



Engineering Machine Design Contest



✧ Bibble Babes ✧
(Bib-uhl)



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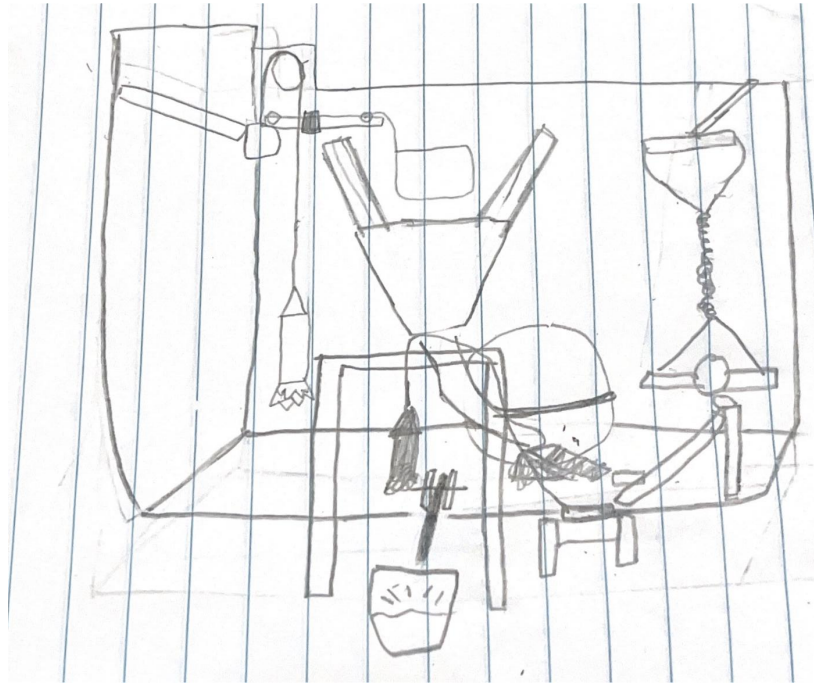


Planned Machine Design Sketch and Description | Sketch of planned machine with clearly articulated description of planned machine including labeled components with technical details (i.e. anticipated transfers of energy, directions of force, materials, etc.). This is the team's original plan, prior to building



Here is our original design! We labeled everything on the side with colors. This design ended up being pretty unreliable, so we had to take some steps off and move things around. We were going to have a ping pong ball fall down a ramp and float up, hit a ramp that will go up and have a water balloon fall, the water balloon would go into a bucket on a pulley, the rocket would go up on the pulley and hit a rolled up piece of paper filled with marbles, the paper would unroll and marbles would go into a funnel, then down a ramp that wraps around the paper machet saturn, the marble would hit a satellite and spin it around. That is what we had before we started building!

Near Final Machine Design Drawing / Image and Description



First, the balloon rolls down the ramp and falls into the bucket attached to one end of the pulley. On the other end of the pulley there is a rocket. When the balloon falls in the bucket the rocket rises and hits a lever. On one end of the lever, there is a marble tilted down, that side gets hit with the rocket. on the other half there is a rock connected to a string. That string is connected to a folder. The folder has marbles in it and is held up with velcro. When the marble on the lever gets tilted up, it hits the rock. The rock falls and pulls down the folder. Then the marbles fall into a cardboard funnel. After the marbles go in the funnel they land on a tin foil track that represents the rings on Saturn. Then the marbles roll down the ramp and hit a mouse trap with a piece of string under it. Next, The mousetrap jumps up. The string under the mouse trap is attached to a satellite. The satellite is spun up on a piece of rope. When the string gets released it allows the satellite to spin. Next the satellite hits a ball that rolls down a pvc pipe. At the end of the pvc pipe there is another mouse trap with a string under it. The mouse trap jumps up and releases the string which releases the rocket. The rocket hits a tube filled with vitamin c and water and starch. The mixture pours into another bucket filled with hydrogen peroxide mixture. This is called the iodine clock reaction. The mixture instantly turns blue!

Machine Steps

Step 1 - golf ball falls down cardboard ramp and falls into bucket on pulley

Step 2- the bucket falls down the pulley and the rocket goes up

Step 3- the rocket hits the ramp which causes it to go up and the marble rolls down the ramp.

Step 4 - the marble hits the rock that is connected to the folder

Step 5 - the rock pulls down the folder with marbles in it and the marbles fall down a funnel and a ramp

Step 6 - the marbles hit a giant marble and they all roll down the ramp

Step 7 - the marbles hit a mouse trap, releasing the satellite spinner

Step 8- the satellite spins and hits a ping pong ball.

Step 9- the ball rolls down a pvc pipe.

Step 10- the ball hits a mouse trap- releasing the string attached to a rocket

Step 11 - the rocket falls and hits a tube filled with one mixture of chemicals. It pours into another mixture. Then it instantly turns blue!

Materials

<u>Item</u>	<u>Cost</u>
Cardboard	Recycled
Bucket	Recycled
string/yarn	Recycled
Feathers	Recycled
Pulley	Recycled
Paint	Recycled
Pvc pipes	Recycled
Metal pole	Recycled
Screws	Recycled
Folder	Recycled
Velcro	\$0.05
Rock	Found outside
Tin foil	Recycled
Hot glue sticks	\$2
Balloons	Recycled
Marbles	recycled
Beach ball	Recycled
Pallets	Donated
Styrofoam balls	Donated

Xylophone	Recycled
Mouse traps	\$0.50
Fan	Recycled
Page	Recycled
Blanket	Recycled
Golf ball	Recycled
Christmas lights	Recycled
Styrofoam ball	donated
wood	Recycled
Popsicle sticks	Recycled
Iodine	Found in first aid kit
Vitamin c	Already had
Hydrogen peroxide	Already had

Total cost: \$4
 % of recycled materials: 97%

STEM Process

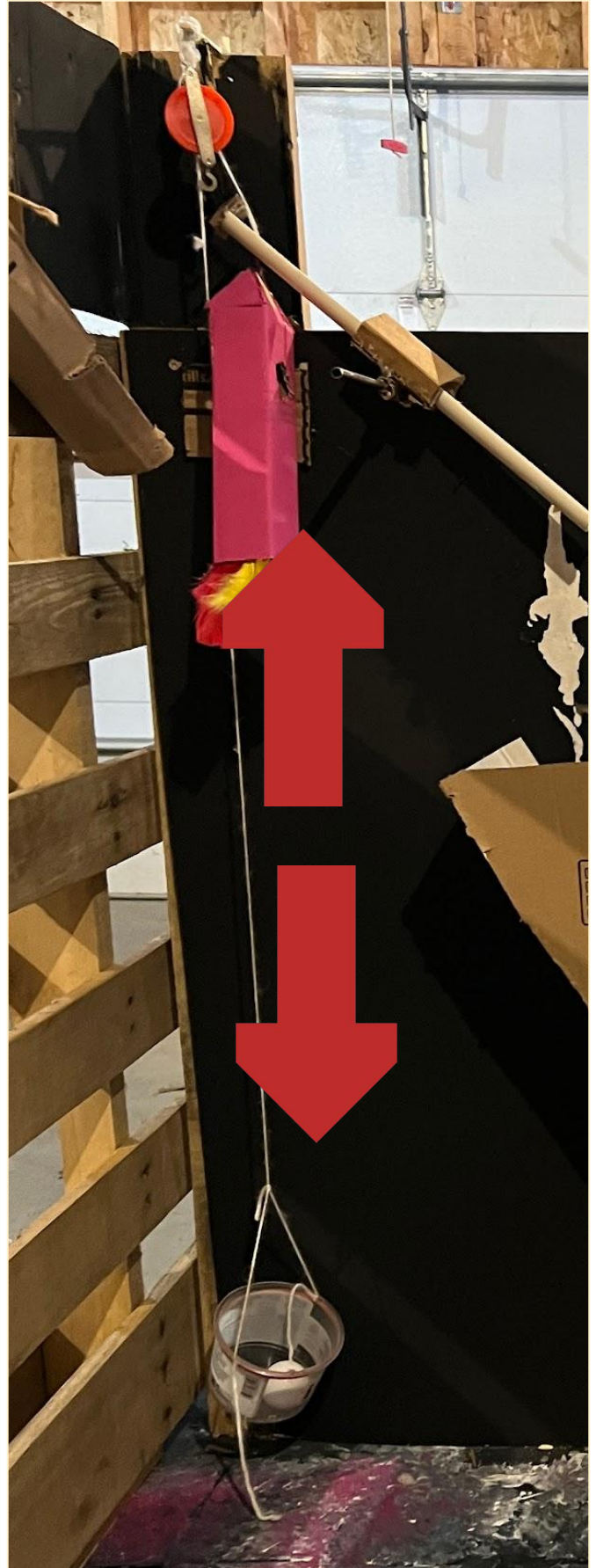


In this step we are using friction to keep the lever from tipping too much. We experimented a lot with this step to find out what worked the best to keep it stable. With this step, the rocket uses force to push the lever up to release the rock on the other side.

We are using Gravity and tension in our machine. The Arrow that is pointing down is representing gravity, and the arrow pointing up represents tension. When the mass increases the tension of the rope increases too

When the balloon drops into the bucket the mass is heavier then the rocket so, the rocket accelerates up.

STEM Process



Reflection

Teamwork

We worked very well together. We all did our part and worked together. For example, some days one person would do more of the journal while someone else is making the steps, while someone else planned and drew out the next steps. But we also had rough moments when someone would be doing more work than the others. Even though we had rough moments we talked to each other on all working together.

Communication

We all agree that we could have done a little better at communicating respectfully. Sometimes we would argue and disagree with each other, but we always worked it out in the end. We think it was good that we disagreed sometimes because we got to tell each other our ideas on how something would work or how to construct a step. In conclusion, we were not the best at communicating at the start, but now we are a lot better.

What we learned

We learned how to make the measurement of the base to fit through door. We also learned that you the machine won't work the first time you run the machine you have to keep on changing and adjusting the steps. We learned how to use a bandsaw and many more powertools like a skewdriver, we learned how to use it properly. We all learned how to use a mouse trap. We learned how to communicate better

Time management

In the beginning, our time management was a little too good. Meaning, we planned more than we built. We worked on things in beginning that we should have been working on at the end. All the chaos started when Jane left for Italy for 2 weeks and then Sophia for another 2 weeks. Our time management was terrible once Jane left. We had Jane take it home to continue working on it. Overall, we definitely improved in time management

Personal reflections

Sophia

I thought this project was really fun! I liked it alot . We had some ups and downs to this project. I was gone for 2 weeks toward the end of the project. I could have done a lot better on not doing so much art in the beginning and focus more on the engineering and building the steps. I thought i did a good job on thinking of of ideas for our machine and brainstorming. I also thought that i did a good at making the base of our machine and making it fit through the door. My favorite part of this project was putting steps together.

Jane

I really loved this project. The thing I enjoyed the most was coming up with ideas together and making our ideas come to life. Even though I was gone for 2 weeks I think I was able to make up for it by taking it home and working on it every night. One thing I wish we did differently was our time management. I think I did the best at brainstorming ideas and testing out any ideas that we had, even if they didnt work. One thing that I struggled with was staying on task. A Lot of the time I would start one thing and then start another thing without completing it.

Josselyn

I enjoyed this project alot. My highs and lows were not being able to listen to others advice all of the time. But my strengths were that if my teammates were distracted I got them back on track. I had a ton of fun working with my teammates. Reflecting back on this project, I realized that our teamwork wasnt on point. I got a little frustrated when we wouldn't agree on things Stepping back during work time and seeing other group's projects helped me come back and talk with my group. We had our rough patches but we got through it in the end. I also got distracted way too much, but my teammates helped me refocus.

Bibble-ography

<https://youtu.be/6FzUx2EFk8s>

<https://youtu.be/OHwDf8njVfo>

- We used these videos to brainstorm our machine and what we wanted to do for our steps

People who helped

- Jane's brother (he helped brainstorm the idea for the mousetrap)
- Sophia's mom (she helped brainstorm ideas in the beginning)
- Our Teachers Mr Johnson and Ms Schroeder (helped out a lot with brainstorming and problem solving. Also helped with power tools)

January

January 9th

Today we made groups and brainstormed ideas for ur machine.

January 10th

Today we brainstormed more ideas and discussed with each other about what the machine wanted to look like. We started drawing a rough draft of our machine with a few steps on it.

January 13th

We watched the movie Apollo 13 to learn more about space technology.

January 16th

Today we tested the design for our pulley. We made several models for each side of the pulley. We made a practice rocket out of cardboard and a plastic container. It worked eventually and it was so fun!

January 17th

Today we did more planning for our project and got over some obstacles. We wanted to incorporate some lights into our design. We also learned about pendulums.

January 20th

Today we made our practice rocket out of cardboard. We drew out most of our machine on an ipad. We also discussed what the background would look like. Then we made a prototype of one of our steps.

January 24th

Today we made a design for our rocket on the computer. We started 3D printing it but it broke half way through. While it was printing we tested the ping pong ball floating on the fan but it didn't work. We tried it with a balloon instead and it worked!

January 25th

Today we reprinted are rocket on the 3d printer but unfortunately it broke again.

January 28th

Since are 3d printed rocket broked we redesigned it and printed it again

February

February 1

Today we got pallets so we could start building are structure. We also got our measurements and cut the pieces of the pilates of to fit the measurement we wanted

February 2

Today we put most of our structure together. We decided to make the bottom pallet less wide so that it could easily fit through the doors.

February 3

We added wheels to our machine so we could easily pull are machine around. It was a bit of a challenge because it was hard to line everything up but eventually we got it!

February 7

Today we made a pvc pipe frame for the back of our machine. Then we realized it would be too flimsy for anything to be on it. Eventually we decided to just use a pallet for the back.

February 10

Today we connected a pallet to the back of our machine. We tried many different techniques to attach it but it kept failing. Eventually after many tries we realized that we were making it too complicated and simply just drilled down.

February 12

During this work period we attached the side panel the same way we connected the back. It was fairly easy to do because we had already done the back. Then we painted the bottom.

February 15

We painted one of the side panels today. We didn't have much time so that is all we got to do.

February 20

We just got back from a camping trip so we really tried to work hard today. Jane is gone so it's just the two of us. We painted more of the side panels and tinkered with the steps.

February 21

Today we kept tinkering with the first few steps. None of them worked quite how we wanted them to but it was still helpful to tinker around

February 23

We tinkered with a few more steps and figuring out what we thought worked the best.

March

March 1

MISS JEN CAME AGAIN! She helped us figure out how to do our first step. We decided to use a pulley after the ramp. We found the perfect weight difference with the bucket and the rocket (we put a rock on the rocket)

March 3

Jane came back from vacation today! we talked about what we had accomplished while she was gone. It was a bit difficult explaining everything but eventually we got all caught up!

March 6

We took the first step that we had already made off and started experimenting with pulleys. We remade our first step and explored what we could do after that

March 7

We tested a paper roll for falling marbles, but i didn't work so we tried felt. Then we tried a plastic folder and it WORKED!!!

March 9

It was a work from home day so we facetimed and worked on our step ideas and journal.

March 10-19 was spring break

March 20

Today we experimented with cardboard funnels. We started with the actual funnel, but it was too small. We started making different sizes of funnels to see what worked best.

March 21 (at school)

Today we added the finishing touches to the pulley and the funnel and we tested it about 50 times and we finished it up before Jane took it home

March 21 (Jane at home)

I worked on making the ramp to go around the saturn and how to attach it to the funnel. I tried using cardboard to connect it but it didn't work for like 5 times and i decided to work on the ramp instead. I tried using paper, it didn't work, i tried normal tin foil, it didn't work, then a walked around my house to find something. Eventually I found really strong tinfoil. I cut it up and made the shape of the ramp then hot glued it on. Later that night I used the same tinfoil to connect the funnel and the ramp. Then I tested that whole thing to make sure everything was reliable.

March 22 (at school)

Jane and Josselyn worked on The team journal. We got the cover page, planned machine design drawing and description, and part of the final machine drawing description done.

March 22 (Jane at home)

Today I worked on what to put after the saturn. I decided to put a xylophone after. Next I started to construct the satellite. I cut some pvc pipes to hold it up. I experimented with it spinning for a while.

March 23 (at school)

We worked on filling out the journal template more. We tried to call Sophia to ask her things but she didn't answer. She ended up answering eventually and gave us some good ideas about the final step.

March 23 (Jane at home)

While at home, I worked on the satellite more. I managed to finish constructing the actual satellite but I worked for about 1 ½ hours on making the step before activate it. I tried putting a thumb tack on a marble and having it pop a balloon that was attached to the satellite, but it didn't work. Then i tired putting a bunch of thumbtacks on a little car and having that pop the balloon but I couldn't get that to work either. I kept experimenting with it more but eventually decided to stop because I was getting too tired.

March 24 (at school)

Jane finalized the machine drawing and description. We both worked on our reflections. Josselyn put in and edited the daily journal.

March 25 (Jane at home)

Today my brother help me brainstorm for the satellite spin. We worked for an hour and then figured out the mouse trap.

March 30

Competition day! We had a ton of fun! Judging didn't quite go as planned though. We had a marble fly out which had never happened before. All of out steps that we were concerned about worked, but of course the easiest step of a marble moving didn't work. We got set back a lot of points for those things which we were sad about. We ended up winning 6th place, so we get to go to the championship!

April

April 3rd

All of looked up cool chemical reactions because we wanted to have an advanced component for the championship. Jane found something called the iodine clock reaction.

April 11

Jane and sophia started planning out the iodine step. We were pretty behind because we haven't been planning for a while. We were not able to come up with something but we did brainstorm.

April 12

Today the journal is due. We all edited the journal to adjust to the new steps. We brainstormed the iodine clock reaction step. We decided to have the rocket hit a tube with one solution, then it will pour in the other and change color. We are stressing out a little because the journal is due very soon, but we are trying to work efficiently. We tested out the last step until it worked!

Photos of our process

