

The Adams
Michael, Dylan, Joey
Junior Division
Coach: Alexa Hurd
Engineering Journal

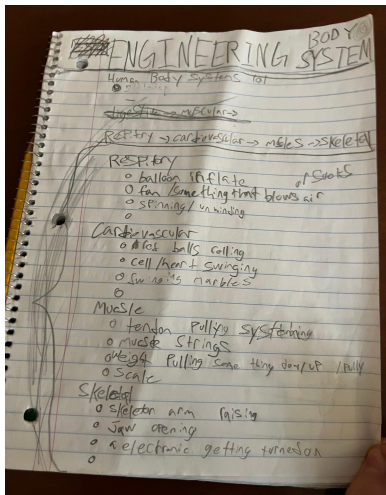
Machine-Making Journal



Monday, January 29

Today we did a newspaper design competition in our class where we were given 10 pieces of newspaper and 18 inches of tape to design a structure that can support the weight of 2 large textbooks. The structure we made was 11 inches and could support the weight of the textbooks for

at least 20 seconds. This activity was a fun learning experience for teamwork and practicing using only a few materials. My group enjoyed seeing how all the different groups made their structure and took notes.



Monday, February 5

With our project just starting, we decided to spend our work time this day brainstorming possible ideas for our steps and what body systems we could incorporate into our project.

A method we used to find step ideas was watching rube goldberg machine videos and noting down some of the unique and impressive steps. We also, as a class, watched a simple video explaining each human body

system and how it worked. This was incredibly helpful because it was a quick and easy way to wrap our heads around the annual theme.

Friday, February 9

Today we went to a furniture and material store called Hope Hardware for inspiration about what materials we should use. While here, we came up with many different ideas for how we want our machine to appear, as well as ideas for what steps we may want to have. One of the ideas we came up with was that we would have an object unscrew and then roll onto something, triggering another step. While here, we bought a board with many miniature holes to secure steps onto. However, at this point, we are still determining whether we will use it. We also sketched our ideas for our steps. We wanted to start with a pulley system and have that pushed up a ramp so marbled would fall down. After that, the marbles would fall into a cup that spun and released marbles into a funnel, then allowing them to hit some Jenga blocks that fall and release a pendulum. This pendulum would then hit a marble down a ramp into a cup. While making this plan, we were aware we would need to make a more interesting big finale but decided to leave that for later.

Tuesday, February 27

By this day, we hadn't had much time to work on engineering and wanted to make significant progress on our machine. The Two main things we completed that day we're painting our base white and securing the sides. Painting the base was fun because we got to experiment with how paint layers dry and figuring out what the best way to paint a large object is.

Wednesday, March 13

On this day we didn't make much progress on our machine, however, we did spend a lot of time brainstorming what our group name should be and what our theme should be. After going through ideas like little einsteins, atoms, and a few other options we decided to go a more funny route. We decided that our group's name would be "The Adams"

and our machine steps would probably be based on the functions someone needs to make to hit a golf ball into a hole. The Adam part of our name was chosen because our big finale would be an Adam Sandler cutout getting a hole in one. We liked this idea because it was funny, not too unprofessional-sounding, and would be a fun idea to incorporate into the engineering contest's theme. We finished this work time by deciding plans for other work times, such as planning to make a mini golf course.

Monday, March 18

Today we focused on making progress to our machine base. One of the first things we did was decide who would bring what, which included deciding I (Michael) would be the one to bring the fake grass for the golf course. After that, we decided to get working on attaching the pinboard to our machine. This action of trying to put the board on set off a rabbit hole where the bottom of our machine cracked and didn't want to hold very much weight. Because of this, we had to find pieces to hold it together, figure out how to make them work, and then screw them on. This set us back about 40 minutes and made the process of attaching the pinboard very time-consuming. While fixing the base, we realized that this problem may be a hazard in the future, especially for attaching heavy objects to it so we decided that we would keep extra wood on deck just in case the problem appeared again. We finished off the work time by deciding on a step idea that uses marbles to represent blood cells and oxygen.

Tuesday, March 19

Today we focused on making our steps and exploring what materials we could use. The step we experimented with was creating a mechanism that held up Adam Sandler's arm to hit the golf ball and would release it so it would fall. We ended up finding a Jenga block, putting a hole in it, and positioning it so that if it got hit it would fall. For

materials, we were able to find a glass plate/panel that we may use to cover something or roll. At the end of this work time, we finalized that I would take home the project over the weekend to work on.

Wednesday, March 20

On this day we began our work time with our teacher, Mrs. Hurd, giving us a short lesson on how mass and velocity affect momentum. We were taught the equation $p=m*v$ and appreciated that piece of hindsight. Later that day, we worked on our engineering project by deciding to shift our interpretation of the annual theme from how an arm works to how eyes work. We chose this because to hit a golf ball, you have to see where you want it to go and aim your club.

Thursday, March 21

Today our work time began with a short lesson about correct vocabulary relating to physics to use while presenting. Some examples of what we learned were kinetic energy, the transferring of energy from one object to another, wheel and axles, a wheel and rod where the wheel can spin, weight, and the measured effect gravity will have on an object. Later in the work time, we started painting some parts of our machine such as CDs, ramps, and tunnels.

Friday, March 22

Due to us not having a back for our base, we decided to start our work time by painting the back of the base white. While painting, I brainstormed how we would mix Adam Sandler hitting a golf ball and a bunch of eye-related steps, but I couldn't come up with anything I felt would fit.

Tuesday, March 26

This day was a work-from-home day at our school so we decided to spend most of our time on engineering. At home this day I was able to

complete the last few steps using marbles, jenga blocks, and cardboard. One of the steps we did was where a marble would hit the side of a popsicle stick, making it spin enough to hit another marble and make that one trigger some dominos.



Tuesday, April 2nd,

Today we had our regionals competition at Augusta. We ran our project 4 times in total. There were 2 different groups of judges we had to run our project 2 times for each group of judges. Then came the rewards and trophies. Our group got the best presentation reward and we got 3rd place! Everyone is going to state by default but our school got 3rd, 4th, and 5th place! Unfortunately, 2 of our wheels broke off and 1 of them was about to break off but we got 3 new wheels to put on! Now we are printing more pictures of Adam Sandler.

Our Steps

1. We first place the marbles in the tube which they roll through and weigh down the platform. This represents your eyes processing the precise details and sending that information to the brain.

2. As the marbles weigh the platform and cause the pulley to tilt the box causing the marbles to fall out. This represents the eyes sending the information to the brain and the brain processing the info.

3. As the marbles are released, they fall down various ramps to finally hit a series of blocks. This action of them traveling to trigger another step represents the brain sending commands to the body.

4. Once the marbles complete going down the various ramps, they transfer their energy and force through a sequence of jenga blocks that we used as dominos. This step represents the action of fingers curling around a golf club handle

5. These dominos hit a suspended board that when applied pressure from the correct side, will open up a gap for the next step to occur. The cardboard is held on to a metal rod using rubber bands and a simple technique of balancing. This step represents the tendons of an arm and hand stretching and pulling for an arm to move.

6. Once the board slips open, a marble will fall out and go down a track where at the end of it, the marble will set off the next step. The way this step works is that behind the cardboard "Tendon" there is a miniature track that holds this marble and it stays in place by leaning against the board. When the board gets pushed away, the marble loses its balance and falls down to then use its momentum to ram into a wooded piece that's part of the next step. The marble falling and going represents an eye moving to look and aim at a target

7. This step consists of a wooden popsicle stick taped onto a stick that is put through the cardboard base it rests on. When force is applied to where the marble from the previous step hits, it makes the stick spin enough to transfer that energy to the next step. The stick being moved and turning represents someone moving and raising their arm in order to hit a golf ball.

8. This next step starts with two marbles stationed on a flat track with the stick behind them. When the stick hits them, they get pushed just enough to fall down a ramp to cause the next step to fall. This step represents the body sending back a signal to the brain that it is ready to do whatever the brain needs it to.

9. Once the marbles hit the next step, they cause a Jenga block to get pushed forward and fall using their momentum. When this block falls, it causes the next step to get hit forward. This whole process was made to represent the entire action of an arm swinging to hit a golf ball and encompasses a unique, simple interpretation of how that works.

10. This step consists of a marble balanced in place ready to be knocked down a ramp. When the previous step occurs, this ball is pushed the tiny bit further that it needs to be to fall down the ramp. This step represents a golf ball being hit and racing towards the hole.

11. While the marble “golf ball” goes down the ramp, it hits baking soda into a pool of vinegar, causing a chemical reaction between the two. This final step represents the action of getting a hole-in-one and the dopamine rush from succeeding in something.

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Helpful resources we used:

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Reflection

Our engineering project was about the process in the human body of hitting a golf ball. We worked well with the materials we had access to, and maximized the tools we had at our disposal. A challenge we faced was ensuring that our base was sturdy enough to hold weight, because about half-way through the project some wood snapped and we had to screw in supportive pieces. Another hardship we went through was that on one of the last school days for this project, we were unable to bring the machine in so we had to improvise ways to work on our project without the machine. A huge success that we faced we feel was being able to finish all our steps in time to show the school. We feel like during this project we really grown as a group and all our skill sets have increased like learning how to use certain power tools, learning how to write a journal, and figuring out how to apply information we’ve learned into our project.

Price of Objects

| | |
|--------------------|----------|
| Cardboard | RECYCLED |
| Cardboard Pegboard | \$6 |
| Cups | RECYCLED |
| Domino | RECYCLED |
| Glue | FREE |
| Hooks | FREE |
| Jenga blocks | RECYCLED |
| Marbles | FREE |
| Nails | FREE |
| Paint | FREE |
| Paper | FREE |
| Plywood | RECYCLED |
| Pulley | FREE |
| | |
| Screws | FREE |
| String | FREE |
| Styrofoam Block | RECYCLED |
| Tape | FREE |
| Wooden pallets (3) | RECYCLED |
| Wooden sticks | FREE |

Price Percentages

~41% was recycled

~54.5% was free

~4.5% cost money