

Mock 3D Car Reflection

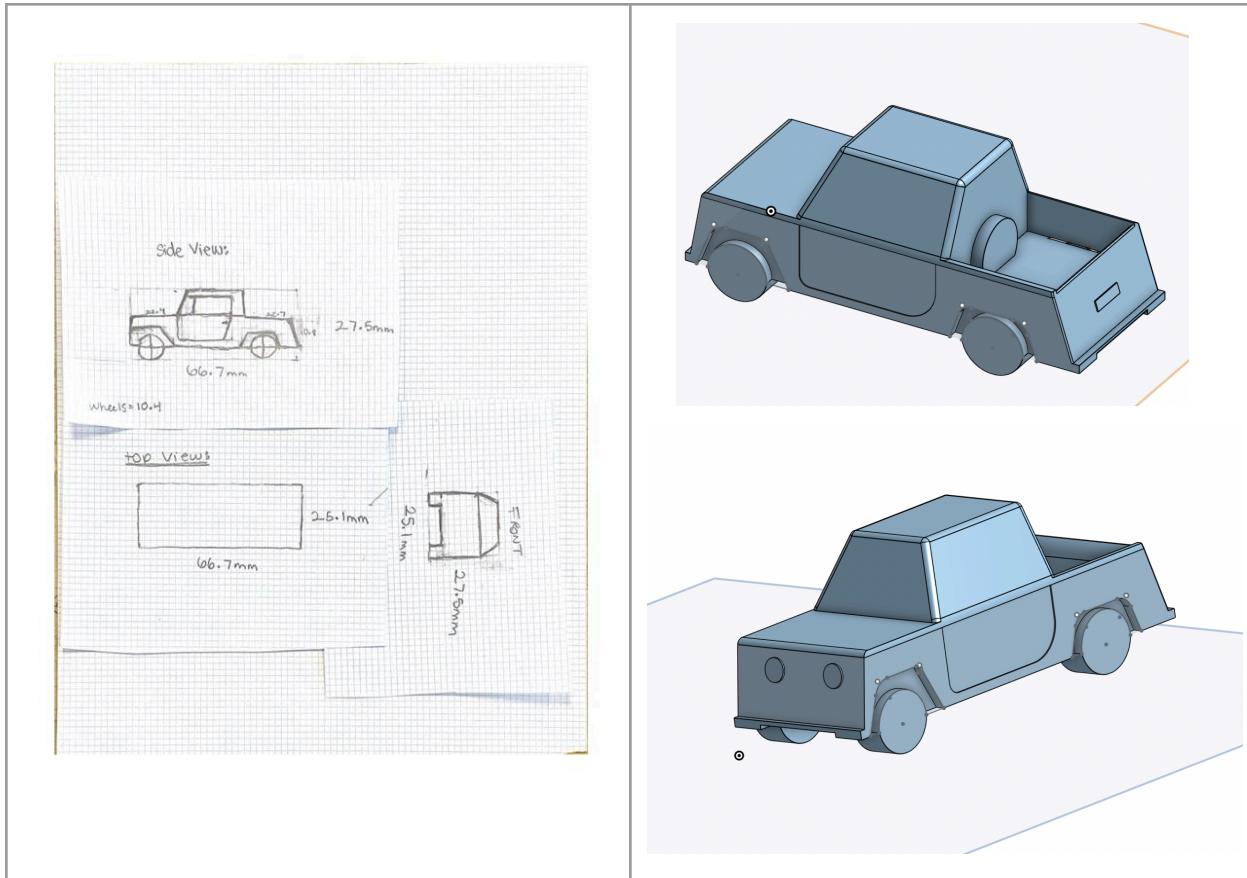
The steps were as follows:

- Choose a car
- Using a caliper, measure the top, side, and front view
- Draw out each side of the car on graph paper using accurate measurements
- Photograph the sketch
- Create a document on OnShape a create a rectangular shape proportionate to the length, width, and height of the car
- Upload the sketch images onto the cube, creating a 3D dimension
- Sketch and draw lines over all the hand sketches
- Extrude the empty space, leaving only the car
- Add details - create wheel well drawing and then extrude it/ add a truck bed/ tire/ headlights/ license plate etc.
- Add filets to soften edges of the car
- Create a drawing CAD design → add dimensions and find percent error (if necessary)
- Download STL file and drag it into Ultimaker Cura
- Find the angle that provides the most support for printing and rotate the design until fit
- Slice the file and download Gcode for printing
- Print design
- Remove excess support filling and the car is done!

The process:

I picked out a truck that I liked. I measured it using a caliper and drew out the sides of the car on graph paper with the correct dimensions. I went onto OnShape and made a rectangle that matched the length, width, and height on my car. I uploaded my sketches onto the correct side of the rectangle. I then created a digital drawing sketch over my hand drawn sketch. The empty spaces were extruded to leave only the car behind. After some edits to the sketch, and redoing the extrusion I was ready to move onto the next step. I thought about what details I wanted to add. The most important for me was the wheel wells and the back tire. I started with the wheel wells by creating a sketch of where I wanted open space around the tire. I extruded this shape to indent around the tires. Then, I tackled the back wheel. I had to start by adding the truck bed. I did so by creating a square sketch where I wanted the truck bed to sit. I extruded this shape to sink the shape, leaving behind the truck bed. To add the tire, I created a circle sketch in the middle of the front of the truck bed and then extrude added the circle to have a 3D tire effect. I was having fun with the design process so I added headlights and a back license plate, both by creating a sketch and then extrude adding the shape. Once my design was done, I started on the CAD design. I added the dimensions back onto the digital design and found that it was the same as my original measurements leading me to have no percent error. This meant that my ratio for my sides was 1:1. I downloaded this as an STL file and dropped it into Ultimaker Cura. In Ultimaker Cura, my car was

already in the best supported position so I didn't have any changes to make. I sliced the file and downloaded the G code for printing. Once my car was printed I removed the extra support filling and was left with my final design!



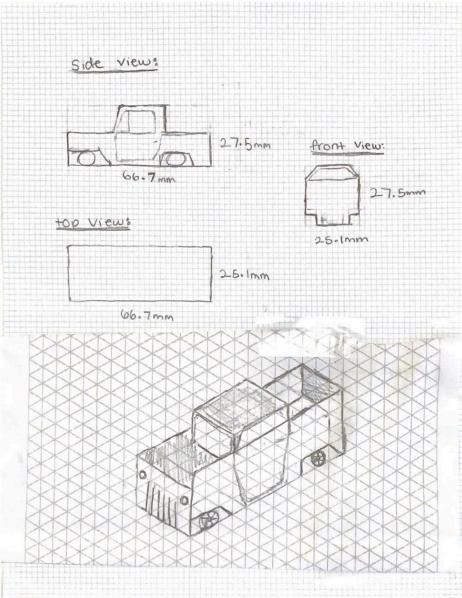
The final sketch of the original toy car

Digital 3D car made in Onshape

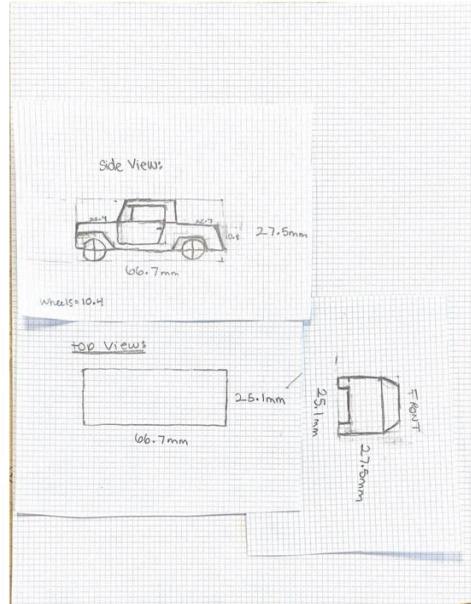
Challenges, setbacks, and solutions:

My main challenge and setback was in the beginning of the process with my sketching. My original sketch, as seen below, had the middle section of my car touching the floor. Once I put this into Onshape and began sketching over it I realized the design I had drawn was not accurate to the car I chose. The middle section should have been lifted - a silly mistake! I went back and re hand sketched my side view to lift it to about half way through my tire. When doing so, I caught another mistake I made in the drawing process. This mistake had to do with the bottom bit of my front view. In my first drawing I sketched open space where I wanted the tires to go. I realized that I actually needed to do the opposite and have the tire space incorporated into the shape so that I could carve the tires out of them. I was able to keep my original rectangular cube but uploaded the new sketches to each side. When I extruded the open space for the second time, I was left with a much more accurate result. Another slight setback I had was realizing my original car had front

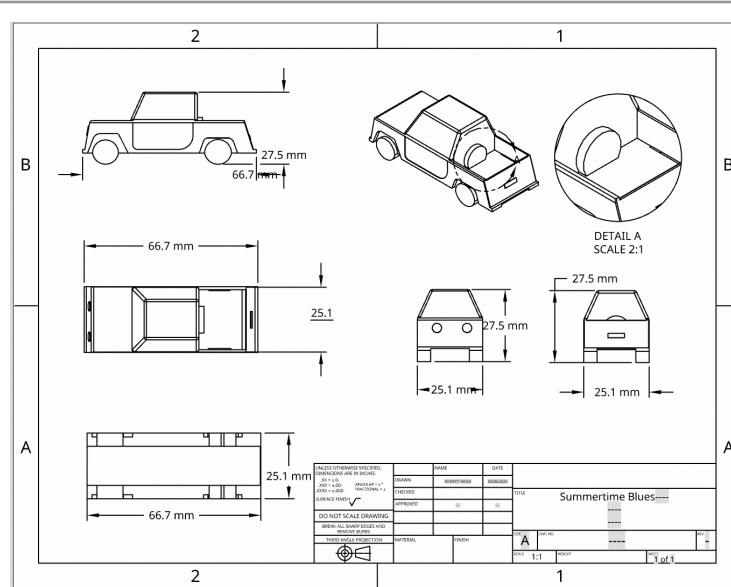
and back bumpers that I did not sketch on. I had to go back and change my digital sketch to incorporate the bumpers.

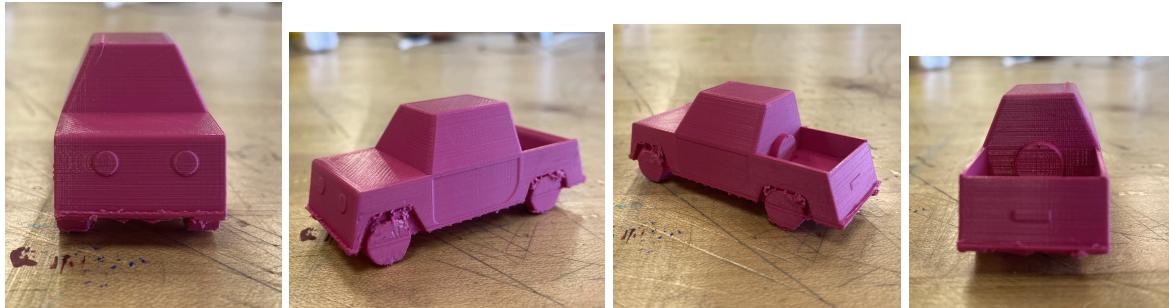


First sketch



Second Sketch





Finished project