

## Engineering Machine Design Challenge

### The Circle Team

#### Day one : legos

We worked for a day on building lego mechanics as an example on how the real things work. So far, we have built the second and the third version of the lever.



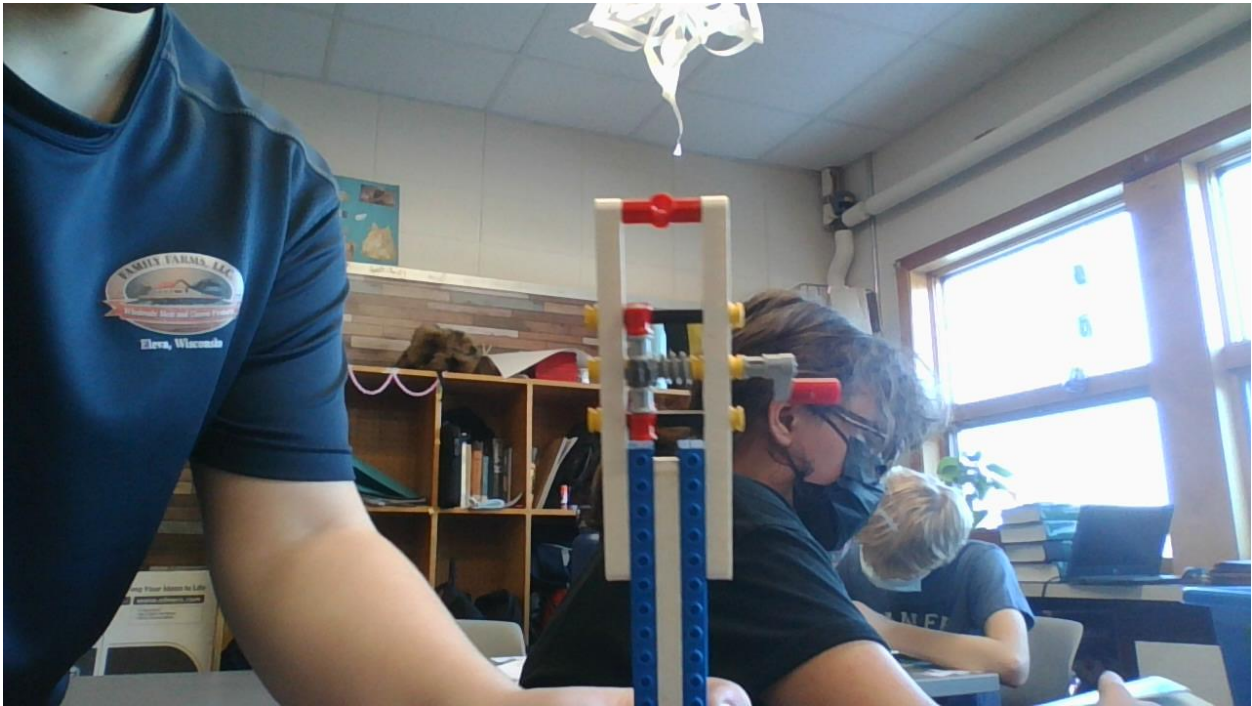
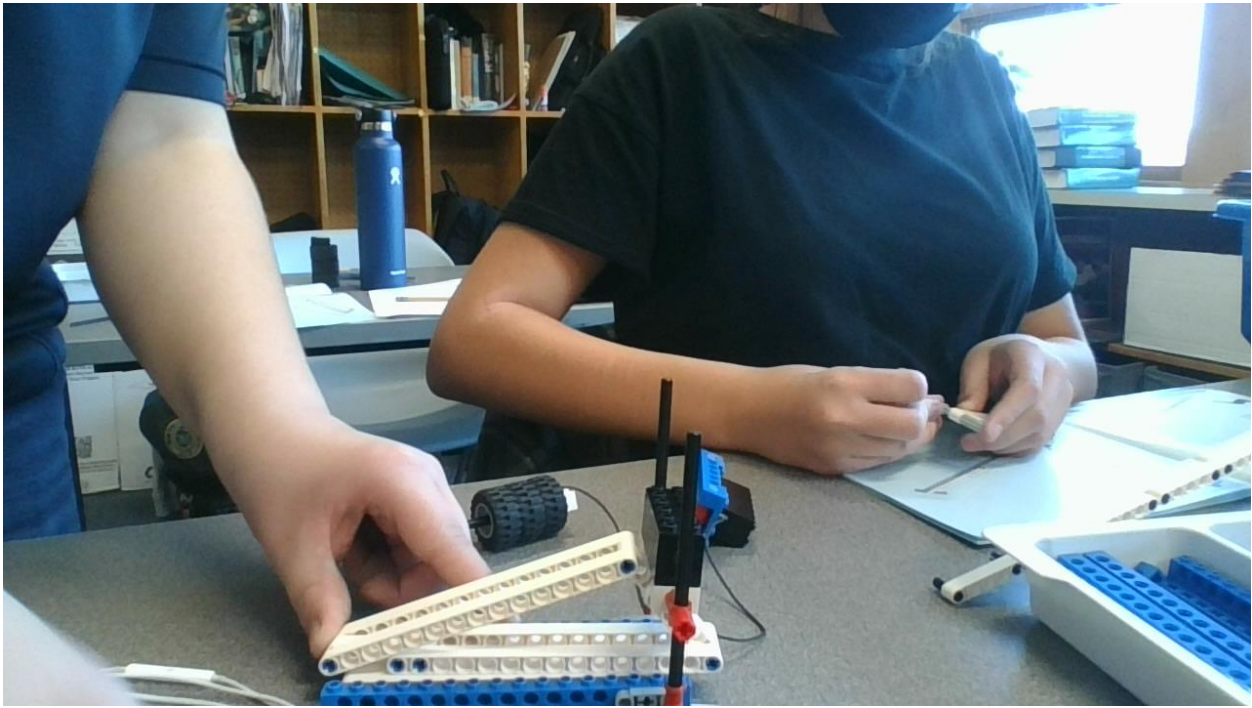


Day two:

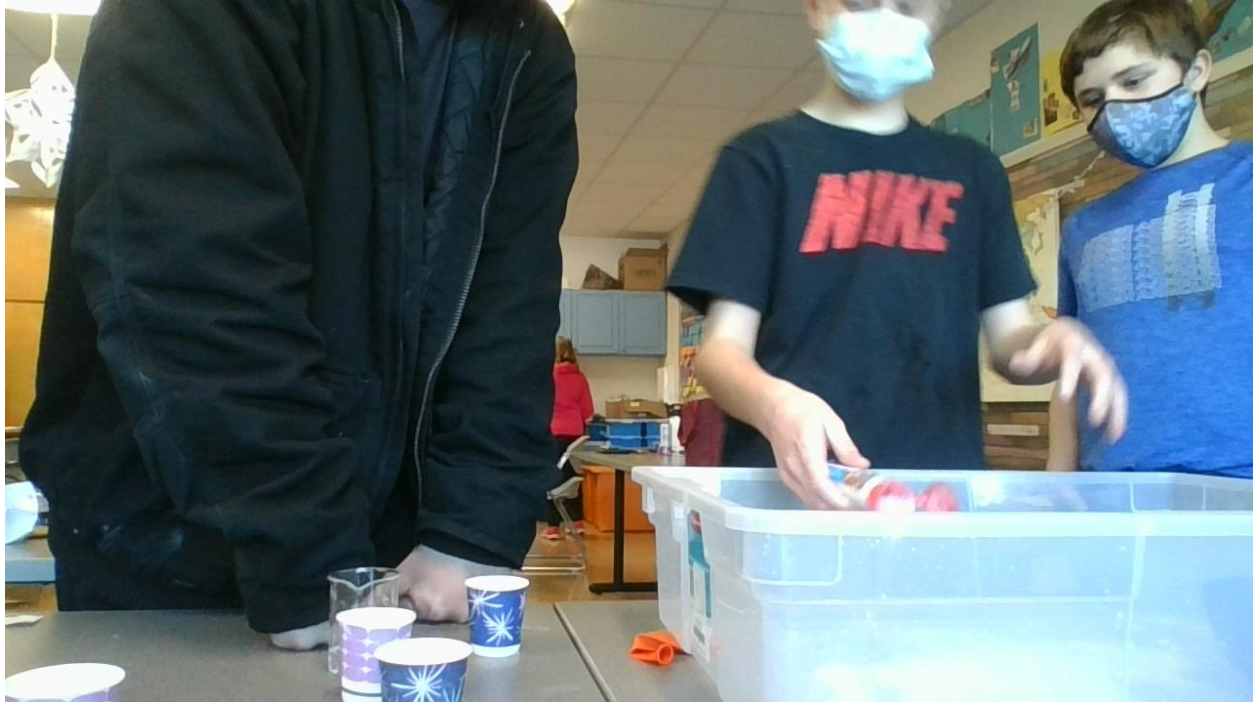
We continued to build simple machines today. We built a few different types of pulleys.



Day three: we continued to build examples of simple machines.



Day four: we're doing chemical things today. We tried putting baking soda and vinegar in a mm mini container. When we put the tip on and shook it, the top blew off. Then we put more baking soda and less vinegar in the m&m mini tube, and did the same thing. This time, it exploded all over Quin. We added some corn starch later on.



Day five: We are using 20 mL of vinegar, we are putting that in an M&M tube, we are also using 10 mL of baking soda with no seal on the cap.

It is also an almost instant reaction.

20 ML baking soda 20 ML vinegar makes a longer reaction.

10 ml of vinegar and 5 mil of baking soda makes a dry explosion.



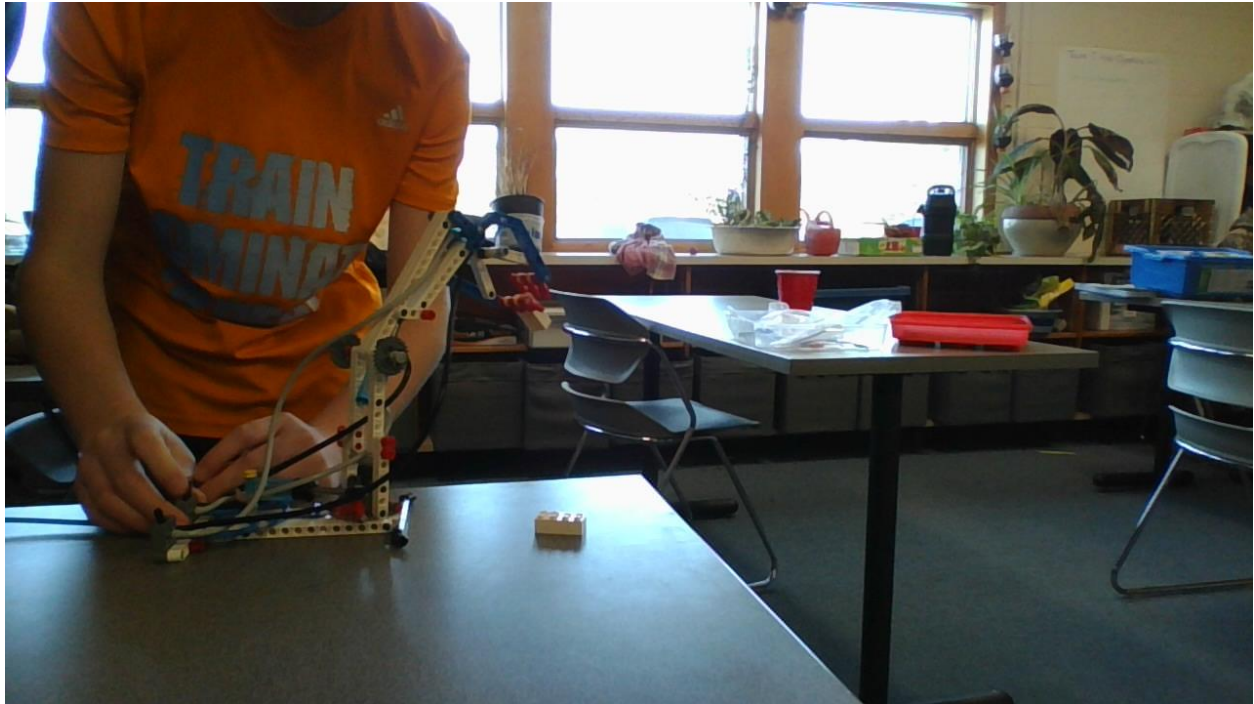
Day six: we continued to work on our chemical things. Me and Carson also started to work on the design for our product. We had a few ideas from dinosaur fossil fuel, and school.

Day seven: 20 mil baking soda and 40 mil of white vinegar is our recipe so far for the volcano. We worked out more of a plan.

Day eight: we worked on hydraulics, and we built some lego things.



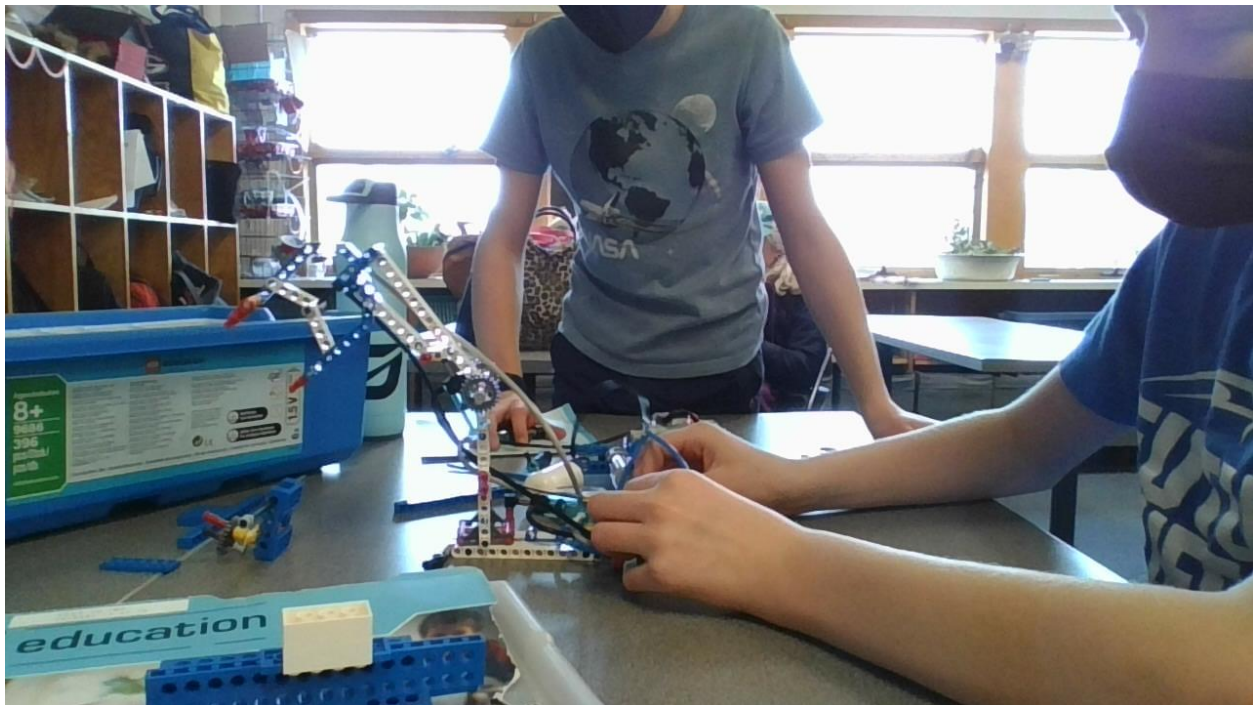
Day nine: we continued to work on hydraulics legos to learn more about how they work.



Here's Quin with the claw he built.

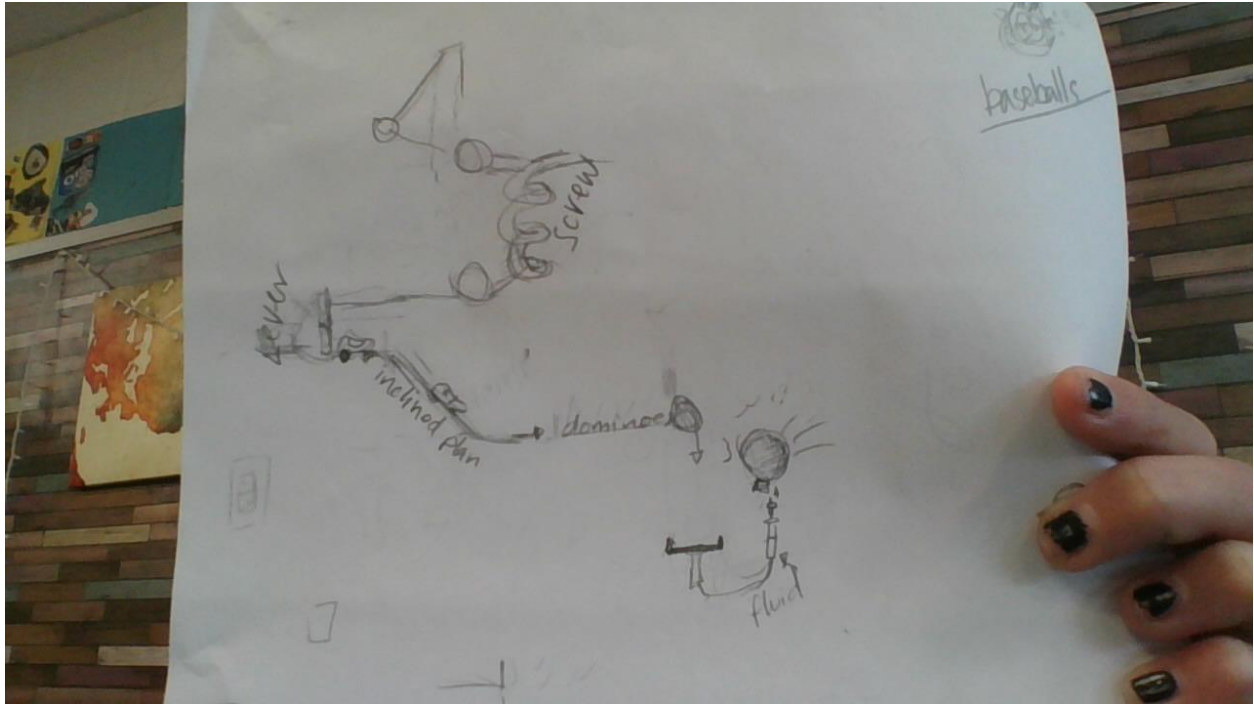
Day ten: today we worked with more hydraulics and did a little more planning for our design incorporating them. We don't think that we are going to use a chemical component like we thought at the beginning, so a lot of that was a waste of time then.

Day eleven: we continued to work on our machine. We focused on how to make a balloon pop with a pulley and a nematics system.



Day twelve: today we started to experiment with snap circuits. Carson and Quin were not with us today, because they were busy.

Day thirteen: here is the almost complete design of our machine.



First, we have someone release the ball that hits the other ball, and pushes it down the screw. At the end, it heads down the ramp to the lever, which when hit, pushes the car forward. The car heads down the ramp and into the dominoes, which pushes the last ball onto the syringe that go up. Then a tack on the syringe pops the balloon.

Day fourteen: we started to build our project, and here are some of the things that we started.





This is our original ball for the first step, but we don't think that it will work well, so we might change it.

Day fifteen: we continued to work on assembling our machine.

Day sixteen: we worked some more on our machine, and we got the screw/first step to work. We also finally got our balloons here, and finished up the dominoes part, so we are on our way to completing this, hopefully.

This is our machine so far.



Right now we have the first step, where we release the ball, and then the screw type step is the tube right below it. We hit the marble off of a ledge there, and it goes down into the funnel at the bottom.

Day seventeen: we continued to work on the machine while I started the script for our presentation.



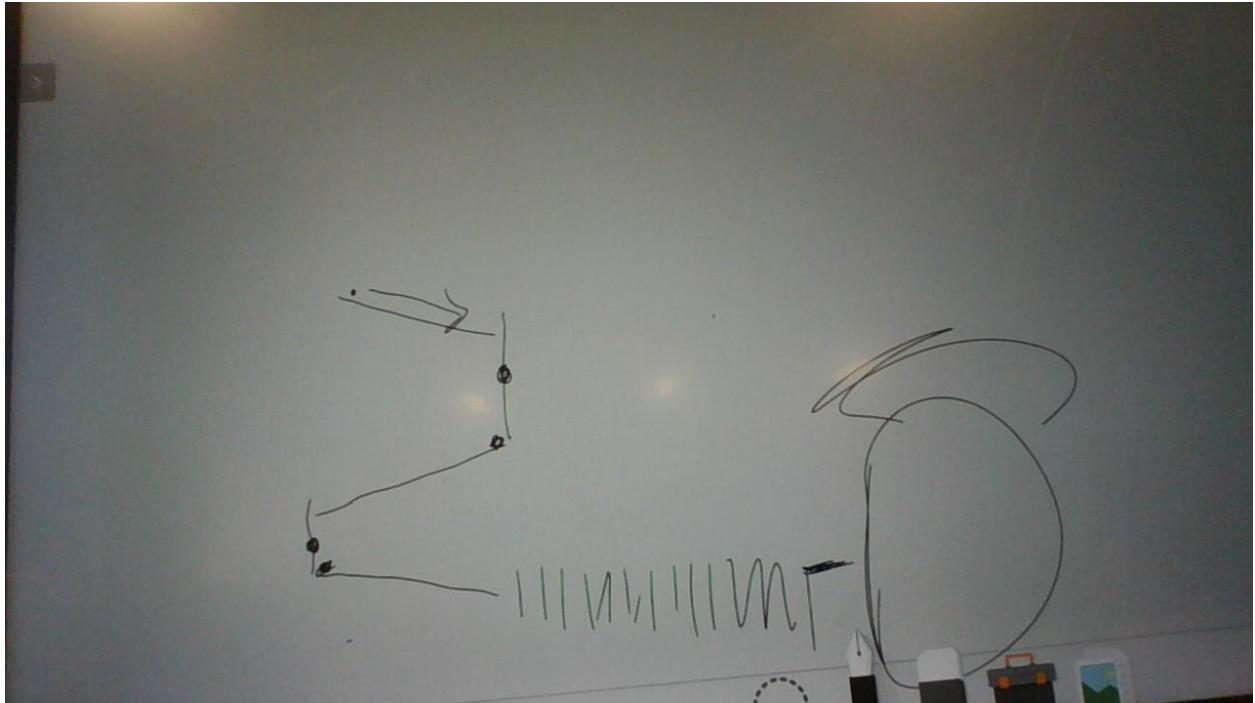
Final journal day: we had a longer work time today for our machine, and we had a few things to get done. I have been working on a draft for what we're going to say for our presentation, and Blake, Quin, and Carson are finishing up the machine. We strayed a bit from the original plan, but we are coming along. Here is the picture of our final machine.



This is the lever, ramp, dominoes, and balloon. We changed it so the tack is on the last magnetic tile, and pops the balloon when it hits it. Our materials at this point are all recycled, except for the balloons. We used all old toys, and used cardboard and tools for the steps.

## Renovating our Machine: day one

We started making plans about what we wanted to change about our machine, and we started making plans. We would like to add another step, and change the base of our design. We got some wooden palettes to replace the cardboard, and we also started to think of an extra step to add. We also put our base structure palettes together. Here is a small design we made for a step we were going to have in our machine.



It is going to be like our ruler step, but we added more of them for more of a fun effect, and it will then trigger dominoes and pop the balloon.

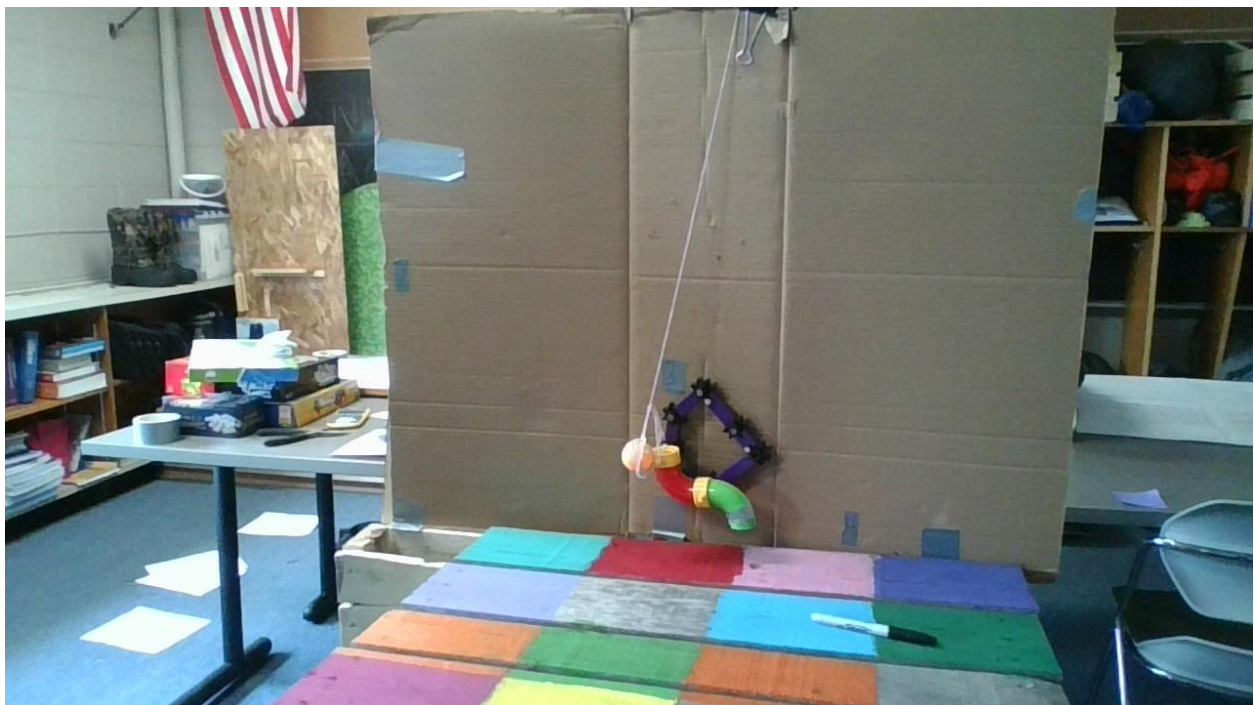
## Day Two:

We continued our building of the base, adding the structure to put the top of our machine on, and continued to progress with the building. We put up our top piece, and drilled holes for the funnel and for the ramp.



This is our machine so far. We have another piece to go on top of the pallets, but it isn't on there yet.

Day Four: we are keeping up our painting and decorating. We added a total 12 new colors, and we are hoping that we could finish painting the squares.



This is our Top half as we have not done much to the bottom half just yet

Day Five: we finished up the painting and fixing up lines today. We also brought in several materials we need, like marbles, and barbies to help with our decoration and scenery.

Day Six:

We started to stencil the letters onto our rug piece.

We also started making some details for our backboard on the top of the 1st half



Day Seven: we worked on painting more of the neighborhood house scene, and we continued to try and get all of our steps on and working.

Day Eight: we continued to put more of our pieces on the machine, and now we are adding some new pieces that we didn't have last time. We also discussed the topic of adding more complicated things to the machine, but with little time left, we remain mainly against adding many super complicated steps.





Day Nine: we finished our levers for the middle part of our machine, and we are making the steps for the domino stairs. We also did more with the decoration part, we painted the first part of the brick wall, and started to put the paper up for the bottom part's decoration.

Day Ten: we finished up the steps for the domino stairs, and the formatting for our last few steps.



We also continued with painting, finishing the bricks, the street scene, and starting the classroom. We tried testing things, but our machine wouldn't pop the balloon

Day Twelve: We finished the painting for the top piece classroom, and the painting for the bottom piece. We now have to put the pieces back together.



This is our machine as of right now, and we have the whole base thing basically assembled except for the dominos and magnet tiles.

Day 13: today we did a lot of test runs, and contemplated whether or not we should have the domino ladder step, and we figured that if we couldn't get it to work by 11:30 am today, that we should scrap the idea and go back to our original design, but on our new machine.

We have somewhat of a plan to improve one step of our machine tomorrow, but otherwise, here is our final machine.



Not all of the dominos are set up, but you get the idea.

#### Reflection:

Overall, we think that this has been a fun time, and a really great learning experience for our team. We learned a lot about STEM, and the engineering design process, and how to work as a team.

When we first started, we didn't know much about the engineering design process, so we did a lot of winging it, and figuring out what we wanted to do with our machine as we went along, constantly changing our plans. But now that we have had the chance to fix

up our machine, it went way smoother. We did everything more efficiently, and it was all more concrete than before. We followed the process better the second time, and I think that taught us even more than the first time did, and we had more ideas.

Building this Rube Goldberg machine also taught us more about how to work as a team than we knew before. We had to communicate very well with each other, so everyone was on the same page of what we were doing. Even though we have had conflicts of interest over the time, we eventually worked it out and compromised.

It was very hard to make our machine, but we did and we are happy to be here today.

Word Count for Journal: 1565 we