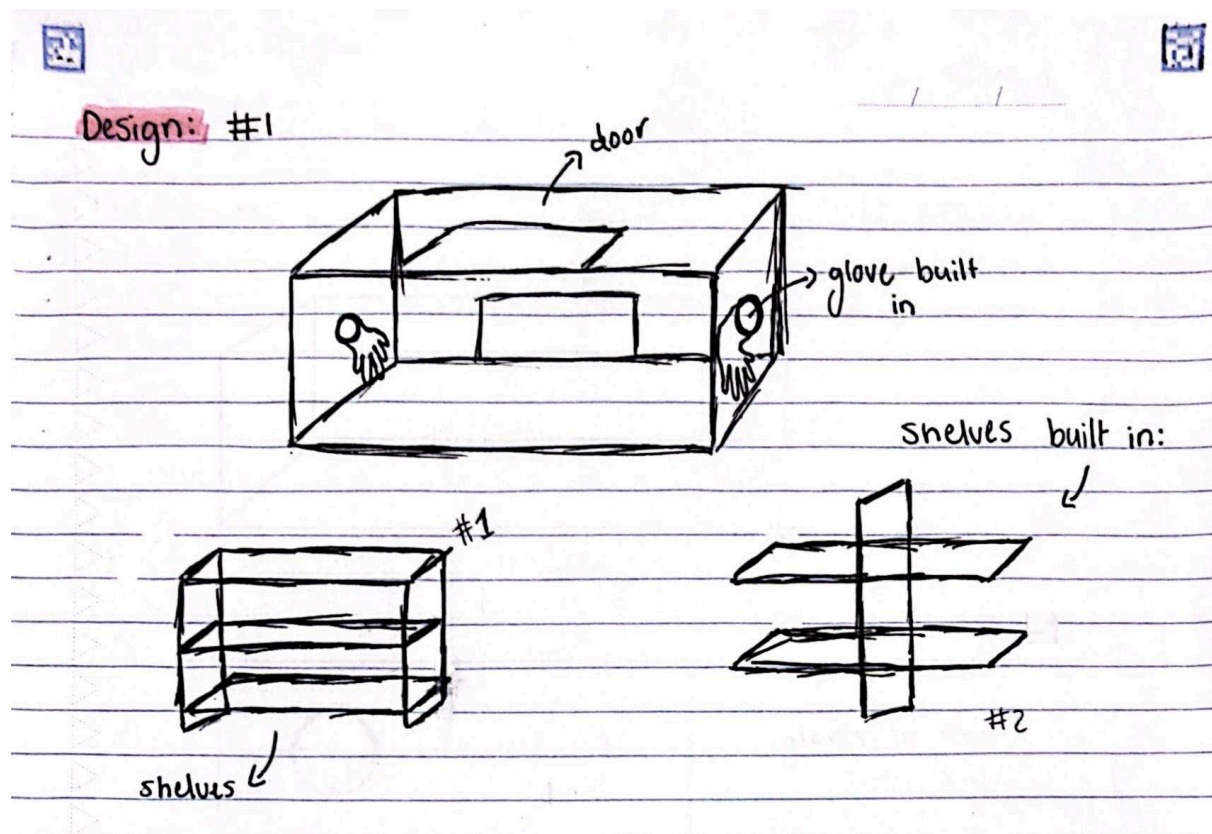


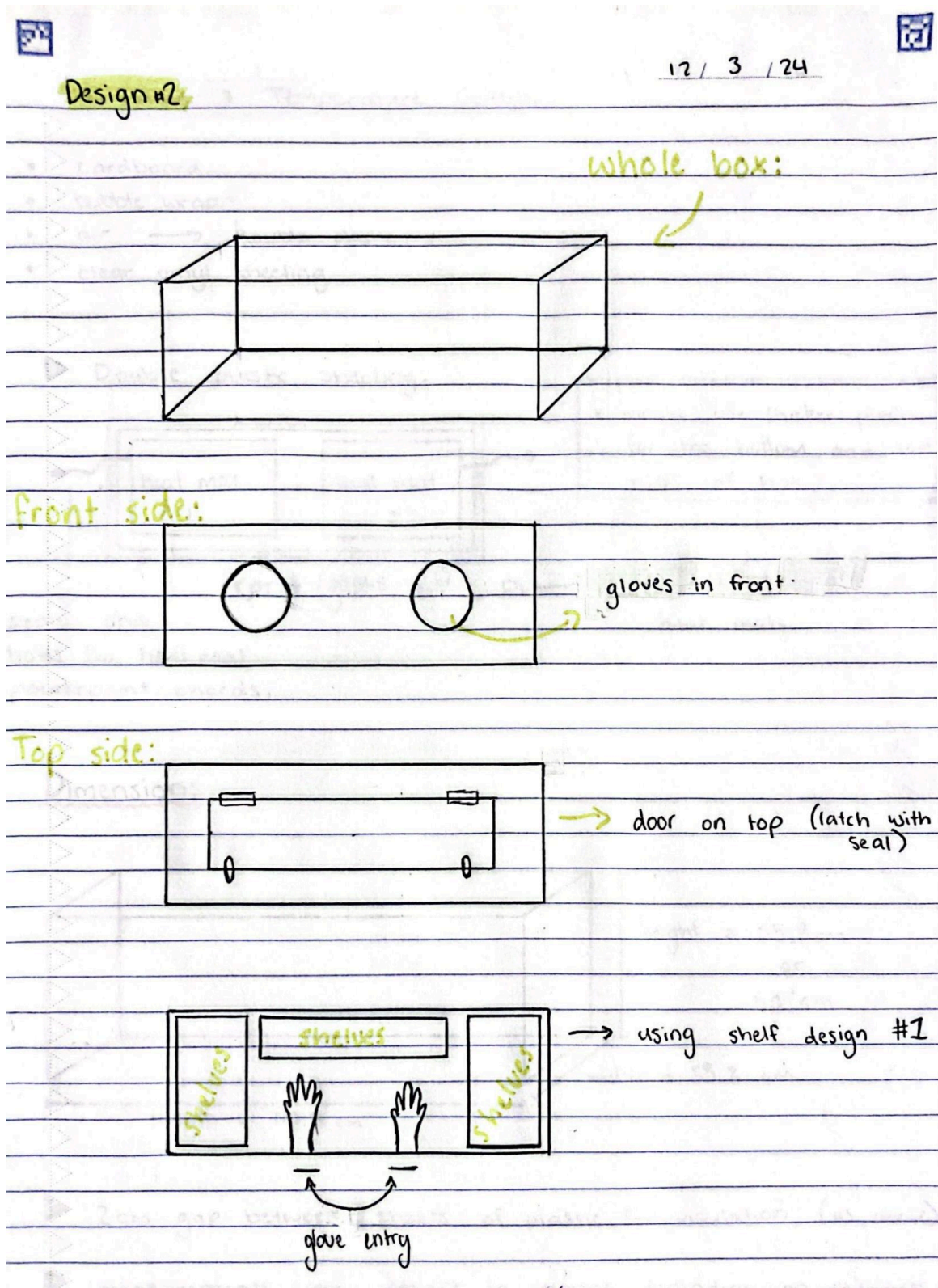
A huge component of my Senior Thesis Project was the design and construction of my very own incubator which would be able to simulate the environment of the human oral cavity.

### Design Process:

When I began the design process for my incubator, I knew I had a clear vision and idea of what I wanted it to look like, and what sort of 'accessories' it would include. For example, I really wanted it to have gloves which were built into it. I knew it would need shelves for the petri dishes/my experiments to sit on, I knew I wanted it to be clear/see-through for easy observation, as well as have an easy access door either on the roof, or on the side of the box. I ended up experimenting with different ways I could build the shelves as well.



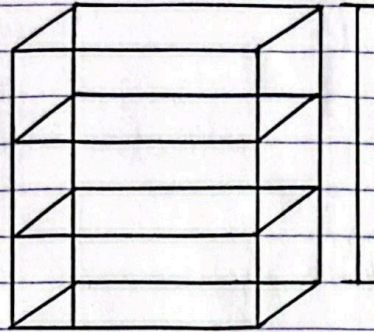
After creating my first design, I wanted to reevaluate it, and see if I could make it better. Using a ruler this time, I wanted to map out what the incubator would look like from every perspective, top to bottom, side to side. I was still very keen on the built in gloves, and decided that I wanted the box to be made of plastic sheeting. I chose the most practical shelf design and wanted to include as many details as I could into the second design.





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## Shelf Design



height = tbd

length = tbd

### Practicality of the Incubator & Variables to Consider:

When designing the incubator, I took many different factors and variables into consideration, including:

- Insulation
- Condensation
- Temperature control
- Materials

#### includes:

- \* possible shelf inside
- \* door at top & at back - doors need to be sealed tightly.
- \* gloves (built in) from side? or front?  
↳ maybe → depends on shelves.

#### materials used:

▷ timber?

▷ plastic?

▷

insulation could be anything e.g. bubble wrap.

- aluminium foil

- clear vinyl sheeting

#### temperature control:

- heat mats



With the help of my science mentor, Grant Arthur, we were able to come up with solutions for each variable/factor which would have to be controlled in order to create the most efficient incubator for what I wanted to achieve within my senior thesis project.

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### Insulation & Temperature Control

- cardboard
- bubble wrap
- air → double plastic
- clear vinyl sheeting

▶ Double plastic sheeting:

sealed chord

holes for heat mat powerpoint chords.

front (glove side)

temperature controlled heat mats

x maybe use thicker plastic for the bottom and top sides of box.

One day when I was planning out my incubator, debating which materials would be the best choice to use, my teacher came up to me and said "Hey, why don't you use a fish tank?". Before then I hadn't even considered that. I immediately got onto facebook marketplace and looked for cheap and affordable fish tanks which were close to me. Taking into account the rough dimensions the fish tank would need to be in order to fit the heat mats I had already collected.





The approach taken with the shelves was to have them easily removable from the incubator if needed, to be easily accessible, and to be affordable. With the two lids of the fish tank being easily removable, it made it easier and opened up new possibilities for the shelves.

### ► Possibilities:

- the shelves themselves are removable and just stack on top of each other.
- the top can also be a shelf or add an extra on the bottom.
- having one less shelf for temperature.
- will have to be smaller to fit a 900mm x 280mm x 270mm fish tank.

### Material Options:

#### ► wire racks

- could use baking trays. (heat resistant)
- epoxy resin: heat resistant.

#### ► plastic

- heat resistant? harmful chemicals?

#### ► shelves

can use utility hooks to keep up.

kmart 2 for \$10  
41cm (W) x 25.5cm (H)  
material:   
Electrophoresis rack

I decided to use wired baking trays which were heat resistant, meaning that the risk of them being damaged or disrupting any future experiments was taken care of. Plastic hooks which can tolerate heavy loads were used to hold the shelves up. The measurements of all of the materials used were also taken into account during this process.





# Measurements



fish tank glass thickness : 6mm

heat mat dimensions: 25.4cm x 52.705

fish tank dimensions: 900mm x 280mm x 270mm

shelf cooling trays dimensions: 41cm x 25.5cm



Large Cooling Rack - Set of 2  
\$10.00

★★★★★ 4.7 (2)

SKU: P\_41961834

Add to bag

afterpay zip Pay in 4

On orders up to \$2000 On orders up to \$1000 On orders \$30 to \$2000

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How to get it **New**

Shop at Broadway Closes 11:59PM

Click & Collect ☒ In stock

Order before 12pm collect by 4pm today

- **Shelves** are the cooling racks. 41cm(w) x 25.5cm(h)
- allows good air circulation & compatible with heat
  - they will be turned upside down.



PERMASTIK

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Permastik Small Utility Hooks - 10 Pack

☆☆☆☆ No reviews yet SKU: 0535681

**\$5.16**

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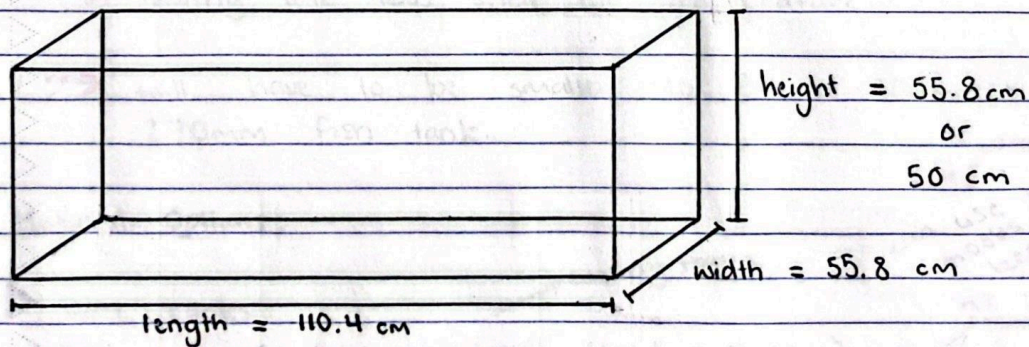
☒ In stock

Aisle 15, Bay 1  
Aisle 15, Bay 1

View map



## Dimensions

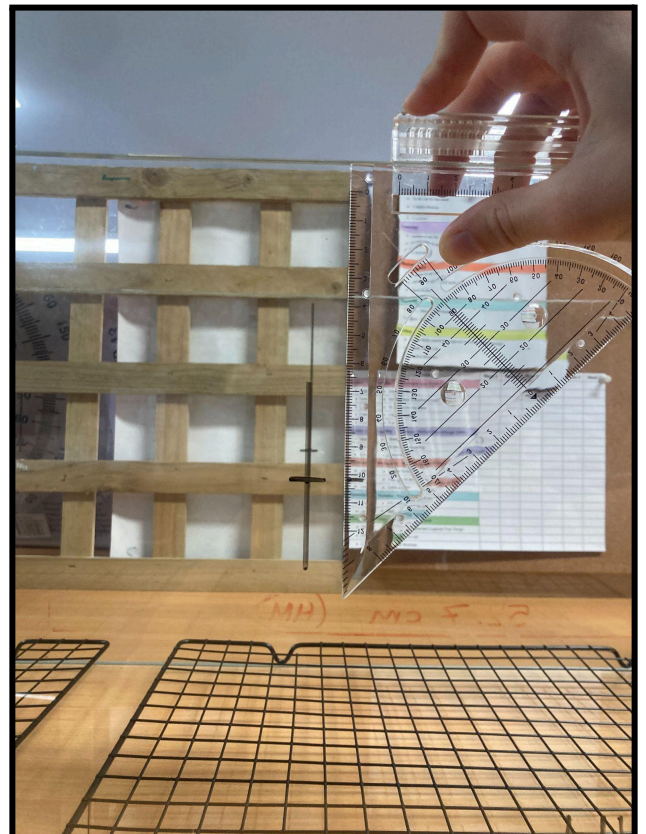


- ▶ 2 cm gap between sheets of plastic for insulation (as above)
- ▶ measurements are subject to change depending on thickness of plastic sheets.

## Construction:

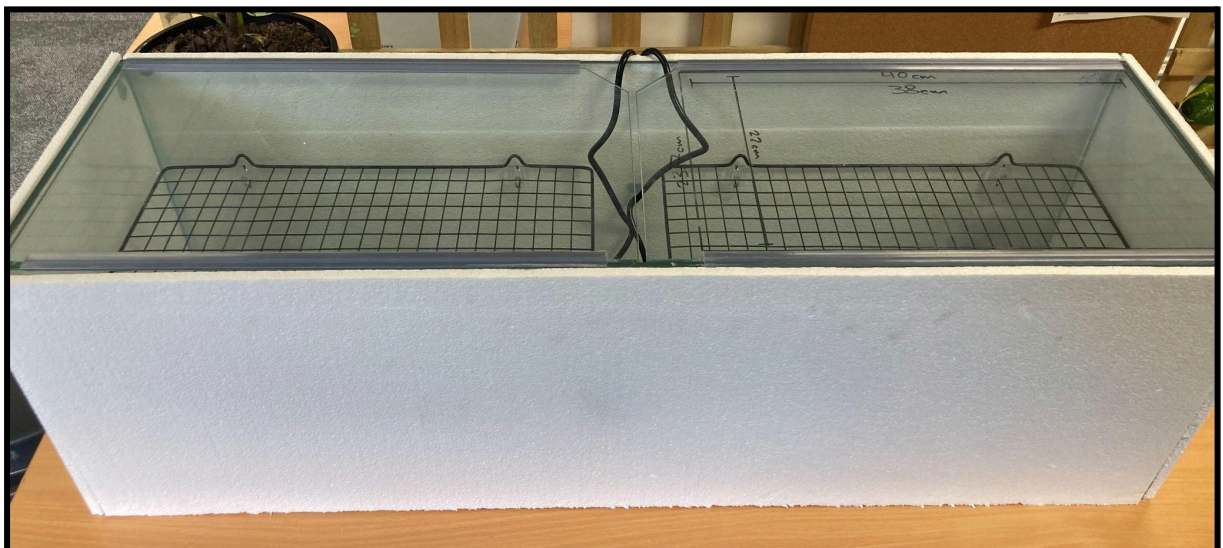
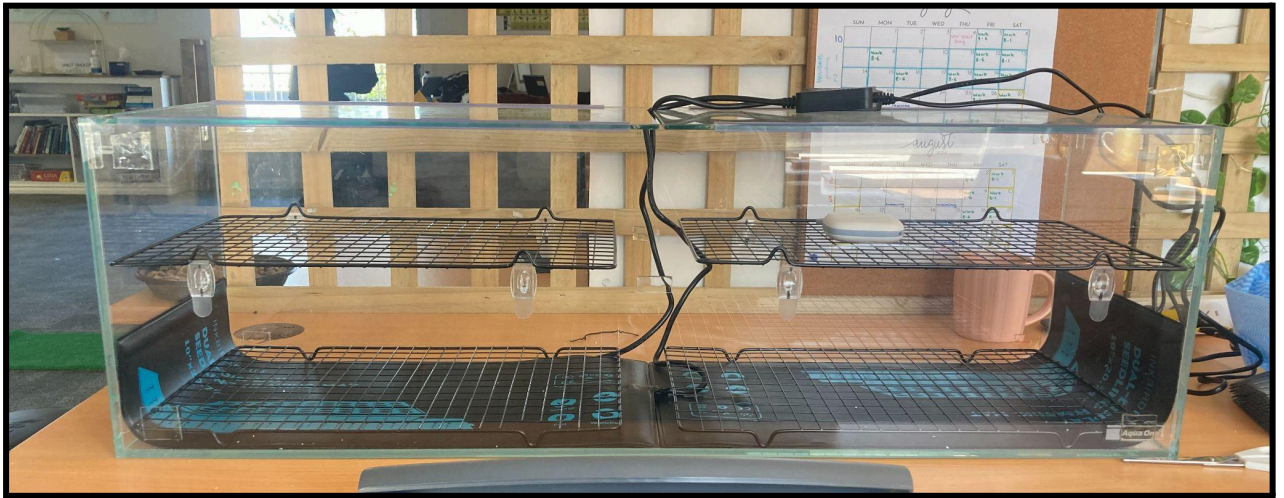
After collection of all materials, it was time to construct the incubator.

Measuring out where the hooks will be positioned:

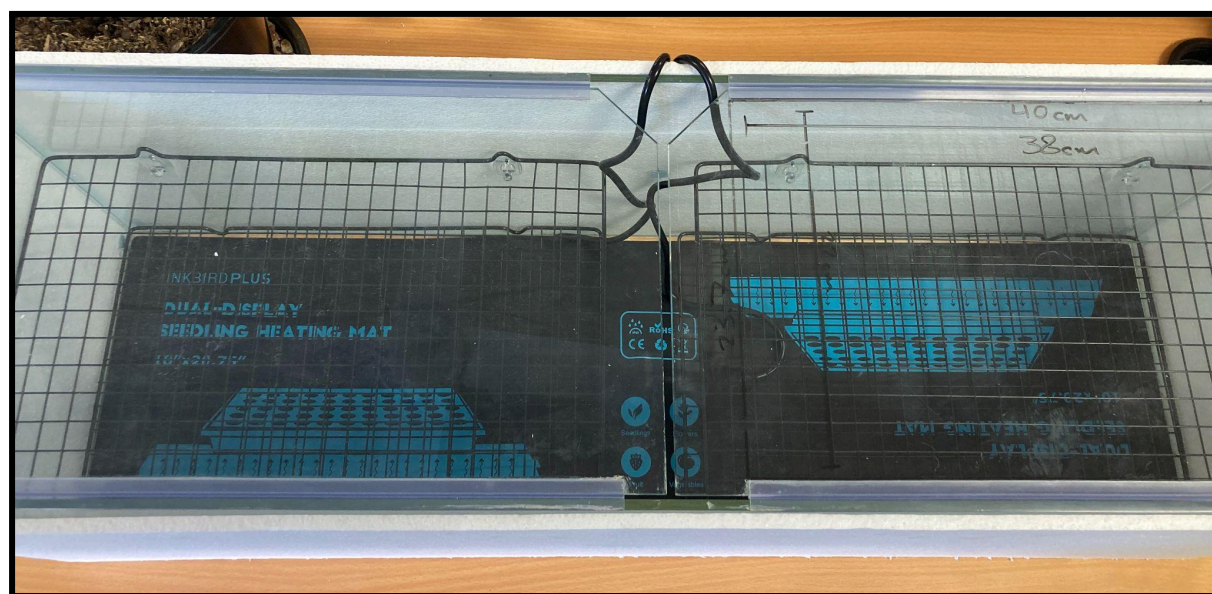




Installing heat mats, shelves, and insulation:









**Finished Incubator - Otherwise Known as 'The Spitbox'**

