

How Scientific is a Pinball Machine?



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Mr. Commeret's Class
2013**

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Making A Bulb Light Up

What I Learned

If a circuit is open it is not complete so the load or thing you're powering will not work. If a circuit is closed it is a complete circuit and the load will power. You need a source to power the load and a path to connect the path between the source and load. If your circuit is incomplete you can put a conductor such as a (copper coin, pencil, tin foil, iron, or a nail) in the middle and electricity can flow through. If you have too many sources the load may burn out because it has too much power. Electric circuits have different components like the



ipod charger

The charger of an ipod is like a circuit, inside the outlet there is a circuit, when you stick the charger in it completes the circuit, and when you plug it in to what you are charging the energy is transferred to what you are charging.

Where you'll see this on the pinball machine

We didn't end up doing a circuit.

Electromagnets

What I Learned From The Experiment

Electromagnets are magnets that are powered by electricity. Its exactly like a circuit there's the source, path, and load. The source is the battery, the wire is the path, and the nail is the load. The more times you wrap the wire around the nail you have the more of the object you're picking up. You can also make an electromagnet stronger by adding more batteries.

What I Learned From Extra Research

Magnetism is a force that electric currents exert on other electric currents. This force can be created by the motion of electrons. The planet earth is a gigantic magnet. Magnets are also in living things. Animals use the magnetism to find their way when traveling.

The Ball Popper

Since we use balls in our class and we are building our pinball machines we use nails and nails pop balls, so we use a ruler stick with two magnets on it to clean up our classroom. We started this because one of our balls got popped by a nail.



Where you'll see this on the pinball machine

You'll see a magnet on our pinball machine by back of the board and if you get stuck on the magnet you get caught by a bear.

Newton's Laws Of Motion

Newton's Laws of Motion

Law #1 - Law of Inertia

- An object in rest wants to stay at rest unless acted on by another force, this is the law of inertia.
 - So if you are in a car and you didn't have a seat belt on and your car hit a car head on you will go flying forward, because an object in motion stays in motion until acted upon by another force, your body wants to stay in motion, and your car suddenly stops.
 - So if you were sitting on a couch above a hole and something pulls the couch away you would fall in the hole because an object at rest wants to stay at rest so that is why you would fall in.

Law #2 - $F = ma$ (Force = Mass x Acceleration)

- Acceleration is produced when a force acts on a mass.
 - So if you were sitting in a chair and your strong friend pushed you, you would go fast because your friend has more strength. If you pushed your friend and you weren't as strong and he was heavier than he would go slower.
 - If there was a ramp and you pushed down a bowling ball and a tennis ball down the ramp, the bowling ball would make it down faster because it has more mass.

Law #3 - Force pairs. For every action there is an equal and opposite reaction.

- For every action there is a reaction.
 - So if you were shooting a gun the action is the bullet and the reaction is the kick from the gun.
 - If you were riding a sea do the action is you going forward and the reaction is the water spraying up in the back.

Time to go Sledding

I was sledding down the Zeeland Christian hill and I went very far but then I stopped because of law #1. I would have kept on going forever if friction didn't stop me, that's why you can't go sledding on grass to much friction. My friend went down too, he went faster and farther because of law #2. He weighs more than me so he accelerated faster so he went faster down the hill. This also goes with law #3. It does because the action is me pushing the reaction was me going down the hill.



Where you'll see this on the pinball machine

You'll see law #1 on our flippers, because they would keep on going if we hadn't put a nail and a rubber band and attached it on the flippers. You'll see law #2 when the metal ball is rolling down the pinball machine. You'll see law #3 on our bumpers the action is the ball bouncing off the bumpers, the reaction is the rubber bands vibrating.

Marbles On A Ramp

What I Learned From The Experiment

I learned that gravity pulls the marbles down the ramp. I also learned that friction slows the marble down. I learned that more mass = more speed and the less mass the less speed. At the top it went the slowest then it accelerated on the way down the ramp (meter sticks). If you put cooking oil on the marbles they would go faster because Friction is reduced.

“Lets ride!”

Once we were at Busch Gardens, and my dad and I love to ride roller coasters. There was a roller coaster that went straight down, and at the top it went slowest and it accelerated down till the bottom it was awesome.



Where you'll see this on the pinball machine

You'll see it when you hit the ball with the flippers the harder you hit the longer it has to speed up until the bottom of the pinball machine.

Final Reflection

Content

A pinball machine is way more scientific then I thought because everything is scientific and you realize it more when you build, or spend a lot of time on something you notice that it's more scientific then you thought.

One thing that surprised me is that we had a lot of problems with our flippers and I thought it would be the easiest part of the pinball machine.

One thing that I learned is that we need to check before we nail or do something, a solution is we could measure twice before we cut something, we should check before we something on our pinball machine.

Collaboration

Some of the joys of working in a group were, it was good that we could be doing more than one thing at a time.

Some of the struggles of working in a group were, sometimes we didn't agree on stuff like the flippers or the launcher but we always worked it out.

Goal(s)

For future group work we could do better on all contributing to the group.

Before market day we could grow by, using all of our time so we can get everything done and over with.

About The Author



Landon Culver lives in Zeeland, MI. I go to Zeeland Christian School, I was born in 2003, My birthday is on Sep. 28. My hobbies are, soccer, running, singing, sports, and reading. My favorite subject is math or PE.

Glossary

attract - To attract means to pull toward one another. Iron and steel objects are attracted to magnets.

battery - A battery is an electric cell that provides electricity or a power source for a variety of electrical devices. The battery is a source in an electrical circuit.

closed circuit - a closed circuit has a complete path, which allows electricity to flow continuously.

conductor - A conductor is a material that allows electricity to flow through it. Metals are examples of good conductors.

current electricity - Current electricity is the flow of electric charge through a wire or another conducting material.

electricity - Electricity is a form of energy that is found in nature (lightning, static) and can also be produced through rubbing, chemical reactions, and generators. Electricity is produced through the movement of electric charges.

electromagnet - An electromagnet is produced when electricity flows through a coil of wire wrapped around a iron bar. It acts like a magnet.

friction - Friction is rubbing of surfaces. Friction can produce heat energy.

light bulb - a light bulb is a lamp or light source whose light is produced by the glow of a heated wire. The light bulb requires an electrical circuit to heat the wire.

load - A load is the part of a circuit that uses electricity by giving off light, sound heat, or increasing magnetic interaction. Light bulbs, motors, and electromagnets are examples of loads.

magnet - a magnet is a material that has the ability to attract iron, steel, or an iron alloy.

magnetic - A magnetic material is substance that is attracted to a magnet and can act like a magnet.

magnetic field - A magnetic field is the area of attraction and repulsion that surrounds a magnet.

magnetic pole - A magnetic pole is a place on a magnet where the magnetic effect is the strongest. The two ends of a bar magnet are it's poles.

magnetically attract - If two objects magnetically attract each other, they are pulled toward each other. Iron and steel objects are magnetically attracted to magnets. When two unlike poles of magnets are placed near, they are magnetically attracted.

magnetically repel - If two objects magnetically repel each other, they are pushed away from each other. When two poles like poles of magnets are placed near, they are magnetically repelled.

open circuit - An open circuit has a break in the conducting material of the path. Electricity cannot flow continuously in an open circuit.

path - A path is the part of a circuit along which electricity travels. The path is made of conducting material.

reflection - Reflection is the light that bounces off a surface.

simple circuit - A simple circuit is a circular path of electric current, from source of energy and back. A complete circuit includes a source, path, and load.

source - A source is the part of a circuit that pushes electric current from the conducting material. along the path. Batteries are examples of a source.

switch - A switch is a device made of conducting material that can open and close an electric circuit.

wire - The wire in an electrical circuit provides a path for the flow of electrons from the source (battery) to the load (light bulb).

Special Thanks,

Thanks to Battle Creek Math and Science Center and Ross Copper.

Thanks For Reading!