Faux Fishing Rods

An innovative way to reel 'em in!

In this activity, creative thinking and artistic expression combine with magnetism to create a cool teaching tool.

Topics: Creative Thinking, Artistic Expression, Magnetism

Materials List

- ✓ 2 Hanging File Folders, any size
- ✓ Paperclips
- ✓ 1 Retractable telephone cord cartridge w/ at least 122 cm (~4') cord length
- ✓ Magnet, 7/8" x 3/16" x 1/4"
- ✓ Tape, any kind
- ✓ Single-hole punch
- ✓ Scissors
- ✓ Fish shapes or pictures (die cuts available at RAFT)

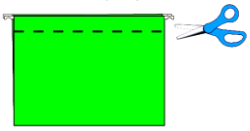
This activity can be used to teach:

Next Generation Science Standards:

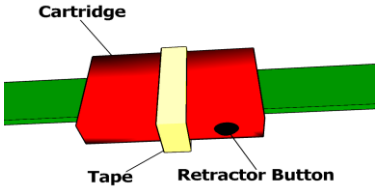
- Properties of materials (Grade 5, Physical Science 1-3)
- Electric or magnetic interactions between objects not in contact with each other (Grade 3, Physical Science 2-3; Middle School, Physical Science 2-5)
- Magnets (Grade 3, Physical Science 2-4; Middle School, Physical Science 2-3)

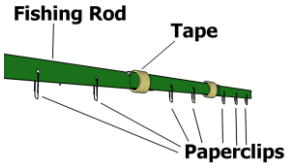
Assembly

1. Cut the metal hangers off of 2 hanging file folders leaving about 2.5 cm (1") of folder material attached to the hangers, as shown. Set aside the remaining file folder pieces to use in step 10.

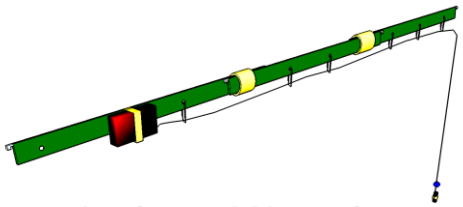


2. Align three of the hangers end to end. Overlap the ends of each by 5 cm (~2") and tape them together to form a "rod."
3. Starting from one end of the rod, punch a hole in the paper portion of the hangers about every 10 cm (~4") along the length and 1¼ cm (~½") from the bottom.
4. Attach paperclips to the rod by looping one clip into each of the holes (as shown).
5. Tape the retractable phone cord cartridge to the rod about 20 cm (~8") from one end. Make sure the retractor button will face downward when the rod is held.

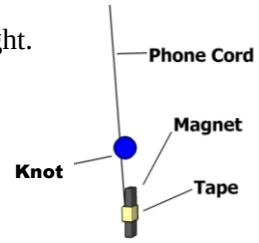




6. Fully extend the phone cord until it locks in place. If there are two phone cords, tie a knot in **one** cord next to the cartridge and cut that cord off.
7. Cut the plastic piece off the end of the (remaining) extended cord. Note: Do not push the retractor button on the cartridge until after step 8.
8. Thread the extended phone cord through the loop of each paperclip and then tie a knot about 5 cm (~2") from the end.
9. Tape a magnet to the end of the phone cord as shown at the right.



Completed Faux Fishing Rod



10. Hand cut or die cut paper fish from the remaining file folder material, or mount fish pictures on file folder sections. Attach paperclips to the "mouth" of each fish.

To Do and Notice

1. With the phone cord fishing line fully extended, fish for the "fish" by moving the magnet near the paperclip on a fish. When there is a "bite", push the retractor button on the cartridge. The fish is a "keeper" if the fish stays "hooked" to the line. Note: The retraction of the line can be made slower by pressing the line between two fingers when retracting.
2. The student who has the most keepers has mastered using the faux fishing rod.

Designed and written by Eric Welker (RAFT)

The Content Behind the Activity

Creating useful items from repurposed materials develops important critical thinking, problem solving, and visual arts skills. This activity provides the opportunity to create an innovative, creative teaching tool out of common materials, based on an everyday object, a fishing rod. In addition to being an opportunity for creative expression, the fishing rod can also be a useful tool for covering important science concepts like magnetism, energy storage, and energy conversion.

The retractable phone cord cartridge has a coil spring inside that is compressed when the phone cord is fully extended, storing energy. The retractor button on the cartridge is attached to a locking mechanism that holds the spring in a compressed state. When the button is pushed, the compressed spring is released and allowed to recoil. The stored energy from the spring, potential energy, is converted into the kinetic energy (energy of motion) of the phone cord as it retracts back into the cartridge.

The magnet on the end of the phone cord "fishing line" is mutually attracted to a paperclip because the magnet's magnetic field causes a paperclip to become a temporary magnet. The temporary magnet's north/south poles are oriented opposite to the direction of the magnet's north/south poles. Since opposite (unlike) poles are attracted to each other the magnet and paperclip are attracted and move together. The lighter paperclip often does most of the moving.

Paperclips that are made of steel contain iron atoms. Iron is a magnetic material that contains microscopic regions (called domains) where the north and south poles of a group of iron atoms are all aligned in one direction. Each tiny domain has a separate magnetic field with a north and south pole. The north/south pole orientations of the many domains in the paperclip will point in many different directions so that the paperclip overall does act like a magnet. When a magnet is brought near the paperclip the magnet's magnetic field causes the north/south poles of the paperclip's domains as a group to become more aligned. Since opposite magnetic poles attract each other the overall orientation of the paperclip's domains is created with an opposite orientation to that of the magnet.

As one paperclip becomes a temporary magnet the same process can cause nearby paperclips to also become temporary magnets. A chain or clump of paperclips may become attracted to the permanent magnet.

When the magnet and a paperclip are separated the orientation of the paperclip domains' magnetic poles will tend to change back to an overall original random orientation.

Taking it Further

- Cut fish shapes from EVA foam and float in a tub of water for added realism.
- See RAFT Idea Sheet ***Fishin' for Numbers*** for instructions on using fishing as a way to review content.
- See RAFT Idea Sheet ***Mini-Magnet Wands*** for a detailed explanation of the science behind magnetism.

Web Resources (Visit www.raft.net/raft-idea?isid=542 for more resources!)

- Visual arts and art-related resources - http://witcombe.sbc.edu/ARTHLinks.html
- Experiments with magnets - http://www.coolmagnetman.com/magindex.htm
- Potential energy - http://www.uwsp.edu/cnr/wcee/keep/mod1/Whatis/experiments.htm