

St. John Stem Club Journal

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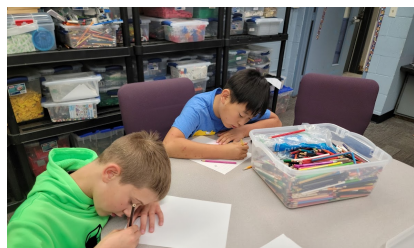
Contents

1. Teams Daily Event Log	2
a. Frame Blueprint and Progress	6
2. Recycled and Reused Materials	7
a. Cost	7
3. Theme	8
4. Elements.....	9
5. Team Roles.....	12
6. Checklist.....	13
7. Team and Personal Reflection.....	14
8. Drawings and Designs.....	15
9. Bibliography	16
10. Team Photos.....	17

The Teams Triumphs and Struggles

Our team started meeting the week of October 3rd and kept meeting until April 17th. We met 47 times for a total of 120 hours. In our first meeting, we looked at team roles and took the Myers-Briggs test to understand and work with each other. Different team members possess various aptitudes, interests, skills, and perspectives. Myers-Briggs is never used to limit or exclude team members from attempting different roles. Instead, it can help a stuck member who wants to know what to try.

The two weeks after that were devoted to demonstrating and presenting for VIP Day. Our team shared the process, struggles, and benefits of STEM. We raised money, and in March, we ordered 11 drones for a new programmable drone club we plan on starting at our school.



We brainstormed ideas for new elements during the rest of October and early November. Nathan drew some ideas of elements and plans to add to the machine. Aiden helped get ideas for more elements in

the machine. Rachel and Abigail did journals and Myers Briggs. Noah and Ethan learned how to program the Spike Prime. Rachel and Aiden started working on designing a T-Shirt. During this time, there were many element ideas, including Hot Wheels Track or the Italian marble track combined with tubes with remote-controlled cars. Unfortunately, these early prototypes did not make it into the machine. Preston then had the idea to look at the history of Space travel for ideas. Preston loves astronomy, owns a telescope, and paints spacescapes. Finally, the team looked at a timeline and got ideas.



From mid-November into January, The team received scrap wood left over from a church project. Email requests went out for donations of used stuff to build our machine.



We wanted to buy as little as possible!

The team also developed different elements using the timeline as inspiration.



Nathan, who was adopted from China, created an ancient China element



because China developed rockets and firecrackers in the 11th century. Noah worked on the funnel and level that

connected the element to the next one. Preston created the 1915 element from spandex, showing Einstein's gravity theories. Wyatt created 1926a and 1926b that represented Goddard's use of liquid fuel and his title as the father of modern rocketry. Aiden created the 1957 Sputnik element. Wyatt also created the 1961 first person-in-space element. Nathan and Ethan

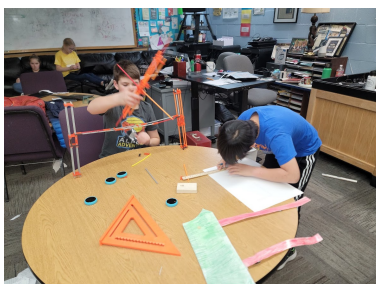


created the 1969 element showing the Saturn 5 rocket slowly lifting off towards the moon. Finally, Abigail, Rachel, and Ethan created the TV element, which was renamed later on to One Small Step.

The next period from February to Mid-March was frustrating and challenging. This was a time of two steps forward and three steps back. Preston, Aiden, Noah, and Ethan spent hours attempting many ways to trigger and get the 1915 element



to work. There were over seven different iterations. The China element was not triggering the lever to trigger 1915. Noah and Ethan spent weeks attempting to get it to work. The cup and the rocket broke in the 1926 element and had to work around differently. The 1957 element required several prototypes to find one that worked. The TV element just did not



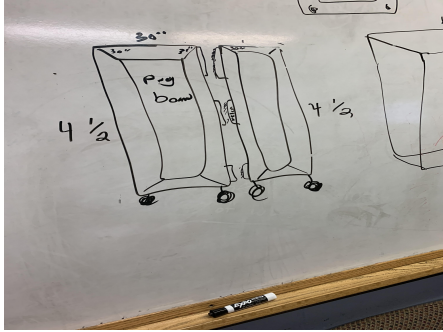
work and needed a total rebuild. Members were getting headaches and feeling frustrated and exhausted. Finally, Covid hit our team, and we had members sick. Our coach had a meeting with us and asked if we wanted to submit the machine instead this summer so we would have more time or meet four times a week and on Spring break to get it to work. The team voted to persevere!

Mid-March to April was a time of intense focus, dedication, and perseverance! The team met four days a week after school for three weeks and during spring break. The TV element was redone with an orbiting moon with a footprint on it. On March 31st, the team demonstrated the machine to the entire school. It had two



interventions but was getting closer. That night, the team got the machine to work for the first time. The team was overjoyed and thrilled! During spring break, the team finalized the journal, worked on the presentation, and tested the machine several times.

Frame Blueprint & Progress



Recycled or Reused materials

- **Repurposed and reused items that were already on hand**

1. **White track**
2. **Wood**
3. **K'nexs**
4. **Legos**
5. **Rubber Tube**
6. **Magnets**
7. **Scale**
8. **Funnel**
9. **Bucket**
10. **String**
11. **Last year's frame**
12. **Clear Covid Barriers**
13. **Plaster of Paris rod and stand**
14. **Foam Ball**
15. **Marble Works**
16. **Electrical Components**
 - **One rechargeable 6-volt battery.**

- **Purchased Items**

1. **Two Wooden dowl rods for \$4.99**
2. **Black Spandex \$9.99**
3. **3d Printed Sputnik \$1.99**

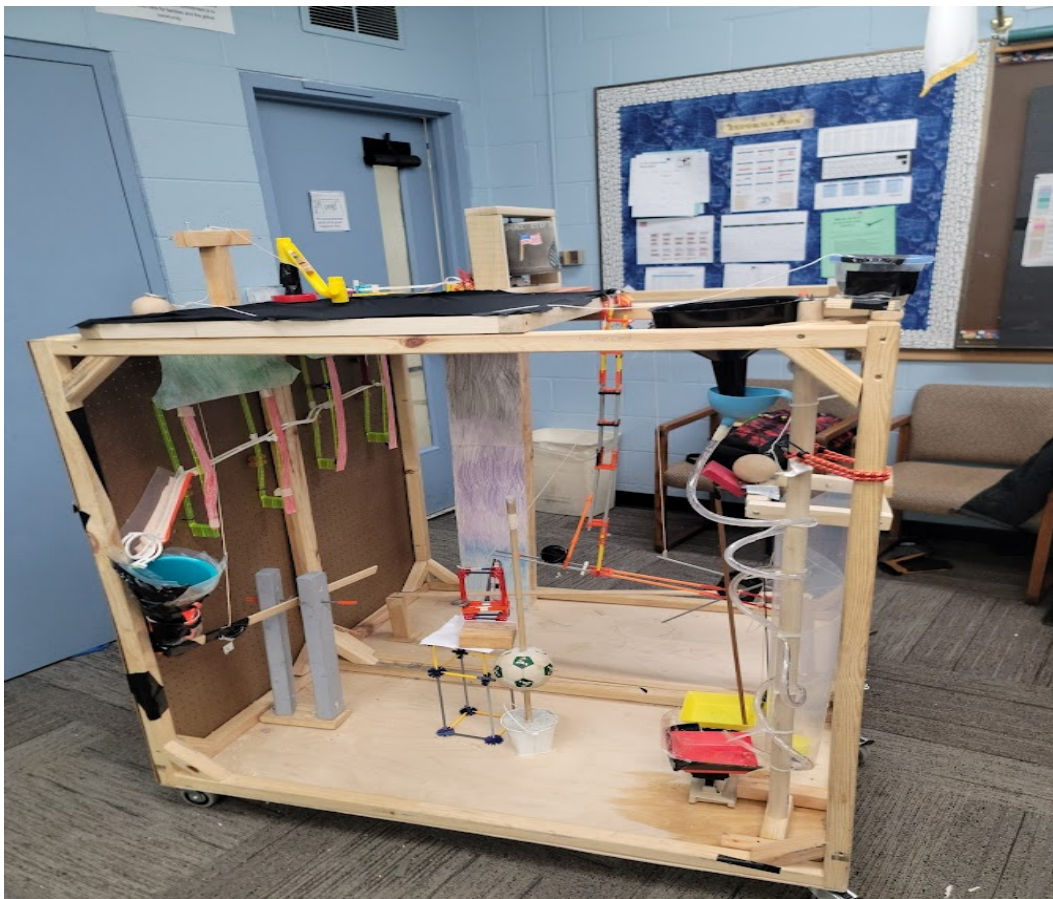
Cost \$4.99

96% Recycled Materials

Our theme is The Space Race!!!

Comrade Swell once lived in Russia with many Green Gremlins in his Grandma's basement. They planned to return in time and beat the Americans in the Space Race. First, they traveled to 11th-century China to try to prevent the invention of gunpowder. Then, they were transported to Einstein's house in 1915. Then, they traveled to 1926 to stop Goddard. Next, they traveled to 1957 to make Sputnik the first satellite in space and to 1961, so Russia could send the first person into Space. Then, they went to 1969 to stop the American Moon Launching.

Find out what happens when we try and stop them!



Elements

Element #1 China

Simple Machines Used

- Ramp

Number of Energy Transfers

- One



Element #2 Lever

Simple Machines Used

- Ramp
- Wheel and Axel

Number of Energy Transfer

- Two



Element #3 1915

Simple Machines Used

- Wheel and Axel
- Lever

Number of Energy Transfers

- One



Element #4 1926

Simple Machines Used

- Lever
- Ramp
- Axle

Number of Energy Transfers

- Two



Element #5 Sputnik

Simple Machines Used

Wheel and Axle with gears

- Pulley

Number of Energy Transfers

- Two



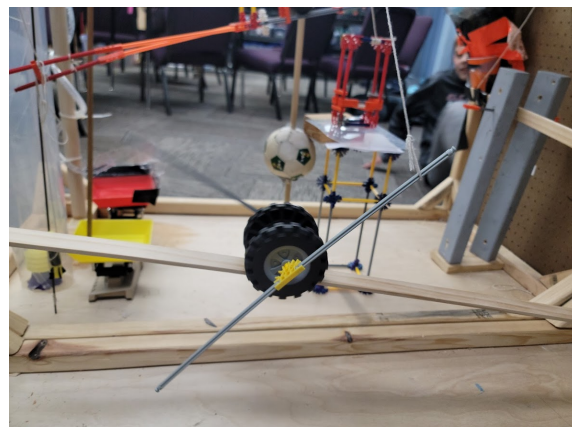
Element #6 1961

Simple Machines Used

- Wheel and Axle
- Ramp

Number of Energy Transfers

- Two



Element #7 Explorer 1, 1969

- Simple Machines Used
- Wheel and Axel
- Inclined Plane

Number of Energy Transfers

- One



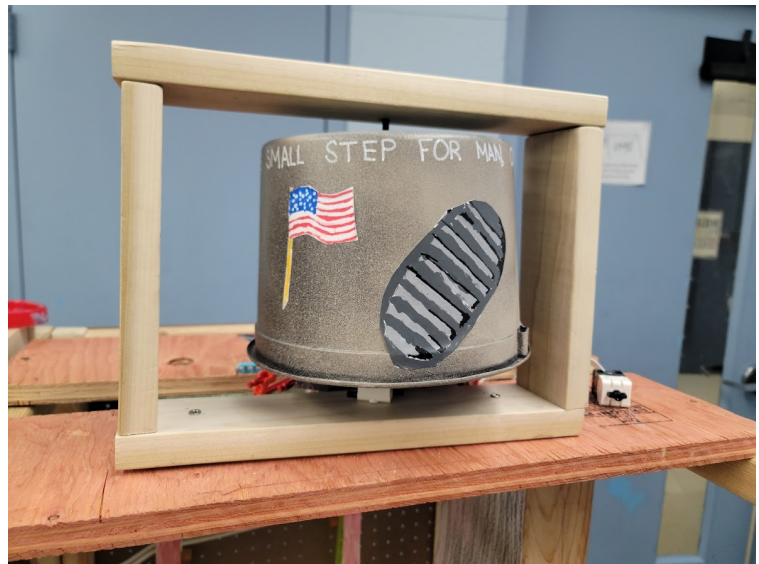
Element #8 One Small Step

Simple Machines Used

- Screw
- Wheel and Axle with gear
- Inclined Plane

Number of Energy Transfers

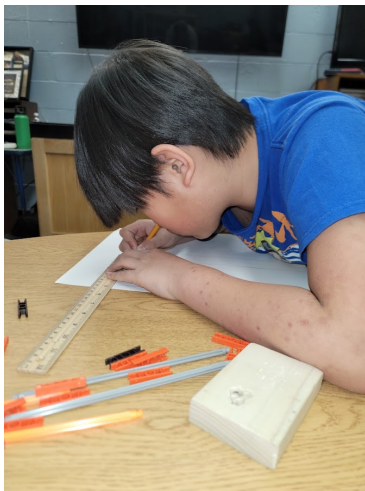
- None



There are 11 transfers of energy on the machine.

Team Roles

- **Captains:** Aiden, Rachel
- **Design Engineers:** Aiden, Noah, Ethan, Wyatt, Preston
- **Test Engineers:** Everyone
- **Record Keeper:** Abby
- **Researchers:** Everyone
- **Discussion Leaders:** Aiden, Rachel
- **Programmers:** Ethan
- **Presentation Coordinators:** Abby, Rachel
- **Story Author:** Preston
- **Artist/Drafters:** Preston, Nathan



Rube Goldberg Checklist

1. Marbles in place
2. Lever in funnel
3. Ball on edge
4. Gravity well is set up
5. Water in cup
6. Bottom cup in place
7. Ball on edge, hook up
8. Rocket down
9. Sputnik is wound up counterclockwise
10. Sputnik on lever
11. Weight on the edge of the platform
12. String on satellite
13. Rocket on
14. Bucket right way
15. Program on/click button

Team Reflection:

We learned about perseverance through this machine because of how hard it has been to complete. We learned how to cooperate with our team members even when they had different perspectives, and elements kept breaking and would not work. But, most importantly, we learned how to stay focused, stay positive, and have fun!!

Personal Reflections:

Aiden: I enjoy hanging out with friends and problem-solving. I faced problems trying to find out why the element wasn't working. I fixed the problem by asking questions and their input on it.

Rachel: I enjoyed working on elements and had a lot of fun with the team, but it was tough getting the presentation all together at the end.

Noah: I enjoyed being with friends and working hard. I struggled with the lever and testing. We built a different lever and tried until we got it right.

Abby: I enjoyed hanging out with friends and working on the journal. However, getting the presentation to work was hard, so I am glad my teammates helped me.

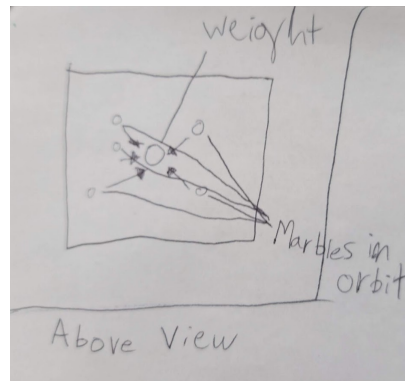
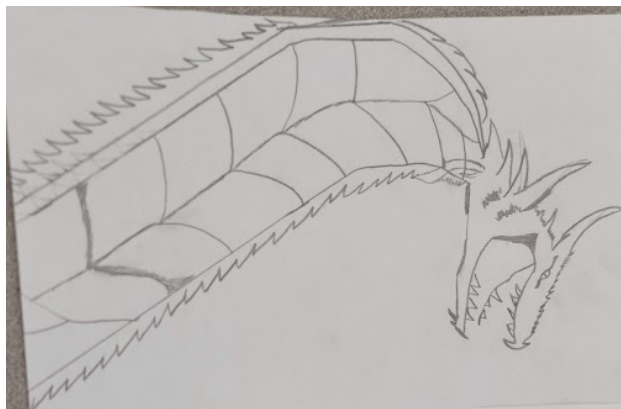
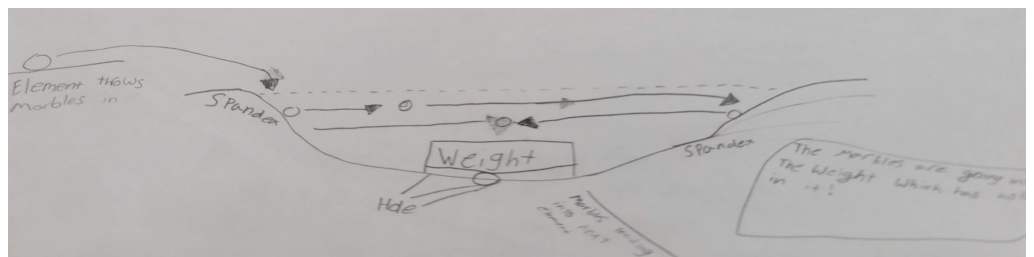
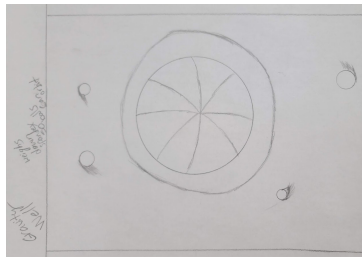
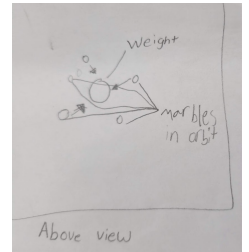
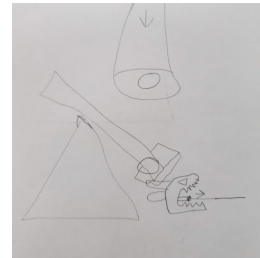
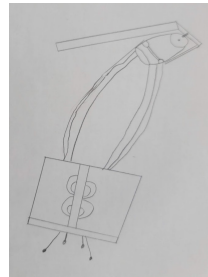
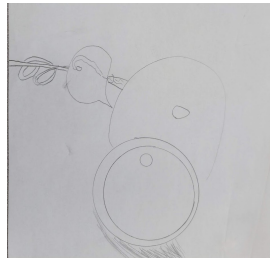
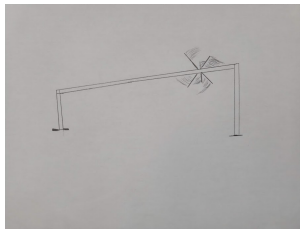
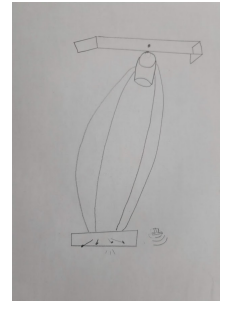
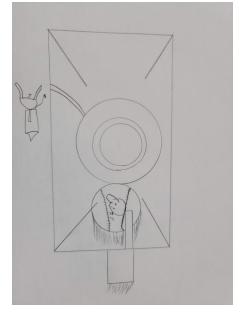
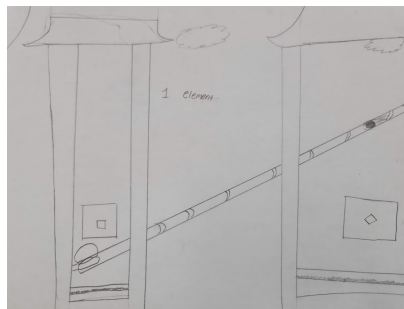
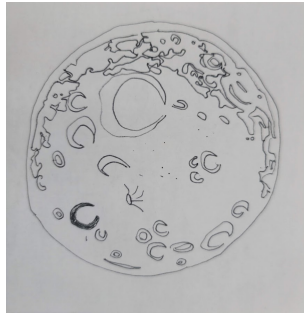
Preston: I enjoyed making elements and writing the story. Since I know a lot about astronomy, I like the theme.

Wyatt: I enjoyed helping others and developing ideas like 1926 A and B. Getting the machine to work was also really hard, but it was fun.

Ethan: I enjoyed programming and making the elements. We learned to work together even when we disagreed.

Nathan: I like working and discussing problems with the machine. I needed help understanding how the machine works and journaling. I fixed it by asking people to show me how it works and getting the machine working. I asked my teammates how I could help them.

Drawings and designs for the machine



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Team Photos

