Views.
- click on the **Home** icon to the upper left of the View Cube. This can always be used to reset the view to the Home View

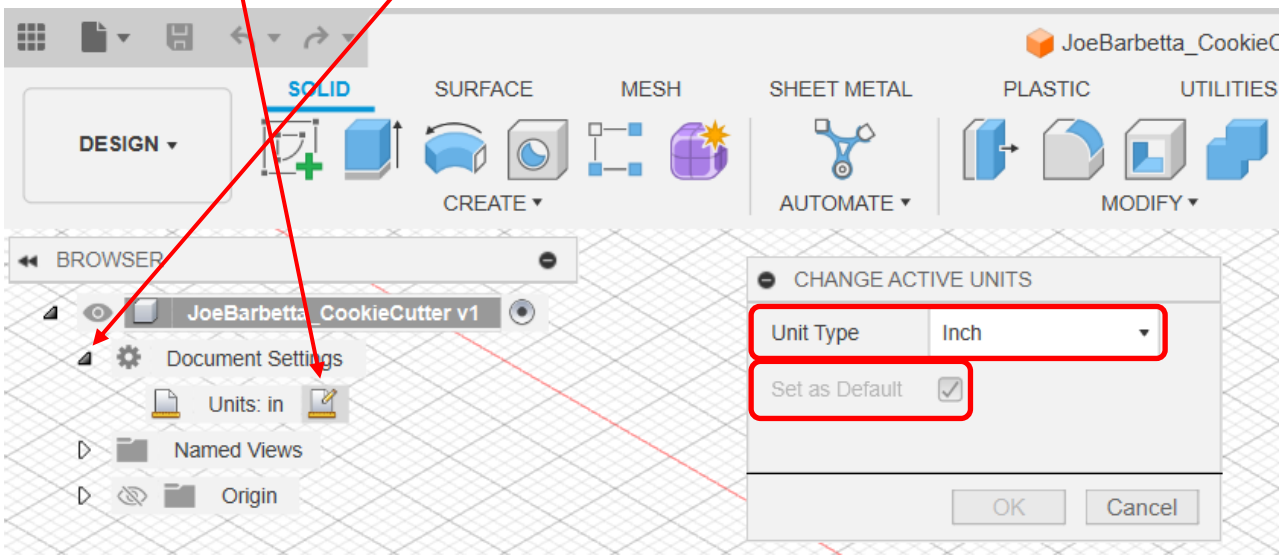
Starting a Design in Fusion 360 (START HERE)

- open **Fusion 360**. If there is no icon on the Desktop, use the Windows search (magnifying glass icon) and type fu
- from top **File** icon select **Save** and name the file.
  Use your name followed by **_CookieCutter** e.g. **JoeBarbetta_** (note the use of the underscore)

Note that by default Fusion 360 saves your project to "the cloud", which are the servers managed by AutoDesk. When you log into Fusion 360 on a different computer, your projects will be available.

As you work save your project occasionally in case Fusion 360 crashes or a squirrel chews through the school's fiber optic..

- in the left **"BROWSER"** click on the **arrow next to Document Settings**
- click on the **edit icon** that appears to the left when you hover over **Units**
- change **Unit Type** to **Inch** and click **OK**. You can also enable **Set as Default** if it is not grayed out.



Note that the default units are in mm, which we just changed to inches.

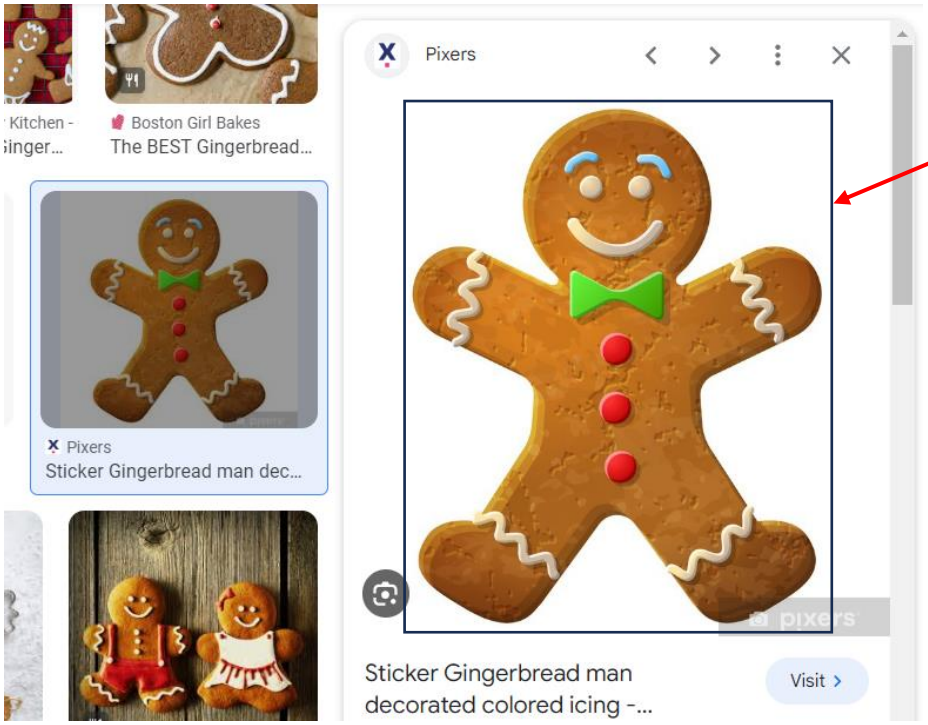
Did you know that the default units have changed over the years? We are using version 360 of Fusion. Version 1, which was the version used to design the Great Pyramid, **only offered cubits as a unit**.

Importing a picture

Note that one could just create a Sketch from scratch for a the cookie cutter and skip this section, but it is good to know how to use an image as a “template” to trace.

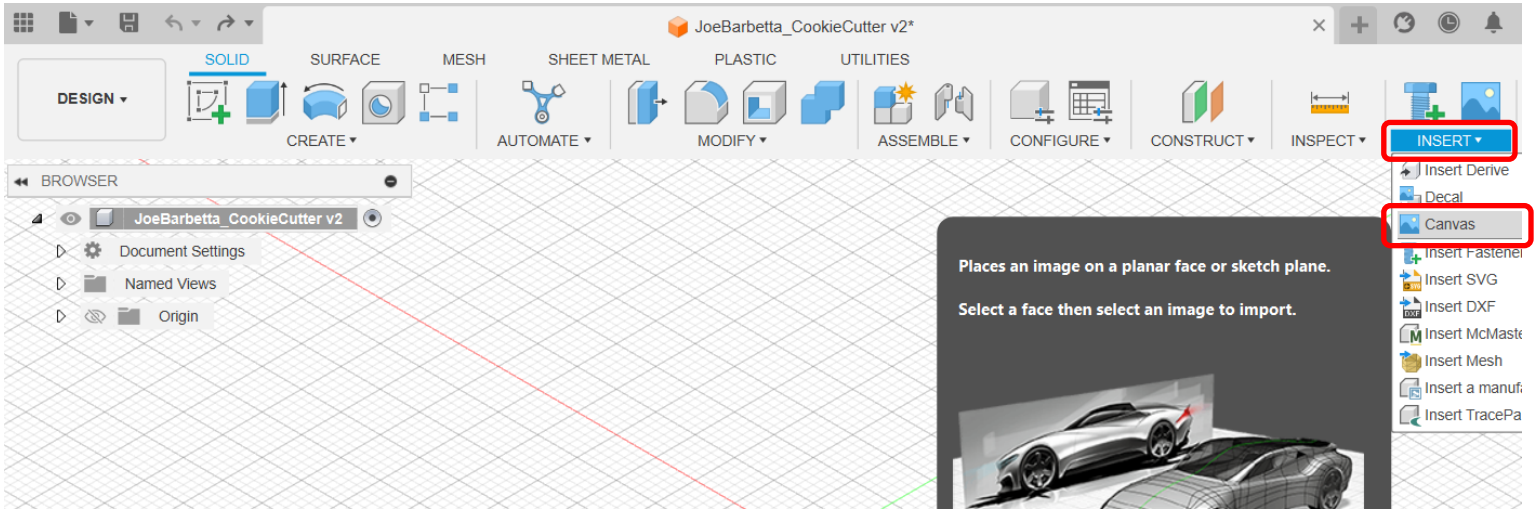
Perform an image search online for a shape for your cookie cutter. It is helpful to find one with an outline that is easy to trace.

Here is a result of a search for **Gingerbread man**. One was found that had a clear outline, which was clicked on to show its large size view. The **Windows Snipping tool** was used by **holding the Shift, Windows, and S keys**. The resulting selection rectangle was drawn around the photo and then saved as .png file to the Downloads folder. There is much info online for using the Windows Snipping tool or the Mac equivalent.

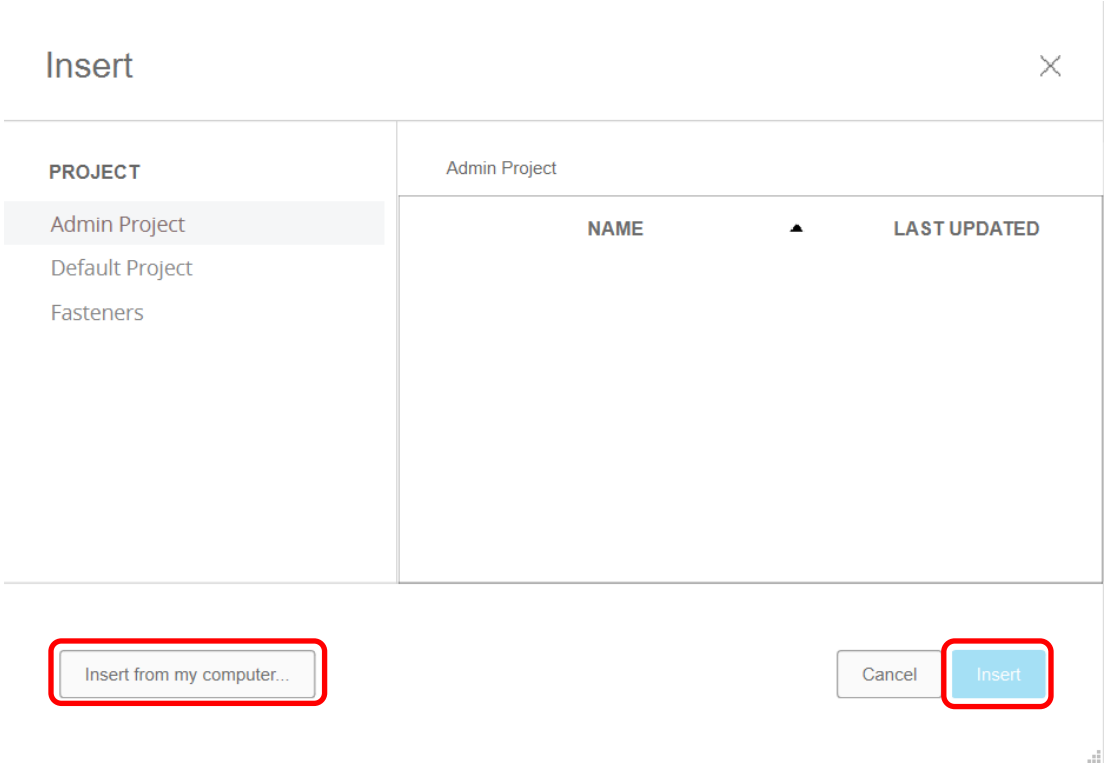


Using the Snipping tool, the selection rectangle is drawn to encompass the entire object.

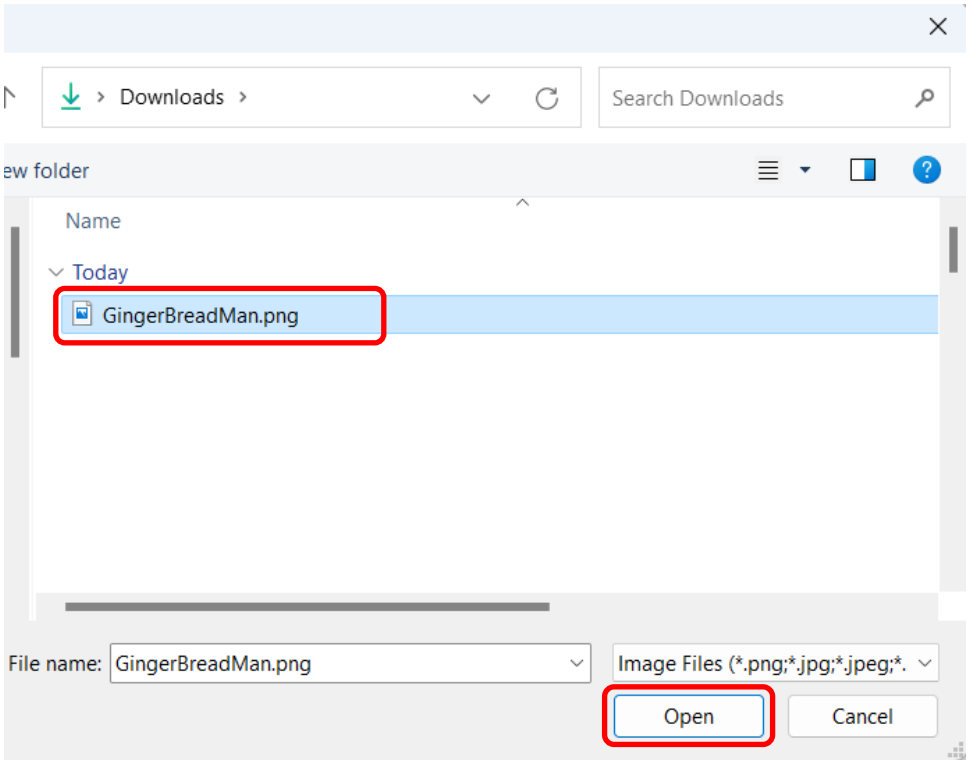
- at the top-right of Fusion 360, select **Canvas** in the **INSERT** menu



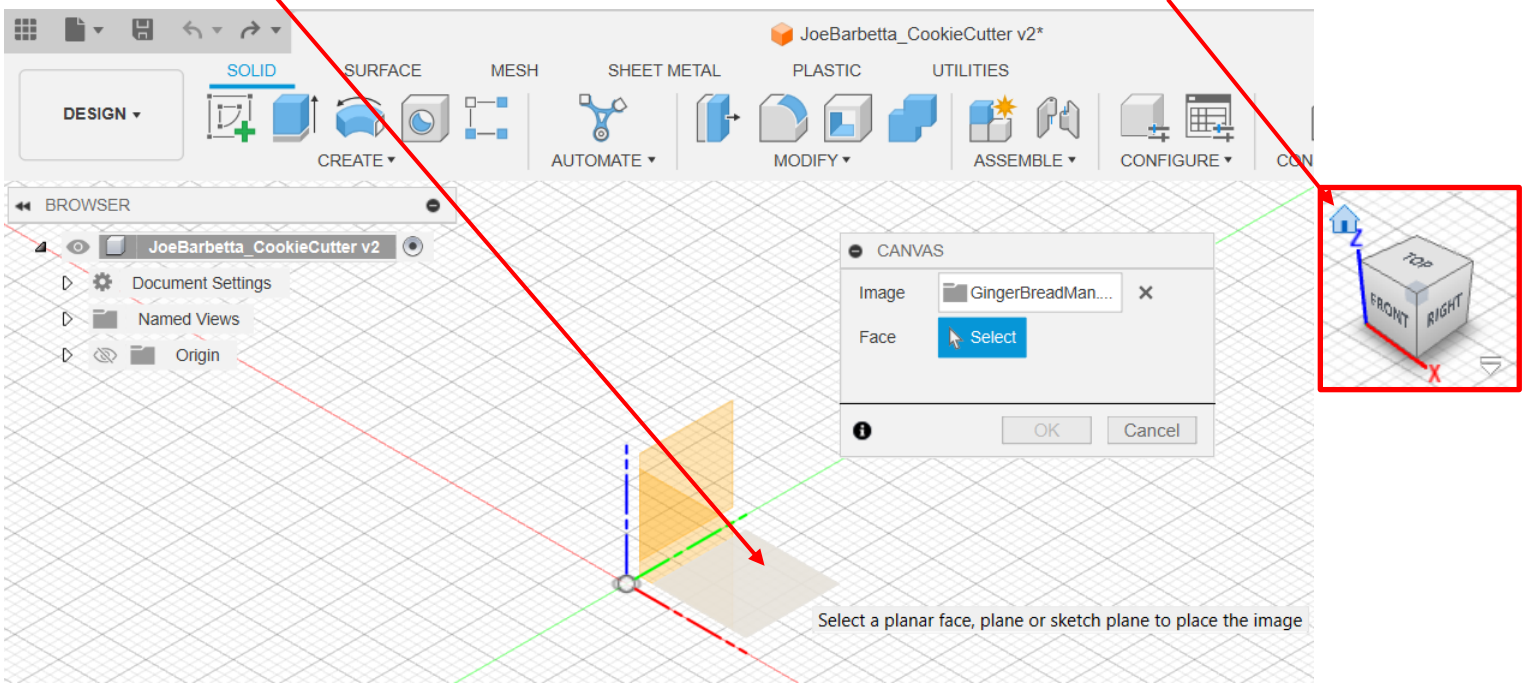
- select **Insert from my computer …** and then **Insert**



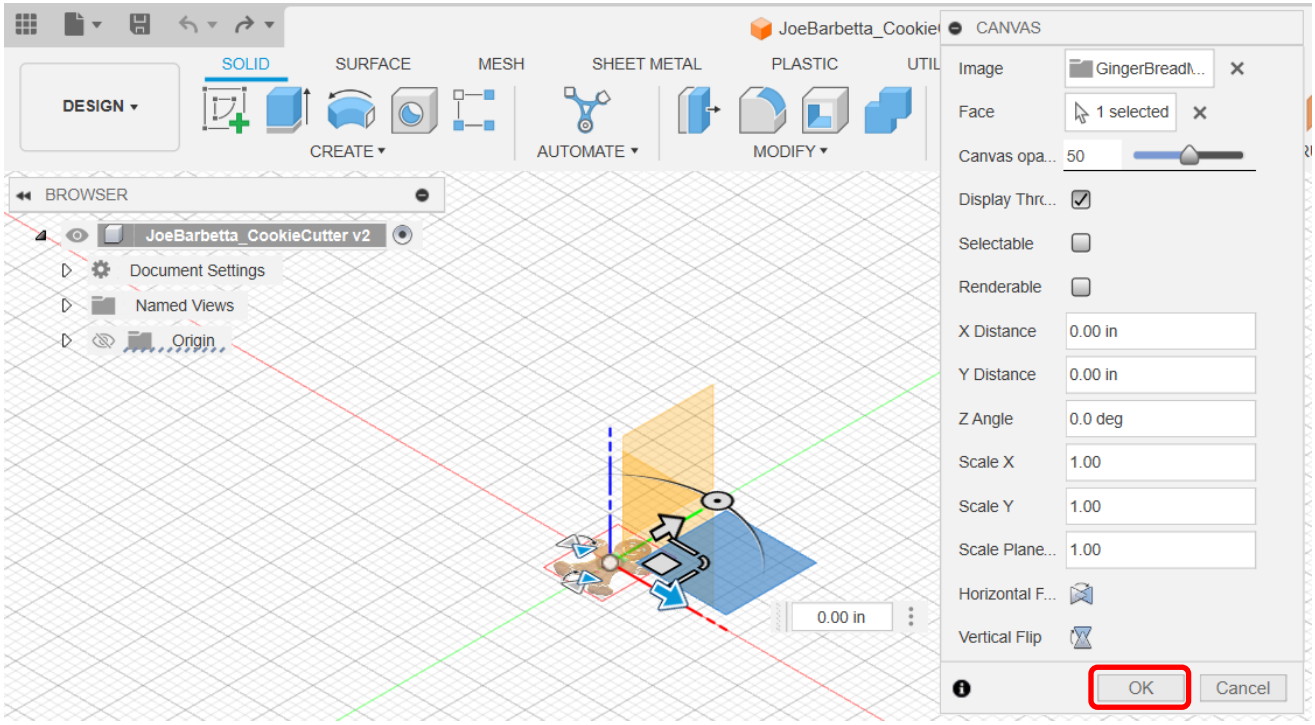
- **select your file** and click **Open**



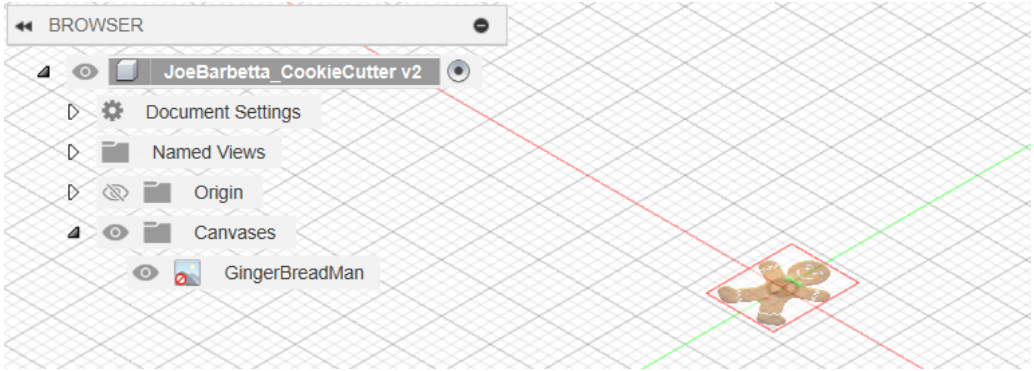
- click on the **bottom rhombus** to select the X-Y plane. You may need to click the **Home** icon to get this view.



- there are many option here, but just click **OK**

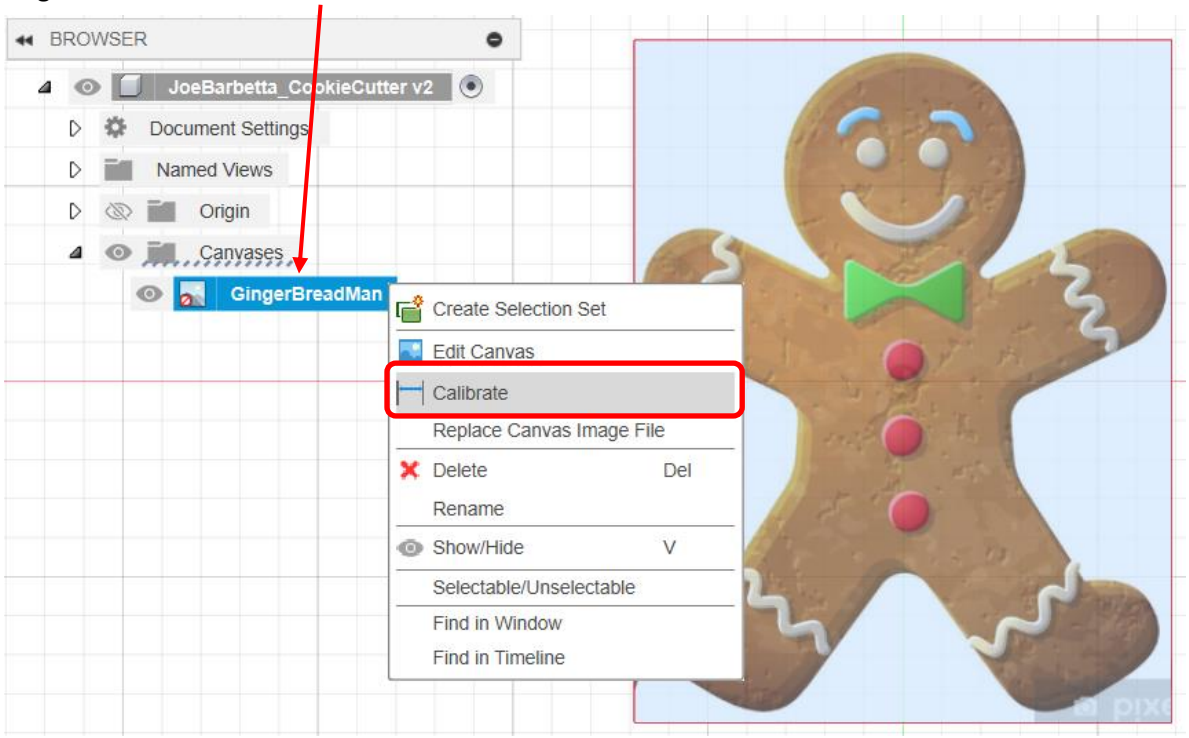


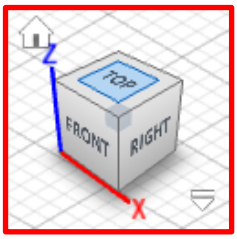
He’s super tiny!



- click on the **Top face** of the **View Cube** and then **zoom** to get the image to about this size

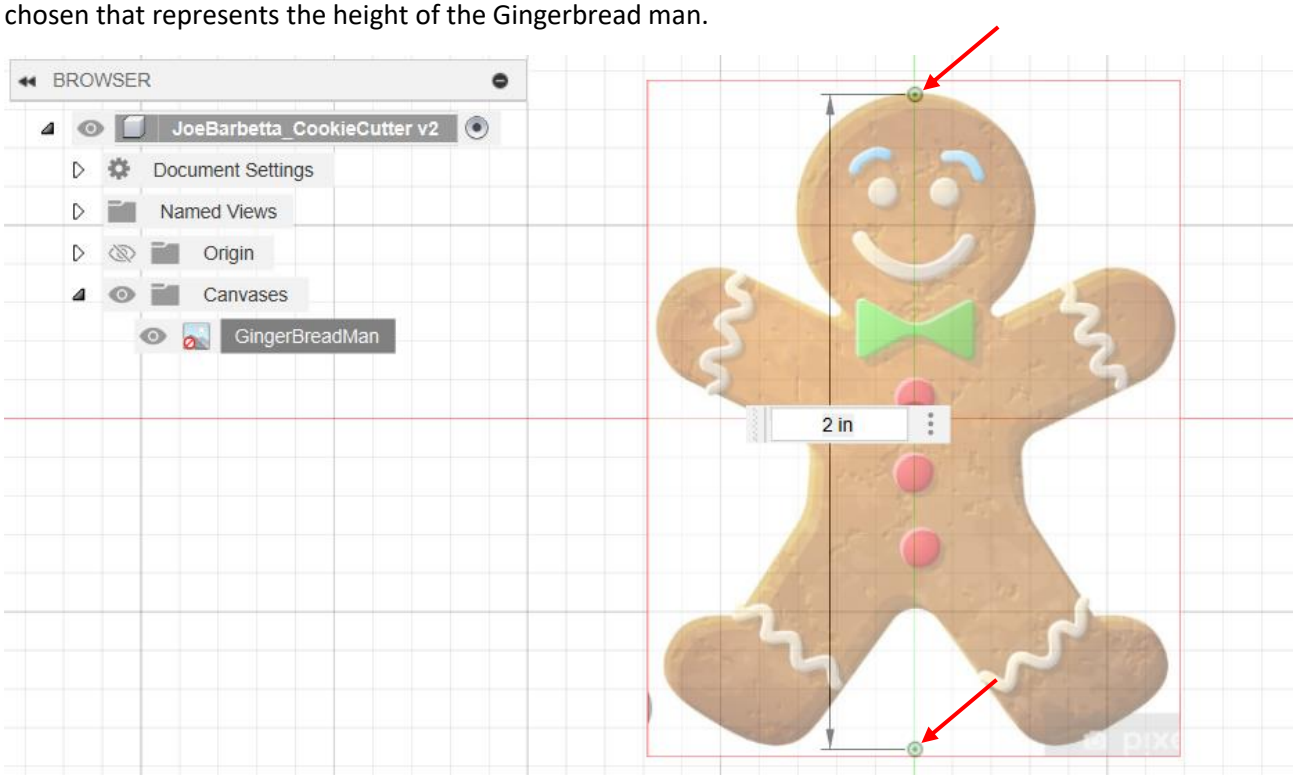
- right-click on the **Canvas name** and select **Calibrate**



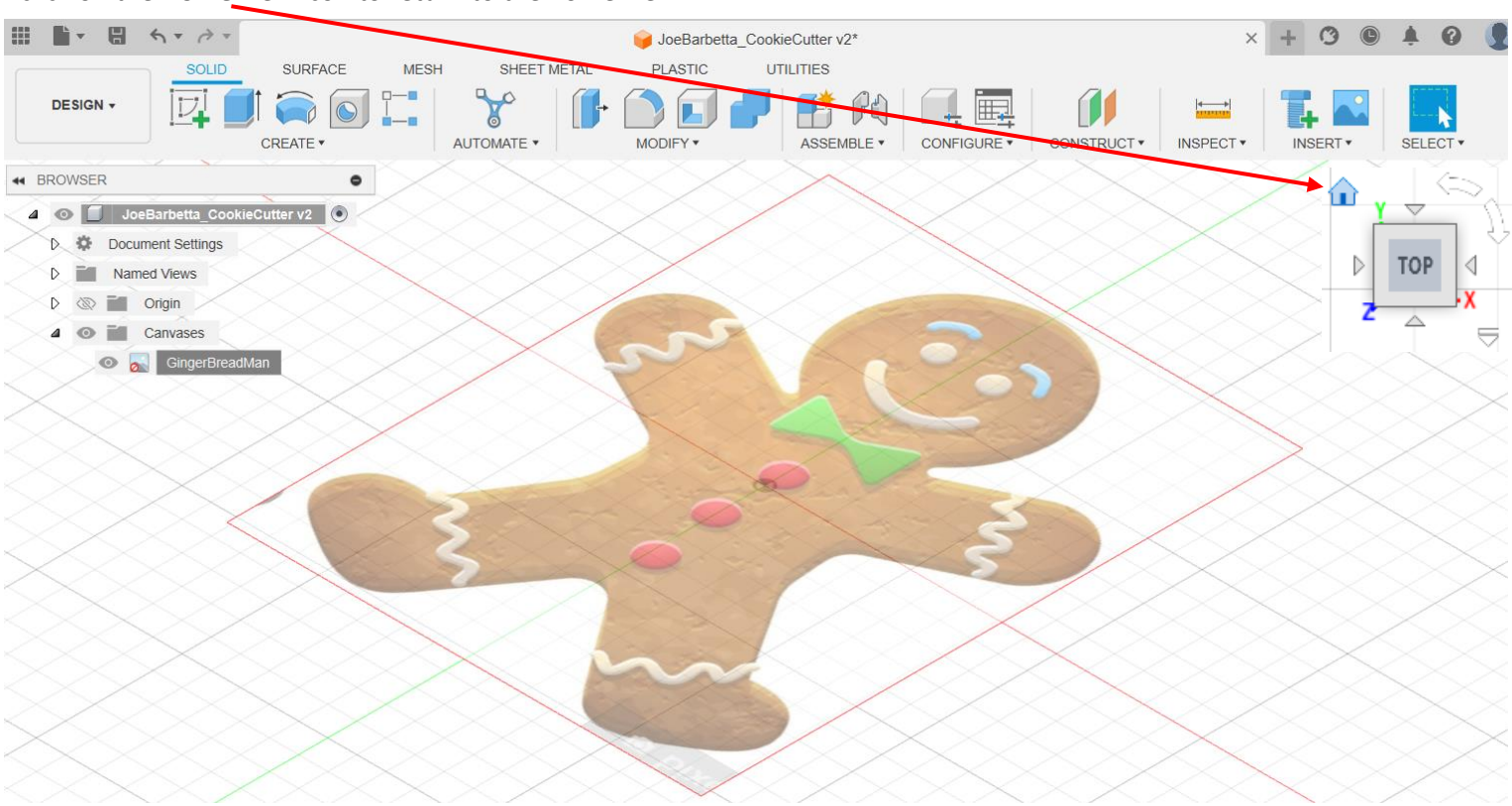


The image must now be scaled to match the size of the cookie cutter that you want. Here we will limit the height to 2” to speed up the 3D printed of the cookie cutter. Note that a larger or smaller size is possible.

- click on **two points at extremes of the image** and enter 2 in. For the Gingerbread example, a top and bottom point was chosen that represents the height of the Gingerbread man.

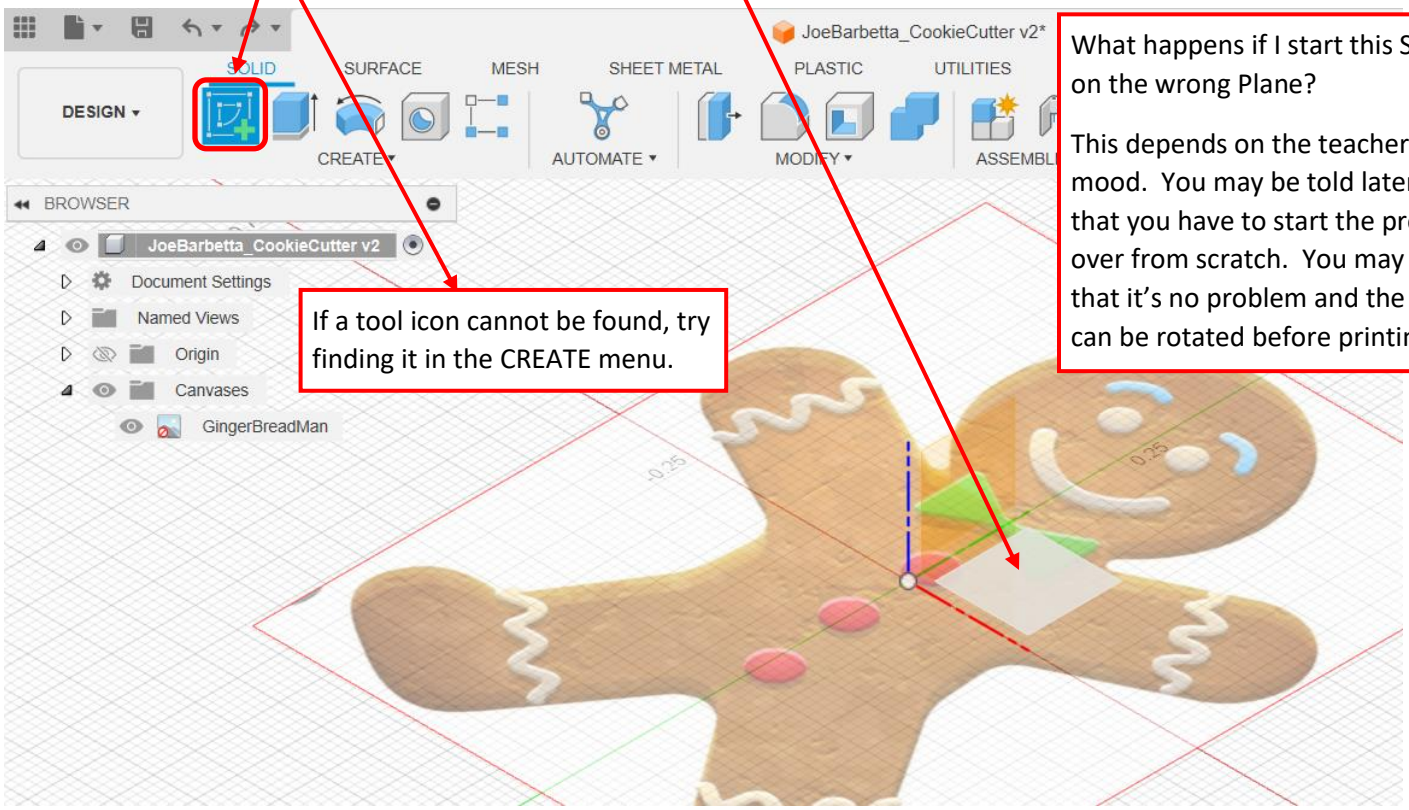


- click on the **Home** view icon to return to the home view



Creating a Sketch

- select the top **Create Sketch** tool and click on the **front rhombus** to select the X-Z Plane.
If a tool can't be found, one can always look in the **CREATE** and **MODIFY** menus for it.

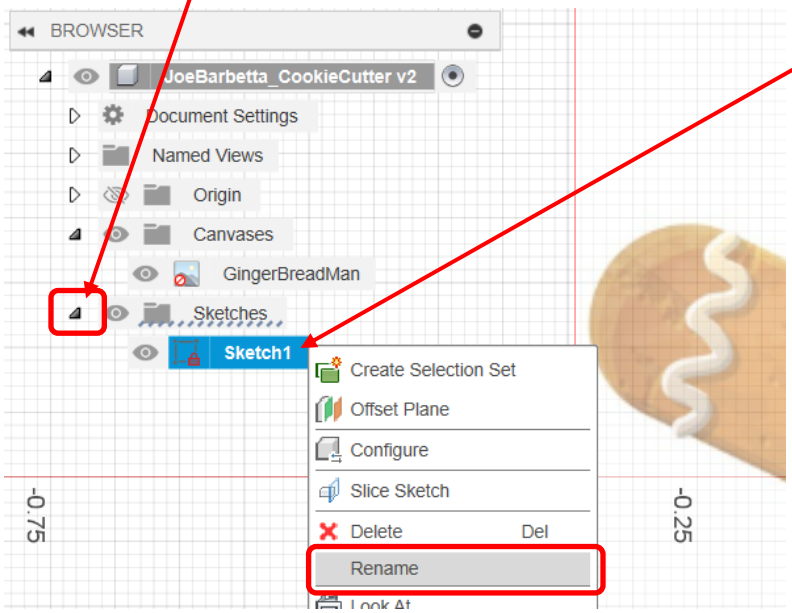


What happens if I start this Sketch on the wrong Plane?

This depends on the teacher's mood. You may be told later on that you have to start the project over from scratch. You may be told that it's no problem and the part can be rotated before printing.

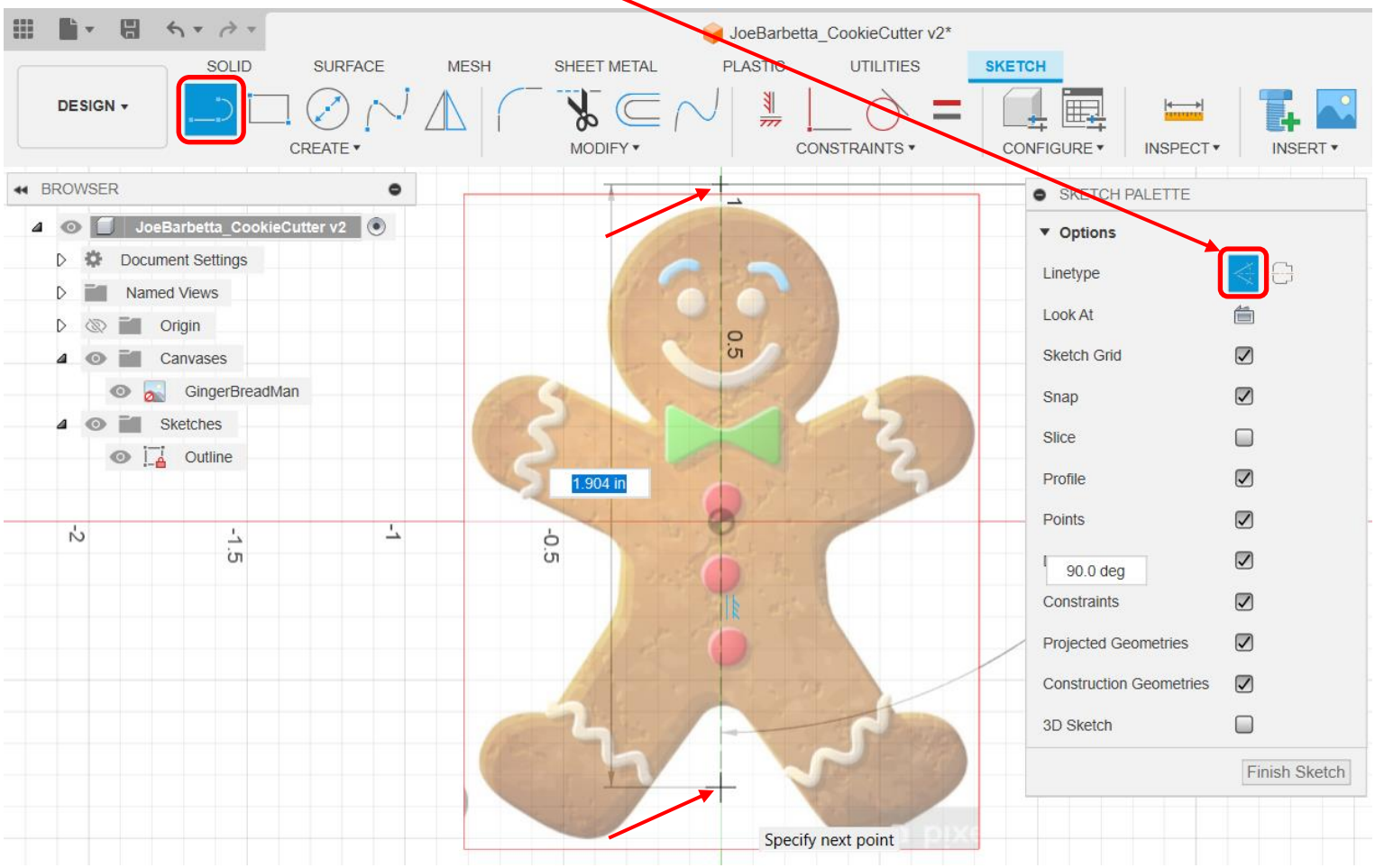
Whenever a new Sketch is created, it **should be named**.

- click on the **arrow** to open the Sketches folder, **right-click** on the default name **Sketch1** and select **Rename**.
- change the name to **Outline**.



If the cookie cutter will be symetrical, as below, a mirror line should be create. If your cookie cutter is not symetrical, you can skip ahead. **All the following steps may be different for your cookie cutter. This gingerbread man is just an example.**

- select the **Line** tool and click on the **Construction line icon** to highlight it blue
- click on **two points** to create a line through the center of the image. The resultant line should be dashed.

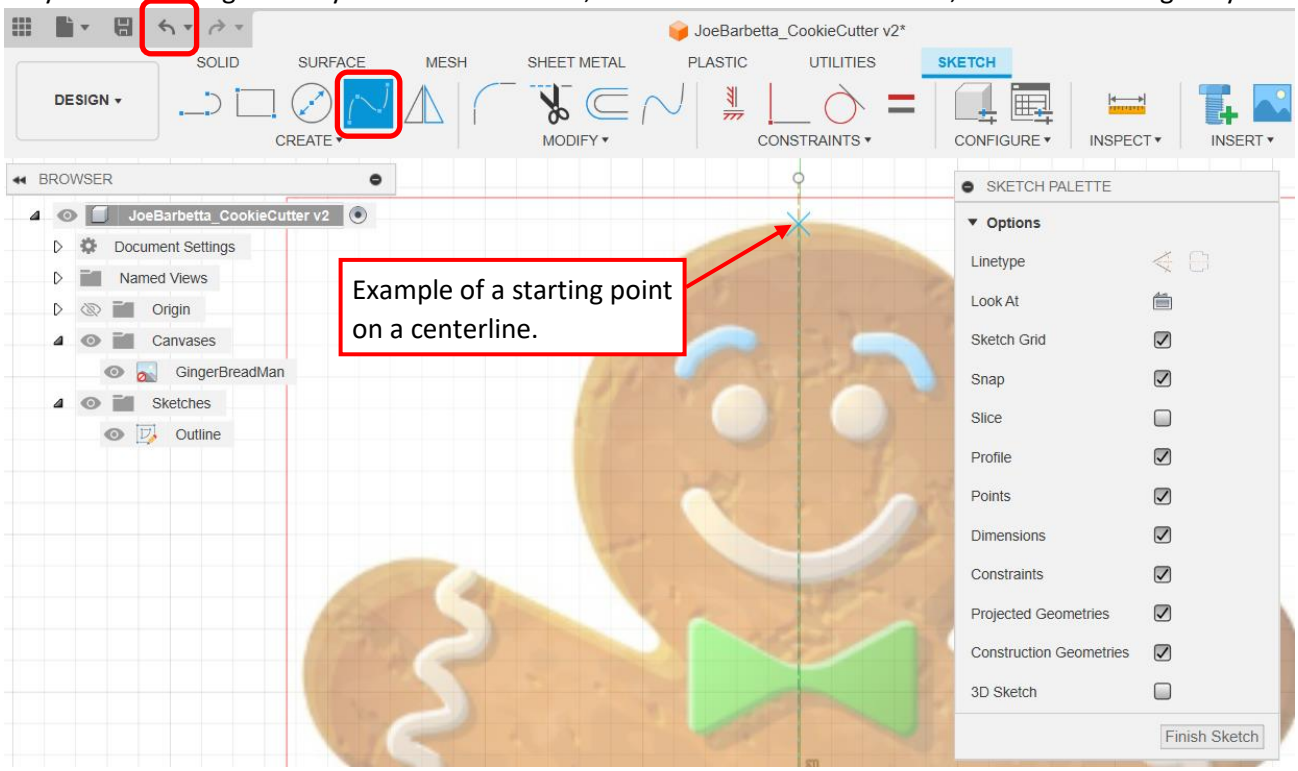


Sketching the outline

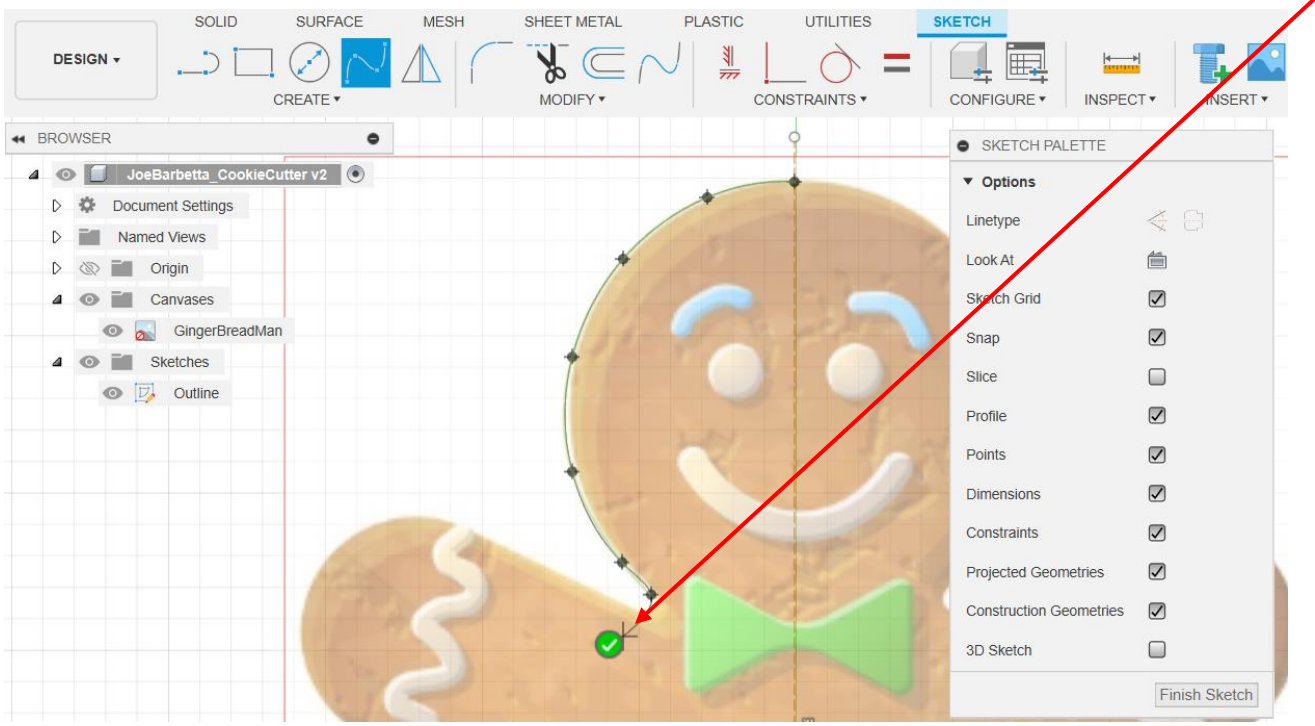
Now is the time to use the various Sketch tools to follow the outline of the image and you may be using the **Undo** icon a lot in the process to undo steps in the sketch that you feel didn't give the best results.

Remember that the following Sketch steps will be different for your cookie cutter. This gengerbread man is just an example.

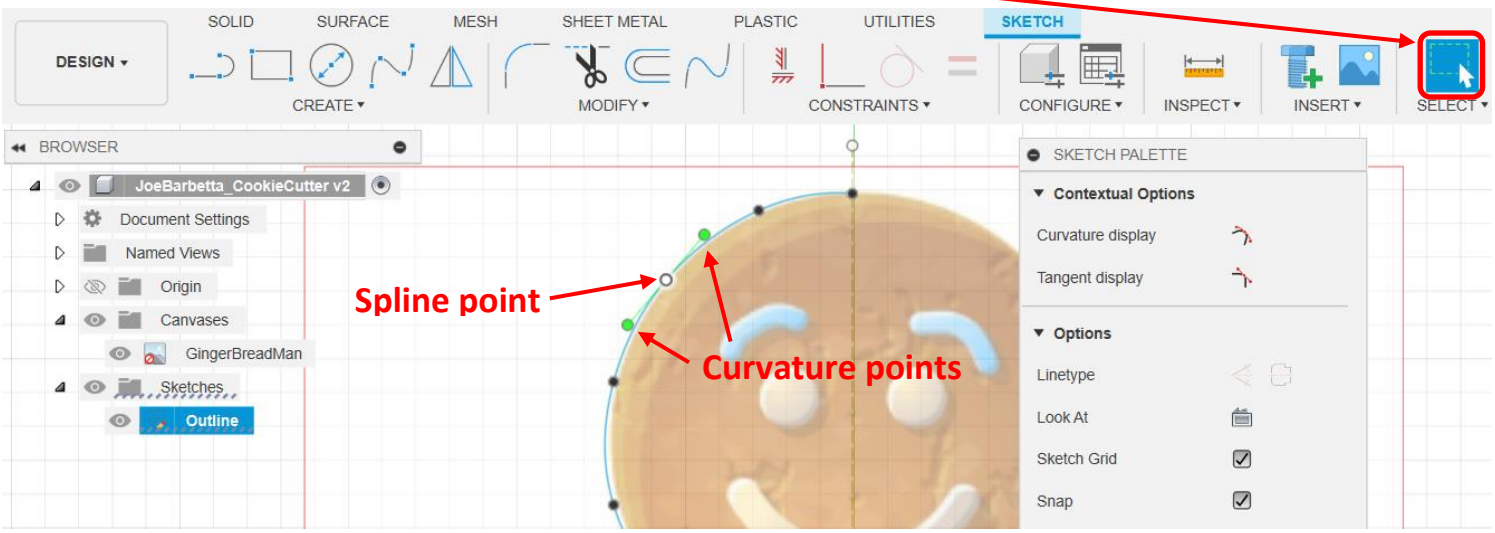
- if the **Construction icon** is highlighted in blue, click on it to remove the highlighting
- if you are creating half of symetric cookie cutter, select the **Fit Point Spline** and click on an **edge of the image** that is on the **centerline**.
- if you are creating a non-symetric cookie cutter, there should be no centerline, so click on an edge anywhere.



- continue clicking on points going around the image and when a curve section is complete, click on the **green check mark**.



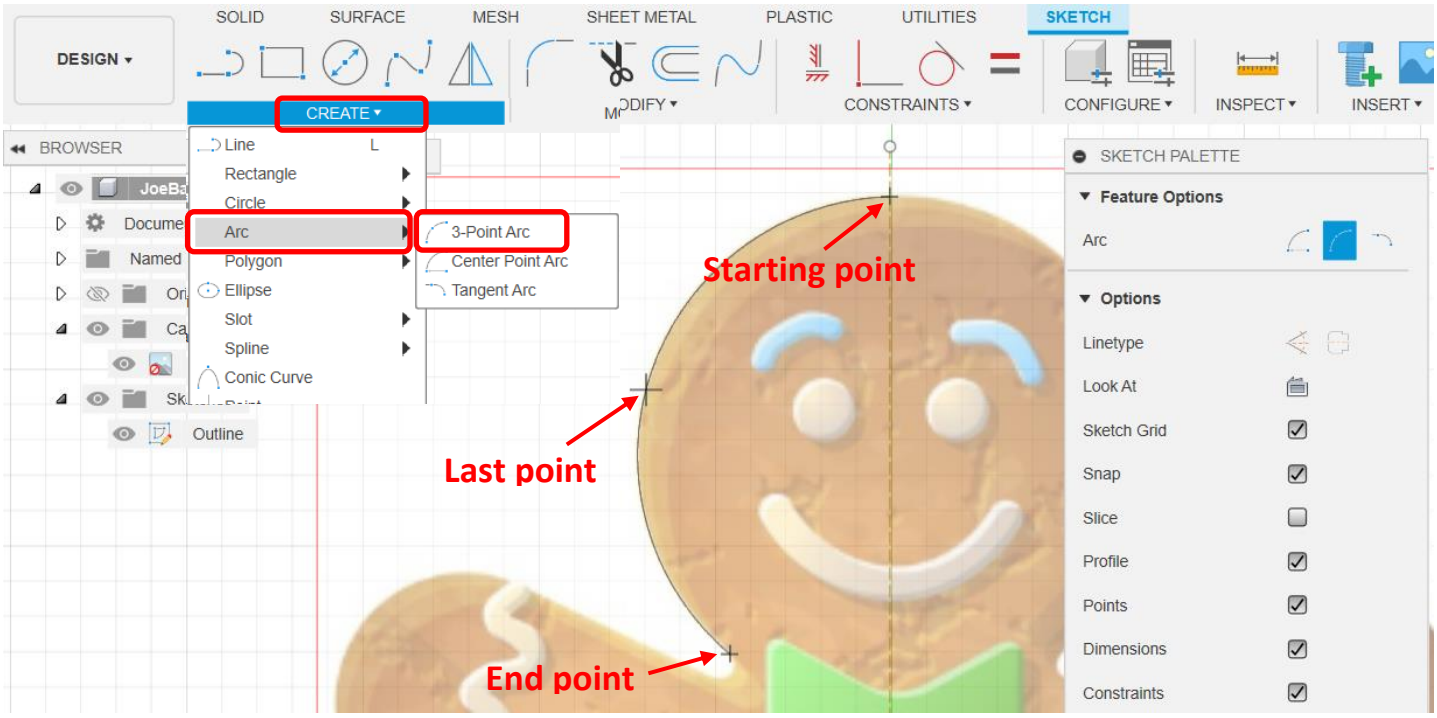
- after a spline is completed, the **Select** icon can be clicked on to allow one to click on any Spline Point to adjust its position and local curvature to fine tune the Spline fit.



There are some irregular curved sections where a Spline is the most useful. However, an alternative for a section that is circular, an arc can be used.

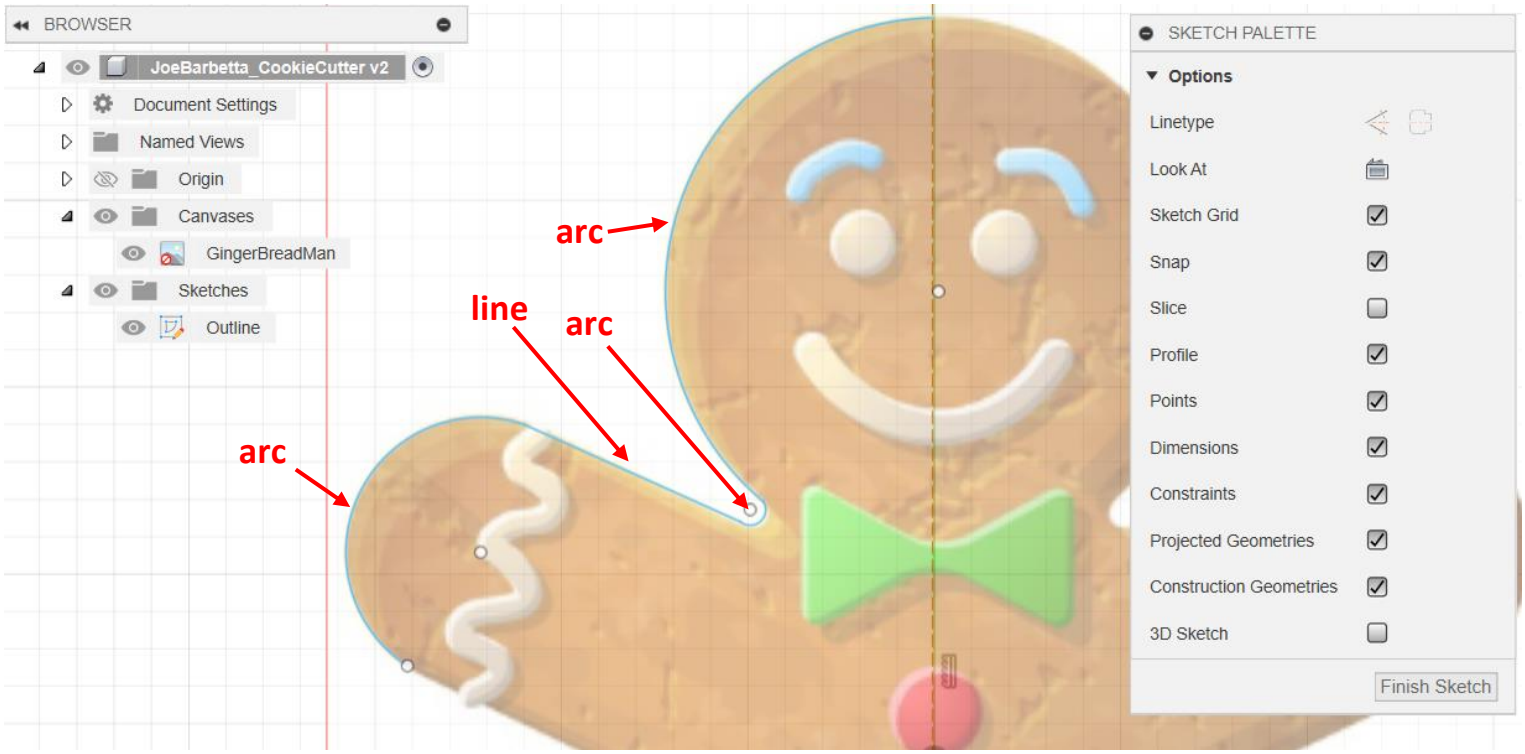
- in the **CREATE** menu select **Arc** and **3-Point Arc**

- click on the **starting point** of the arc and then on the **end point** and then on a point where the arc will intersect.

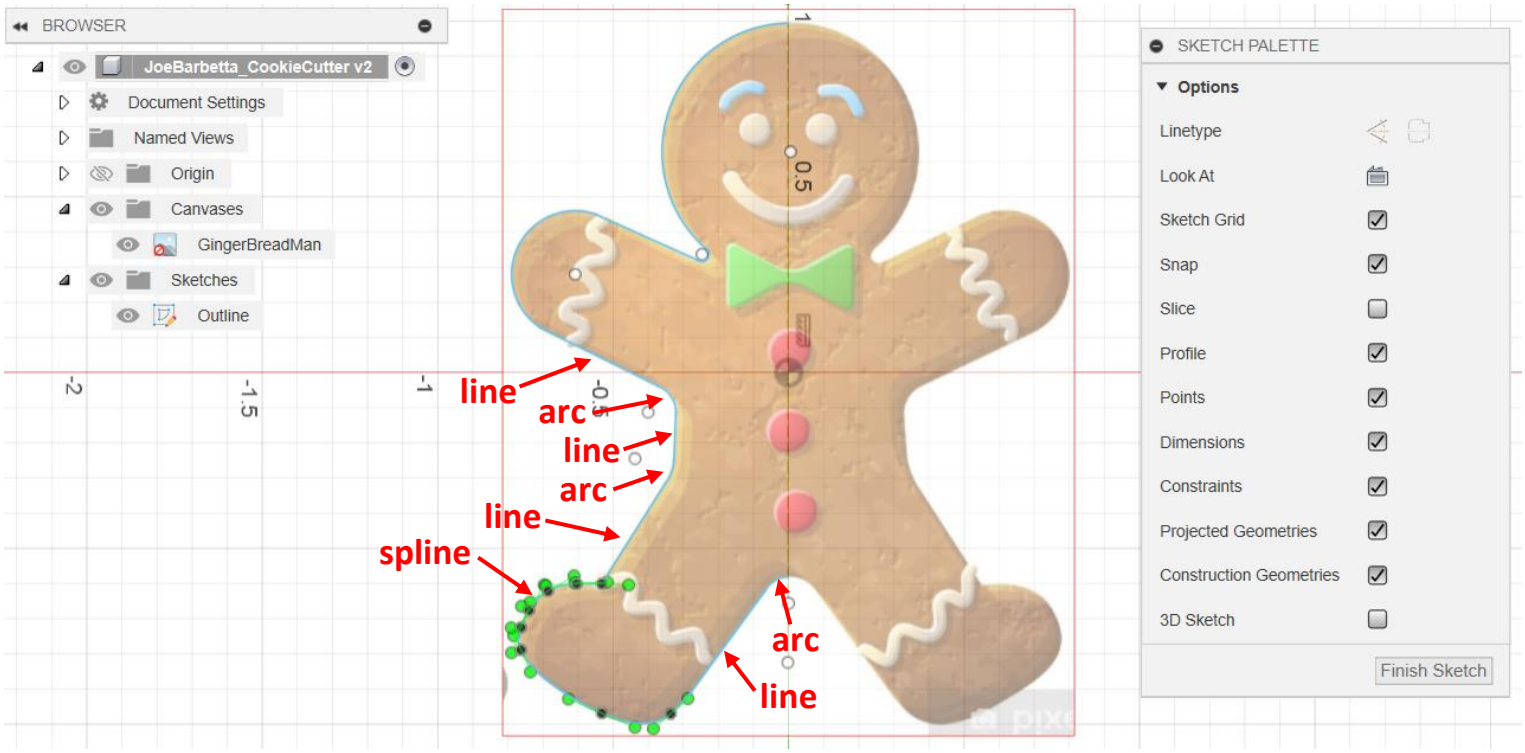


- continue tracing around the image using either, **Splines**, **Arcs**, or **Lines**

Here's an example after creating a large arc, a small arc, a line, and a medium arc



Here tracing was continued using lines, arcs, and a spline

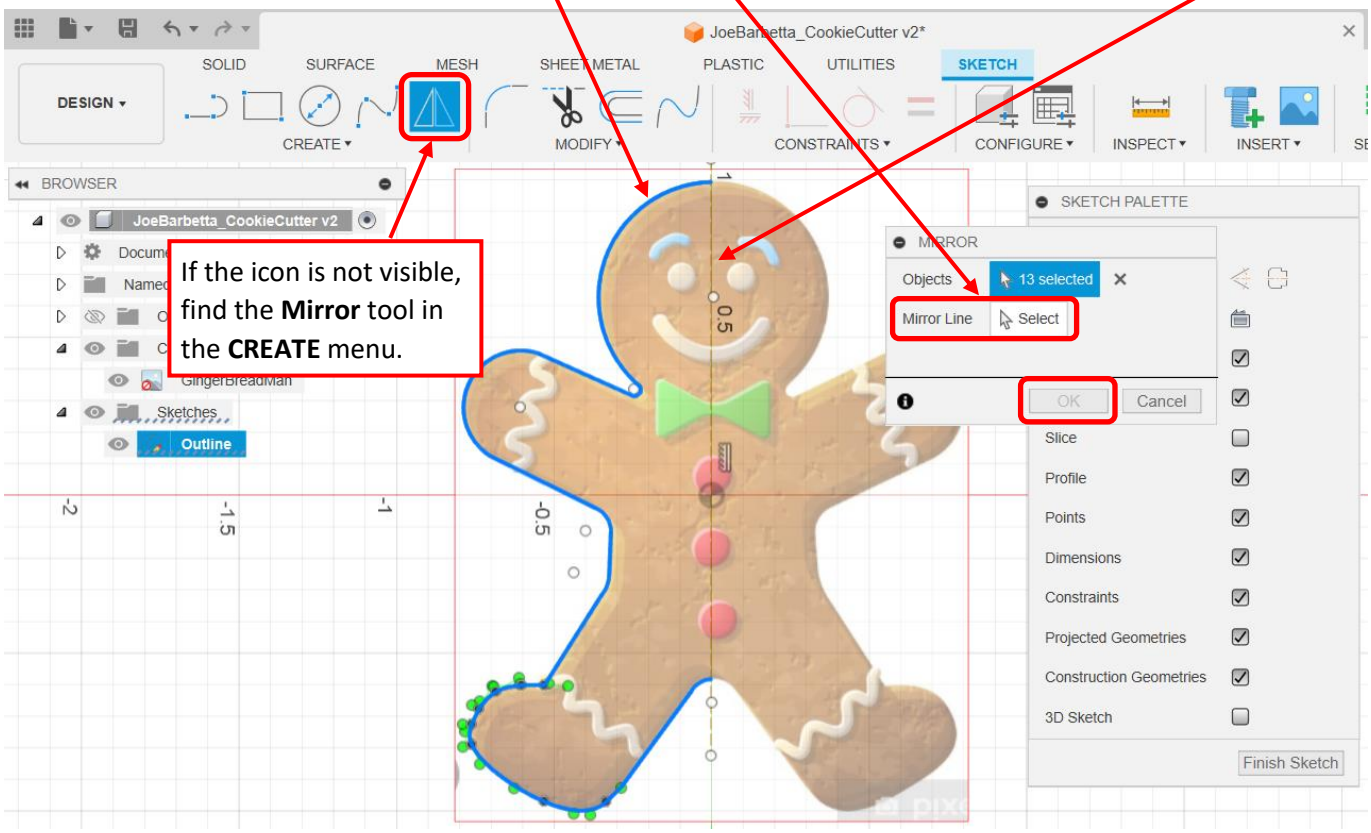


Mirroring a Sketch

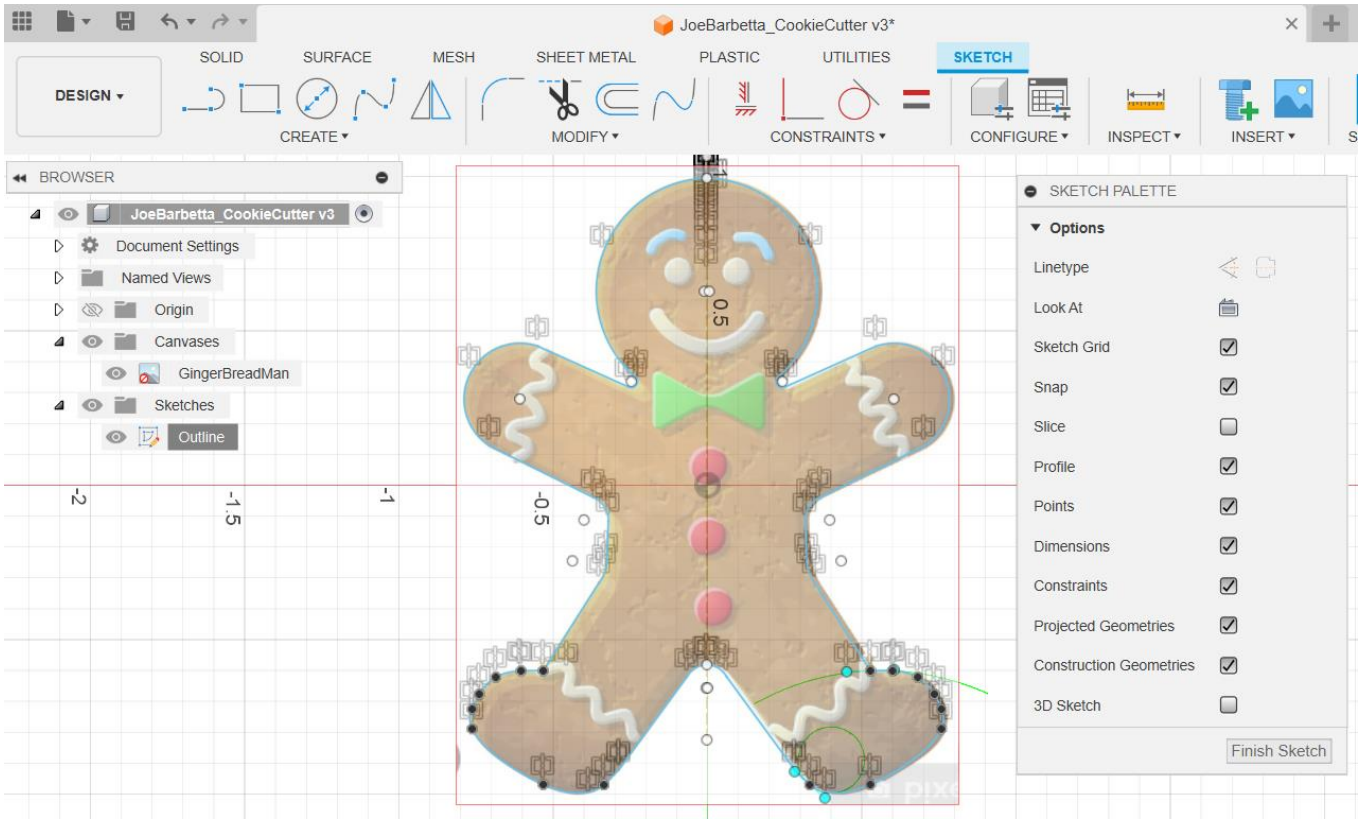
If your cookie cutter is Not symetrical, this step can be skipped.

- select the Mirror tool and **double-click on the Sketch**. If all of the Sketch lines do not turn blue, the Sketch path may not be conituous. Zoom into areas where there are breaks and connect points to bridge any gaps. Then try double-clicking again.

- once the entire Sketch path turns blue, click on **Select next to Mirror Line** and then **click on the center line**. Click **OK**.

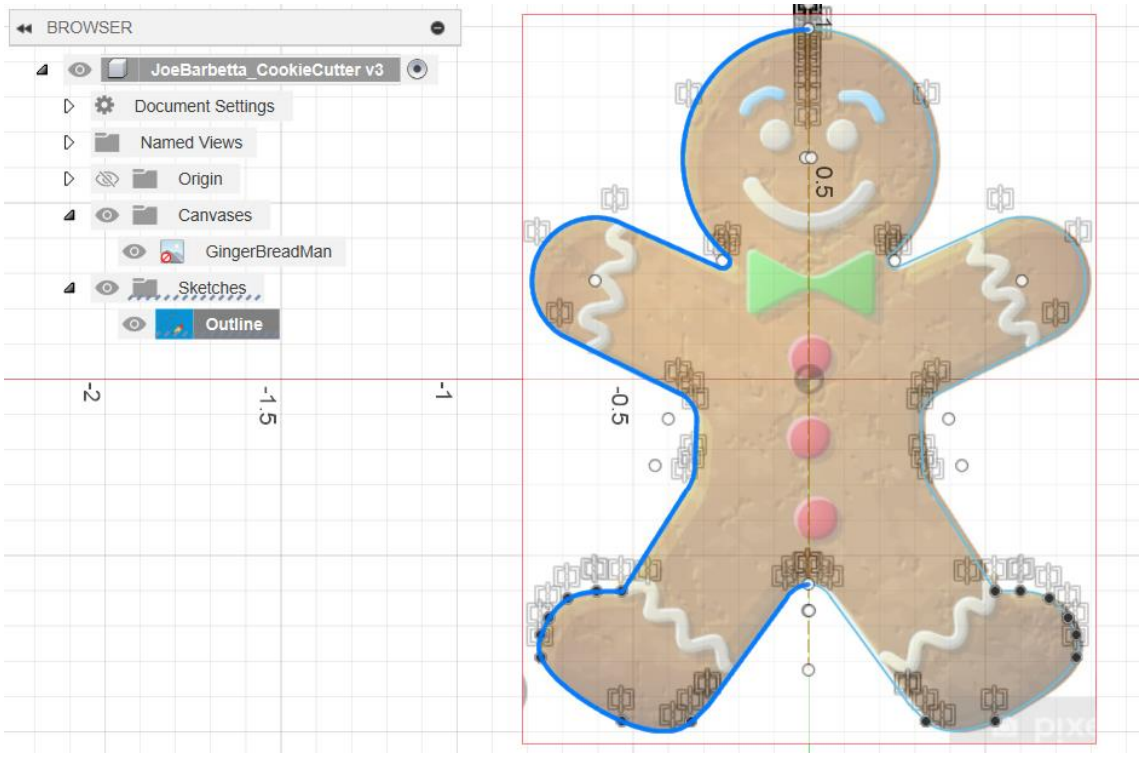


This is the result of the Mirror operation.

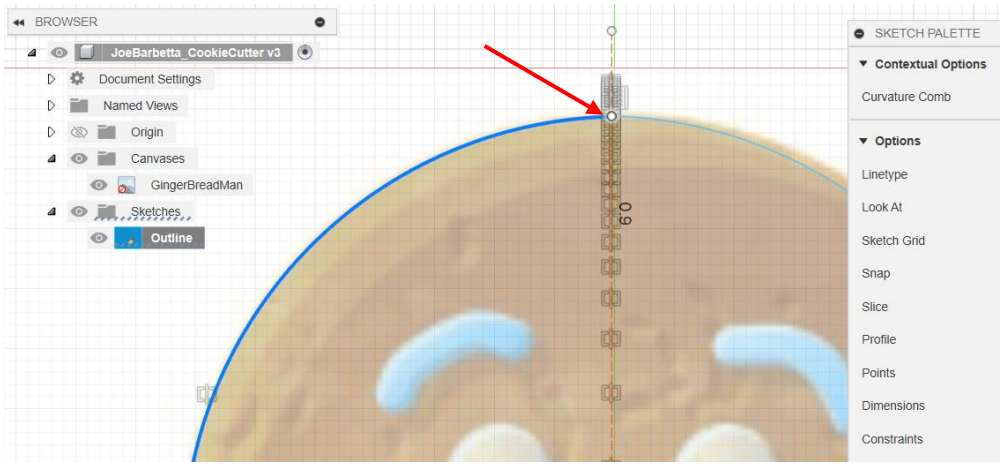


- **double click on the Sketch lines again**.

- If the entire outline doesn't turn blue, **zoom into areas where the blue lines end**.

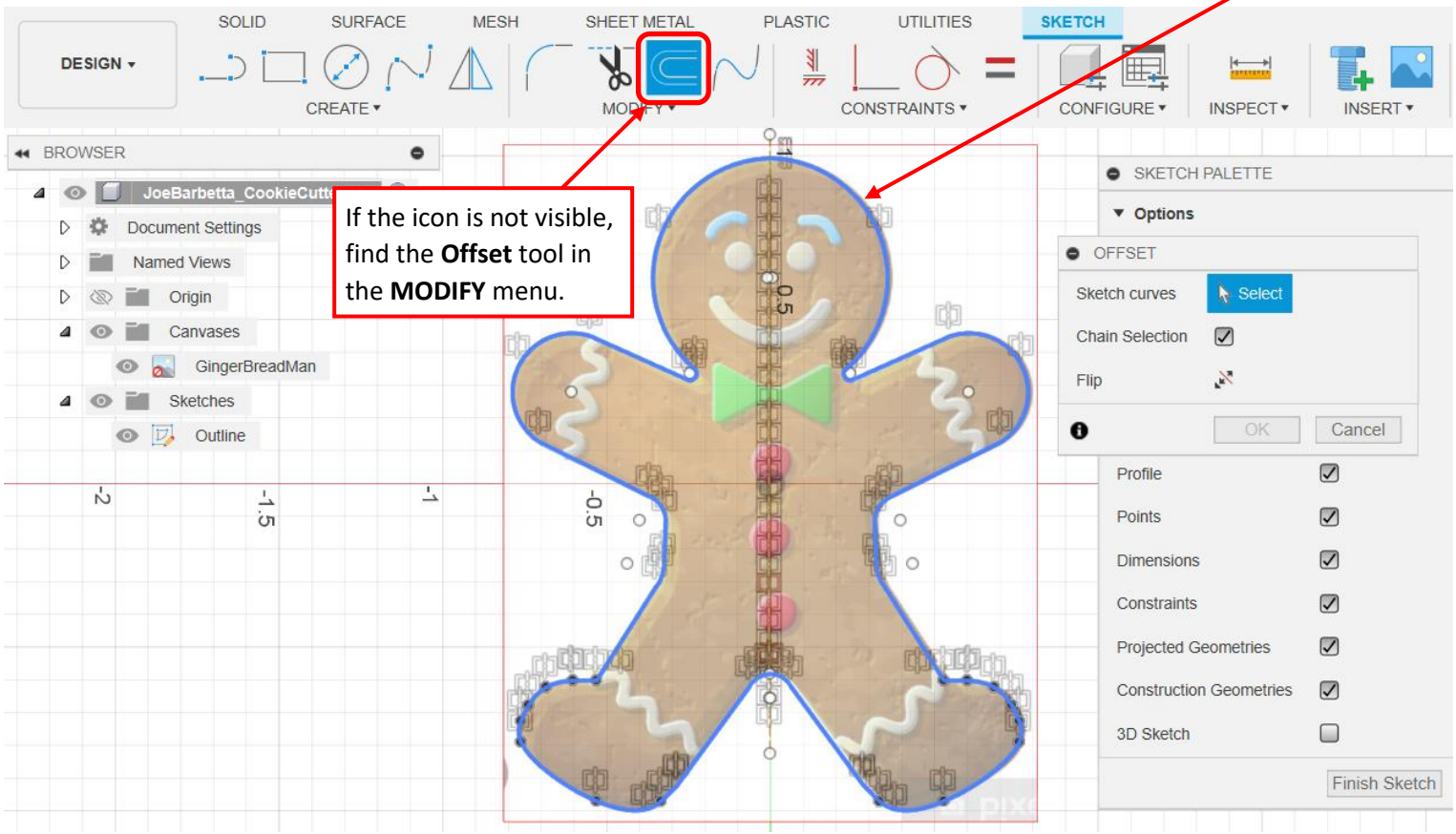


- if there is no visible gap, as shown below, **click on the point and move it slightly**.

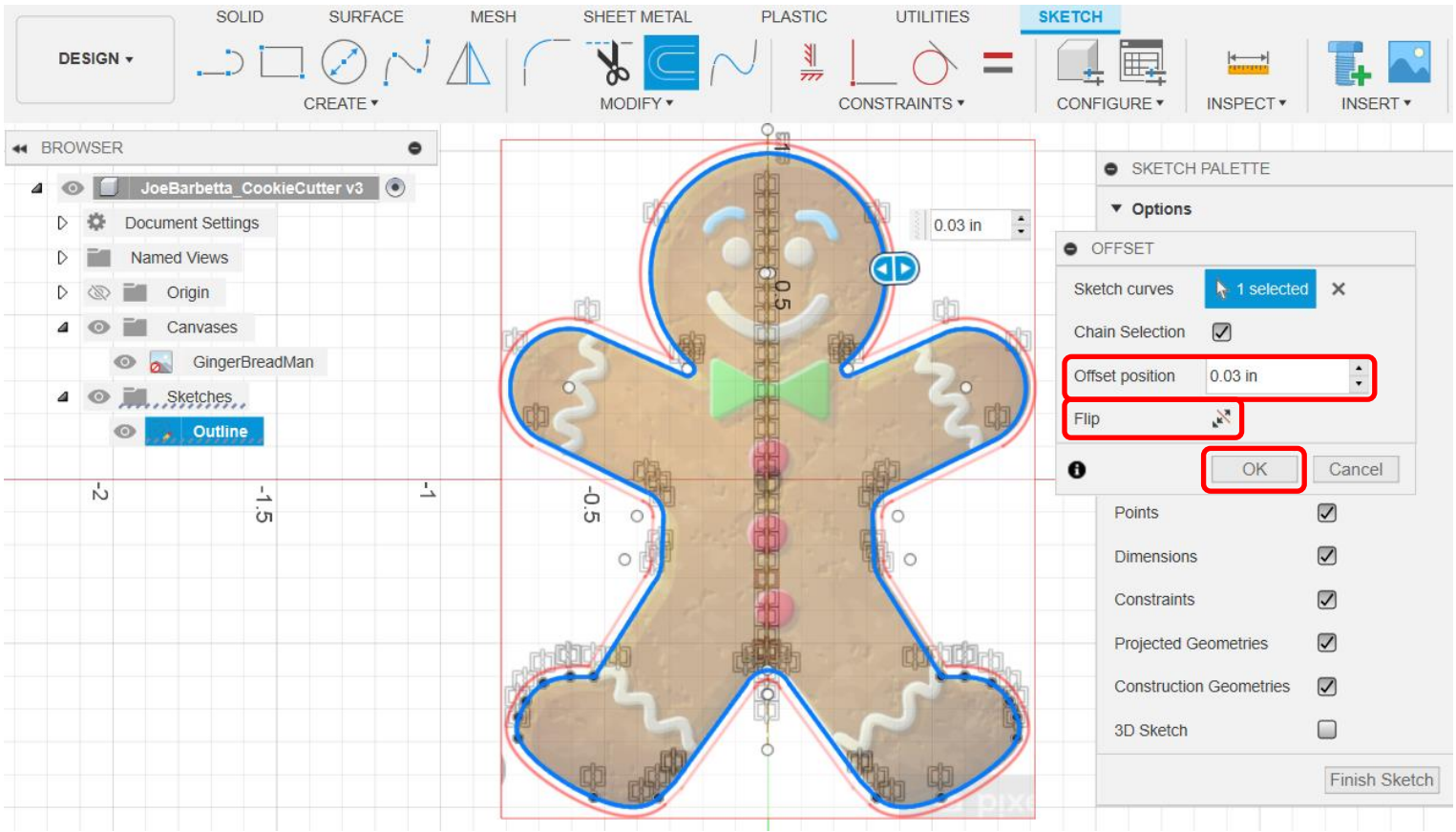


- do the same at the other break.

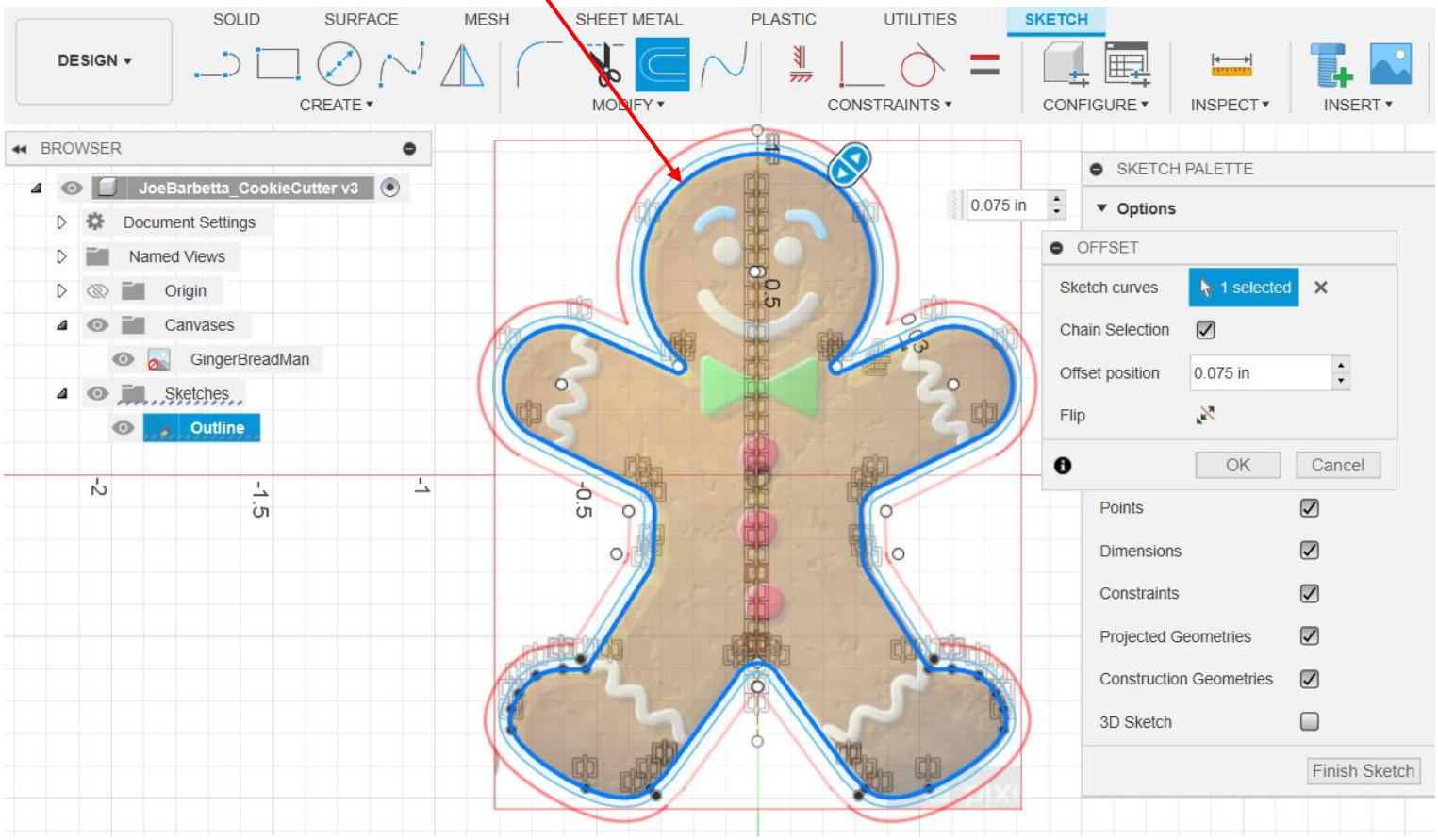
- once you can click on the Sketch path and the entire path turns blue, select the **Offset tool** and **click on the Sketch path**.



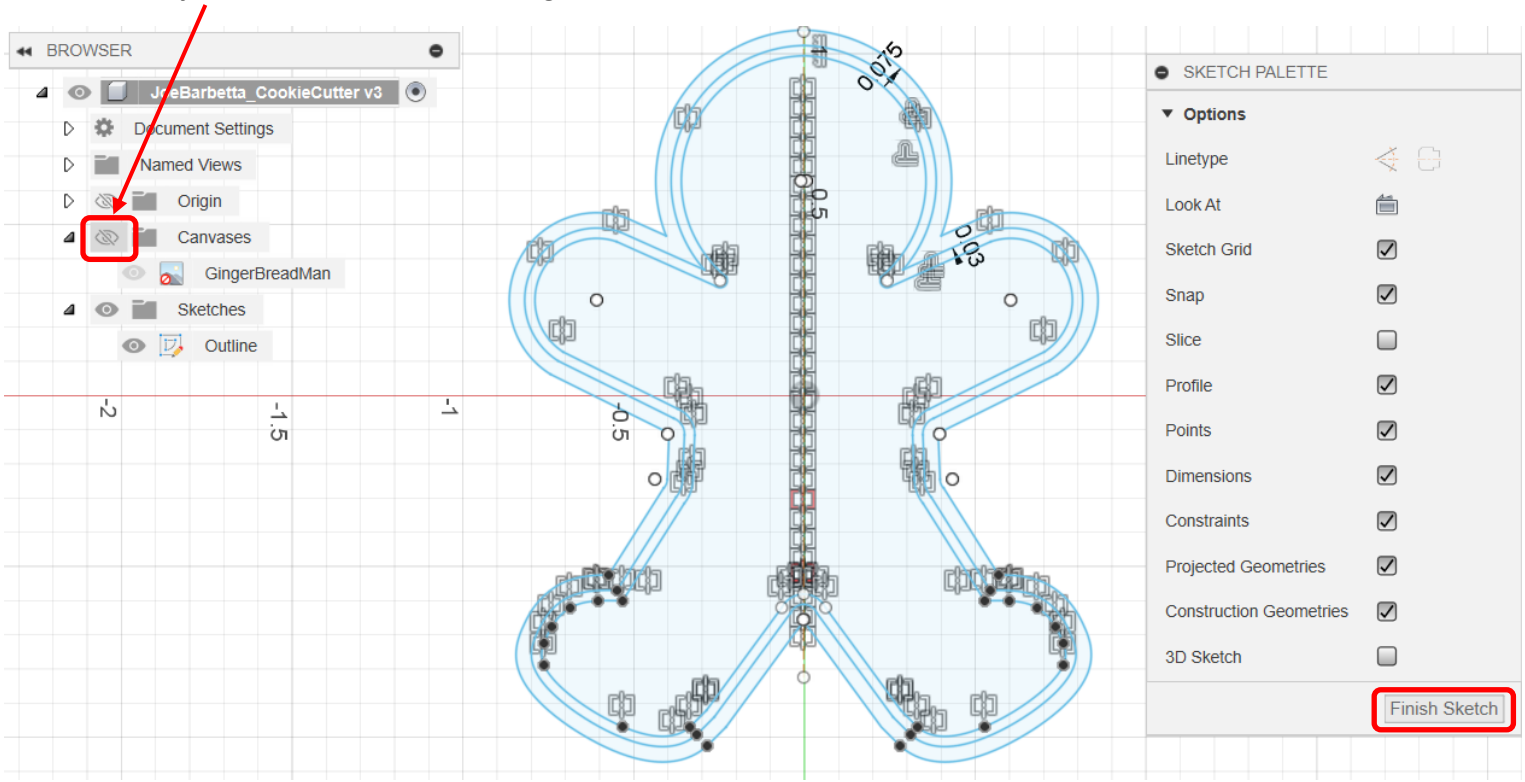
- enter **0.03**. If this operation fails try clicking the **Flip icon**. Click **OK**.



- select the **Offset** tool again, **click on the original path**, enter **0.075**, and click **OK**.

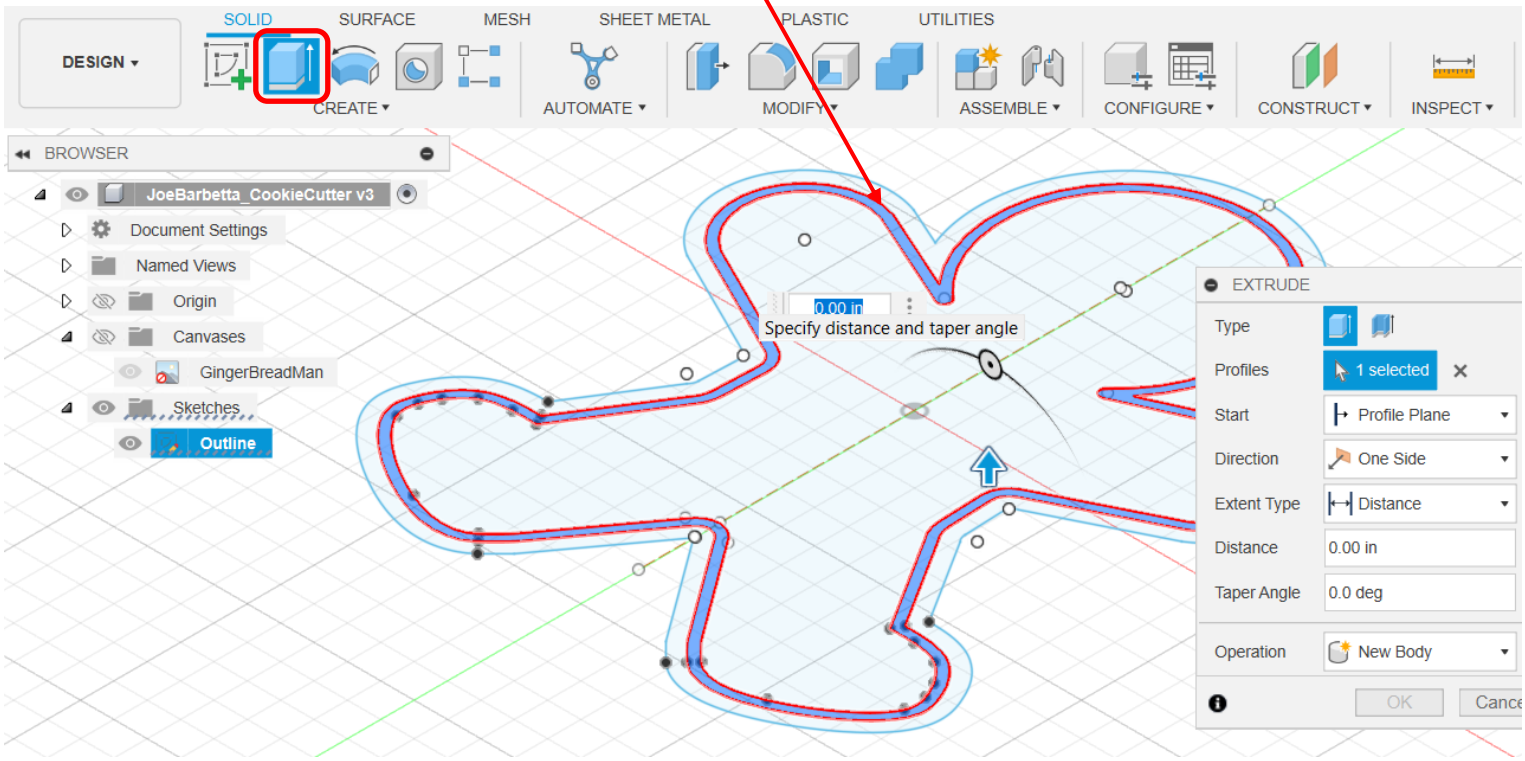


- click on the **eye icon** to hide the Canvas image and then click on **Finish Sketch**.

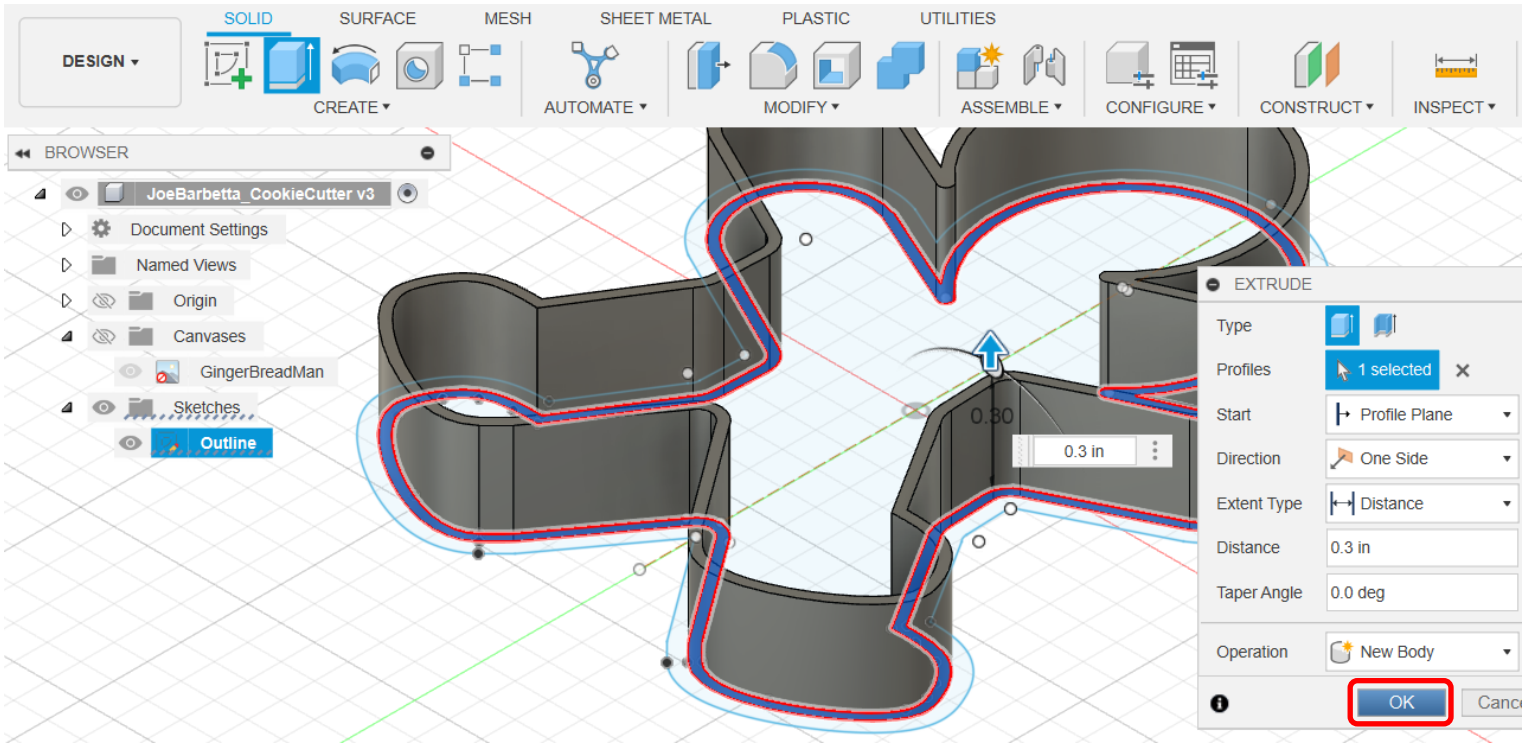


- click on the **Home** icon at the **View cube**

- select the **Extrude** tool and click on the **region between the two inner paths**, which should trun the region blue.

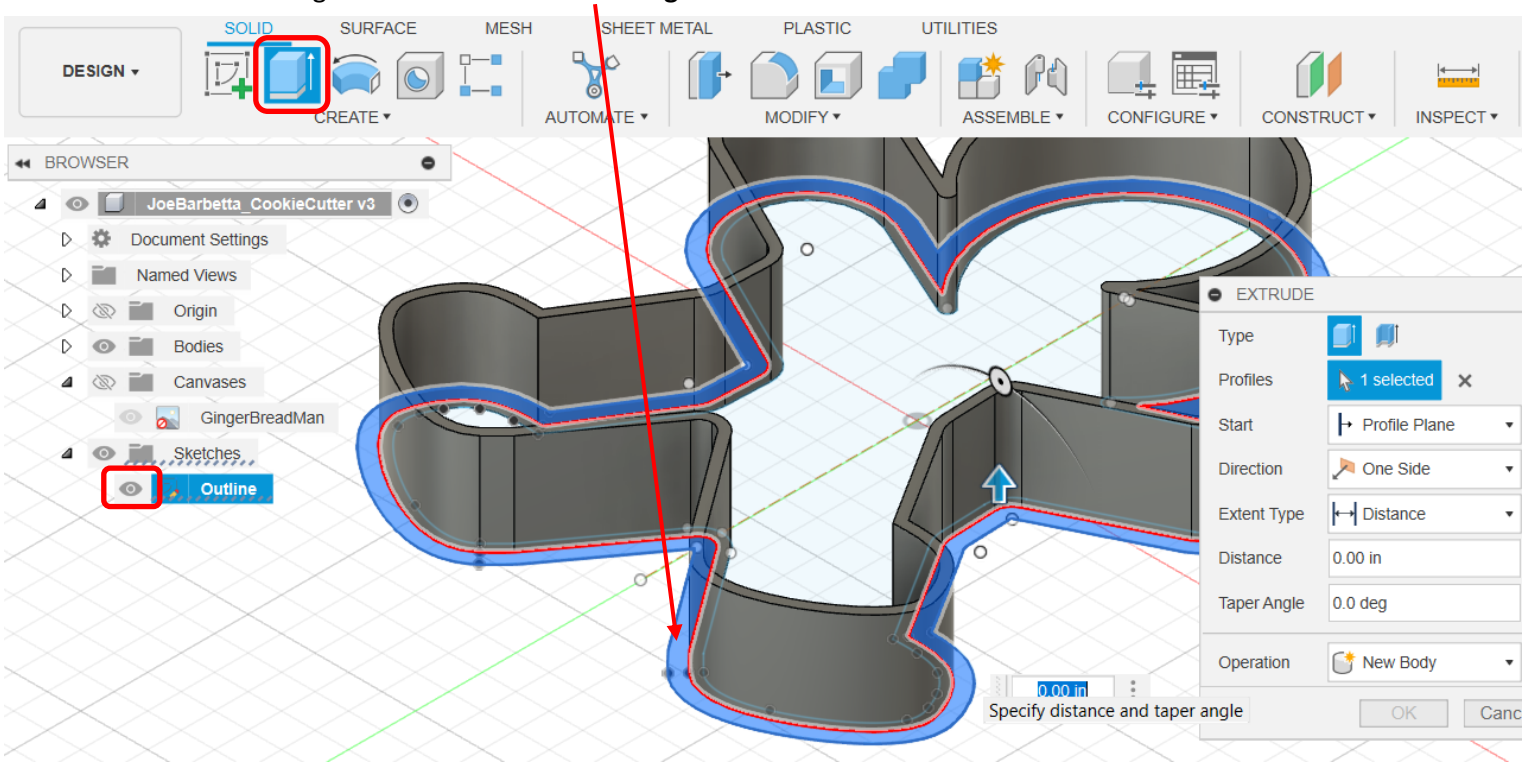


- type **0.3** and click **OK**.

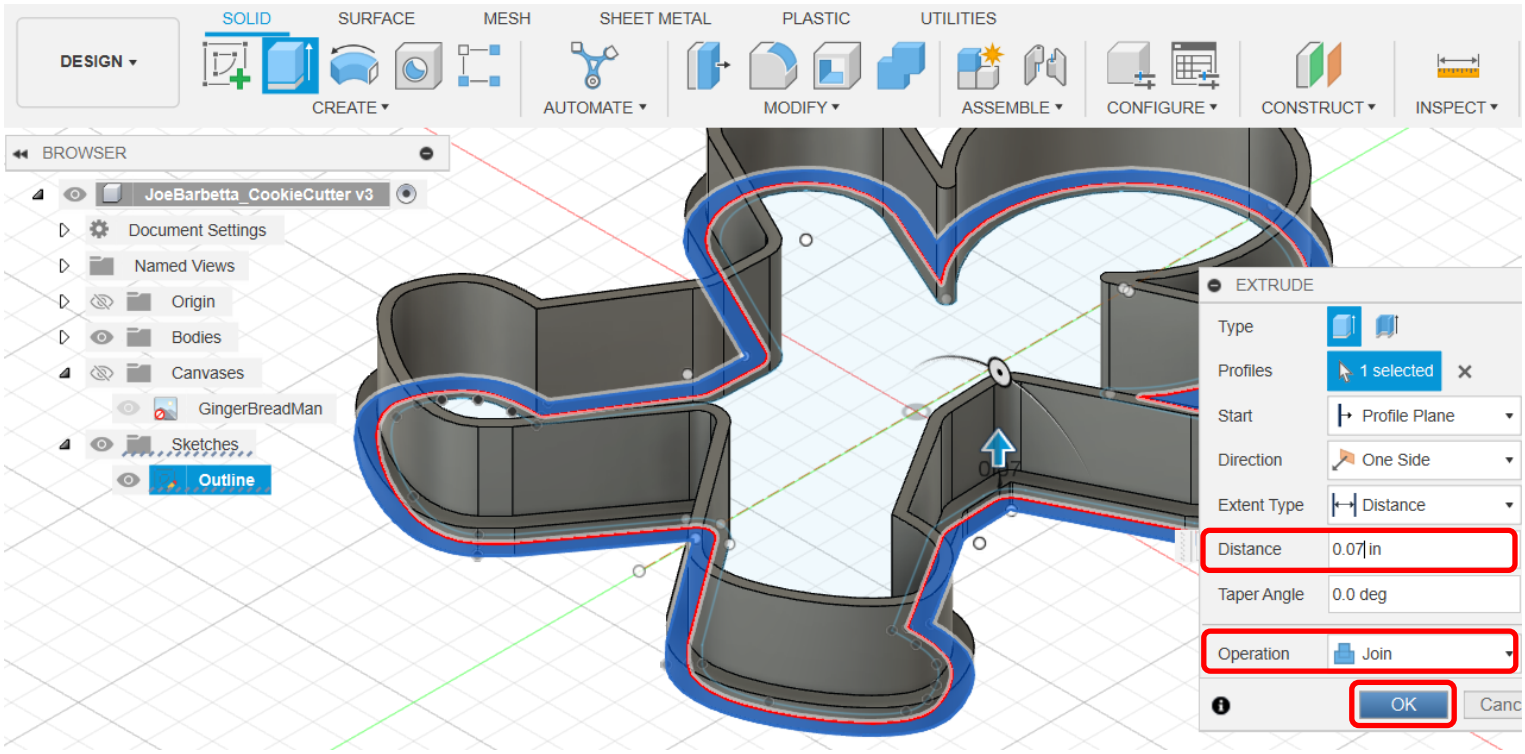


- click on the **eye icon** for the **Outline** Sketch to ensure it is visible

- select the **Extrude** tool again and **click on the outer region** to turn it blue



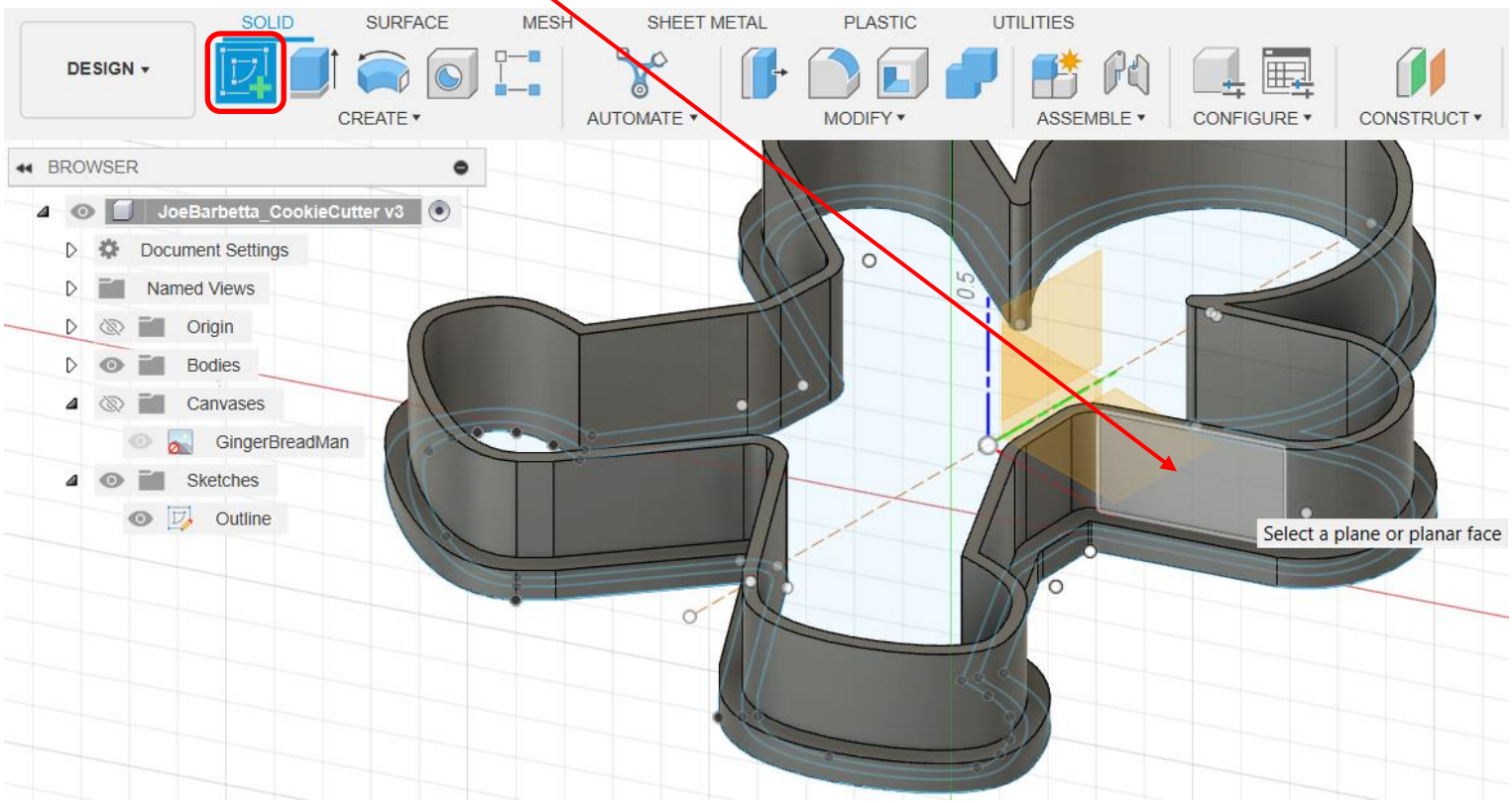
- type **0.07**, ensure **Operation is Join**, and click **OK**.



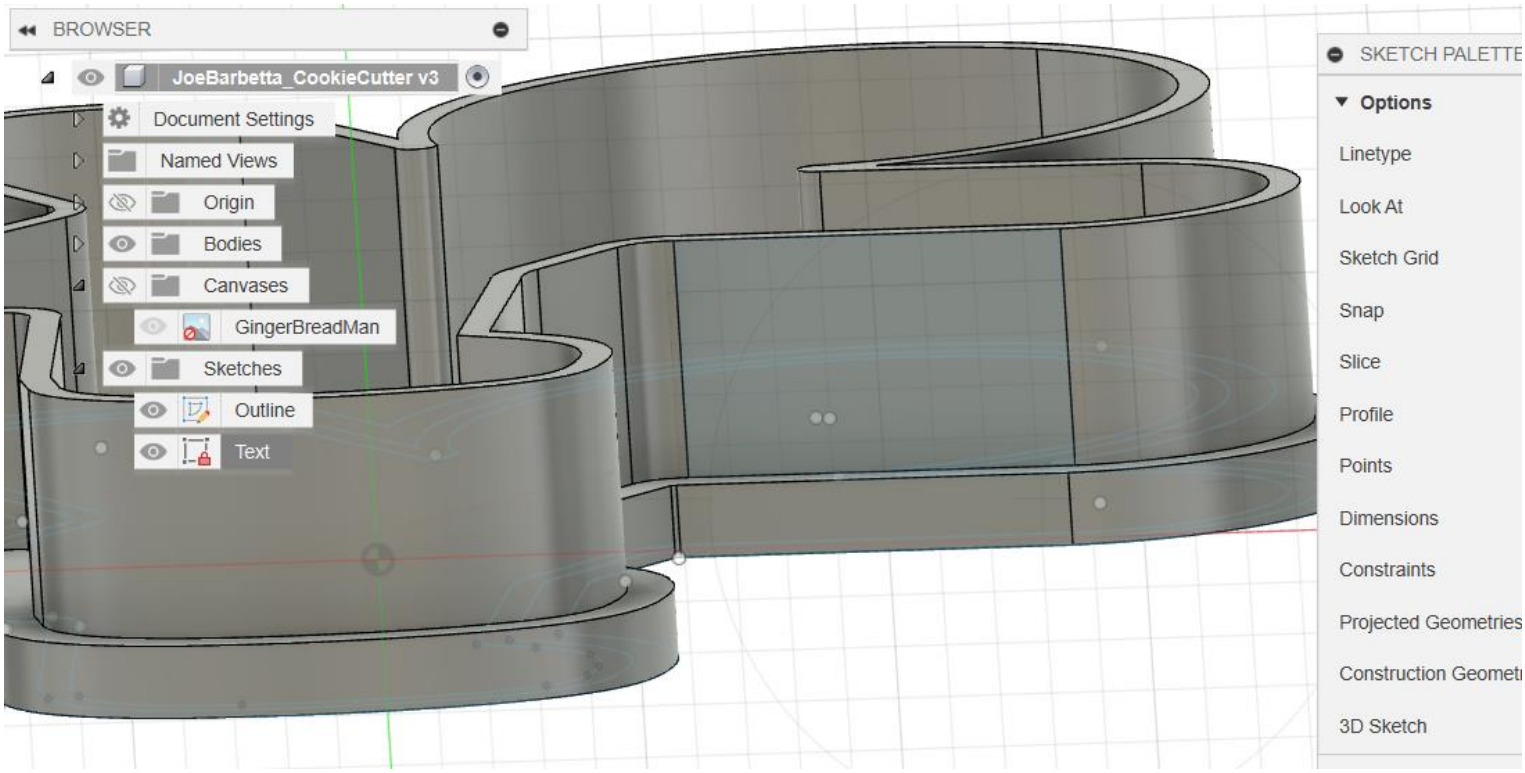
Adding your initials to a flat surface

If there is no flat surface jump to the section "Adding your initials to a curved surface".

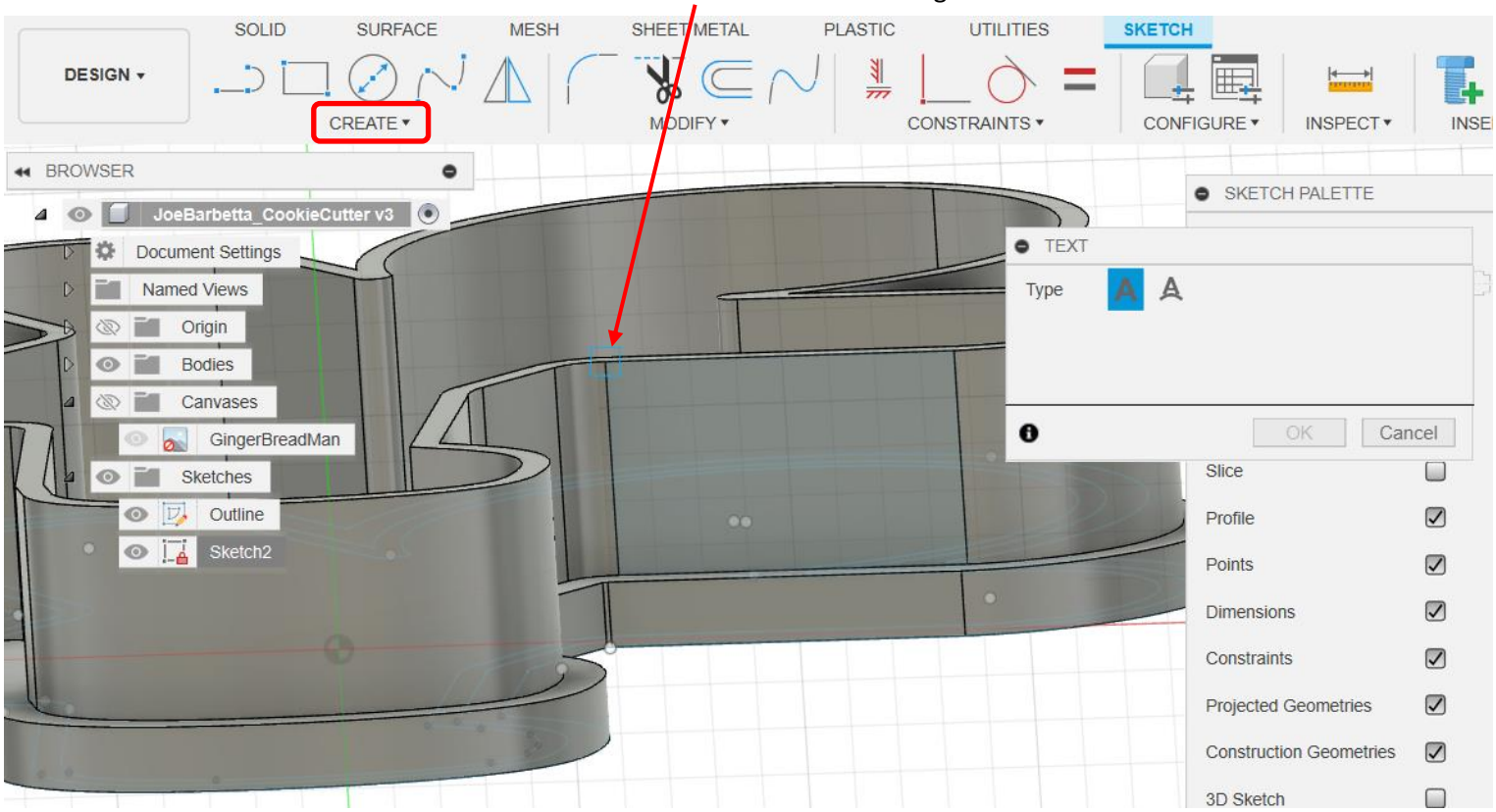
- select the **Sketch** tool and **click on the largest flat wall** on your cookie cutter.



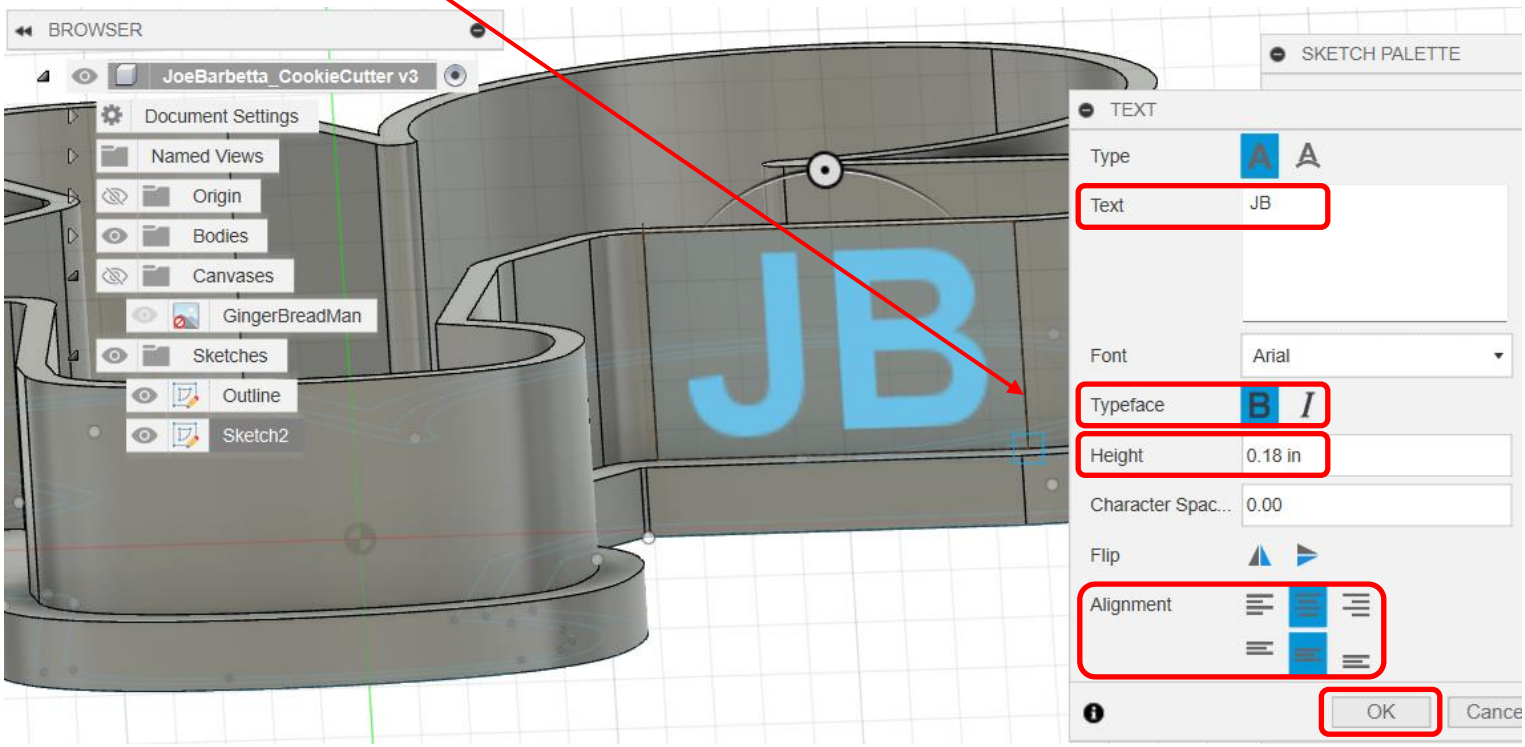
- use the lower **Orbit** tool to Zoom in and position the view to access the face the Sketch was created on



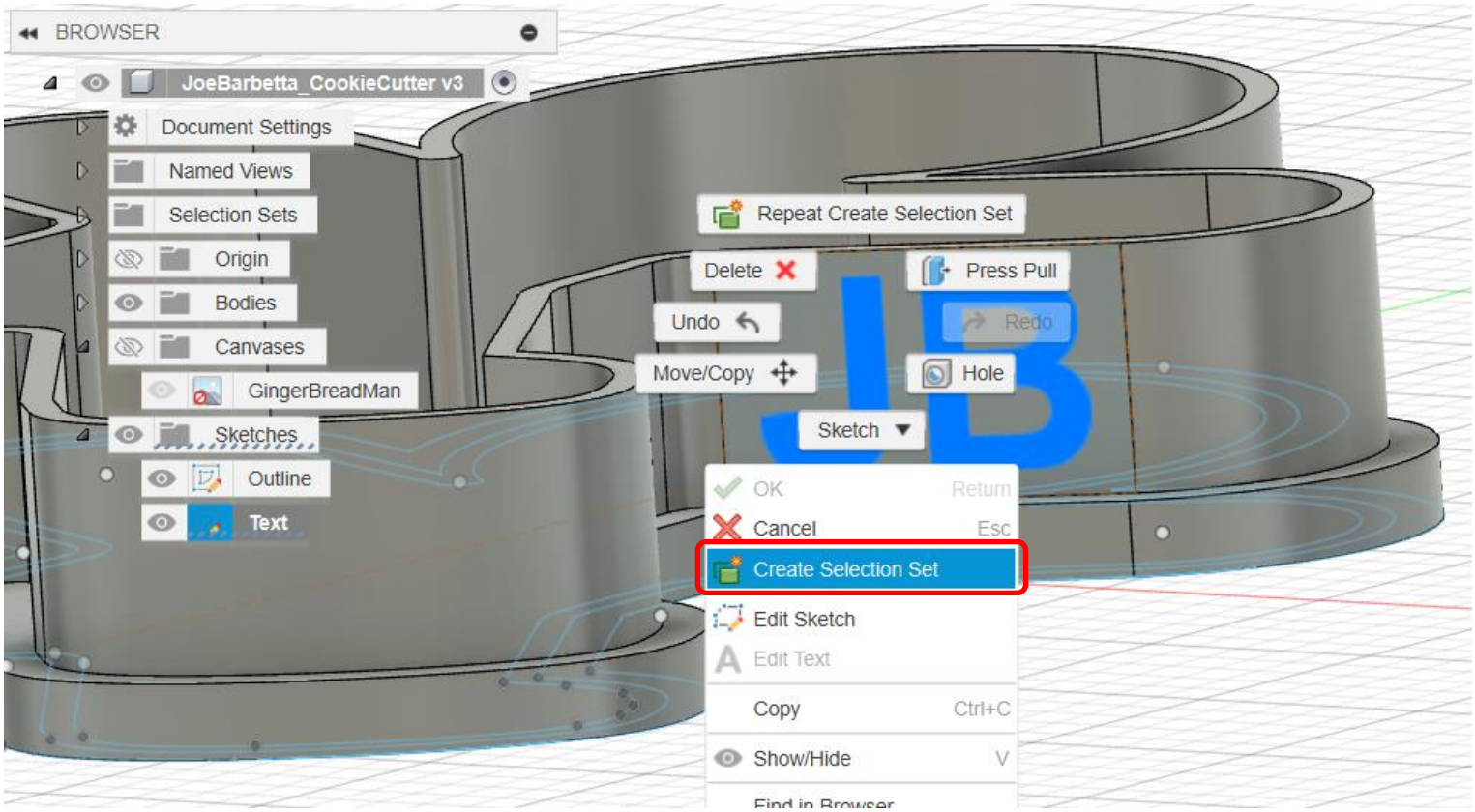
- select the **Text** tool in the **CREATE** menu and **click on a corner** of the Sketch region



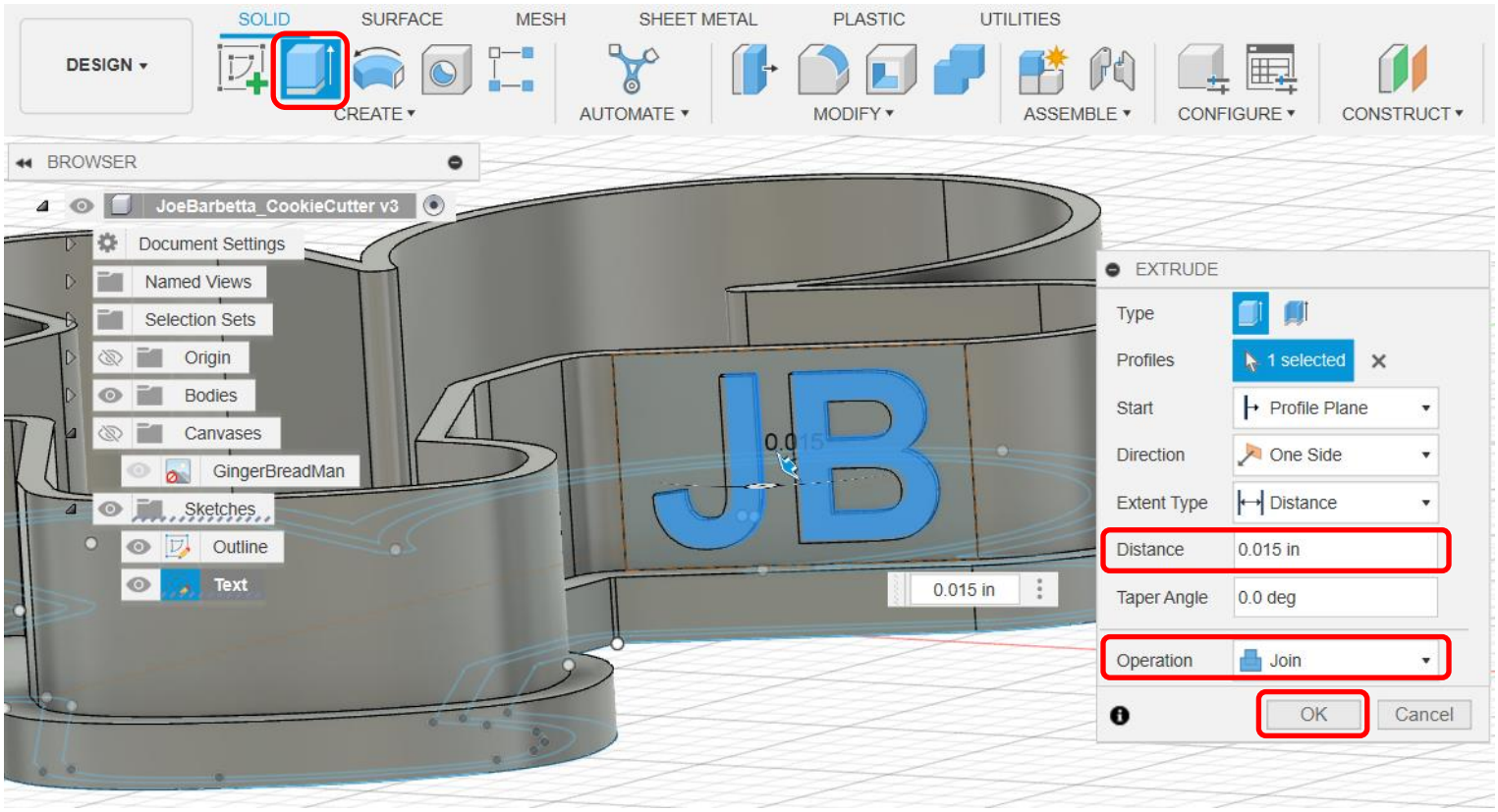
- click on the **opposite corner** of the Sketch region
- enter your initials in the **Text** box, click on the **Bold** icon, enter **0.18 for Height**, and click on the two **Center Alignment** icons.
- click **OK**.



- right-click on the text and select **Create Selection Set**

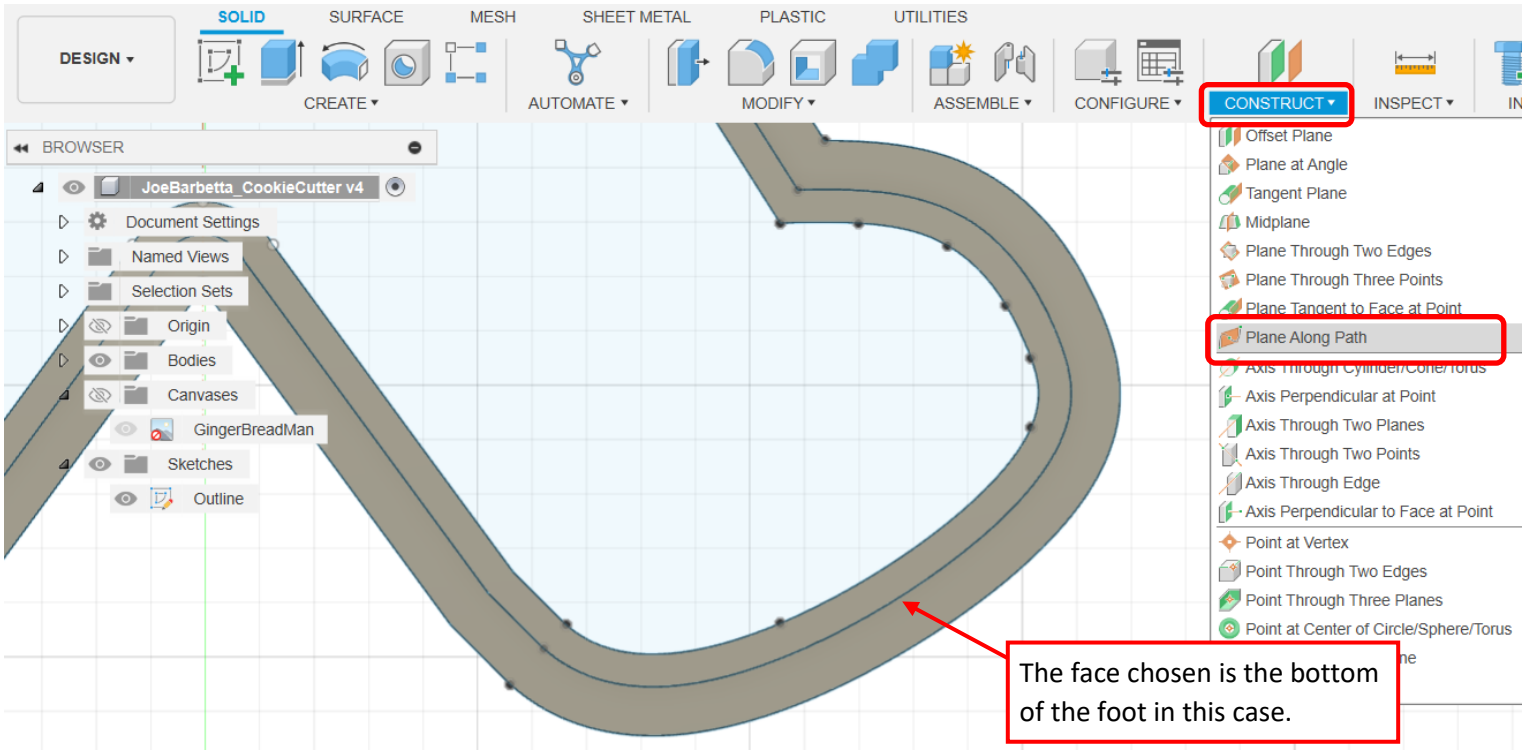


- select the **Extrude** tool, set the **Distance to 0.015**, ensure the **Operation is Join**, click **OK**.

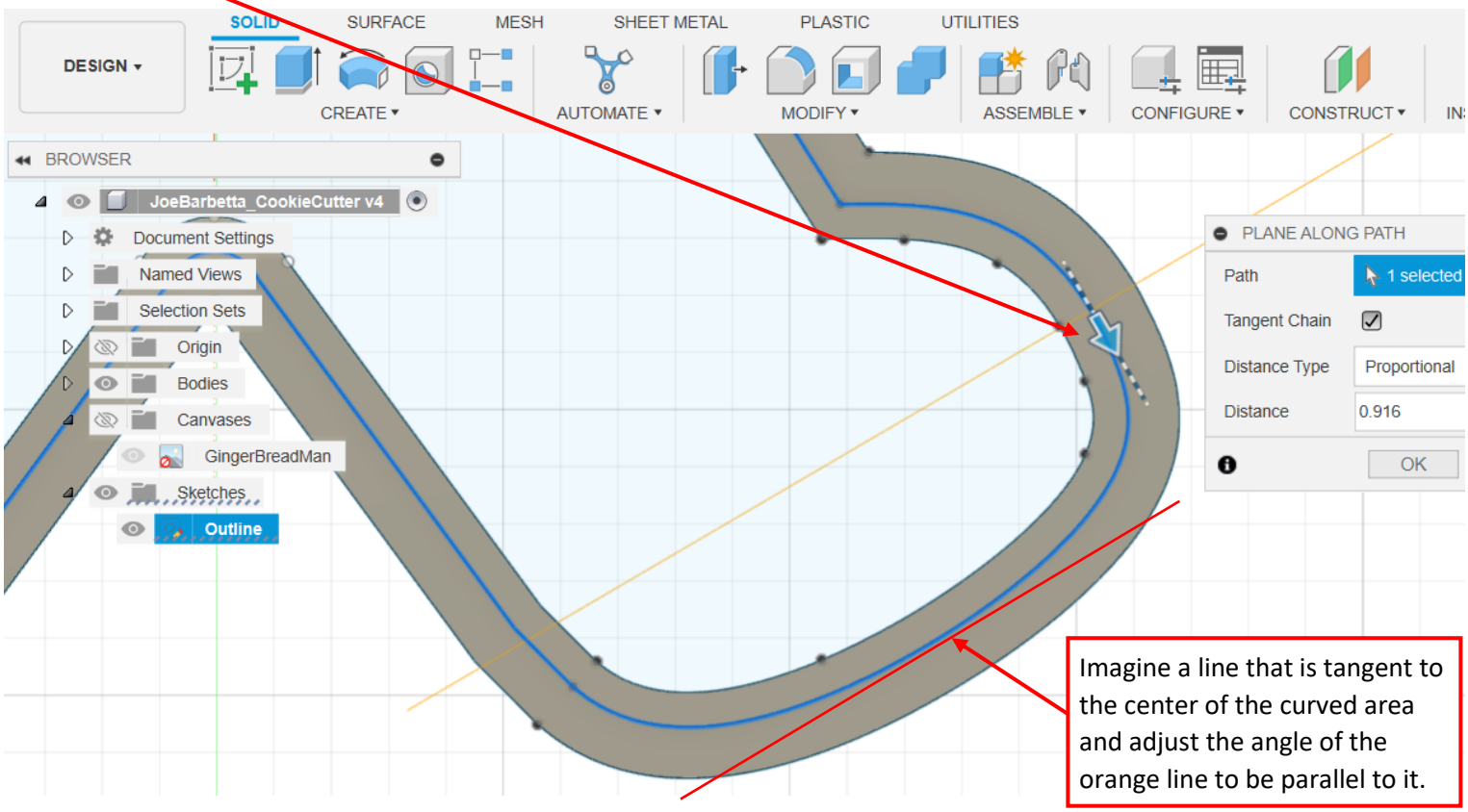


Adding Text to a curved surface

- zoom into a curved area and click on the **TOP** of the **View Cube**
- from the **CONSTRUCT** menu select **Plane Along Path**

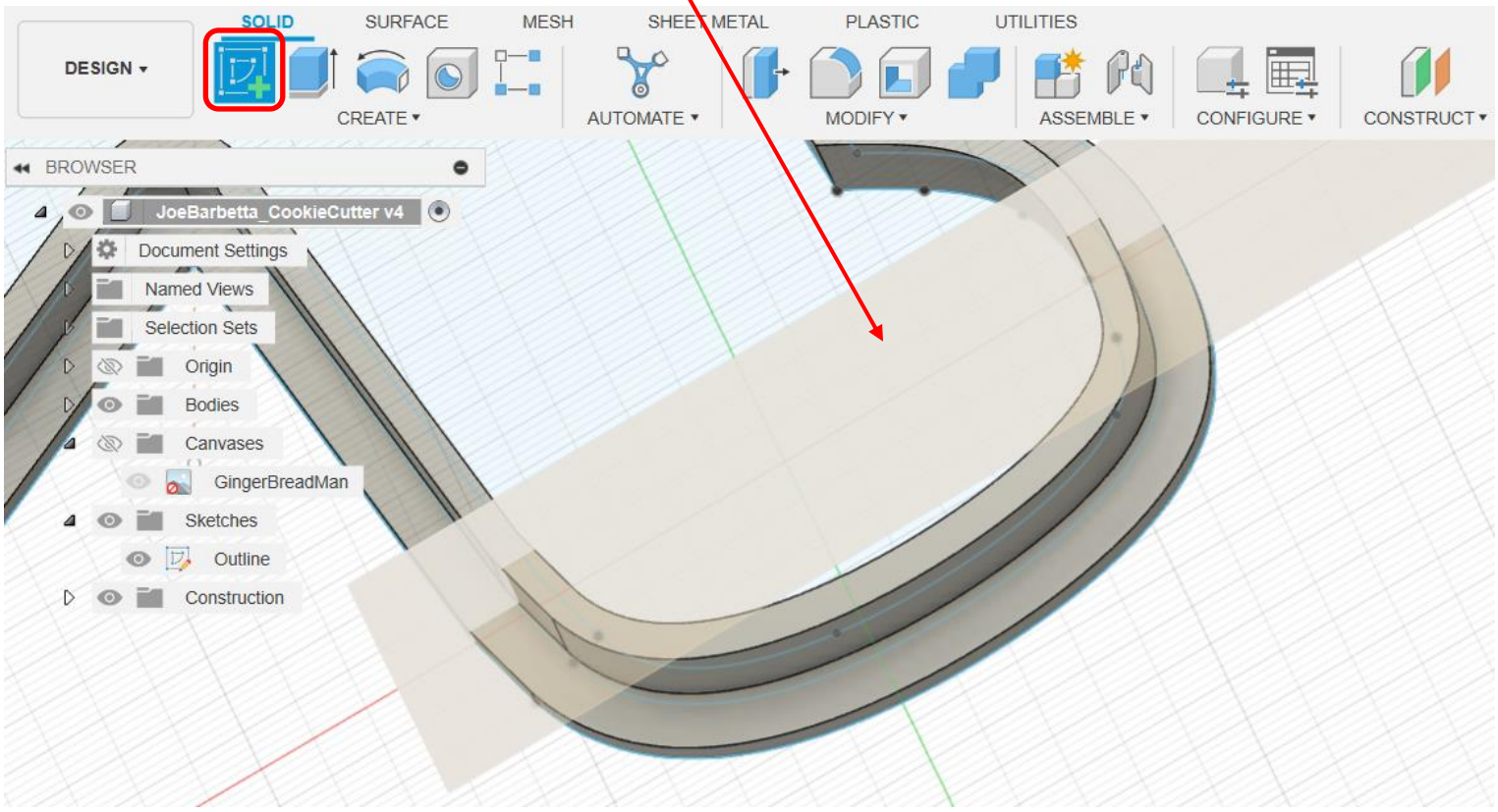


- click on a point on the cutter edge to define a plane perpendicular to the point
- move the **blue arrow** to adjust the angle of the plane and click **OK**.



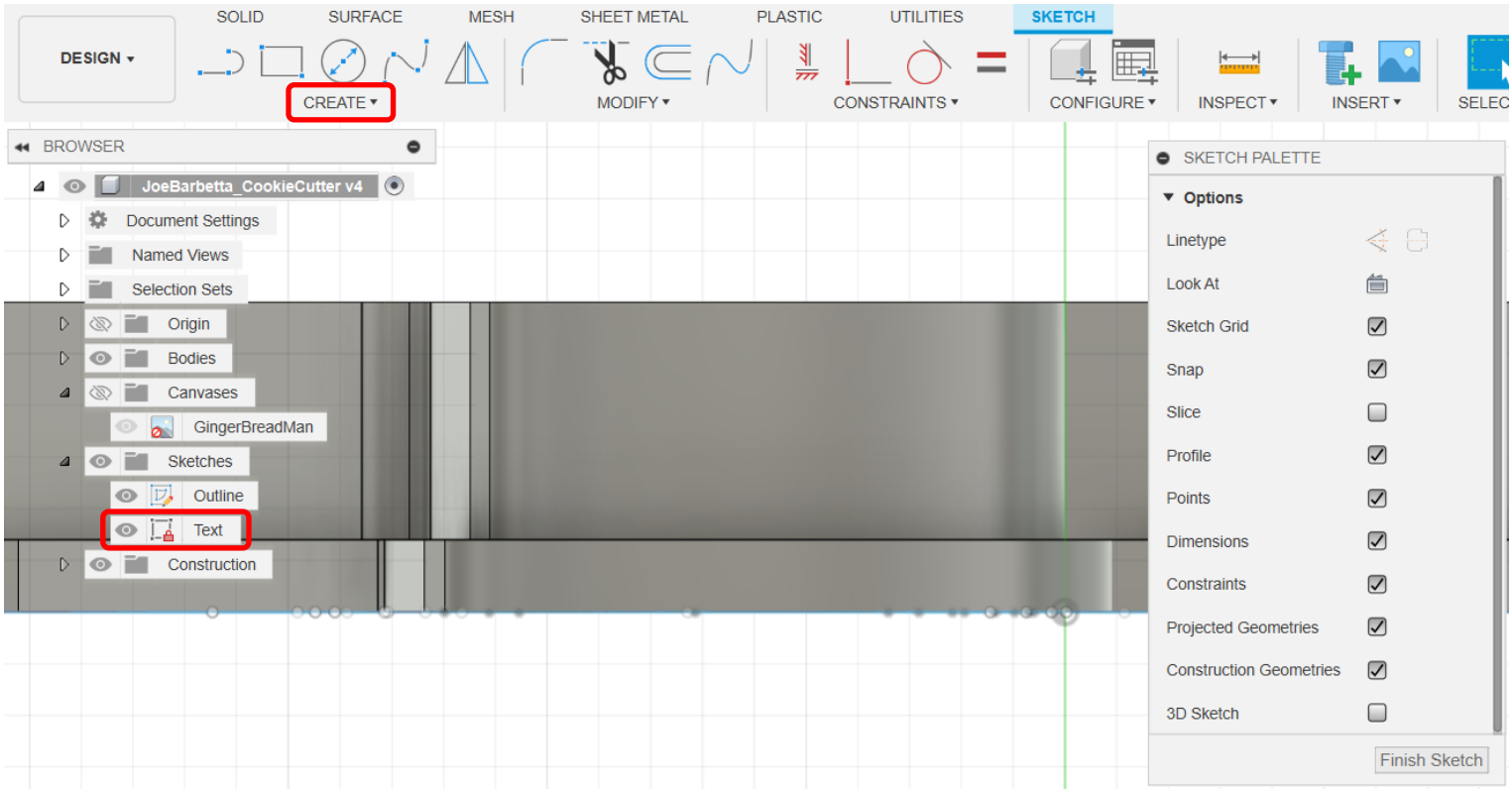
- turn the view slightly to see the orange plane just created

- select the **Create Sketch** tool and **hover over the orange plane until it turns darker and then click**

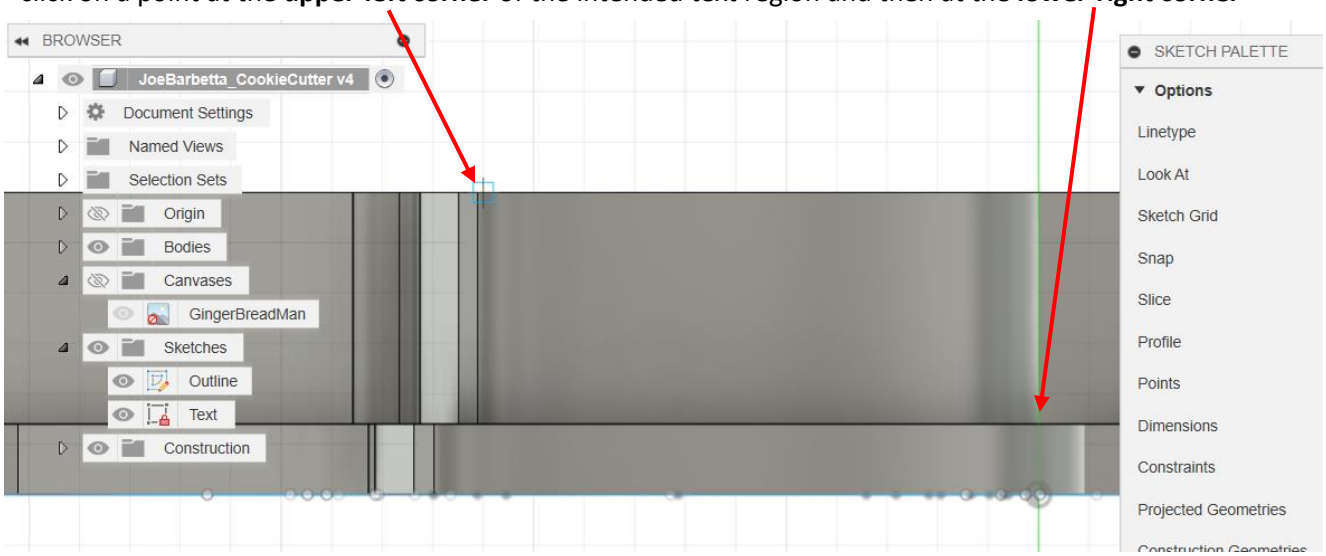


- right-click on the **Sketch name** and select **Rename** to change the name to **Text**

- from the **CREATE** menu select **Text**

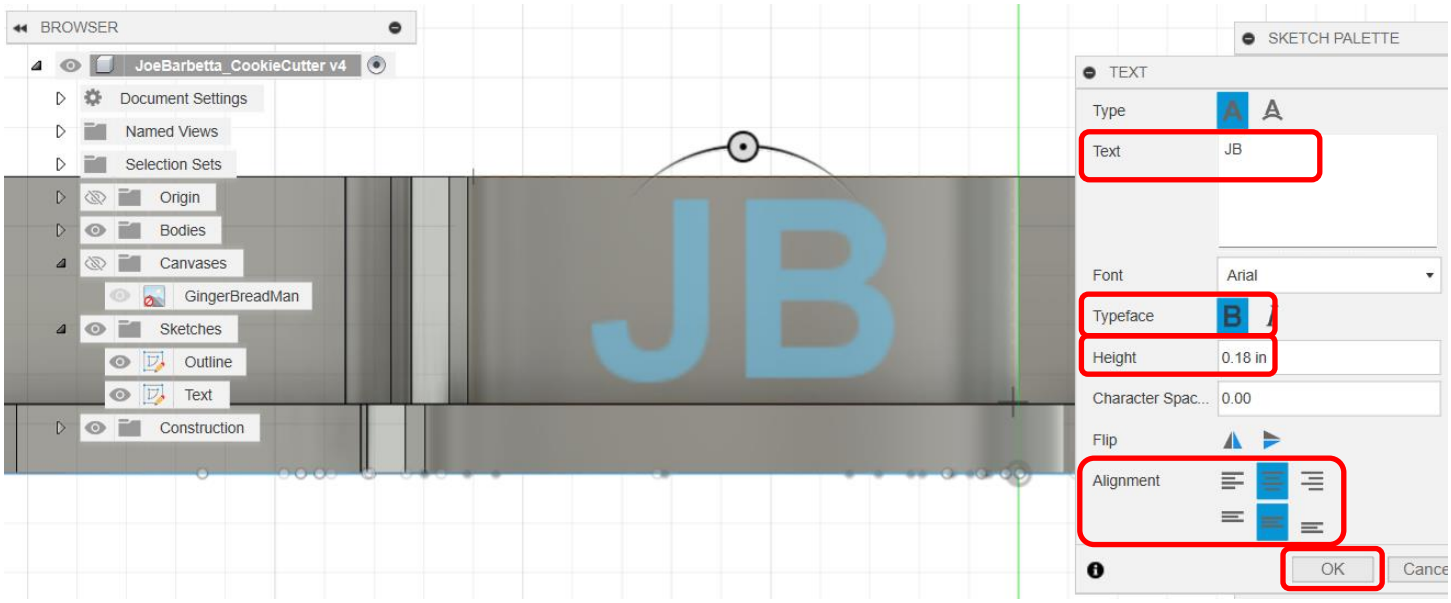


- click on a point at the **upper-left corner** of the intended text region and then at the **lower-right corner**

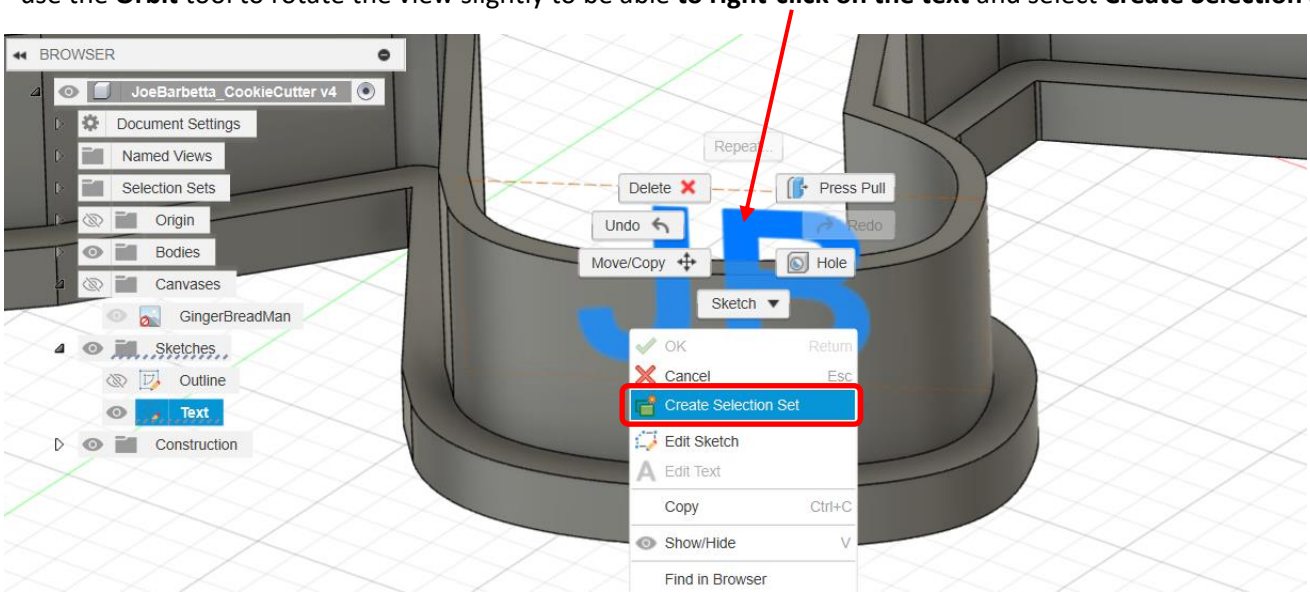


- enter your initials into the **Text** box

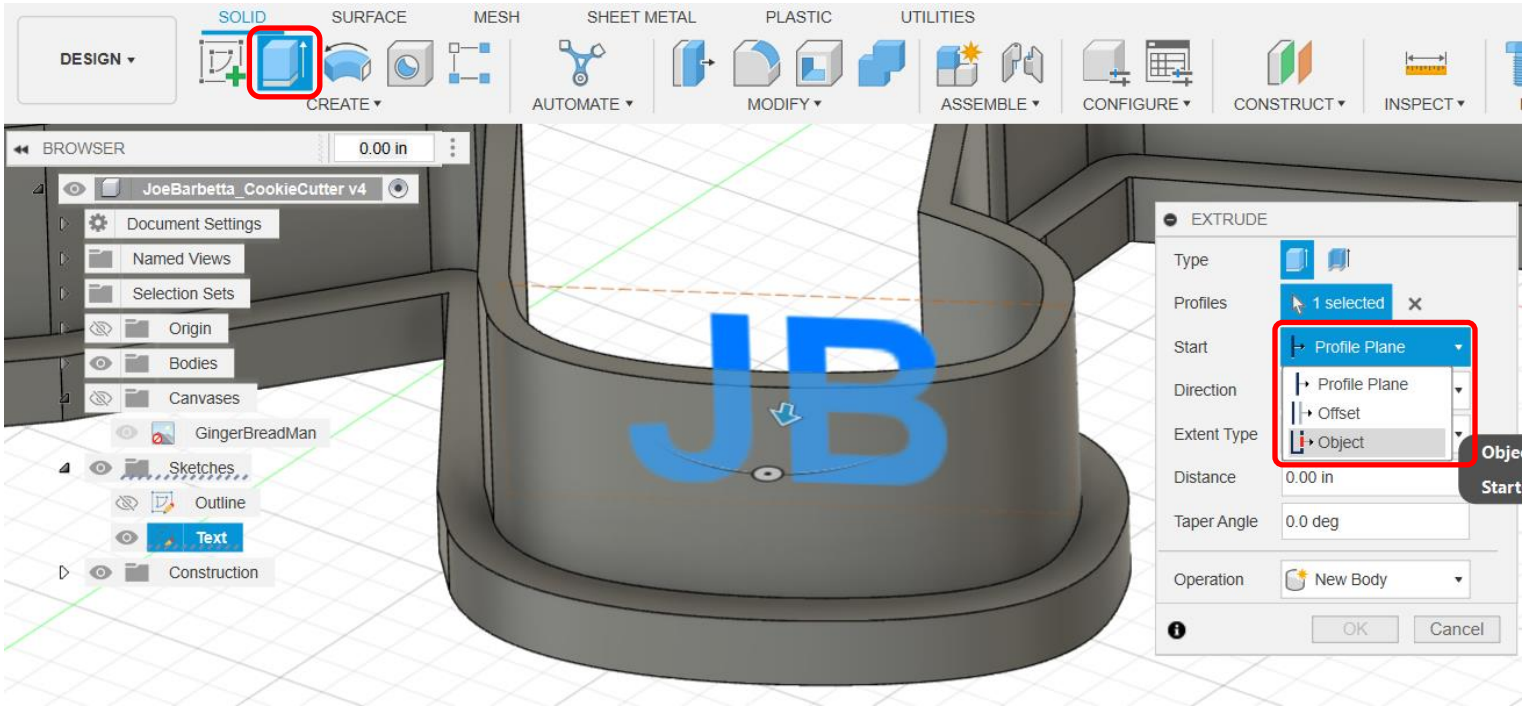
- click on the **Bold icon for Typeface**, enter **0.18 for Height**, click on the **two Center icons for Alignment**, then click **OK**



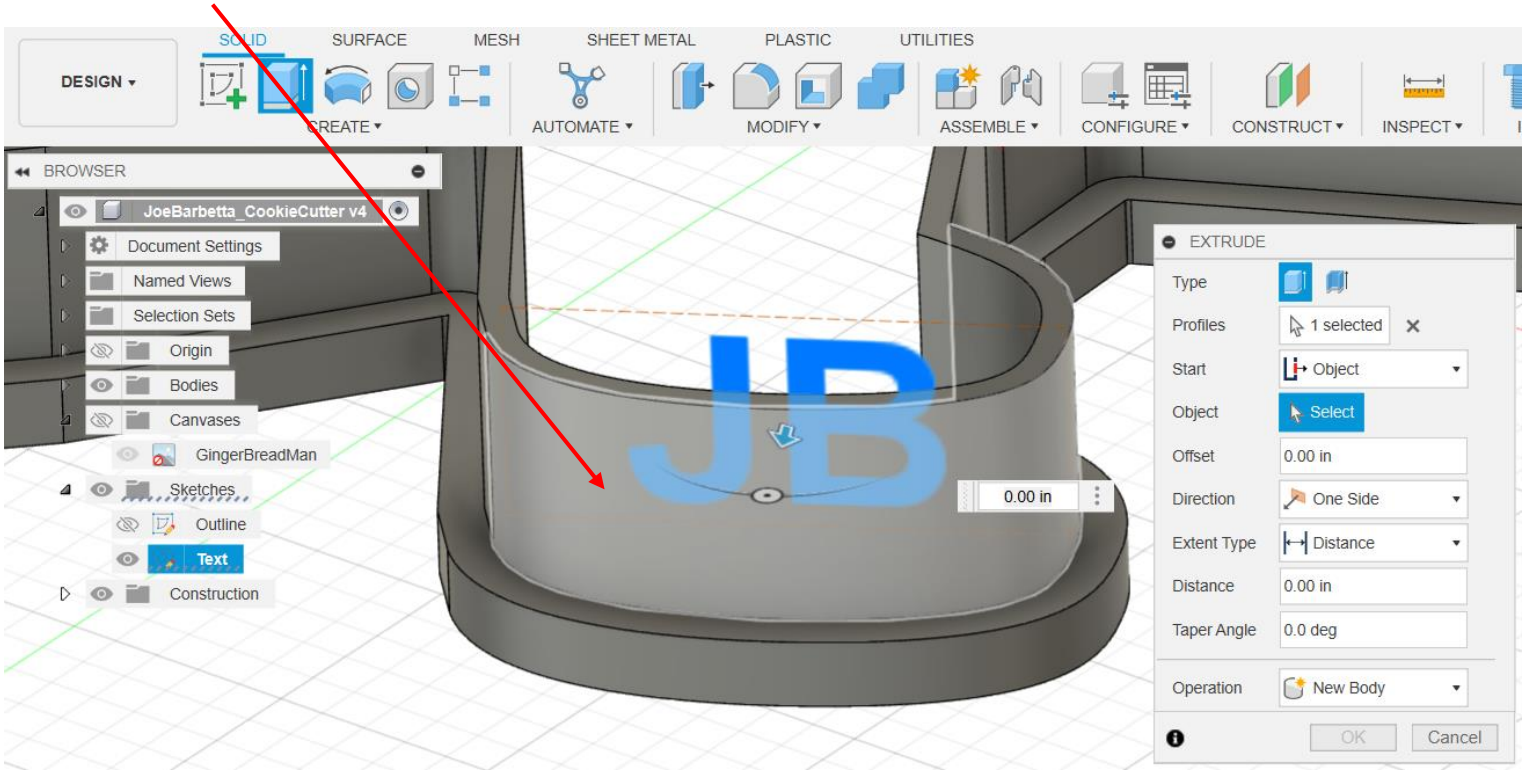
- use the **Orbit** tool to rotate the view slightly to be able **to right-click on the text** and select **Create Selection Set**



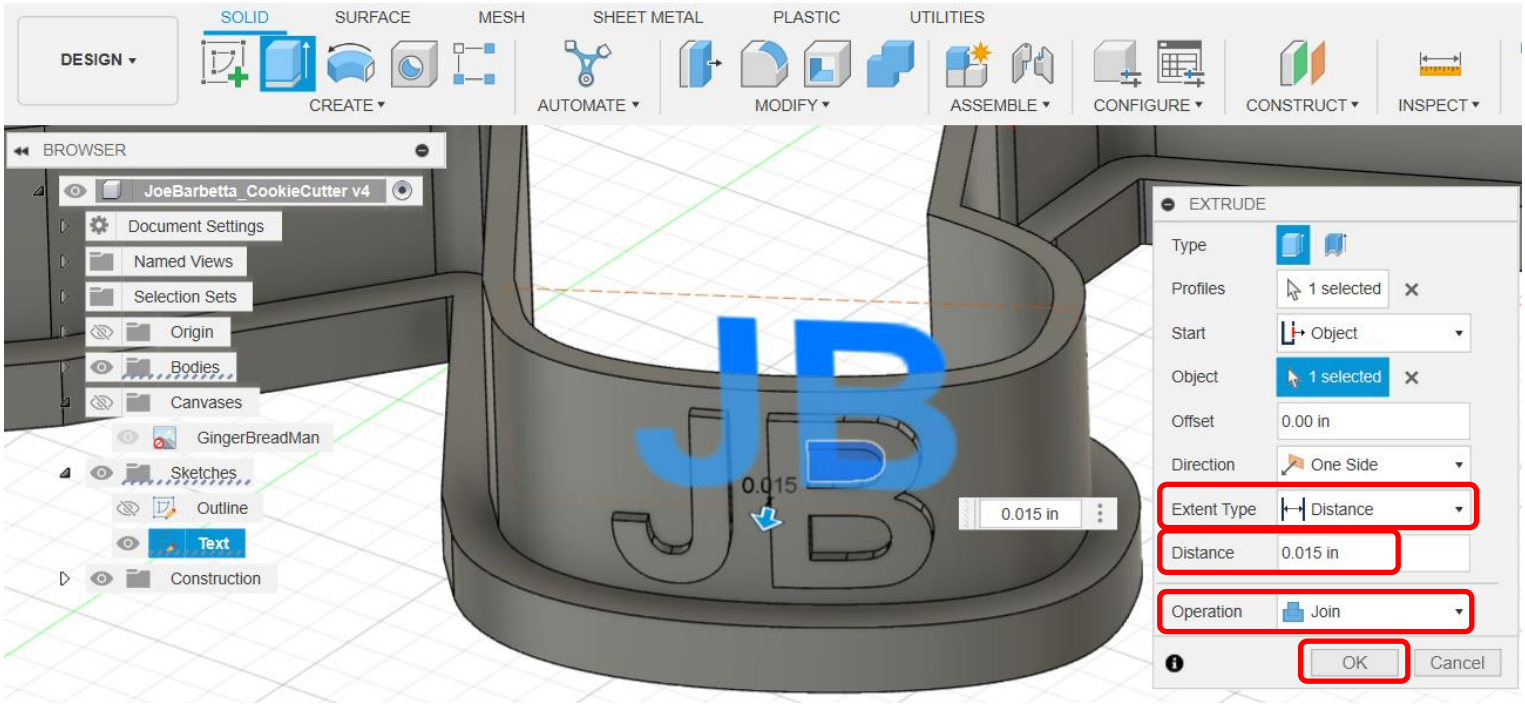
- select the **Extrude** tool and change the **Start** option from **Profile Plane** to **Object**



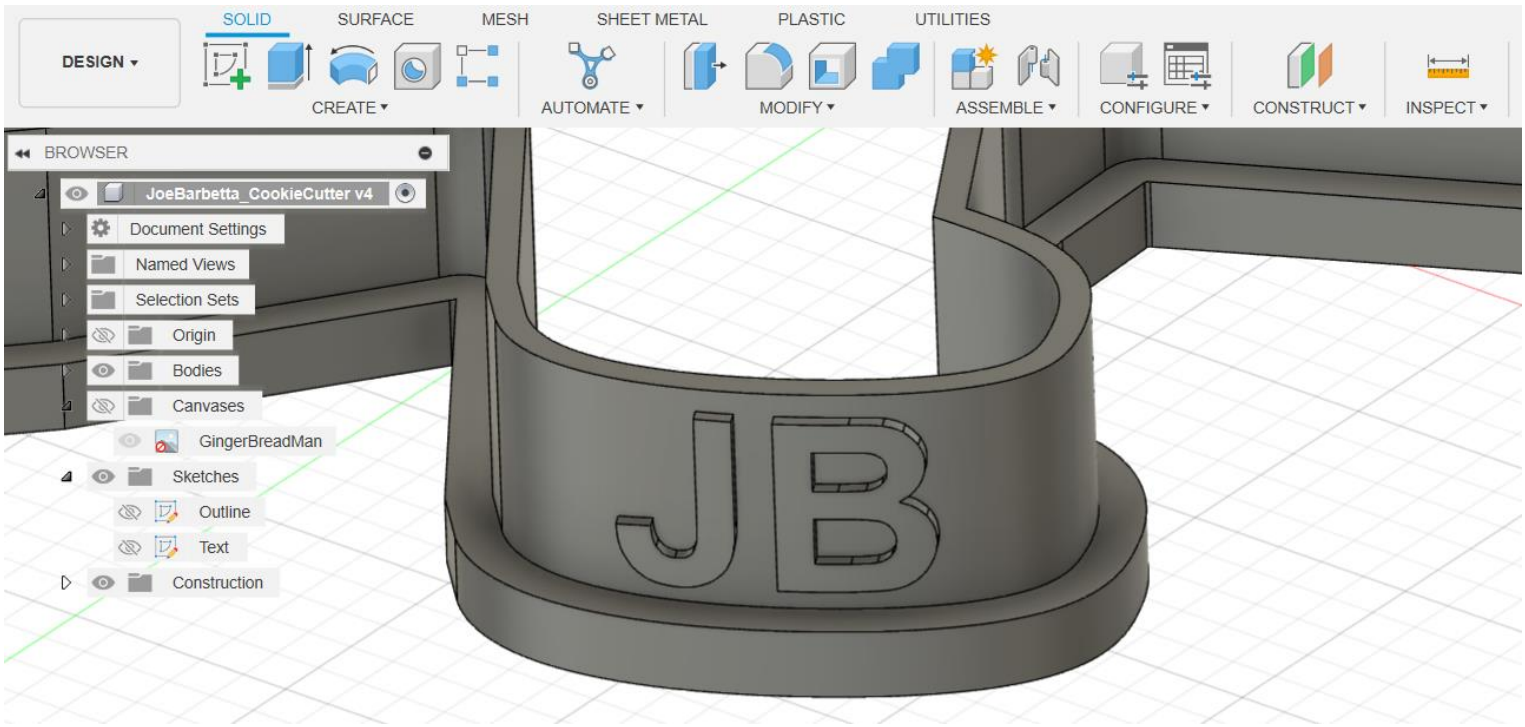
- click on the **surface** the text will be extruded on



- change the **Distance** to **0.015** and ensure **the Extent Type** is set to **Distance** and the **Operation** is set to **Join**. Click **OK**.

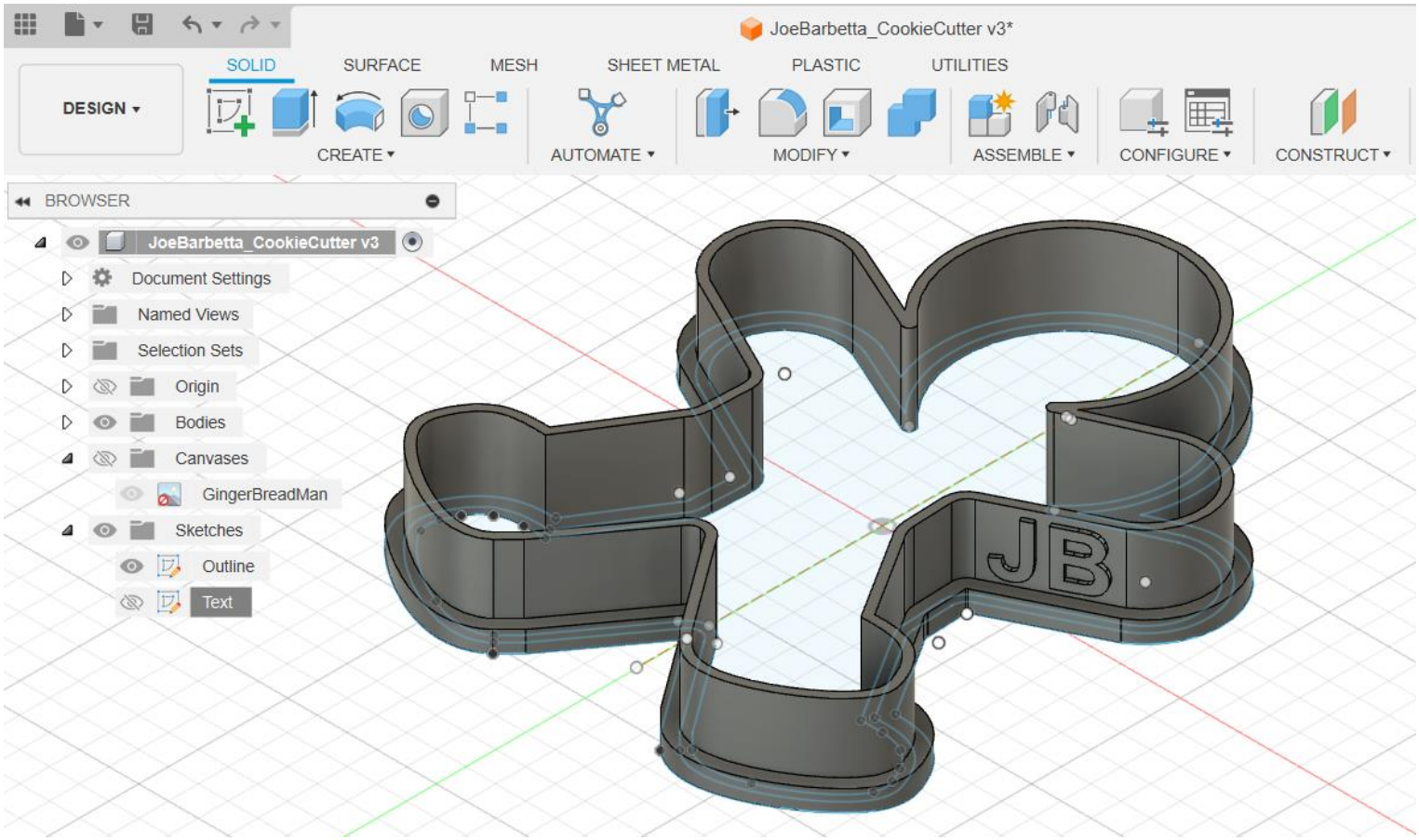


Here is the result.



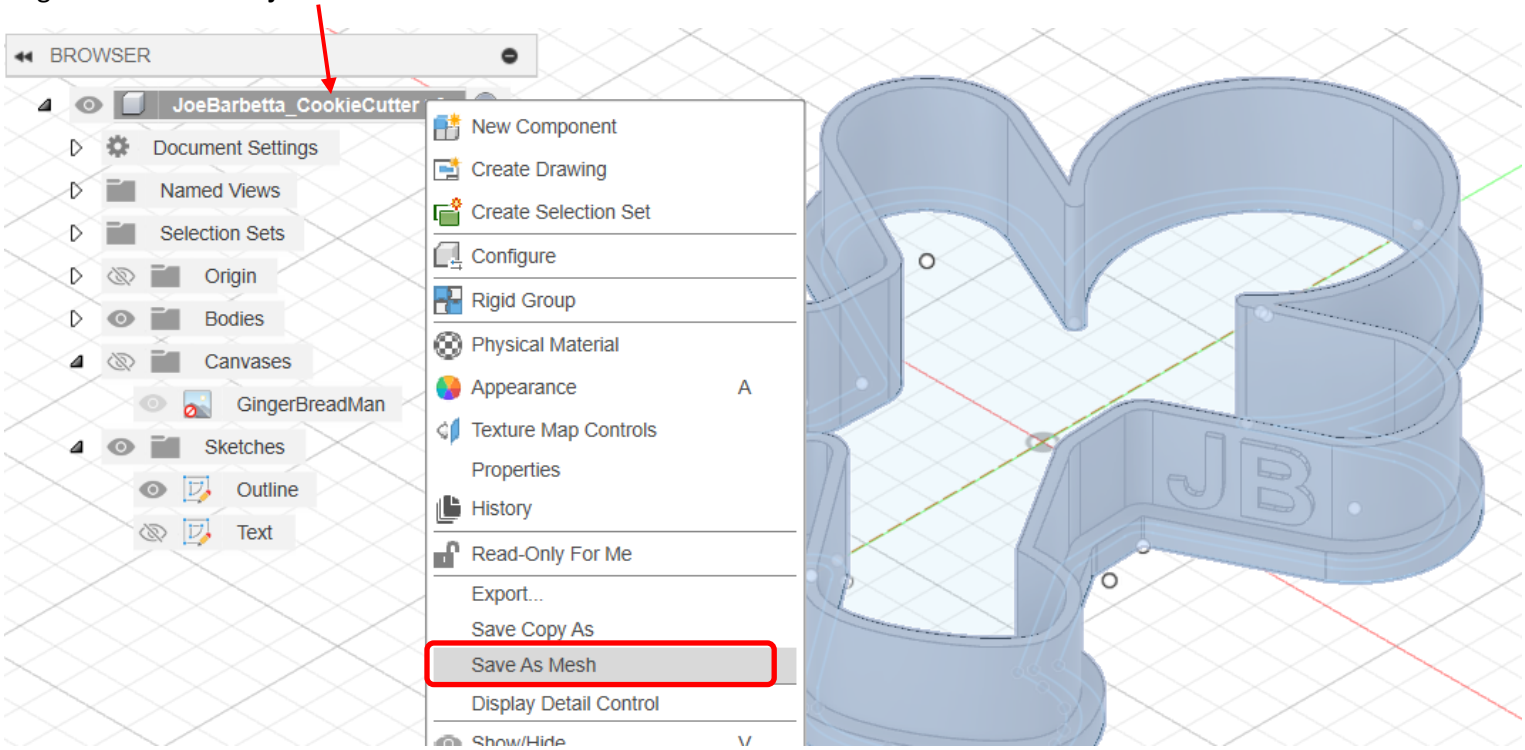
- return to the **Home** view. This is an example of the screenshot that you will submit.

Your screenshot should include the top tab, with you name, the left side Browser view with the Sketch names showing, and your cookie cutter.

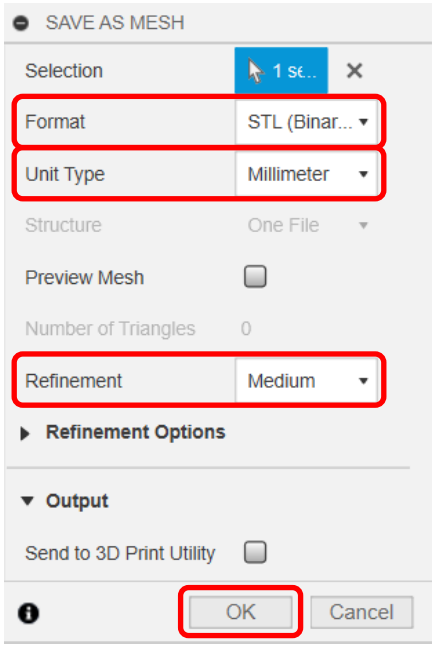


Exporting a .STL file

- right-click on the **Project Name** and select **Save As Mesh**



- ensure the **Format** is set to **STL (Binary)**, **Unit Type** is **Millimeter**, and **Refinement** is **Medium**. Click **OK**.



The Name should be automatically set to your Project Name and the default save location will appear at the bottom. Click **Save**.