

Filters Vs Filter

Can I create a less expensive version of a water filter(s) which can filter water equivalent as the LifeStraw water filter?

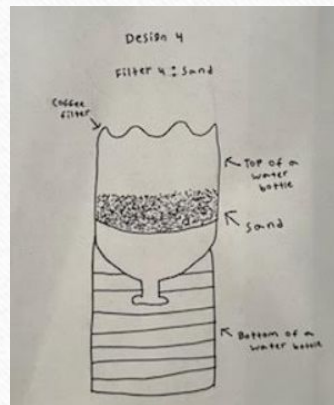
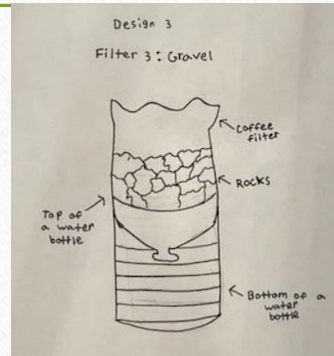
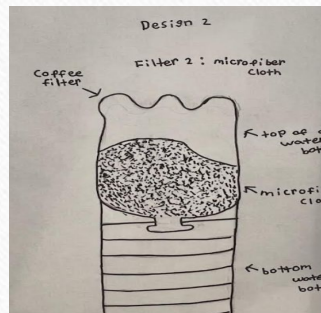
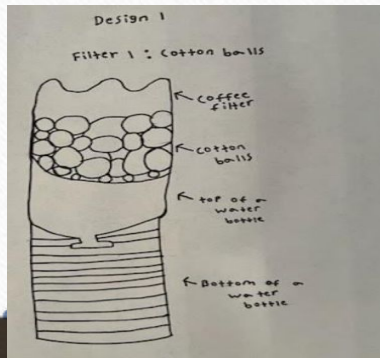
Constraints (Limitations and Conditions)

1. Getting the water crystal clear
2. Getting most of the bacteria out of the water
3. Seeing what water filter works better to filter water

Criteria (standards or features to be measured)

1. Cost
2. Particles
3. Flow

Sketches and Materials



- LifeStraw Water Filter
- TDS Meter (Total Dissolved Solids)
- Gravel
- Sand
- Microfiber Cloth
- Empty Water Bottles
- Dirty Water
- Coffee Filters
- Cotton balls

Procedure

1. I got some empty water bottles and cut them in half so the bottom can hold the top with the cap facing down.
2. I poked holes using scissors in the cap at the top half of the water bottles.
3. I placed the top half of the water bottles inside the bottom half of the bottles. (I leave a space between the top half of the bottles and the bottom half of the bottles so when the water gets poured in it will drip down through the cap.)
4. I placed the coffee filters in the top half of the bottles.
5. Then I added the rocks, sand, cotton balls, and the microfiber cloth to each of the bottles.

Procedure

6. I got some water and went to my backyard to get sand and some small rocks to put in the water to make it dirty so it can be the water I put threw all the filters.
7. Then I set everything up to conduct the experiment.
8. I started the experiment by testing the four homemade water filters I made.
9. I poured the water in the filters, then while that was draining thru the holes I made in the lid, I worked on the LifeStraw part of the project.

Procedure

10. I screwed the back part of the LifeStraw on the water bottle that had the dirty water in it and got another bottle to cut but I only used the bottom part of the water bottle so I could pour the water coming thru the LifeStraw in it.

11. I had to squeeze the water bottle to get the water to go thru the LifeStraw into the bottom part of the water bottle that I cut out but when it came out the water was crystal clear but for all the other filters the dirty water went thru the filters and the water came out with a murky looking color still. It was a light type of brown when the water came thru the homemade water filters.

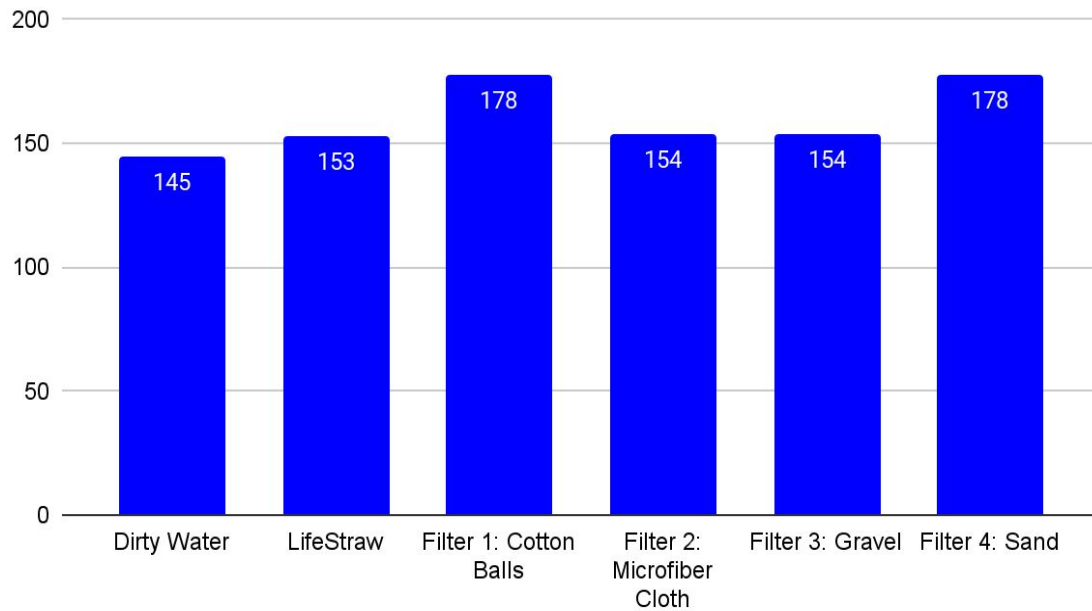
Data Collection Table

Filter names	Dirty Water	LifeStraw	Filter 1: Cotton Balls	Filter 2: Microfiber Cloth	Filter 3: Gravel	Filter 4: Sand
Test 1	145	153	178	154	154	178

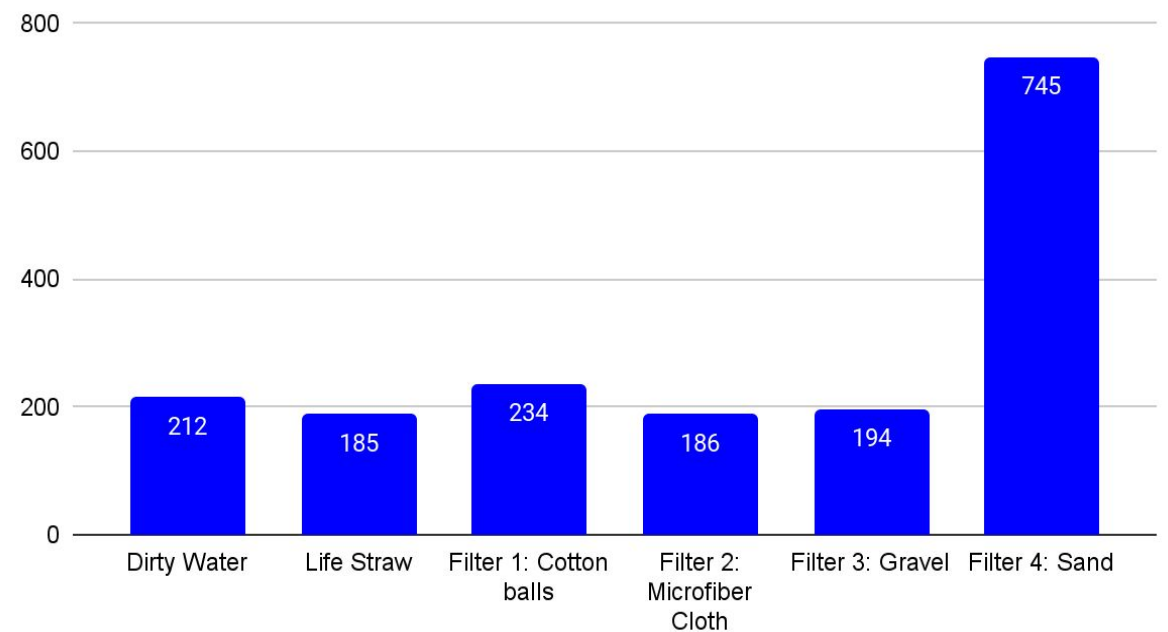
Filter names	Dirty water	LifeStraw	Filter 1: Cotton Balls	Filter 2: Microfiber Cloth	Filter 3: Gravel	Filter 4: Sand
Test 2	212	185	234	186	194	745

Data Analysis Graph Test 1 & 2

Filters vs Filter Test 1



Filters vs Filter Test 2





Critique and Redesign



Prototype A: LifeStraw

Strengths: It worked pretty well and made the water crystal clear and it also did a good job removing some of the bacteria from the dirty water

Weaknesses: It has to be cleaned after it has been used to get the dirt and rocks and stuff it removed from the water out and it made the water have a higher TDS meter result

Improvements: I would run the inside of the LifeStraw through water to clean the inside before I use it to try to prevent the water from having a higher TDS meter result than it already does.



Critique and Redesign



Prototype B: Homemade Water Filters

Strengths: The homemade water filter got some of the murky brown color out of the water and got some of the dirt and bacteria out.

Weaknesses: It is only good for one use then it would need to be thrown away and another homemade filter would have to be built.

Improvements: I would use a little less sand and rocks for those 2 filters and I would add more cotton balls and cloth to the other 2 filters because I think if there is more layers the harder it would be for the small dirt and the rock particles to go through the filter. I would also double up on the coffee filters for each homemade water filter because I think the small particles of sand and rocks can go through the coffee filters.

Pictures



Evaluate Solutions

I did not solve my problem of will a homemade water filter, filter as equivalent as the LifeStraw. Although it was pretty close. On my first test the LifeStraw got 153 and the closest to that same result was filter numbers 2 and 3 with 154 for the homemade water filters. The number 2 filter was the microfiber cloth and filter number 3 was the gravel. On the second test the LifeStraw got 185 and the closest to that result was filter number 2 again. Filter number 2 got 186. Filter number 2 got 1 above the LifeStraw both times but filter 2 did not solve the problem. I tested my prototype with a TDS meter (Total Dissolved Solids). When the water goes thru the filter I wait till all the water passes thru then I take the TDS meter and stick it in the water that I filtered and it gives me a number on the screen of how much Total Dissolved Solids are in the solution. The solution is water and normally is water.

Evaluate Solutions

My prototypes performed well. They didn't solve my problem but I was really surprised on how well all the prototypes performed. The LifeStraw performed the best for both tests. My prototype can be improved further by maybe adding more rocks, sand, microfiber cloth, cotton balls, and coffee filters so it can reduce little particles of sand and rock from the dirty water going thru the lid, coffee filters, and cotton balls since the particles are really small they can slip thru those items. During the experiment a lot of things could go wrong. The cups could have fallen over when I was pouring water into the homemade water filters. When doing the LifeStraw experiment it was hard to screw on the LifeStraw to the bottle so I almost spilt the dirty water everywhere. It was also hard to get the LifeStraw off the bottle so if I tried a little to hard then I could of dropped the bottle which wouldn't be to bad because I already filtered all the water that was in the bottle between the 4 homemade water filters and the LifeStraw water filter but there was still sand at the bottom of the bottle so it could of been a little bad.

Application

I think people should care about my project because if anyone living in an under developed or hot climate areas and are stranded somewhere and or going on a hike or something, they should bring a LifeStraw water filter. They should bring the LifeStraw water filter because it removes 99.999999% of bacteria and just in case they run out of water and or don't have any water they have the LifeStraw so they can filter any water if they find it. If some people don't have access to a LifeStraw and or can't afford a LifeStraw they can bring their own materials or pick up materials from the wild and use them to make their own homemade water filter. Both of the filters work well but the LifeStraw works better but again if some people don't have access to it or can't afford it a homemade water filter is a good second choice. People should also care about my project because all humans need water to survive and my project is about how if people don't have water or don't have access to buy any the LifeStraw or a homemade water filter can allow you to get water from almost anywhere.

Acknowledgement for my Teacher

I would like to thank my awesome science teacher for allowing me to do this project and giving me inspiration on how to do this project. It would be hard to find a way to collect the data and graph it because I have more than one prototype going up against one prototype so it can get confusing on how to collect the data and graph the data but thanks to my science teacher I was able to understand how to do it. I am thankful I have an awesome and great science teacher that is really supportive and helpful. Thank you.

Acknowledgements for my Parents

I would also like to thank my parents for helping out with my experiment and helping me make this project possible. I thought of this project over the summer because I knew science fair was right around the corner but I didn't think it could be possible by how hard it is to collect the data and stuff. So thank you to my parents by supporting me and giving me the courage to do this project, helping me understand more about my project and buying me everything I needed for this project to make it possible. Thank you.