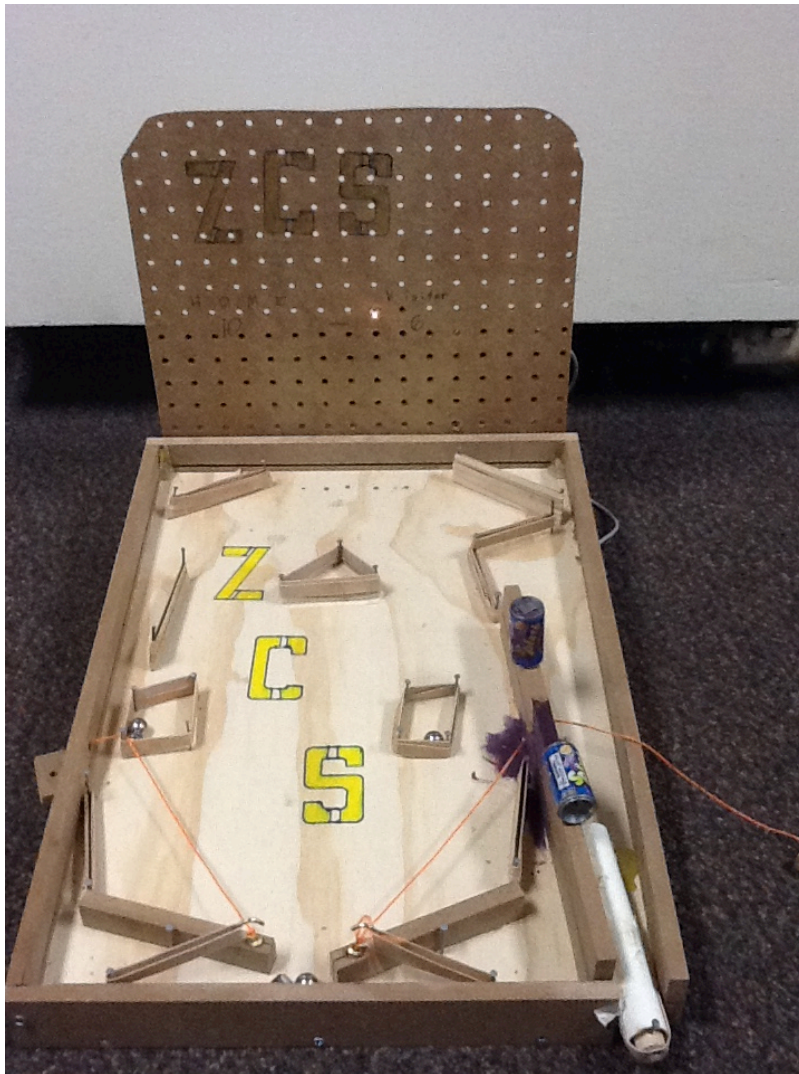


# How Scientific is a Pinball Machine ?



CadeVandenbosch

Mr. Commeret's class  
2013

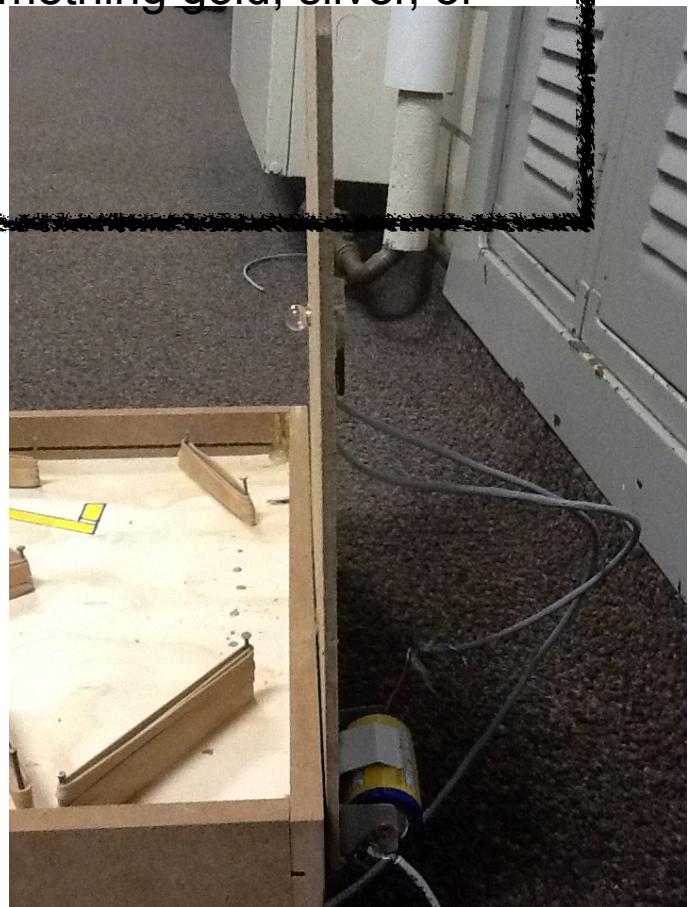
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## Making a bulb light up

A circuit has to be a complete circle. You connect the wire to either side of the battery, the positive and the negative side. Then you put one wire going up one side of the battery and one going up on the other side. So the wires go up on either side of the battery like a circle. Then the light bulb has to be touching the copper parts on the end of both wires so that the energy from both the positive and the negative side of the battery can give energy to the light bulb so that it can light up. The circuit must be a complete circle or it won't work. The battery is the source of energy, the wires are the path to the light bulb, which is the load, which means the thing you want the electricity to go into. You can also use a conductor, which is something that the wire connects to so that the electricity can travel through it. The conductor has to be either something gold, silver, or metal.

where you will see this on our pinball machine. You will see this in the the back of the pinball machine and under the machine and the front of the board that is facing up words



## Electromagnets

1. what was the best part about the pinball machine project?

The best part of the pin ball machine was the circuit because whenever the game was done the ball would hit metal and the light would go on.

2. what were some of the joys working in the group?

Was that you have friends to help and the work would go a little faster.

3. What were some of the struggles working in a group?

some of the struggles were that we would not agree on some of the stuff we wanted to build.

Goals for group work are that we should work together more.

Where you will see this on my pinball machine is...

Is in the left hand corner and if you make it so it goes up there and get's stuck there you loose



# Newton's laws of motion

## 1st Law of motion

- “the law of inertia”- An object at rest will remain at rest unless acted on by an unbalanced force. An object in motion continues in motion with the same speed and in the same direction unless acted upon by an unbalanced force.
- Examples:
  - A person sky diving -- when the parachute opens it slows the fall.
  - A marble rolling on a floor-- it will slow down because of Friction

## 2nd Law of motion

$$f=ma$$

- Acceleration is produced when a force acts on a mass the greater the mass (of the object being accelerated) the greater the amount of force needed (to accelerated the object).
- Example:
  - A fully loaded truck will have a harder time to stop than a not fully truck.
  - A person on a chair is harder to push then a person not on a chair

## 3rd law of motion

### Force-Pairs

- For every action there is an equal and opposite reaction.
- Example: if you shot a gun the Bullet would go one way and the gun would go the other way which is called a kick.
- If someone was on a scooter and tried to push a cart the person on a scooter would go backwards and the cart would go forwards which is called an equal and opposite reaction

### Newton's laws of motion

what i learned about law 1 is...

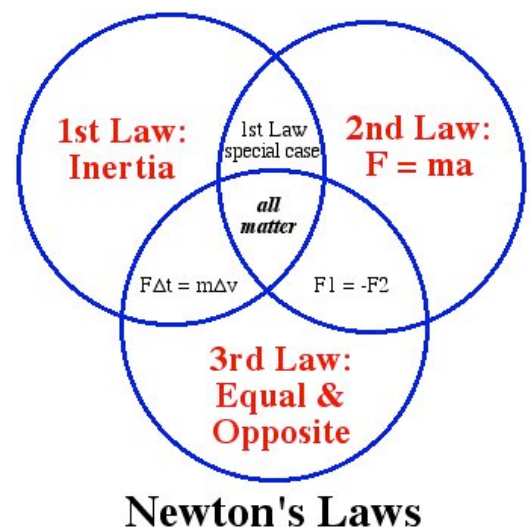
That if you are driving straight and you turn left or right your body wants to stay straight and the car is turning left or right so it feels like you are swerving because your body wants to stay going straight but the car is turning left or right...

what i learned about law 2 is...

That we pushed an empty chair across the room and felt how heavy it was (the mass) we did not need a lot of force to push it. And then we pushed someone across the room in the chair. It took a lot more force to push it across the room...

where you will see this...

when you hit the ball and it goes up the ramp and the board is tilted so the ball will go down the ramp again and again.

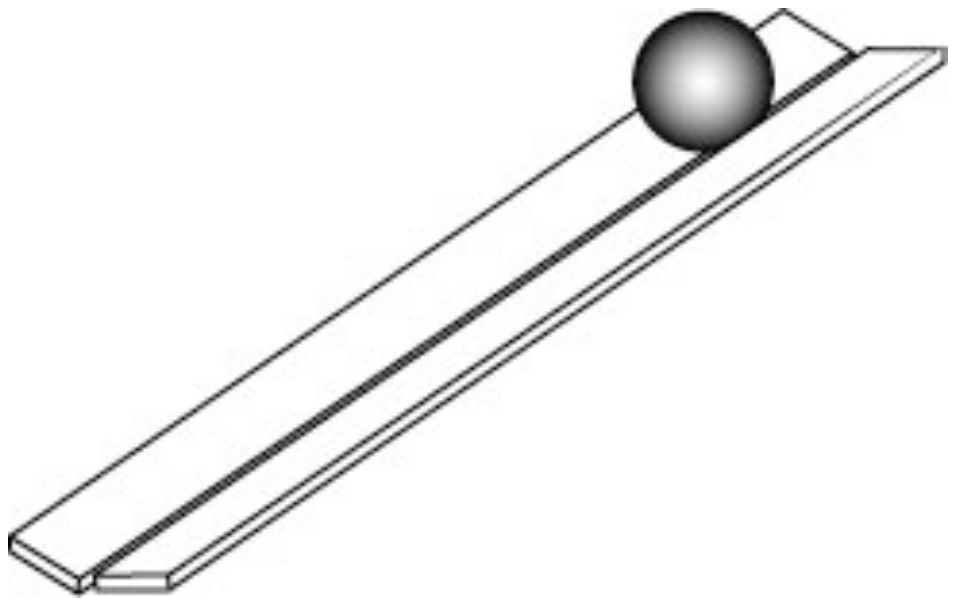


## Marbles on a ramp

What I learned...

I learned that the force makes the marbles go down the ramp. It starts out slow and go faster and faster until an unbalanced force acts upon it. the bigger the marble the faster it will go. The little marble will go slower because it is litter and the friction will make it go slower.

### final reflection



where you will see this...  
when you hit the ball and it  
goes up the ramp and the  
board is tilted so the ball will go down  
the ramp again and again.

## Final reflection

content

the pinball machine is more scientific then I fought because it takes a long time to build the flippers and launcher.

I was surprised that the flippers were actually kind of easy to build.what was one thing I learned how to make a electric circuit and flippers and the launcher.

2. What were some of the joys of working in the group?

Was that you had friends help you out and the work would go faster.

3. What where some of the struggles working in the group? Some of the struggles where that we would not agree on some of the stuff we wanted to build.

Goals for group work are that we should work together more.

### GOALS

to listen to other peoples ideas so it will be a better pinball machine if we take other peoples ideas.

We should let the other people in are group have a turn.

we can try to work and try not to fight so we work together it can get us money to get the supplies we need to make the things we need.



## about the author



my name is cade and I was born in grand rapids. My favorite sport is basketball and soccer. I was born on april 27, 2003, I like to ride my bike in the summer and some times in the winter. My favorite college team is [Michigan](#). I like to take trips to Florida and Hilton Head.

## 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 electrical charges.

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

**Friction** - Friction is the 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 a substance that is attracted to a magnet and can act like a magnet.

**Magnetic field** - A magnetic field is the area of

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**Magnetic** - A magnetic material is a 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 its 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 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

**Repel** - To repel means to push away from one another.

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

**Source** - A source is 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 materials that can open and

**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 to Battle Creek Area Mathematics and Science Center!**