Magnetic Fishing Game

Materials (per classroom)
- 1 small magnet
- 1 stick or pole, about 30 cm (1 foot) long
- string
- small steel washers
- tape
- paper
- crayons or markers

Make a magnetic game to play in your classroom.

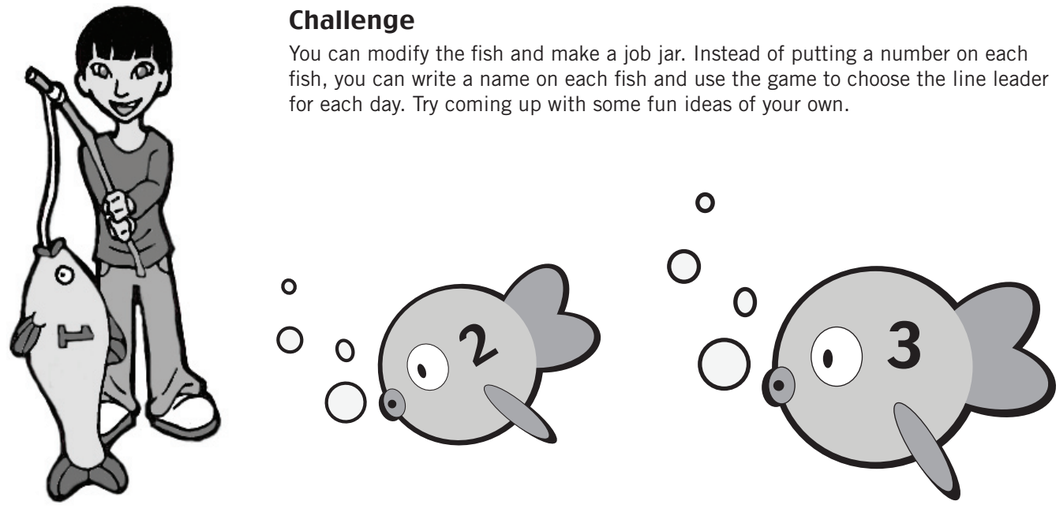
Procedure

- Tape or tie the magnet to one end of the string.
- Tie the other end of the string to one end of the stick. This is the fishing pole.
- Have each student cut out paper fish and color them.
- Number the fish from one to four. This is the number of points each fish is worth.
- Tape a steel washer to the back of each fish and put all of the fish into the bowl or bucket.
- Have students catch a fish by dipping the fishing pole into the bucket.

This game can be played with two or more people. Each player can make their own pole, or share one. Students take turns catching fish. To keep score, add up the numbers on each of your fish. The person with the highest number wins.

Challenge

You can modify the fish and make a job jar. Instead of putting a number on each fish, you can write a name on each fish and use the game to choose the line leader for each day. Try coming up with some fun ideas of your own.



Resources

Find these books at your local library or bookstore:

101 Physics Tricks, by Terry Cash, 1991
175 Science Experiments to Amuse and Amaze Your Friends, by Brenda Walpole, 1988
175 More Science Experiments to Amuse and Amaze Your Friends, by Terry Cash, Steve Parker and Barbara Taylor, 1989
200 Illustrated Science Experiments for Children, by Robert J. Brown, 1987
Light, by John and Dorothy Paull, 1982
Physics for Every Kid, by Janice VanCleave, 1991
Physics for Kids: 49 Easy Experiments with Electricity and Magnetism, by Robert W. Wood, 1990
Physics for Kids: 49 Easy Experiments with Optics, by Robert W. Wood, 1990
Physics for Kids: 49 Easy Experiments with Acoustics, by Robert W. Wood, 1991
Simple Mechanics, by John and Dorothy Paull, 1982
Simple Physics Experiments with Everyday Materials, by Judy Breckenridge, 1993
Science On Wheels website: www.pacificsciencecenter.org/education/sow

Credits

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SCIENCE On WHEELS

POW! Physics on Wheels

Dear Teacher,

Thank you for having the *Physics on Wheels* van visit your school. We hope you enjoyed investigating physics with your students during this Science On Wheels experience. This flier is intended to help continue the enthusiasm generated by our visit and extend your students' learning.

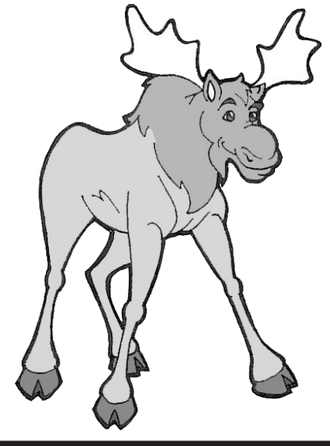
The following activities have been selected because they are straight-forward, require few materials, and support state-adopted learning objectives. The one-page insert is written for your students, with activities you may choose to do as a class, or copy for home use.

Thank you again for having the *Physics on Wheels* van visit your classroom and remember, have fun!

~Science On Wheels Teachers

Moose Callers

Materials (per student)
- 1 paper cup
- 1 piece of string, 60 cm (2 feet)
- 1 paper clip
- 1 paper towel
- water



Build a string instrument that makes use of household items.

Procedure

- Use the paper clip to punch a hole in the bottom of the paper cup.
- Take the string and thread it through the hole in the paper cup.
- Tie the paper clip to the string so that it will lie flat on the inside of the cup.
- Pull the string so the paper clip lies flat on the bottom of the cup.
- Hold the cup in one hand, letting the string hang down. With the other hand, pinch the string between your finger and thumb and slide down the length of the string.
- Wet your piece of paper towel and rub it down the length of the string in the same manner as before. This should improve the effect because the water is increasing the friction as you rub the towel along the string, creating more vibrations.

Challenge

Try rubbing different materials, such as a cloth handkerchief or a sponge, down the string. Does the sound change with different materials? Substitute a rubber band for the string. Pluck the rubber band with your finger. Note the sound produced. How does the sound change as the rubber band is stretched more tightly? Try this activity using different sized cups, cups made of different materials (styrofoam, disposable plastic), or cans.

What's going on?

When you rub the string of your Moose Caller you are making vibrations in the string. The vibrating string also makes the cup vibrate, which makes the sound louder.

Light Blockers

Materials
(per student or team)
- 2 pairs of polarized sunglasses

Procedure

- Look through one pair of glasses. What do you notice?
- Hold the second pair of glasses in front of the first pair and look through the lenses.
- Rotate the second pair of glasses. Now what do you notice?

Challenge

Look through one pair of glasses at a reflective surface, like a mirror, piece of plastic, or hood of a car. Slowly rotate the pair of glasses. What do you notice?
Liquid crystal displays, such as screens on laptop computers, cell phones, and digital cameras, are polarized. Look at a screen through a polarized lens and rotate the lens. What happens?

What's going on?

Light vibrates in many directions as it travels, including vertically and horizontally. When sunlight strikes a horizontal surface such as a lake or the asphalt road, much of the vertically vibrating light is reflected. The reflected light is now horizontally polarized; the light is only vibrating horizontally. Polarized sunglasses are designed to block horizontally polarized light, reducing glare when driving or boating.
When two pairs of sunglasses are turned the same way, both sets of lenses block horizontally vibrating light and allow vertically vibrating light to pass through.
When one pair of lenses is turned, the vertically vibrating light is also blocked and no light passes through.

Pepper Collector

Separate salt and pepper using static electricity!

Materials
(per student or team)
- salt
- pepper (finely ground)
- plastic pen
- felt or wool
- dish or paper

Procedure

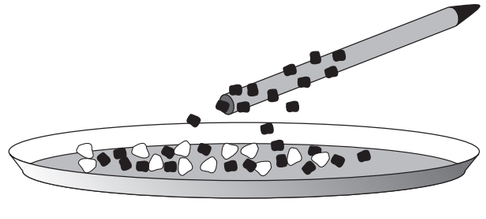
- Sprinkle a little salt and pepper onto a dish or piece of paper.
- Hold the pen in one hand. With the other hand, rub the pen very hard 20 times with the felt or wool.
- Hold the pen close to the salt and pepper mixture. What happens?

Challenge

Can you separate all the pepper from the salt?
How close does the pen have to be to pick up the pepper?
Can you increase this distance by changing the way you rub the pen?
Try rubbing the pen with paper, cotton or tissue. What happens?

What's going on?

When you rub the pen, you cause the pen to become charged with static electricity. Both the salt and the pepper are attracted to the static charges on the pen, but the pepper jumps up to the pen first because it is lighter than the salt. If you hold the pen too close, you will also pick up the salt.



Physics Careers

Have you ever wondered why helium-filled balloons rise? Why water boils? Or how a big, heavy airplane can fly? If you have, you were wondering about physics!

Physics is the study of energy and matter. Physicists explore the physical world and try to explain how things like light, sound, electricity and magnetism work. Physics provides us with guidelines for how the world works. This allows us to predict how things around us will behave, which, of course, is very useful. The study of physics has led to the invention of everything from the telephone and the engines in our cars, to computers and the Space Shuttle.

A physicist can study everything from the individual parts that make up an atom to the makeup of the human body. While it takes a lot of hard work in school to become a physicist, it can be very exciting!

Careers in physics require a strong background in math and science. Someone who goes to college and wants to major in physics can begin in elementary school by observing the world and asking "What would happen if?" In high school a student can prepare by taking courses such as algebra, geometry, chemistry and physics.

Once in college, a physics major takes calculus and introductory physics classes. A physics major will also take classes like thermodynamics, electromagnetic theory, mechanics and much more. Physics is an exciting science, in part, because it includes so many different fields. After earning a bachelor's degree in physics, some students decide to go on to earn a master's degree or a Ph.D.

A person who earns a college degree in physics can enter a variety of career fields. Some professional physicists focus on fields like astronomy and astrophysics. They may study distant stars and galaxies, and try to discover how we can get there. Other traditional fields for physicists include electronics, geophysics, medical, nuclear or theoretical physics. A geophysicist studies our planet and the invisible forces within and around it.

As a medical physicist, you could use radiation to treat diseases of the human body, or use it to look inside the body to make a diagnosis. Besides the traditional physics fields, there are some related fields that involve people who have studied physics. Some of these include computer science, environmental science, oceanography, aerospace engineering, civil engineering, electrical engineering or even working at the Pacific Science Center. These are all careers where physics is used to make important discoveries all the time! Some people combine their interest in physics with other studies and enter fields such as software development, patent law, sports science, or telecommunications. Almost anything you could imagine uses knowledge of physics.

It is surprising how often knowing something about physics can come in handy. Have your class try to figure out how a knowledge of physics would help in each of the following careers or hobbies:

- violin maker
- professional athlete or coach
- sculptor
- race car driver
- movie stunt person
- tight-rope walker
- snow boarder
- bungee jumper
- special effects designer
- magician
- baton twirler
- furniture mover
- elevator operator or repair person
- bicycle designer
- police officer