

Stem Wars

By: Hubbard Middle School
Hubbard ISD
Hubbard, TX

Defining the problem

- Han Solenoid and Chewbeaker have crashed their ship into a swamp on the planet of Dacobalt.
- Their trusty robot BB-8 has died and can no longer be of assistance to them.
- BB-8 has left them with four words of wisdom. The only things Han Solenoid and Chewbeaker have are four words, the materials on their ship and any resources they can find on the planet.
- They need to find a way to get their ship out of the swamp and back home.

KNOWNNS	UNKNOWNNS (DEFINED BELOW)
VINES	CONTENTS OF CARGO
TREES	WEIGHT OF SHIP
COBALT	MAGNETISM OF THE SHIP
LARGE BOULDERS	THE GRAVITY ON THE PLANET
EVAPORATE	
HYDRO PUMP	
ELECTROMAGNET	
PULLEY	

Electromagnet

- An electromagnet is made by wrapping copper around any type of rod and then connecting it to a battery of your choice. When electricity passes through the battery, an electromagnetic field is formed by the electrically charged rod. The tighter the copper wire is wrapped around the rod the stronger the magnetic field.
- Resources- we will use the recycled materials from inside the droid to make our electromagnet.
- Use- we will use the electromagnet to help lift the ship up from the swamp for a short period of time along with pulleys and boulders.

Hydro Pump

- A hydro pump is a machine powered by water that transports water from one location to a different container or location.
- The hydro pump will transport water from the swamp into a bag that is connected to the ship by a pulley. As the bag fills up, it will slowly help lift the ship with the aid of the pulley

Pulley

- Two pulleys on either side of the ship will slowly lift the ship out of the swamp.

- As the ship is lifted, a cobalt lined bag made out of recycled parachute material that is connected to the pulleys will fill up with water from the swamp via hydro pump.
- When the bag is filled and hits the ground, the electromagnetic field created by the electromagnet will surround the bag. As a result of this process the bag will remain on the ground.
- This will counteract the weight of the ship on the pulleys and help steady the pulleys to the ground, while keeping the ship suspended in the air for a longer period of time

Formulas

Work= Mass x acceleration due to gravity x height

$$(W=M \times A \times H)$$

Height – the ship will be lifted 10 meters off the ground

The gravity of Dacobalt-3.7 m/s²

Mass-30,000 lbs. (15 tons)