Car Design Project - [redacted]

Objective: Students will begin designing a car. The final product will be printed and raced against other classmates. The goal is to have the fastest car in a straight line on flat ground (classroom floor).

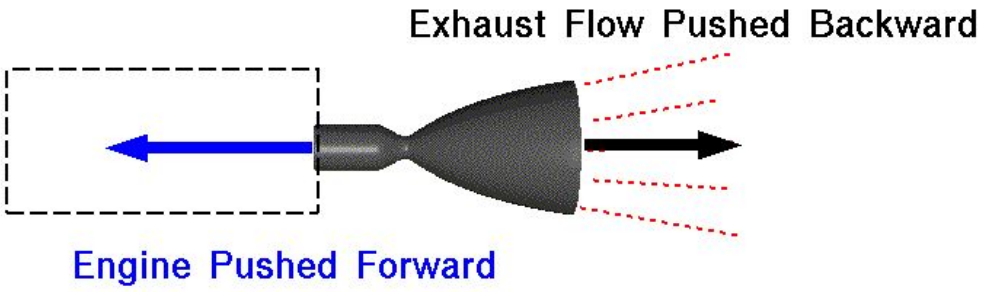
Background:

- The car will need to be somewhat aerodynamic.
- There needs to be a way to attach a balloon to the car somehow for it to successfully move forward.
- The lighter, less filament that is used, the better off the car will be.
- The wheels will need to be attached smoothly so that they can turn freely with the least amount of friction slowing them down from moving forward as possible.
- There are creative ways to attach the balloon to the car, probably the smartest and efficient way to attach it to the car honestly, on Google Images.
- Top Fuel Dragsters are very aerodynamic and are a simple design (front spoiler sort of thing low to the ground for downforce, skinny triangular shaped body, and a large rear spoiler in the back). They are also really cool to watch and feel the experience of a car doing 300+ MPH down a track and finishing the ¼ mile in less than 4 seconds!

- Create a design that somehow resembles something like a rocket engine. Possibly have the body be the same as a rocket engine since the design of one is so simple but successful in the world of NASA (like the image below).

Newton's Third Law

Rocket Engine Thrust



For every action, there is an equal and opposite re-action.

Sources:

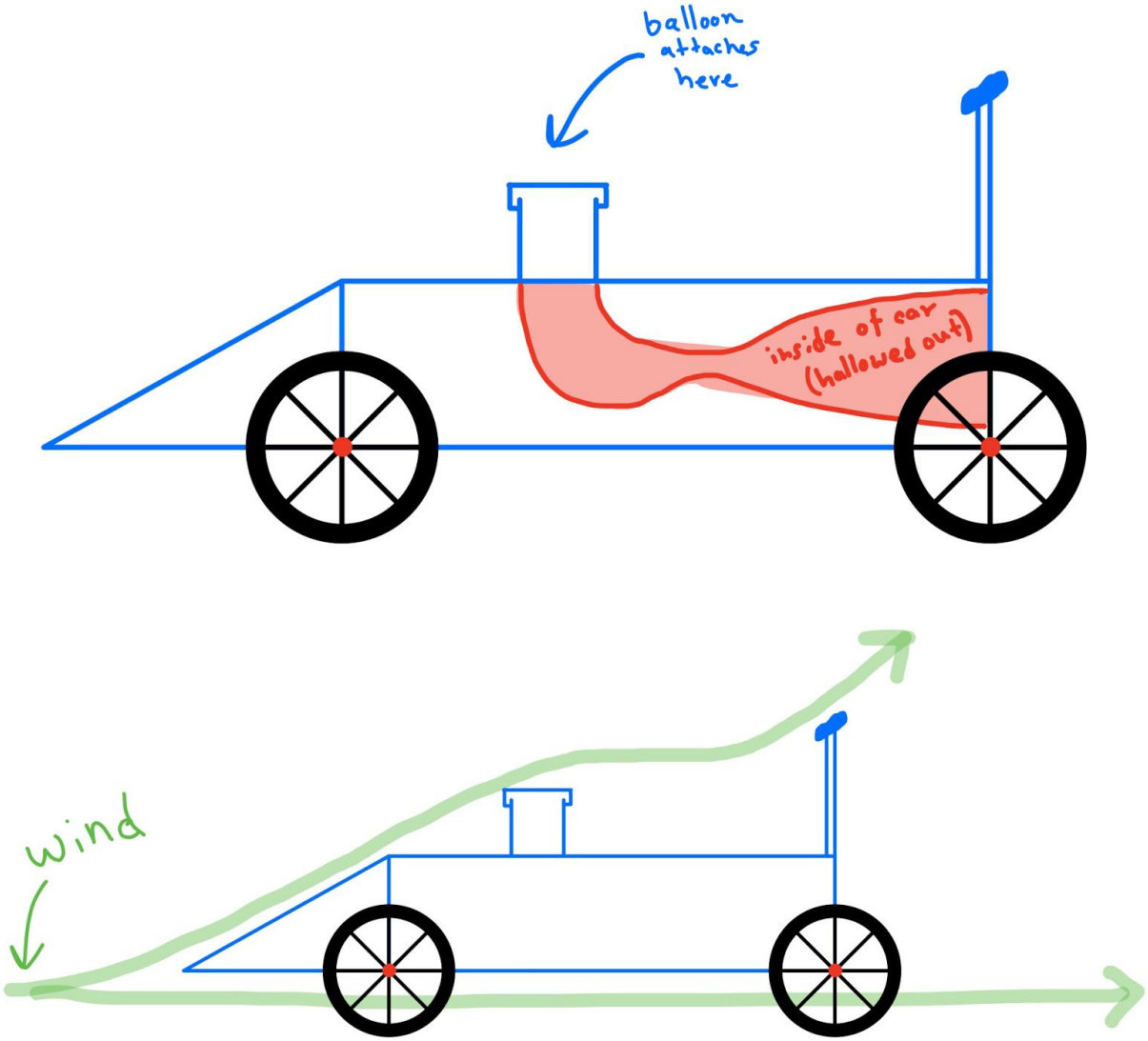
- https://sports.yahoo.com/blogs/nascar-from-the-marbles/nhra-approves-enclosed-cockpit-top-fuel-dragster-020508556--nascar.html
- https://www.grc.nasa.gov/WWW/K-12/rocket/newton3r.html

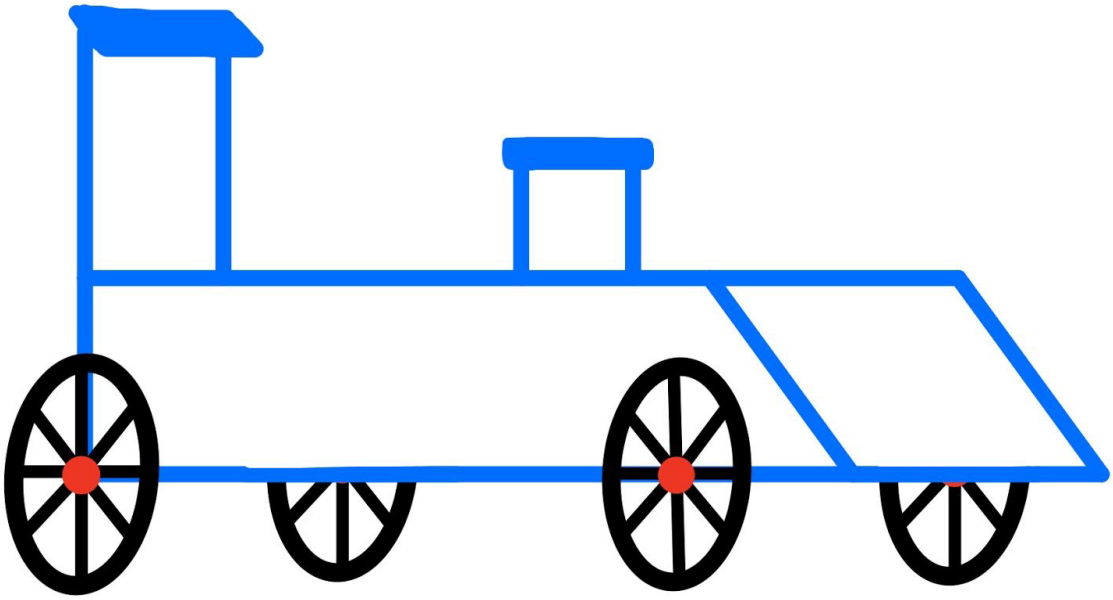
Constraints/Parameters:

- Has to be somewhat aerodynamic.
- Will hopefully look kind of cool.
- Have to make sure the wheels fit and are straight so that it will go straight and as fast as possible in the straight line like the requirements say we will do.
- Create something that is no larger than 15 cm by 15 cm because that is the size of the platform that is available.
- It needs to be fast in a straight line and have the balloon not interfere with the workings of the 3D printed car.
- It needs to be the best out there on the track!
- Needs to have downforce both in the front and the rear using a front spoiler (not technically a splitter I don't think) and rear tall spoiler.

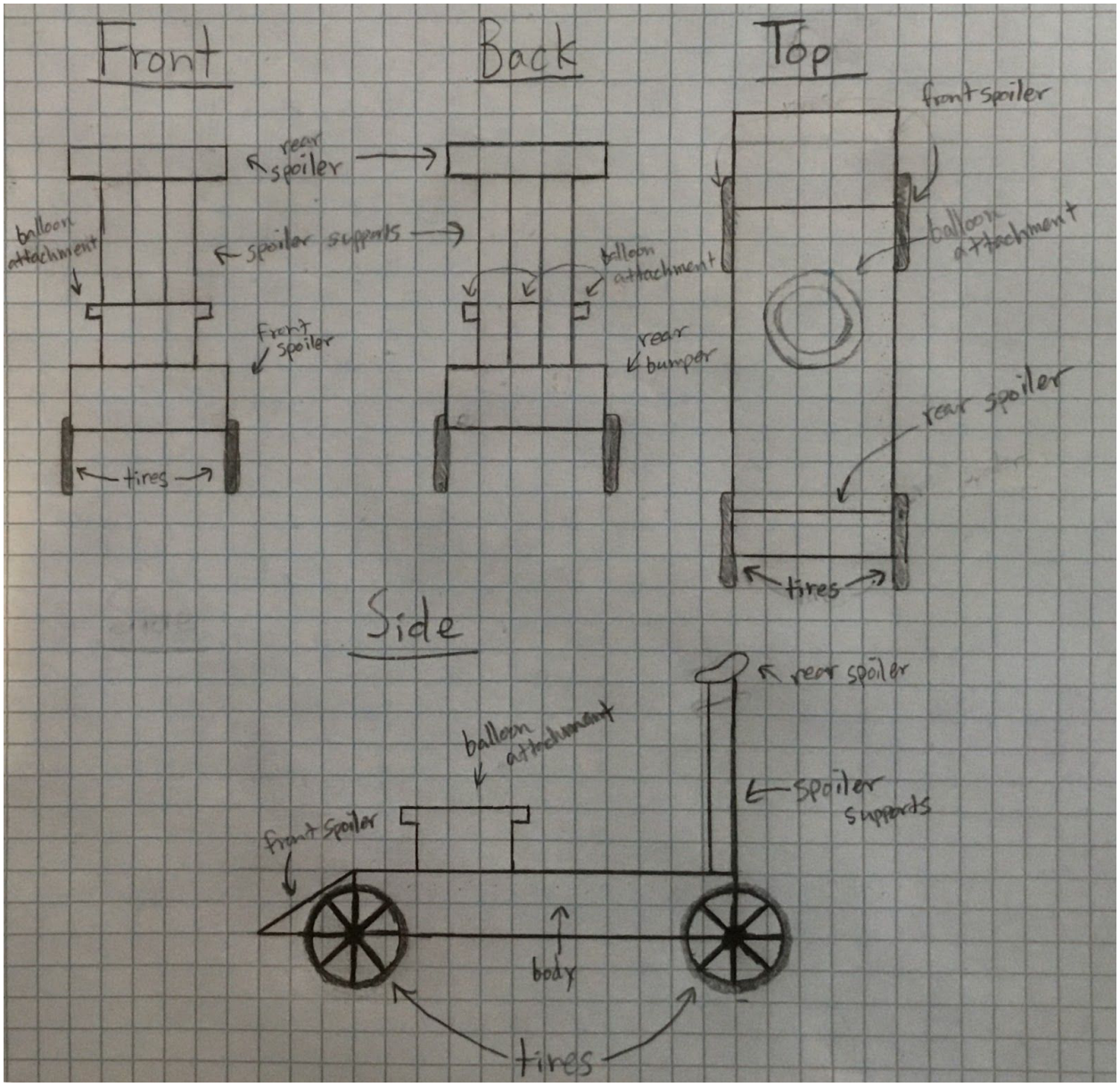
Brainstorm:

- Make the car have a sort of angled front nose part and have a cool looking spoiler on the backs and cool looking spoke-style wheels on it.


balloon attaches here
inside of car (hallowed out)
wind

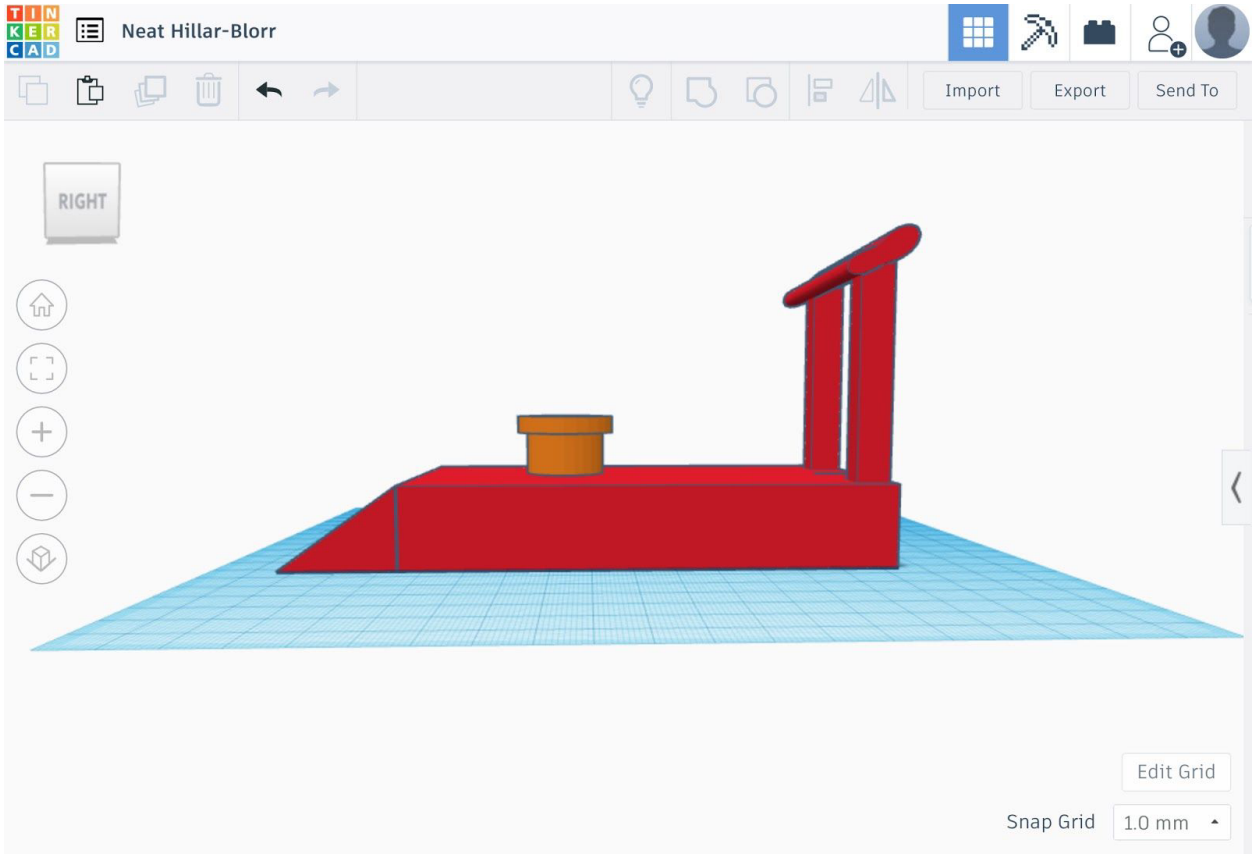


Orthographic Drawings:



Develop/Design:

- Use a laptop to find your design on the computer and then export it onto a thumb drive.
- Export the file to the thumb drive, bring it to the 3D printer, insert it into the printer, find the file on the printer, select build, and print it at 220 degrees celsius.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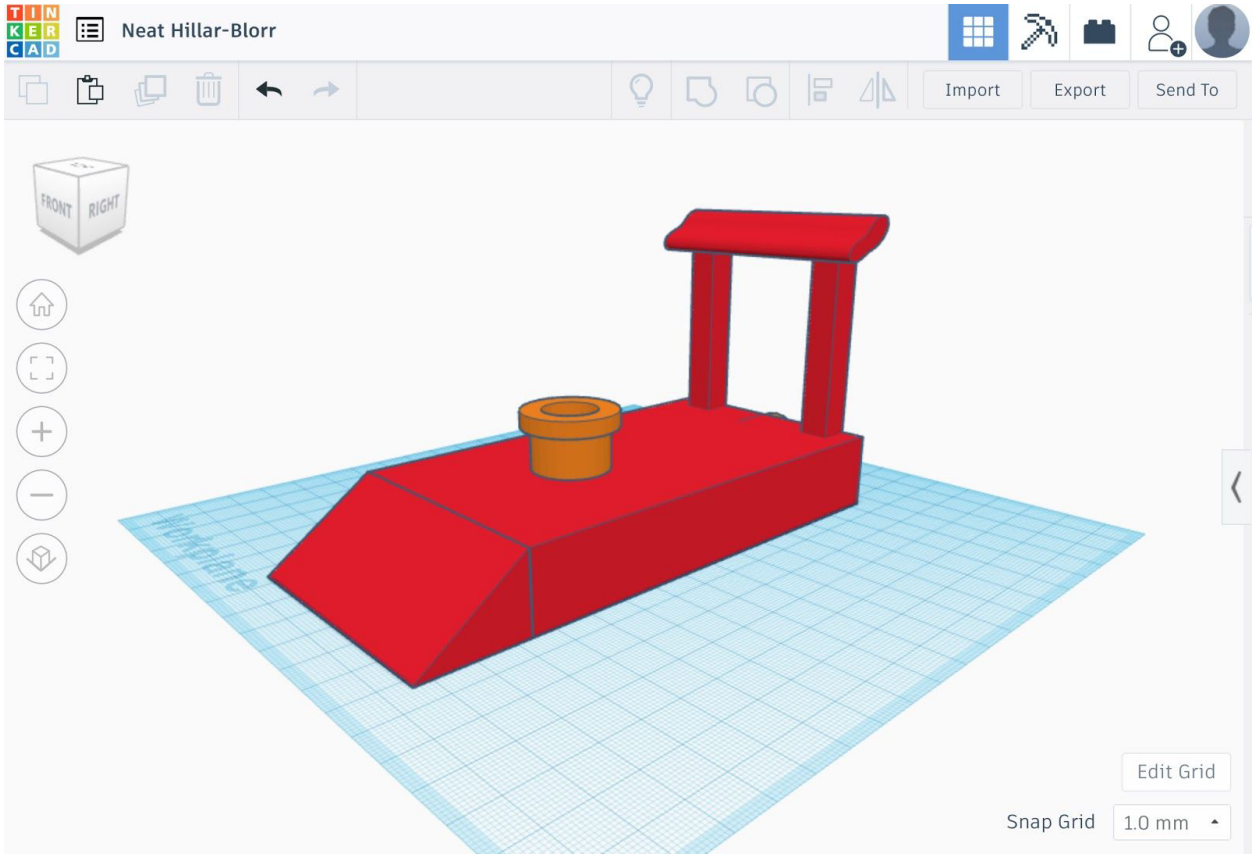
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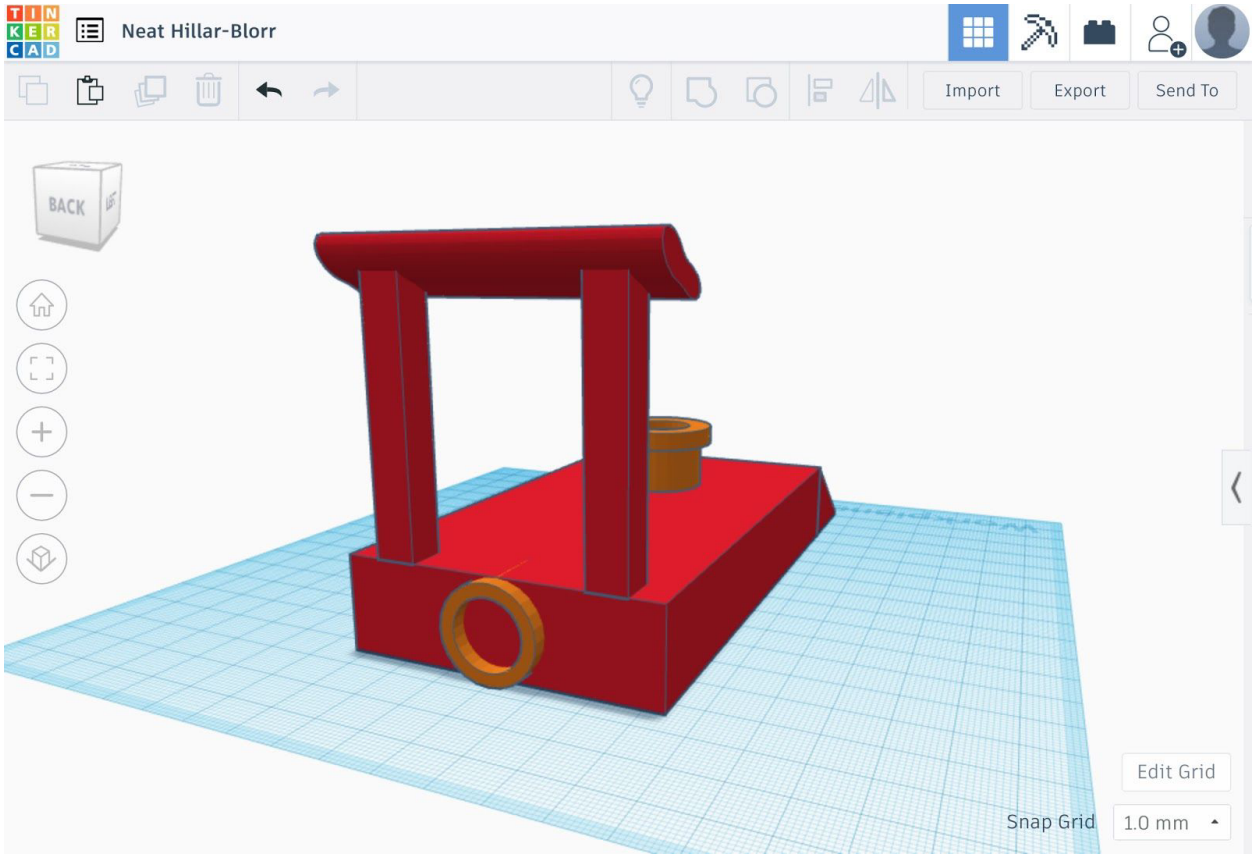
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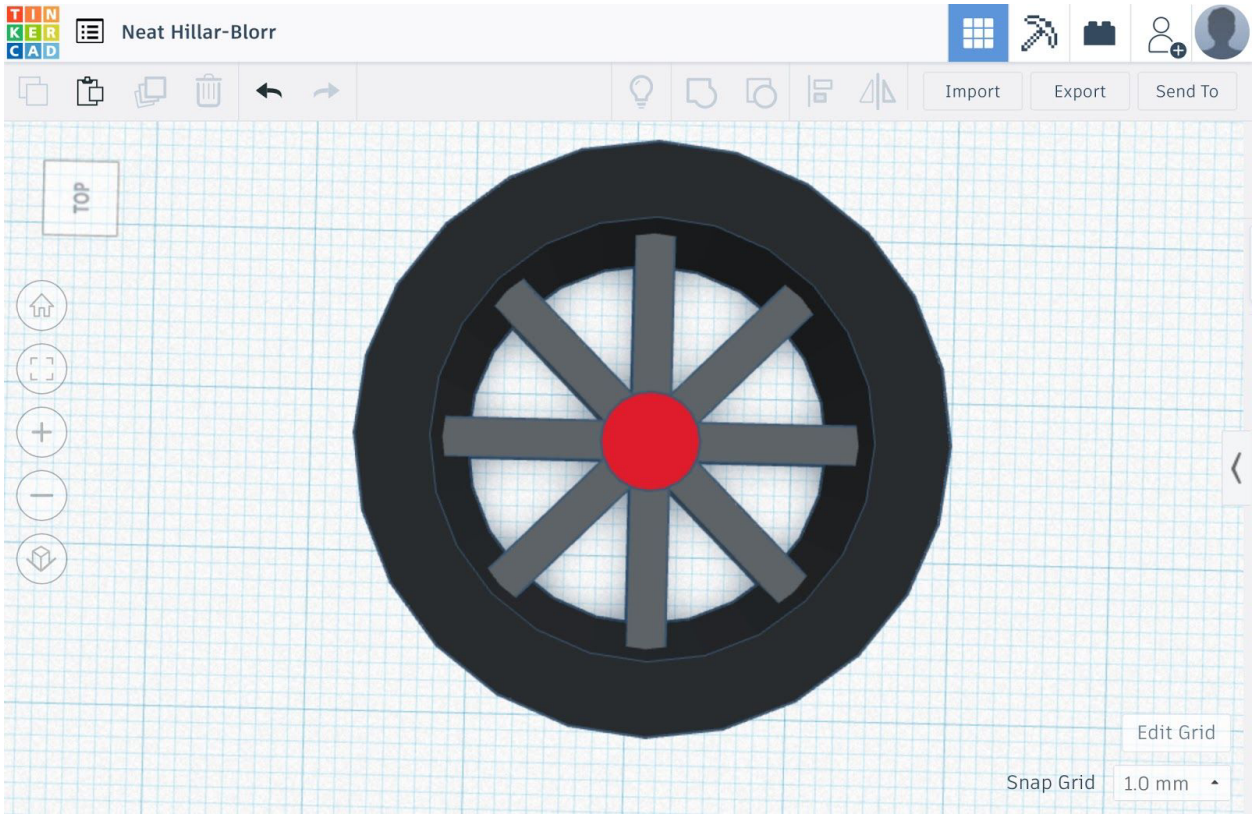
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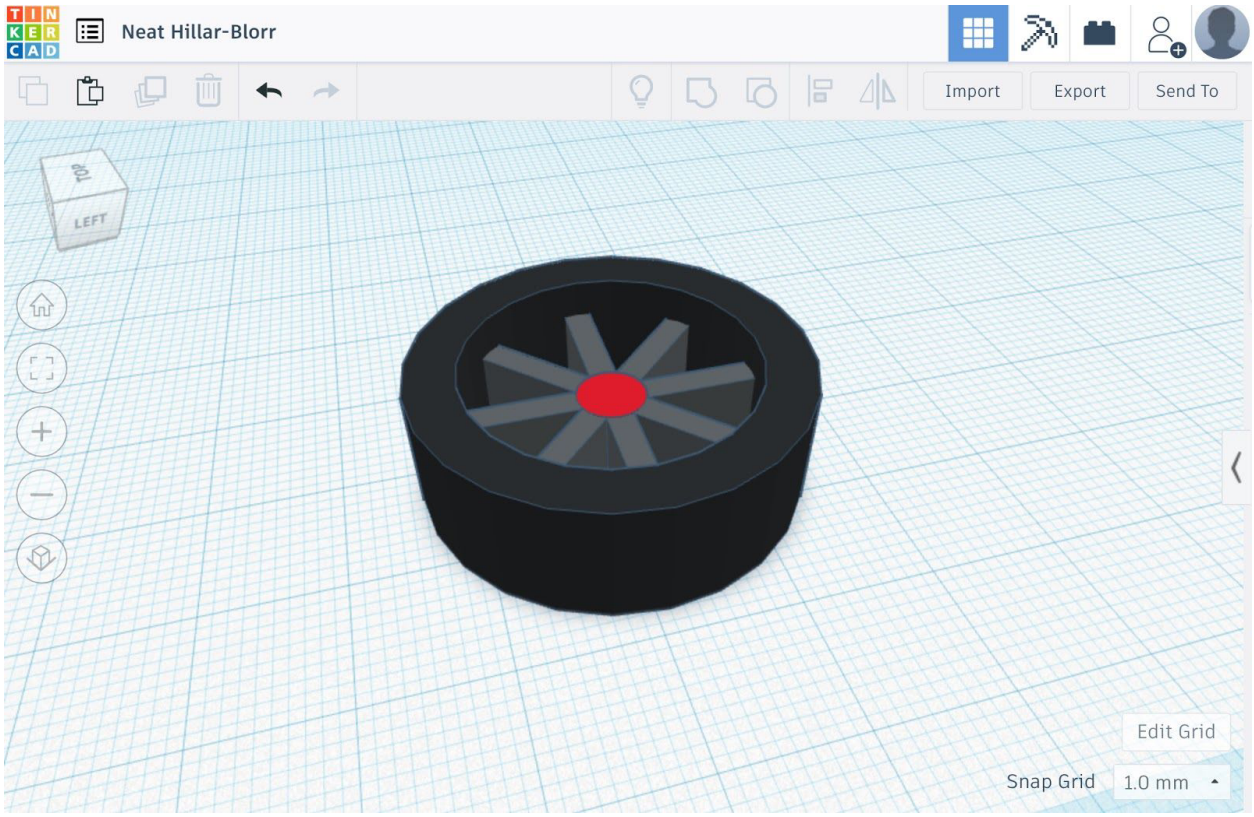
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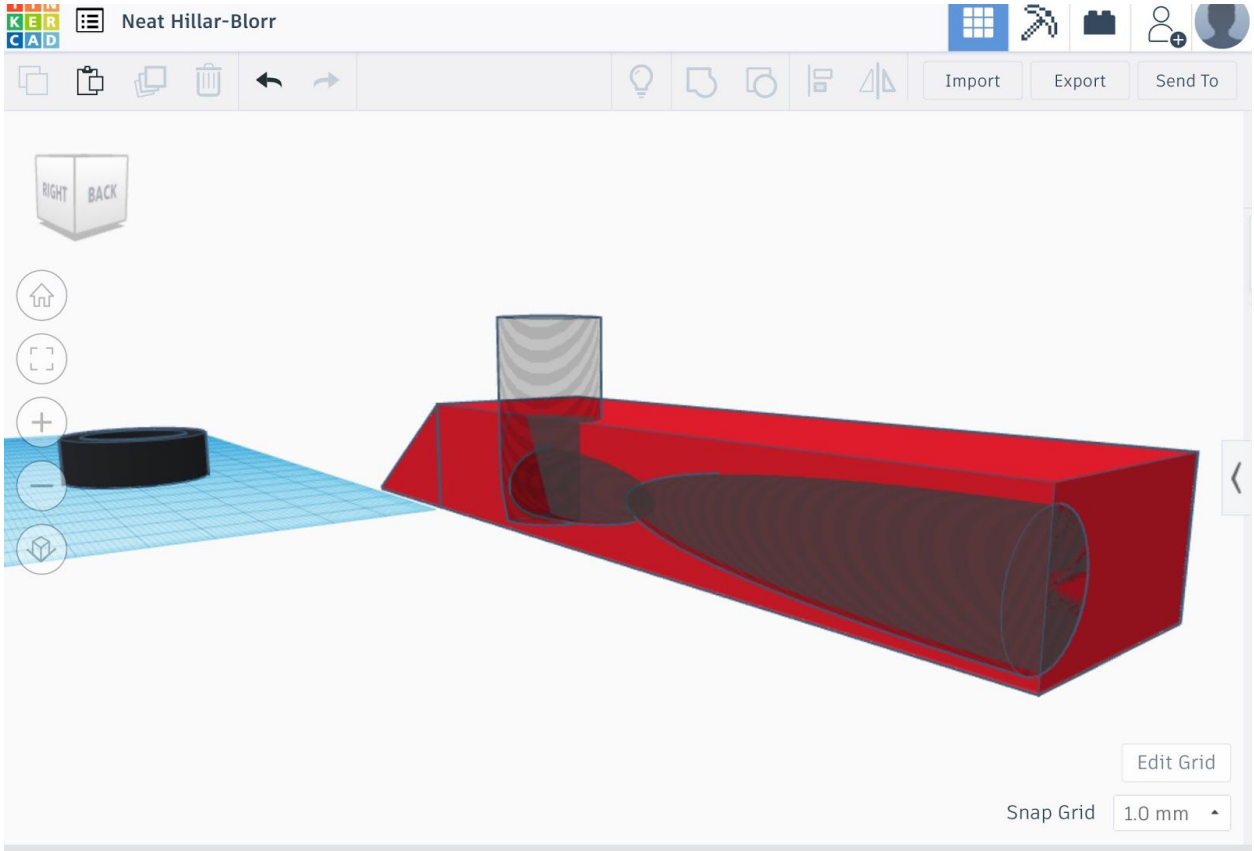
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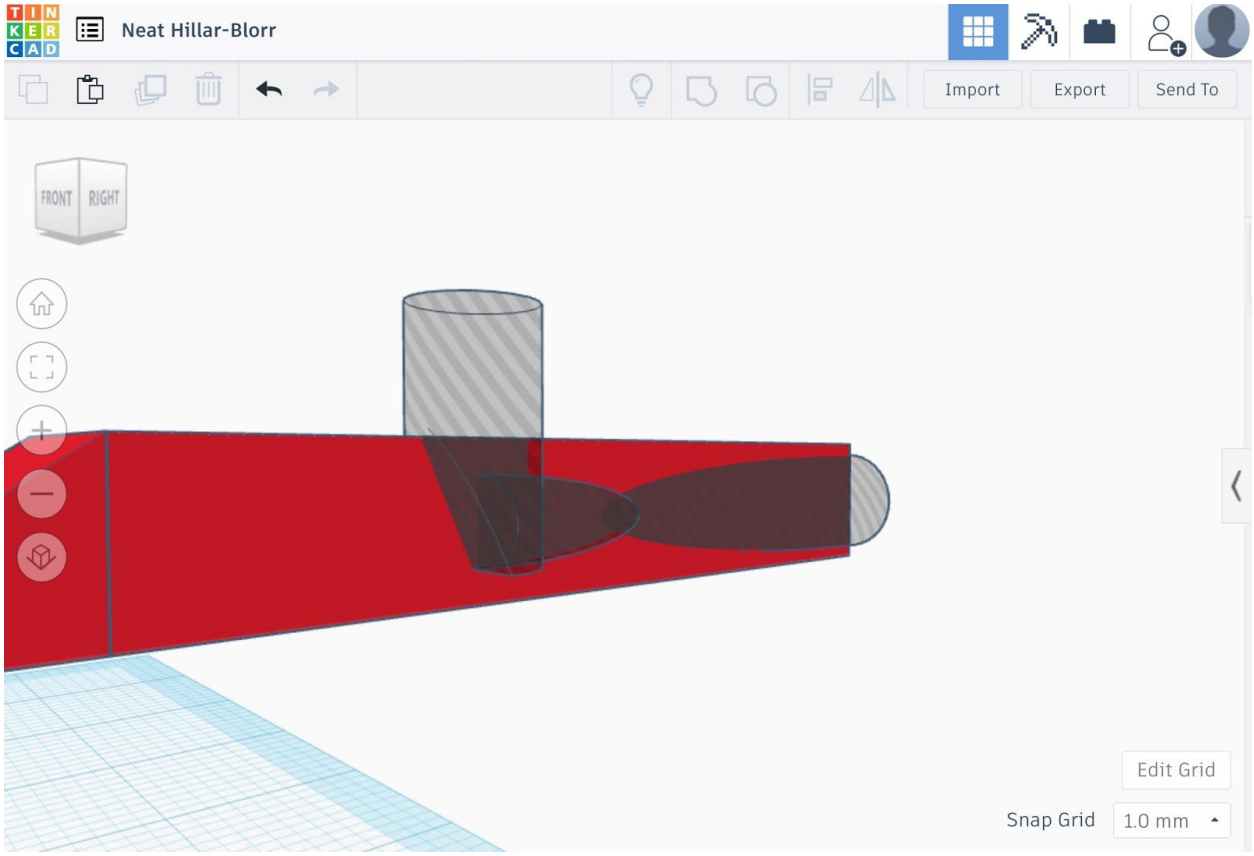
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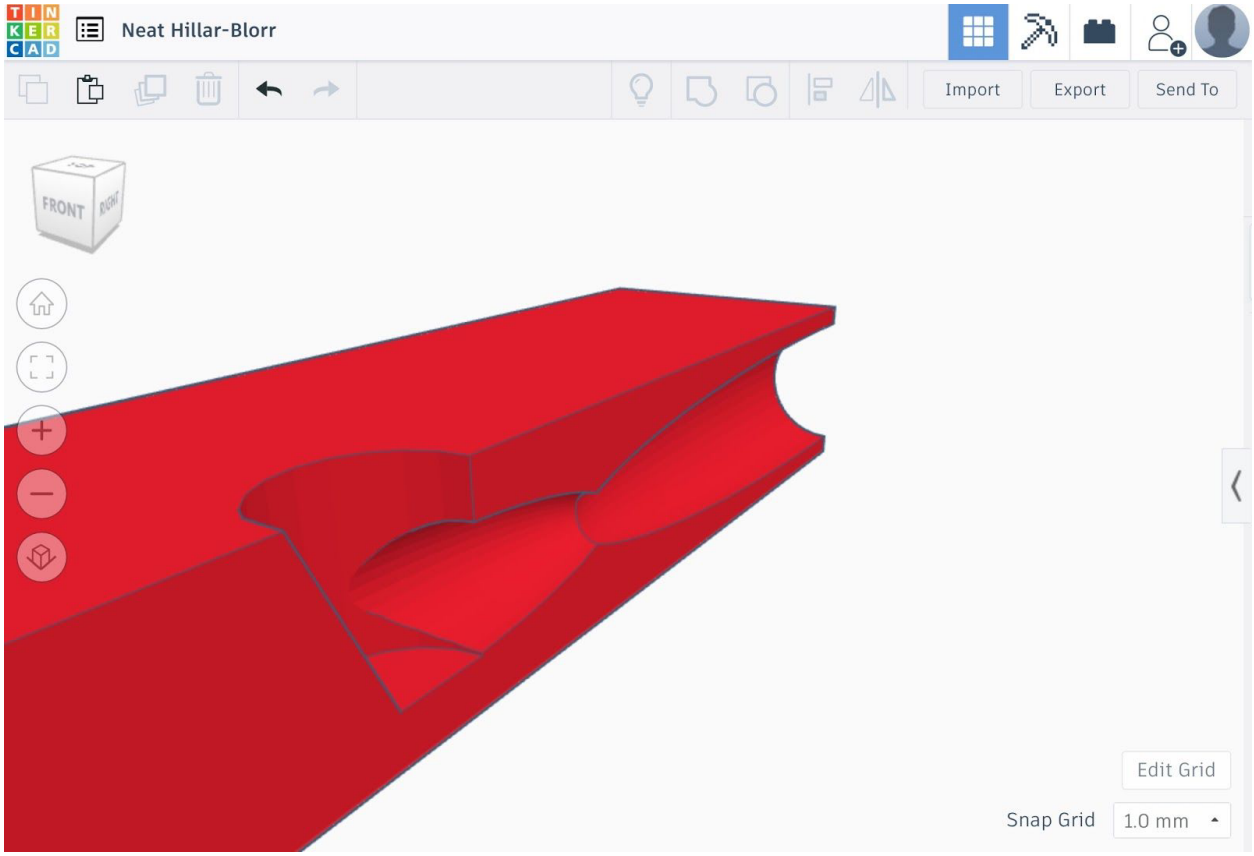
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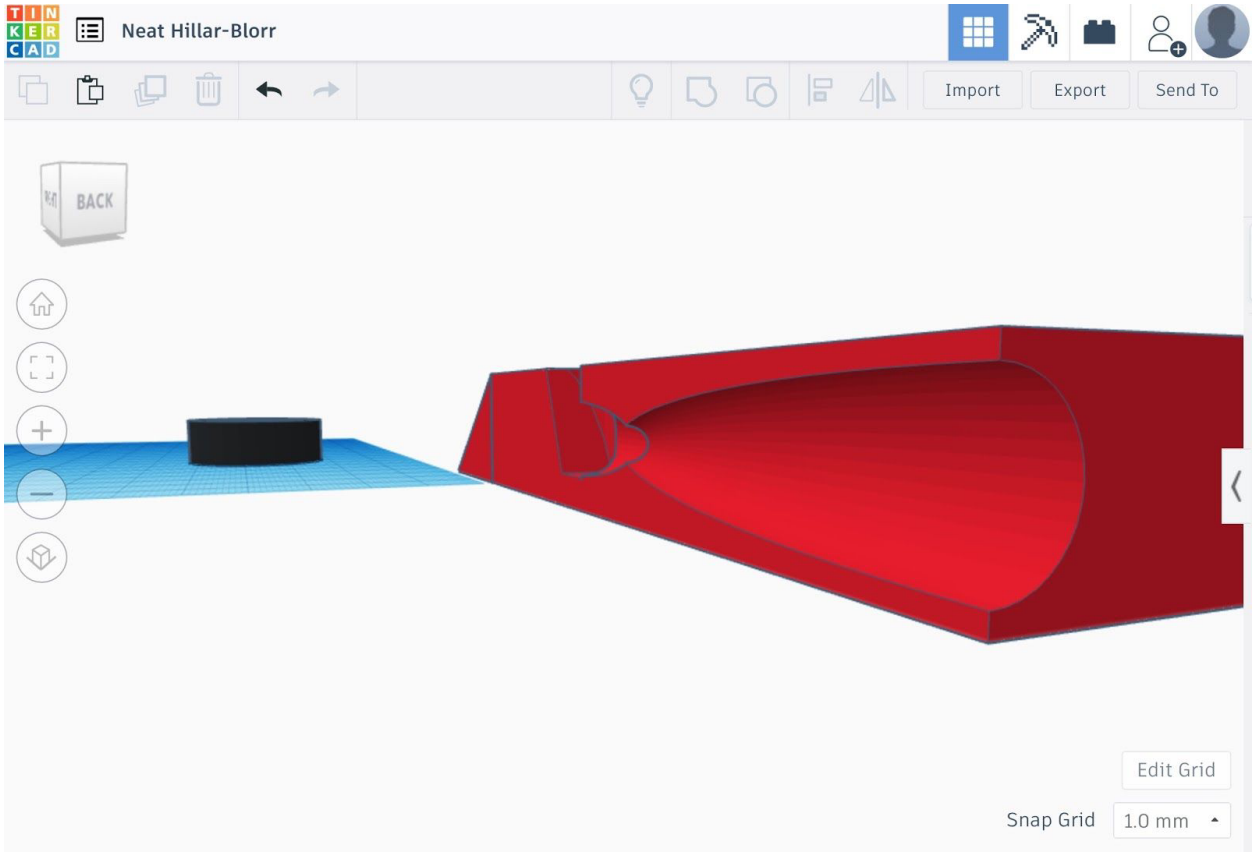
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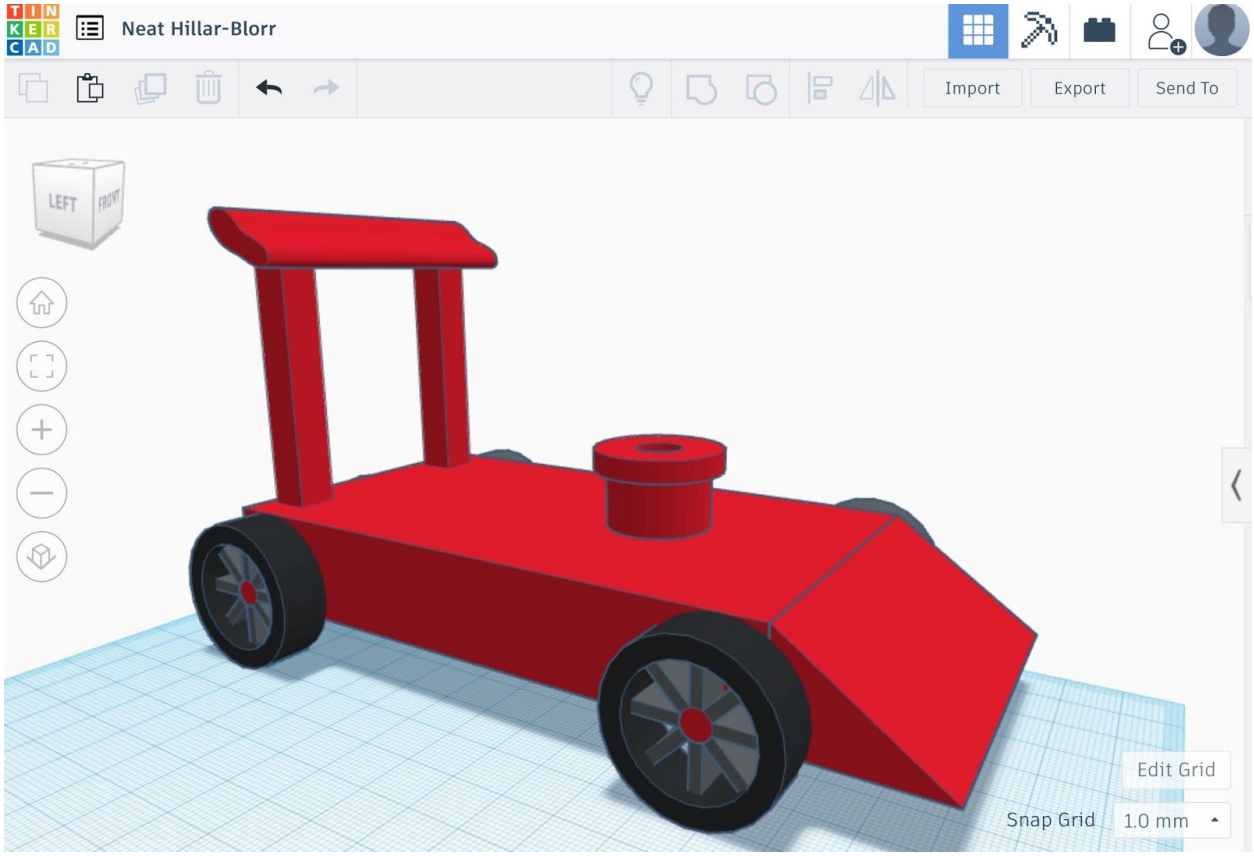
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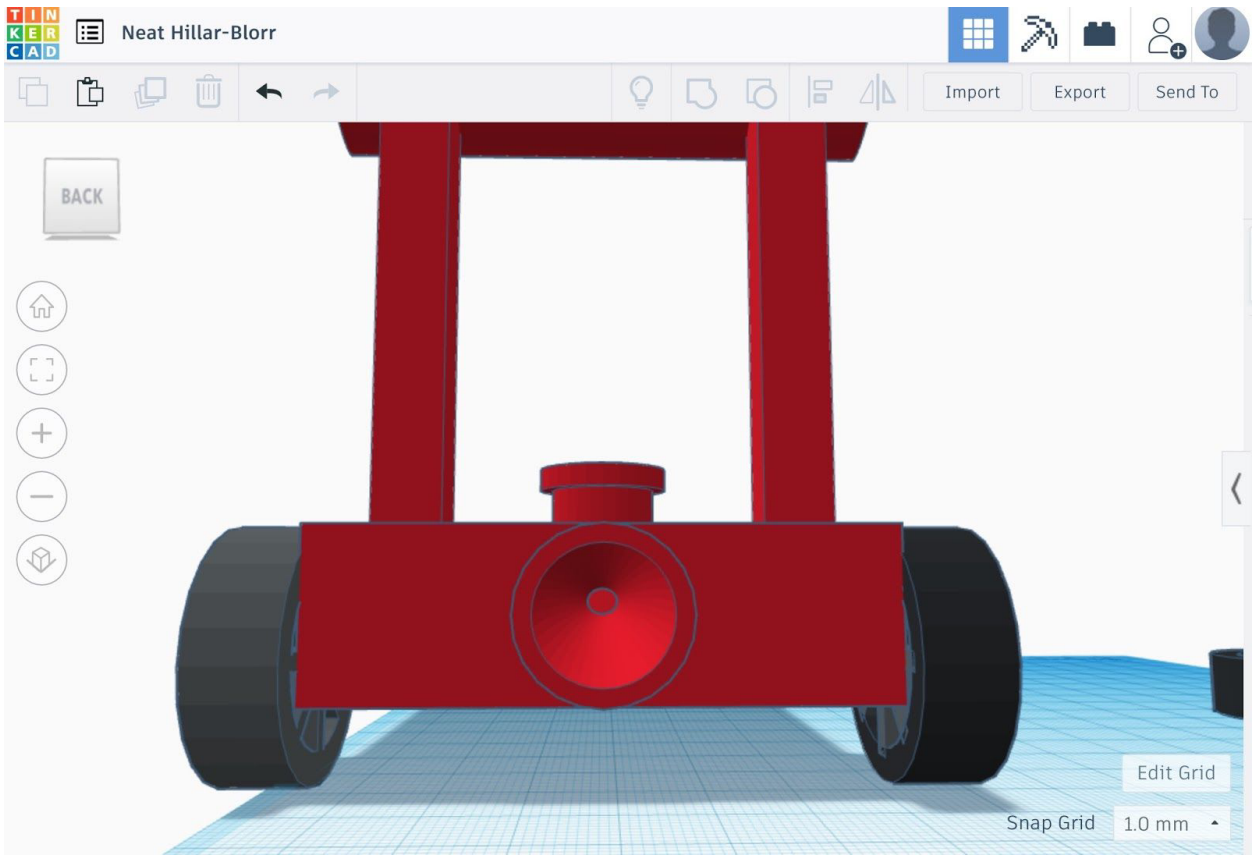
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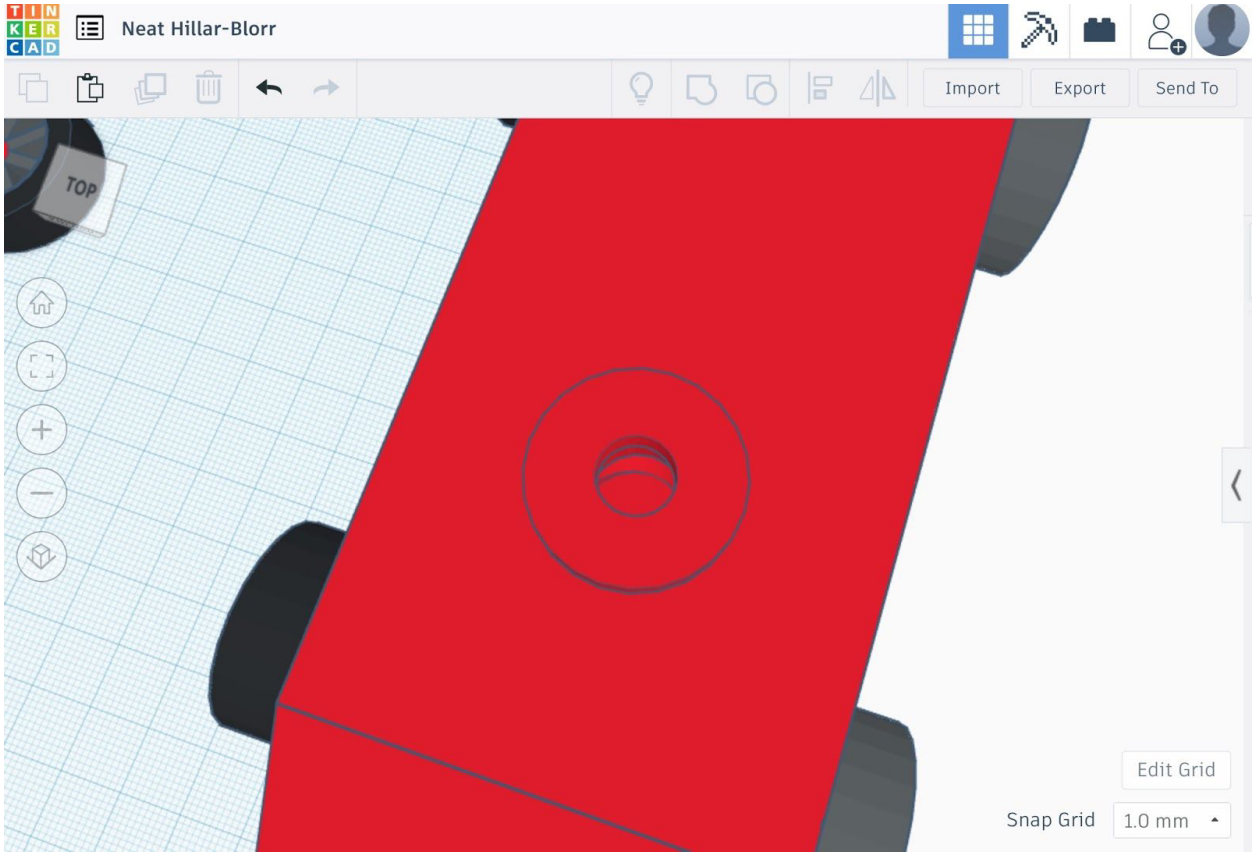
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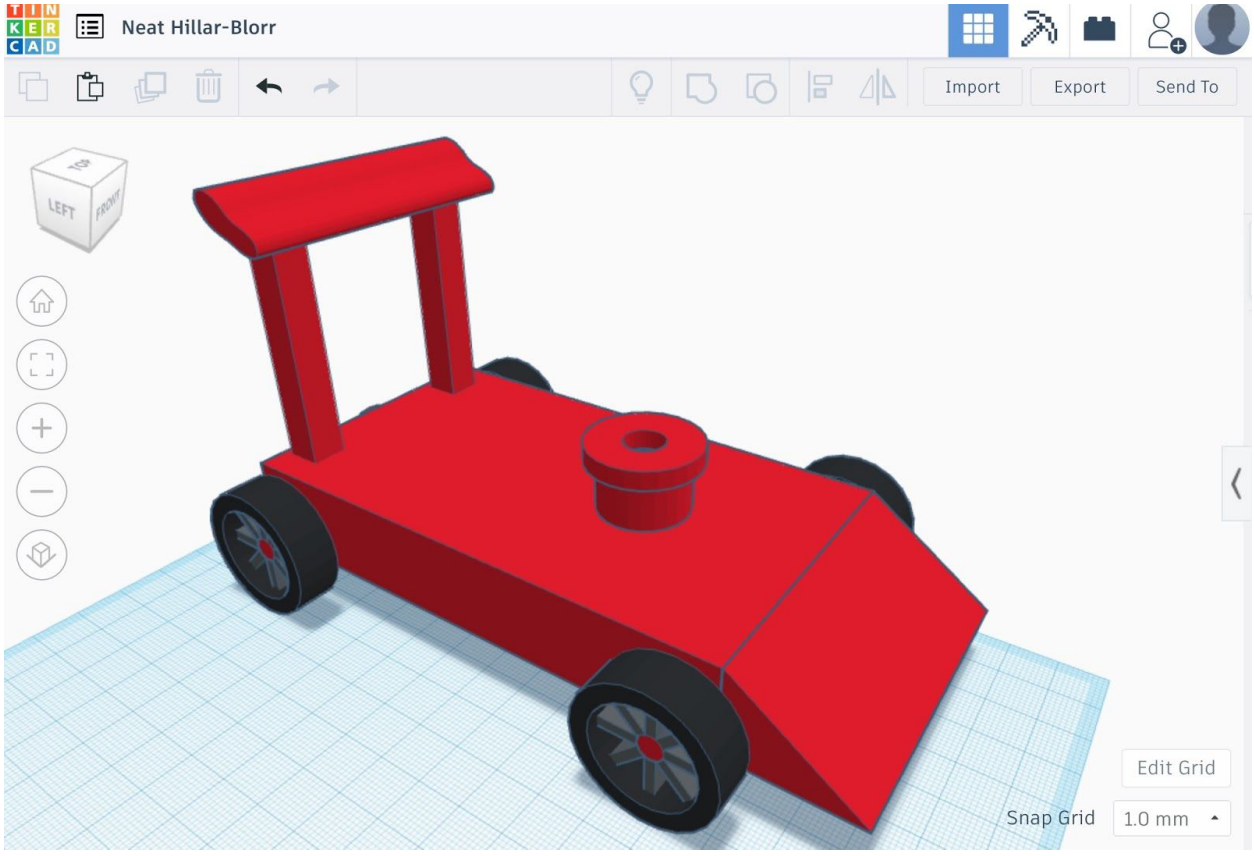
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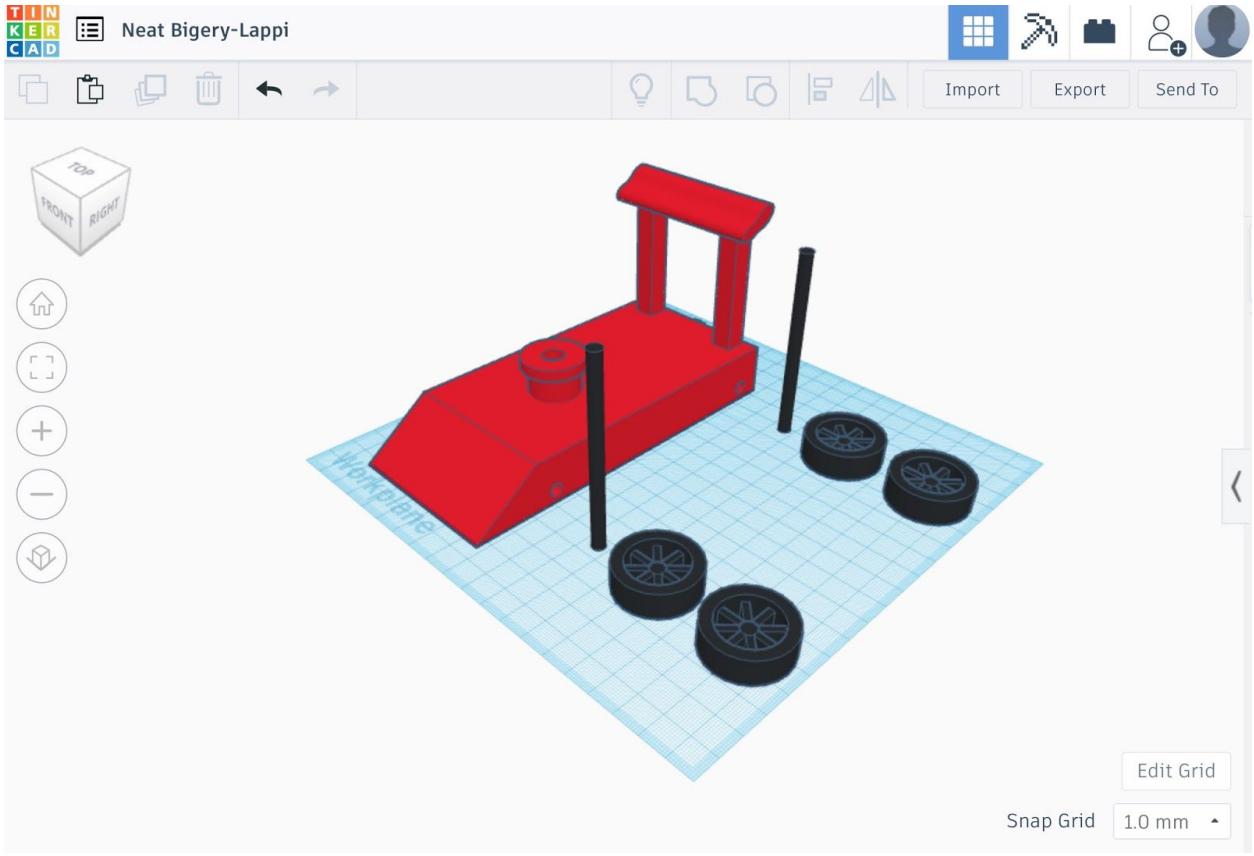
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Note: Axle area is oversized so axles will fit through the axle holes. The inside of the wheels have a space for the axles to sit in and be “welded” with the 3D pen to the wheels. The inside is holed out and everything as of now is in perfect working order as I see it and I believe the dimensions of the object are small enough to be printed on one build plate now!

Reflection Write-up:

What has been the easiest part of this project?

- The easiest part of this project I would say was creating the wheels and tires because of how easy it was to make the spokes for the wheels and to make them look really cool. I enjoyed the customization and freedom of creativity this project offered us!

What has been the hardest part of this project?

- The hardest part of this project I would say was holing out the inside so that the hair could flow throughout the car. It was challenging since we use different shapes to hole out the inside of it. The inside is holed out to my liking, but it was a lot easier to draw it on notatvility than it was actually holing it out to the shape I wanted.

What would you do the same next time?

- If I were to do this again, I would definitely use the air flow design I have to attach the balloon to. I actually stole that idea of how to attach it from someone elses I saw online when I was doing background research, but that is definitely something I would reuse again on the project if I had a second chance to do it.

What would you do differently next time?

- Next time, I would design my car body to be smaller and lower to the ground with smoother, non-sharp and rough edges for better aerodynamics. Even though we aren't focused on aerodynamics really at such low speeds our cars will be traveling, the big idea is what counts.

What could have made the project better?

- The project would have been better if maybe we didn’t use balloons and we used a downhill ramp or downward incline of some sort and someone made the tread of the wheels different and tested friction. That would be probably a different project though involving friction. Maybe we use the cars afterward with an inclined ramp. Overall I think the project was pretty fun as is!

STL Files:

Car Body - https://csg.tinkercad.com/things/koEmgg0rZcH/polysoup.stl?rev=-1

Wheels + Axles - https://csg.tinkercad.com/things/dEj1ViHsdkX/polysoup.stl?rev=-1