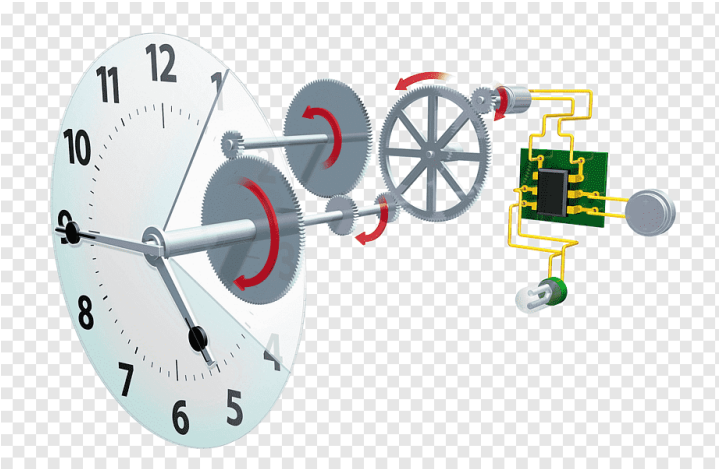

OMEGA



https://feltmagnet.com/crafts/HowToMakeAWoodenGearClock

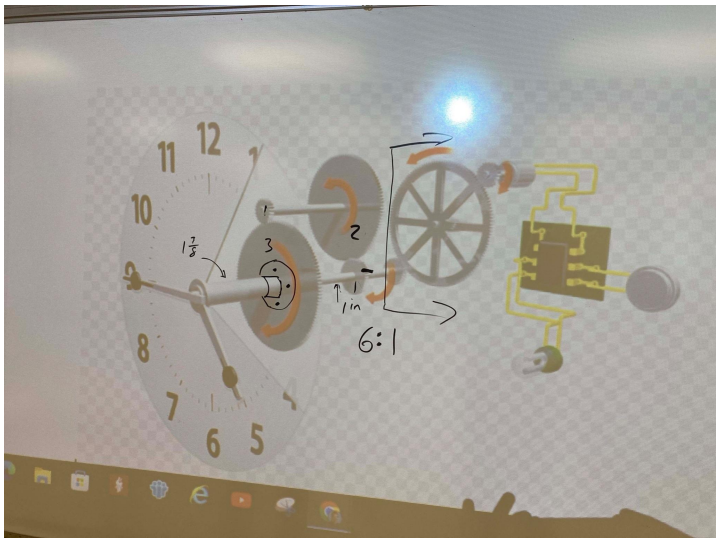
PVC built center shaft - 1’’ pvc pipe and 1 ¼” PVC pipe will work together.

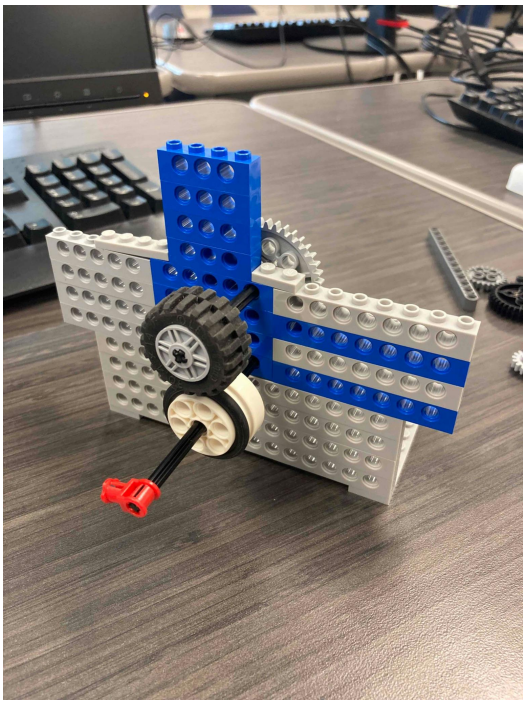
1” PVC (10ft.) - https://www.homedepot.com/p/1-in-x-10-ft-White-PVC-Schedule-40-Pressure-Plain-End-Pipe-531194/202280936

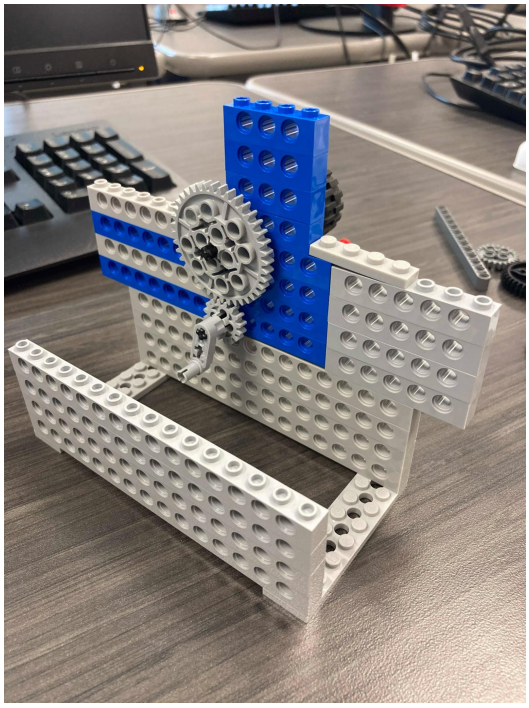
1 ¼” PVC (10ft.) - https://www.homedepot.com/p/JM-EAGLE-1-1-4-in-x-10-ft-White-PVC-Schedule-40-DWV-Plain-End-Pipe-1586/100147742

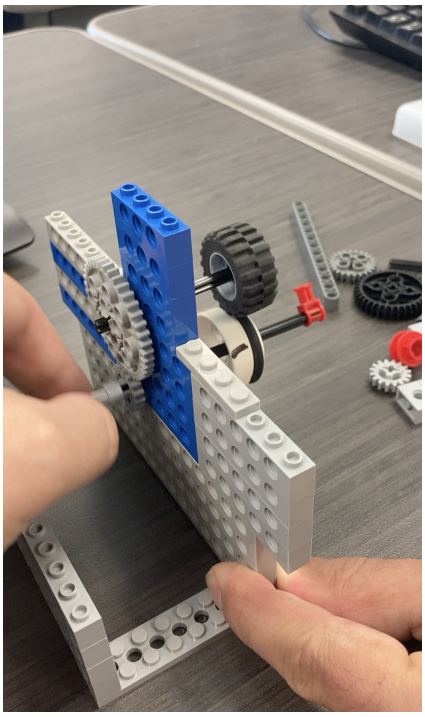
This 1 ½’ flange with foot seems to be a good fit. A slight amount of play but I don’t see it being an issue.
https://www.homedepot.com/p/STZ-1-1-2-in-Black-Iron-Floor-Flange-310-F-112/302074522

8/8/22 - Prototyping with Stephen
Starting with 6:1 Gear Ratio





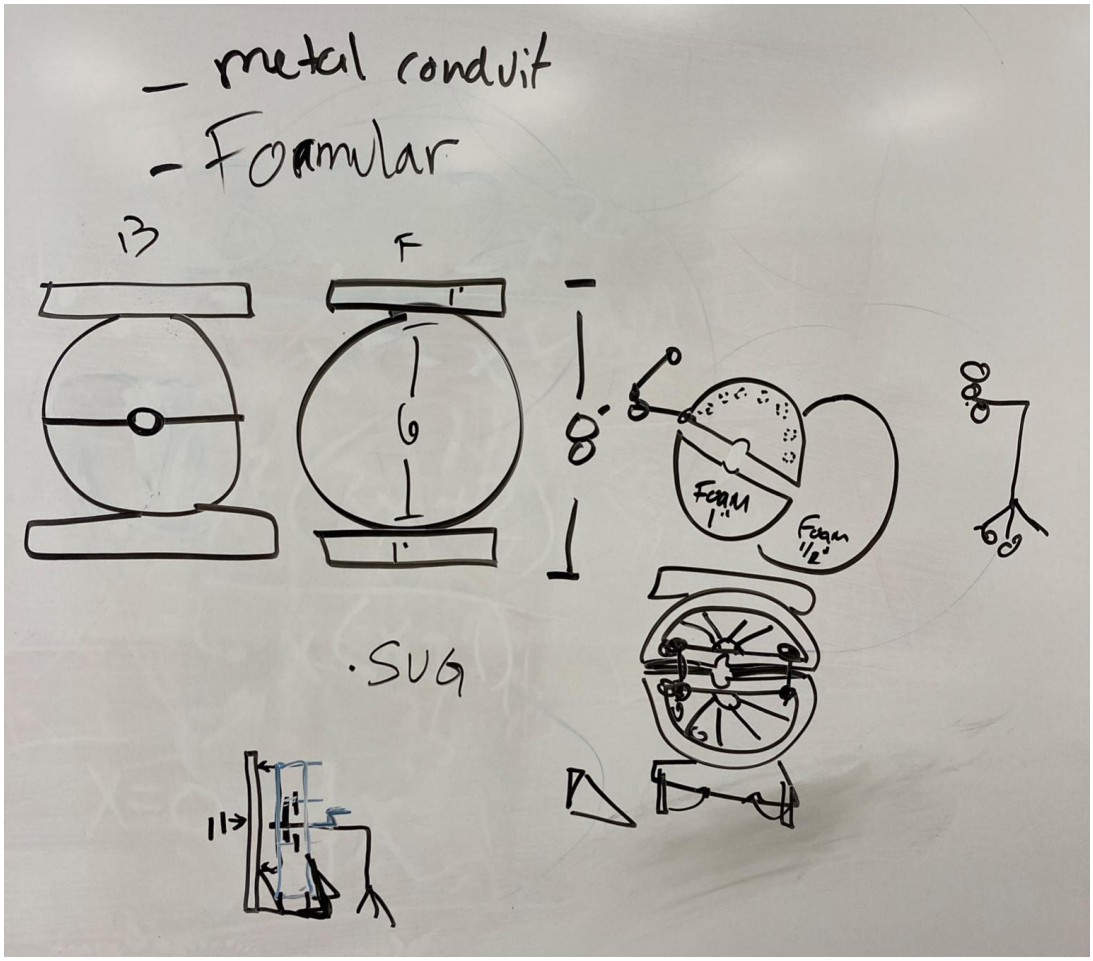




<-Click for Video

8/15/2022

Moved to Thursday 8/18/22. Today in John Kings 6th Period Tech. Theater class we will begin the discussion of how to build a portable, yet durable clock for the play. The main talking points will be: Scale, Materials, and Portability.



Stephens students will be tasked with the following build challenges:

1. Build a housing to hold gears in place
2. Design and construction of bracing for Foamular clock face front
3. Design and wiring of LED Strips for Clock Number Illumination.

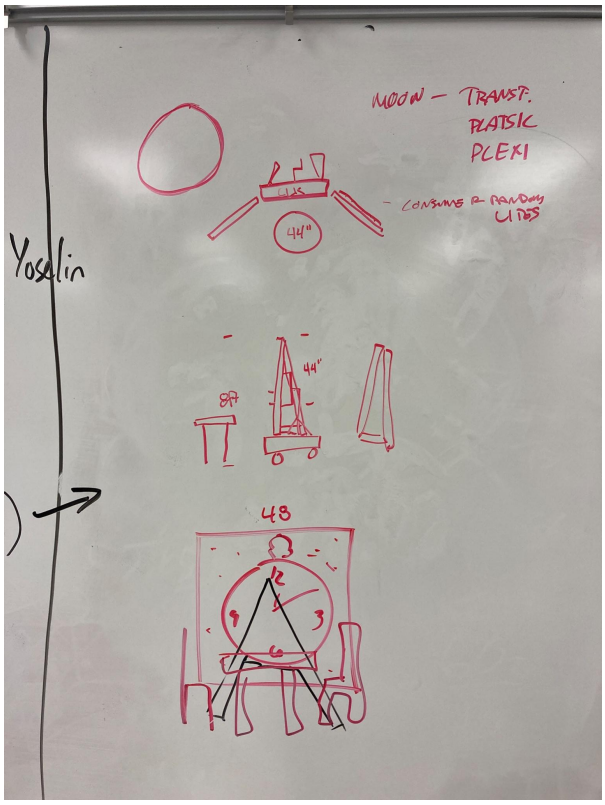
Friday 8/19/22

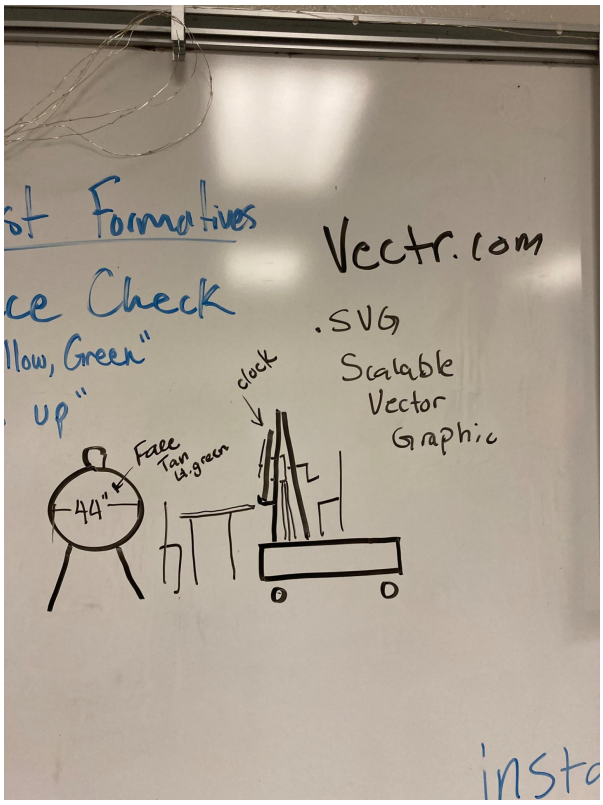
Met with Mr. Cochran and updated him on John Kings requests for the Clock Design.

Meadow Creek Adv. Theater students Joshua Avelez and Joshua Hernandez will be the lead students designing the clock face. I have introduced Vectr.com, a free online Vector graphics program and provided a few resources with key search terms (‘Art Deco, Deco, Radium, Font, dafaont.com’) in order to start their research. This will allow the students to create an .SVG (Scalable Vector Graphic) in order to provide Mr. Cochran’s class a file format to cut the clock face from.

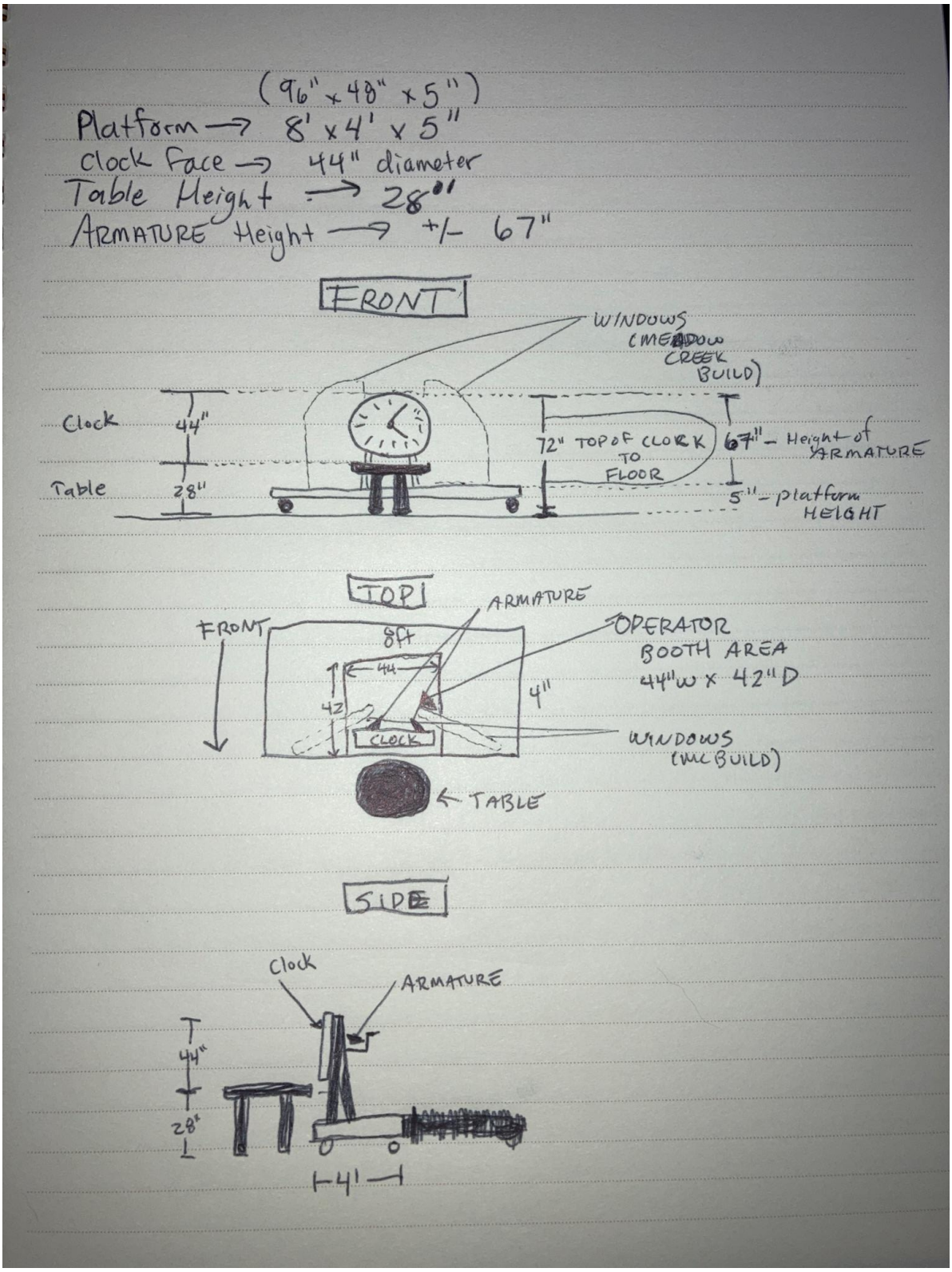
The clock design will resemble a pocket watch and will sit upon a rigid A Frame style structure to support the clock face. Mechanical gear box set currently imagined to sit inside A-Frame structure.

Clock Face - 44’’ across, made from Foamular Insulation Foam. Designed by Meadow Creek Advances Drama students and fabricated/engineered by Paul Dukes Mechatronics 3 Class.

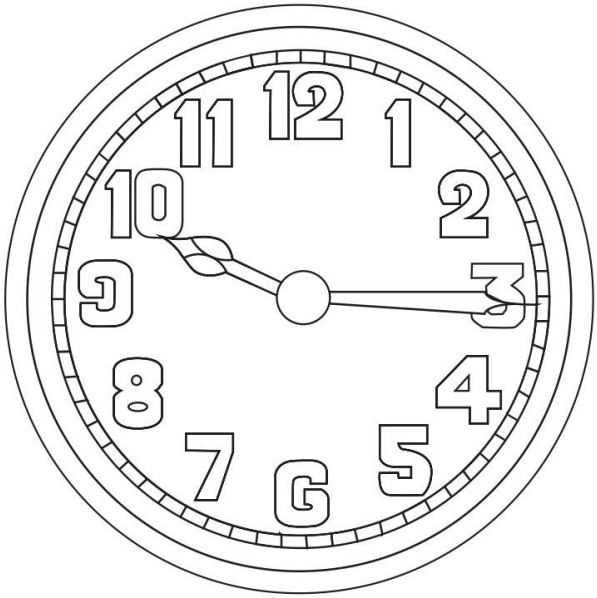




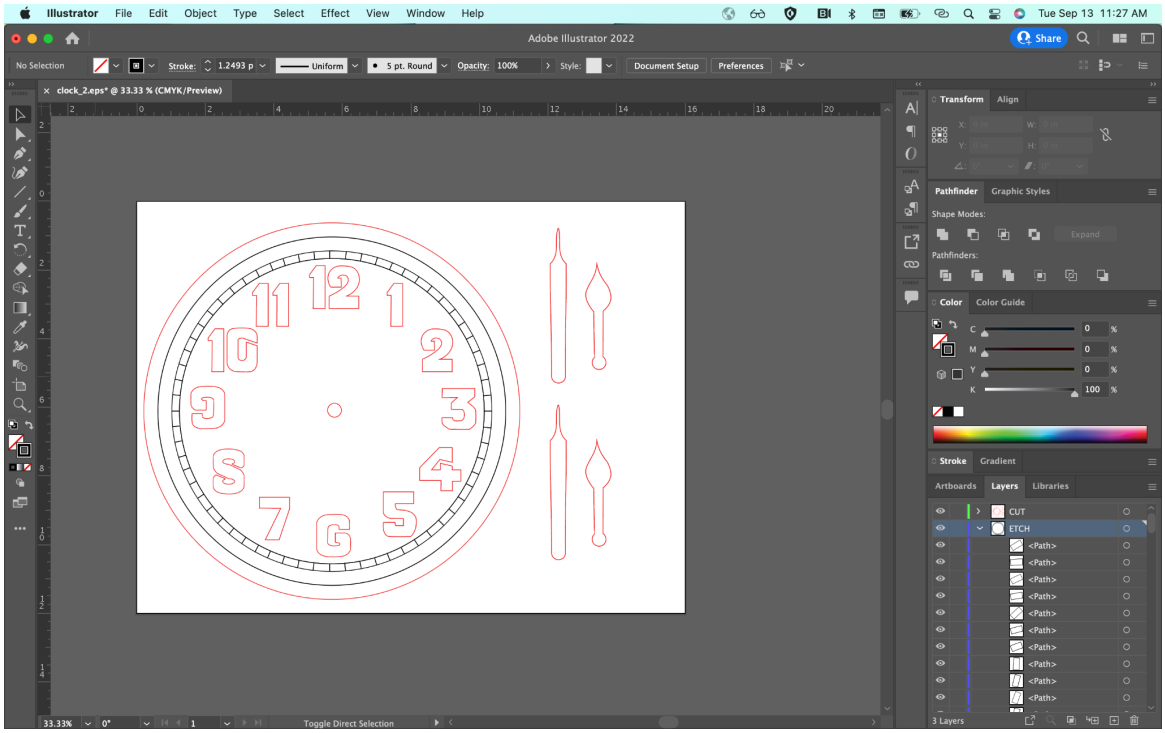
9/6/2022 - Met with Meadow Creek Adv. Theater students and finalized the measurements for the stage objects. Continued working on the final clock face design.



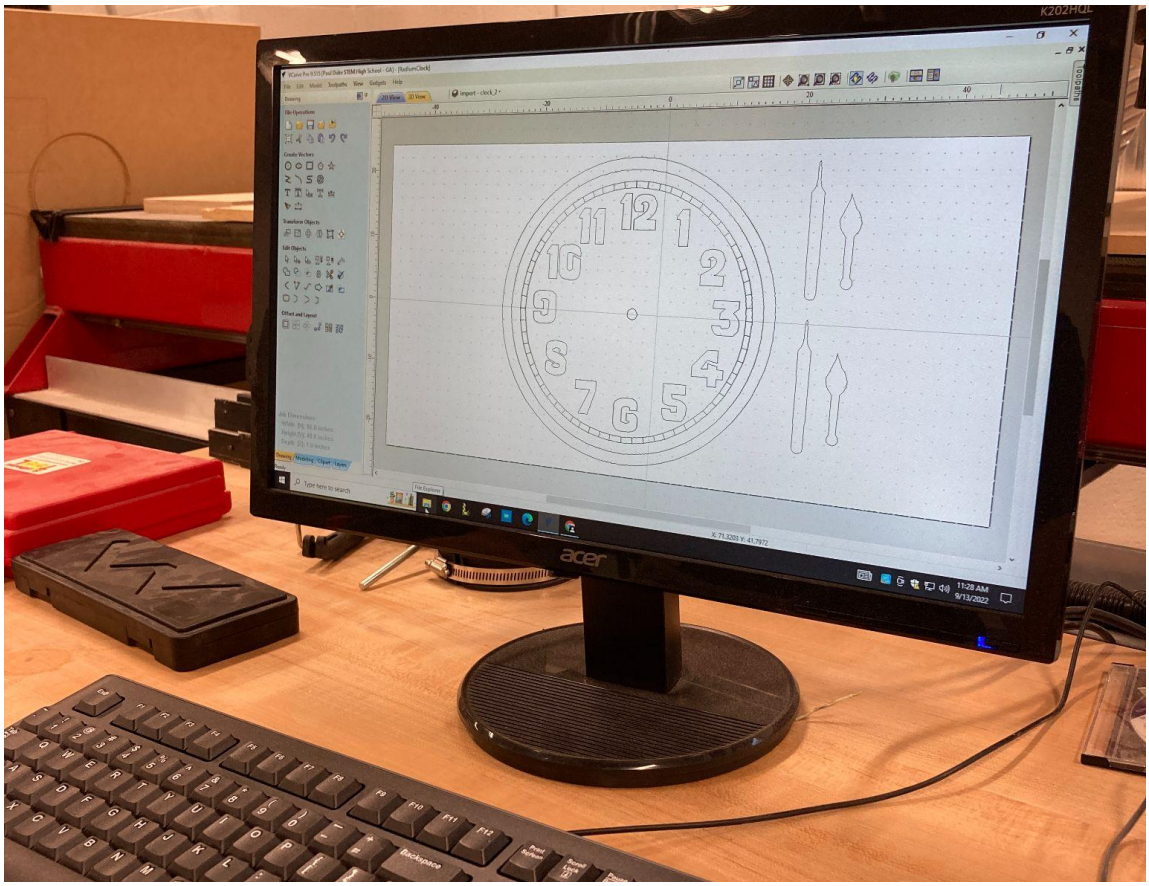
9/8/22 - Received the digital image file from Meadow Creek Theater students. The software they used was **Vectr**(www.vectr.com), a FREE web based Vector based illustration program used to make drawings and illustrations.

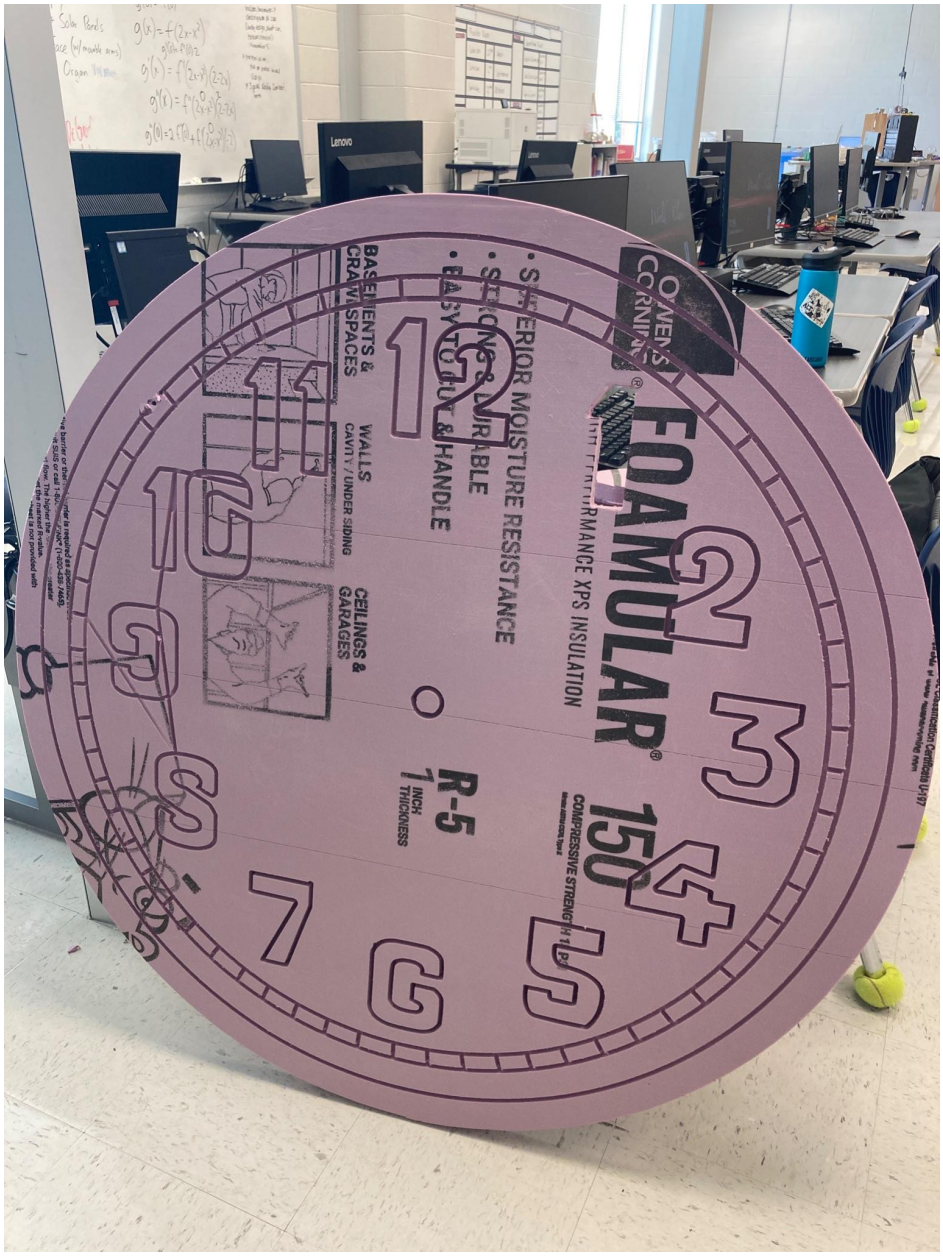


9/13/22 - Finalized the drawing in Adobe Illustrator for Mr. Cochran. In the drawing below, the red lines are for CUTTING and the black lines are for ETCHING. Our aim is to provide some detailing from the original watch design into the foam clock face. Using a combination of CUTTING and ETCHING approaches will allow us to have a fully formed clock face.

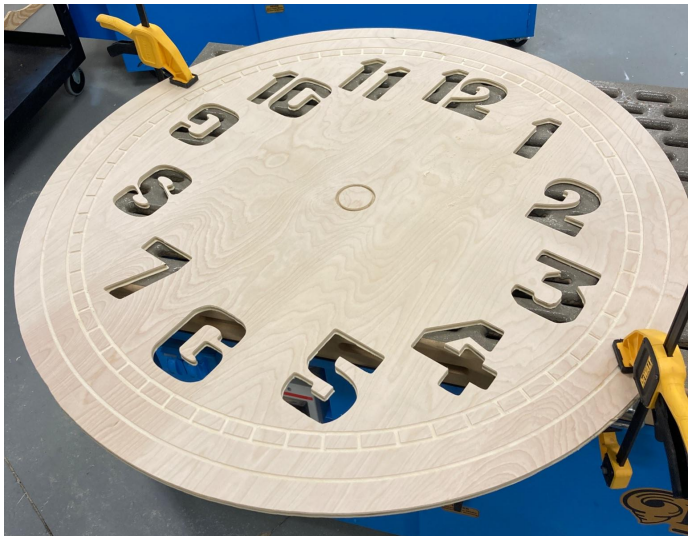


From here, we exported the Adobe Illustrator file as a **.eps** file (Encapsulated Post-Script) format. We originally tried to use an **.svg** (Scaleable Vector Graphic) file format, but ran into some issues of numbers and lines that were missing.
Here Mr. Cochran is setting up the file to control his CNC machine using VCarve Pro.





This was the first clock face cut out of Foamular. The scale was correct however there were a few issues with the file used to cut the shape out.

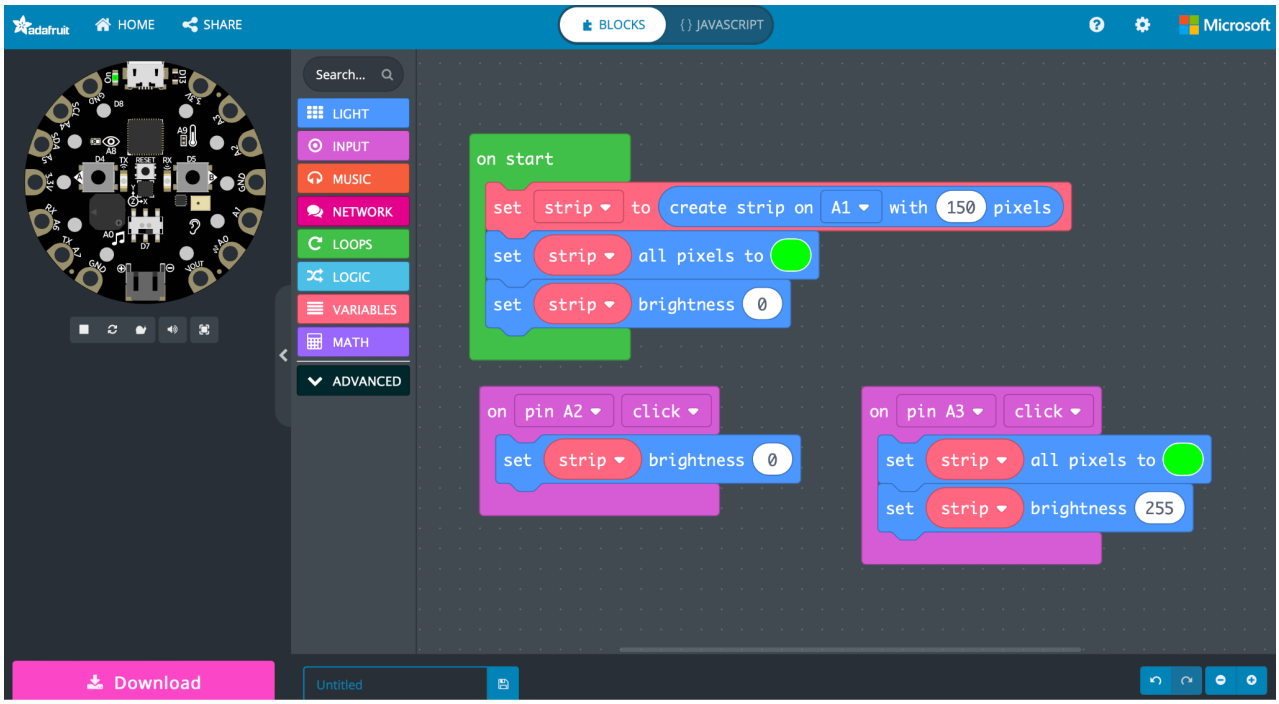


Mr. Cochran and I decided to use ¼” thich sanded plywood. The Foamular seemed a bit too fragile for the scale we needed. The final results were much better than the Foamular version.


Once the clock face was brought to Meadowcreek High, the students painted the clock details with black paint surrounding the outer perimeter of the clock. We also began to set the Neopixel LEDS onto the back of the clock face for illumination.

The NeoPixel LED strip was powered using The Circuit Playground Express (CPX) microcontroller. Additionally, we used The CRICKIT for Circuit Playground. The CRICKIT gives users physical inputs to apply Neopixel LED Strips, Servo Motors, Solenoid motors, and more. The addition of the CRICKIT also brings a 5V 2Amp power supply to power the 144 Neopixel LEDS.

To code the Neopixels, we used [Adafruit MakeCode](). Below is the code we used:



We decided to use a separate controller box to cue the lights, instead of using the CPX's on board "A and B Buttons".

Breakdown of code:

On Start (This code is ran once as the CPX is booted up)

Set strip to create strip on [A1] with 150 pixels (The CPX with CRICKIT is automatically connected to Analog Input 1, A1)

Set Strip all pixels to [GREEN]. This set all LEDs to GREEN on the STRIP That we set up in the previous line.

Set Strip brightness to [0]. This sets the BRIGHTNESS of STRIP to 0, so it doesn't Show any color when booted up.

On PIN A2 click (only executes when pin A2 is clicked) - OFF Command

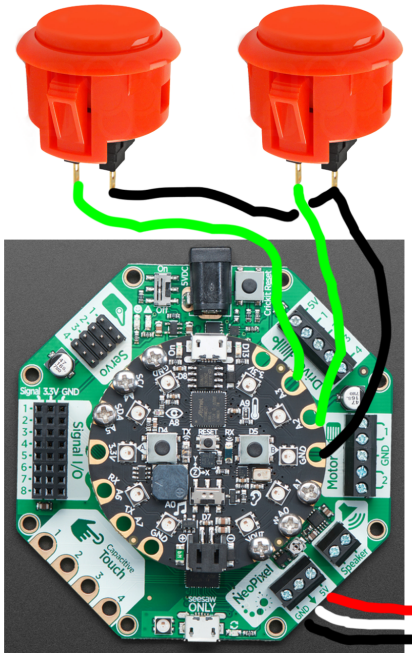
Set Strip brightness to [0]. This sets the BRIGHTNESS of STRIP to 0.

On PIN A3 click (only executes when pin A3 is clicked) - ON Command

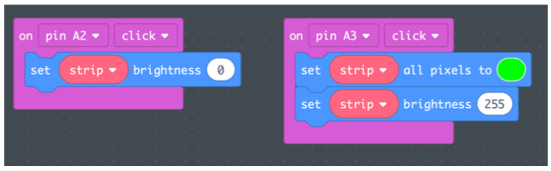
Set Strip brightness to [255]. This sets the BRIGHTNESS of STRIP to 255, the highest value of brightness.

Set Strip all pixels to [GREEN]. This set all LEDs to GREEN on the STRIP That we set up in the previous line.

Controller Button Wiring Diagram:



The GREEN wires are connected to pin A2 & A3. The BLACK wire is connected to each button and Ground (GND). When the button is pressed it will execute the code as its written.

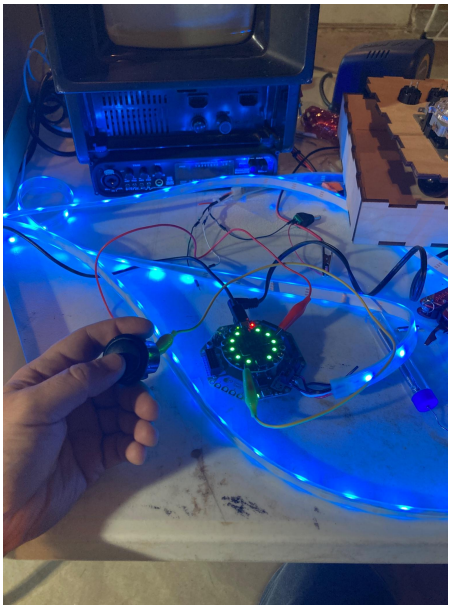


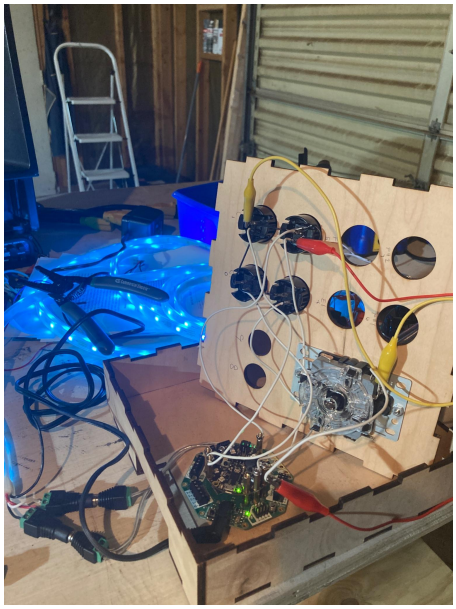
Using the Neopixel, we connect the RED wire to 5V, white wire to DATA, and the BLACK wire to GND.

NeoPixel

I also used an old project from my personal studio to make an ON/OFF controller for the clock LEDS. The idea behind this was to house the The Circuit Playground Express (CPX) and CRICKIT for Circuit Playground inside the wooden controller, rather than on the clock itself. This way the LEDS could be triggered ON/OFF away from the clock itself.

To connect the Neopixel LEDs to the The Circuit Playground Express (CPX) and CRICKIT for Circuit Playground, we use the onboard Neopixel connectors.

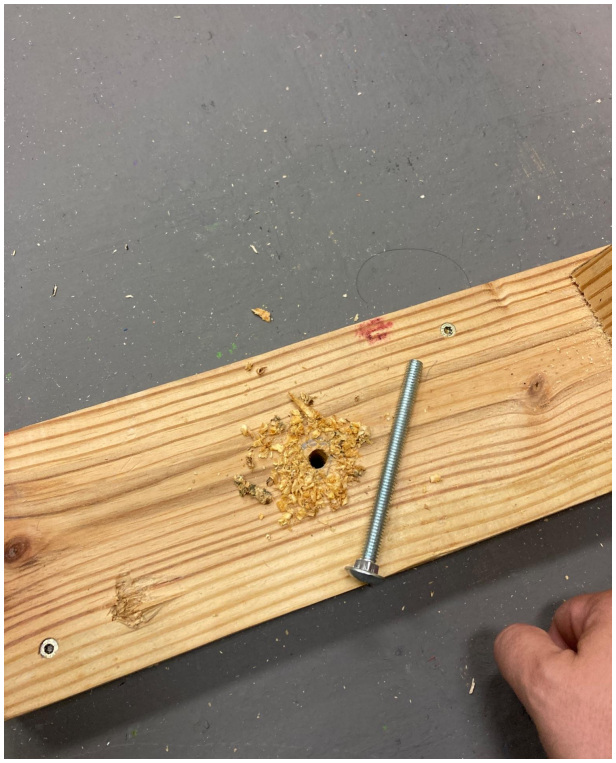




We then attached a second piece to ¼” plywood to the back. This second piece was covered with translucent poster board. The positioning of this translucent poster board allowed the LED lights to reflect off the posterboard and provide a clean and consistent glow for the clock numbers.

The nails from the electrical ties allowed the backing piece to sit directly onto the LEDS without additional pressure/damage. From here, we pre-drilled holes to add final screws to attach the backing board to the clock face.

Once the clock was put together, we built some stands for the clock to rest on.

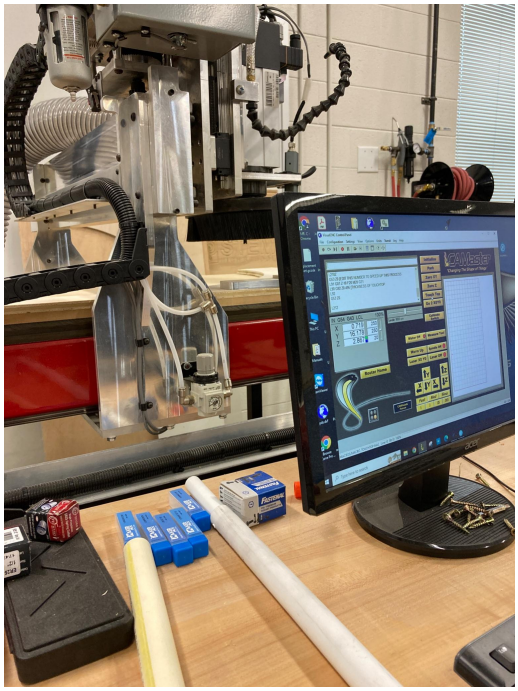


Here we used ⅝’’ x 4” threaded bolts with washers and lug nuts to secure the windows and clock stand to the platform. They were originally attached using screws, but we decided the modify the make the setup/breakdown for their One Act Competition play move faster.

These ⅝’’ x 4” bolts were drilled through the clock stands and into the 4’x8’ platform (grey). Mr. King provided the main platform (grey) and we used scrap pieces of wood from his shop to build the remainder of the set, mainly the window frames and clock stand.

The back of the clock has two 5/8’’ holes which will seat onto the 5/8’’ bolt attached to the clock stands.

We then painted the front of the clock face to match the original color from the reference photograph. Above is an in-process shot on the Meadowcreek stage.



Here Mr. Cochran and I made measurements of the PVC pipe used to allow the clock hands to move independently of each other. We used the CNC machine to cut out custom sized holes to dry fit the clock hands onto the PVC without using glue.
(insert image explaining the PCV interaction)

Here the students are painting the remaining parts of the set black to make sure they aren't a distraction visual during the plays performance. I also attached this piece of wood to act as a backing board while i drill out the proper sized hole through the front of the clock face.

Here is the back of the main staged clock and windows platform.