

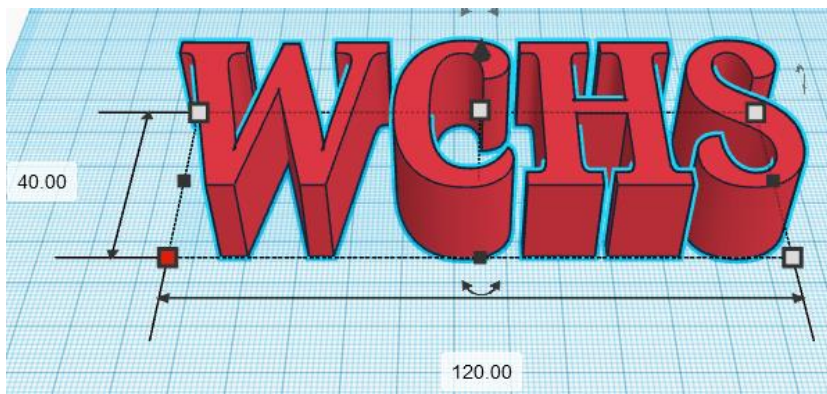
3D Object Weight

Due Monday 4/18/22

When you 3D print something, it becomes a physical object with weight. The things we print are usually quite small, and their weights would typically be measured in grams. 3D printers have all sorts of settings that allow them to make printed objects partially hollow to reduce cost and printing time. Today we're going to do our own version of optimizing an object to reduce its printed weight by reducing the volume of what would be printed.

Just read this over, the complete instructions are on the last page.

We're all starting with the same thing: the text "WCHS" in Tinkercad.



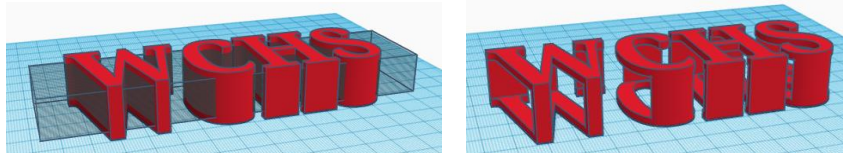
There is a web site that will tell you the volume of an object in cubic millimeters if you were to print it. The above object, for example, would have a volume of 40,275 cubic mm. Here is the info the web site gives us for the starting text:

Model info

Name	WCHS Weight 2022.stl
Size	120 x 40 x 20
Volume (mm ³)	40,275
Units	<input type="text" value="mm"/>

Your task today is to remove parts of the object while preserving the front, back, top and bottom connections and with the goal of reducing the volume dramatically.

For example, I created a hole rectangular box placed it inside the text such that it would remove a bunch of the insides of the letters, while leaving the front, back, top and bottoms unchanged:

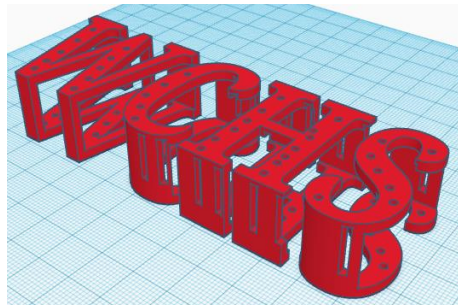
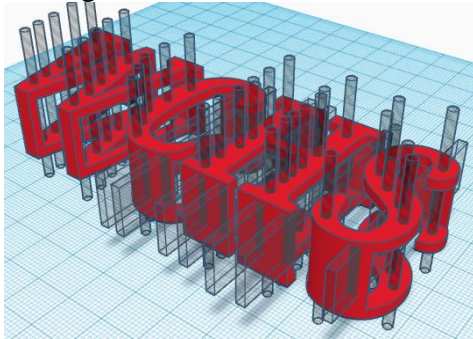


When I group those parts and check the new volume of the object, it was lowered to 14,167 cubic mm. That's a huge reduction (from nearly over 40,000 down to around 14,000 in one move!).

Model info

Name	WCHS Weight 2022(1).
Size	120 x 40 x 20
Volume (mm3)	14,167
Units	<input type="text" value="mm"/>

I brought down the volume much further by adding a bunch of holes like this:



This brought things down to under 13,000:

Model info

Name	WCHS Weight 2022(3).
Size	120 x 40 x 20
Volume (mm3)	12,656
Units	<input type="text" value="mm"/>

I know I could have gone farther. Can you?

If you have an object in Tinkercad and you want to make a copy of it, you can hold down the Alt key and then click and drag on the object. This makes a copy of it automatically.

The assignment today is clearly detailed on the next page.

Steps:

1. Rename your Tinkercad project to be your name and "3D weight".
2. Use the text tool and write "WCHS" in all caps in the default font. Change the size to 40 by 120 by 20 tall.
3. Use at least 10 hole objects to reduce the volume of the word. Do not completely remove the fronts, backs, tops and bottoms of the letters. Each letter must have some bit of front, back, top and bottom all continuously connected by material. Please do not change the overall size of the text "WCHS". Obviously if you just made the object smaller it would have a smaller volume; the goal today is to make the volume smaller using hole objects while keeping the outer dimensions constant.
4. When you feel that you have reduced things enough or if you want to test your results, export your project to an STL file.
5. Go to this web site: <https://www.think3d.in/landing-pages/3d-model-price-calculator/> and upload the STL file you just created. Decide if you want to try to reduce the volume further.
6. Can you beat my record of 12,656? Note the size of my object as shown below: (120 x 40 x 20) that is the size yours should be. (See step 2 above.)

Sample screen shot:



When you are done, turn in a Tinkercad share link (get the link by clicking on the person with the + symbol icon over on the top right.)



Also turn in a screen shot showing your model on the other web site (like I have included above).

To take a screen shot on Windows 10 use Shift-WindowKey-S, then click on the image that should appear to the lower right of the screen. Then type Control-S to save it. I recommend saving the file with your name and 3D volume in the title.

When you are done you have turned in a Tinkercad share link and a screen shot of the statistics for your model. Call me over to ask for help if you aren't clear how to do any of this.