

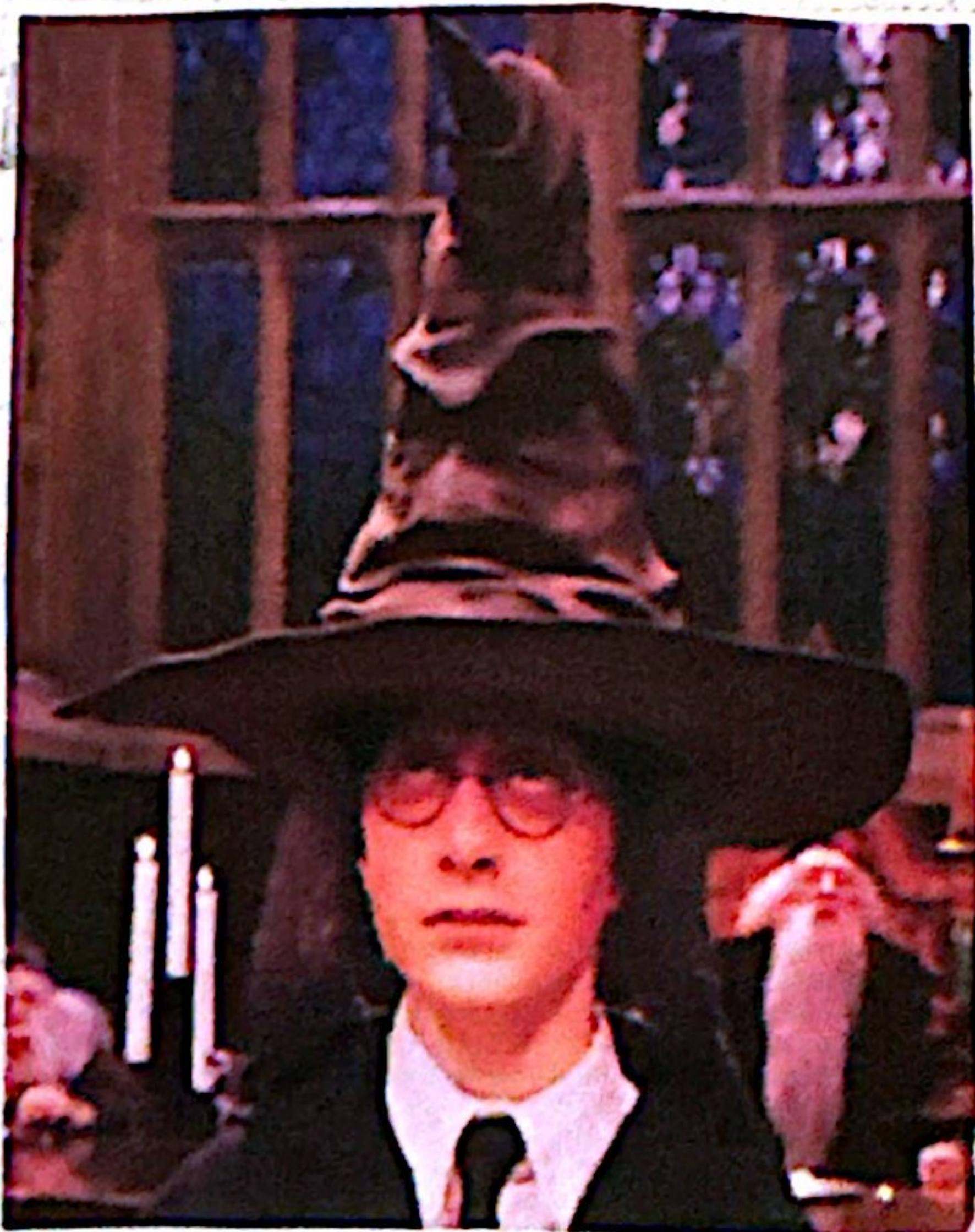
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HELLO!!! welcome to Angela and Adhvik's SIDE Project ☺
 we are making a . . . REAL LIFE HARRY POTTER SORTING HAT

PROJECT DESCRIPTION

With the current rise of Artificial Intelligence, we are implementing the use of AI chatbots/assistants for SLU's (spoken language models) and speech recognition software into the creation of a real life Harry Potter sorting hat. Instead of seeing what's in the person's mind, the sorting hat will ask them a series of questions, correlating the answers to a specific Hogwarts house. We will be using a Raspberry Pi as the "computer", listening to what the person says and responding to them.

Inspiration: Harry Potter movies
 and J.K. Rowling



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Adhvik

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8/24/23

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MATERIALS LISTMATERIALS NEEDED

3 categories: craft, electronics, software

Craft

- brown fabric
- brown felt
- aluminum foil
- paperboard posters
- newspapers
- sewing machine
- paper towels

Electronics

- Raspberry Pi 3 Model B+
- Mini Microphone with 3.5mm Jack
- Mini Bluetooth Speaker (small enough to fit on the hat)

Software

- AI on AI software
- VS Code (probably not, not confirmed)

RASPBERRY PI

← VS CODE

MOVO LVI-USB MICROPHONE



MOHIO MINI
BLUETOOTH SPEAKER



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HAT DESIGN

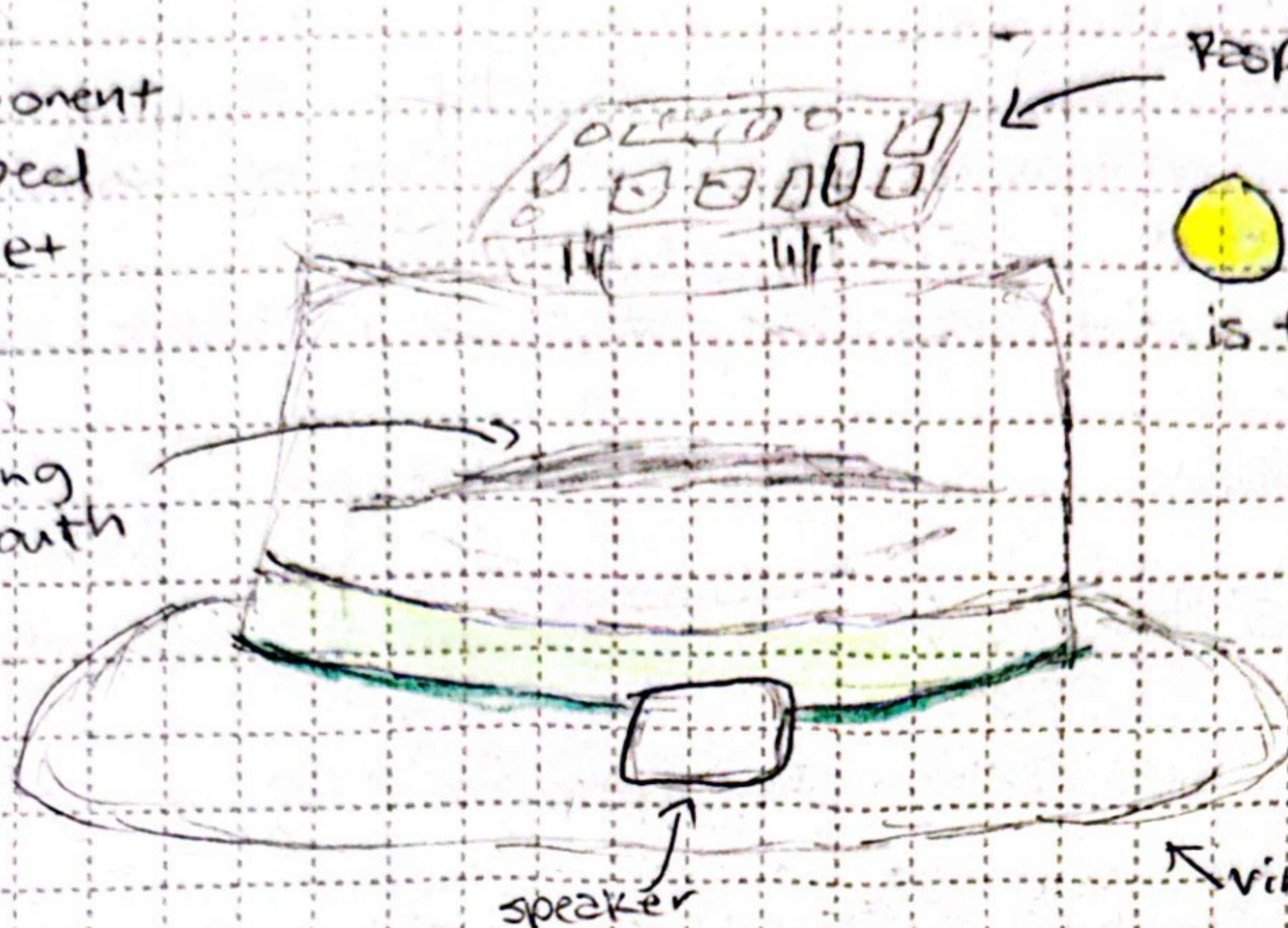
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Hat is going to be separated to 2 parts: Bottom & Top

Bottom

- Bottom component will be shaped like a bucket hat

Sorting Hat's Mouth



Raspberry Pi 3

yellow part is the velcro strap

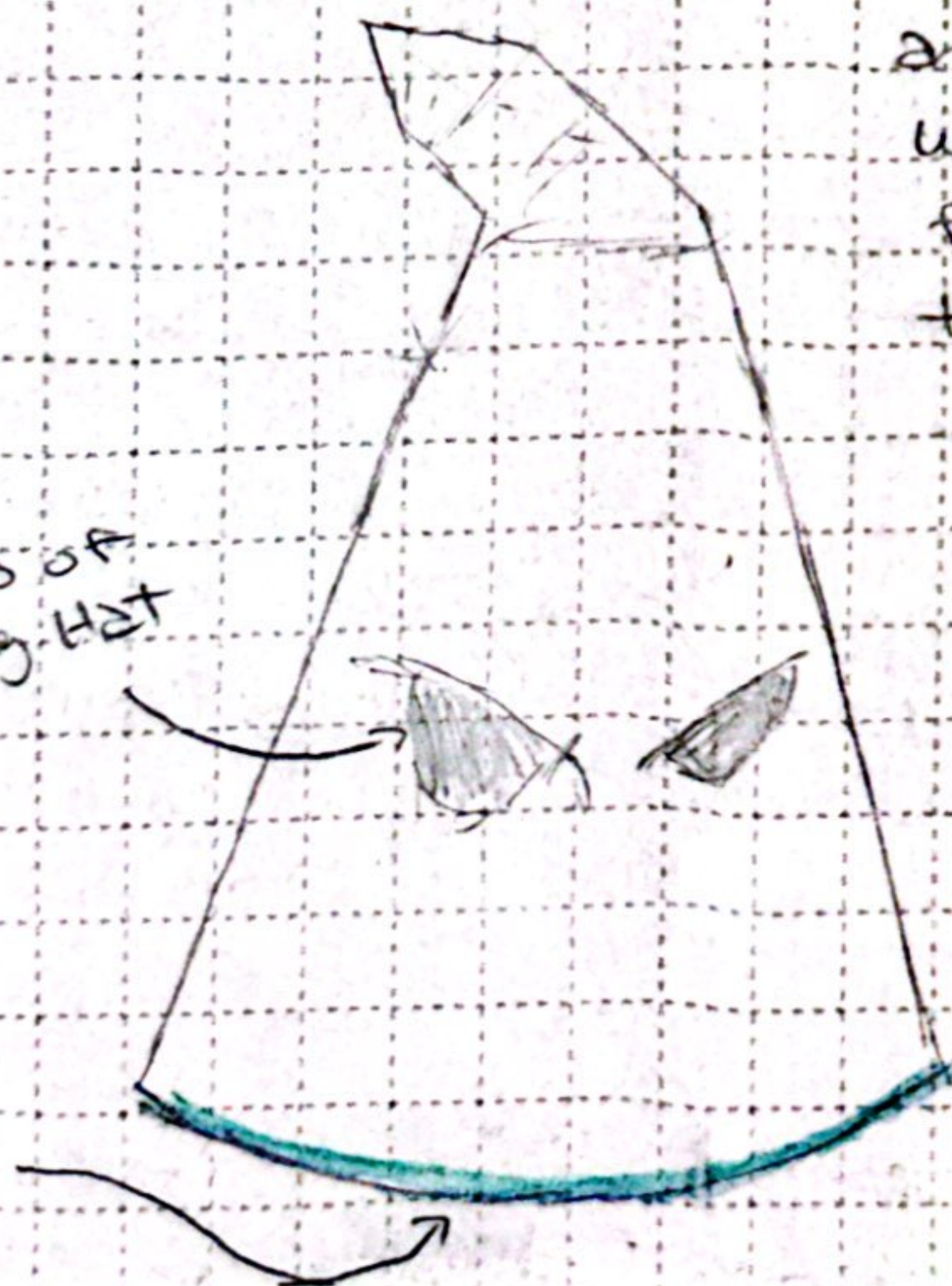
rim of hat

speaker

- Top of bucket hat will be a sunken shape:
- this way, the Raspberry Pi will be more secure

Top

Eyes of Sorting Hat



This part will attach to the green part of the bottom component

- To create the eye shape and wrinkles of the hat, we are going to use aluminum foil & paper towels to create the basic shape, which will then be stuck on the paper board

- Bottom & top components are supposed to be detachable. Top component will have a velcro strap on the interior.

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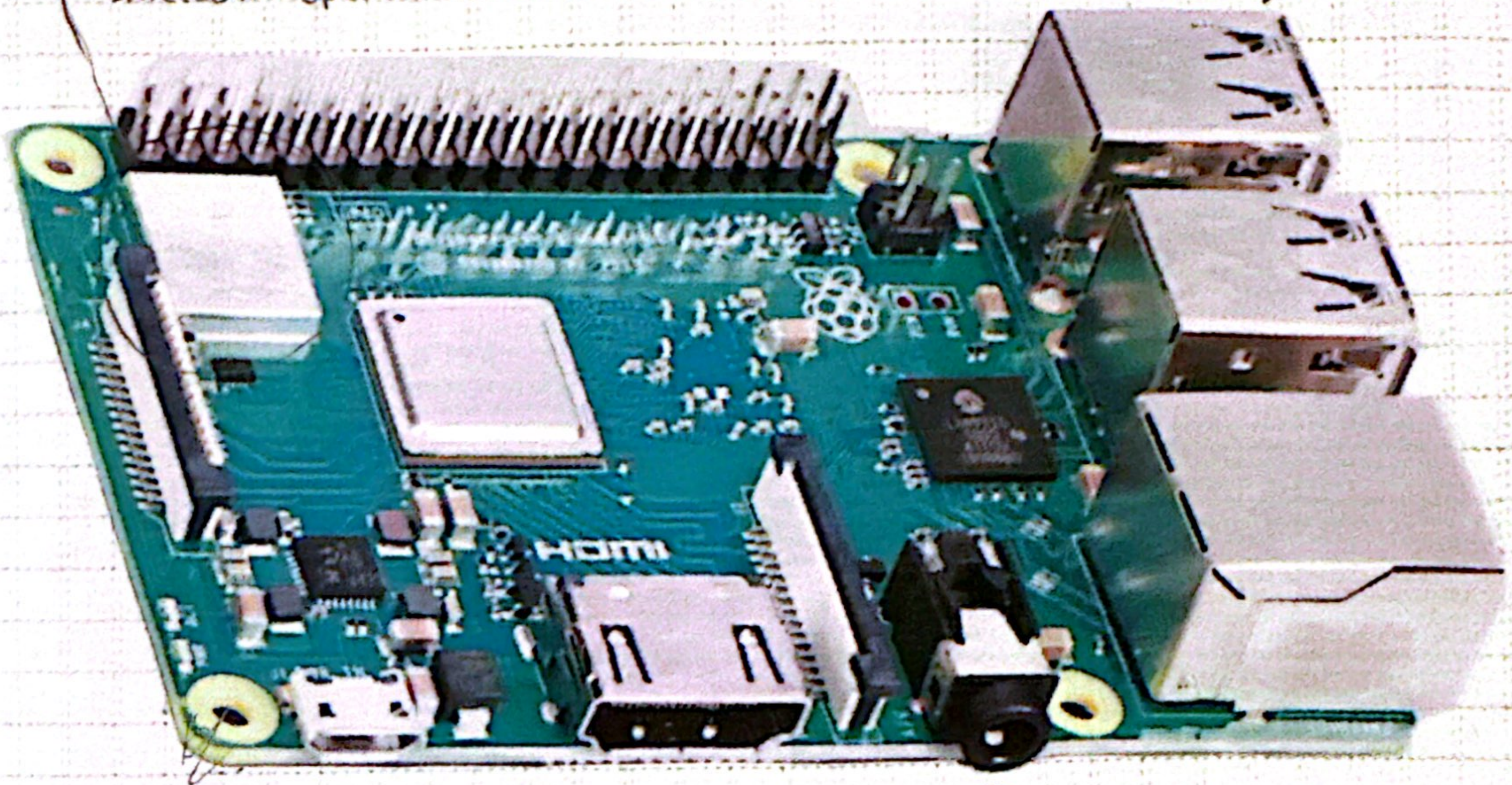
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Understanding Raspberry Pi 3Wireless LAN Bluetooth

- Raspberry Pi 3 has the ability to connect to bluetooth
- This component will be needed so the Raspberry Pi can connect to the bluetooth speaker

USB 2.0 Ports

- we will need to convert our code from Arduino into files
- Code files will be transferred with a USB Drive

Role In Project

- The Raspberry Pi will play the role of a computer
- small and convenient, unlike having a big computer on the side

↑ 3.5 mm composite video and Audio socket

- will be used by the mini microphone
- 3.5 mm Jack connector

Our Main Concern: we are concerned if the Raspberry Pi can handle all the matrix multiplication and functions of Artificial Intelligence. The first thing we are going to do is test our code on the Raspberry Pi after we finish coding.

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We used Niffler's Pottermore question analysis to develop questions for our sorting process.

Posted by u/Niffler 8 years ago

Pottermore Sorting Hat Quiz analysis

Hi everyone! I have performed an analysis on the new Pottermore sorting quiz. The data I collected should give a good indication of the correspondences between the quiz answers and the house outcome. You can also use this data to get sorted in the house of your choice, or see why you ended up in a certain house.

Niffler provided analysis for 2 option questions, which we used to sort people based on their answers.

	Gryffindor	Ravenclaw	Hufflepuff	Slytherin	Ex.
Dawn	73% (618/842)	73% (567/776)	30% (283/943)	26% (196/755)	Dawn: Gryffindor, Ravenclaw
Dusk	27% (224/842)	27% (209/776)	70% (660/943)	74% (559/755)	Dusk: Slytherin, Hufflepuff

We have 6 initial questions that we ask people:

1. Dawn or Dusk? - Based on the response, the house highest likely to pick that response will get a point. At the end, the house with the greatest amount of points will be the final house.
2. Forest or River?
3. Moon or Stars?
4. Black or White?
5. Heads or Tails?
6. Left or Right?

	Gryffindor	Ravenclaw	Hufflepuff	Slytherin
Tortoiseshell box w/ gold	14% (72/502)	18% (80/454)	46% (264/575)	18% (82/452)
Jet Black Box w/ silver lock	18% (88/502)	20% (91/454)	16% (90/575)	46% (209/452)
Ornate Golden Casket	19% (96/502)	44% (198/454)	21% (121/575)	19% (84/452)
Small Pewter Box	49% (246/502)	19% (85/454)	17% (100/575)	17% (77/452)

If there is a tiebreaker, we will use the box question →

* Ask "which box would you choose among these?" and give responses based on the tied houses. The response breaks the tie.

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DEPARTMENT

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Initial Pseudocode

// Count system

g = 0

v = 0

h = 0

s = 0

houses = [g, v, h]

user says "Sort me"
ask first sorting
question.

Move to next
question (context)

Next context

Based on
response, give
points to chosen
houses.

Ex.

g = g + 1

v = v + 1

- Then ask
next question.

At the last question
when user asks for
their house

Calculate house w/
most points.

Tell user their
house.

* Our code will be redone completely because the code is
inefficient.

Our (failed) code

```
var gryffindor = 0;
var hufflepuff = 0;
var ravenclaw = 0;
var slytherin = 0;
const houses = [gryffindor, slytherin, hufflepuff, ravenclaw];
```

* To keep track of the most chosen house.

```
intent('(Sort me|lets begin|Start|begin)', p => {
  p.play('Which one would you choose, dusk or dawn?');
  p.then(Forest_River)
});
```

```
let Forest_River = context(() => {
  intent('Dawn', p => {
    p.play('Would you rather go towards a forest or a river?');
    gryffindor = gryffindor + 2;
    ravenclaw = ravenclaw + 1;
    p.then(Moon_Stars);
  });
});
```

```
intent('Dusk', p => {
  p.play('Would you rather go towards a forest or a river?');
  slytherin = slytherin + 2;
  hufflepuff = hufflepuff + 1;
  p.then(Moon_Stars);
});
});
```

```
let Sorted = context(() => {
  intent('What is my house?', p => {
    p.userData.final = Math.max(houses);
    p.play('You are sorted into ${p.final.value}');
  });
});
```

* This code failed because the computer
couldn't read the final value.

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Code (Failed) Results:

Basic example for AI assistant:84

Would you rather go left or right?

Basic example for AI assistant:99

left

Basic example for AI assistant:100

Aha, this is the last question!

Basic example for AI assistant:116

what is my house

Basic example for AI assistant:118

You are sorted into \${p.final.value}

The code worked until the end.

- It printed `${p.final.value}` instead of the value of the variable `final`.

- We need to figure out a way to get Alan AI to tell users their results through a variable instead of hardcoding it.

- * Hardcoding it is inefficient and time consuming.



- Alan AI says everything printed above.

Code #2 - Pseudocode

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Basic code should...

- Ask user the six questions to sort them into a Hogwarts house.
- Depending on the user's response, assign points to whichever house matches the user's response.
- At the end of the questions, calculate which house has the highest points and tell the user their house.
- If there is a tie, determine the houses that are tied.
 - ↳ Ask the final questions and give options that correspond w/ the tied house. Announce result based on user response.

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09/28 reconsidering use of Raspberry Pi



Ms. B introduced us to the technology of Seeed Studio.

← Name: Seeed studio XIAO NRF52840

- supports bluetooth applications
- convenient for ar bluetooth speaker
- strong software capability
- more reliable if dealing with AI

current considerations:

- How will we get the code onto this?
- Will this have enough memory for our code?

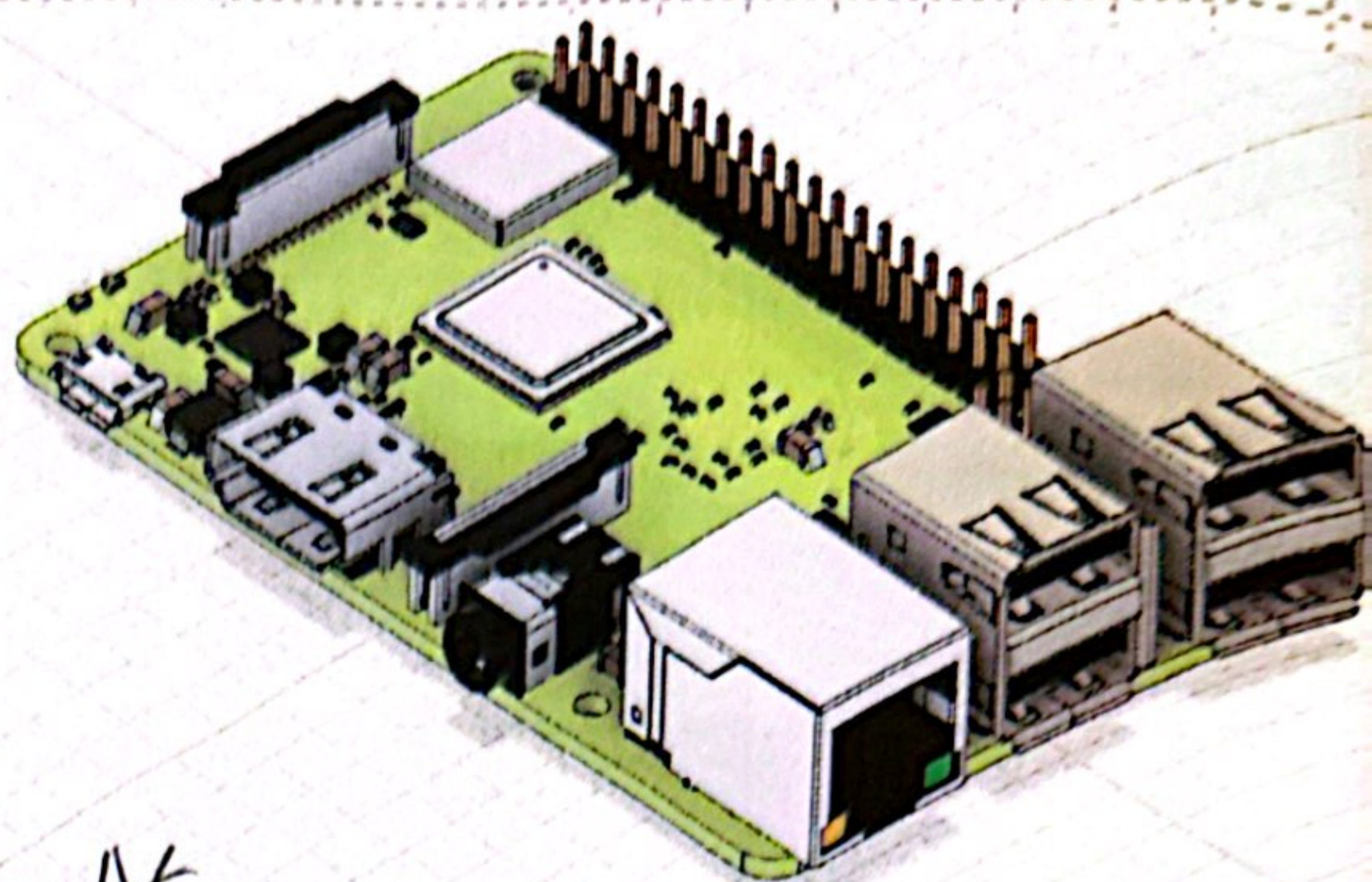
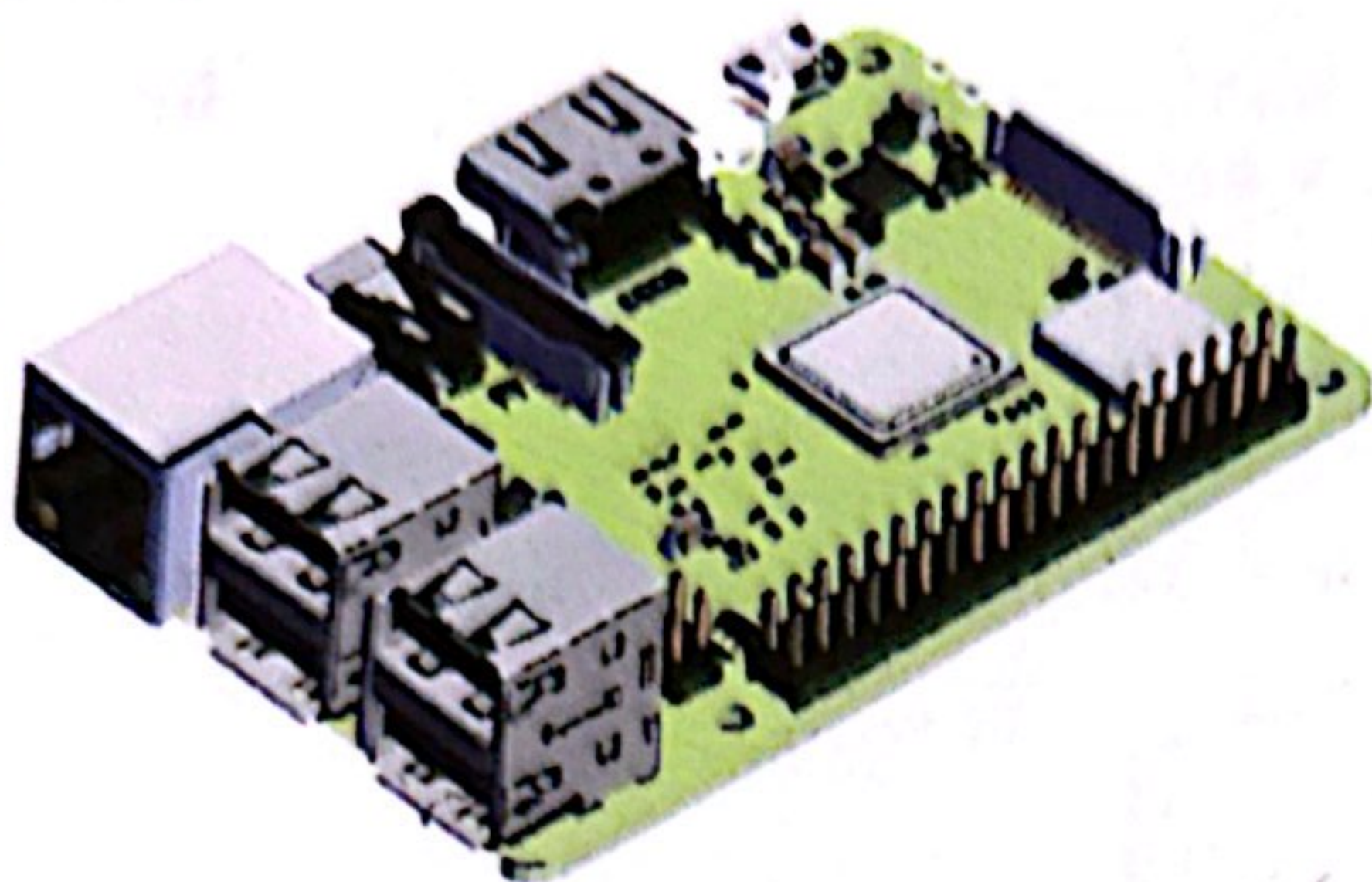
Comparison Diagram

Raspberry Pi	Similar Aspects	Seeed Studio
• bigger • more components • 2 USB Ports • less information considering if it can handle code relating to Artificial Intelligence • has 3.5 mm Jack	• contains bluetooth • can connect to WIFi • can upload code onto both of them • convenient enough to put in the hat	• smaller (way smaller) • fewer components • more convenient for aspects relating to Artificial Intelligence • better for speech recognition

Results: We will use the Raspberry Pi 3 Model B+ w our MOVO microphone isn't compatible w/ the Seeed studio chip.

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raspberry_pi_3_b_plus.stp

went on GrabCAD, got Fusion 360 model of Raspberry Pi 3

I had to download as a STP file, which I did not do in the beginning

GrabCAD sorting Hat



We asked Ms. B if we could use this model on GrabCAD, and she said as long as we get the right dimensions we can.

• we will be using this model for the top component of our hat.

• we will be CADDING the bottom component entirely by ourselves

• we will need to get vid of the bottom of the hat in order to use this model.



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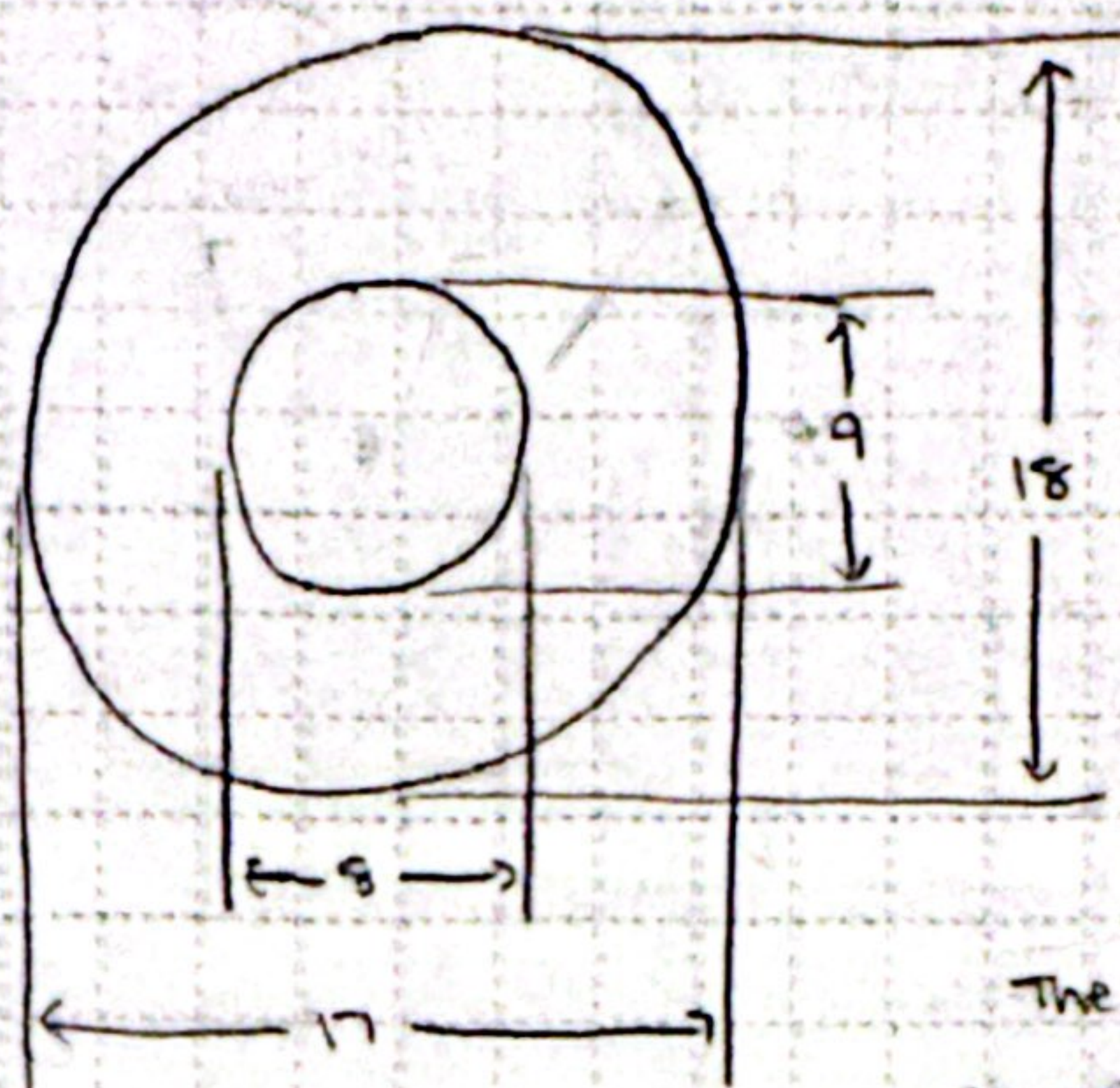
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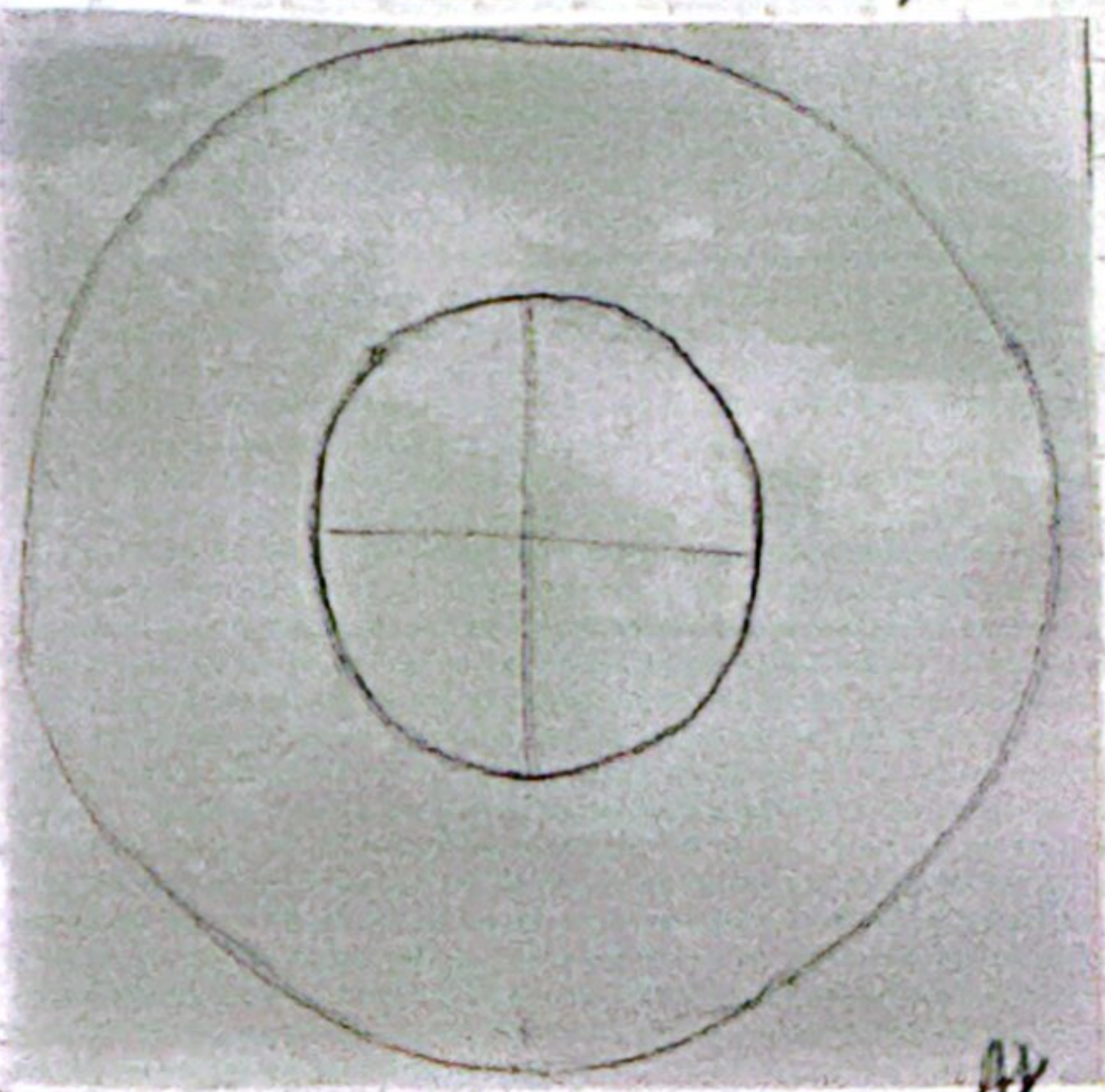
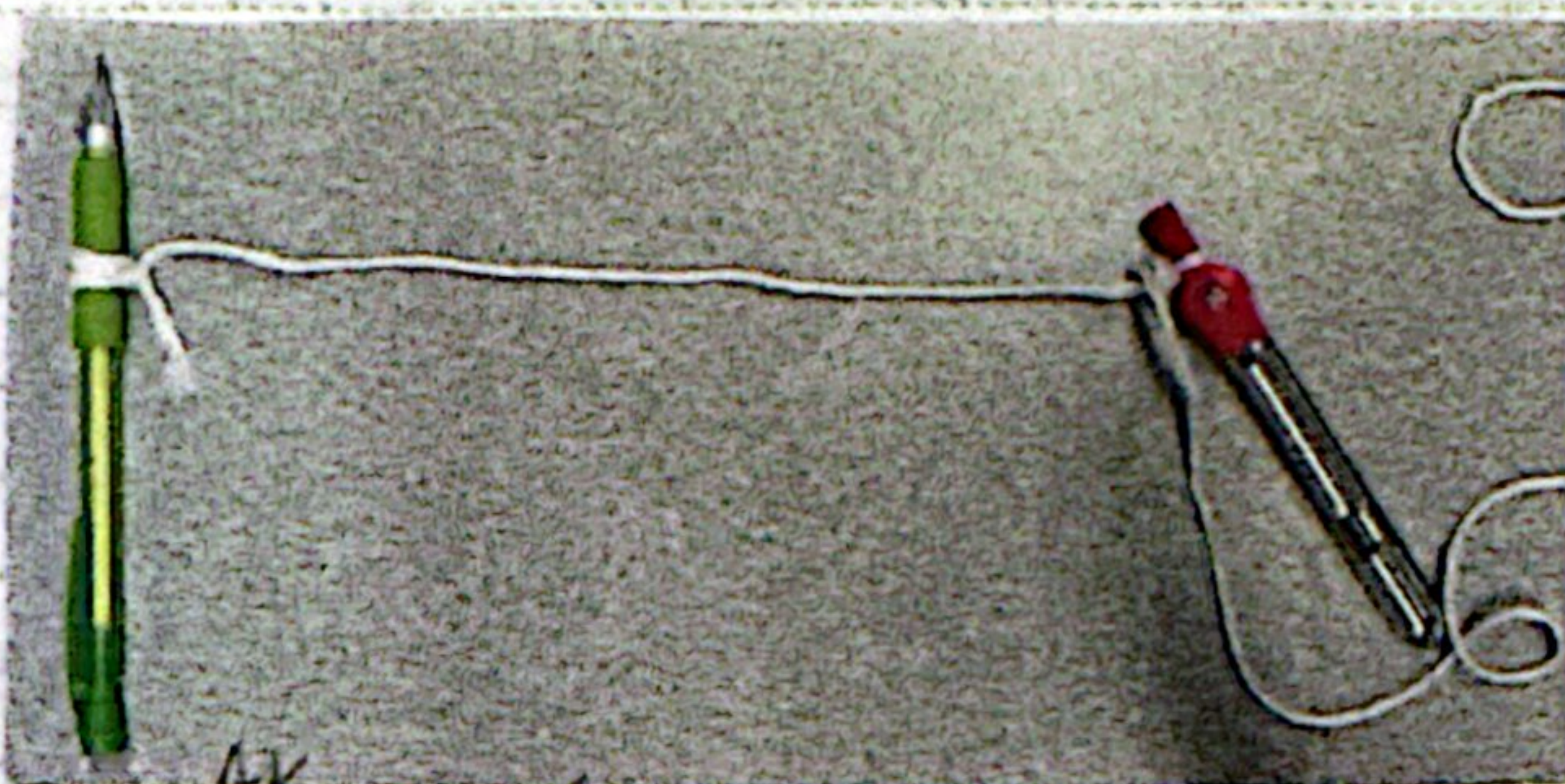
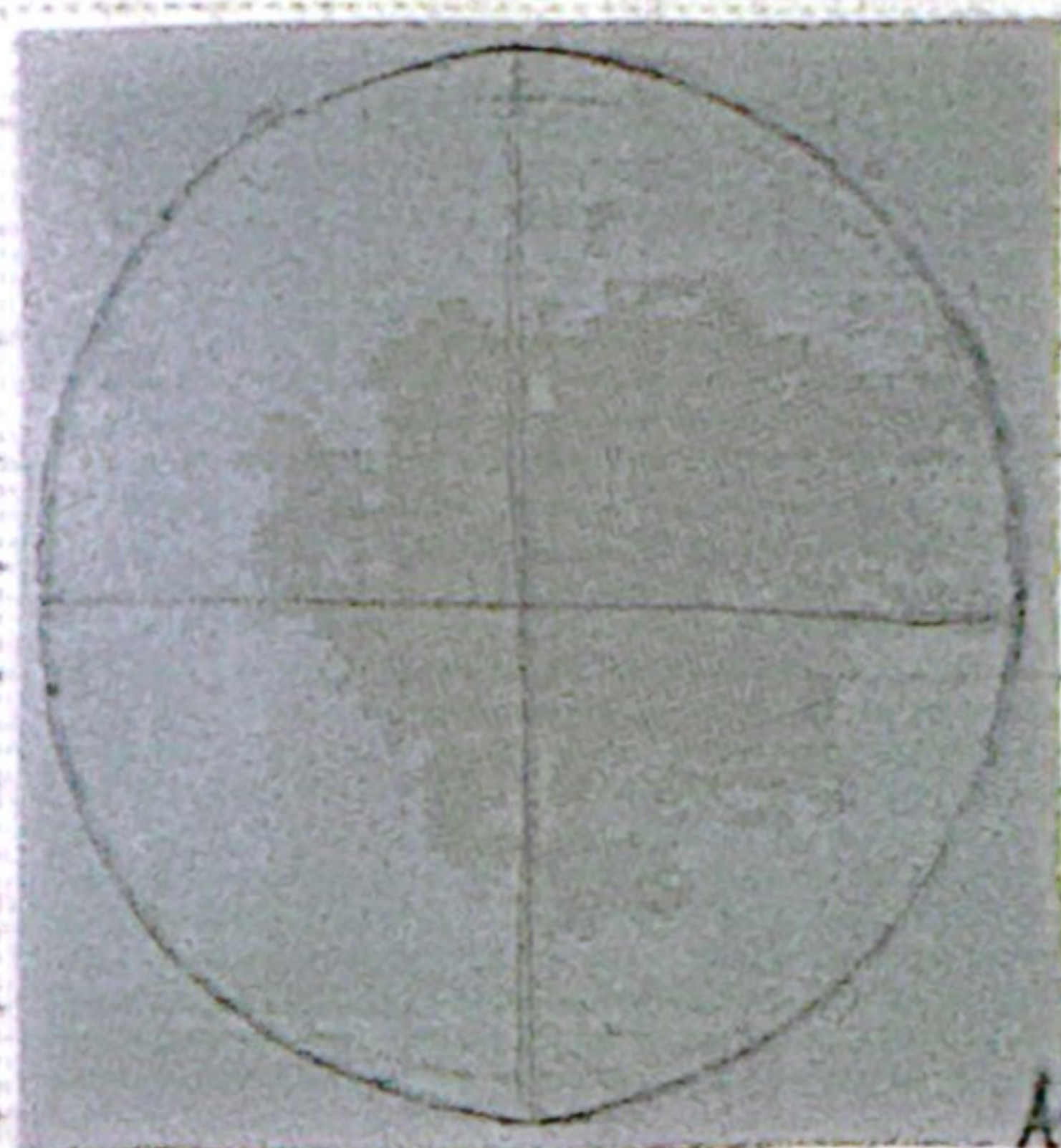
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Dimensions of Bottom Component Units: inches



We determined the dimensions of the base by getting an average size of a head, then making it 0.5 - 1 inches larger. The inner shape is an oval when the outer shape is a circle with radius 8.5 in. Whole Hat: 18 in x 17 in

The compass we were using was too small, so we used a piece of string instead.



Started off with drawing 2 circles with diameters of 8 in & 9 in.

• head is not a perfect circle shape, so we sketched an oval with side lengths 8 in & 9 in

← Brim of hat: 4.5 inches

• Looking at a string hat on Amazon, it stated that the brim of the hat is 5.5 inches. After drawing it out on paper, we decided to deduct one inch.

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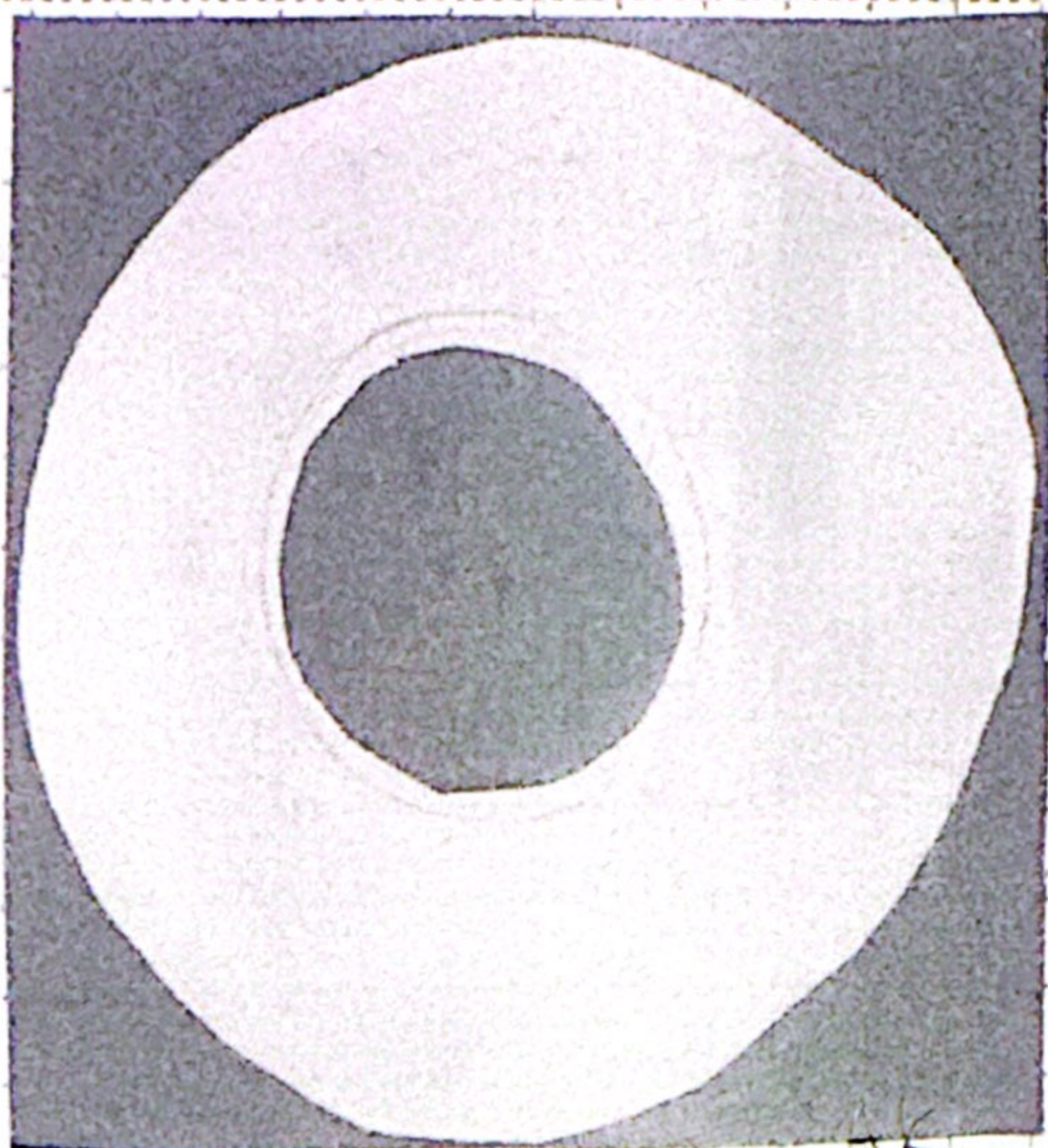
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As seen in this picture, the hat is DEFINITELY not a perfect circle (it's not even close to one).

It's OK!

- adds to the "realistic" part of the hat
- sorting hat is Harry Potter and old, definitely was not a perfect circle

size was based on the average of the head lengths we measured for sixth period



The hat fits on Jason!

- Jason counts as a person in our class whose head is not that small
- After testing the base on other people is sixth period, it mostly fit on boys when it was a little too big for some girls, including us two

• This is only the paperboard base, so we did not add the newspapers for support and brown fabric yet

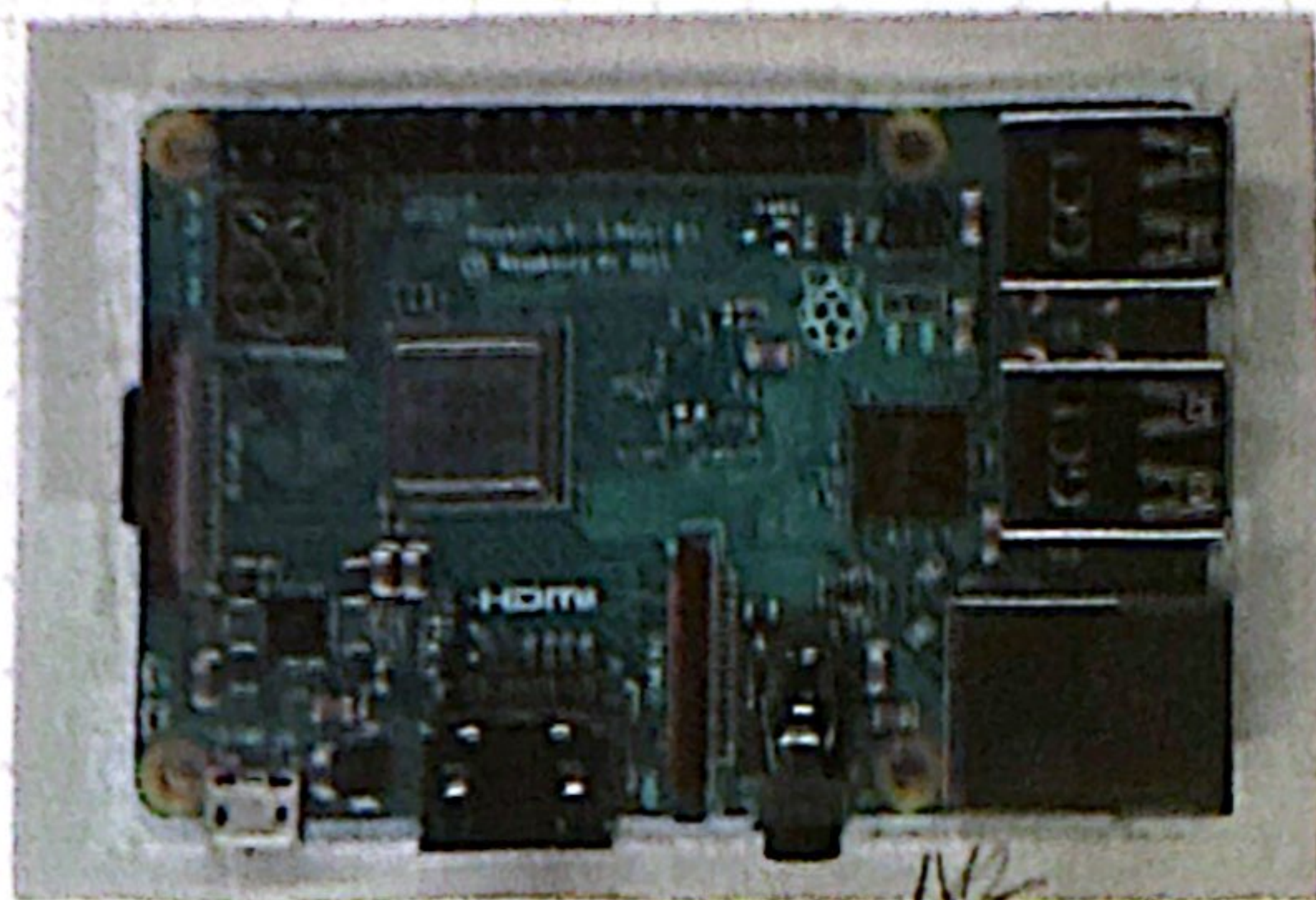
- After adding two more layers, it should definitely fit on a girl's head in our class

Our main priority was to make the base bigger. We reckoned that the hat being too big would be better than the hat being too small for some people.

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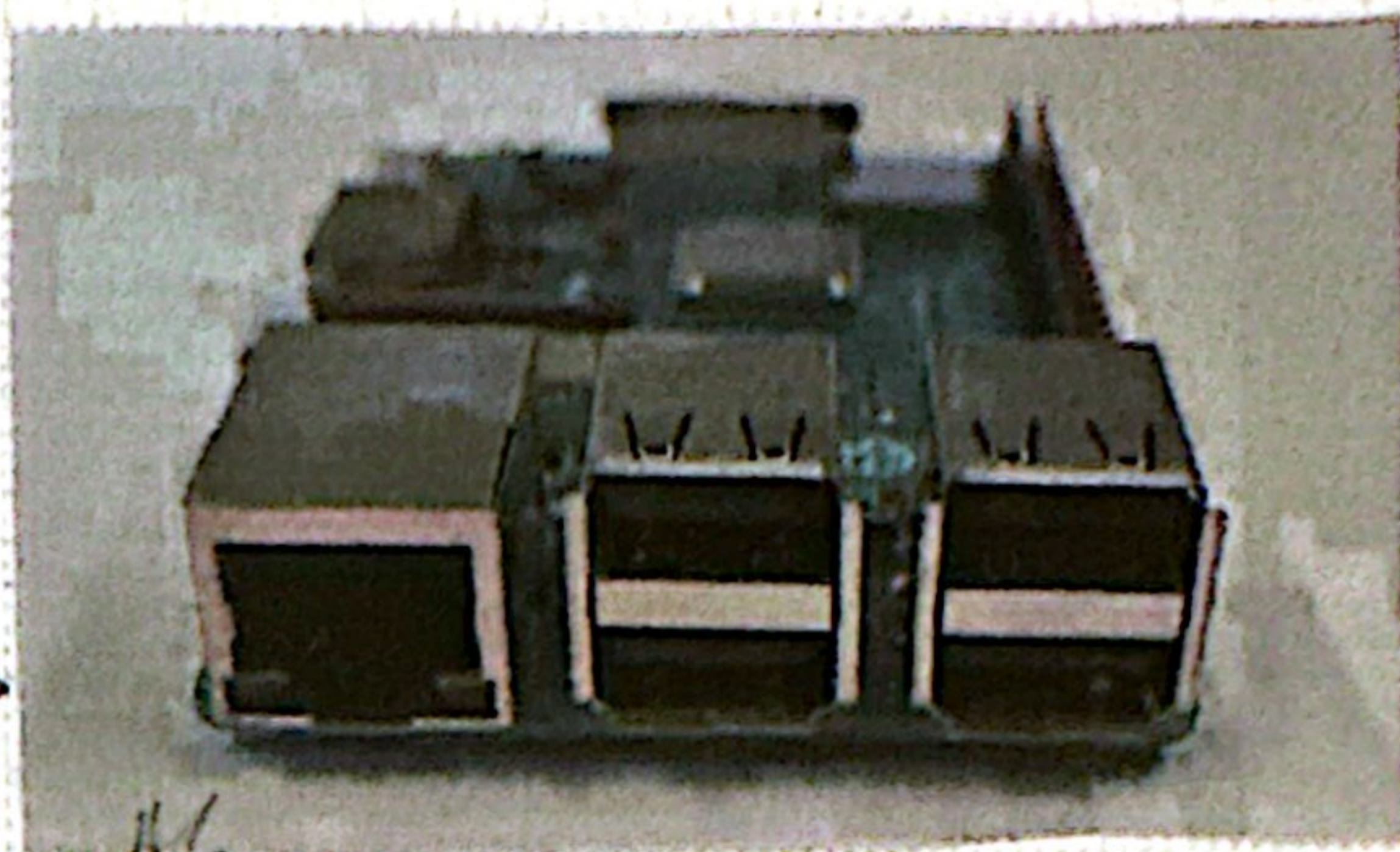
3.5 mm Jack

Our MOVO microphone wasn't able to plug in w/ the 3.5 mm jack, but it was able to plug in w/ the USB plug in.

USB Plug in

The first thing we did was test to see if our microphone was able to plug into our Raspberry Pi 3.

* Our microphone can plug in w/ a 3.5 mm jack and a USB.



This is our MOVO LVI-USB microphone.

We tested...

- If it was able to capture sound.
- If it can capture sound from a distance (above our head).



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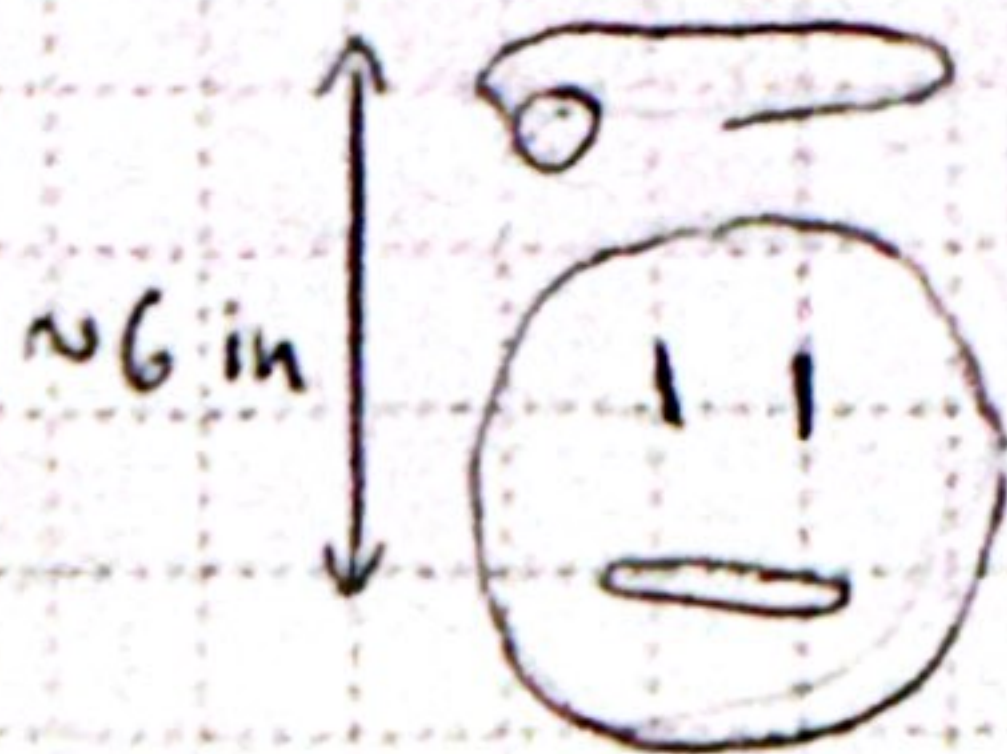
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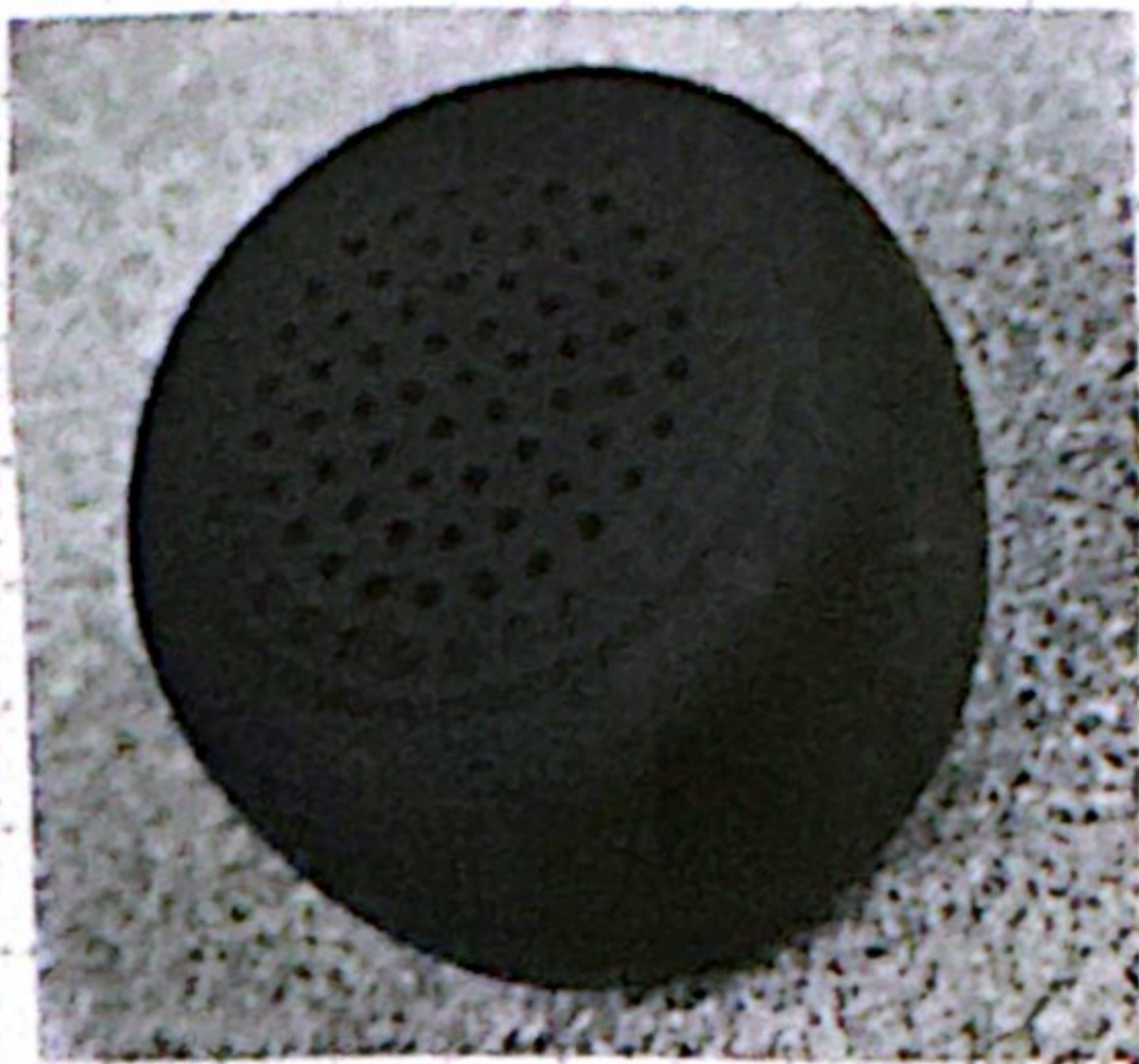
1. Tested to see if it could capture sound.
 - It was able to capture sound w/ the USB plugin, but not w/ the 3.5 mm Jack.

2. Tested to see if it could capture sound from a distance.



- We tested it from around 6 in from the mouth.
- Successfully captured sound from that distance.

* Have to consider that it will be harder to capture sound when the microphone is in the hat.



← We plugged the MOMOTIO speaker in to our computer to see if it can properly play sound (ex. music).

- It worked and the speaker was fairly loud.

- Then, we tested the speaker w/ the microphone & some basic code.

* The speaker asked questions (the pre-programmed questions)

* Our microphone captured our responses.



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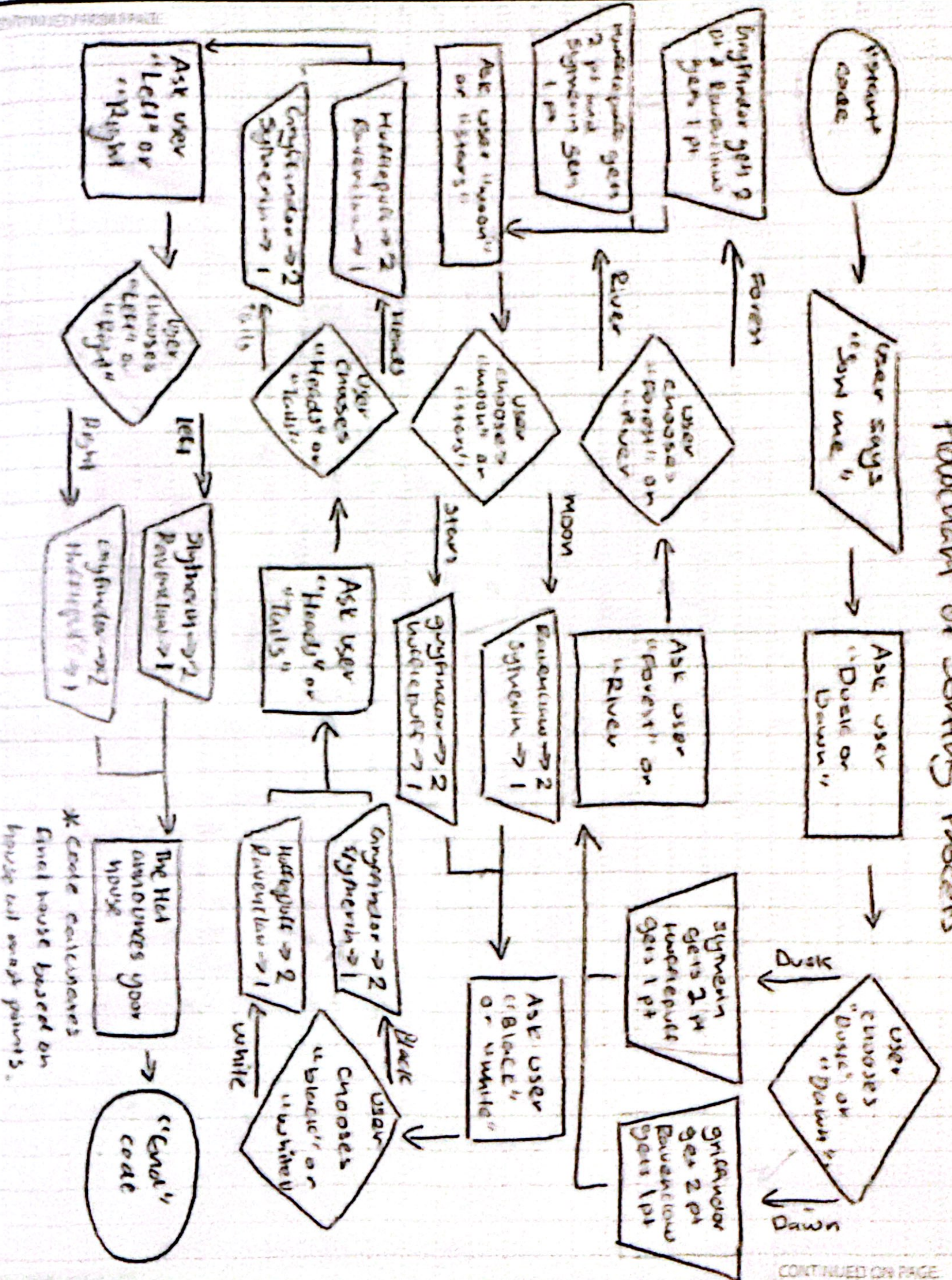
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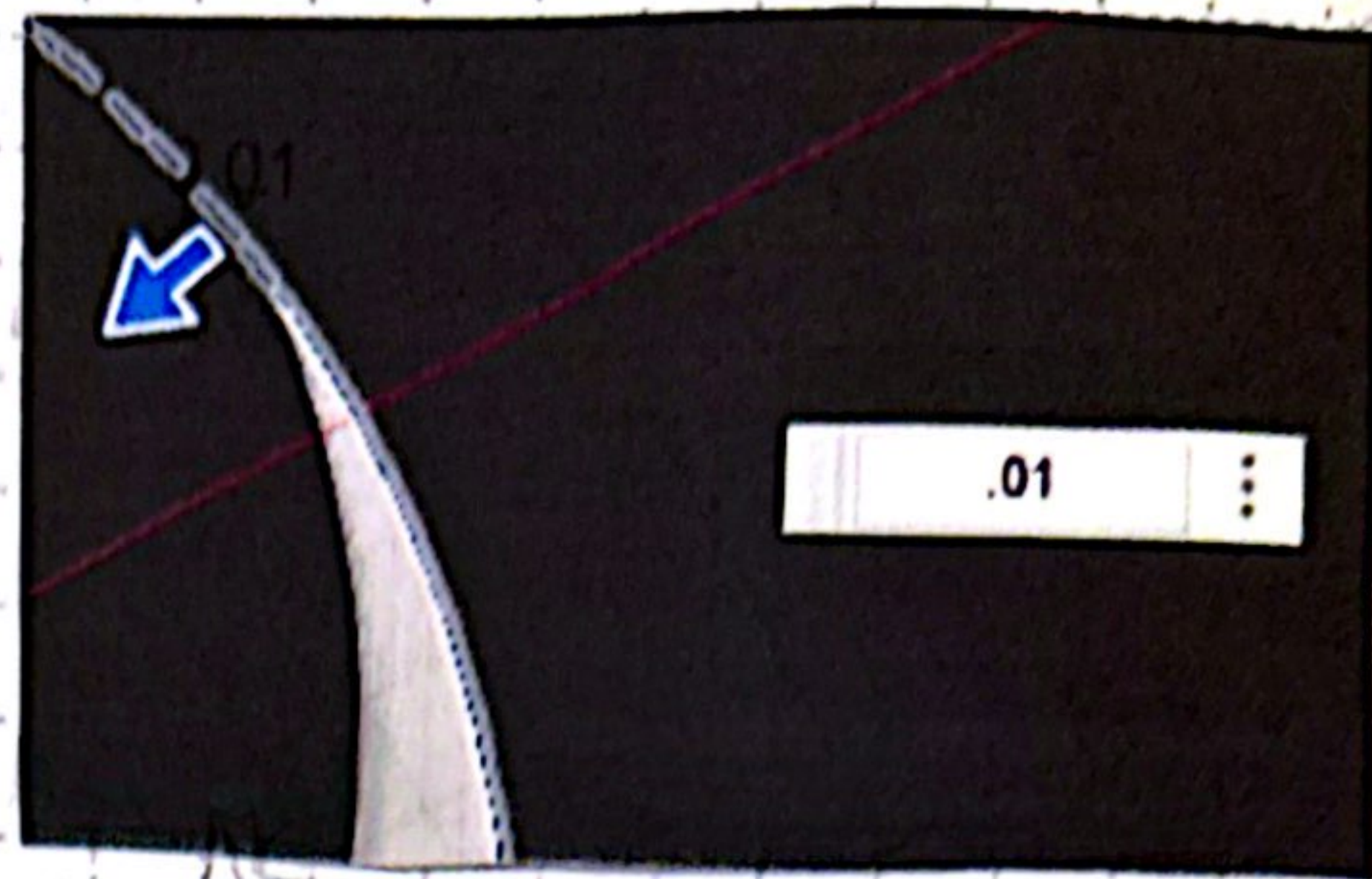
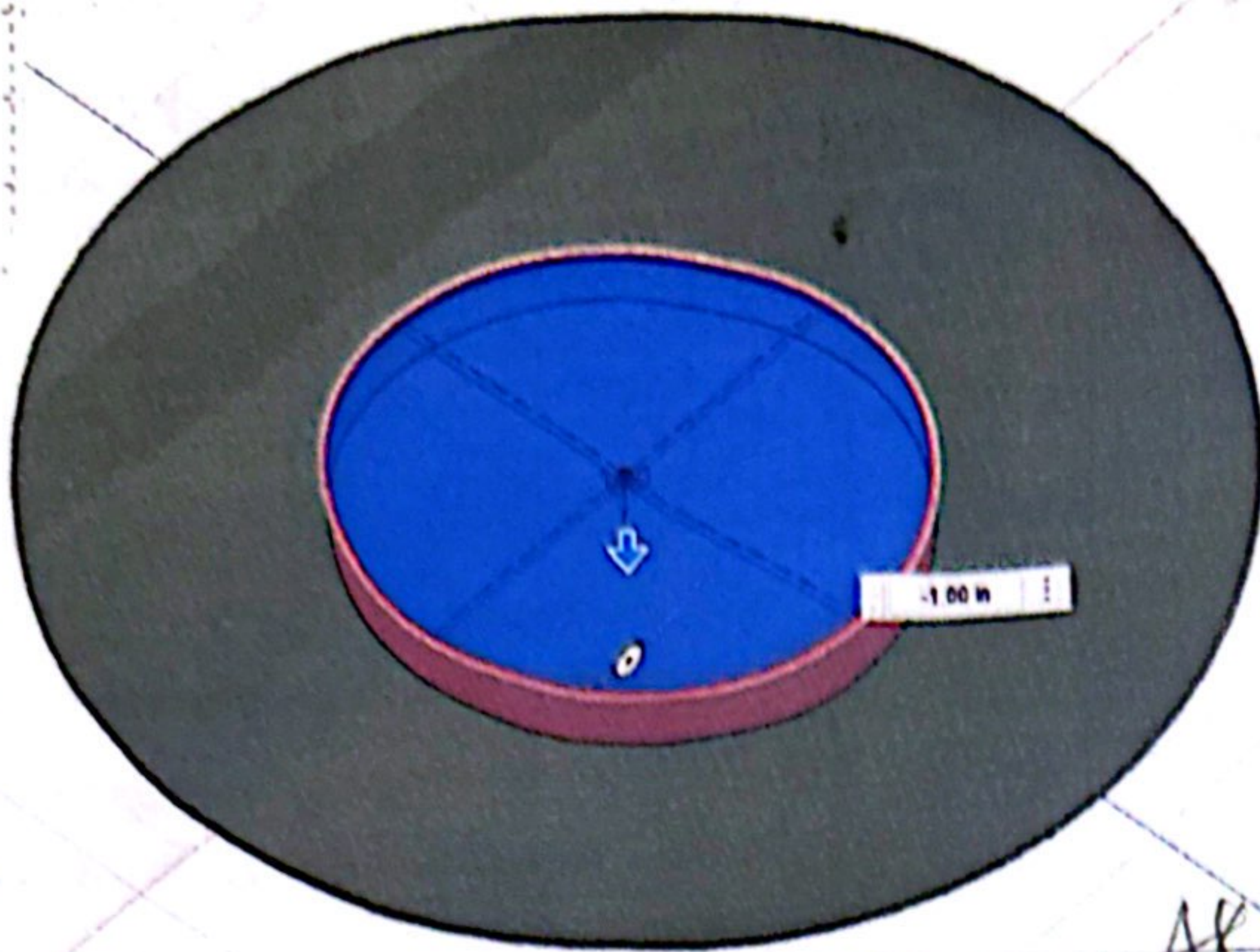
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Flowchart of Sorting Process



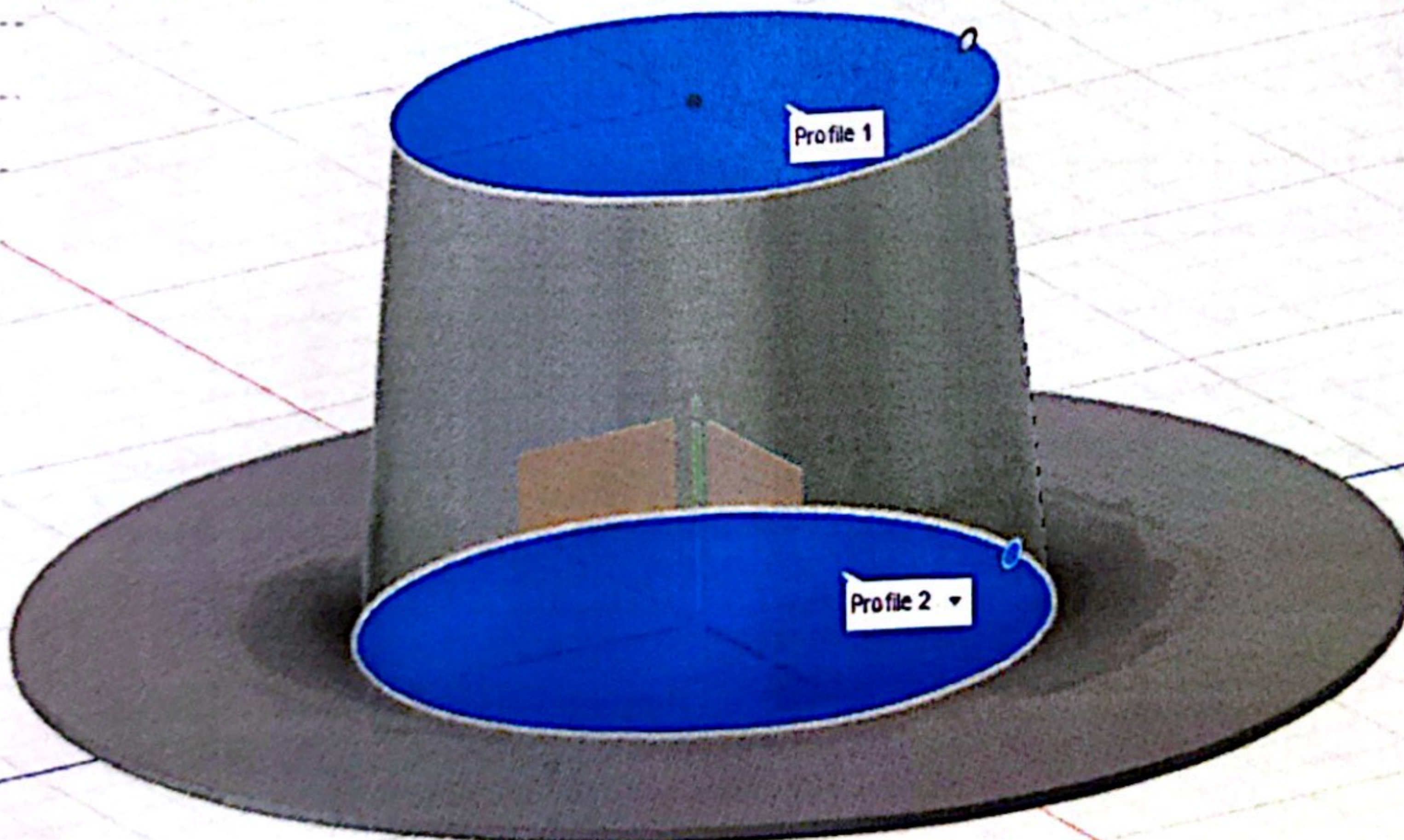
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Shelled the bottom just a little bit: 0.01 inches

We made the same shape on Fusion (same shape as our bottom base made from the poster board). Inner circle are both ovals that have a different side length of 1 inch.

our bottom component is going to look like a top hat / bucket hat. To do that on Fusion 360, we made an offset plane 5 inches away from the base, created a 6 x 7 in oval, and used the loft tool to create the figure in this picture.



The next thing we need to do is make a curve on the top, which is where the Raspberry Pi 3 will be placed.

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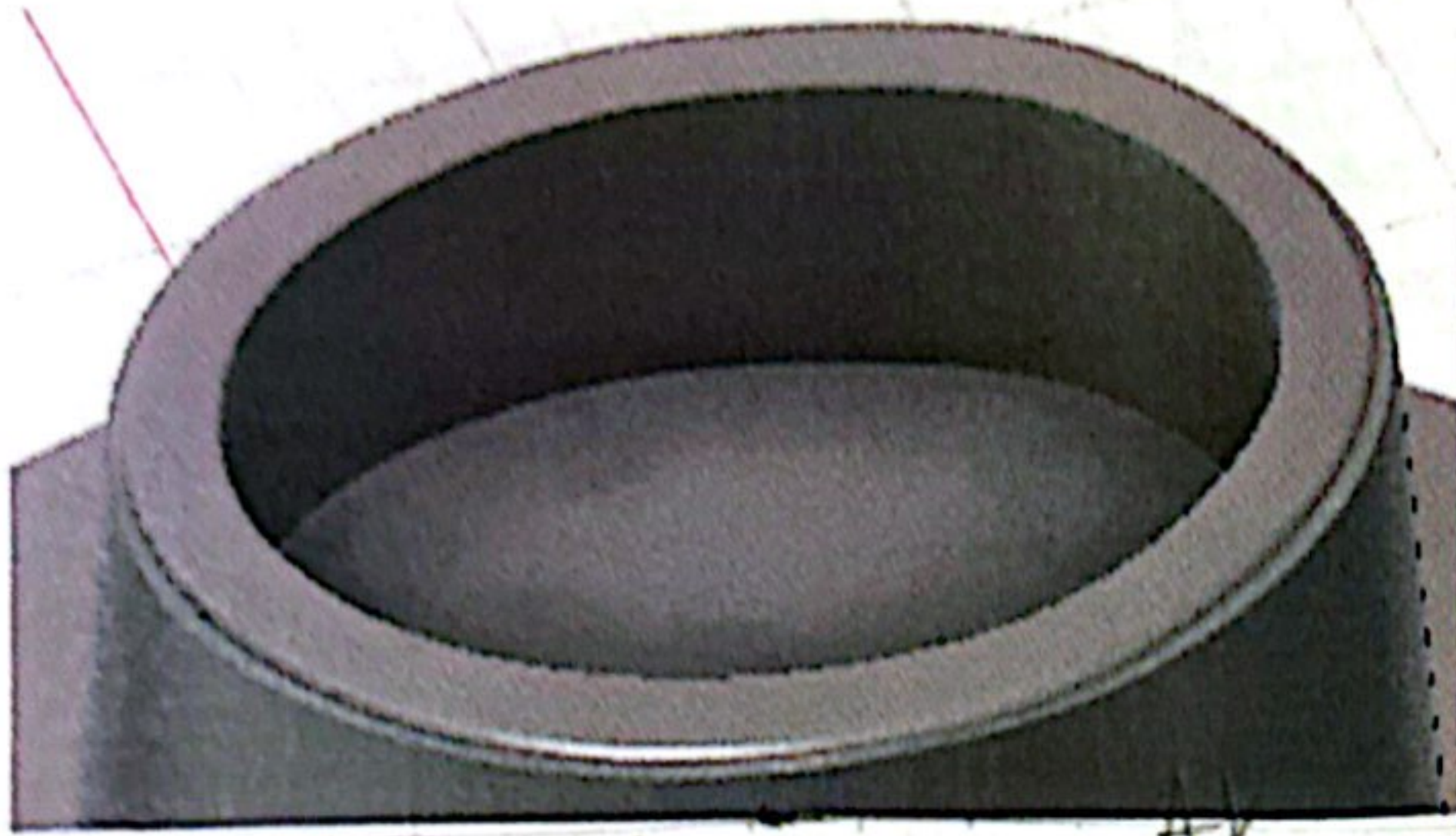
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To make this shape:

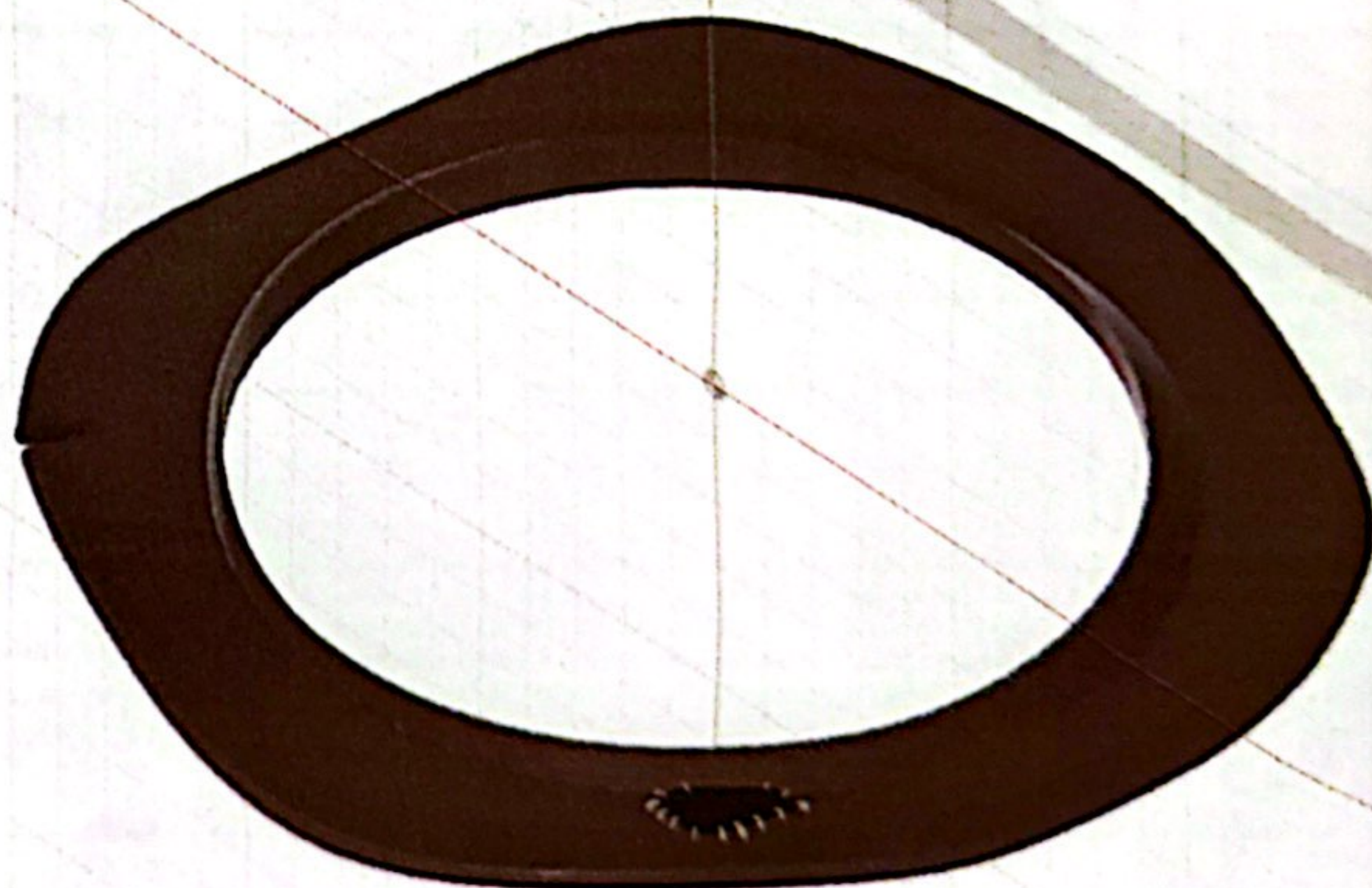
- Extruded it 2.5 in from the inside of the hat.
- Draw a circle 0.3 inches in from the top of the hat.
- Cut the smaller circle in by 2 in.
- Fillet the sharp edges.

Pictures showing the process

FIXING THE BRIM

currently, the bottom of our CADDED base component looks extremely stupid (looks like a top hat).

we went to the original grab cap model design, (seen in page 9 of this notebook), cut the top part of the hat, and imported it into our CAD model.



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SCALING

When we first imported the bottom of the GrebCAD model sorting hat it was way too big. We fixed the dimensions by scaling the component. We then joined the two components together.

The picture on the bottom right shows the fully colored sorting hat. In order to make our original component the same color, we edited the "PEEK" color and made it a lot darker. The whole hat looks a lot smoother, especially the filleted part.

This is the finished model of our bottom component, not including the additional Raspberry Pi.

CHANGE: This is our ROUGH DRAFT of our bottom component.



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Dialog script

```
intent('I want to order $(R latte|black coffee)', p => {
  p.userData.coffee = p.R.value;
  p.play('Sure, wait a bit I'll get you some ${p.R.value}');
});

intent('What is in the cart?', p => {
  p.play('You have ordered ${p.userData.coffee}');
});
```

When using user-defined slots, the variable that is restated by Alan AI must be defined in the intent statement.

*We tried to use a user-defined slot in our previous code, but we failed because our variable doesn't have a pre-defined hard coded value.

Dialog script

```
intent('What (is|was|would be) the weather $(D yesterday~past|last day~past|today~now
console.log('Value:', p.D.value);
console.log('Label:', p.D.label);
switch (p.D.label) {
  case 'past':
    p.play('The weather ${p.D.value} was terrible!');
    break;
  case 'future':
    p.play('I hope that the weather ${p.D.value} will be fine.~');
    break;
  case 'now':
  default:
    p.play('The weather ' + p.D.value + ' is great!');
}
});
```

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While working with user-defined slots, we encountered an error as our variable didn't have a predefined value.

The previous code snippet demonstrates an example of a possible solution.

- The example switches responses based on the user's response.

Pseudocode - Count mechanism

switch NatResult

```
case g > r & g > h & g > s
  p.play "You are in Gryffindor"
  break
```

```
case r > g & r > h & r > s
  p.play "You are in Ravenclaw"
  break
```

```
case s > r & s > h & s > g
  p.play "You are in Slytherin"
  break
```

```
case h > r & h > g & h > s
  p.play "You are in Hufflepuff"
```

* We will have another function in anticipation of a tie breaker.

- Also need a new way to store houses count

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Storing info & then passing it to Intent()

11/

Dialog script

```
onCreateProject(() => {  
  project.movies = {en: "Sergio|Valley Girl|All Day and a Night|The Half of It"};  
});  
  
intent('When is $(MOVIE p:movies) on?', p => {  
  p.play('Let me check the showtime for ${p.MOVIE.value}');  
});
```

↑ In the example above, they store possible responses in a variable and pass it on to each intent function.

Count Mechanism: Alternative to Case Switch

- Another thing we could do is create a sort of dictionary (but in JS) and update the value of specific houses using the count mech.
- We can pass this variable on to the final Intent() function & announce the results.

Case Switch

- Switches based on scenario
- Can store each case scenario in a variable & simplify the process.

Passing the value

- Passes the value to the function, & cuts down amount of code.
- Difficult to create dict (in JS) and update values continuously.

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DESCRIPTION

EVENT NAME

buttonClicked	Fired when the user clicks the AI assistant button in the app
buttonReady	Fired when Alan AI connects to the virtual assistant project and is ready to listen to the user's input
firstActivate	Fired when the user activates the AI assistant for the first time during the dialog session
firstClick	Fired when the user clicks the AI assistant button for the first time during the dialog session
micAllowed	Fired when the user allows access to the microphone
micPermissionPrompt	Fired when a prompt to allow access to the microphone is displayed
popupCloseClicked	Fired when the user clicks the close icon in the Alan AI button popup
recognized	Fired during and upon the user's input recognition
showPopup	Fired when a popup next to the AI assistant button is displayed

Functions needed

buttonReady } used in the beginning for setup.
firstActivate }

micAllowed } used to activate the mic
micPermissionPrompt }

*used when code is running from Raspberry Pi

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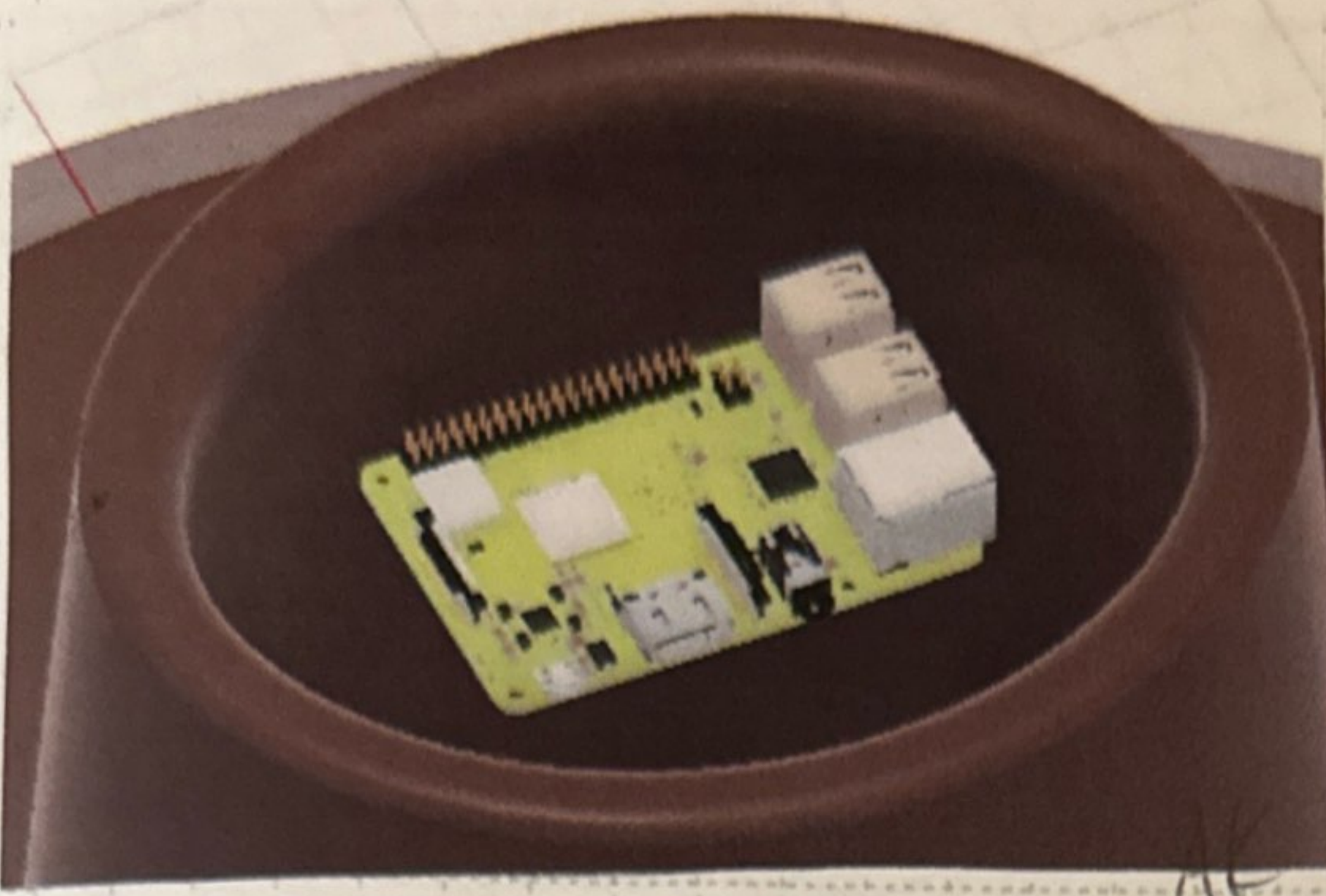
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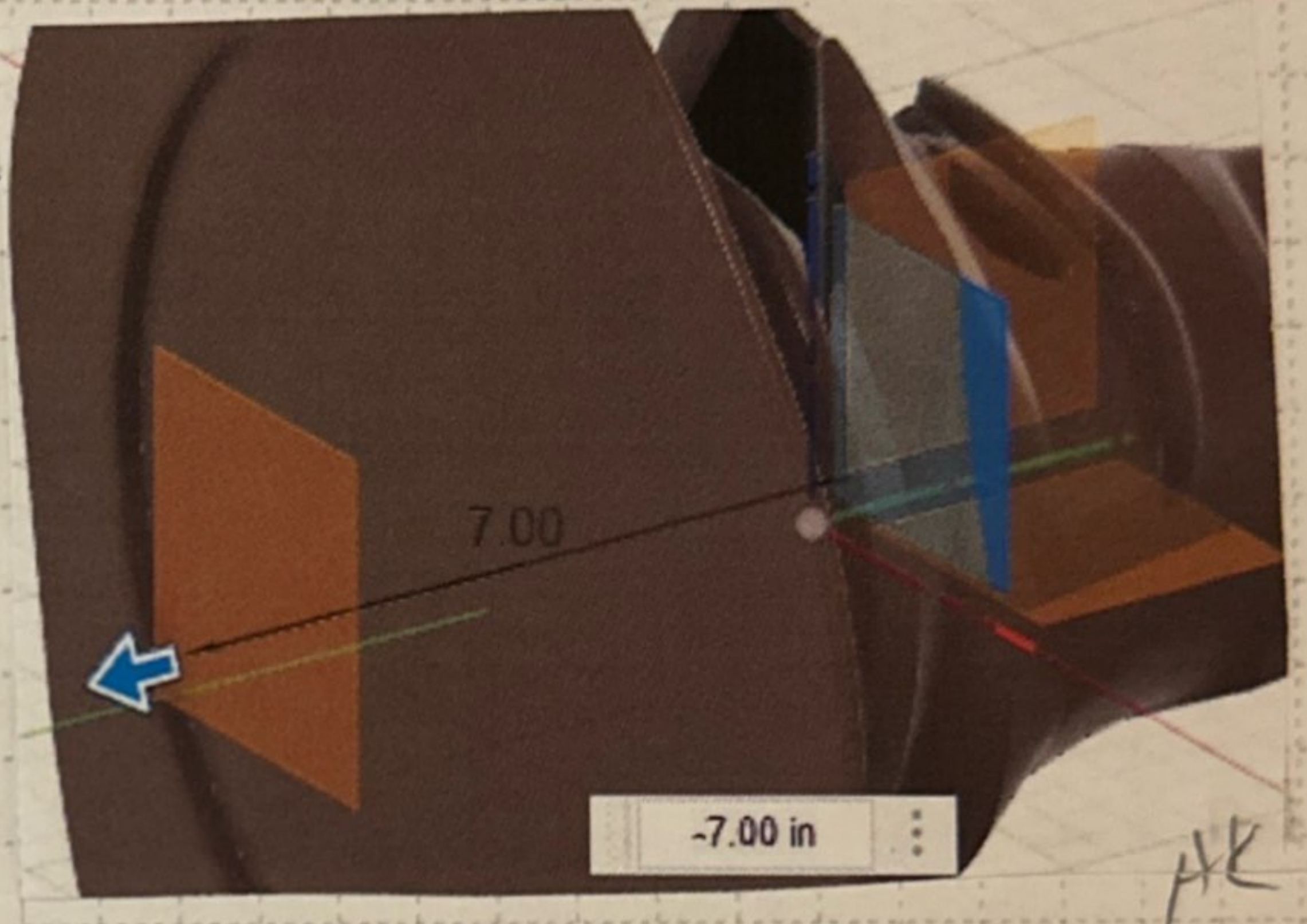
Adding the Raspberry Pi to the "sinkhole"

← As we learned from last year, we could import another design into our current one, which is what we did in order to add the Raspberry Pi to our sorting hat.

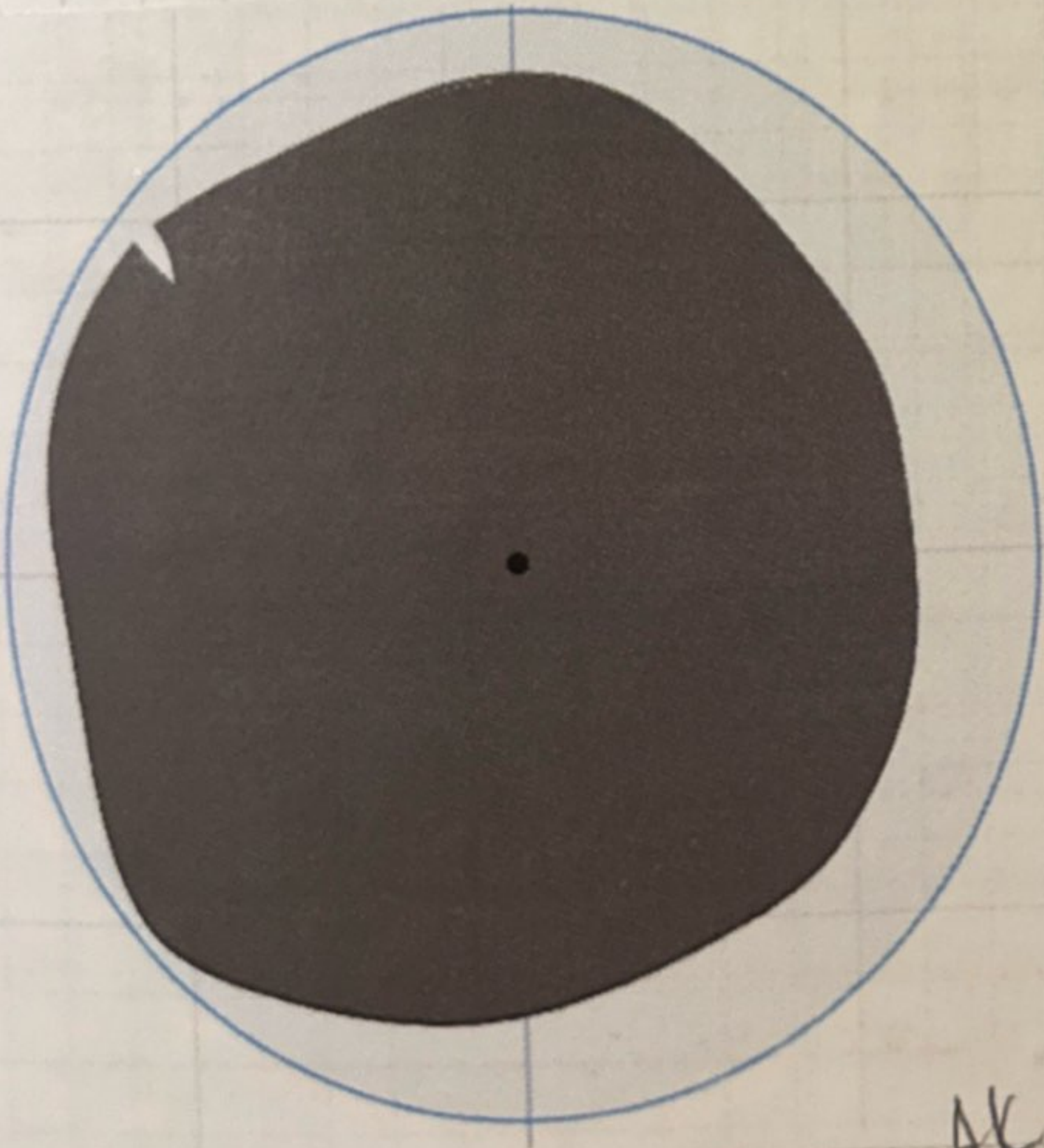
Cutting the original hat

Just like before, instead of cutting the top part, we cut the original model's brim.

Process: Construct → Offset Plane
We made the offset plane a length of .7 inches.

Extruding as "Cut"

← We made a sketch on our offset plane: a circle with a radius big enough to cover the whole base of the hat. Then, we extruded the circle upwards. Instead of extruding it as a new body / join, we extruded it as a cut.



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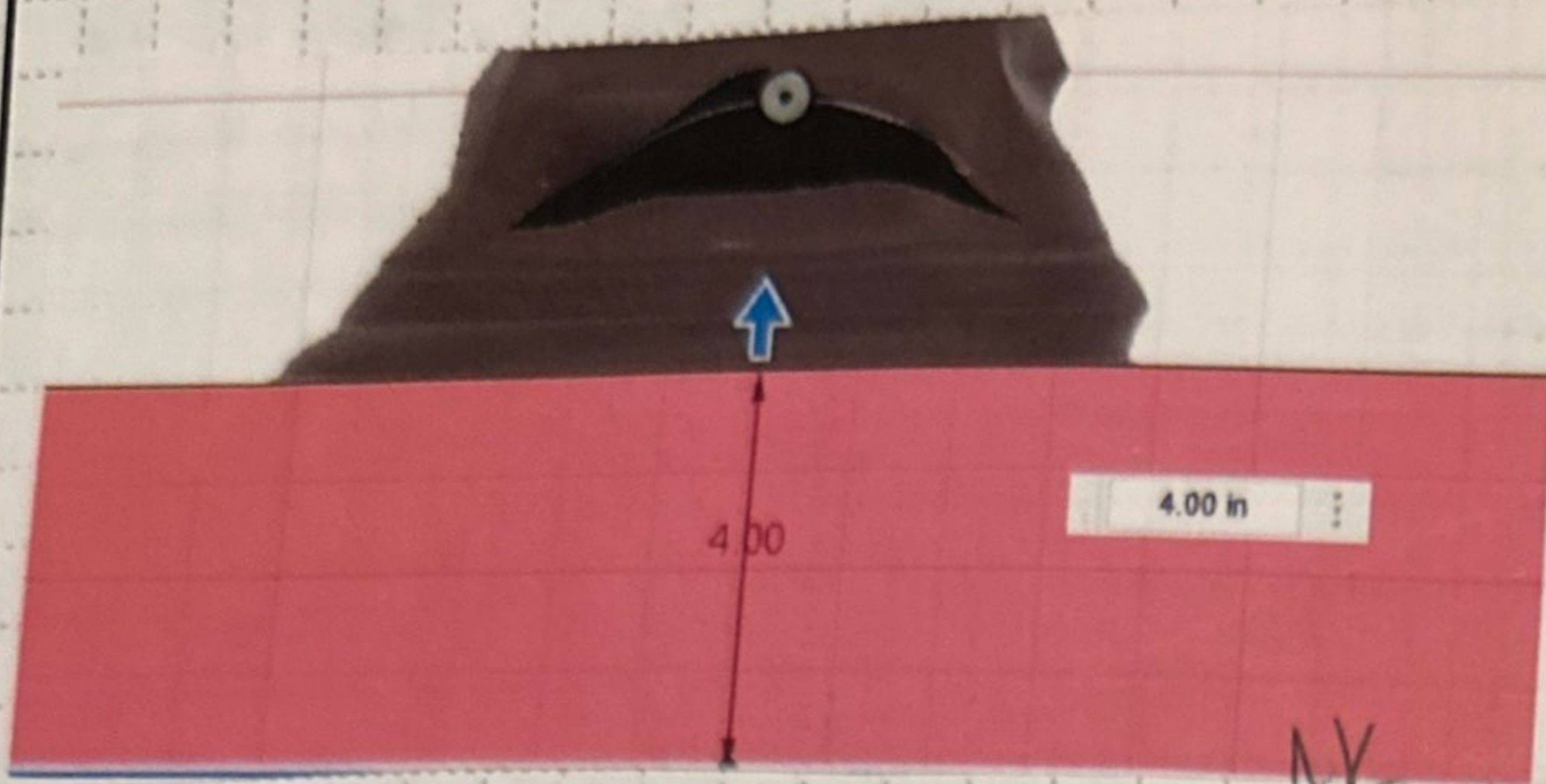
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← This picture on the left shows the cut. We cut the original hat upwards by 4 inches getting rid of the brim and parts of the bottom.

AK

P.S. You can only extrude upwards ?!

Scaling The Component

The "scale" function is something new that I (Angelo) learned. It is in the modify section of Fusion 360.

In the picture on the right, it was a uniform scale so the only thing that changed was the ratio of the dimensions. The hat is separated into three parts, so 3 entities are selected.

SCALE

Entities

3 selected

Point

1 selected

Scale Type

Uniform

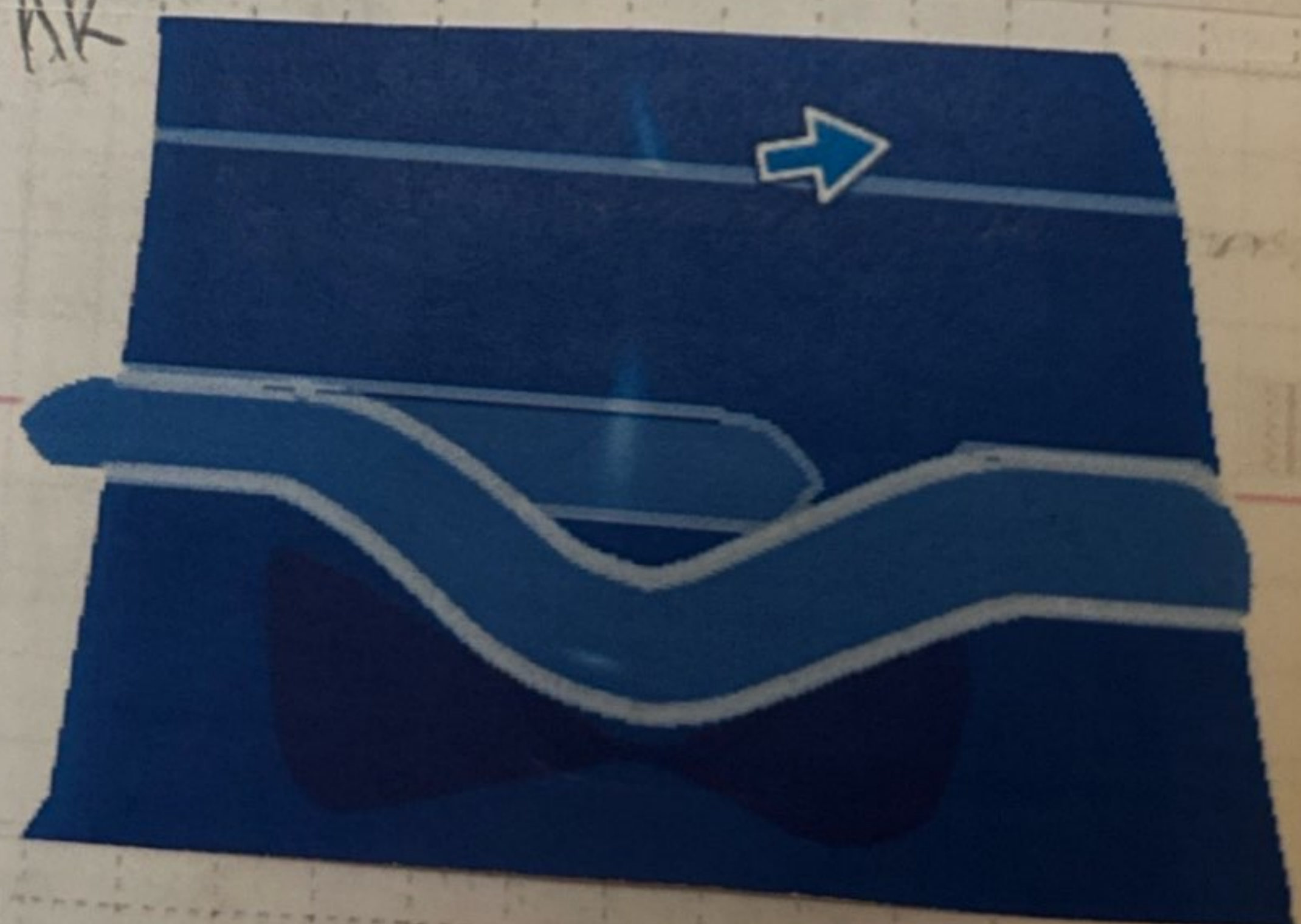
Scale Factor

1.79

OK

Cancel

AK



1.79

This picture on the right shows a better visual on how the scale function works. The whole hat is selected (highlighted in blue), and its dimensions were each multiplied by 1.79.

There are so many other functions in Fusion 360 to learn, and the scale function completely blew my mind.

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AK

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FINISHED MODEL

The picture on the right shows the sorting hat, fully CADDED and scaled to the right dimension. Our physical, real life hat will not look exactly identical to this, but overall they are pretty similar.

The title of this page does not imply this is the final CAD model. It definitely is not. This is just the finished first draft, and there are many drafts that are coming up.



AK

Things we still need to modify / add:

- velcro straps
 - need to add to the interior of the top and exterior of the bottom
- a stand for the Raspberry Pi 3 so it can stay secure
 - the Raspberry Pi is extremely fragile; it cannot just stay in the sinkhole by itself
- the microphone and speaker
 - these two small components still need to be CADDED and added

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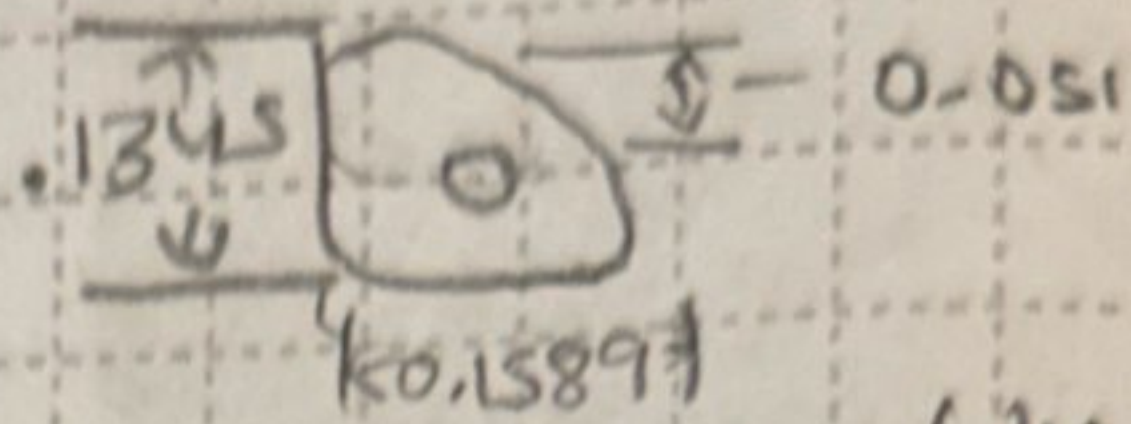
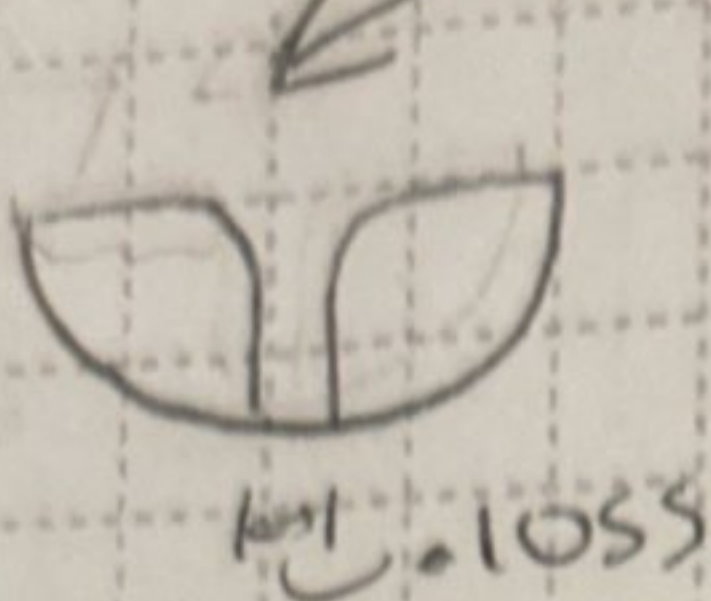
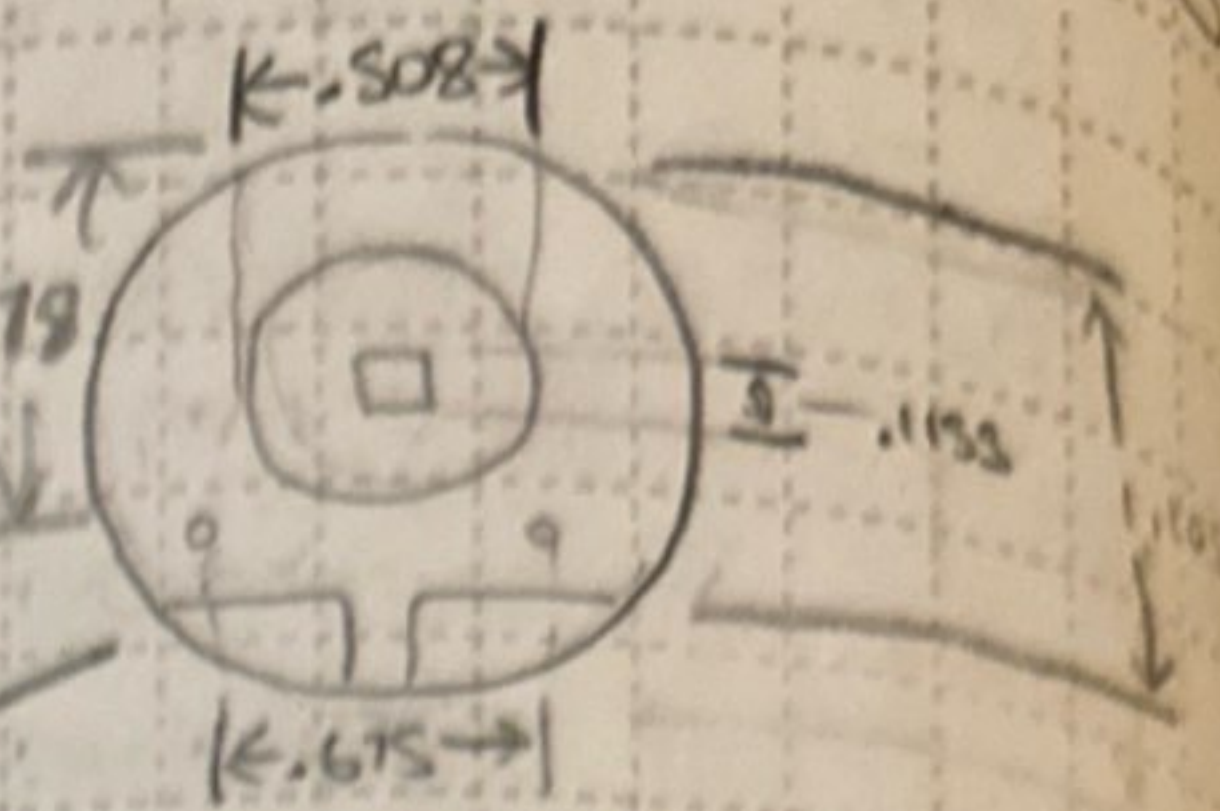
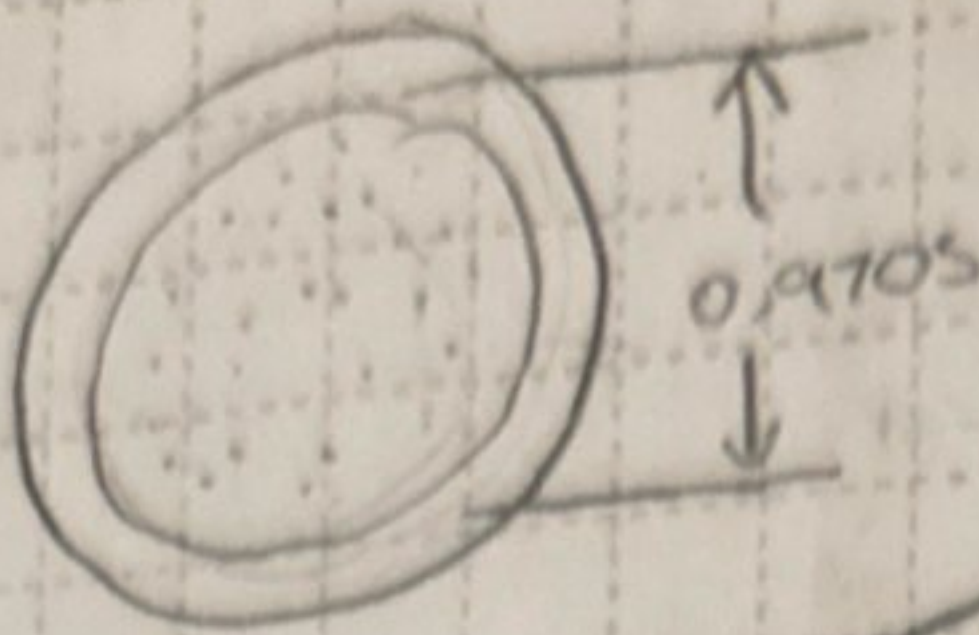
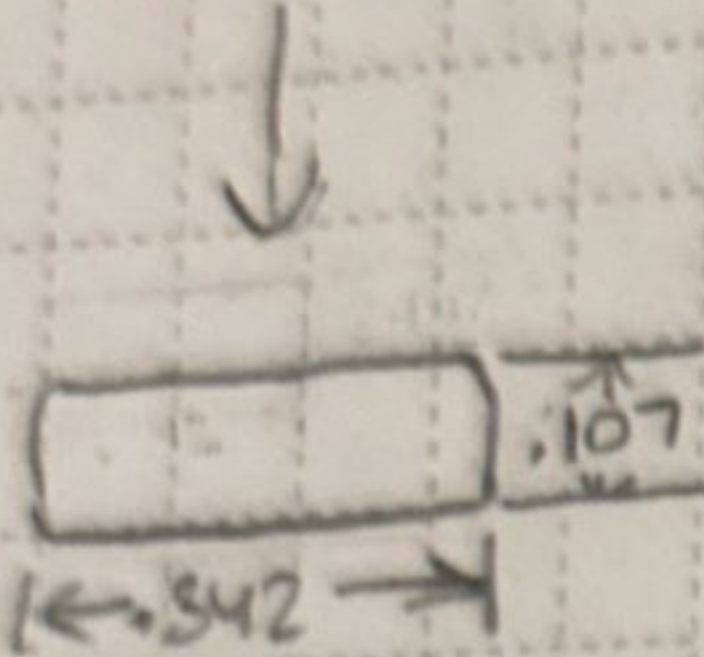
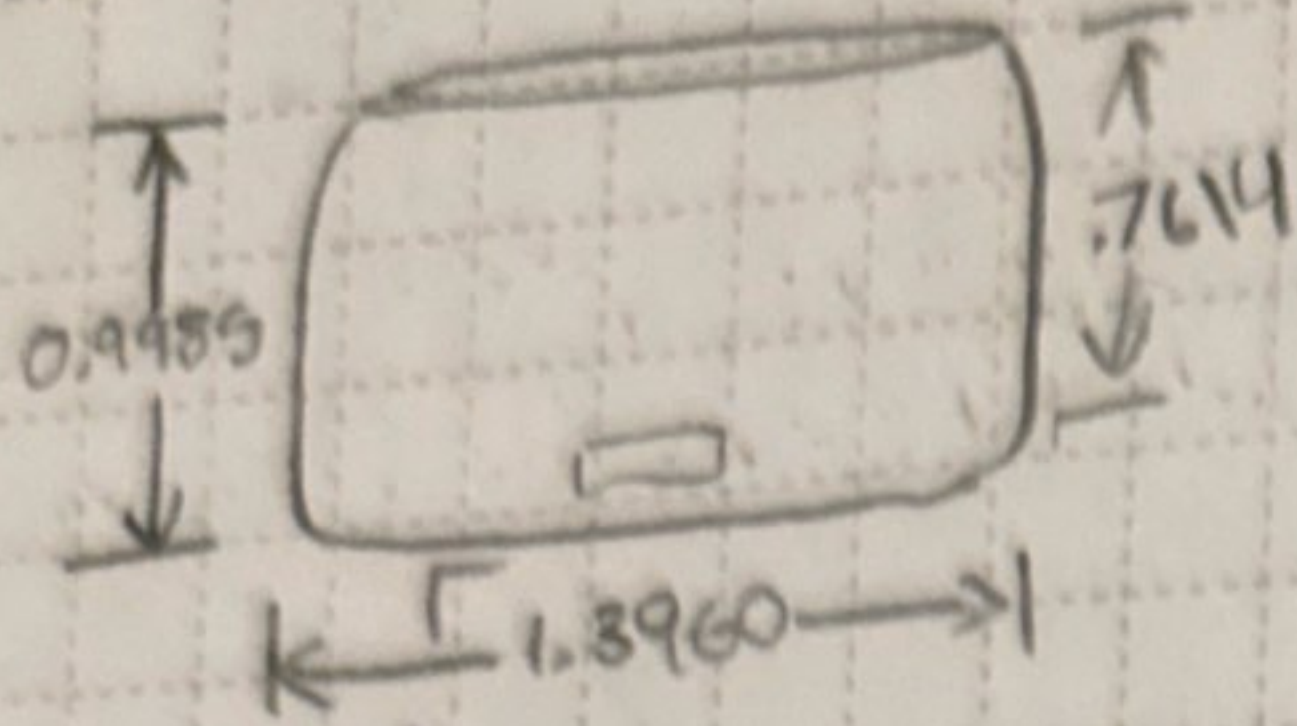
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Dimensions

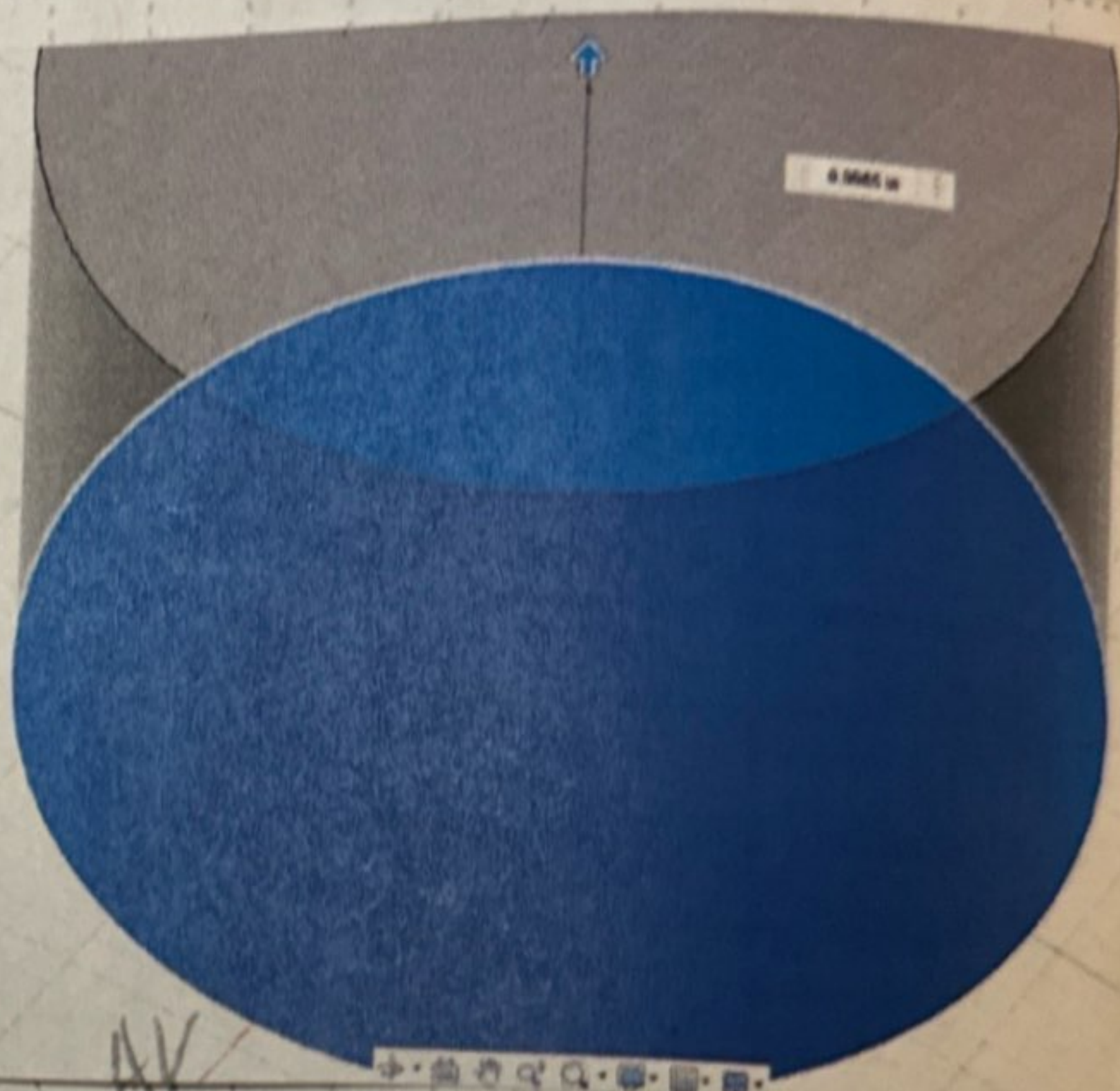


Unit: Inches

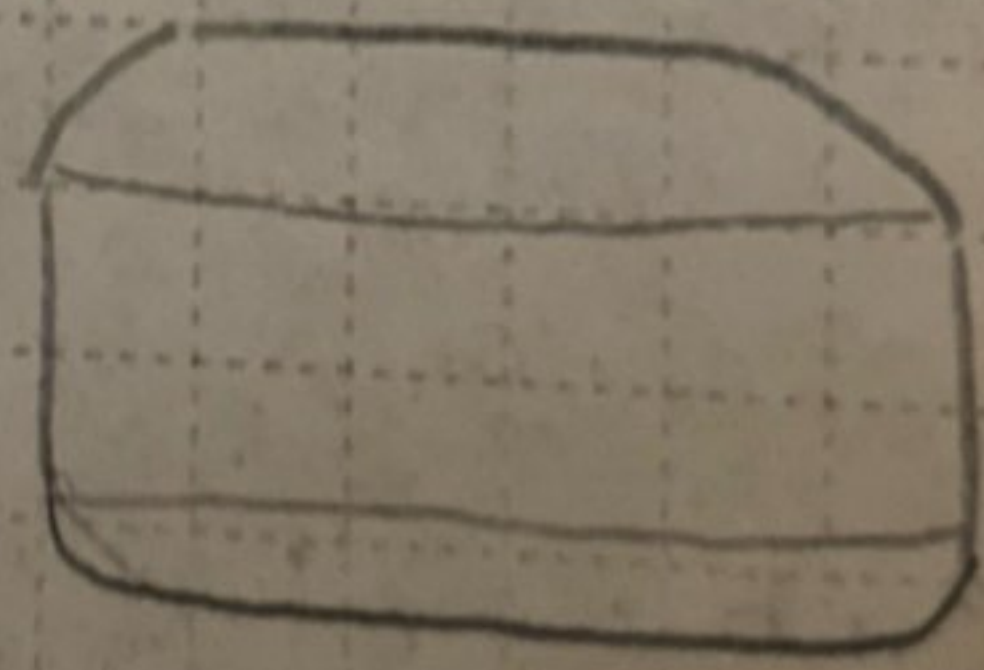
1. I began by creating the basic shape of the speaker without considering the details.

- + I created a sketch with a circle w/ a diameter of 1.3960 in.
- I extruded the sketch by 0.9985 in

AK



2. I began working on side profile.



Because the speaker has rounded edges, I filleted the speaker's sides by 0.12 in.

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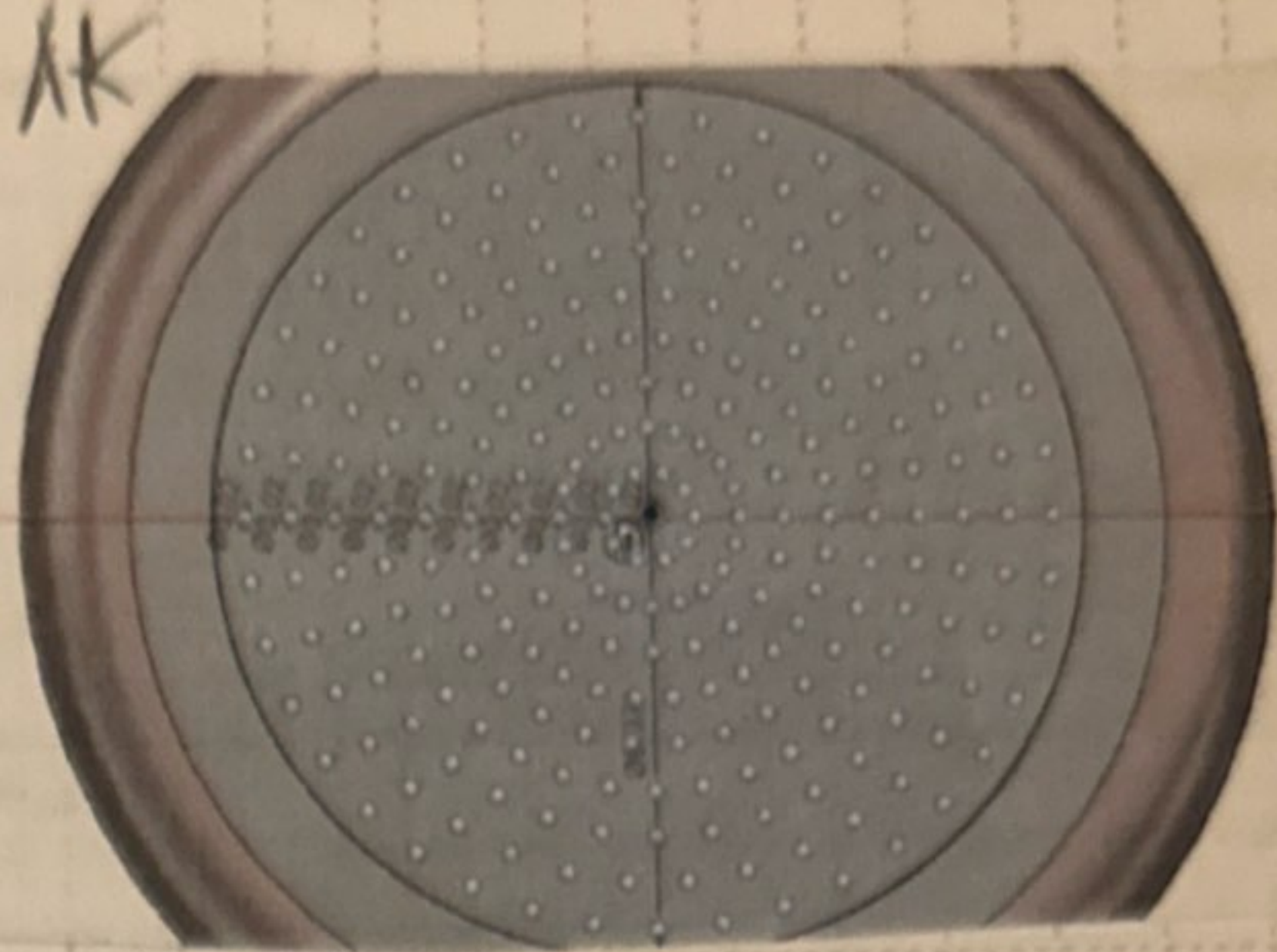
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Speaker Top View

To create the speaker pattern on the top of the speaker, I used the circular pattern option around A times to create all the dots on the top of the speaker.



10/23

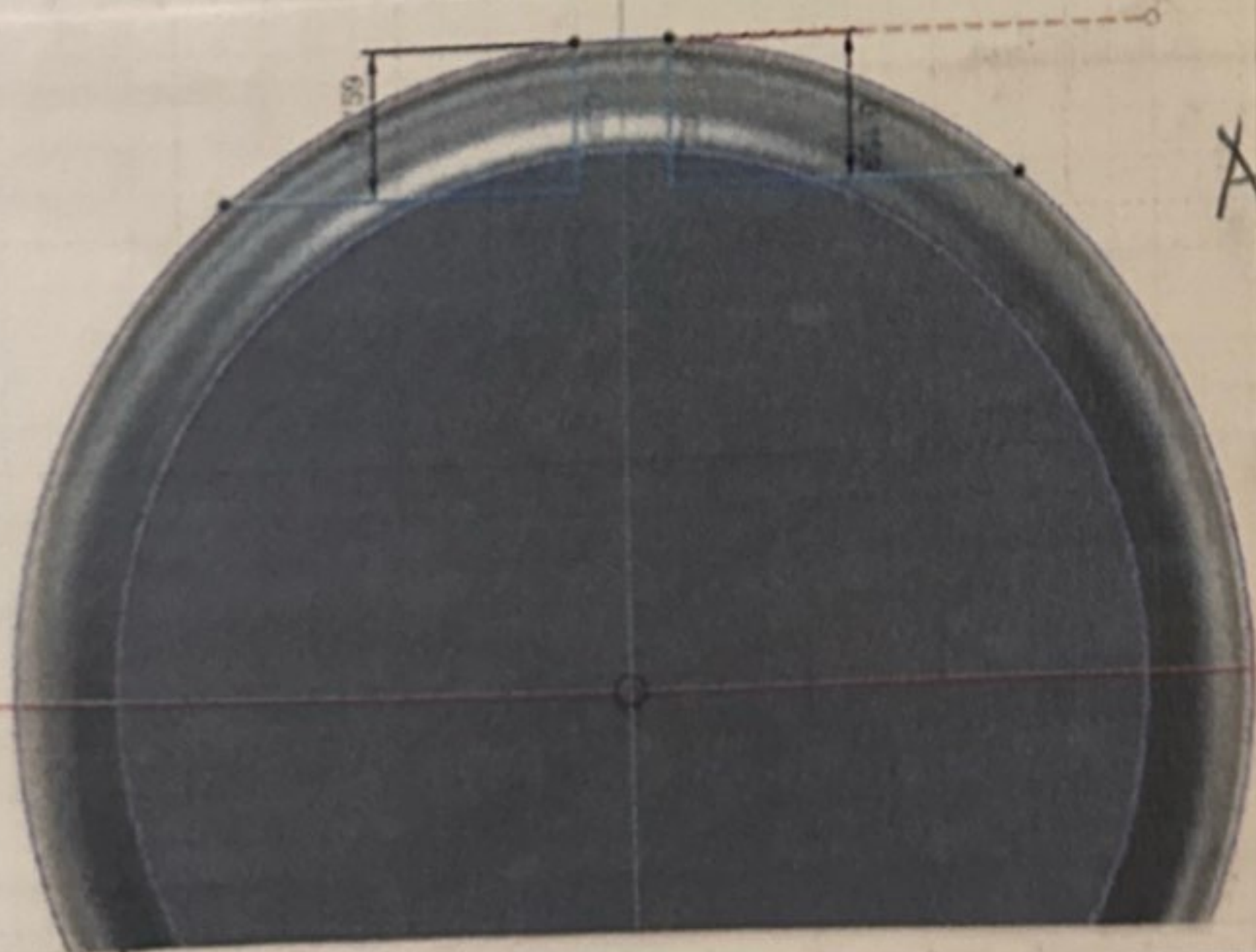
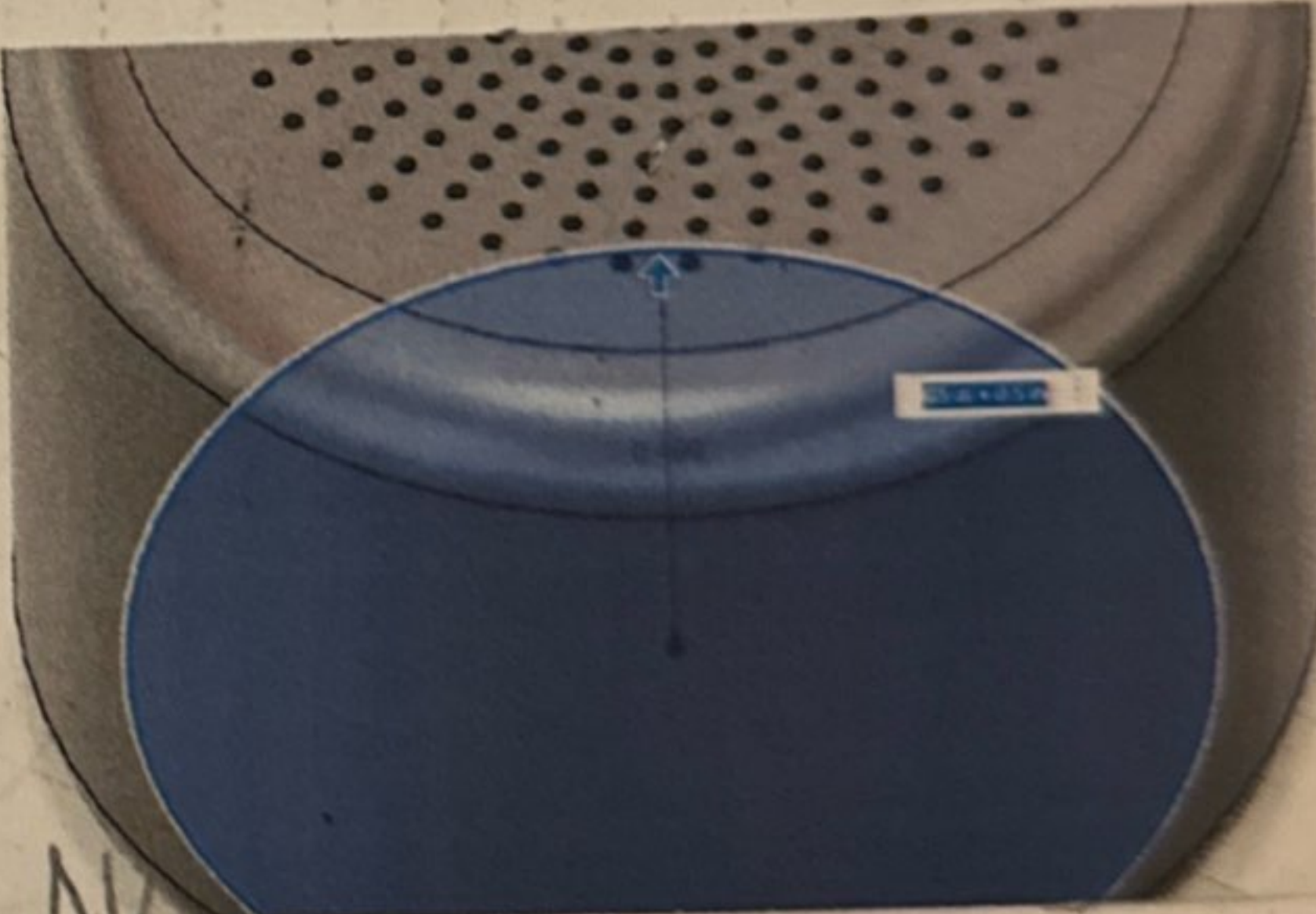


- Rather than extruding the dots individually, I cut a hole in the middle of the speaker and extruded the gray part inside by 0.9985 in to create the speaker design.

10/26

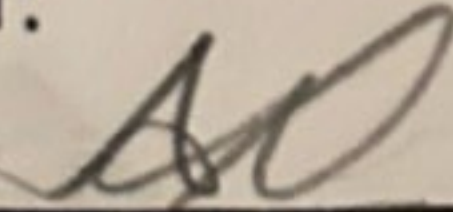
Speaker Bottom View

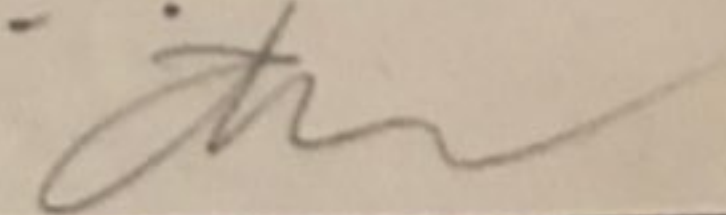
To begin creating the bottom view of the speaker, I created a sketch and extruded it up to hide the holes from the top view.



Then, I created another sketch at the bottom to create the part at the bottom of the speaker.

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Speaker Bottom Part Cont.

11/3

After creating the sketch on the bottom of the speaker, I cut the little piece in to create the indented feature on the bottom of the speaker.



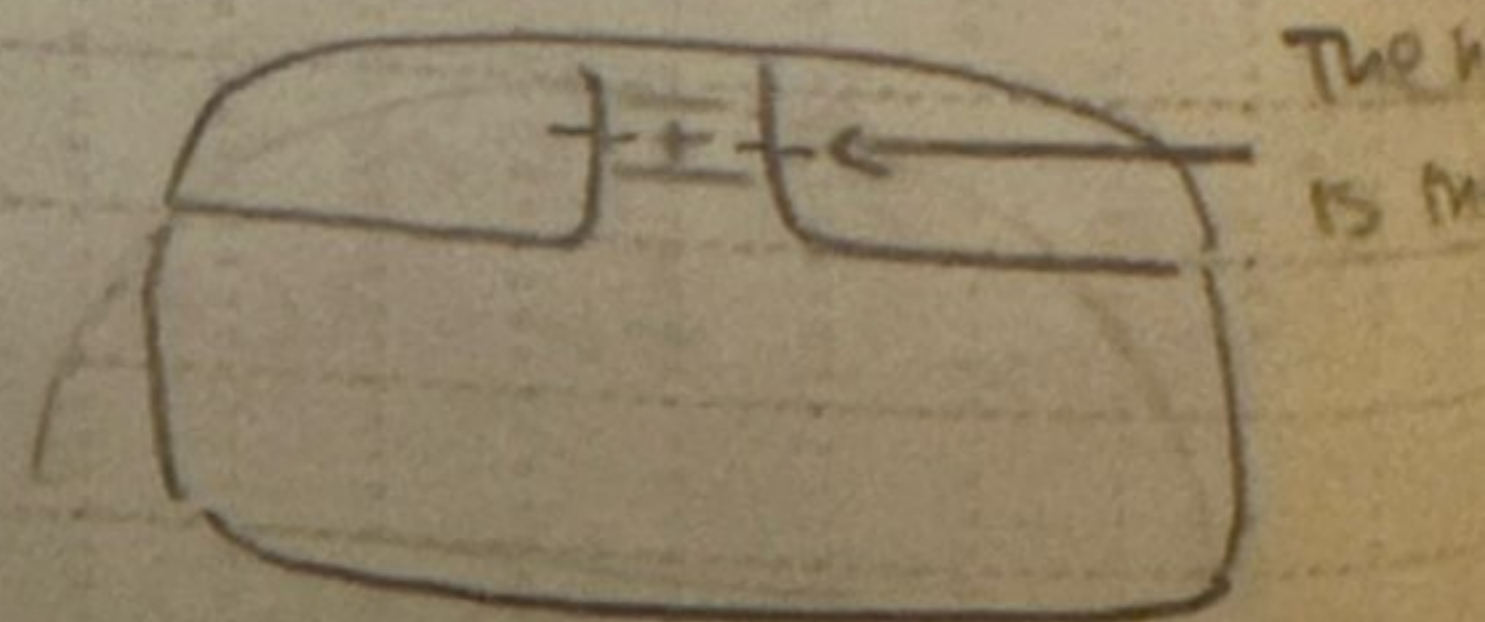
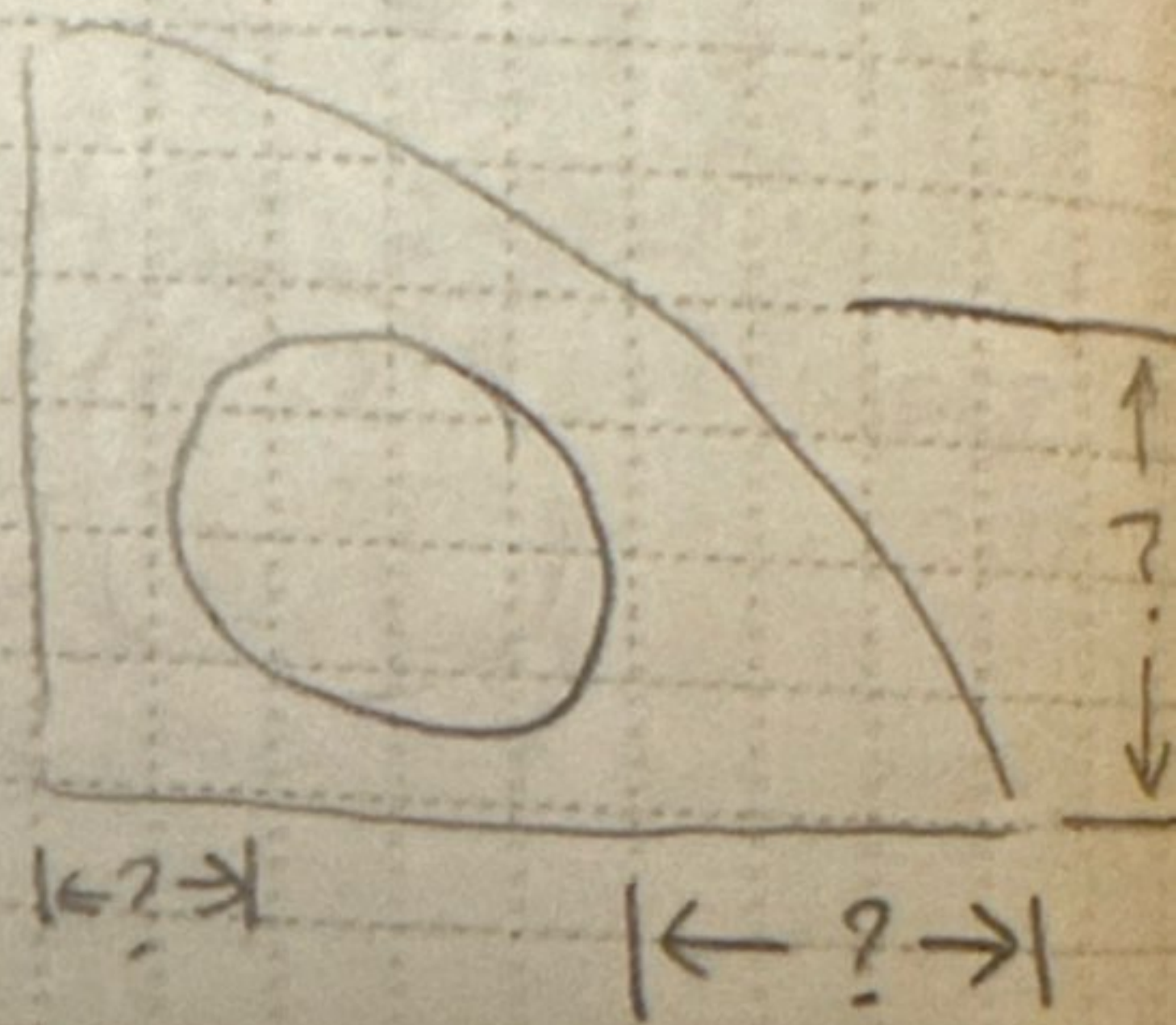
To replicate the speaker, I filleted the sides to make sure the speaker had no sharp edges.

ISSUE: Measuring the hole in the middle of the feature we built above.

- We are unsure on how to measure this hole, & we don't know height and the width of the hole.

& We cannot seem to measure the placement of the hole.

& w/o the measurements, we cannot CAD the hole.



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AD

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Jim

DATE:

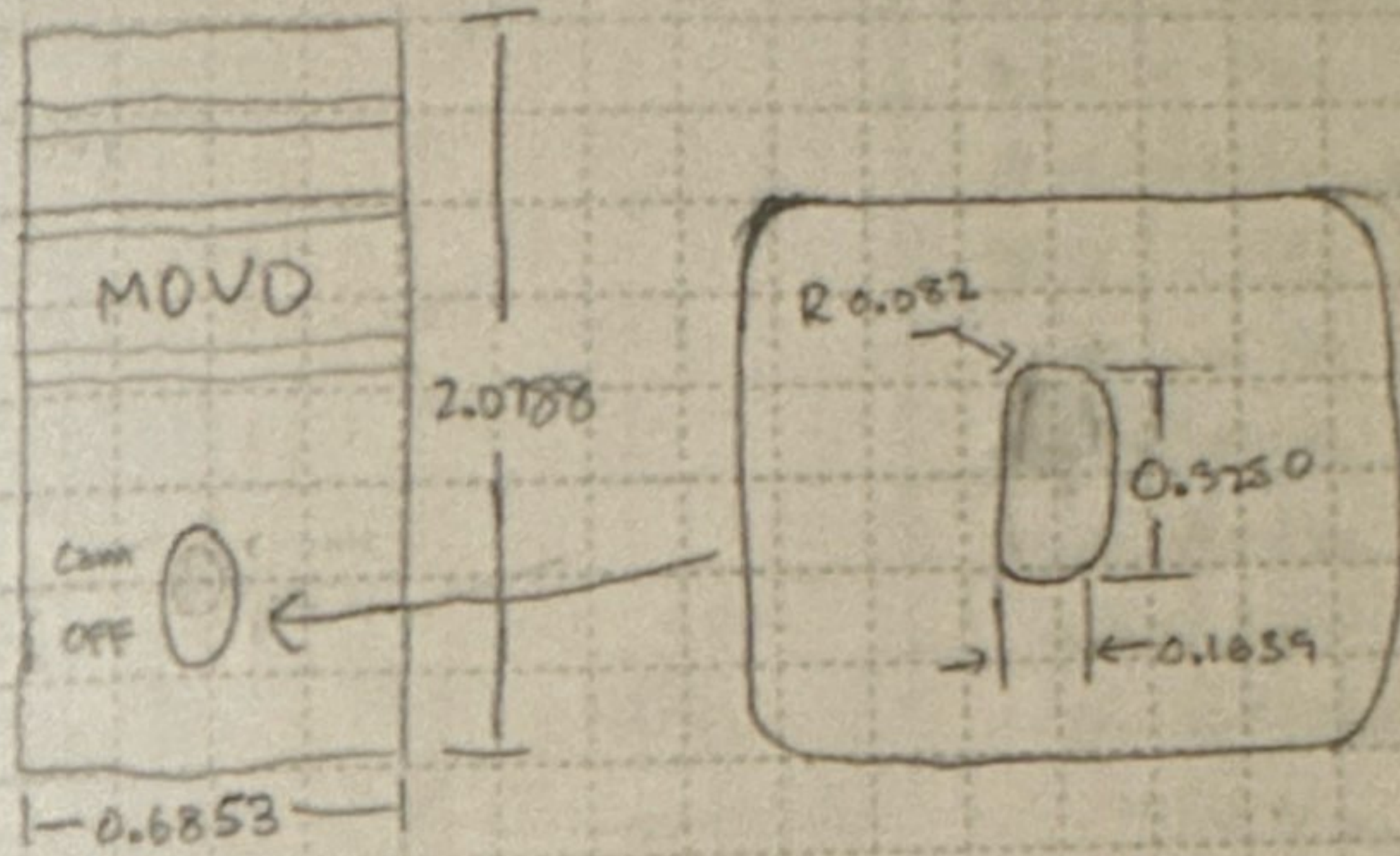
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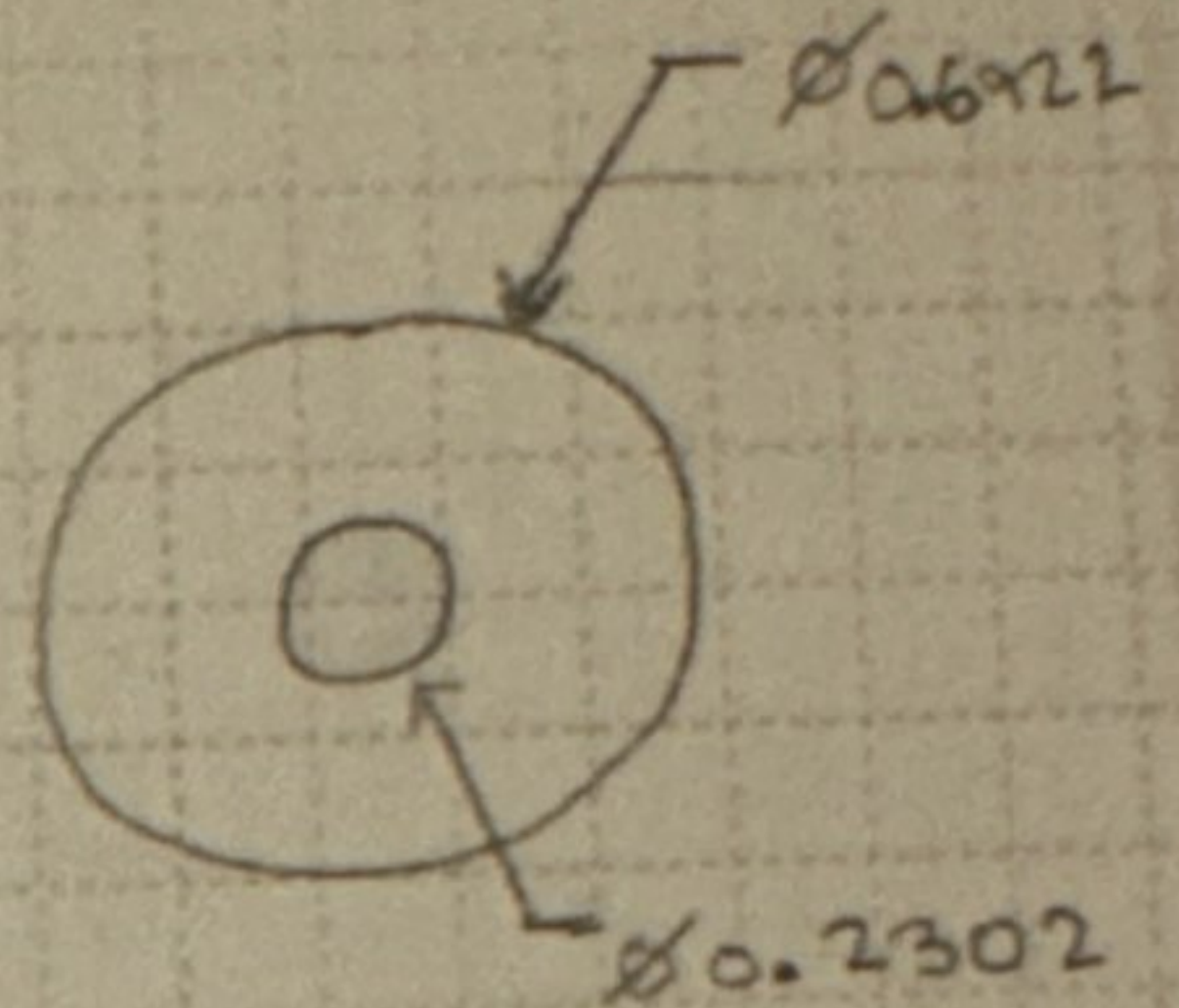
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Dimensions

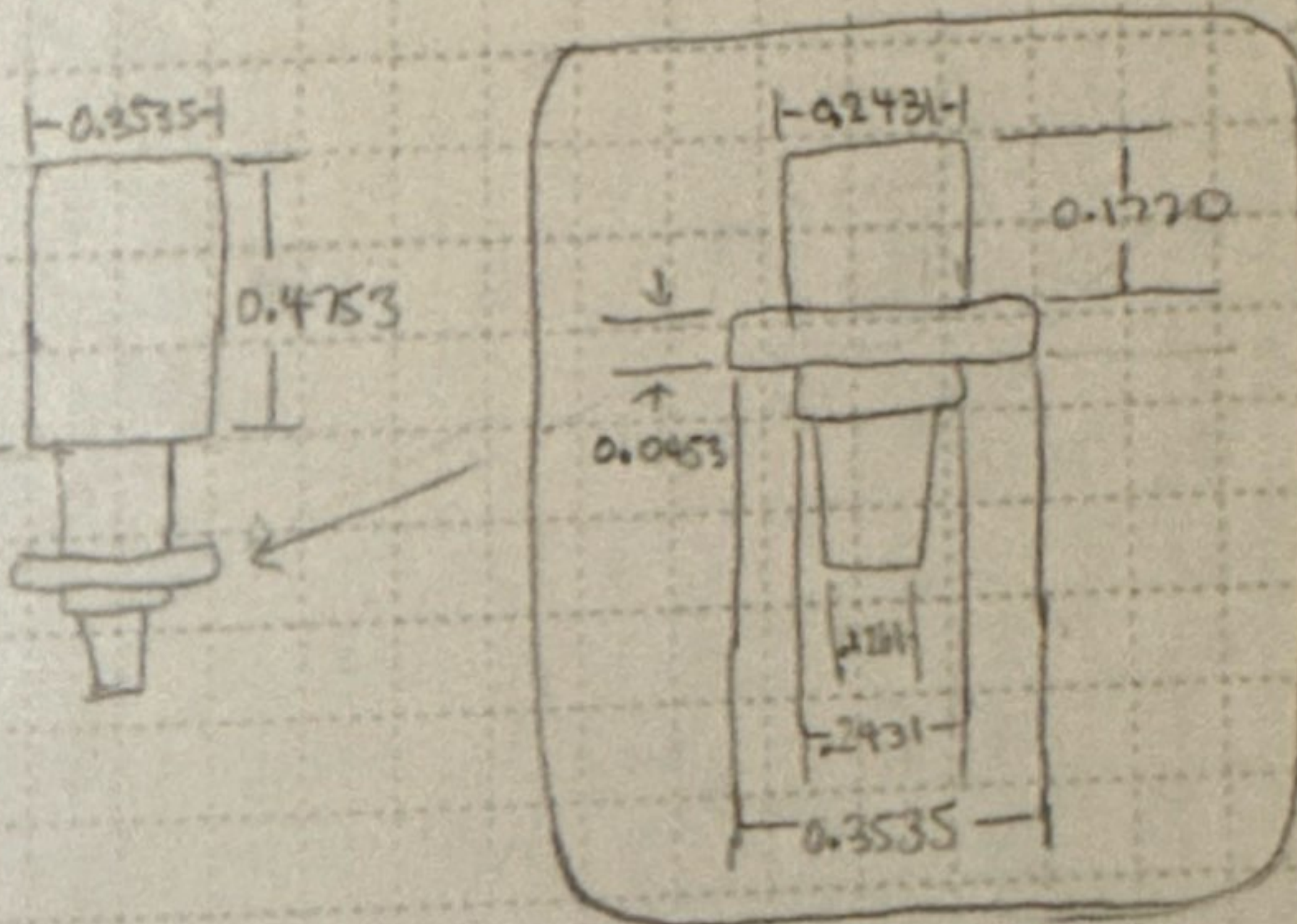
Mid Element
Front View



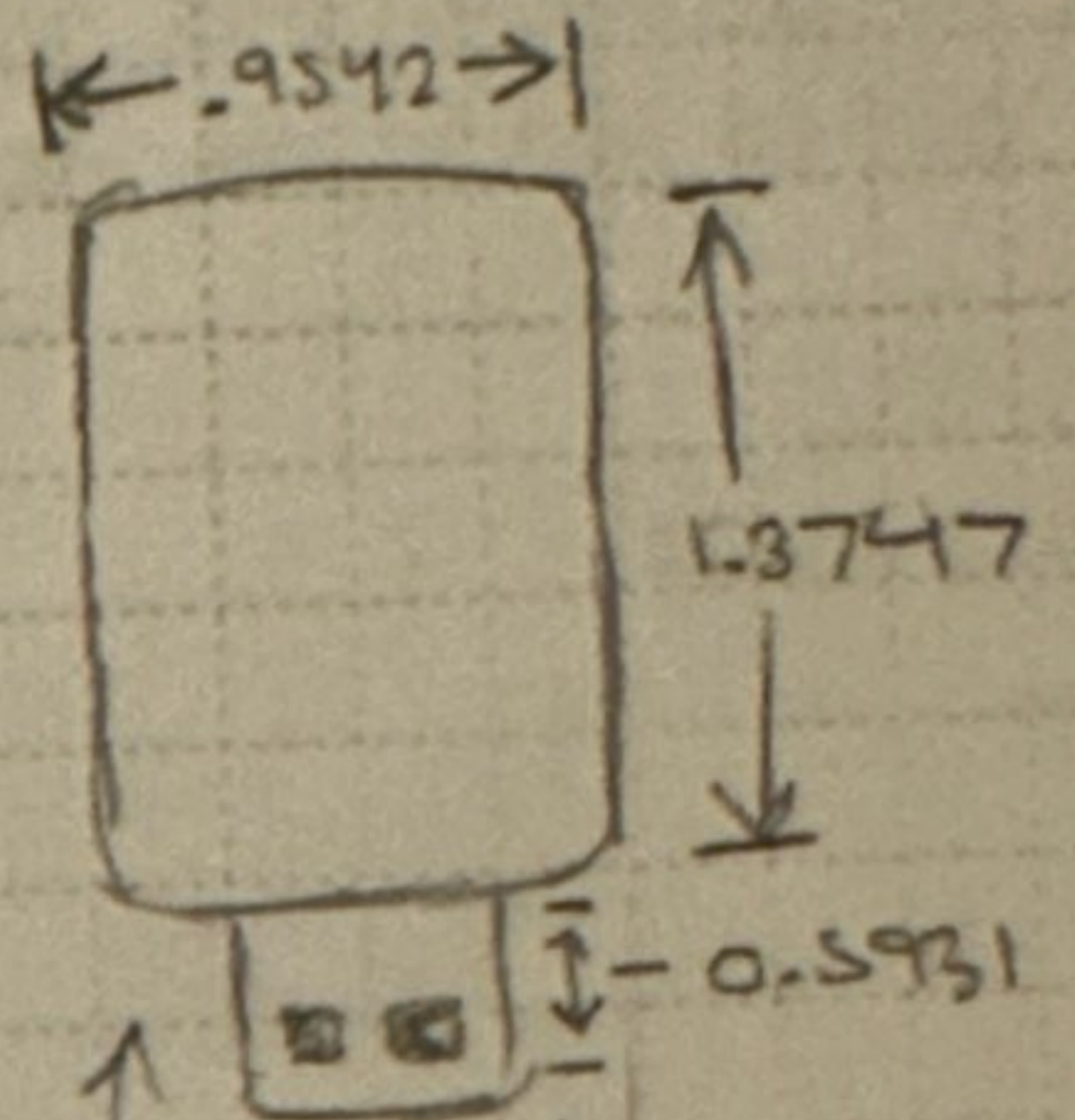
Top View



Microphone
Front View



Adapter

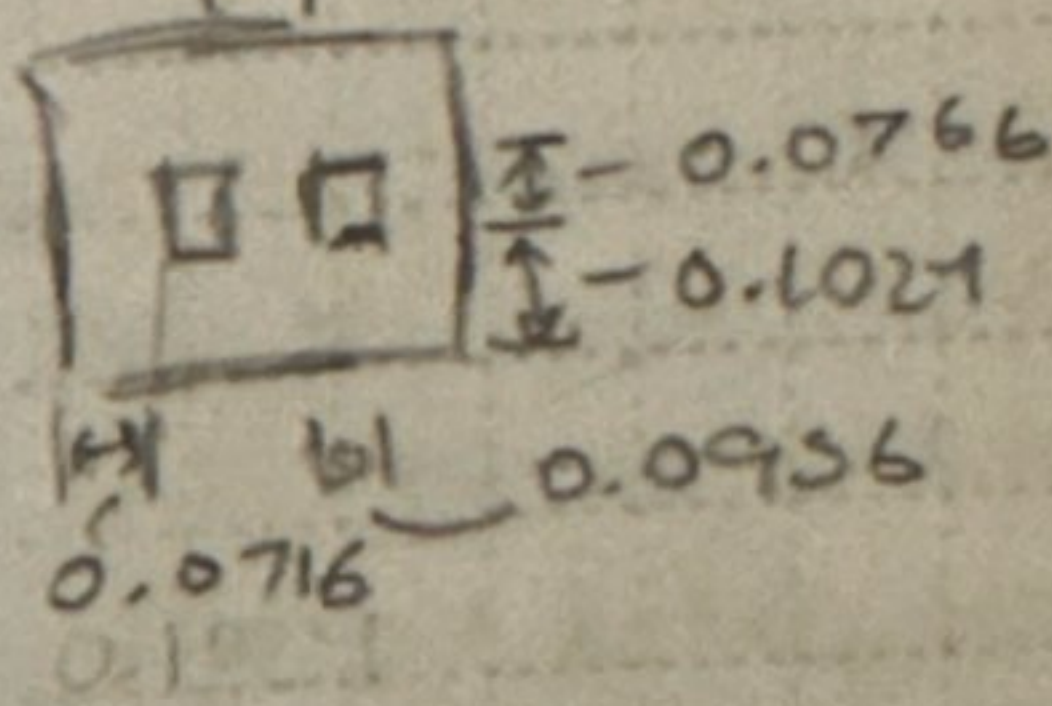


Top View

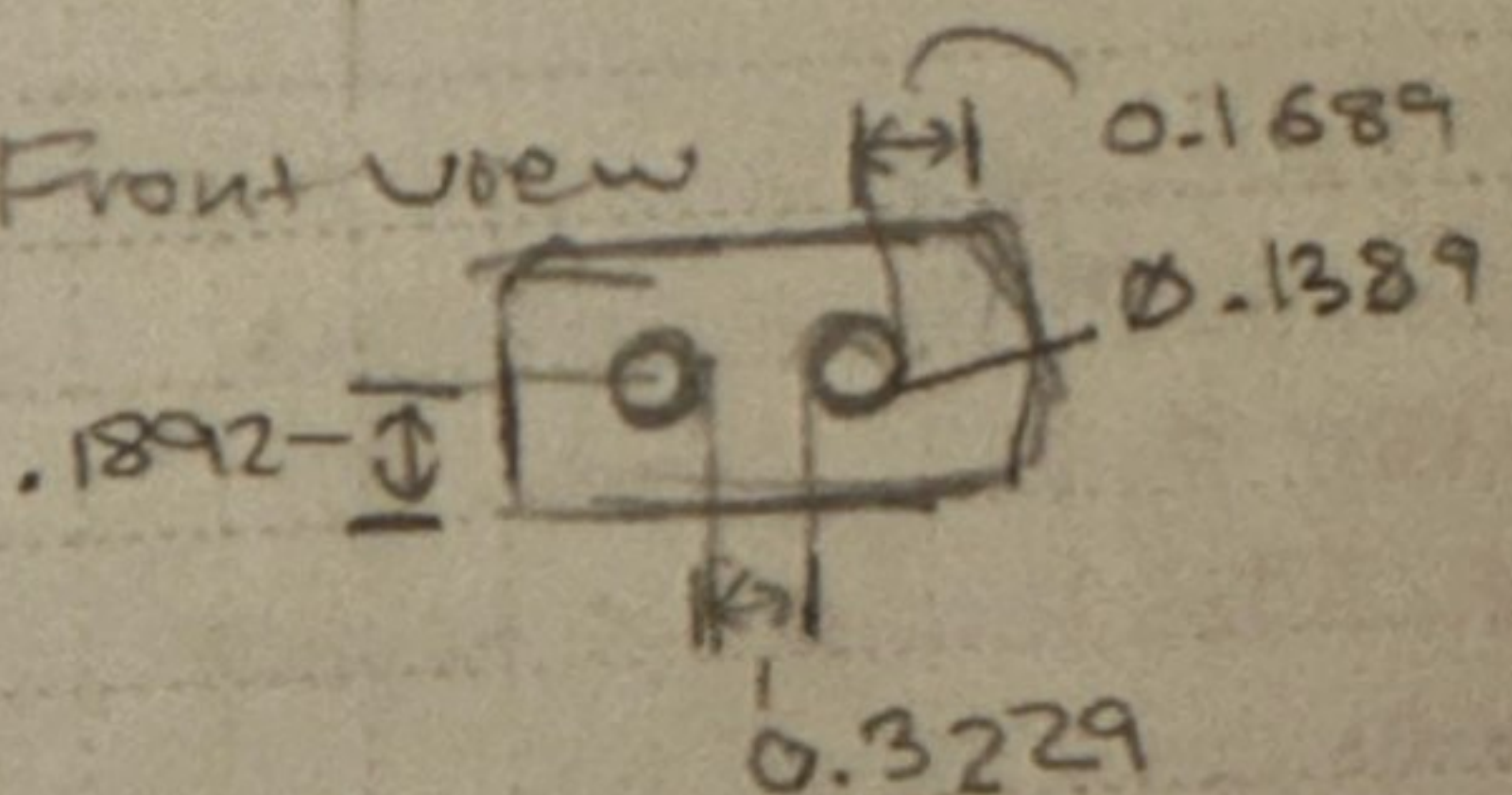
Side View



Adapter
Insert



Front View



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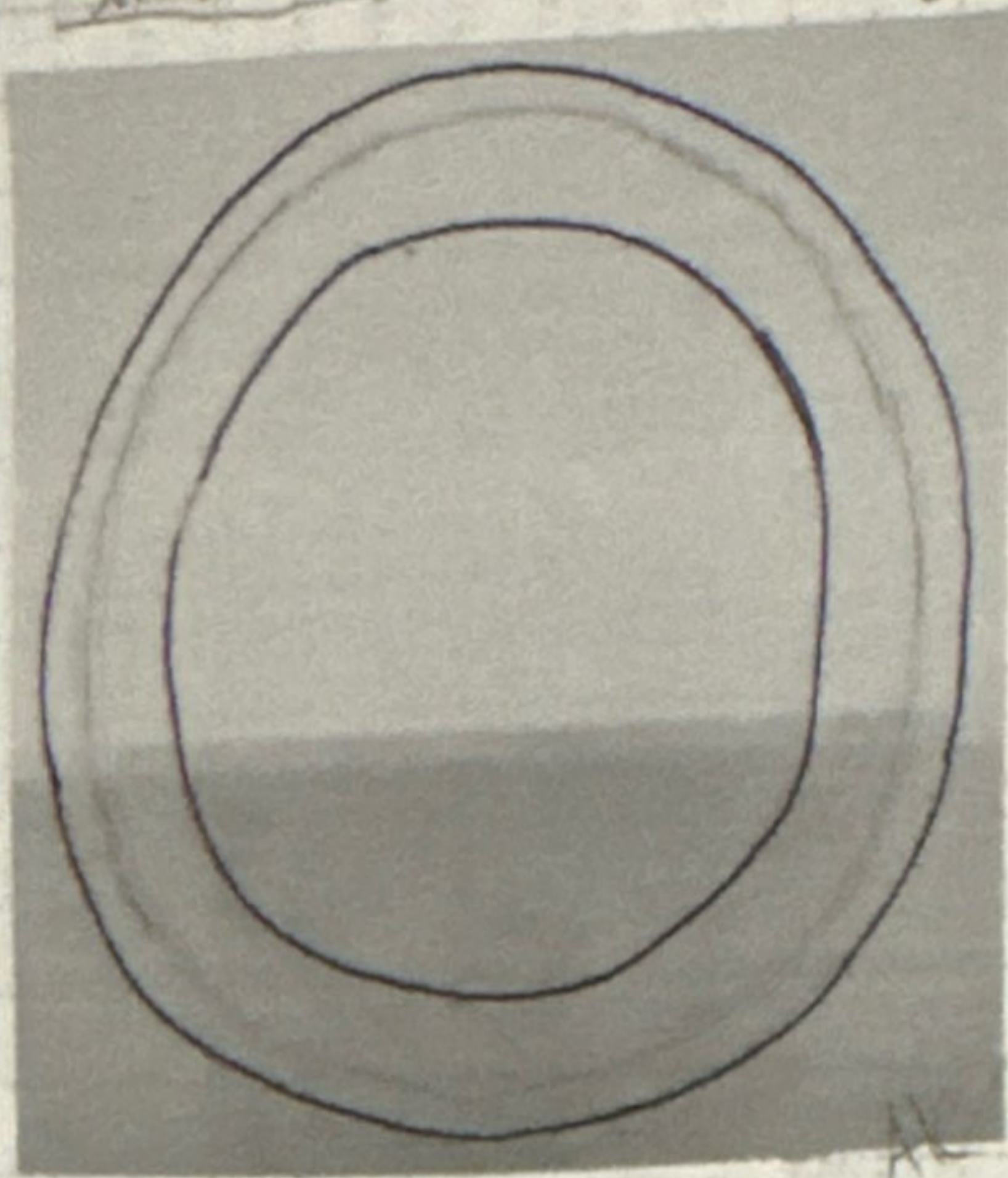
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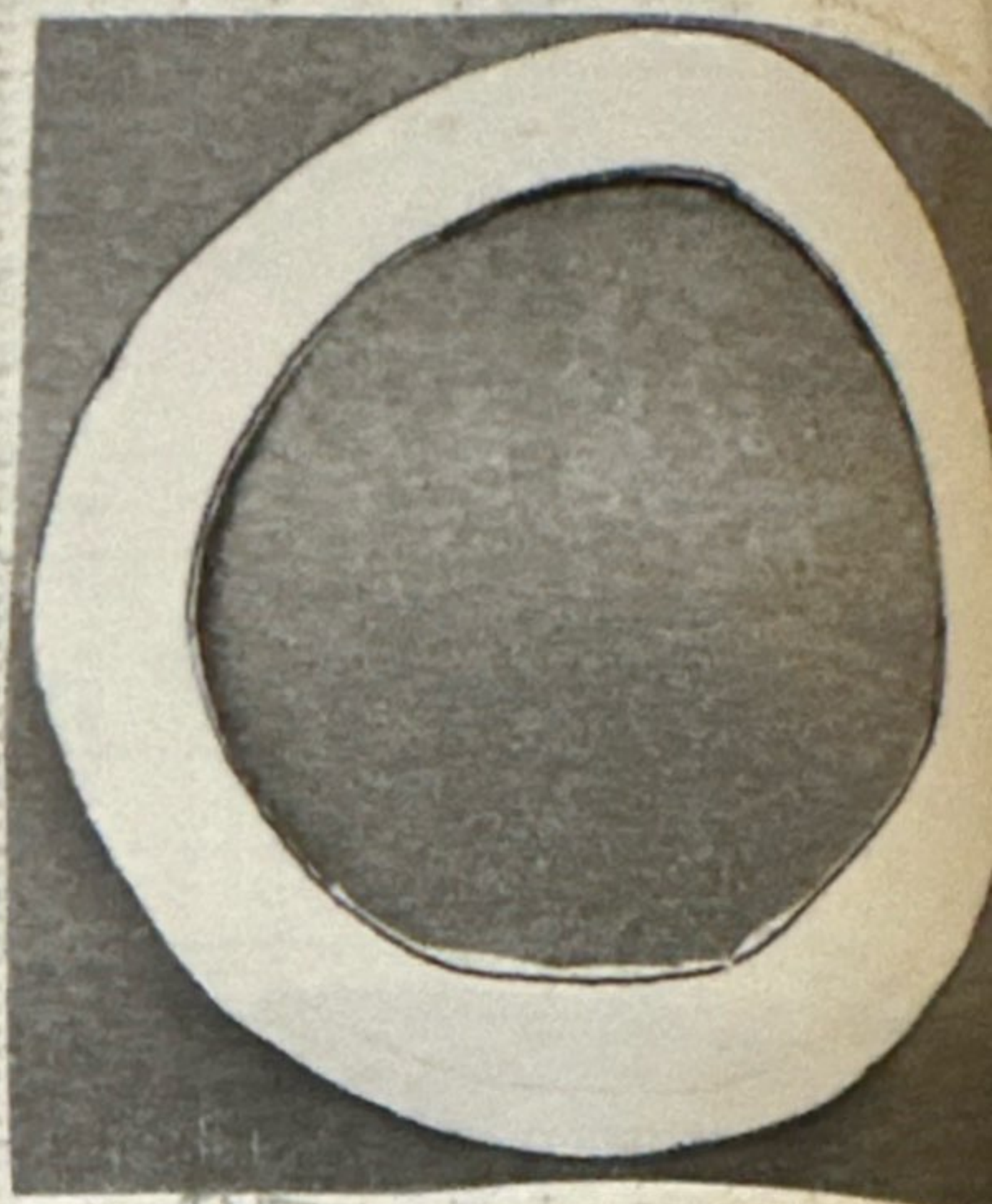
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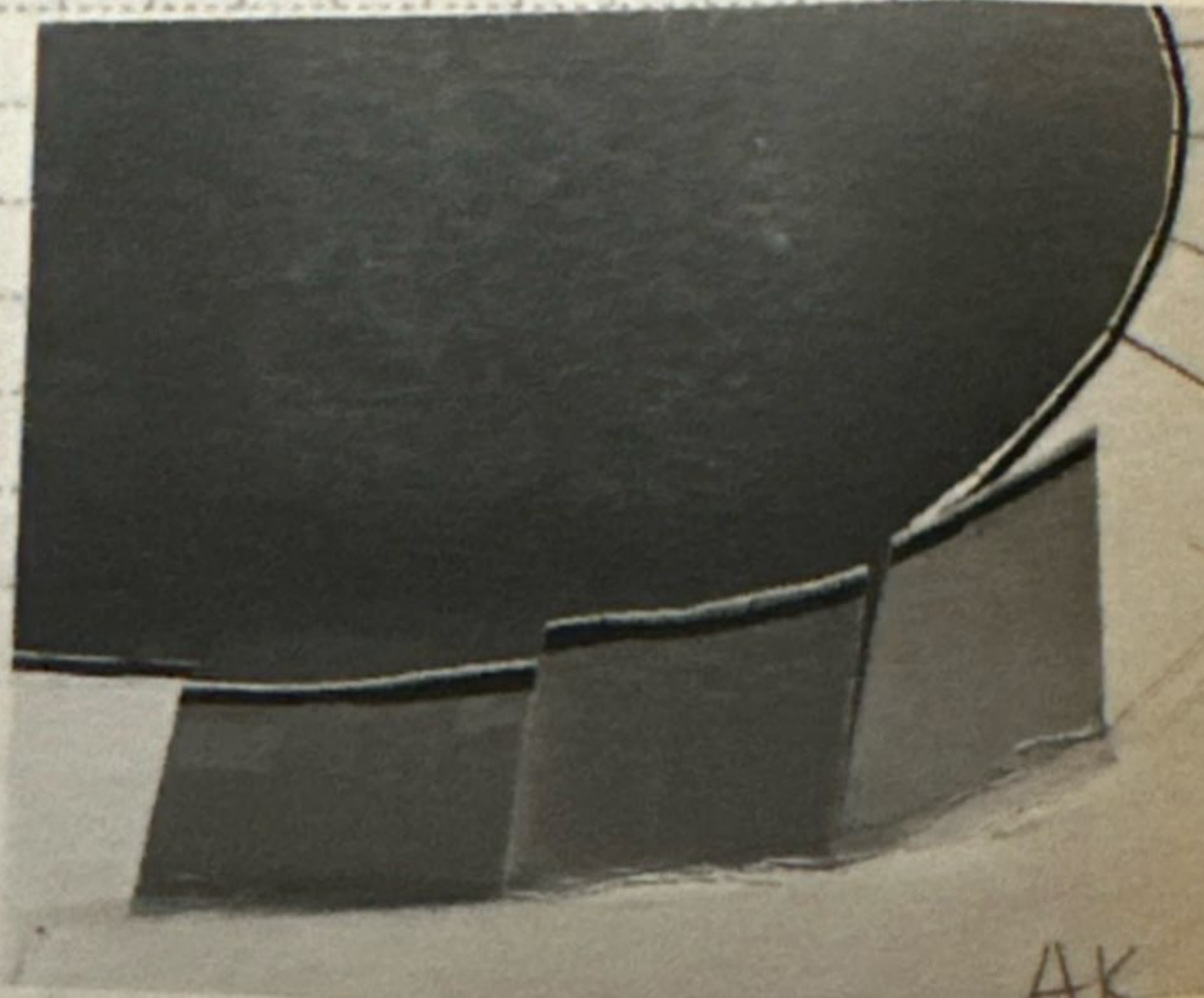
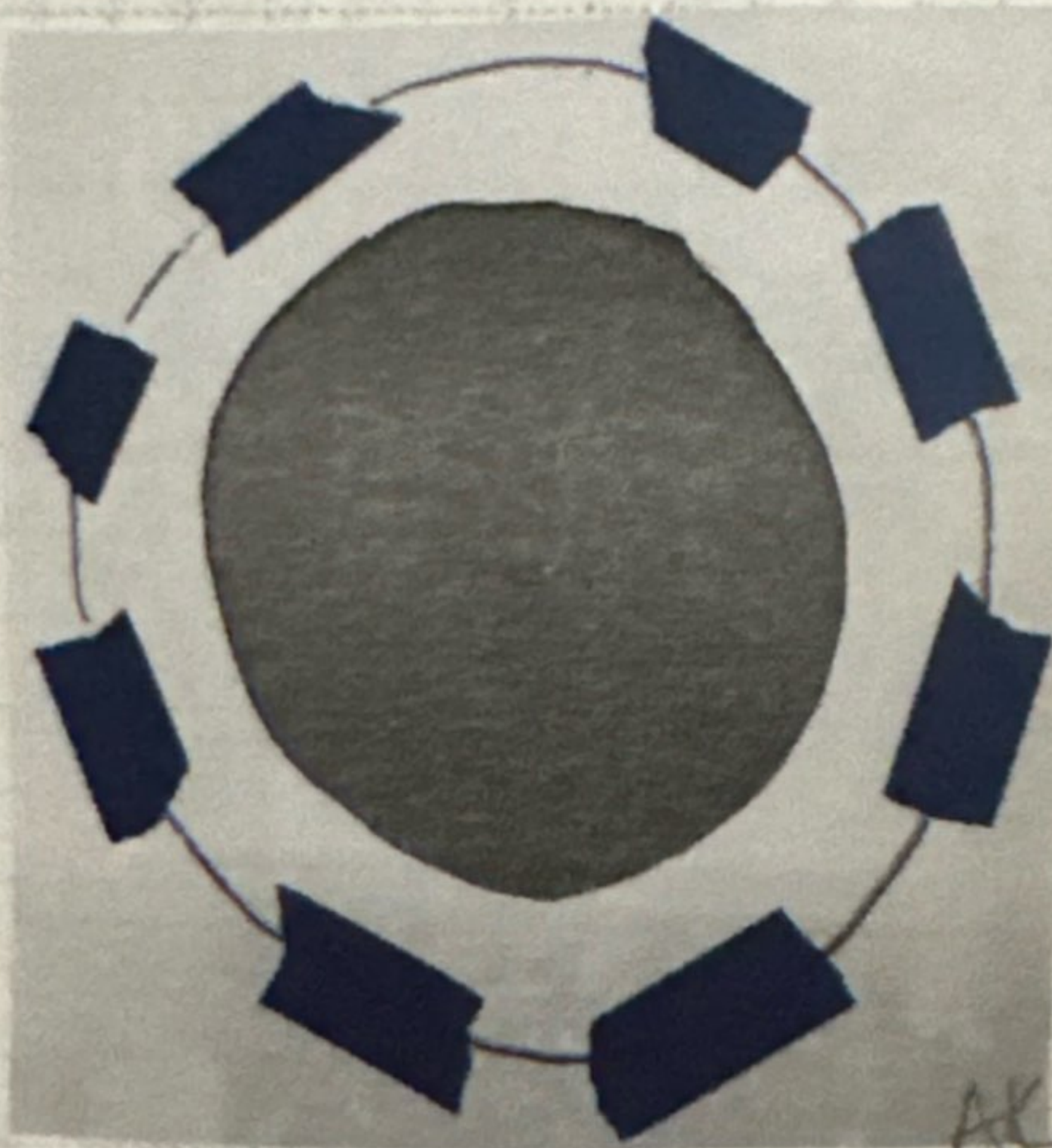
Small Ridge?



The gray line is the circumference of the hat. The lines in black both have an offset of about 0.6 inches, with the outer most one being a bit smaller.



The picture on the right is the sketch cut out. We will tape this onto the actual hat in the next picture.



We taped the circle on the back of the hat so it is easier to fold up, & the blue tape will not be shown.

After taping the circle, all the ridges are supposed to face up, as shown in the picture above. This will secure the top part of the hat when it is attached.

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Speaker Hole Issues Resolved

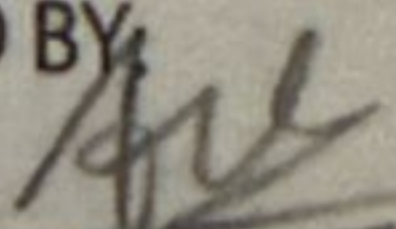
* As the hole isn't important to the Sorting Hat and doesn't affect the functionality of the speaker, we will be eyeballing the hole.

By ignoring the hole, we completed our speaker

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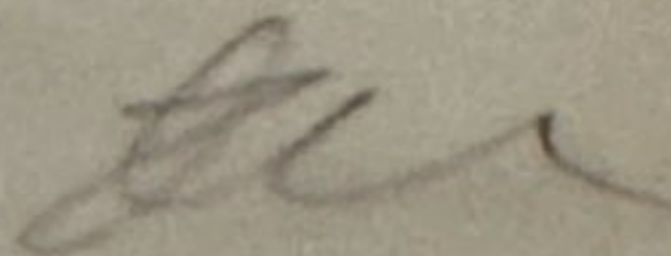
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Continuing on from where we left off for our Alan AI code, we had trouble in outputting the final value. Our first step of debugging was to print the values of each variable in (almost) every intent method to see if they were taking inputs in, shown on the bottom.

```
let Forest_River = context(() => {
  intent('Dawn', p => {
    p.play('Would you rather go towards a forest or a river?');
    gryffindor = gryffindor + 2;
    ravenclaw = ravenclaw + 1;
    p.then(Moon_Stars);
  });
});
```

Added console.log() (we realized console.log() appears in "Logs" & not "Chat")

```
let Forest_River = context(() => {
  intent('Dawn', p => {
    p.play('Would you rather go towards a forest or a river?');
    gryffindor = gryffindor + 2;
    console.log('g: ', gryffindor);
    ravenclaw = ravenclaw + 1;
    console.log('r: ', ravenclaw);
    p.then(Moon_Stars);
  });
});
```

Syntax OK

LOGS

Errors

Info 1

- Nov 16, 11:03:05 corpus indexing status: READ
- Nov 16, 11:03:18 g: 2
- Nov 16, 11:03:18 r: 1
- Nov 16, 11:03:21 g: 4
- Nov 16, 11:03:21 r: 2
- Nov 16, 11:03:27 g: 8
- Nov 16, 11:03:27 s: 1
- Nov 16, 11:03:29 s: 3
- Nov 16, 11:03:29 r: 4

The picture on the left shows the log of our code, which prints something everytime it receives a console.log() call. The highlighted statements above show the syntax.

It is shown that the variables are changing, so it is no problem that the variables are local instead of global. After this, it was clear the error had to relate to the final method at the end of our code.

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Debugging Final Function

```
let Sorted = context(() => {
  intent('What is my house?', p => {
    p.play(Final);
  });
});
```

AK

We got rid of this last function entirely. Instead, we implemented the code below into the intent function with the last question.

```
var final = Math.max(slytherin, gryffindor, hufflepuff, ravenclaw);
console.log(final);
console.log(gryffindor);
console.log(ravenclaw);
console.log(hufflepuff);
console.log(slytherin);
if (final == slytherin){
  p.play('Let me see. Slytherin!');
}
else if (final == gryffindor){
  p.play('Let me see. Gryffindor!');
}
else if (final == hufflepuff){
  p.play('Let me see. Hufflepuff!');
}
else {
  p.play('Let me see. Ravenclaw!');
}
```

- Math.max() finds the variable that stores the greatest value by comparing it with the others
- the set of console.log() calls gives the coder the values of each variable (does affect the chat)
- p.play() calls are the actual ones that are printed for the user to see.

AK

Test Case #1

Nov 16, 14:04:17	6	final
Nov 16, 14:04:17	6	ravenclaw
Nov 16, 14:04:17	5	gryffindor
Nov 16, 14:04:17	5	hufflepuff
Nov 16, 14:04:17	2	slytherin

AK

Basic example for AI assistant:135

Aha, that was the last question!

Basic example for AI assistant:154

Let me see. Ravenclaw!

AK

Text shown on the debugging chat.

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Test Case #2

- Nov 16, 14:17:32 6 Final
- Nov 16, 14:17:32 2 Ravenclaw
- Nov 16, 14:17:32 6 Gryffindor
- Nov 16, 14:17:32 5 Hufflepuff
- Nov 16, 14:17:32 5 Slytherin

Basic example for AI assistant:109

Aha, that was the last question!

Basic example for AI assistant:124

Let me see. Gryffindor!

Text shown in the debugging chat.

Updating values of variables

- Nov 16, 18:06:34 8
- Nov 16, 18:06:34 8
- Nov 16, 18:06:34 5
- Nov 16, 18:06:34 0
- Nov 16, 18:06:34 5

First run when variables are initialized at zero during the beginning of code.

Second run. It is showing that the variables are not resetting to zero.

- Nov 16, 18:06:51 14
- Nov 16, 18:06:51 14
- Nov 16, 18:06:51 6
- Nov 16, 18:06:51 7
- Nov 16, 18:06:51 9

```
else {
    p.play('Let me see. Ravenclaw!');
}
gryffindor = 0;
slytherin = 0;
hufflepuff = 0;
ravenclaw = 0;
```

In order to fix this problem, we reset the 4 variables to 0 at the very end of the code. Henceforth, the variables would not keep randomly increasing like before.

Adding House Descriptions

Below is the added dialogue that the hat will say when it finishes sorting the user.

```
Cunning, ambitious, but respectful, having a big love for your own reputation. SLYTHERIN!');
indor){
    Bravery is a big quality. Passionate about what you love, and owns to your own mistakes. Gryffindor!');
epuff){
    Loyal and honest, and extremely well-rounded. I feel the goodness in your heart. Hufflepuff!');
Analytical and observant. I sense that you definitely work smarter than others. Ravenclaw!');
```

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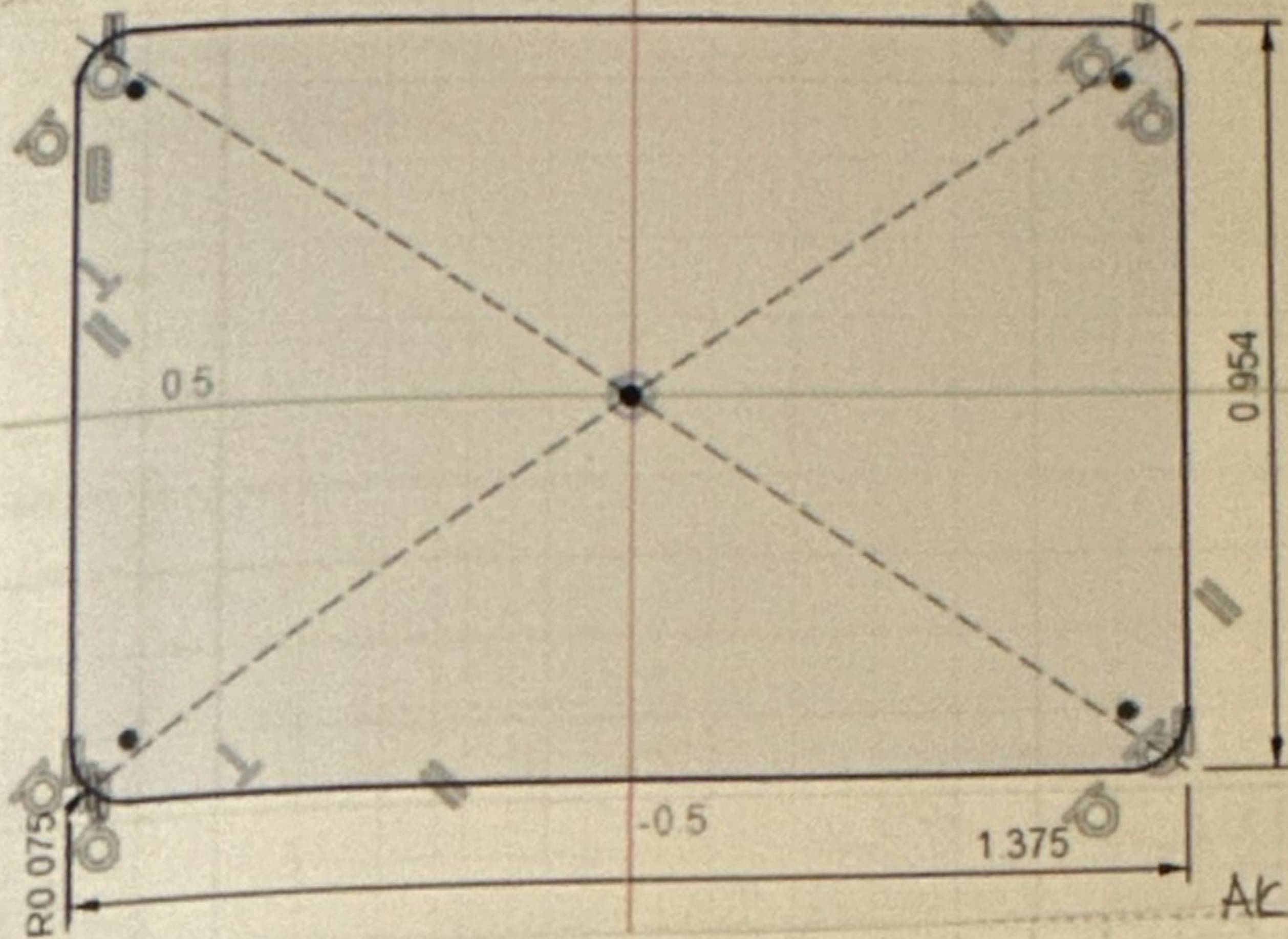
CONTINUED ON PAGE 40



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Adapter



Sketch

This was the length and width of the adapter's main body.

1.375 in x 0.954 in
* Also curved the edges in by 0.075 in.

Extrude

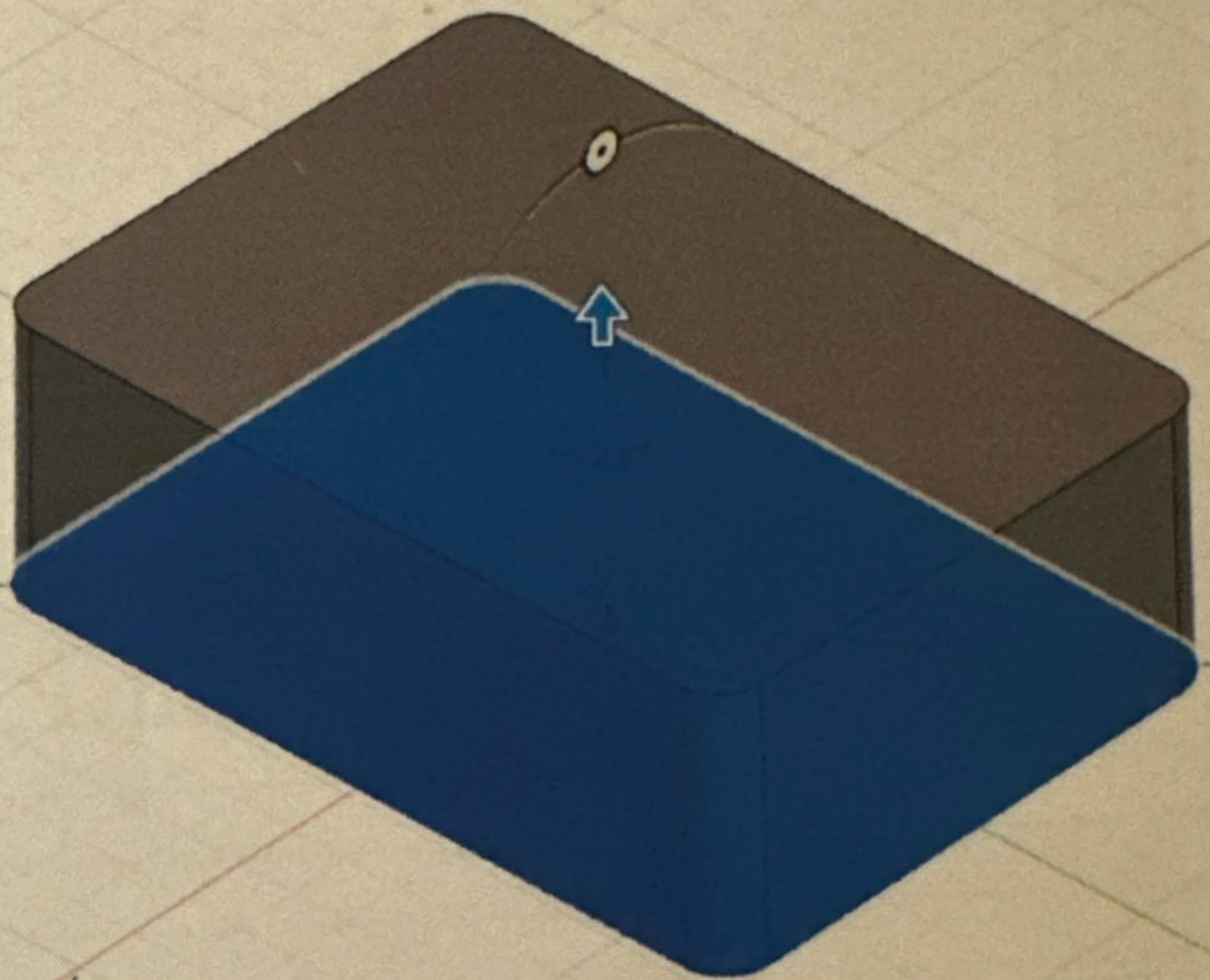
I then extruded the shape up.

0.442 in



0.075 in

Ak



Ak

As the Adapter has curved edges, I fitted the edges by around 0.075 in.

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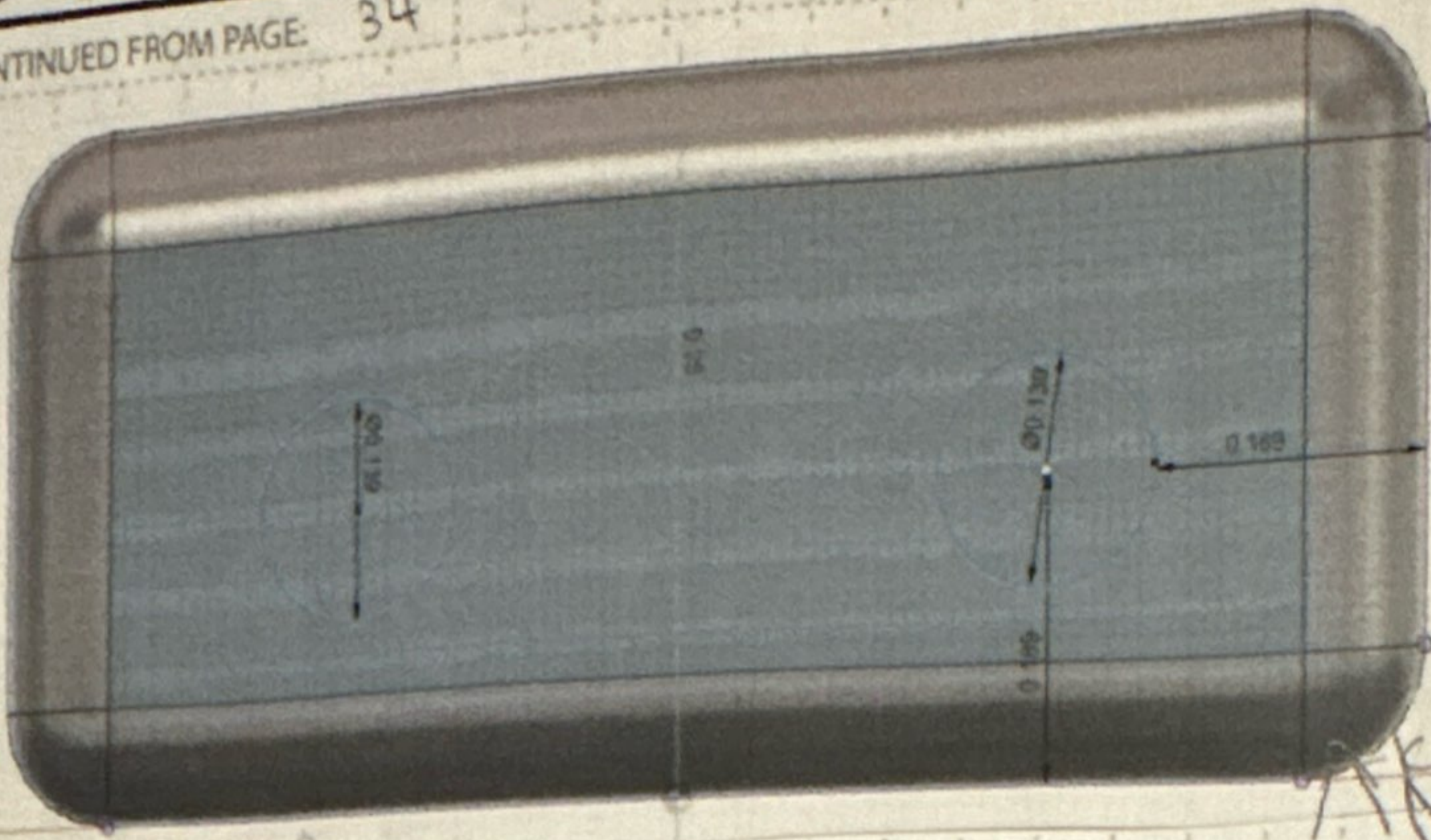
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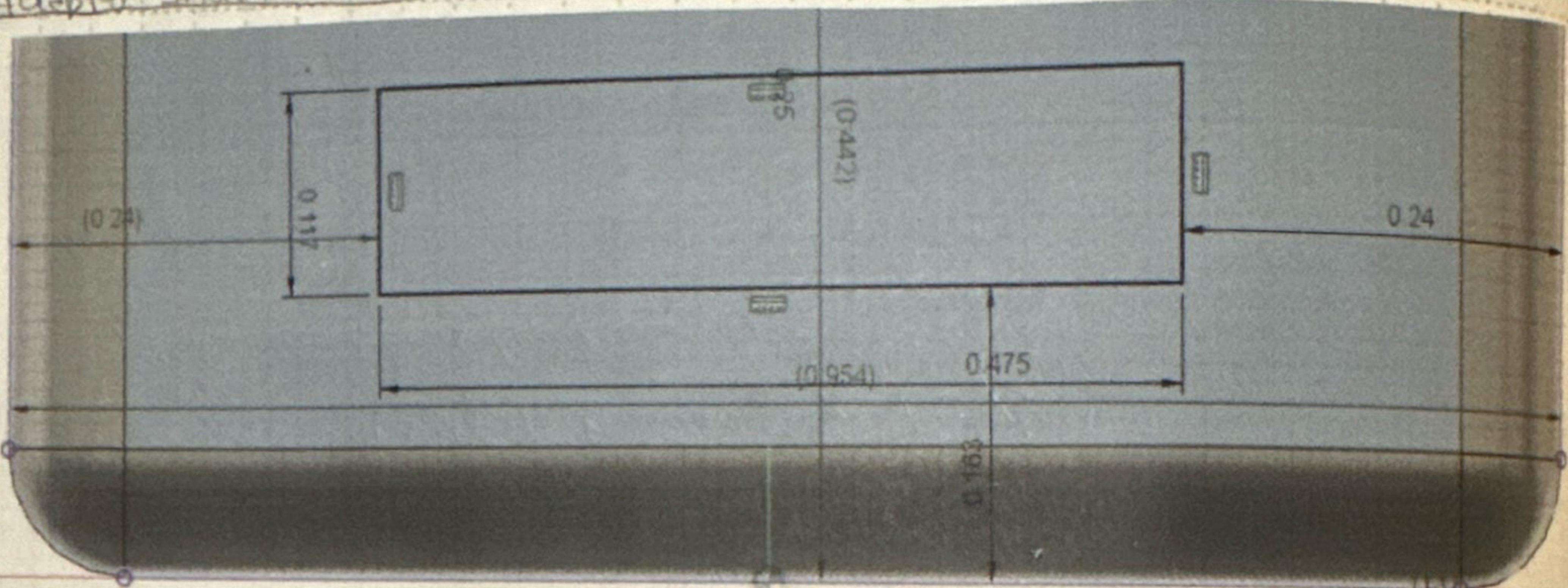
BERBAW
MAKERS IN



These are the holes for the 3.5 mm Jack. They have a diameter of 0.139 in and is 0.169 in away from the side of the USB.

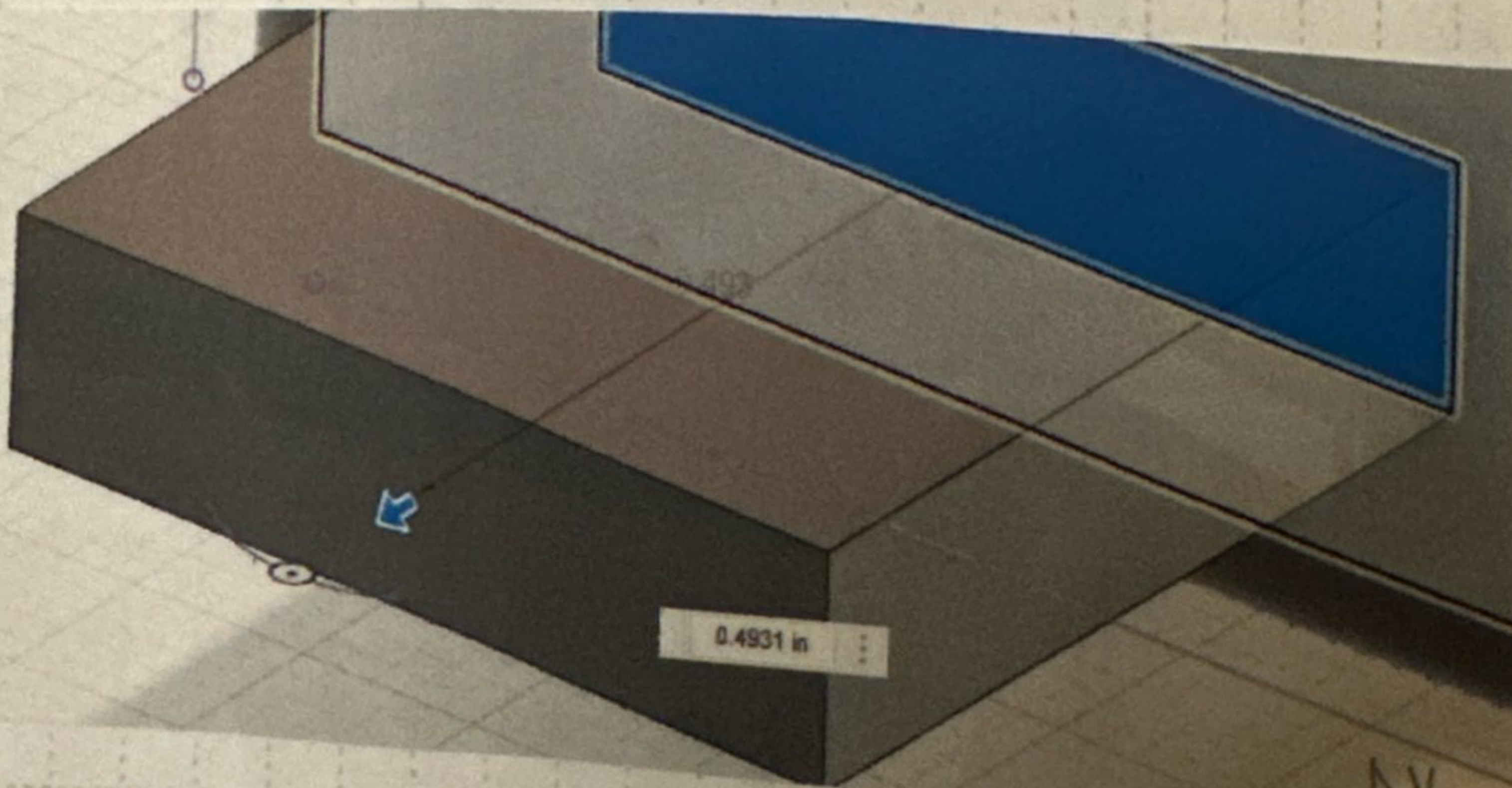
AK

Adapter Insert Sketch (for extruding later, not cutting)



AK

Created sketch for the adapter insert. Used project geometry in order to create the sketch.



AK

Extruding
Extruded the adapter sketch by 0.4931 in according to the dimensions we have recorded.

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AK

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DATE:

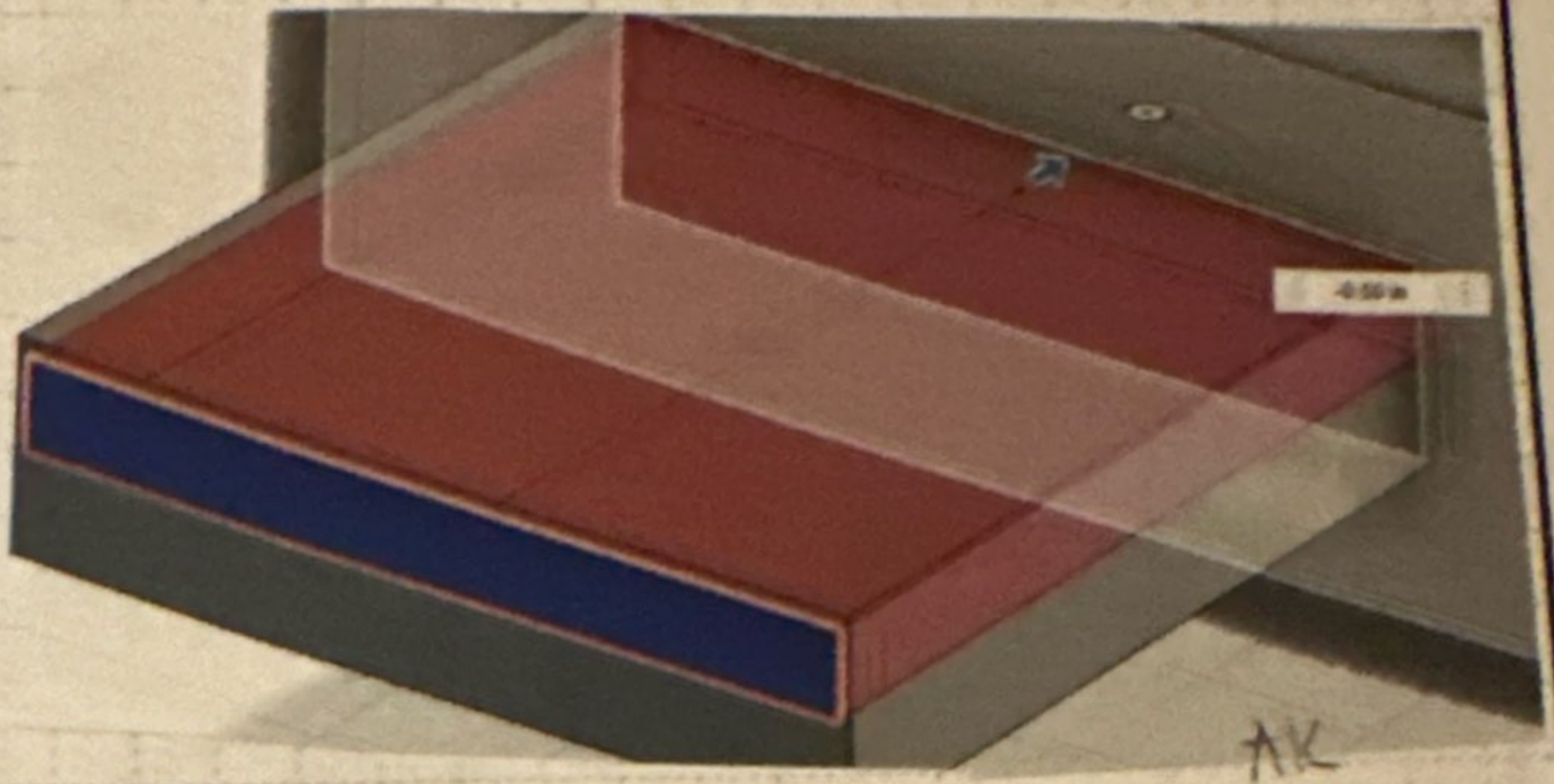
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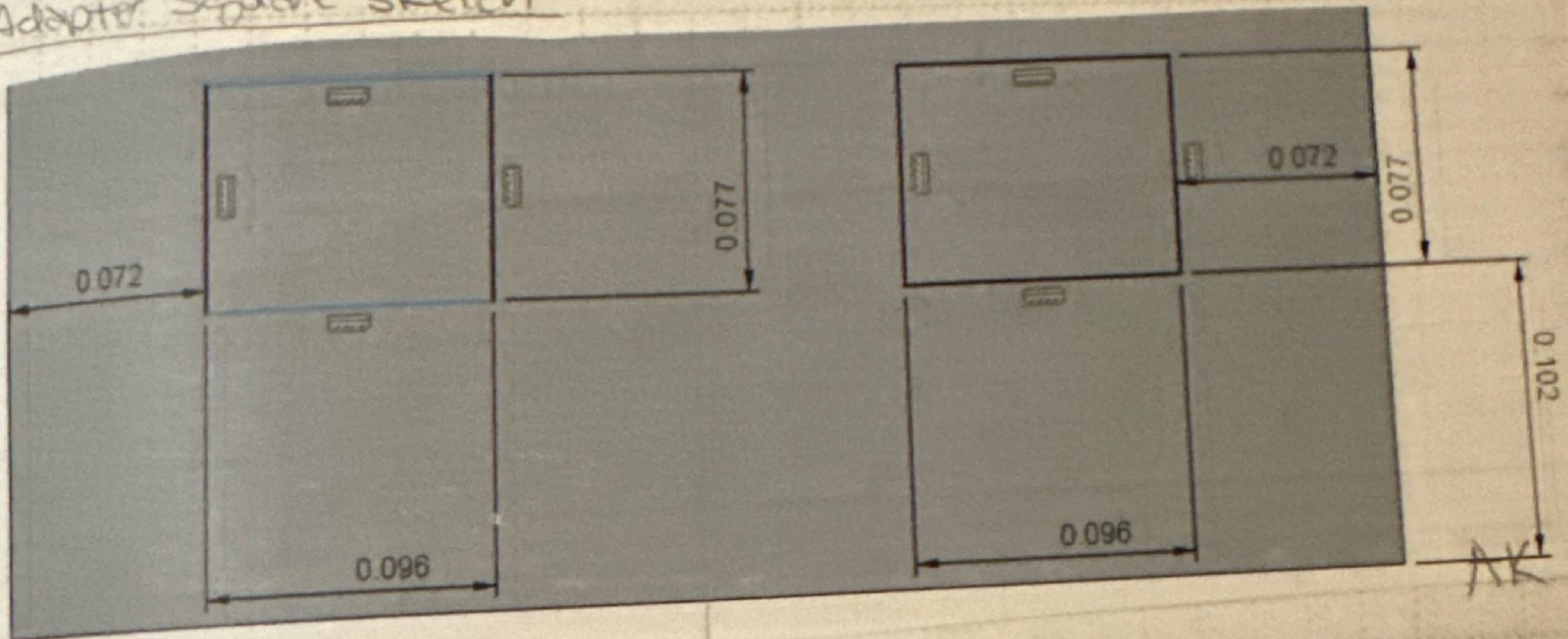
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Adapter Insert Cut

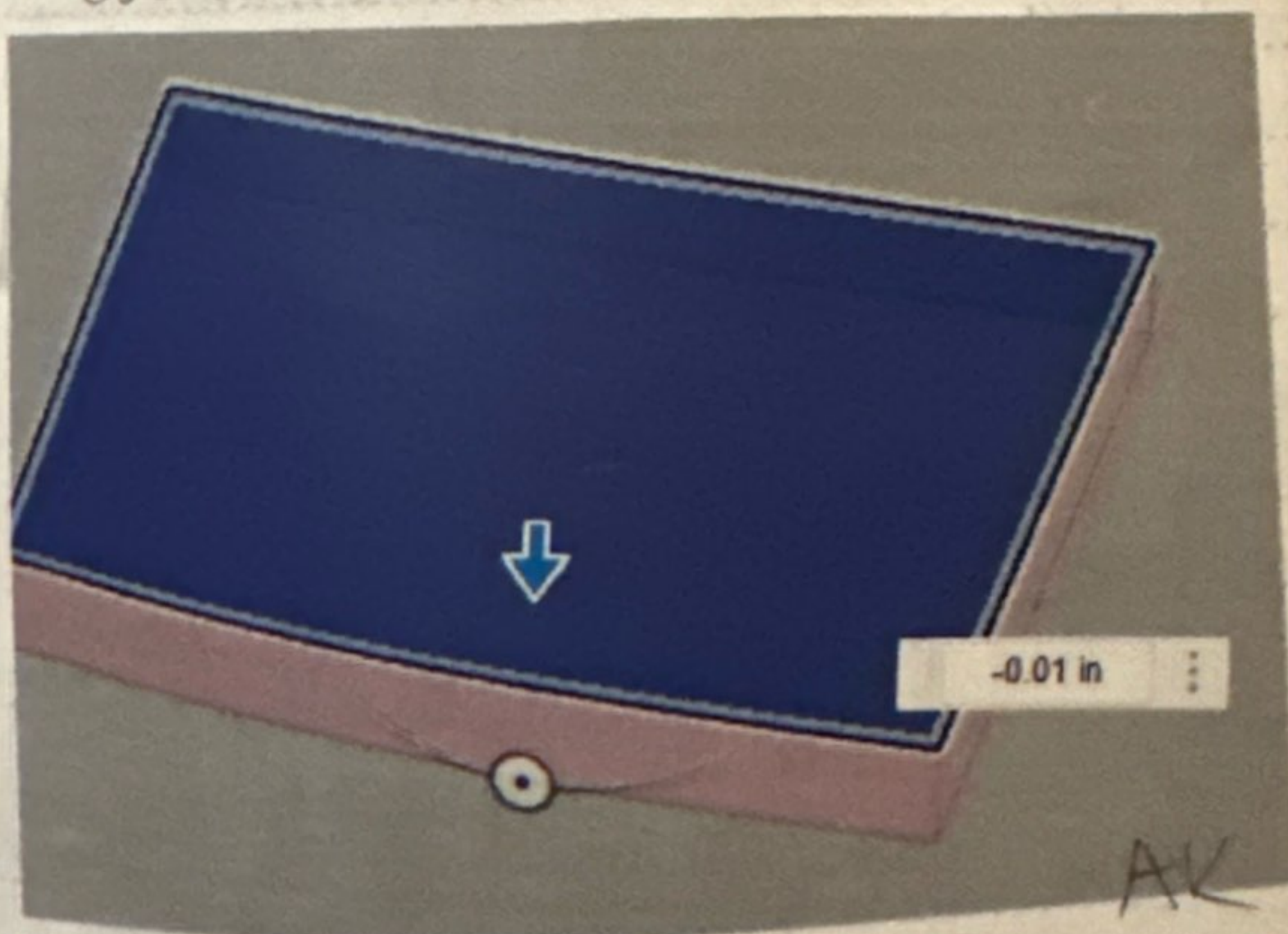
Adapter inserters have an empty space in between them. we cut have of the adapter inserter by -0.50 inches.



Adapter Square Sketch



The adapter has squares on both of its sides. The squares are 0.096 in $\times$ 0.072 in, as seen in the dimensions.



Adapter square sketch is cut by -0.01 inches.

This is the finished USB. we will be using this to plug the microphone into the Raspberry Pi 3. The microphone will be coded in the next pages.

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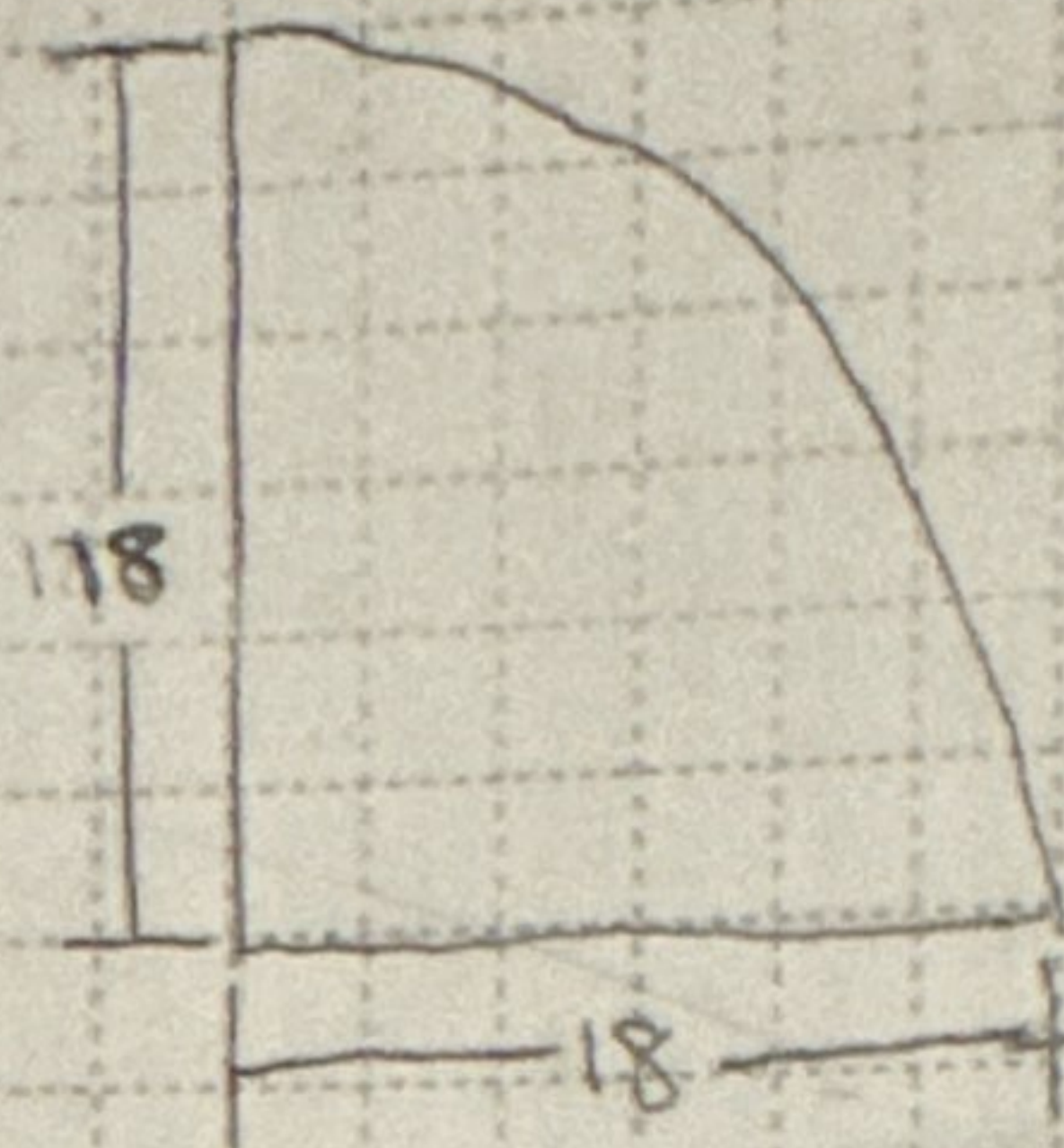
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To create the top cone of the hat:



- created semicircle with radius of 18 inches
- inner circle of hat has radius of 9 inches, the length of the arc has to be 9π
- length of arc = $PR = \frac{\pi}{2}(18) = 9\pi$

Following the DIY video, the semicircle was rolled up into a cone looking figure. It took us a few tries to roll the poster board the correct way.

Regarding gluing the "cone" together, we realized tape would not work because it could not hold the poster board together. I ended up using a hot glue gun, gluing the outside and inside of the hat.

The bottom of the cone had a GIGANTIC SLANT at the base... This was probably caused by rolling up the cone incorrectly, but in the video, the person also had a little slant.

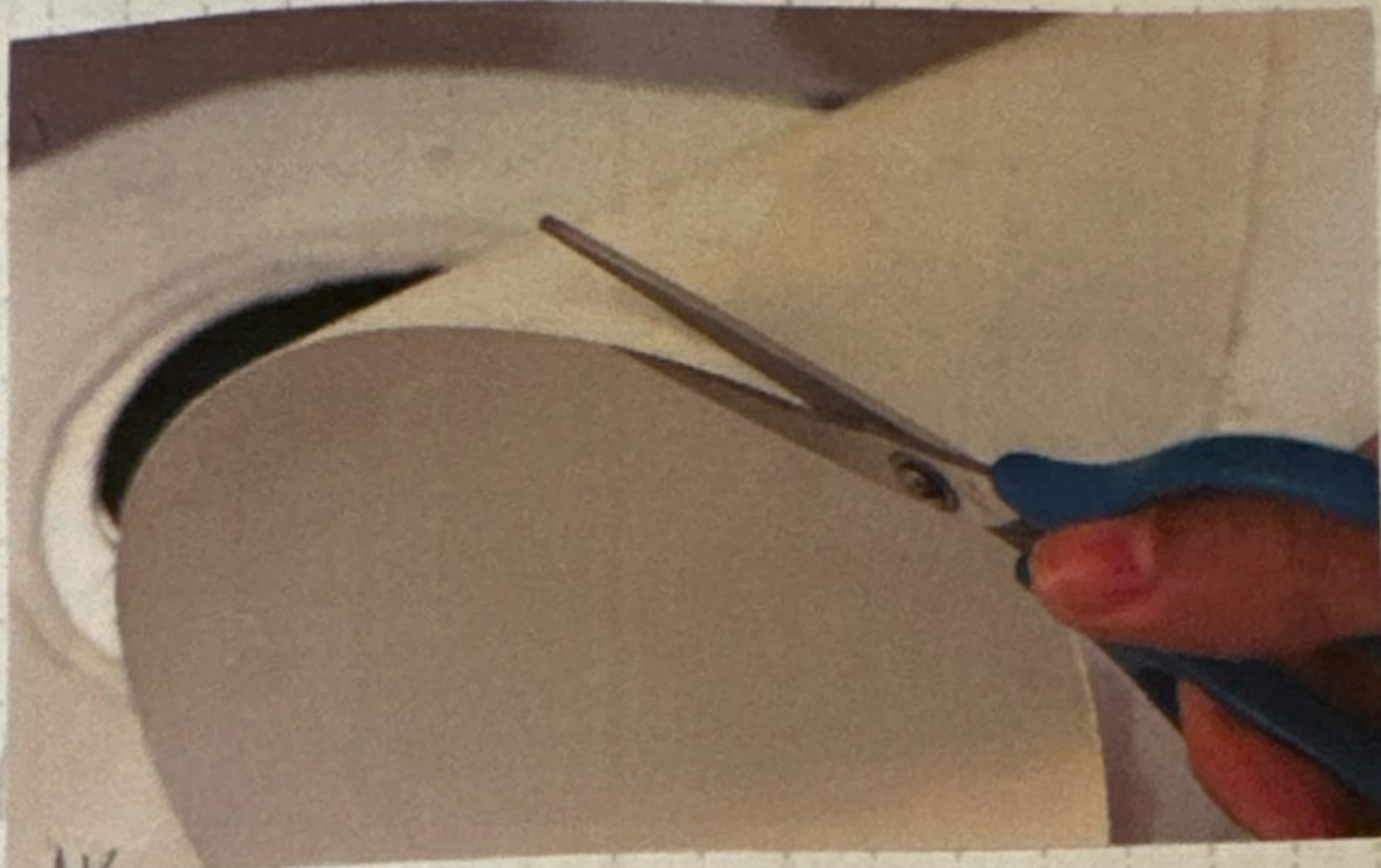
Knowing this, the overall radius of the base will definitely be smaller than predicted.

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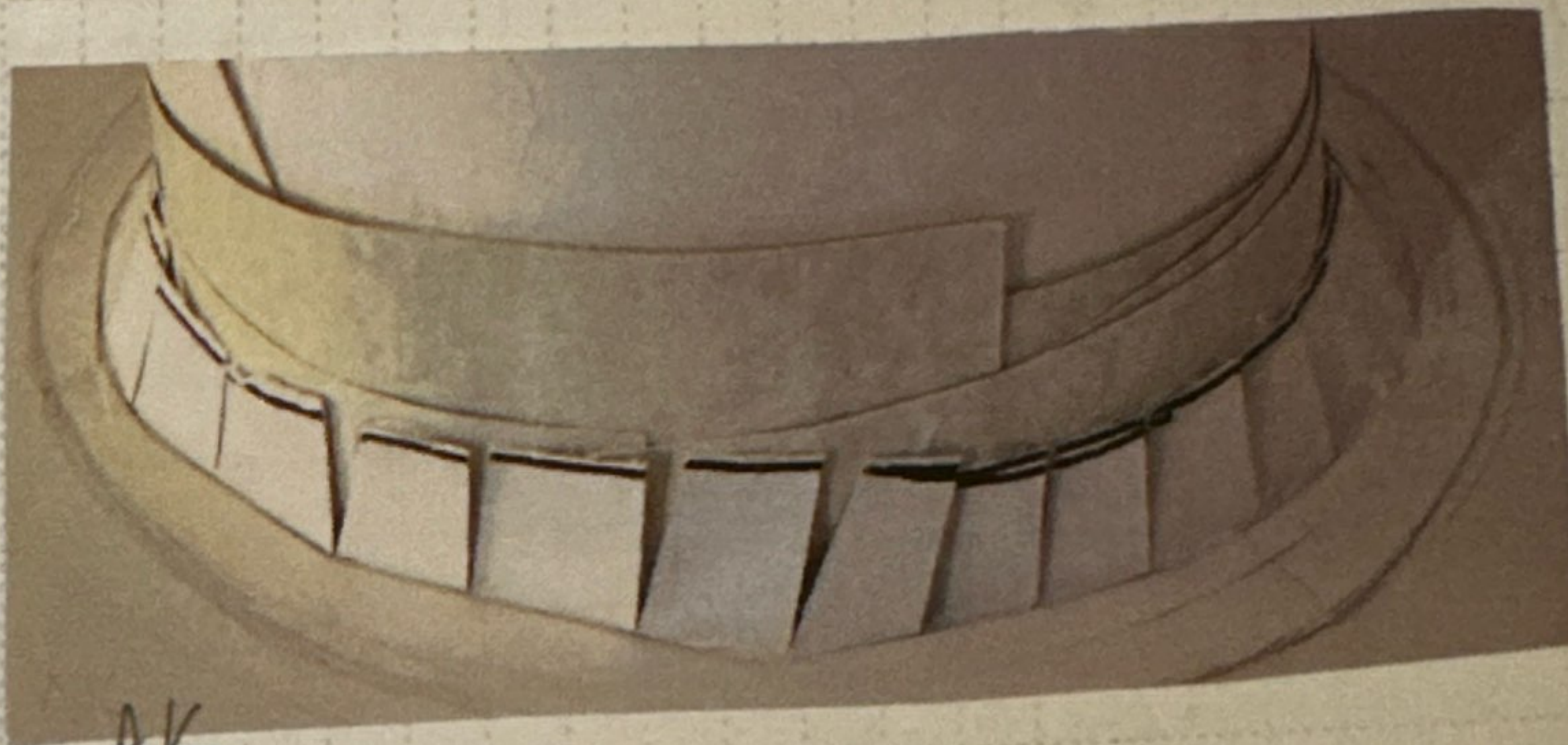
In order to fix the problem explained in the previous page, we had to cut the part that was sticking out of the bottom of the hat, in order for the base to properly sit on a surface.

Overall, not a hard problem to fix, but definitely unexpected.

AK

Again, following the DIY video, we put the cone through the brim of the hat in order to glue the two components together. The little ridges I made earlier are specifically made for the purpose of making the top of the hat more secure.

As shown in the picture on the left, I had to add green construction paper because the cone was a little too small.



AK

The cause was definitely because I had to cut a part of the bottom, making the base of the cone smaller.

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This is the full picture of the hat. we are going to cut about 75% of the top part off, since we have to make a sinkhole.

The next step is to make the ~~hat~~ for the hat. We are considering CADDING it, since paper-mache might not be strong enough to hold a Raspberry Pi and a microphone.

Considered materials:

- regular poster paper
- leather / felt
- Miniflex
- Pet.G???

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Tiebreaking Situation

```

var final = Math.max(slytherin, gryffindor, hufflepuff, ravenclaw);
console.log(final);
console.log(gryffindor);
console.log(ravenclaw);
console.log(hufflepuff);
console.log(slytherin);

```

AK

```

if (final == slytherin){
  p.play('Let me see. Cunning, ambitious, but respectful, having a big love for
}
else if (final == gryffindor){
  p.play('Let me see. Bravery is a big quality. Passionate about what you love,

```

one thing we did not fix in our code is what happens if there is a tie (if two houses values both equal to final). Currently, whichever comes first in the conditional statements would be the chosen house. But that was extremely stupid and simple.

AK

```

let Final = context(() => {

  let TieSH = context(() => {
    intent('Tortoiseshell box with gold lining', p =>
      hufflepuff = hufflepuff + 1
    });
    intent('Jet black box with a silver lock', p => {
      slytherin = slytherin + 1
    });
  });

  let TieSR = context(() => {
    intent('Ornate Golden Casket', p => {
      ravenclaw = ravenclaw + 1
    });
    intent('Jet black box with a silver lock', p => {
      slytherin = slytherin + 1
    });
  });

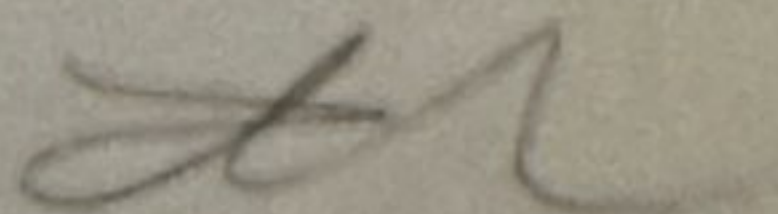
```

Shown in the picture on the left, TieSH and TieSR are all functions of context(). The answers measured in the intent function will be received by the user, and there will be a tiebreaking action adding one point to either house.

The next step is to make the speaker say the final house out loud, and we already have the code for that in a previous page.

CONTINUED ON PAGE

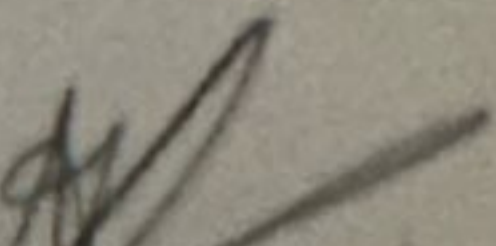
DESIGNED BY:



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12/17

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DATE:

12/17

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CONTINUED FROM PAGE: 40

```
intent('Left', p => {
  p.play('Aha, that was the last question!');
  slytherin = slytherin + 2;
  ravenclaw = ravenclaw + 1;
```

```
  if (slytherin == hufflepuff){
    p.play("Hmm, looks like you're not done yet. Let me ask you a few more questions...")
    p.play("If you're trapped in a mysterious room with a locked door, and you were only")
    p.then(TieSH);
  }
  else if (slytherin == ravenclaw){
    p.play("Hmm, looks like you're not done yet. Let me ask you a few more questions...")
    p.play("If you're trapped in a mysterious room with a locked door, and you were only")
    p.then(TieSR);
  }
}
```

we added 6 conditional statements, each one targeting a possible "tie" condition. As seen in the picture on top, each statement leads to the functions on the previous page (TieSH, TieSR).

Of course, when finishing a "first draft" of code, there will always be problems. In the Active shown on the right, the program was comparing ANY two houses that had the same value.

We only wanted the tiebreaker to be for houses that both share the variable "final". The AI chat does not let the user answer anything, and it is not even supposed to ask the tiebreaking question.

Basic example for AI assistant:95

Would you rather go left or right?

Basic example for AI assistant:167

left

Basic example for AI assistant:168

Aha, that was the last question!

Basic example for AI assistant:188

Hmm, looks like you're not done yet. Let me ask you a few more questions...

Basic example for AI assistant:189

If you're trapped in a mysterious room with a locked door, and you were only allowed to pick one box to help you escape, would you pick the Tortoiseshell box with gold lining or a small pewter box?

Basic example for AI assistant:219

Let me see. Analytical and observant. I sense that you definitely work smarter than others. Ravenclaw!

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CONTINUED ON PAGE: 42

CONTINUED FROM PAGE 41

```
if (final == slytherin == ravenclaw){
  p.play("Hmm, looks like you're not d
  p.play("If you're trapped in a myste
  p.then(TieSR);
```

AK

```
if (final == slytherin && final == ravenclaw){
  p.play("Hmm, looks like you're not done yet.
  p.play("If you're trapped in a mysterious rc
  p.then(TieSR);
```

AK

Problem Identified!

We had to check if both variables are equal to the final value that was previously calculated.

At first the code did not work because of a syntax error. The picture above shows the correct syntax in the conditional statement.

```
else if (final == slytherin && final != ravenclaw && final != gryffindor && final != hufflepuff){
  p.play('Let me see. Cunning, ambitious, but respectful, having a big love for your own res
}
else if (final == gryffindor && final != ravenclaw && final != slytherin && final != hufflepuff){
  p.play('Let me see. Bravery is a big quality. Passionate about what you love, and owns to your
}
```

AK

We also changed the previous conditional statements to make sure it double checks if there is only one distinct final value between the four houses.

CODE IS DONE!!

After so many hours of debugging and creating coding new programs/functions, our code has no more issues and exceptions! This Alon AI code is basically the only software component of our project (not including connecting the speaker & microphone), so now we're focusing all our energy onto the hardware.

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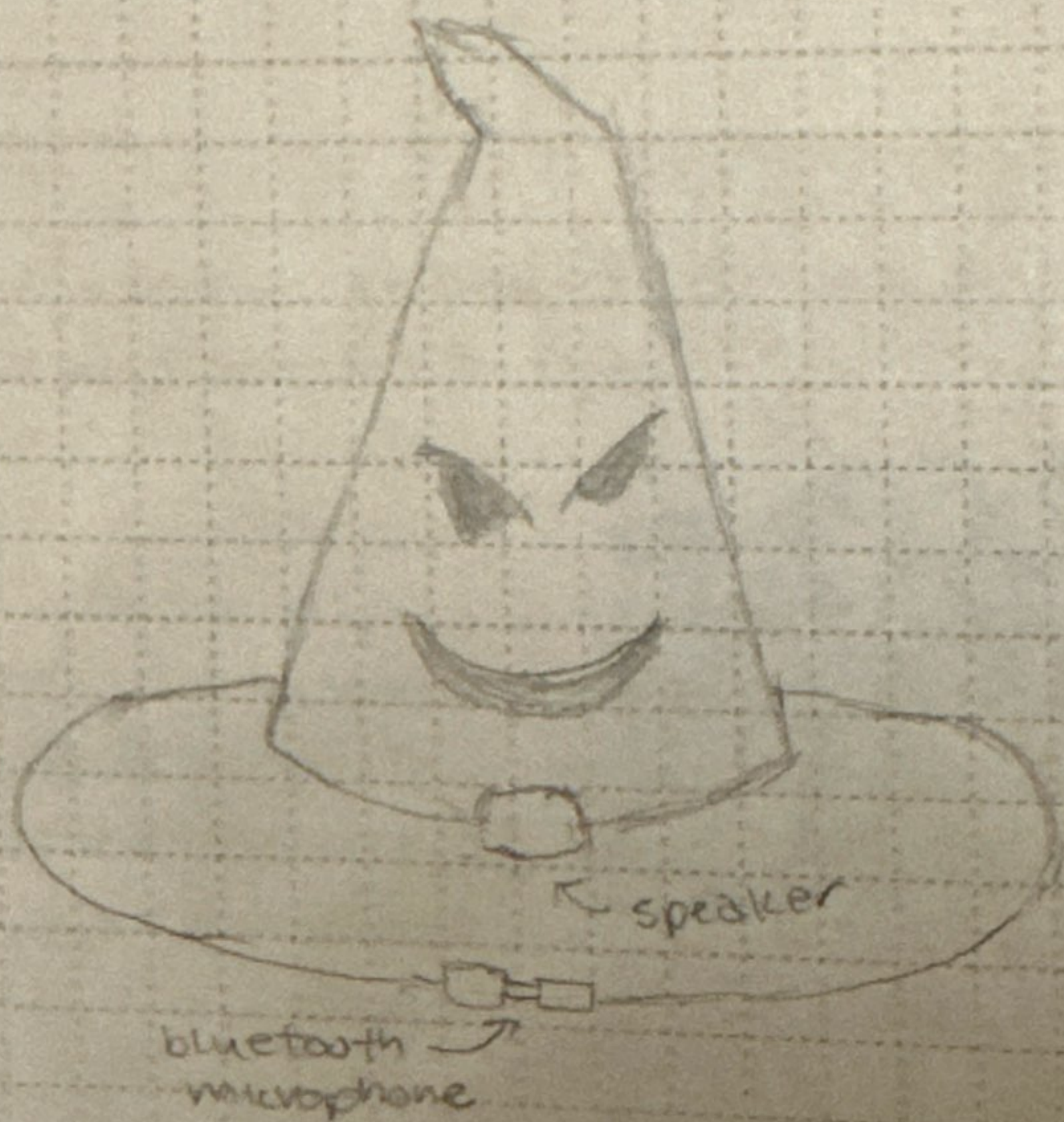
CONTINUED FROM PAGE:

Due to the EXTREMELY close deadline, our design with the Raspberry Pi definitely will not work.

1. Alan AI is usually implemented for websites/applications, there is not a clear way on how to transfer Alan AI code to the Raspberry Pi. This is a problem we should have identified sooner.

2. when exporting our code, our file still does not directly show how much memory the code uses, and we seriously do not want to damage the Raspberry Pi.

Design change:



- the overall exterior looks the same
- the bluetooth microphone we bought earlier can also be clipped on
- there will be no interior. this way, we can directly follow the DIY video and add ~~all of~~ the speaker and microphone on the brim

What about the code?

For our code, we are going to make a small application with React Native and import our Alan AI code onto the application. That will allow us to control everything using our cellular device. The only risk of this design is the fact that the speaker and microphone have to simultaneously connect to the phone.

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Remaking and re-attaching the cone

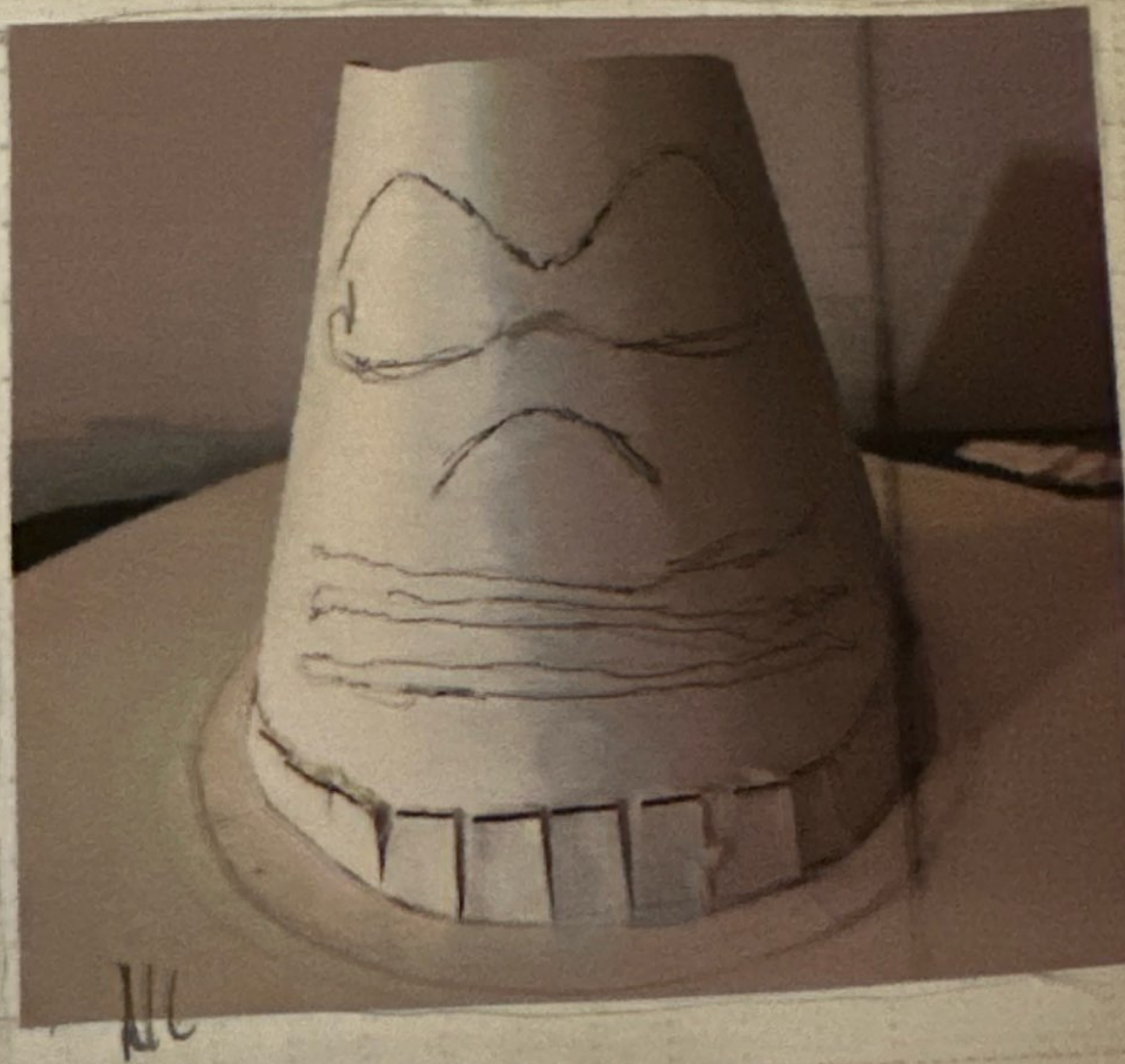
this time, we will make the cone close at the top, as well as making the bottom bigger in order to fit the ridges.



we used hot glue to glue the cone onto the hat by attaching it to the ridges. This time, there was no space between the cone and the ridges, so no additional paper was needed.

Shown in the picture on the right, we first made the cone look more realistic by cutting lines down the parts and regluing the pieces together.

After that, we sketched the face of the Sorting Hat with pencil. Regarding how the eyes and mouth are going to be made, we will use aluminum foil to outline the facial features.

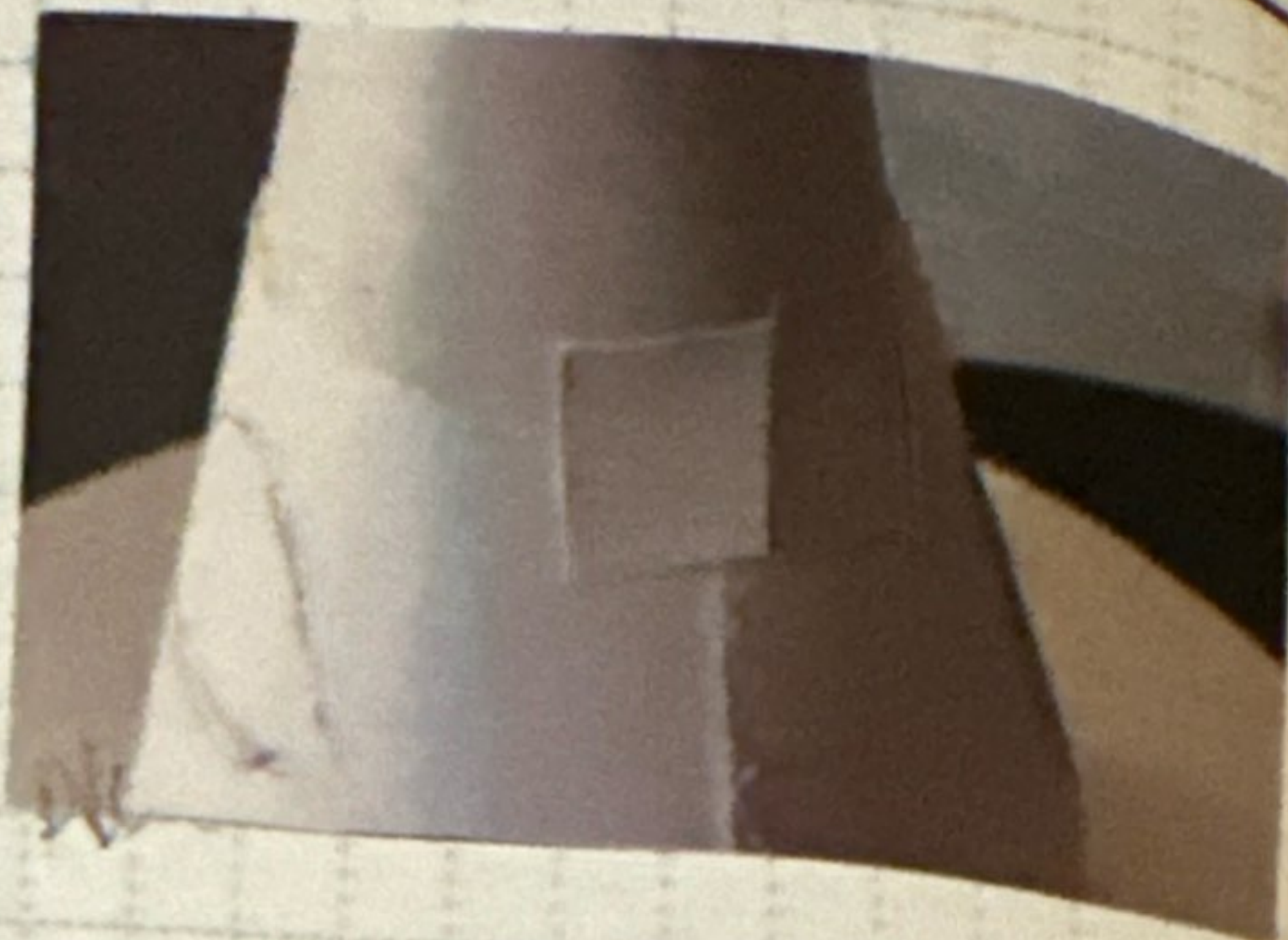
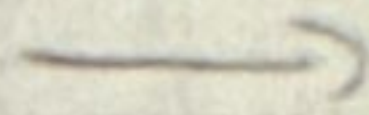


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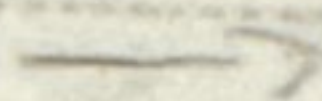
DESIGNED BY:

DATE:

CONTINUED FROM PAGE 44



From the parts of the cone that we cut off earlier, we reattached it to the empty for top part of the hat, but in a different direction to make it stick. We now glued little pieces of paper to cover the empty spaces.



Added more ~~parts~~ broken parts of the cone to close off the hat. placed more tiny pieces of posterboard to cover the empty gaps.



Regarding what we said earlier about outlining the facial features with aluminum foil, the picture on the left shows the visual depiction of how it actually works. We used not glue to glue the foil onto the hat.

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Unfortunately, speaking, a poster board is definitely not the most sturdy and strong material. In order to make the hat feel sturdier, we first surrounded the whole thing by giving rod towers around it. The paper towels also makes the whole thing denser.

AK

The second phase is to ~~too~~ give the whole hat with newspapers. This adds more structure and overall strength. The next phase is to start gluing the felt and fabric onto the hat.



AK



Putting / attaching the fabric onto the hat is definitely one of the most difficult parts of this whole building process.

AK

CONTINUED ON PAGE: 52

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Install react-native-cli globally

Terminal

```
npm install -g react-native-cli
```

Install the app

Terminal

```
npm i @alan-ai/alan-sdk-react-native --save
```

We used the alan ai documentation and the yt video below as reference:

We are integrating Alan Ai to a React Native App



CONTINUED FROM PAGE 47

Bluetooth Microphone



AL

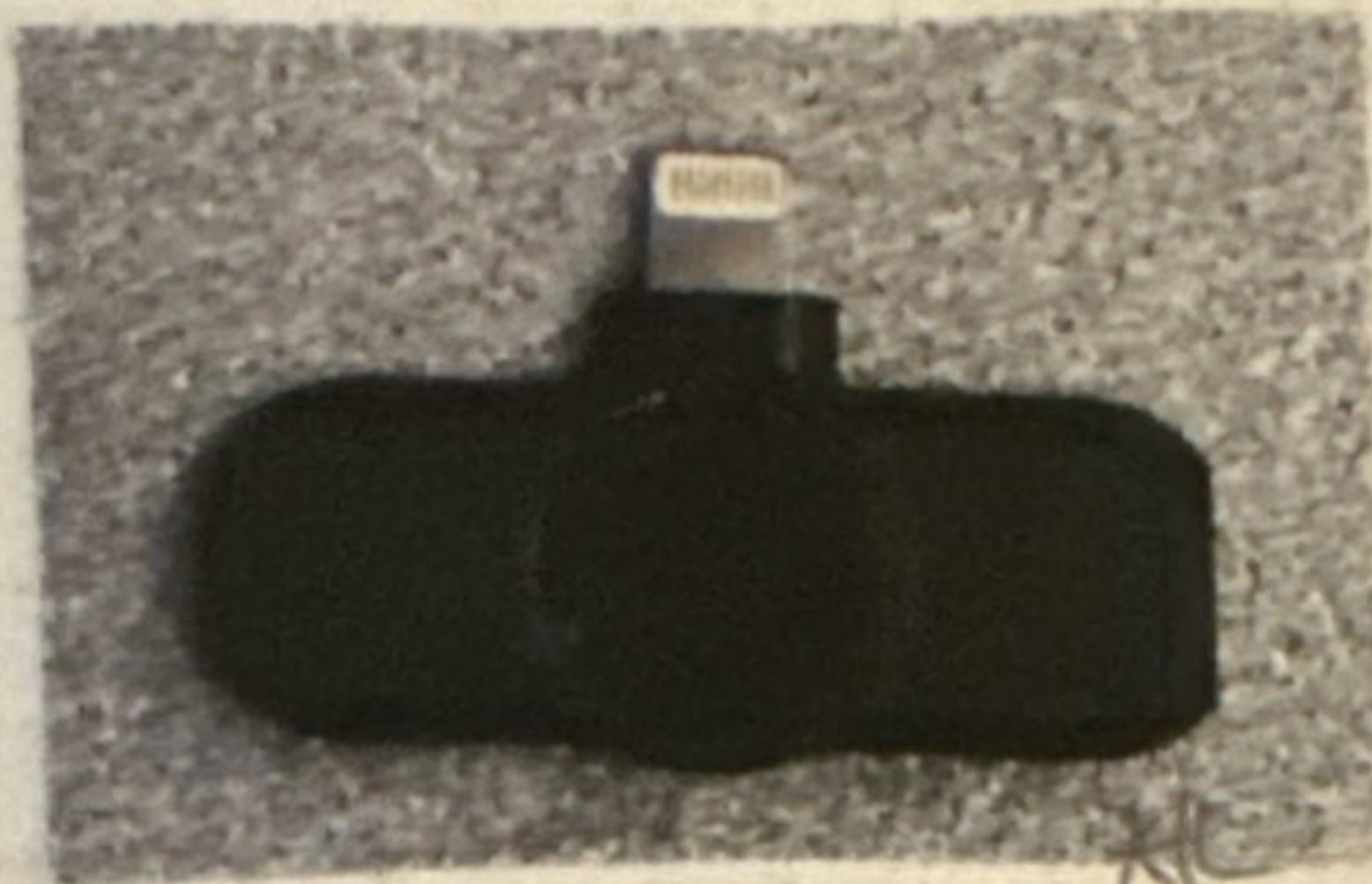
Another component of our project is the Bluetooth microphone, which is going to be clipped onto the hat.

Example of how it is going to be clipped on →



AK

This is the "Bluetooth" part →



AL



AL

The app will be connected to the mic & a speaker

Before beginning integration, we have to create a basic React App.

However, our first issue began as we tried to open a react app.

```
C:\>expo init SortingHat
WARNING: The legacy expo-cli does not support Node v17. Migrate to the new local Expo CLI: https://blog.expo.dev/the-new-expo-cli-f4250d8e3421.
(node:30636) [DEP0040] DeprecationWarning: The 'punycode' module is deprecated. Please use a userland alternative instead.
(Use 'node --trace-deprecation ...' to show where the warning was created)

The global expo-cli package has been deprecated.

The new Expo CLI is now bundled in your project in the expo package.
Learn more: https://blog.expo.dev/the-new-expo-cli-f4250d8e3421.

To use the local CLI instead (recommended in SDK 46 and higher), run:
  npx expo <command>

Migrate to using:
  npx create-expo-app --template
  Choose a template: > blank
a minimal app as clean as an empty canvas
```

AK

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CONTINUED FROM PAGE 48

We slightly deviated from the instructions and used expo-cli instead of React Native cli, as expo-cli allows us to use our app w/o adding it to the app store.

```
C:\SortingHatFinal>npm i @alan-ai/alan-sdk-react-native --save
npm ERR! code ERESOLVE
npm ERR! ERESOLVE unable to resolve dependency tree
npm ERR!
npm ERR! While resolving: sortinghatfinal@1.0.0
npm ERR! Found: react@18.2.0
npm ERR! node_modules/react
npm ERR!   react@"18.2.0" from the root project
npm ERR!
npm ERR! Could not resolve dependency:
npm ERR! peer react@"~16.11.0" from @alan-ai/alan-sdk-react-native@2.4.0
npm ERR! node_modules/@alan-ai/alan-sdk-react-native
npm ERR!   @alan-ai/alan-sdk-react-native@"*" from the root project
npm ERR!
npm ERR! Fix the upstream dependency conflict, or retry
npm ERR! this command with --force or --legacy-peer-deps
npm ERR! to accept an incorrect (and potentially broken) dependency resolution.
```

Once I tried installing the Alan AI SDK, I encountered even more errors.

The Alan AI SDK seemed to only be compatible with React 16.11.0.

Before attempting to install React 16.11.0, I cleared the cache and ensured all the packages used were updated manually.

I also attempted to install the Alan AI SDK's latest version before changing the React version.

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```
C:\SortingHatFinal>npm install @alan-ai/alan-sdk-react-native@latest
npm ERR! ERESOLVE
npm ERR! unable to resolve dependency tree
npm ERR!
npm ERR! While resolving: sortinghatfinal@1.0.0
npm ERR! Found: react@18.2.0
npm ERR! node_modules/react
npm ERR!   react@"18.2.0" from the root project
npm ERR!
npm ERR! Could not resolve dependency:
npm ERR! peer react@"~16.11.0" from @alan-ai/alan-sdk-react-native@2.4.0
npm ERR! node_modules/@alan-ai/alan-sdk-react-native
npm ERR!   @alan-ai/alan-sdk-react-native@"2.4.0" from the root project
npm ERR!
npm ERR! Fix the upstream dependency conflict, or retry
npm ERR! this command with --force or --legacy-peer-deps
npm ERR! to accept an incorrect (and potentially broken) dependency resolution.
```

- However, all versions of the Alan AI SDK had their compatibility limited to React v. 16.11.0.

Once we changed our react version from React v. 18.2.0 to v. 16.11.0, we discovered more dependency issues w/ v. 16.11.0. The old version had a few bugs, and this was causing even more errors within our project.

I then attempted to update all the packages but

```
C:\>npm update
npm ERR! EPERM
npm ERR! syscall: mkdir
npm ERR! path: C:\
npm ERR! errno: -4048
npm ERR! Error: EPERM: operation not permitted, mkdir 'C:\'
npm ERR!   at async mkdir (node:internal/fs/promises:855:10)
npm ERR!   at async [validatePath] (C:\Users\aadhv\AppData\Roaming\npm\node_modules\npm\node_modules\@npmcli\arborist\lib\arborist\
reify.js:195:5)
npm ERR!   at async Arborist.reify (C:\Users\aadhv\AppData\Roaming\npm\node_modules\npm\node_modules\@npmcli\arborist\lib\arborist\
reify.js:158:5)
npm ERR!   at async Update.exec (C:\Users\aadhv\AppData\Roaming\npm\node_modules\npm\lib\commands\update.js:65:5)
npm ERR!   at async module.exports (C:\Users\aadhv\AppData\Roaming\npm\node_modules\npm\lib\cli-entry.js:61:5)
npm ERR! Error: EPERM: operation not permitted, mkdir 'C:\'
npm ERR!   at async mkdir (node:internal/fs/promises:855:10)
npm ERR!   at async [validatePath] (C:\Users\aadhv\AppData\Roaming\npm\node_modules\npm\node_modules\@npmcli\arborist\lib\arborist\
reify.js:195:5)
npm ERR!   at async Arborist.reify (C:\Users\aadhv\AppData\Roaming\npm\node_modules\npm\node_modules\@npmcli\arborist\lib\arborist\
reify.js:158:5)
npm ERR!   at async Update.exec (C:\Users\aadhv\AppData\Roaming\npm\node_modules\npm\lib\commands\update.js:65:5)
npm ERR!   at async module.exports (C:\Users\aadhv\AppData\Roaming\npm\node_modules\npm\lib\cli-entry.js:61:5) {
  errno: -4048,
  code: 'EPERM',
  syscall: 'mkdir',
  path: 'C:\'
}
npm ERR! The operation was rejected by your operating system.
```

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WHAT WE WENT TO GET DONE:

- putting felt on the bottom of the hat's brim
- using a sewing machine to make the fabric for the tip of the hat
- implementing our Alan AI code into a portable app
- creating a placeholder for our speaker
- finding a secure placeholder for our bluetooth speaker
- coding the app
- researching microchips that support Alan AI / NLP

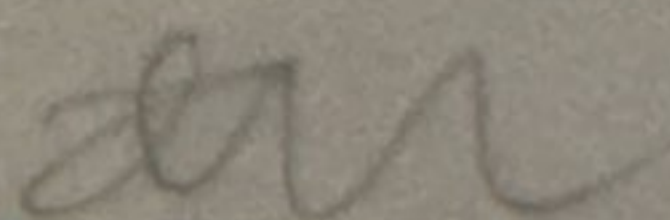
CALENDAR

Date / Time	Work
01/11	Finish 75% of CAD, figuring out bugs when integrating Alan AI
01/15	Finalize app & working code
01/17	Finish CAD, ensure working bluetooth
01/20 OR 01/21	First test print of hat, secure a good place to put microphone
1/29	second print incl assembly with hat
02/01 → 02/29	Buffer Time

FORGOT TO ADD:

Berndt's Flex on 1/31 and 02/01 to learn how to use the sewing machine and make the tip of the hat

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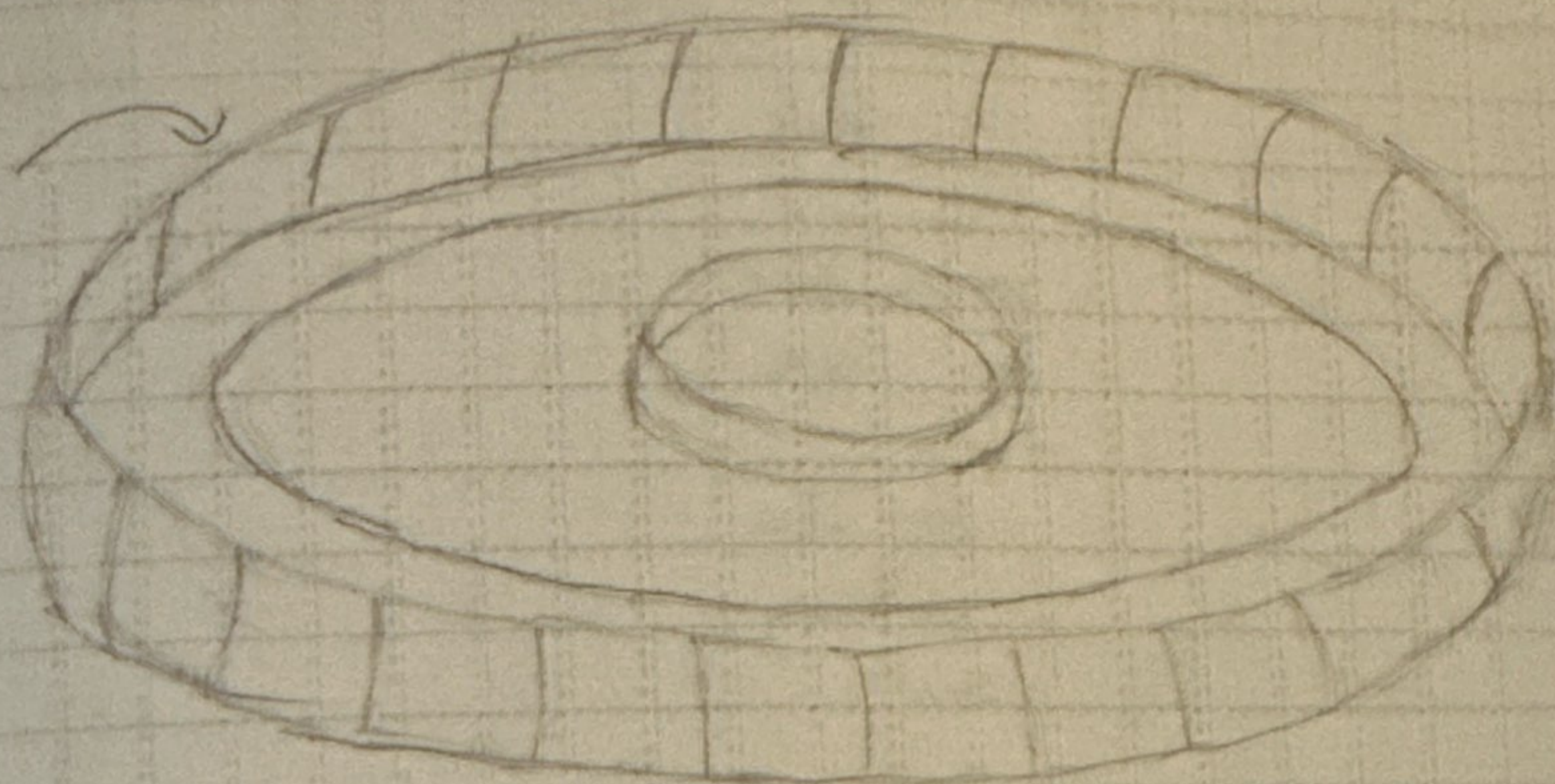
01/08

DATE:

To make our hat more "realistic" and "moveable", we need to place the speaker in a secure position in the interior of the hat.

Idea #1:

cardboard
wedges
and
cardboard
base



The interior is 3D printed filament with a speaker holder in the center, mimicking the bottom of the speaker so the speaker is held in place.

Idea #2:

Instead of using cardboard for the exterior (since it is a reasonably flexible material), we can print the whole thing in a more flexible 3D printing filament like NinjaFlex or TPU. This would also make it more convenient for the speaker, since the "filament" of the little holder component has a wide angle.

We will most likely be implementing the second Idea into our sorting hat. However, a cardboard prototype is definitely still needed.

CONTINUED ON PAGE 53

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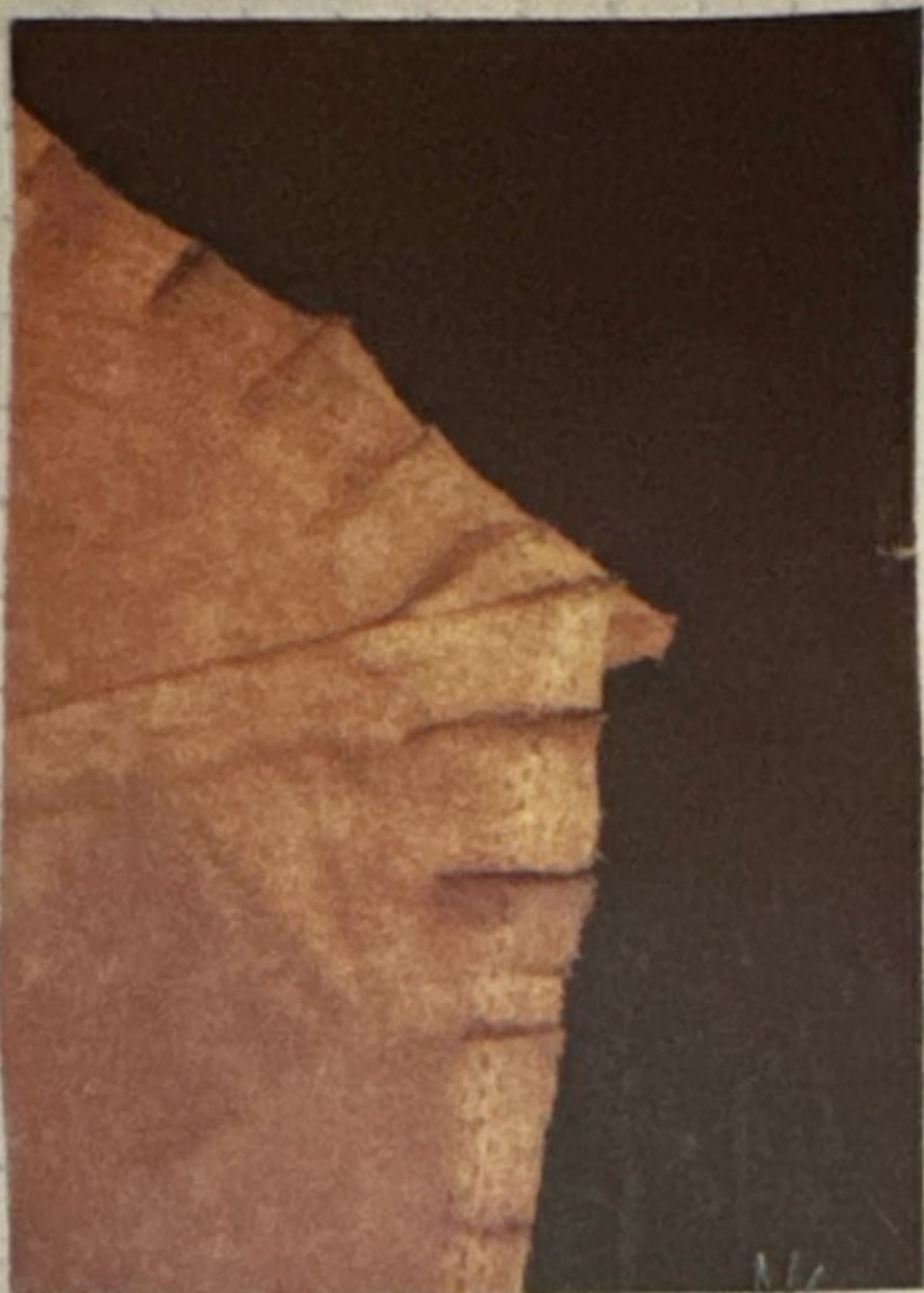
DATE:

2/1/21



BERB
MAKE

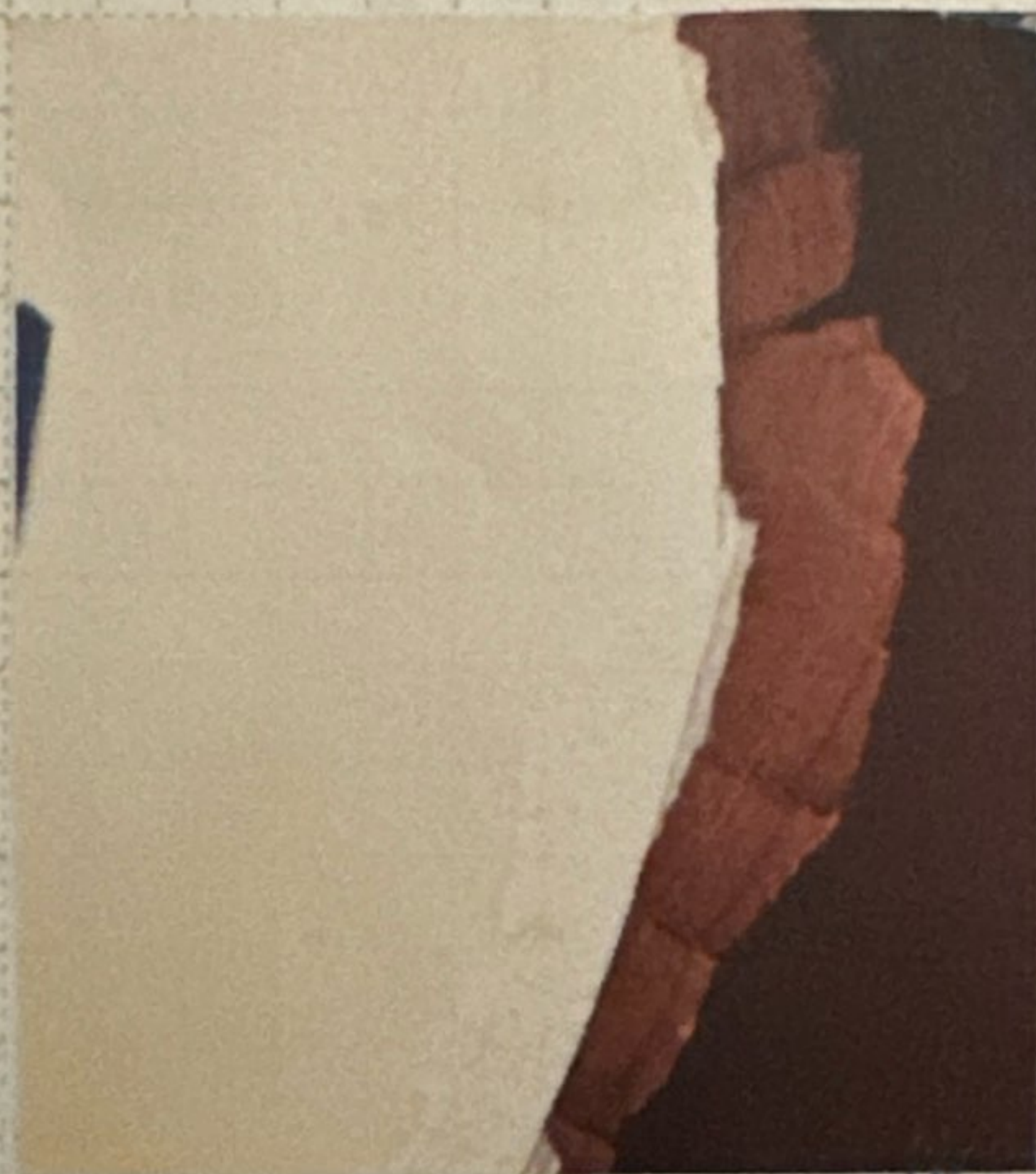
Closing the Edges and Structuring The Bim



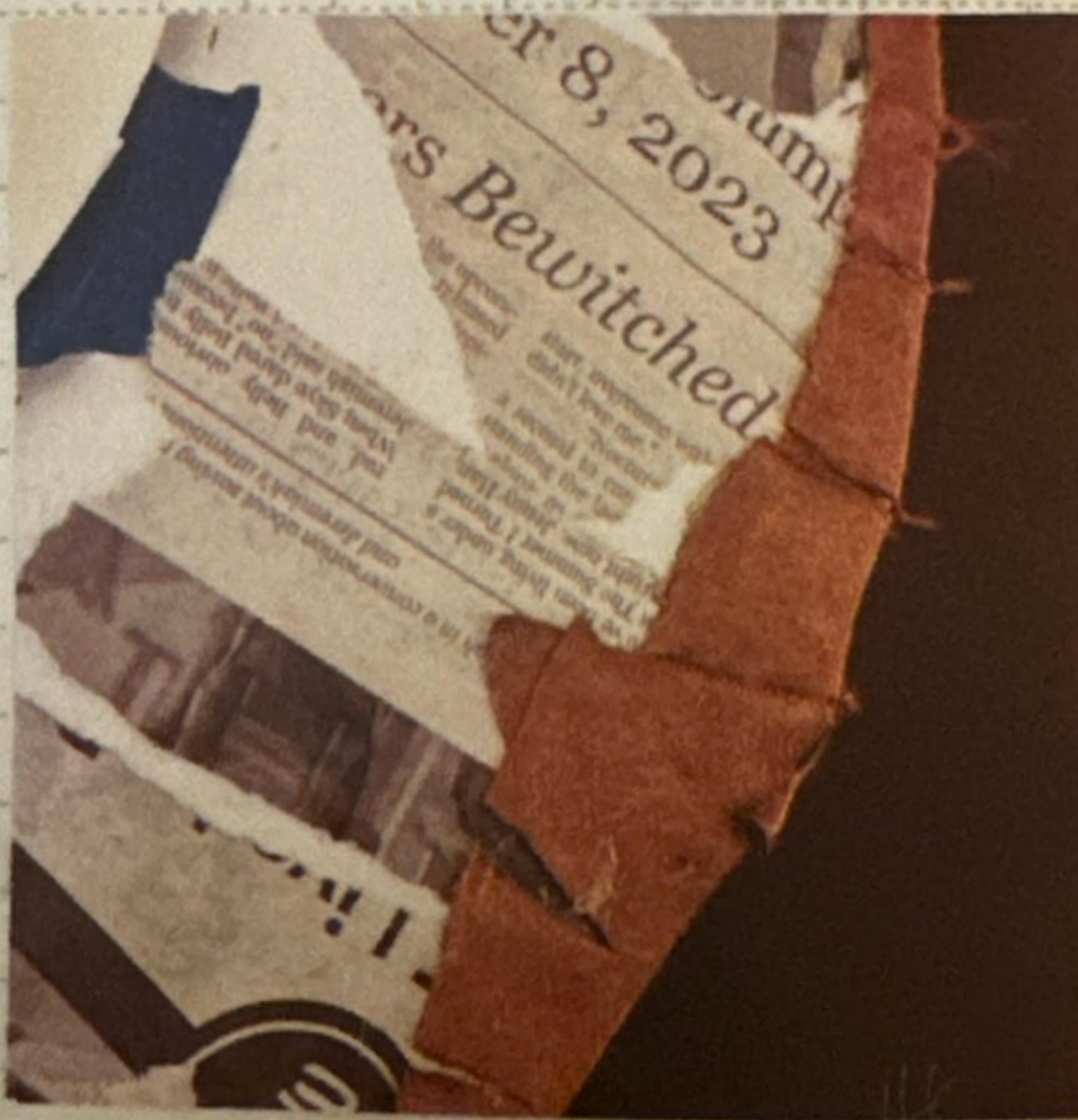
→
we used
hot glue
in order
to close
the edges
that were
sticking
out.



Bottom View



→
Again,
we glued
on paper
towels
& newspapers
to make
the bim
stronger.



The next step is to glue on the felt in order to complete the bim's bottom.

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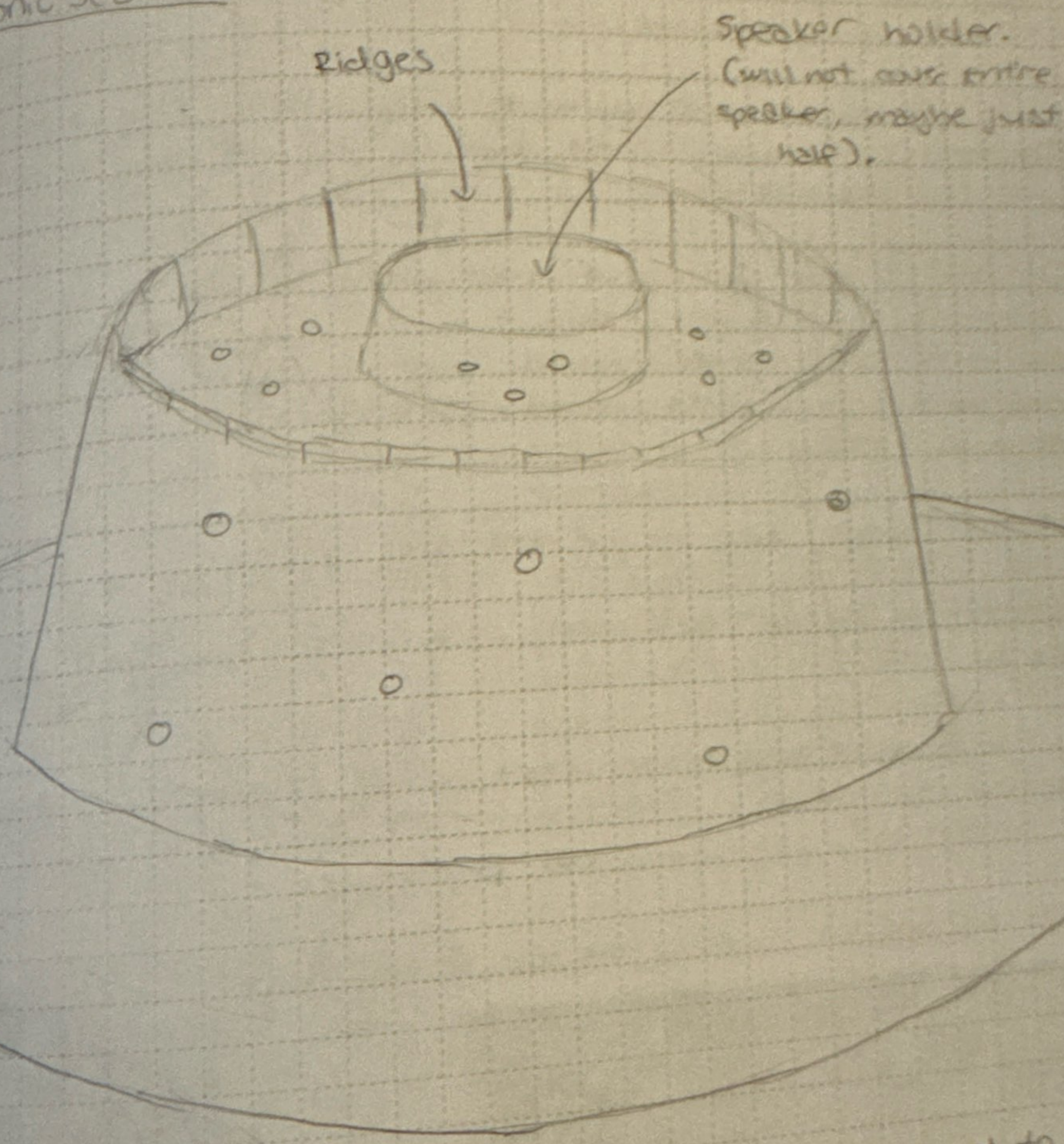
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BERE
MAKE

Elaborating on the sketch of the component (page 52), it would be put INSIDE THE HAT. This also contradicts the sketch on page 43, where the speaker is just

Conic Section:



The little circles are air holes in order for sound to travel through. We want the speaker to not sound muffled when it is in the hat.

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CHANGE IN PROJECT (01/25)

Before, we were going to make an app with React Native or Vue, until we tested it and found out that the version for Alan AI is not compatible with the React Native terminal and software.

Way before, we were going to implement the code into a Raspberry Pi Model 3 B+, but it does not complement the Alan AI Software.

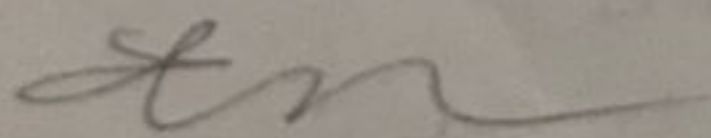
CHANGE: Our last resort is to just use a laptop when presenting our project. It is the only way to solve all of the connectivity issues and the code works beautifully on the computer. We just asked Ms. Berbaury, and she said that it is okay.

With this change, these are our remaining tasks:

- implement "wake word" and voice changes for Alan AI code
- CAD Interior component, test print, figure out the specific tolerances
 - need to make cardboard prototypes
- make fabric for covering the tip of the hat
 - Q: do we really need a sewing machine?
- finish placing brim of hat
 - try to make the interior (head part) after

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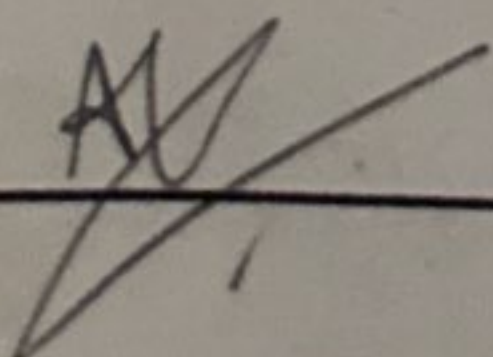
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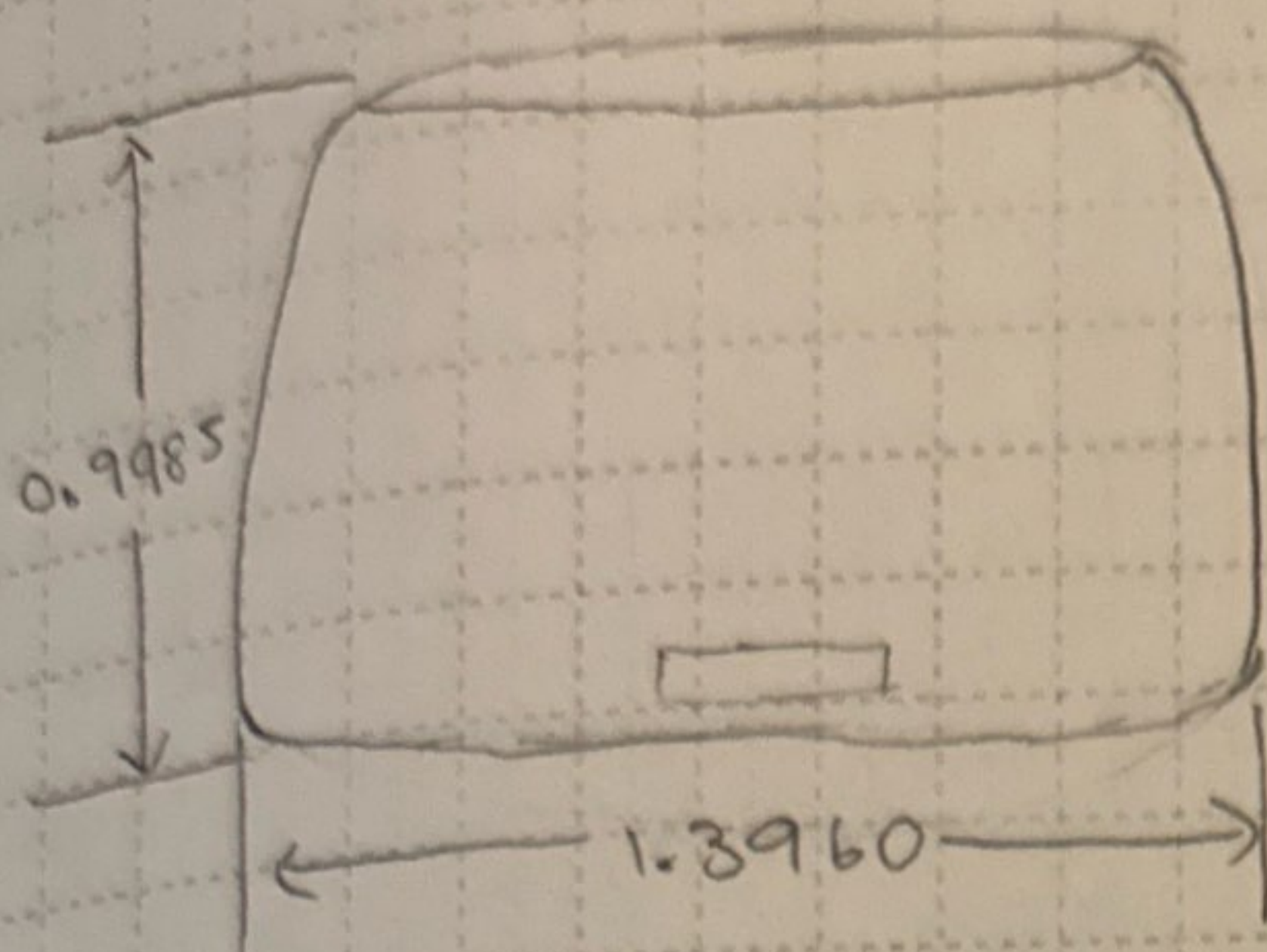
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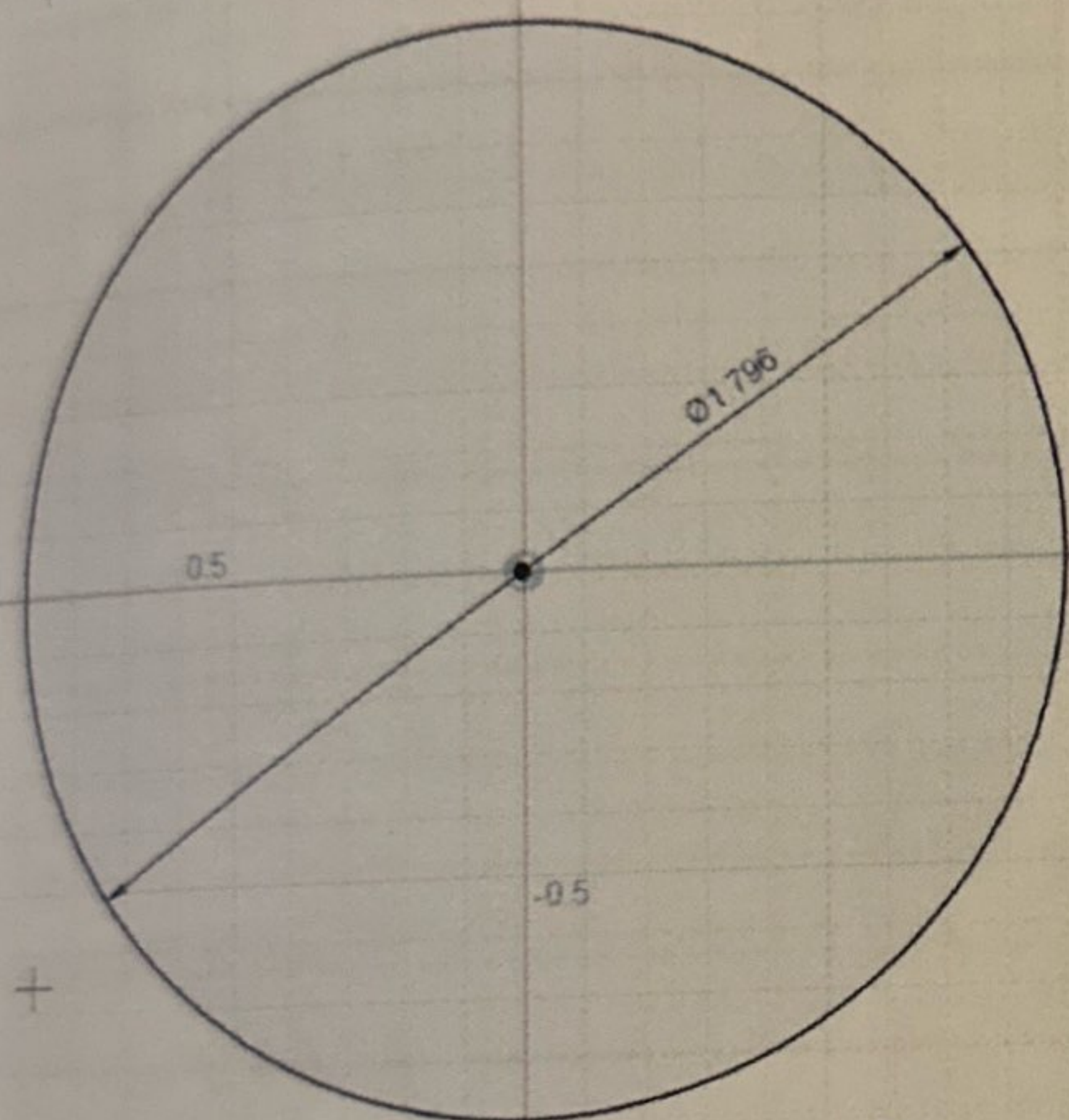
SPEAKER DIMENSIONS



Unit: inches

We only need these 2 dimensions, since the holder just needs to be larger than the width and height of the speaker.

There will be air holes on the holder so sound can pass through, and it will not be as muffled.

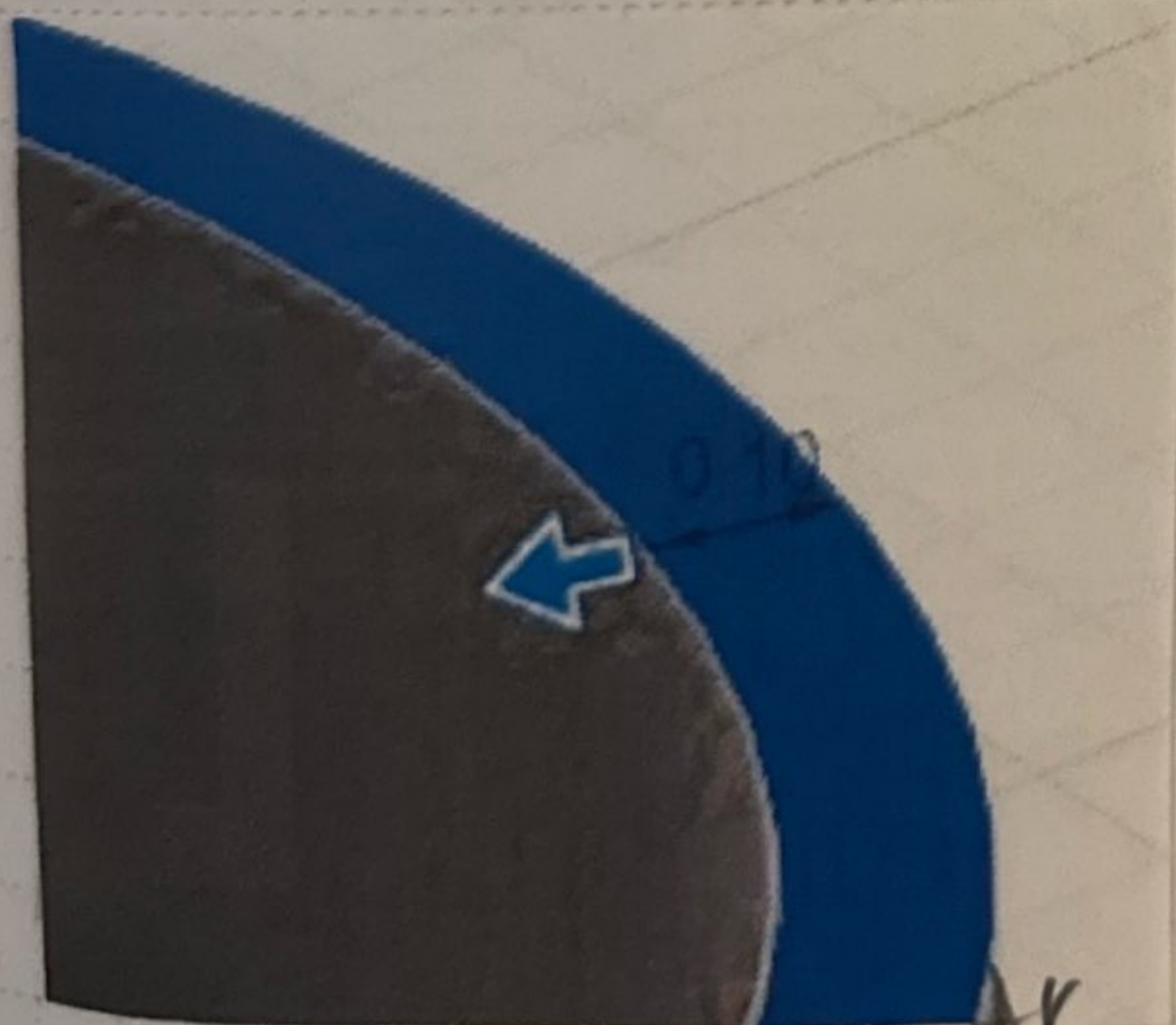


AK

The circle has a diameter of 1.796 in, and with a shelling (bottom left image) of 0.1 inches, the total tolerance is 0.3 inches.

The bottom picture shows the side view. The height is 0.7 in, which does not cover the whole speaker (we do not want it to).

I then filleted the edges just a little, filleting them by 0.05 inches.



AK



AK

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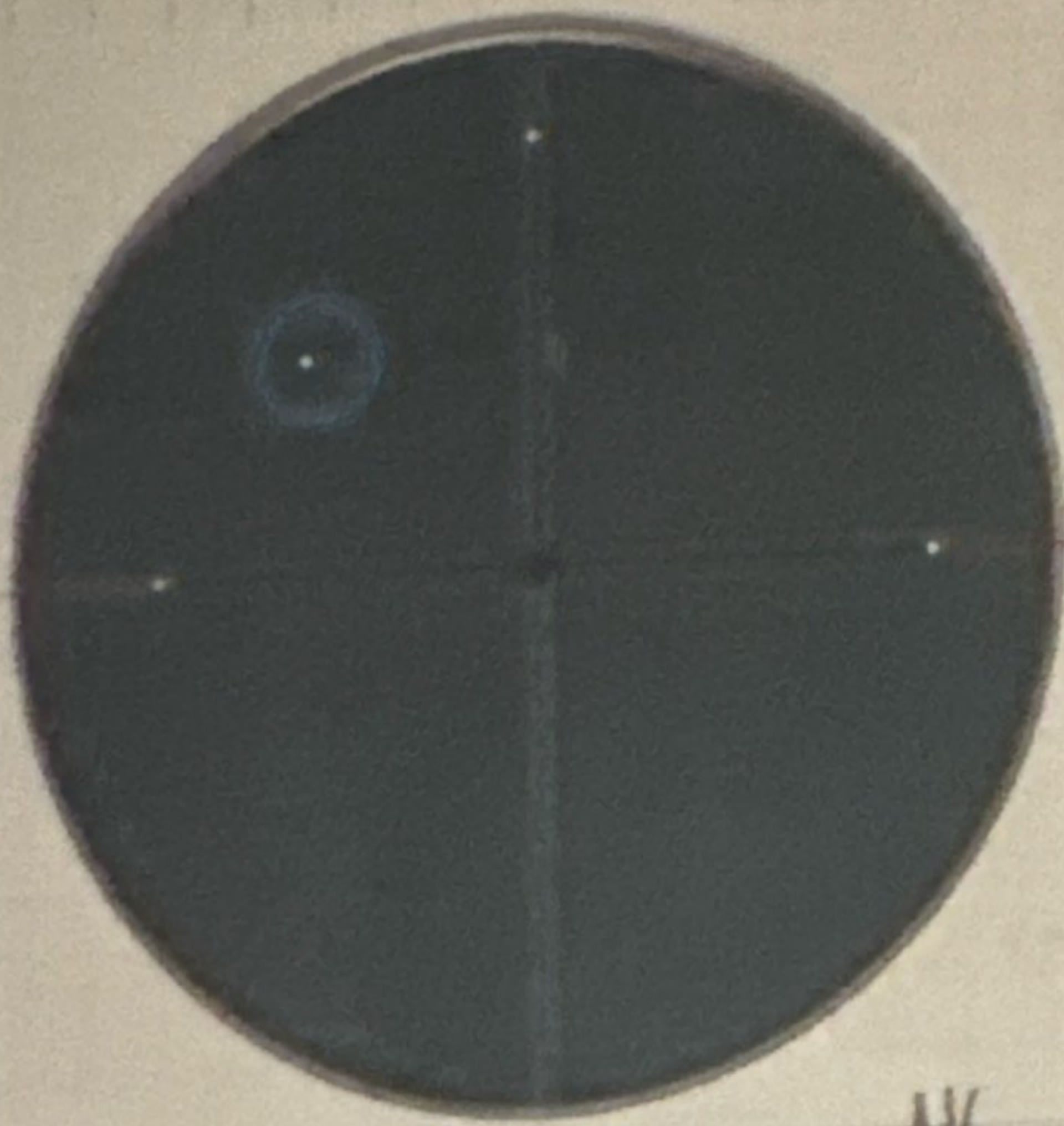
DATE:

1/25

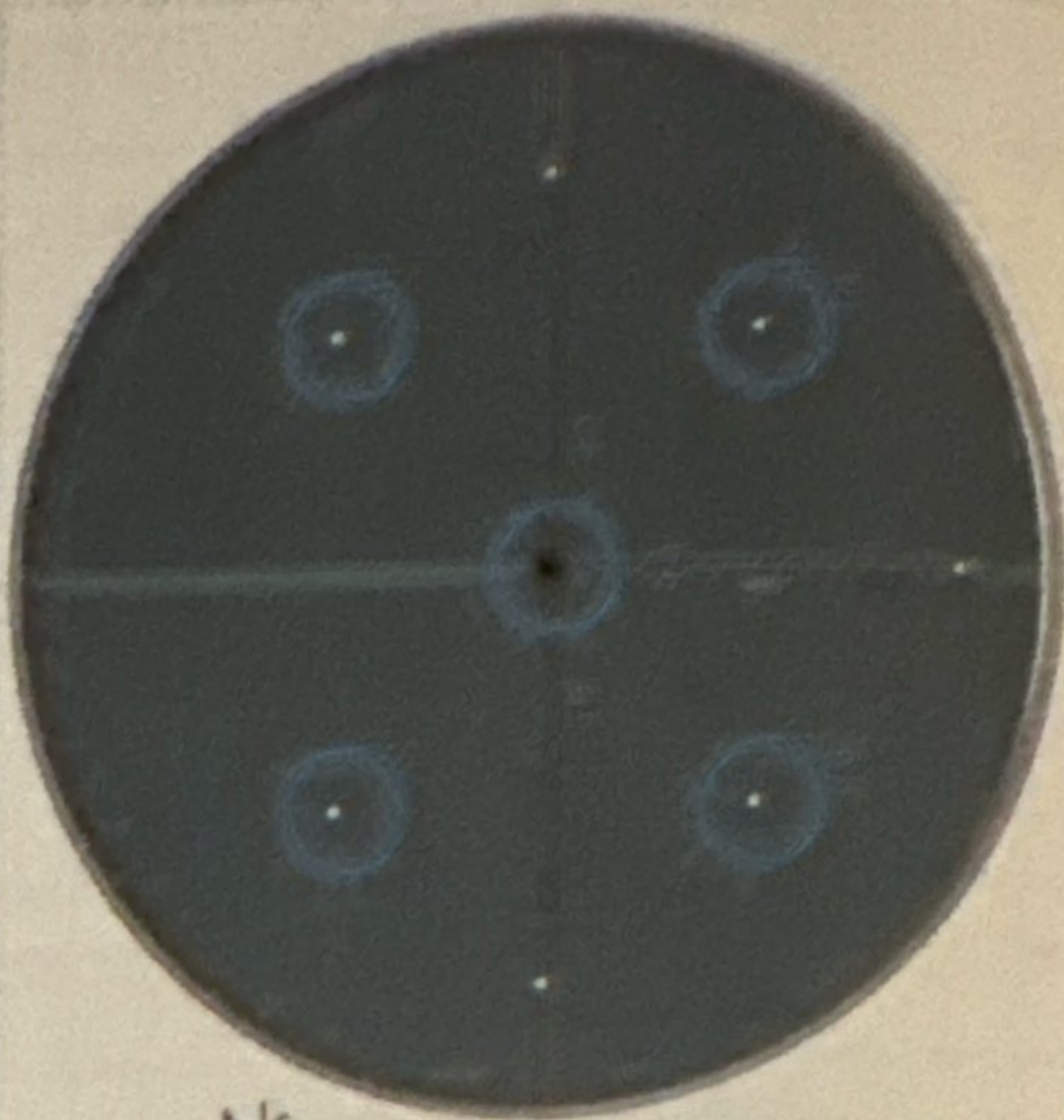


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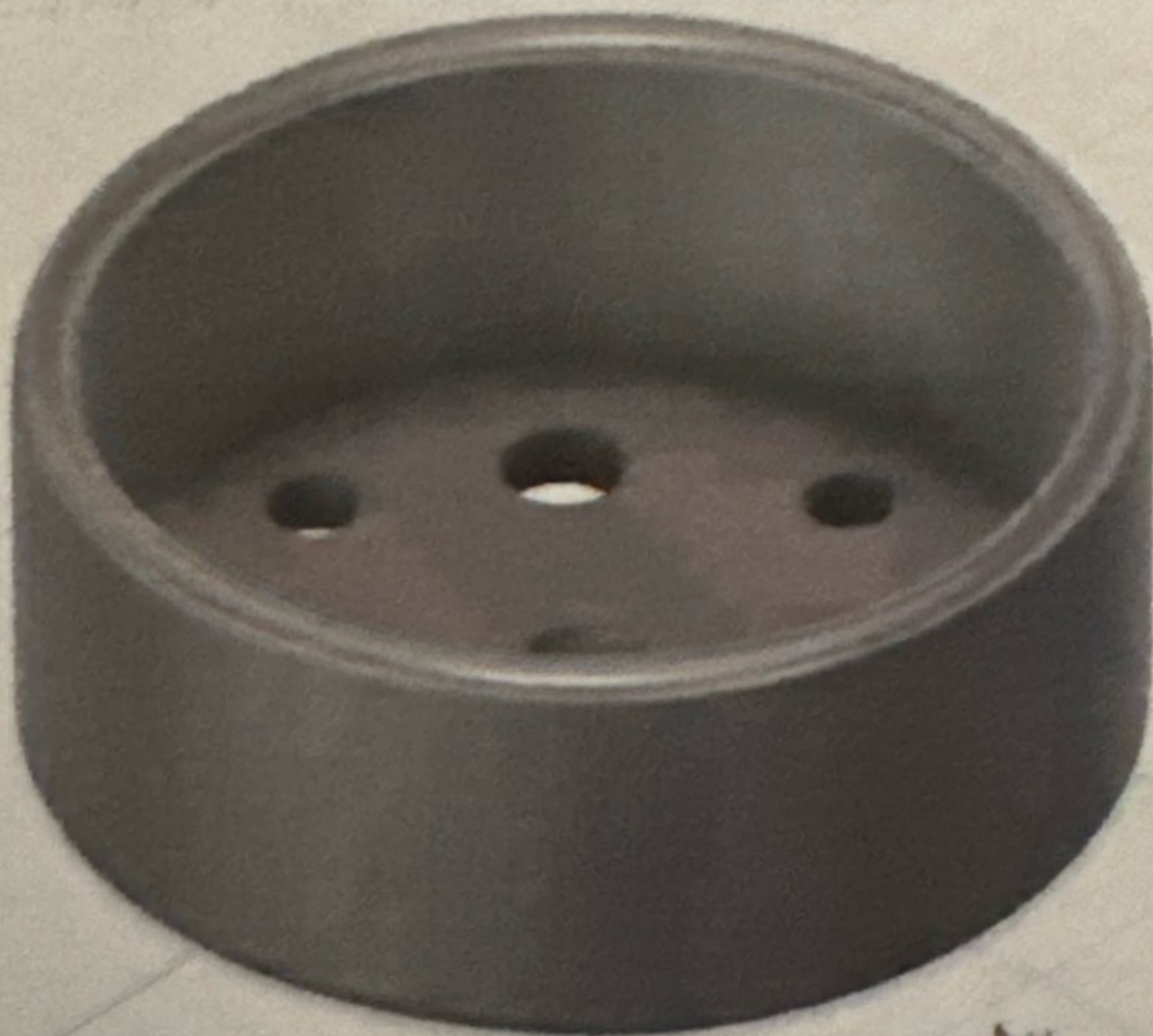


AK



AK

From the views that were mentioned in the previous page, I created a sketch, made one circle of 0.09 in. and modified it by making a construction line on the X and Y axis. Then I added one more small circle in the center.



AK

This figure on the left is the full isometric view of the speaker holder.

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Plan

We are using our laptop instead of programming an app for our phone.

Issues w/ programming an app:

- * The Alan AI API isn't compatible with the most recent version of React Native.
- * We was unable ^{to} open on our phones as an App.
- * The app wouldn't run on our phone if we closed the QR code on our computer.
- * Alan AI didn't allow you to open the QR code from your phone.

↳ Approach #1 - React Native App

We initially intended to use React Native to access Alan AI on our phone.

However...

↳ The Alan AI SDK was incompatible w/ the most recent version of React Native.

↳ The version it was compatible w/ was a very old and bug-filled version.

↳ Due to version, and compatibility errors, we scrapped this approach.

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Approach #2: Alan AI assistant App

We then pivoted and planned to use the Alan AI assistant app to run our code.

However...

↳ The Alan AI app only worked with a computer.

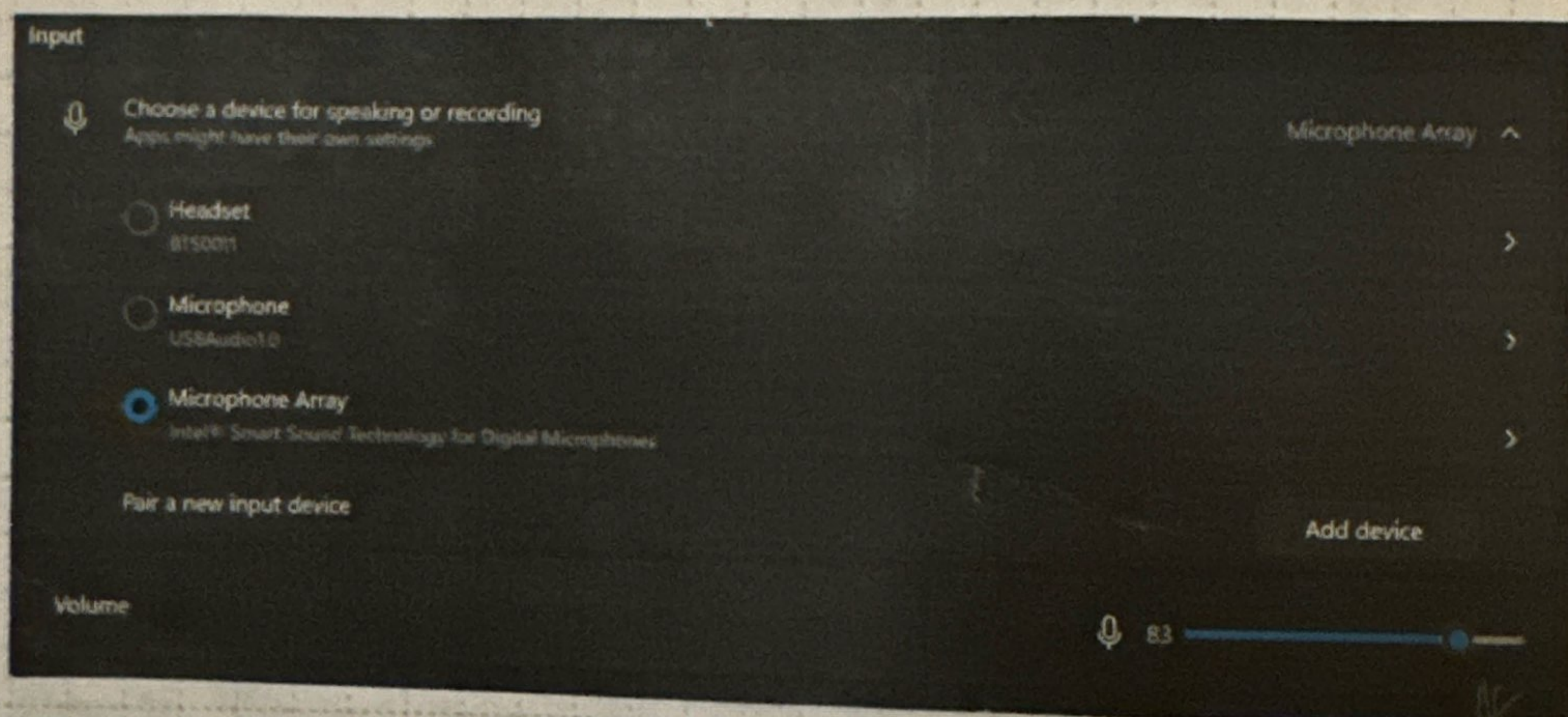
↳ The code wouldn't run if the computer closed.

↳ The app only worked with a QR code generated by the computer.

In the end, we decided to use a computer.

Connecting our components to the computer

Input:



- Connected a microphone to the computer to capture the user's voice.

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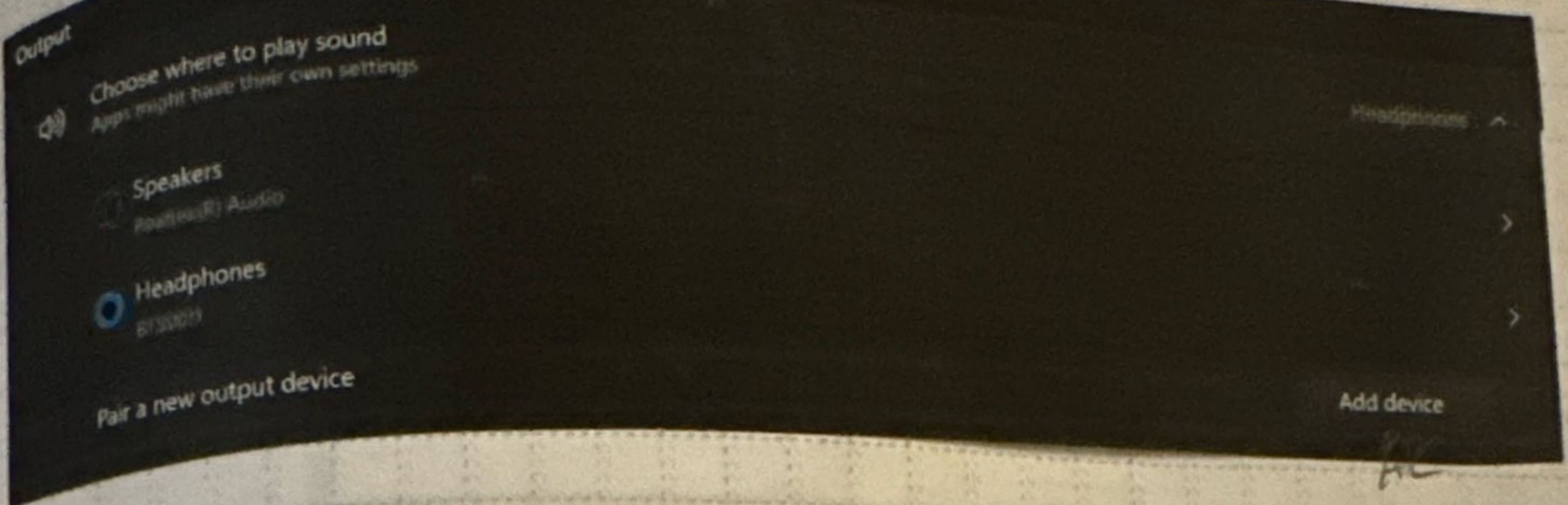
DATE:

CONTINUED ON PAGE: 60



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Output:



- Connected the speaker to the computer, to display the output.

* We used double-bluetooth to connect our computer to our components.

After testing vigorously, we ensured that this method works properly and consistently.

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AD

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DATE:

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