

The 3 “E”s: Easy, Exciting and inExpensive Physics



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PORTAGE, MI

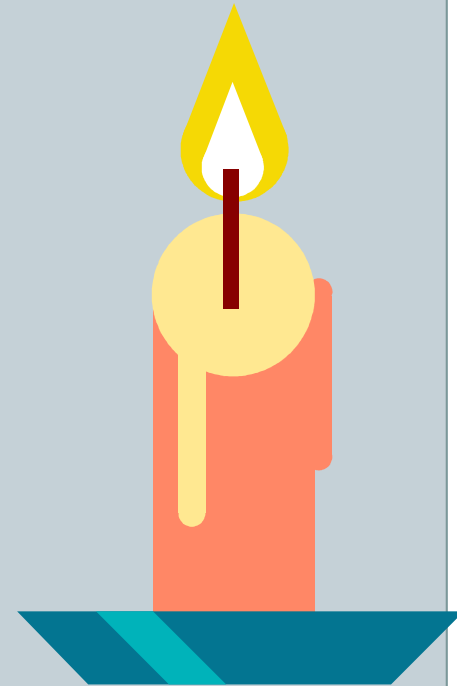


First Day: Observation Exercise



- Observe the object and tell me what you see.
- The object will be changed...make more observations.
- One more change...what do you observe?

Why do we do this activity?

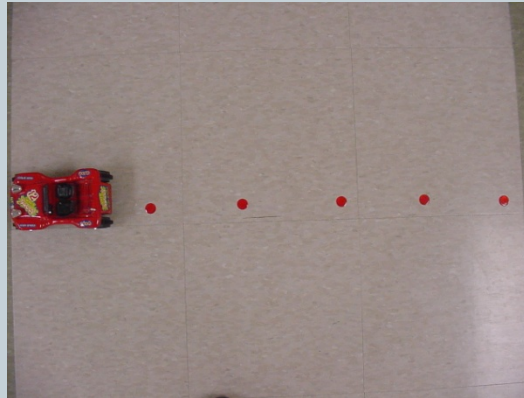


Motion Lab “Dot” Timer

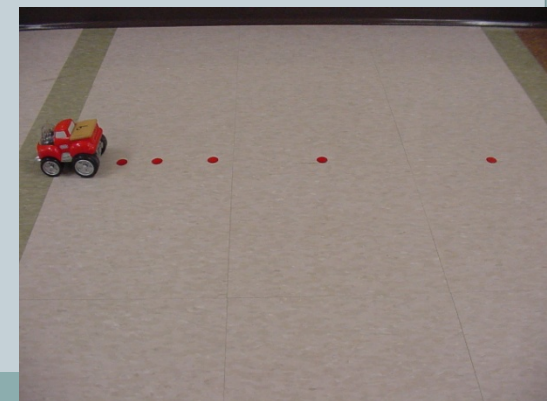
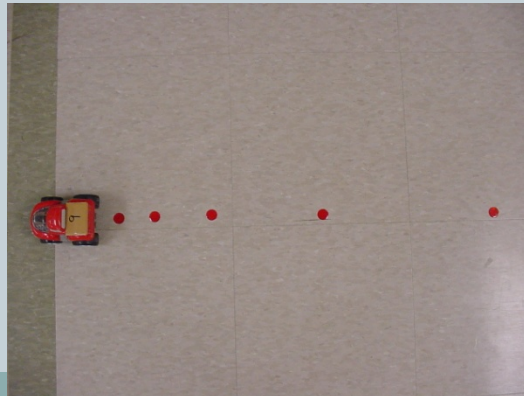


- Use bingo chips (Magnetic ones make clean-up FUN!), poker chips, pennies
- Time for 1 or 3 seconds. Mark each time interval.

- Constant Motion Vehicle



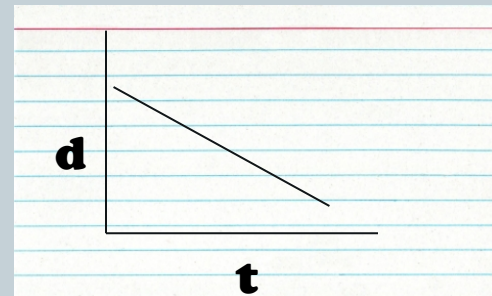
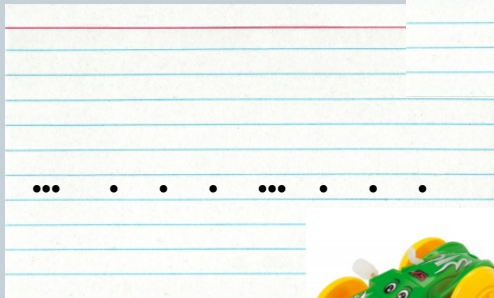
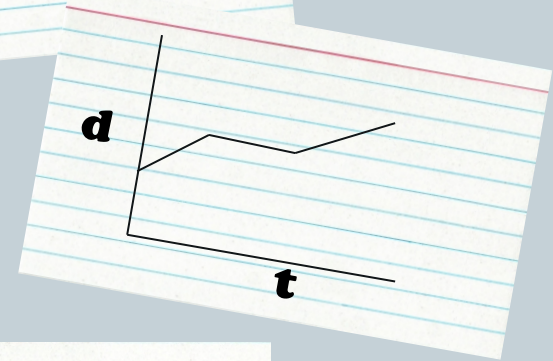
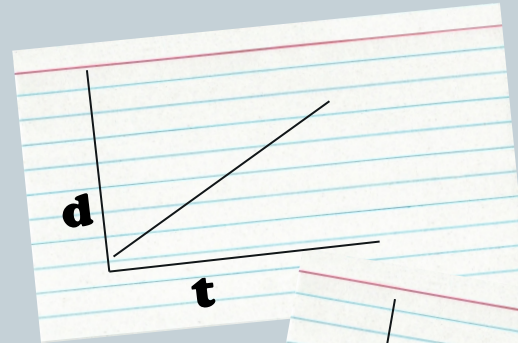
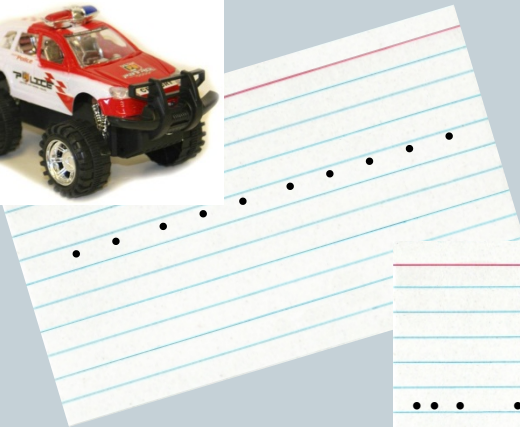
- Negative Acceleration Vehicle



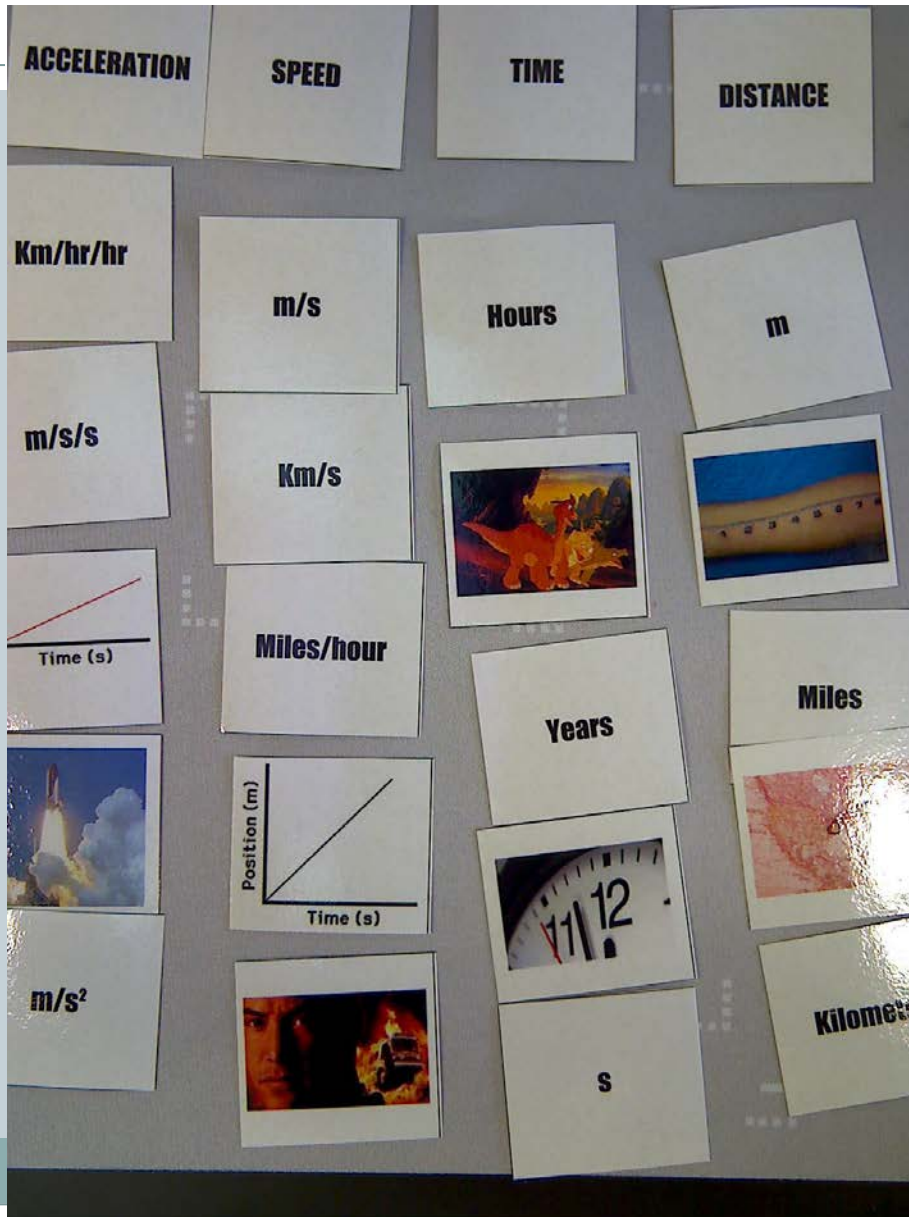
Dot Diagram/Graph Matching



- Using the cars from the dollar store, match the car with the diagram/graph.



Motion Matching



4 main categories:
**Acceleration, Speed,
Time, Distance**

Students sort all the
other cards in these 4
categories.

Direction of Acceleration



- The Acceleration Jar
Topics: Force, Acceleration, Inertia
- How are Force and Acceleration related?
- Which has more Inertia, water or the fishing bobber?
- Predictions First!

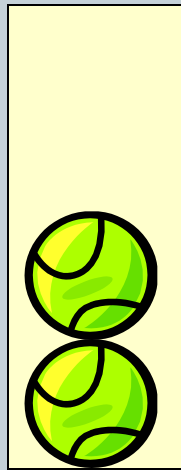


Centripetal Force



Tennis Ball Demo

Tennis Balls
in Air

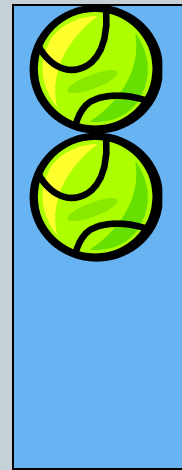


Before

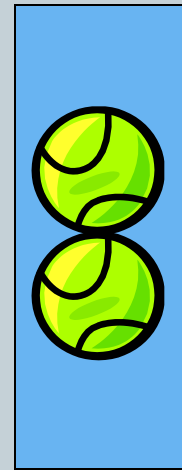


After

Tennis Balls
in Water



Before



After

Tennis Balls Centripetal Force Demo Videos



Tennis Balls in Air

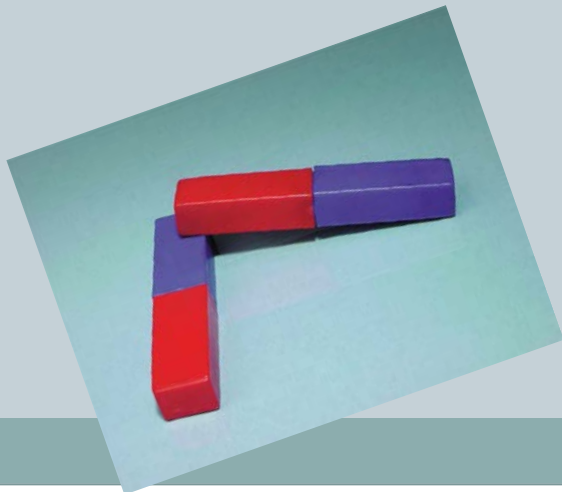
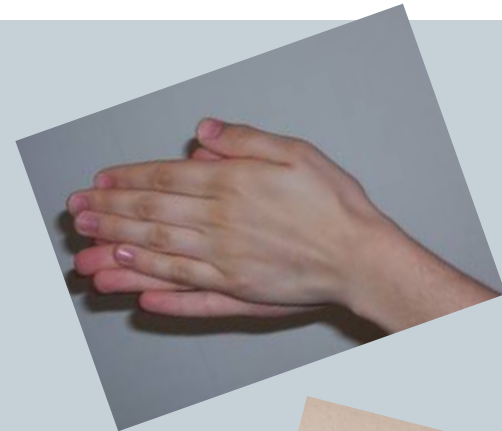


Tennis Balls in Water

Forces Inquiry



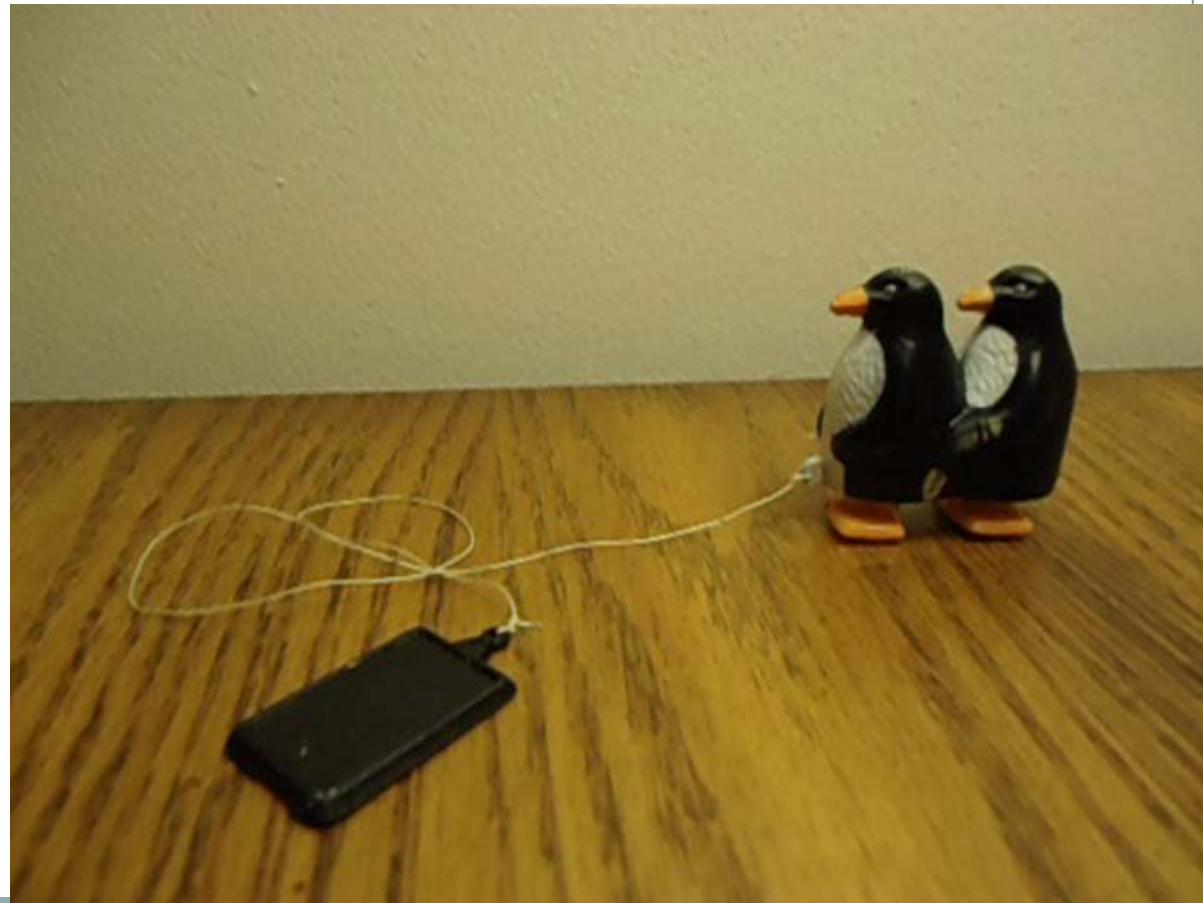
Drawing	Are there forces? ___ Yes ___ No	What object receives the force?	Name of the force?
	What/Who is applying the force?	What effect does the force have on the object?	



“Gravity” Walkers



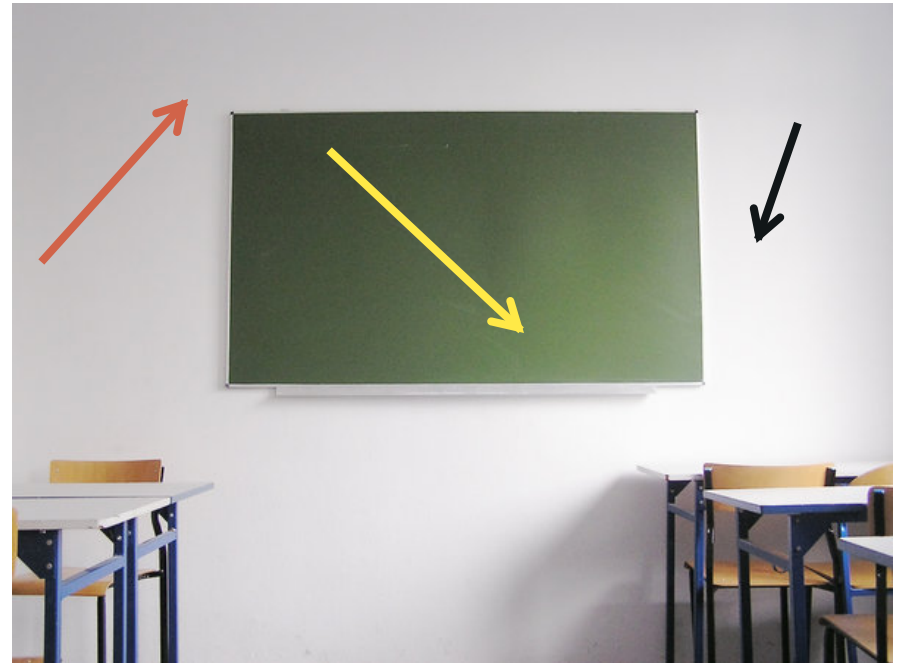
Topic: Forces



Tape... as force vectors.



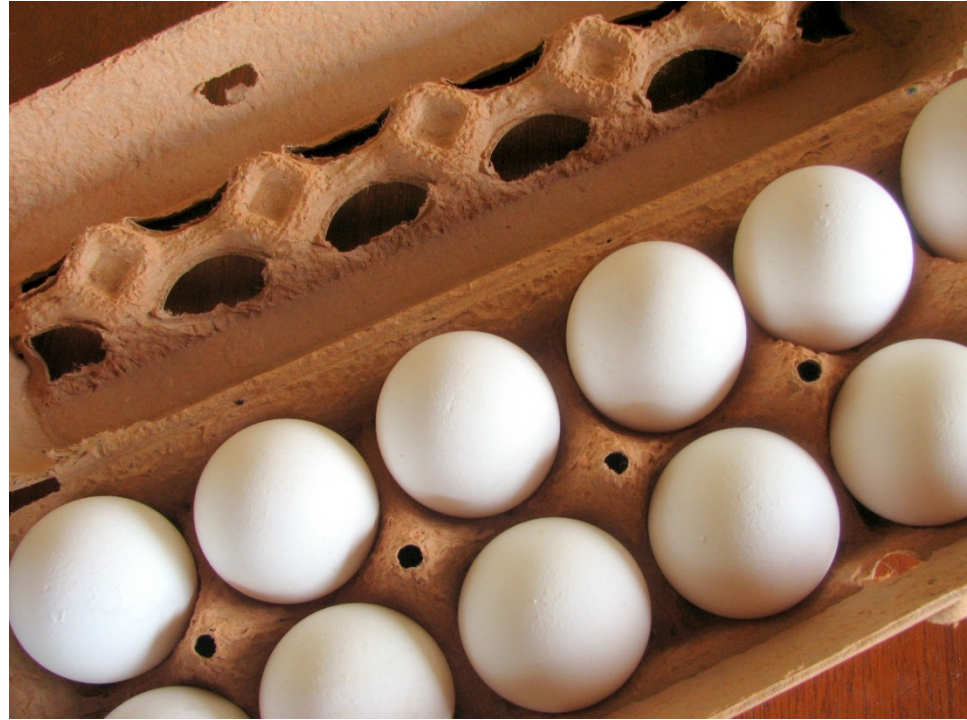
1. Find the magnitude and direction of the (orange) vector.
2. Find the horizontal and vertical components of the vector.
3. Extension Idea—
Drinking Fountain



Momentum/Impulse

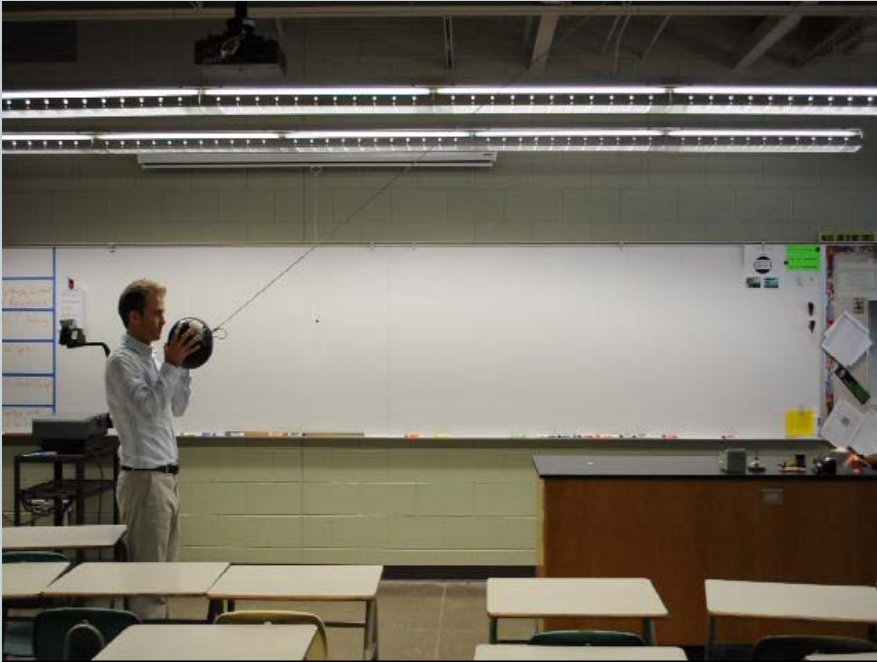


- Egg Toss/Egg Drop
- Dropping eggs from 2 stories or any significant height
- Design & Construct a container w/ 4 sheets of paper and a meter of tape.
- Great use of WHOOPS paper!



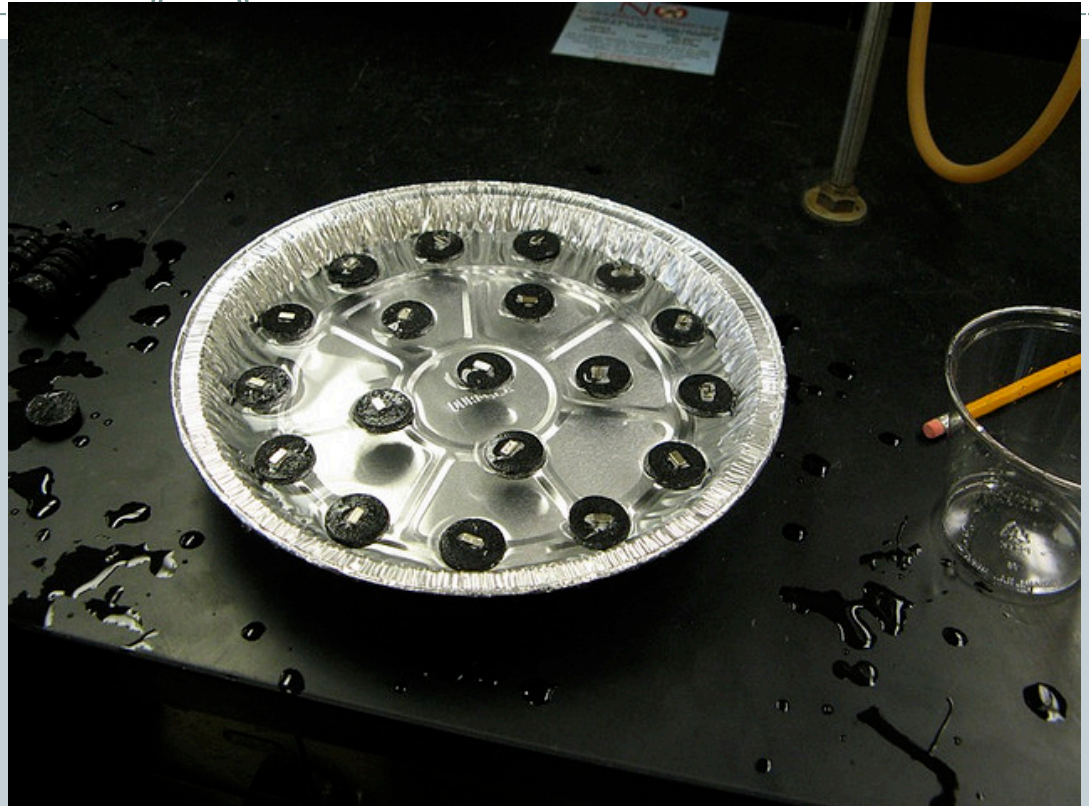
Bowling Ball: Conservation of Energy

Topic: Conservation of Energy



Tip: Use string and a softball for smaller demo

Self - Assembly




http://farm2.static.flickr.com/1125/1056809574_cd8d601c5b_z.jpg?zz=1

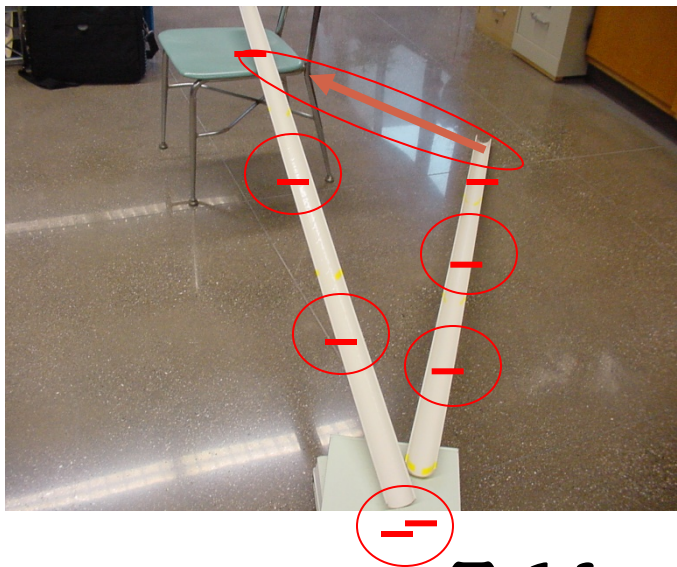
Topics: Self-assembly, Static, Forces

$$V=IR$$

Electric Circuit Model




Ramp=Wire
Ball=Charge
**Low Ramp
to High
Ramp=PD**
**Sock w/out
toe=
Resistance**



*** 6 Students:**
1 Driver
5 Gates
*** Halved PVC
Pipe**

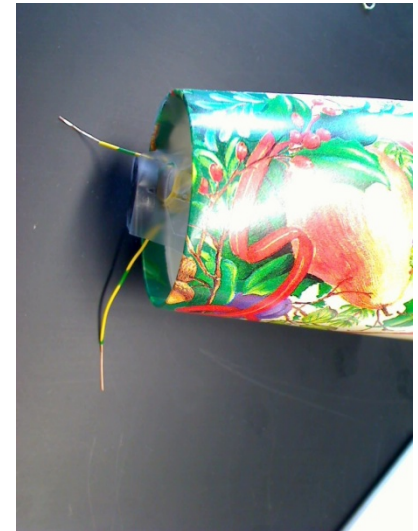
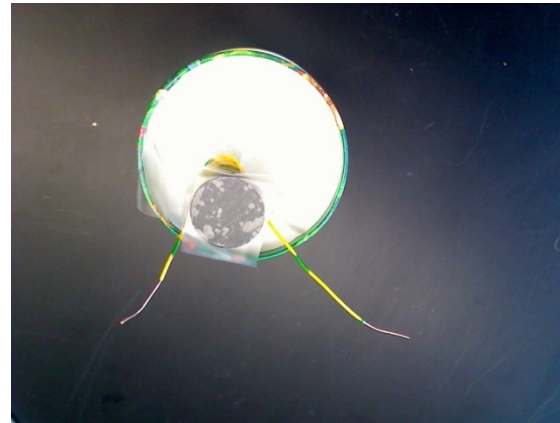
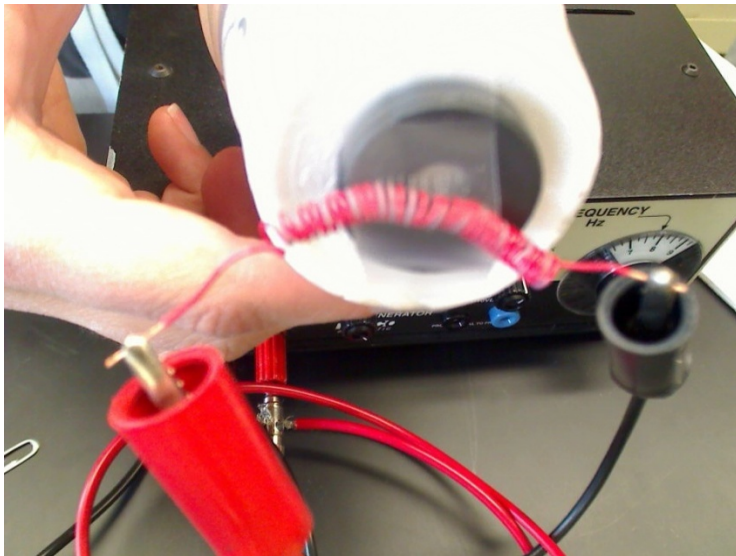


Taking Charge, NSTA Press

Fun with Physics

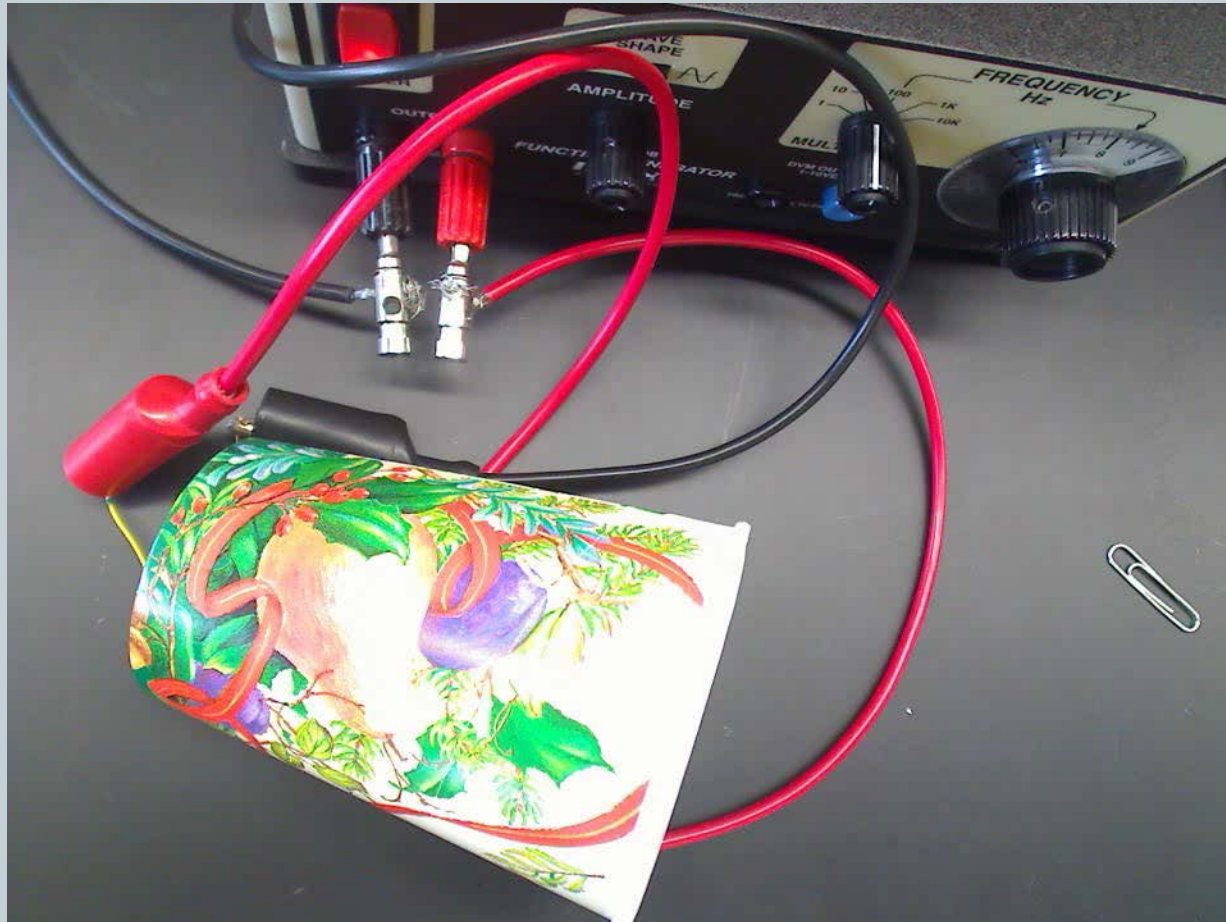


- **Sound/Speaker Lab** — Review of sound and intro to technology unit



Topics: Electricity and magnetism, sound

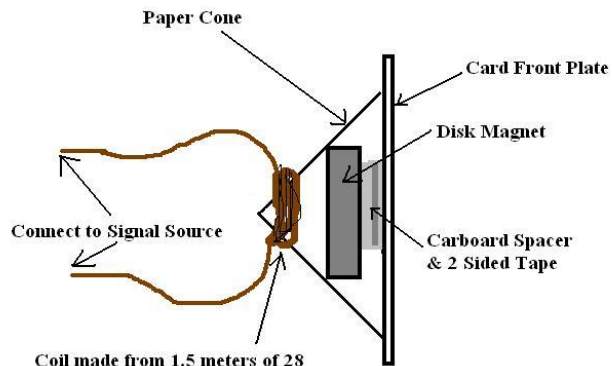
Shhh...



Sound Demonstrator

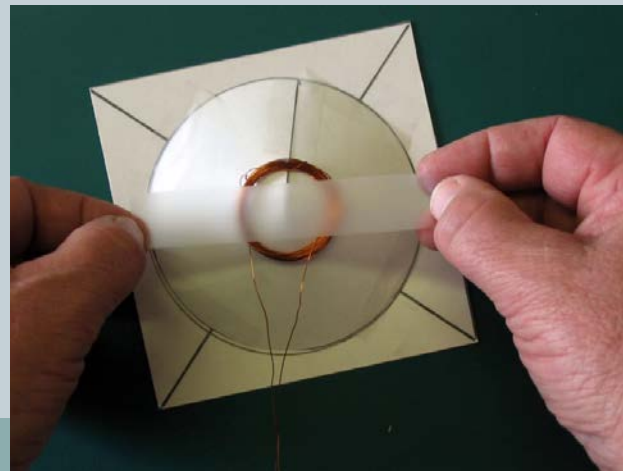
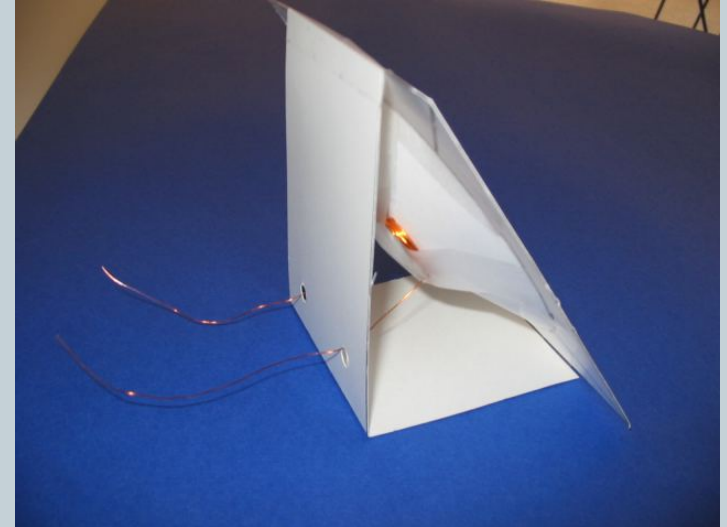


http://hilaroad.com/camp/projects/speaker/A_Demonstration_Speaker.html



Coil made from 1.5 meters of 28 gauge magnet wire.

Caution: This demonstration speaker may damage a radio or other electronic device if connected to it. Impedence < 1 Ohm



Gas Laws (minus the n and the R)

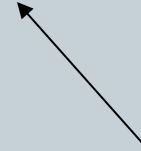
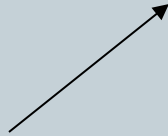


P T V

Charles Law

Boyles Law

Gay-Lussac



Homemade Wave Motion Demonstrator



Topics: Properties of waves

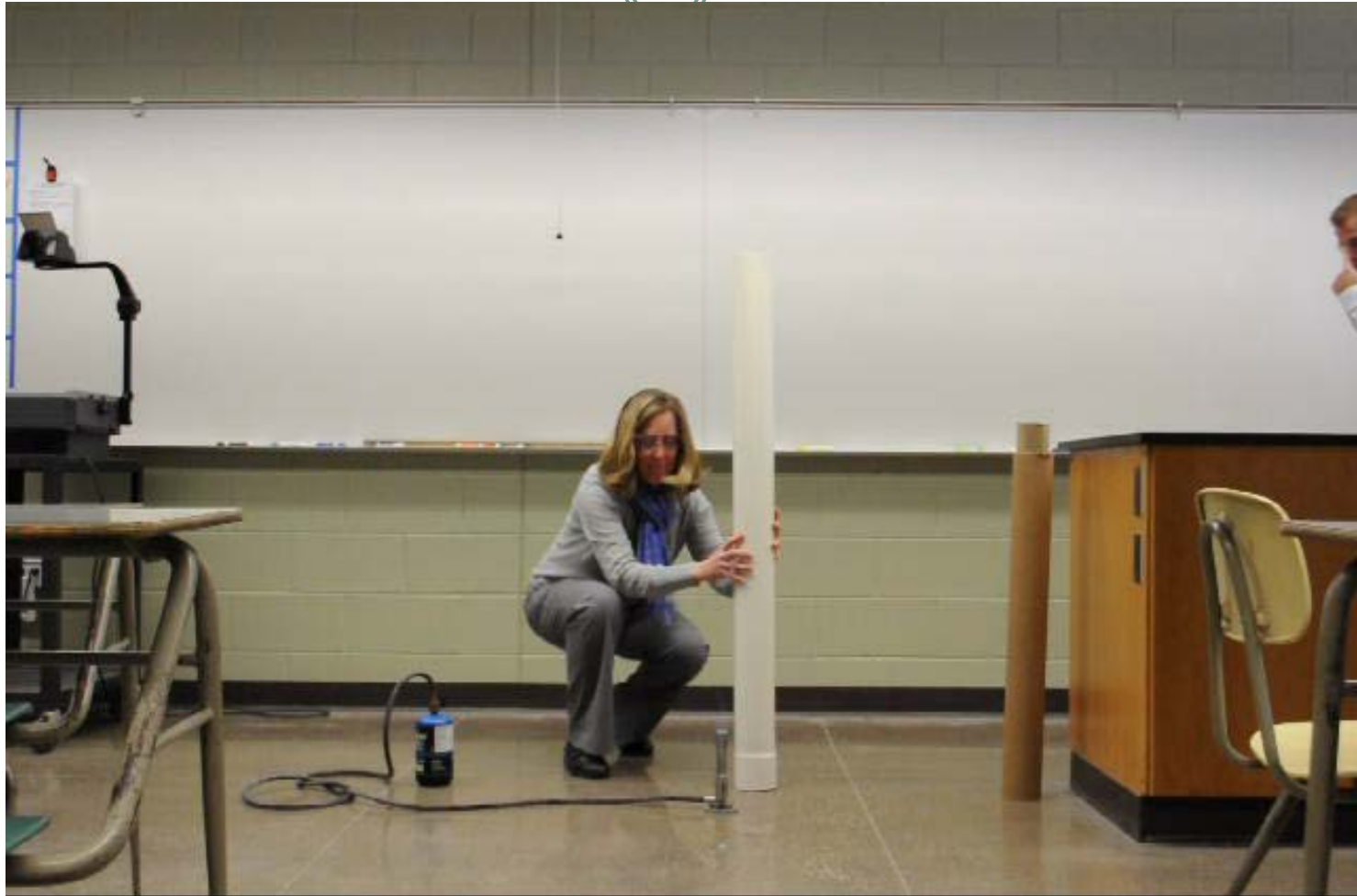
From The National Stem Centre in the U.K.

<http://www.nationalstemcentre.org.uk/elibrary/resource/2096/wave-machine>

[Wave_Machine.mp4](#)

Hoot Tube

Topics: Sound waves, resonance

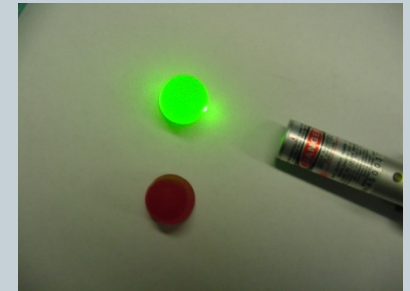
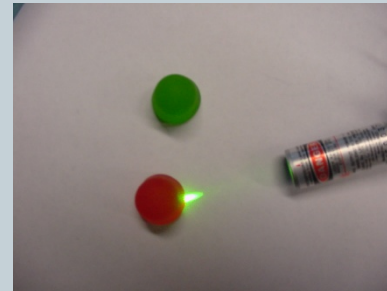


- <http://www.physics.umn.edu/outreach/pforce/circus/>

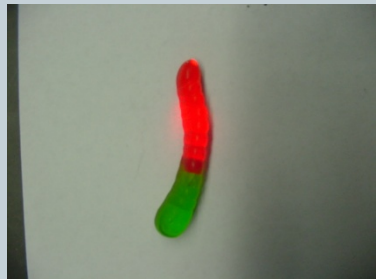
Lasers and Gummi's



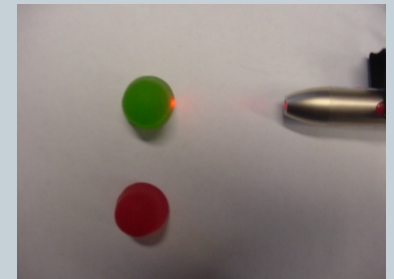
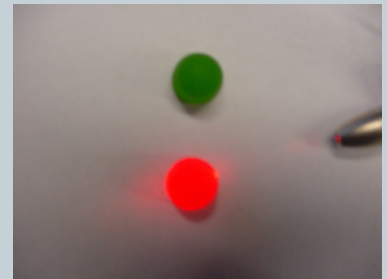
Green Laser



Green Laser



Red Laser



Red Laser

Topic: Light and color

Thank You—Questions?



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Presentation at

<https://sites.google.com/a/portageps.org/dhertel/>