

6th Grade SOAR Team @ Samuel Mickle School

559 Kings Hwy

Mickleton, NJ 08056

Teacher: Nicole Macaluso (macaluson@eastgreenwich.k12.nj.us)

Students: Evan Kidd, Amelia McGravey,

Tim Ninan, Arya Patel, Ethan Zheng

Hints

- electromagnet
- pulley
- hydropump*
- evaporate*
- cobalt
- natural resources such as vines, twigs, large boulders, etc.

The Website

<http://blog.iat.com/2015/12/19/stem-wars-the-fma-awakens-project-based-contest-for-jedi-students-stemwarscontest/>

The Problem

Han Solo and Chewbacca's space ship is stuck in a swamp and we need an efficient way to get their ship out, using STEM. Their robot H-N1L is damaged severely.

Our Idea-Explanation

Our innovative, efficient idea to help Han Solo and Wookie using STEM is to build a pulley system. We want to use the natural resources; a tree as the base, cobalt to support the tree and act as the pulley base, and braided vines for the pulley itself. We need an electromagnet to use at the bottom of the pulley, hopefully strong enough to lift the Millennium Falcon out of the swamp. We also are using parts of the ship to construct a reflective lens to a tree, creating a focal point for sunlight to enter and point to the swamp for timely evaporation.

Unknowns

- unfamiliar lands
- wildlife
- weather conditions
- depth of the swamp
- damage done to the ship
- mass of the ship
- dimensions of the ship
- available equipment on board
- additional tools or pieces of nature for support

- personal injuries

Knowns

- natural resources (vines, cobalt, trees)
- droid (shutdown)
- Cobalt is ferromagnetic
- droid says, “electromagnet, pulley, hydro pump, and evaporate
- tail landed first

Materials

- **tin foil**
- **thread**
- **twine**
- **water bottle cut in half filled with rocks**
- **rocks**
- **pipe cleaners**
- **straws**
- **magnets**
- **cardboard**
- **toilet paper rolls**
- **duct tape**
- **plate**
- **desk**
- **string**

Estimated Value for Knowns and Unknowns:

We thought it was highly important that we know more about how we could use the natural resources, such as Cobalt and the vines and trees as a pulley system. We took the keywords that the droid last stated very seriously and tried to use all of them in our STEM system. However, without knowing the mass and dimension of the ship, as well as the amount of solar energy available to harness a system of direct sunlight for evaporation, the ideas could prove unsound from a mathematical standpoint. Also, not knowing other available resources on the vessel causes us to rely heavily on the natural environment surrounding the swamp.

Science Topics Involved in the Solution:

When designing a pulley system, you have to keep in mind the Laws of Motion. The purpose of the system is to allow for lifting a heavy mass more easily by changing the direction of the force. However, when you look to cause this change in position, the second law comes into action, requiring more force to move a more massive object. The third law is also relative because only the amount of energy put into the system will be able to transform the potential into kinetic energy. Thus, we had to research more about the elements of Cobalt and use the mass and magnetic nature to support our experiment, in order to create the pulley of such a large object. This part of the experiment was focused on mechanic energy transfer and transformation.

We also wanted to harness solar energy for the evaporation process to occur, so that we could analyze what the ship may be stuck in and support our movement of the vessel. We wanted to build something that would bring a more direct sunlight to the swamp and help us move the ship through water displacement.

Design:

1. Build cobalt boulders and vine pulley system from twine, foil, and hard objects
2. Rig system to the tree and strongest branches
3. Build solar energy system and position it toward the swamp from above
4. Attach electromagnet to ship by lowering it from above in the trees via the pulley system
5. Allow time for evaporation and test tree, branch, and vine strength.
6. Use other natural resources and tree pieces to reinforce pulley system
7. Dig out cobalt boulder and attach pulley system
8. Push boulder over the edge and allow the ship to be pulled

*See video for model design

Analysis:

We had to work quickly so there are things that we would adjust about our design. For instance, we do not know how heavy the ship is and how much

force would be required to move it. We also don't really know if we would be able to push or pull the boulder over a ledge with the system attached. We do not know how long the evaporation process would take or if it is the best idea to displace the water and we also do not know the magnetism levels of the ship and our magnet support. We are proud of our project because we tried to use all of the available information and simulate the mission utilizing natural resources and available tools. If we had further measurements, we could be more precise in calculating the magnitude of need.

Thank you for your time in reading our STEM WARS mission folder.