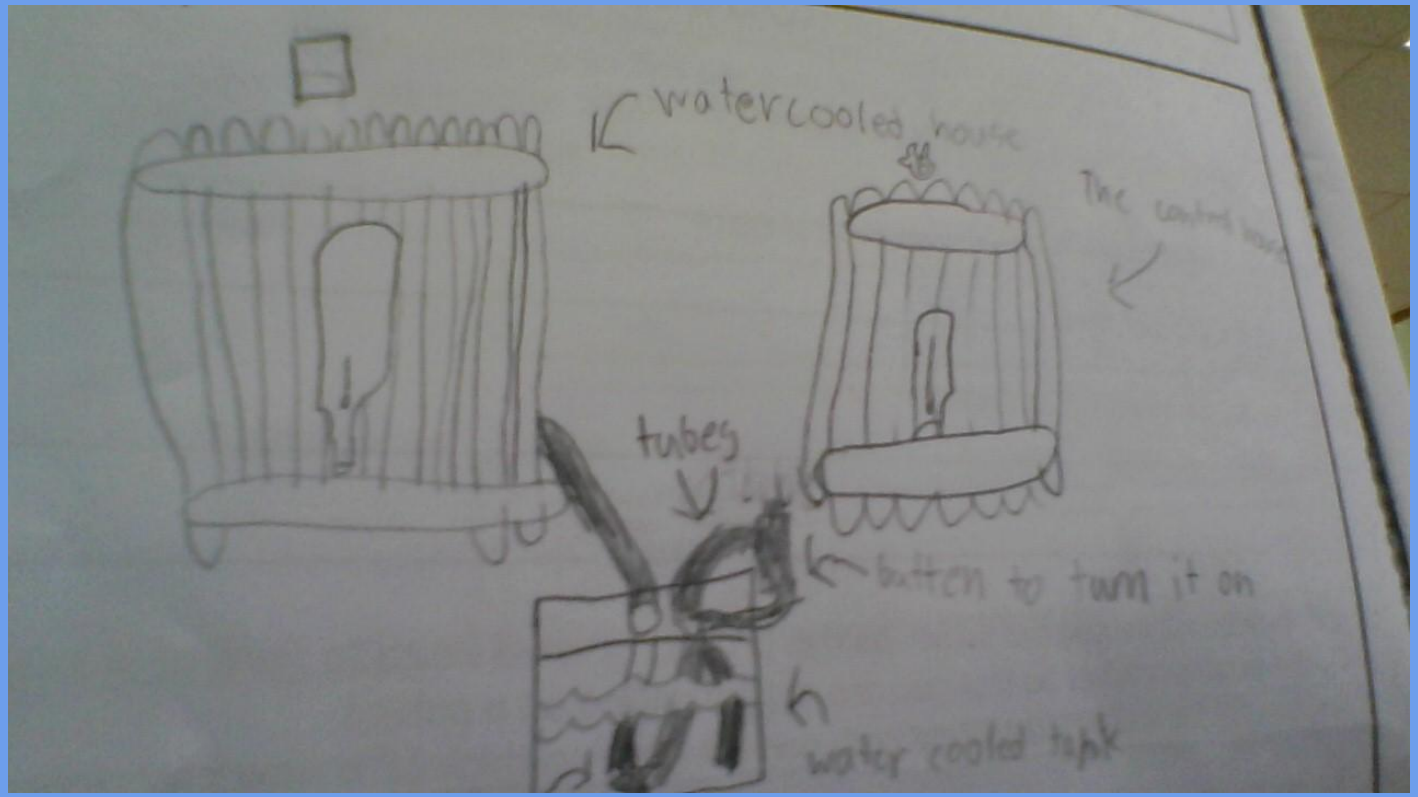
The Cool Ice House

Define/identify

In the summer, people get super hot. Also the air conditioning is too weak in the desert. So citizens stay hot here. That is why I am making a naturally cooled house. It has cold water pumped through the walls from a tank under the house in the cold ground.

Brainstorming



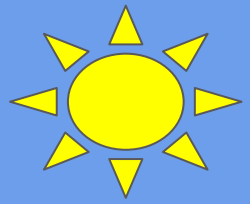
Materials list

- Popsicle sticks
- Plastic containers
- Thermometers
- Water pump
- Glass water bottle
- Plexiglas
- L-brackets
- Sand
- Rubber tubing

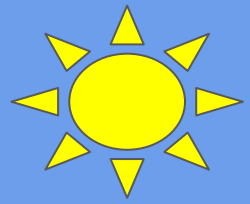
Steps of Design

1. Construct 20 wall frames using popsicle sticks and glue.
2. Attach 2 wall frames together to make one thick wall. Each house will have 5 thick popsicle stick walls and one glass wall.
3. Put water tubes with pump into 5 thick walls for one of the houses.
4. Place both ends of water tubes into a water tank and attach a water pump.
5. Assemble stick and glass walls into two houses. One house will have the water tubes and the other will not. The second is the control house.
6. Fill two terrariums with soil. Make sure to put the water tank with tubes under the soil to stay cold like underground.
7. Place each house in a terrarium. The house with water tubes goes into the terrarium with the water tank.
8. Test the experiment by turning on the water pump to see if the house with water tubes is colder than the control house.

My Prototype



Test



The prototype does not actually go underground. It is limited in the amount of heat or cold we can make to experiment with the summer heat. Also the walls of a real house are not made of popsicle sticks, so the heat coming in might be less in a real house.

Steps of Improvement

- My prototype design did not have a good roof. It was too small to fit over the walls completely.
- Also hot glue was not strong enough to hold the walls against each other.

- I improved my prototype design by making a longer roof to go over the walls. I added more popsicle sticks with hot glue.
- I fixed the problem with the walls by adding L-brackets to my design.

Iterate/Improve

Besides making the roof better and adding L-brackets for wall support, I found out that the hot glue is not a good idea for the walls. When I did the experiment, the heat lamp for the “sun” started to melt the hot glue. Uh oh!

In my next prototype, I will have to use something else to put the walls together. Maybe real wood instead of popsicle sticks would be better.

Communicate

My experiment went well because the water pump did make the house colder than the control house. Next time I can use real wood for the construction instead of popsicle sticks and hot glue.
I also need a deeper container for the ground so the pump can stay in its area without leaking. It also needs to be deeper like it would be in the real ground with a stable temperature of 60° degrees.