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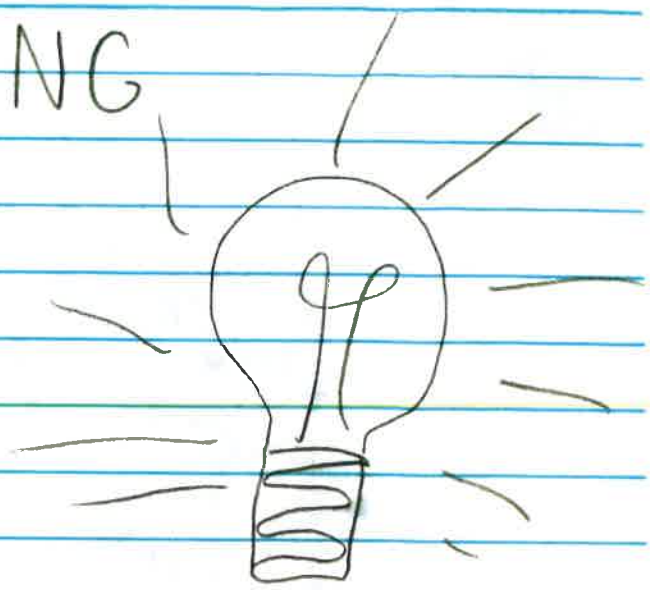
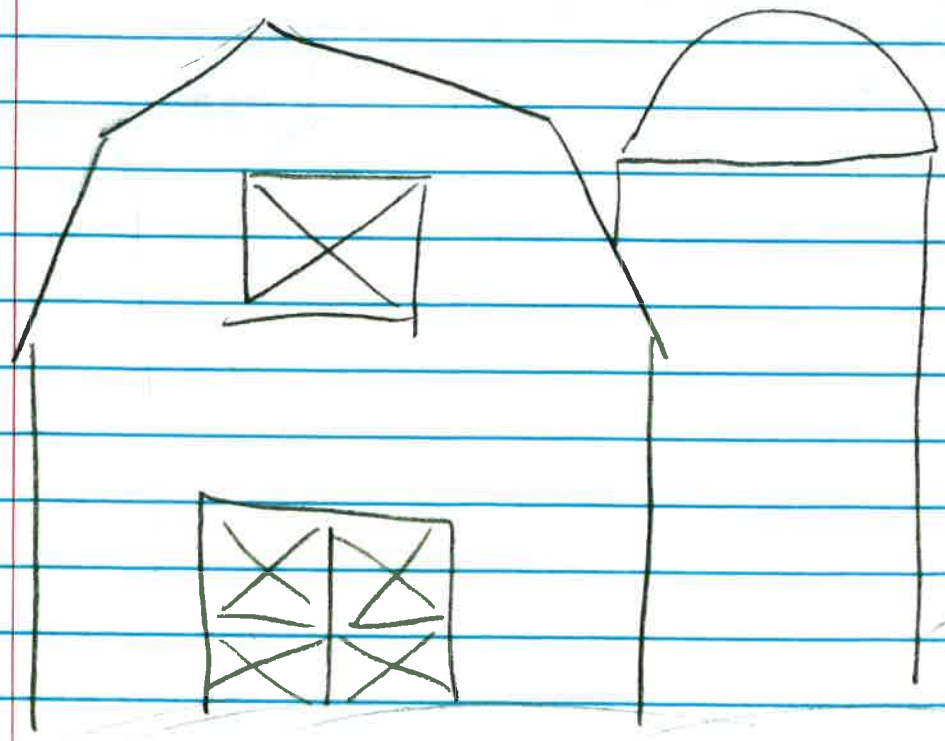
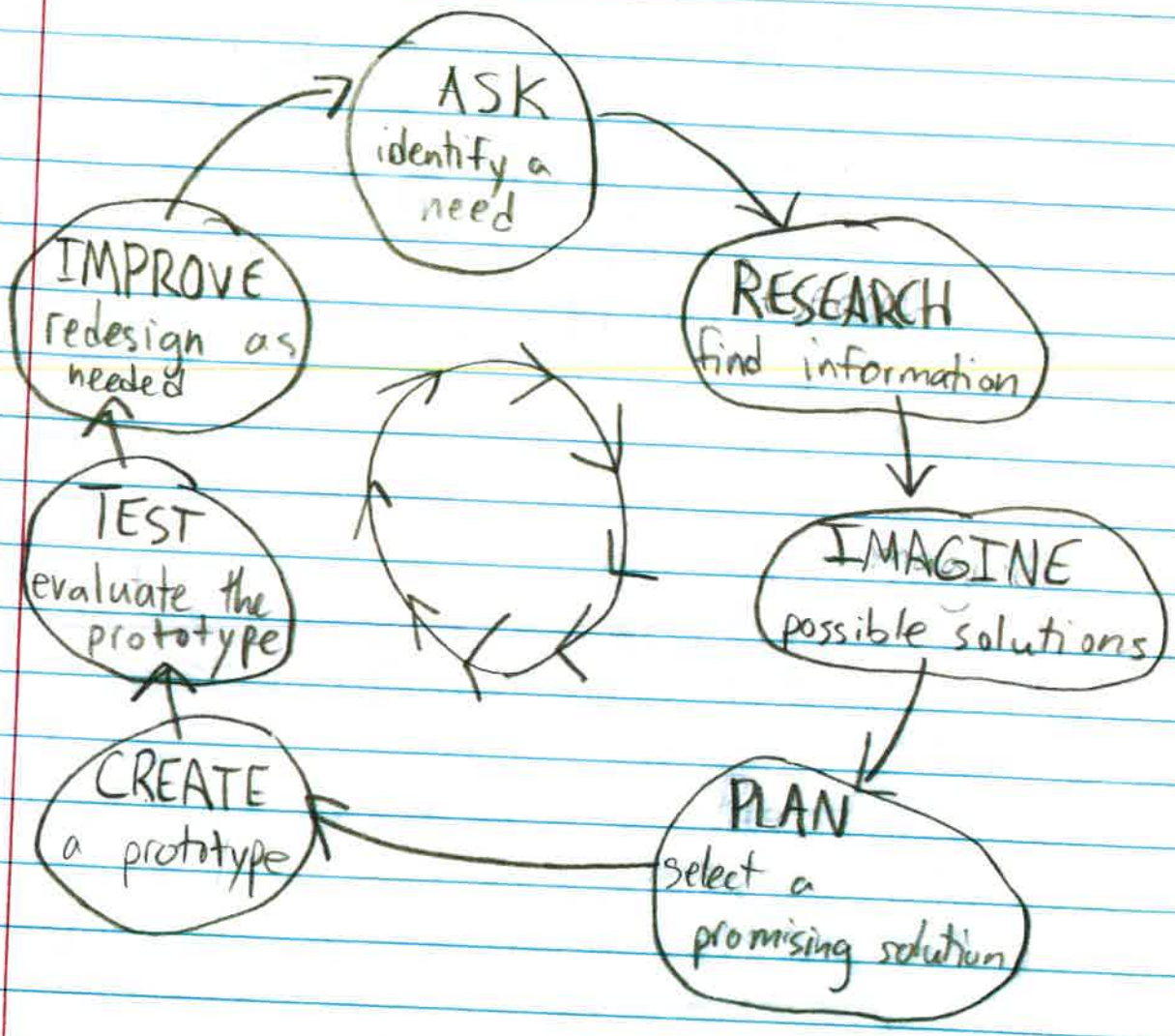
ENGINEERING DESIGN CONTEST



Team Milk Science



Engineering Design Process



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Science Journal

Our team name is Milk Science. We have four people in our group. Clare, Claire, Brody, and Savannah.

Today we worked on the structure. We tried to used peg board for one of sides but it wasn't strong enough.

Today we continued to work on the structure.

We are reinforcing the sides with 2x4s. We have been using 2 inch and 2½ inch screws.

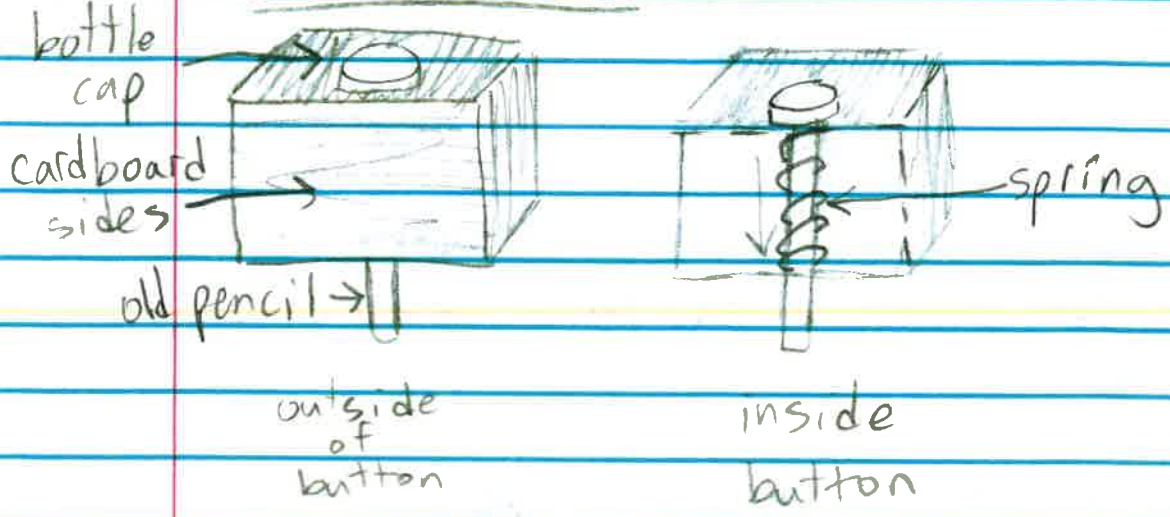
Today we worked on making the structure more sturdy.

Today we worked on making a swinging piece.

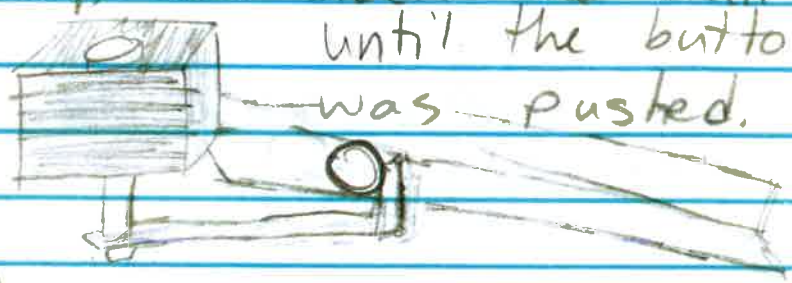
1-24-22

Today we are still working on the swinging piece. Brody also brought in our button for step number 1.

Button Sketch

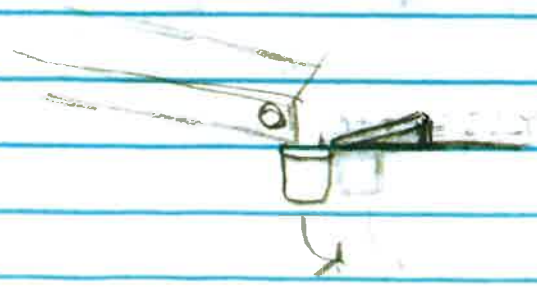


We will try to attach a popsicle stick to the bottom of the pencil, and then another popsicle stick could stick up into our first ramp and block the ball until the button was pusted.



1-25-22

We are using a cup to catch the ball once it is on the swinging piece



Story

At 5am the rooster crows. Then the farm wakes up and Bobatha gets out of bed. It is summer and the plants are thirsty. The animals get up and go about their daily buisness. Then the pig gets out of its pen and knocks the fence over. That causes the rooster to get scared and hop into a trailer. The trailer than rolled down the hill. That causes a chicken to fly up and over to the sheep. The sheep runs over to Bobatha's farm train and gives it a push. The farm train starts rolling! The farm train goes down a hill which starts the watering machine. Lastly it waters the plants.

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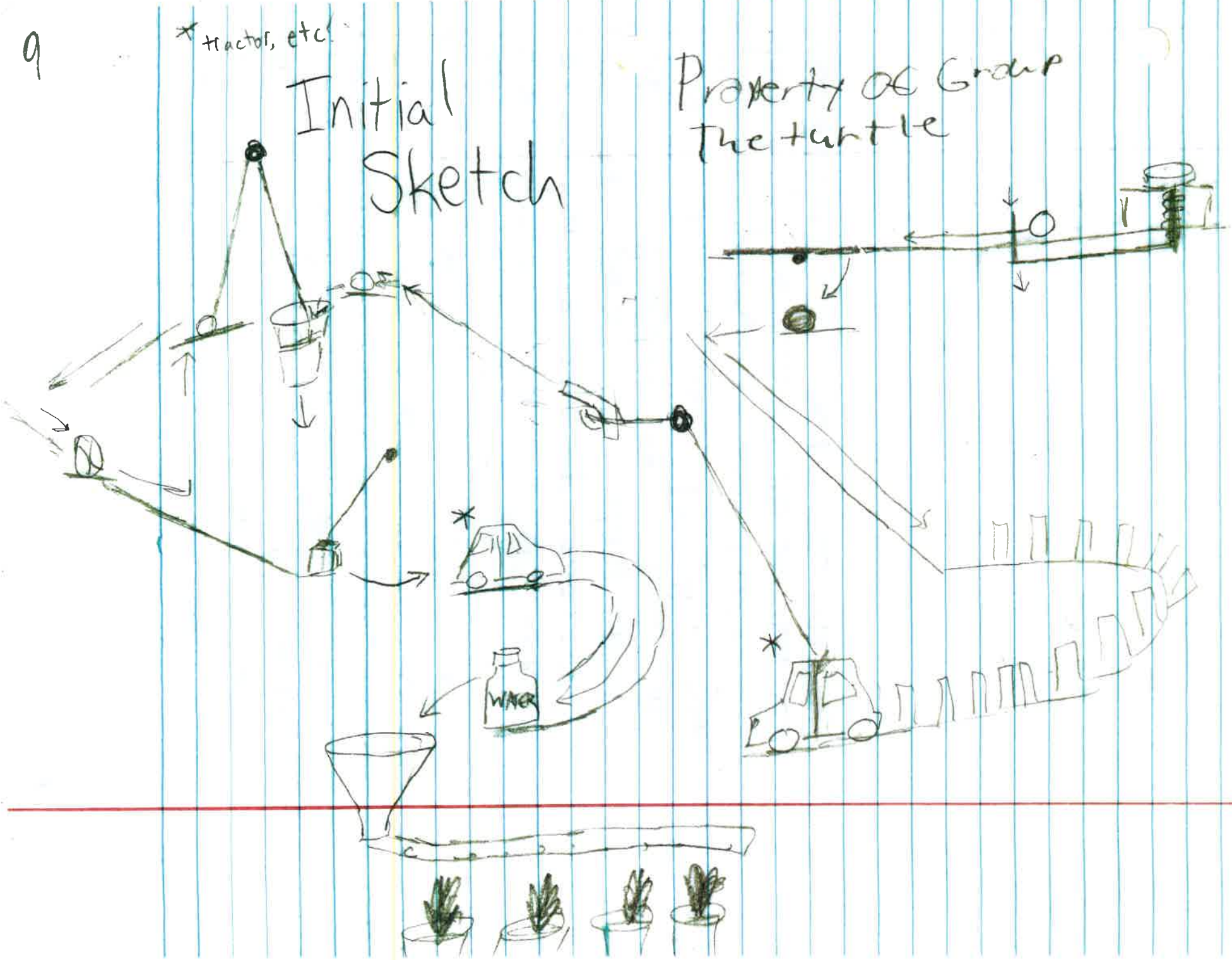
Initial Sketch

Property of Group The turtle



Challenges and Progress

The cup was going to swing and hit the yarn but we had trouble getting it to roll so were using a golf ball.

1-27-22

Today we put the button on. We had trouble cutting a hole for the popsicle stick.

1-31-22

today we attoche another board beneath the golfball we will put the dominoes on that board. we are having trouble keeping the marble from

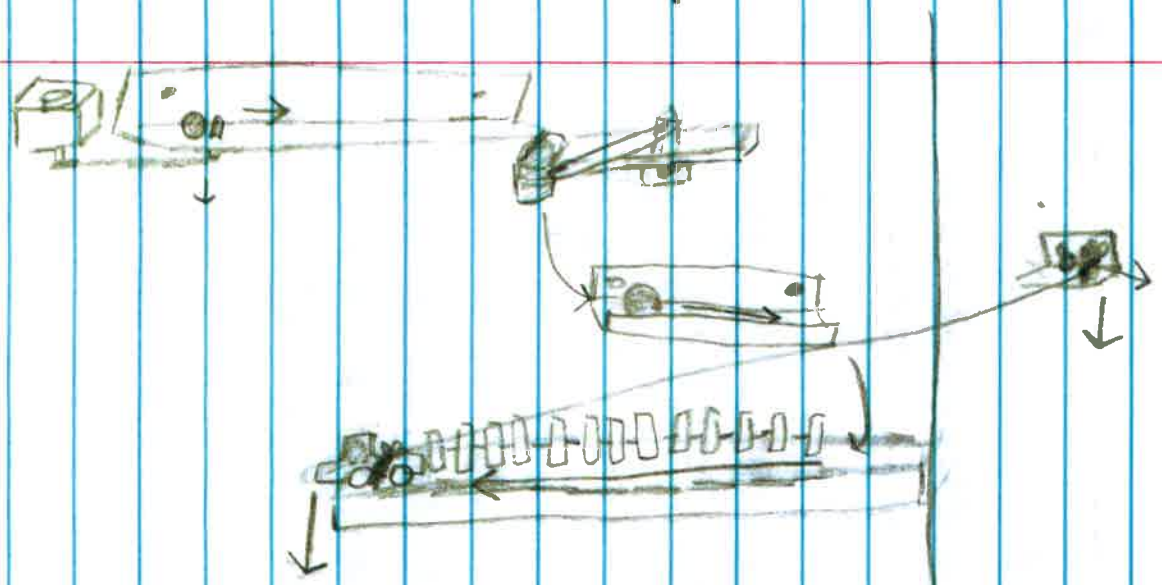
2-7-22

We made the board level so the dominoes wouldn't fall over when we put them up. Also we are going to use a different nerf gun.

2-8-22

We decided to not use a nerf gun. We put in a platform for when the tiger falls it pulls the string attached to a block of wood which will fall letting a ball roll.

First Steps of our Machine



Challenges and Successes

Today when making the structure we tried using peg board but it wasn't strong enough so we used plank board.

1-25-22

In step 2 we had trouble keeping the marble in the cup. We solved this by adding part of a popsicle stick on the cup.

1-26-22

In step 3 the cup was going to swing and hit the yarn ball causing it to roll, but the yarn ball wouldn't roll. We solved this by using a golf ball instead.

1-31-22

In step 4 the board with the dominoes we had slanted but the dominoes would just fall over. We solved this by making the board level. Also for step 5 we tried to use a nerf gun, but it wasn't working, so we tried a different nerf gun but it also wouldn't work. We solve this by using a tractor with a string attached, but we switched it with two dominoes hot glued together.

2-8-22

In step 6 when the dominoes fell and pulled the string which would pull the block but the block would fall in the cup. We solved this by putting a popsicle stick in front of the block.

2-14-22

We were having trouble finding the right weight to balance the pully in steps 6 and 7. We finally found the right weight when we used a rooster in a trailer.

2-23-22

In steps 6 and 7 the cup would knock the marble off the platform. We fixed this by adding a barrier in between the elevator.

2-28-22

In step 7 we were going to have the marble hit a haybale with sand in but the haybale wouldn't roll. So we decided to remove this step.

2-29-22

In step 8 we were going to use a cow but switched it with a pendulum. [illegible]

March 8-21

In step 9 we had a cardboad ramp for a tractor/car but that wasn't working. We then tried to use hot wheel track and a car. The problem with that was the pendulum wouldn't knock over the car. We solved all this by using a train track instead of a hot wheels track, a train instead of a car and a sheep instead of a pendulum.

Finalized List of Steps

1. It all starts when the rooster crows in the morning. The button goes down, and attached to the button are popsicle sticks that also go down. The popsicle sticks were protruding into a ramp, holding back a marble. When they go down, the marble is released. The marble is Bobatha the farmer, going to start the farm chores.
2. The marbles potential energy is converted to kinetic energy, and the marble falls into a cup. The cup, which is attached to a small board, swings down and hits the pig, a small golf ball.
3. Once the cup transfers its kinetic energy into the pig, the pig gets out and rolls down a small ramp. It falls of that ramp and onto another one, and knocks over the fence, which is our dominoes.
4. As each domino falls, it transfers its kinetic energy into the next domio, and so on . . . The last two dominoes are hot-glued together, and they fall off the edge of the shelf.
5. There is a string tied to the last two domioes, and the other end of the string is tied to a small wood piece that sits on a shelf on the other

List of Steps (continued)

side of the machine. When the last two dominoes are knocked over, the force of gravity pulls them downward. The string tied to the dominoes and the wood piece is yanked down by the dominoes and again, the force of gravity pulls the block downward.

6. In this step, the rooster gets scared of the fence falling over and hops in the trailer. When the wood piece falls, there is nothing to hold back the trailer. The trailer's potential energy is converted to kinetic energy as it rolls down the ramp and falls into a cup. Here we used a pulley system, which is an advanced component. As the cup goes down, its potential energy is converted into kinetic energy. The cup going down also causes the platform with the chicken to go up, gaining in potential energy.

7. The chicken flies up on the platform, until the edge of the platform makes contact with the edge of a shelf. The platform tilts, and the chicken is no longer balanced on the platform.

List of Steps (continued)

Gravity causes the chicken to roll off the platform onto the shelf.

8. The chicken loses its potential energy while gaining in kinetic energy as it goes down the ramp, falls off, and starts rolling down another incline plane. The chicken knocks into the sheep. The sheep has a string tied to it, with the other end of the string tied to a nail. When the chicken hits the sheep, the sheep swings off the shelf.

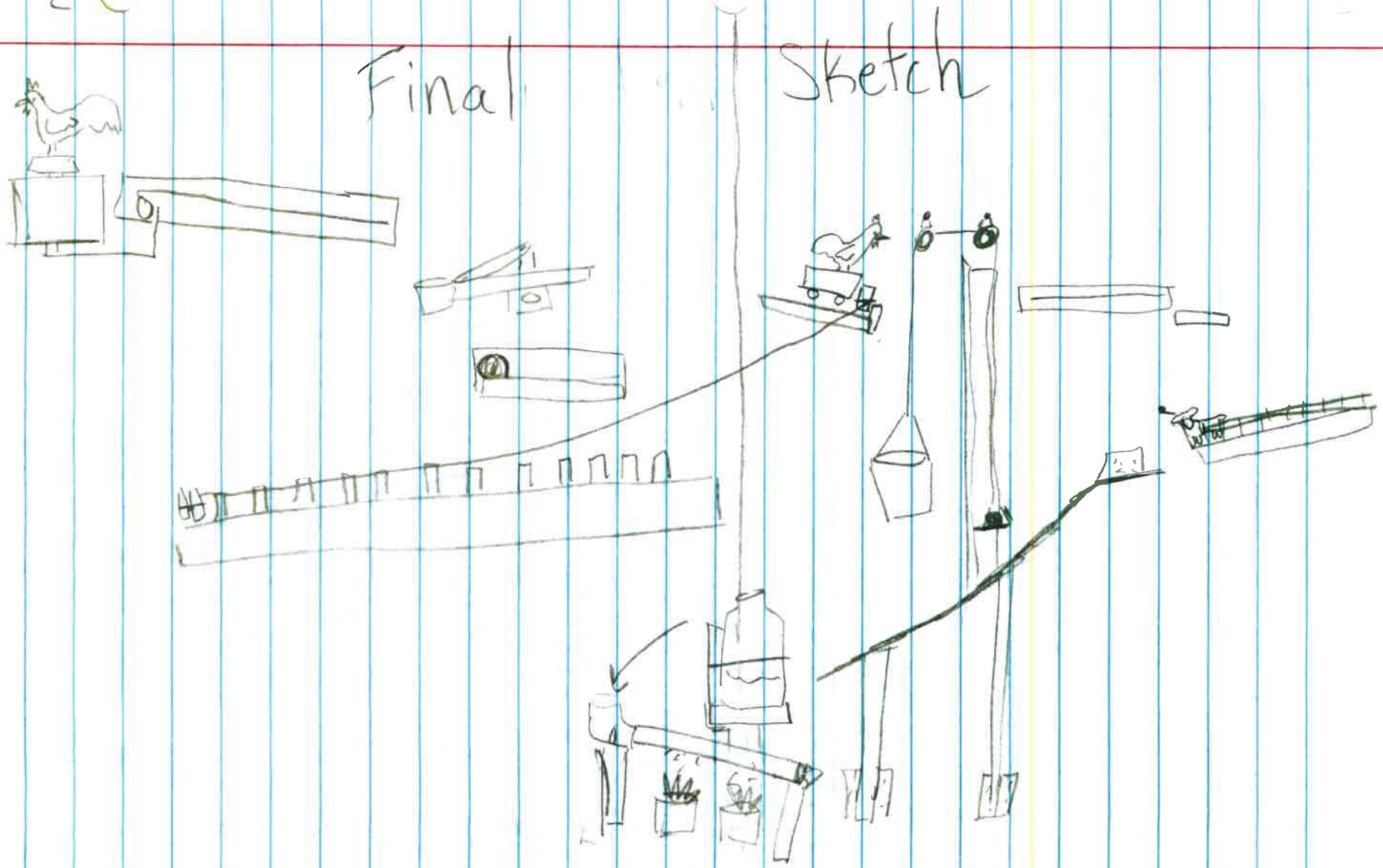
9. The sheep swings off the shelf and starts up the farm train. The farm train transfers potential energy to kinetic energy as it goes down the track.

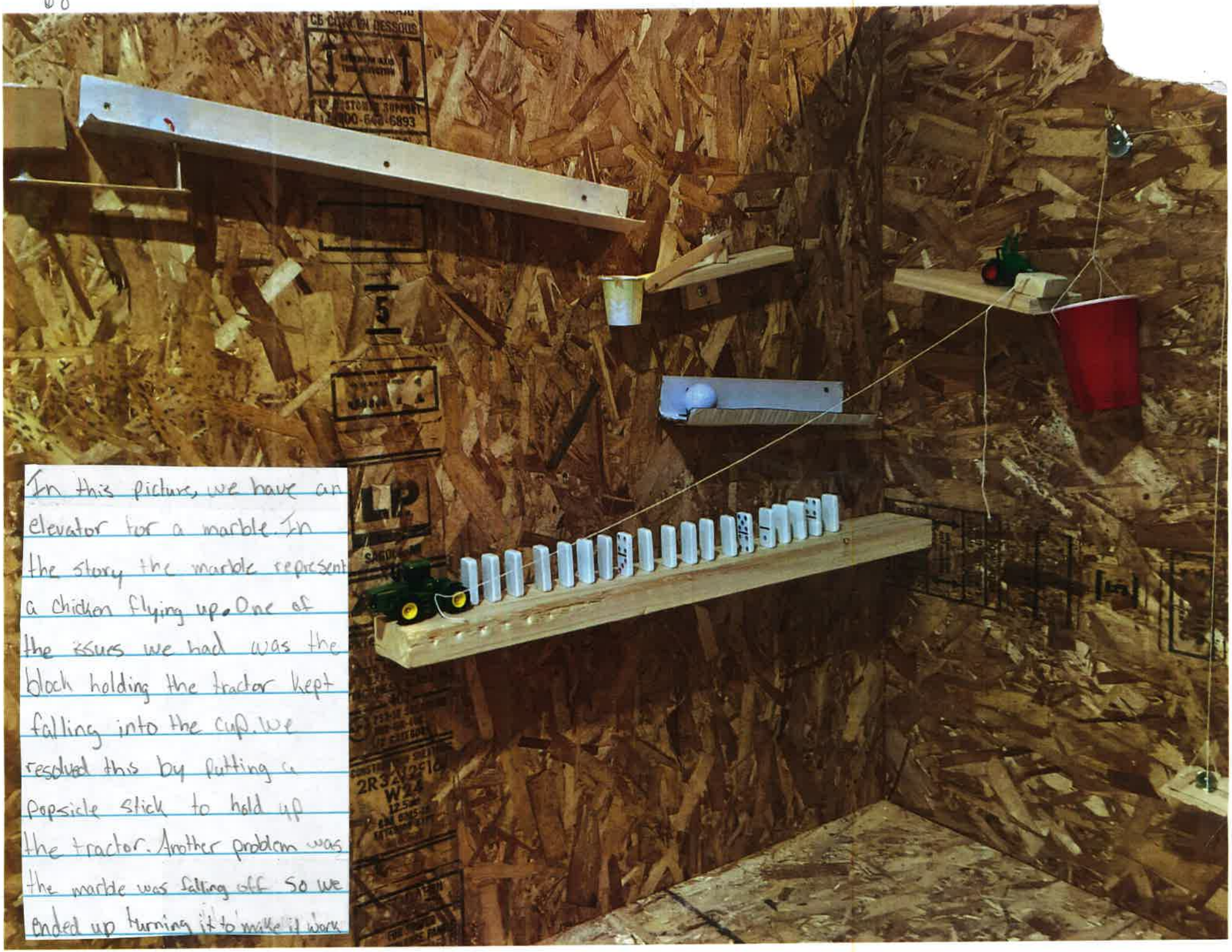
10. The farm train gains speed and hits the bottle. The bottle, which has a small amount of water in it, tips over as the force of gravity pulls it down. The mouth of the bottle lands in the curved PVC pipe.

11. The water in the bottle flows out of the bottle and into the PVC pipe. It drips out of holes in the bottom of the pipe and waters the plants.

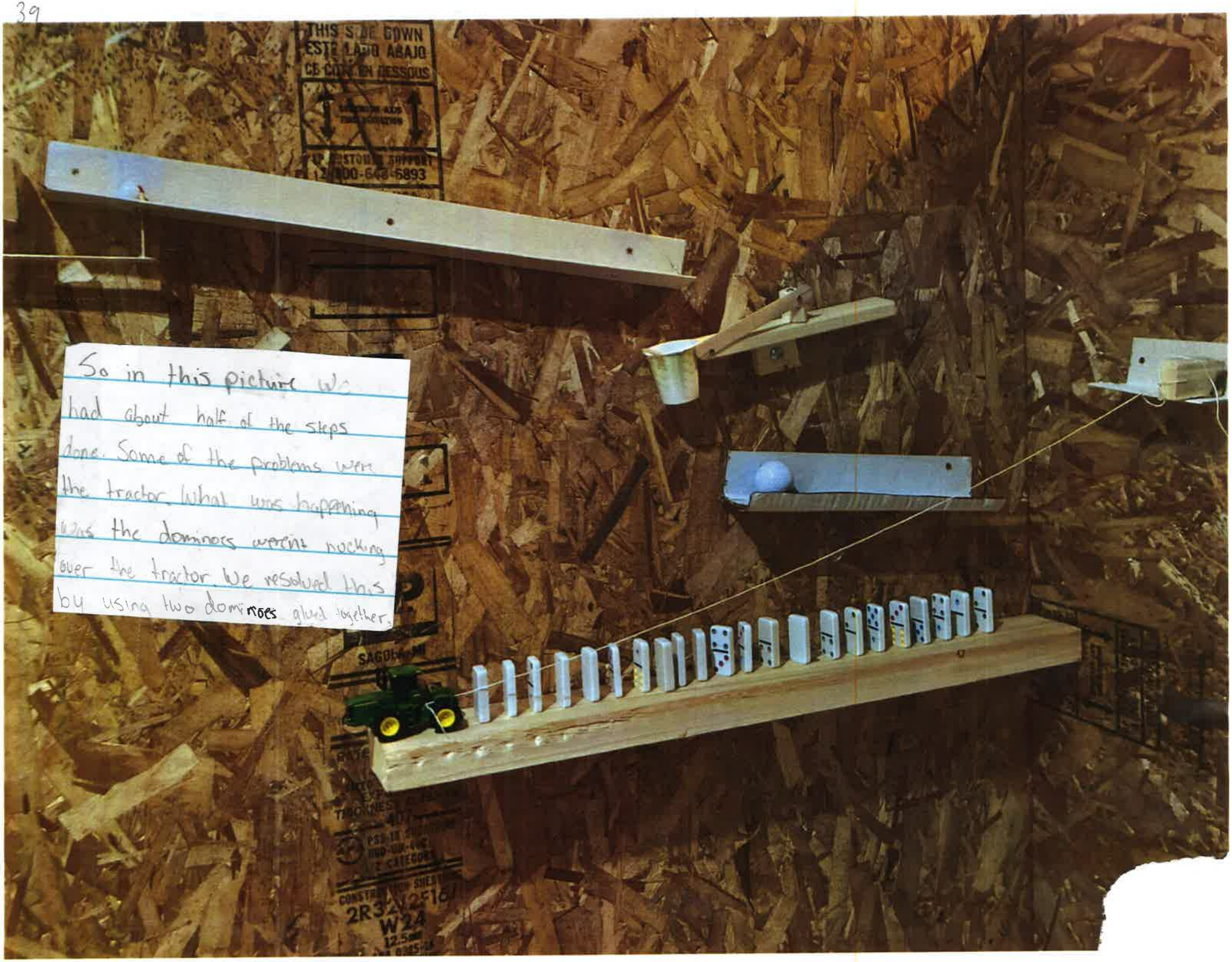
2 C

Final Sketch



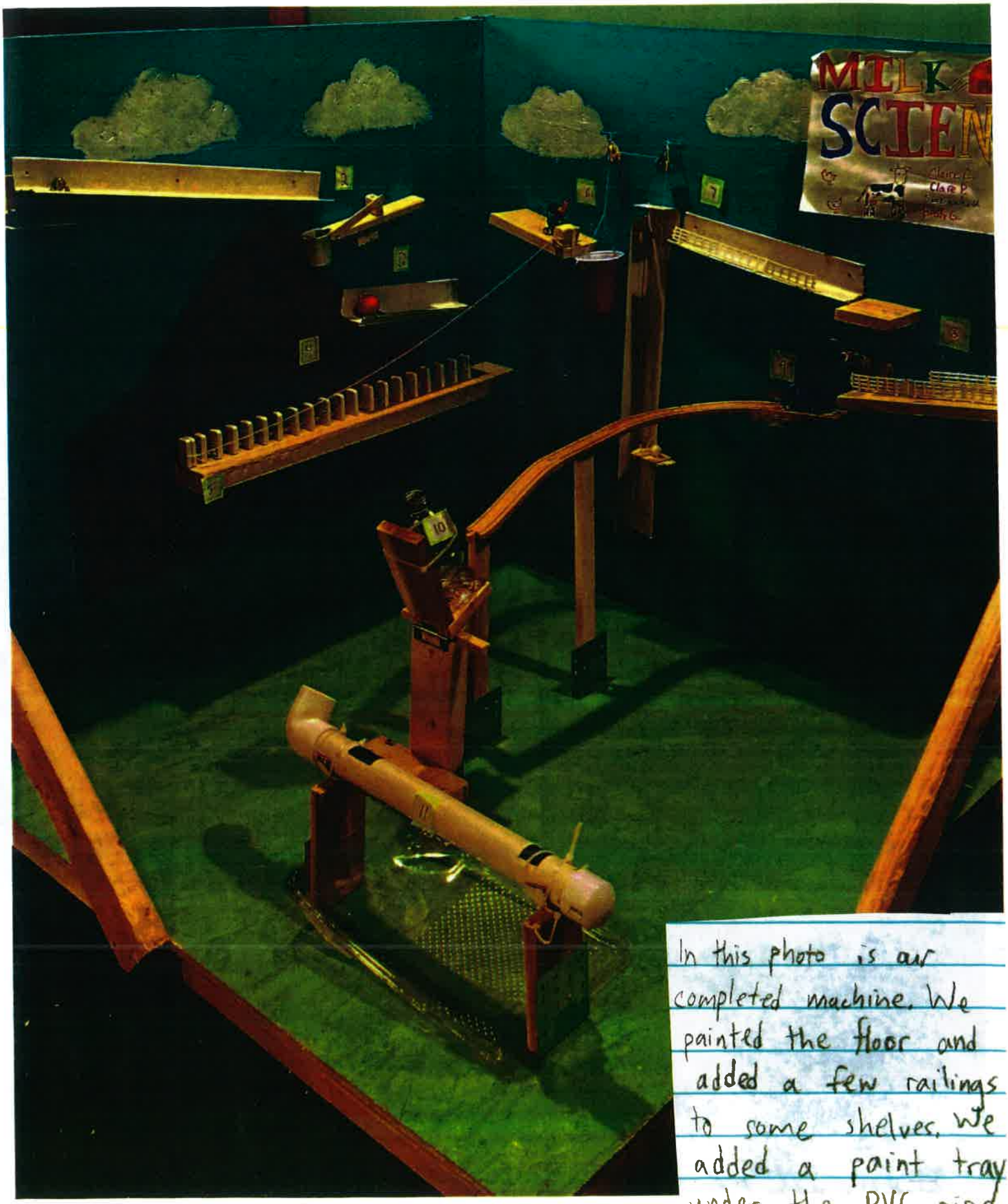


In this picture, we have an elevator for a marble. In the story the marble represent a chicken flying up. One of the issues we had was the block holding the tractor kept falling into the cup. We resolved this by putting a popsicle stick to hold up the tractor. Another problem was the marble was falling off so we ended up turning it to make it work



So in this picture we had about half of the steps done. Some of the problems were the tractor. What was happening was the dominoes weren't knocking over the tractor. We resolved this by using two dominoes glued together.

In this photo we haie the ramp that the marble rolls onto. Then there is another ramp that the marble also rolls onto. One thing that happened was we had a round bale on the small platform and it kept falling off the side so we took that away and just used the marble.



In this photo is our completed machine. We painted the floor and added a few railings to some shelves. We added a paint tray under the PVC pipe to catch excess wat

This is the finished painting. It was hard to put the steps back on in the right places.

Team Reflection

118 words

My name is Clare, and I had a good time building this machine. I learned a lot throughout the process. First of all, I learned teamwork and cooperation. This is a skill that is useful in many careers. I will always be interacting with people wherever I go, so it is important to be able to work with others and cooperate.
I also learned about overcoming challenges and thinking of multiple solutions to a problem. These critical thinking skills would be useful if I pursued an engineering career, or something related to that. The skills I have acquired through doing this project could serve me well in certain careers, and I would definitely do something like this again.

90 Brady Fay reflection

I am Brady I created alot of the simple machines. In the creation of the gracline my team and I learned alot. one of the things I personally learned was how to take a concept written or drawn on paper and creating it in real life. one example of this was the creation of the swing arm. the Arm was much differnt now than it was on paper. this project has shown me what engineers is like and how it is good in future career paths that I might pursue.

Team Reflection

87 words

Hi am Savannah and I am the team journalist. During the project I feel that everyone has learned a lot. I have learned ways we could make the structure of the machine more stable. And also how to work together with my teamates to get the project done. Since I learned some skills from this project can be helpful in future carears. For example I want to be a preschool teacher. And since I learned problem solving skills and teamwork that could help with that future carear.

Team Reflection

72 words

Hello, my name is Claire and im the artist. During the project I think that everybody learned a lot more about engineering and teamwork. For future careers like interior design I could use this experience for the engineering part and working with other people. For instance like trying to make sure everything was lined up right when we put all the stuff back on after painting. I also learned more about engineering.

Integration of STEM Processes

We used STEM Processes throughout the creation of this machine. We used the processes of: asking, imagining, planning, creating, testing, and improving throughout the making of all the simple machines. One of these simple machines we used the STEM processes for was the elevator. In this machine, first we had to figure out what to make, and we decided to make an elevator. From here, we planned out our design, created a prototype, and tested it. After that, we had many problems we had to improve upon. Eventually we found a design that worked well. We also used the STEM Processes while designing Step 2, the lever that swings down. We especially used the processes of testing and improving while building the train track step. The STEM Processes were very useful to us as built this machine.

Materials Cost

material	pricing	amount used	total
1/2 4 ft. x 8ft strand board	$41.55	1 1/2	$62.33
2x4 board	$9.18 per/foot	49.5 ft	$454.41
9x2 1/2 flat head wood screws	$32.29	1 470-pack	$32.29
Golfball	$10 per/12 balls	1	$0.89
Toy Chicken	~$0.50	2	$1
Interior latex paint	~$30/pint	5 pint-cans	$150
cardboard edge protector	$118/55	1	$2.18
1x4 board	$52/6ct 8ft	8.5in	$0.70
Box of Dominoes	$10	1 Box	$10
			total: $713.80
		% recycled materials: ~20%	

total word count: 2,113