

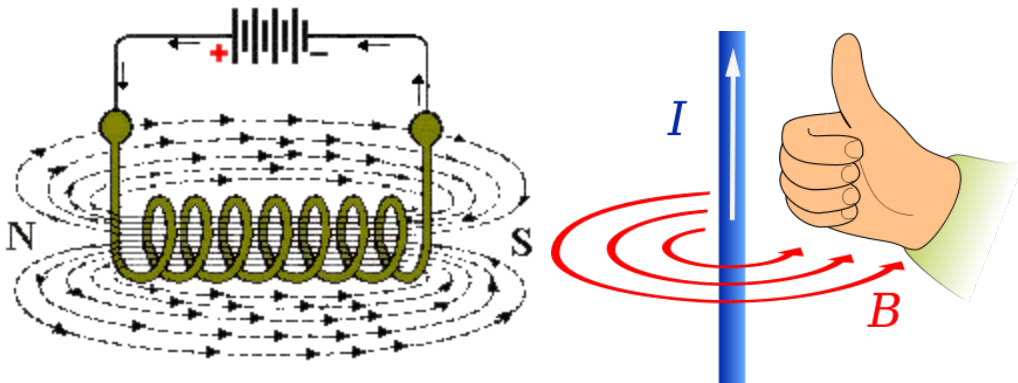
Coil Motor

CA Science Standards Addressed:

Physics 5f,5h

Introduction:

If we were to wrap a straight wire into a coil (spiral), we see that the magnetic fields overlap in a small area. So, one can either increase the magnetic field by increasing the current. Alternatively, one could increase the magnetic field through a small area but increasing the number of turns in the coil while keeping the current the same. However, depending on the direction of how we wrap the coil, we can change the polarity of the electromagnet. Taking advantage of magnetic forces created by the electromagnet, we can use it to our advantage to make objects move. Objects that use electromagnets to move in repeated motions are known as motors.



Abstract:

By sending electrical current through a wire, can we generate a magnetic field? What happens to this magnetic field when we coil it? What does a coiled piece of wire become when electricity runs through it? How can using the properties of electromagnetism be used to make something move?

Materials:

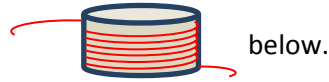
- 1) 1 meter of Magnet wire 24-28 gauge.
- 2) 2 paper clips
- 3) Tape
- 4) Cup.
- 5) Magnets
- 6) Template of three 1" by 6" inch strips.

Procedure:

- 1) Scrap off 2.5 inches of enamel (using scissors) off of the magnet wire from both ends.
- 2) Cut template out. You should have three 1" by 6" strips.
- 3) Wrap one of the paper strips to create a tight ring around the magnet. Tape in place.



- 4) Take magnet wire and coil around the paper rings VERY tightly. Do not overlap until at least half of the paper ring is covered.
- 5) **RECORD NUMBER OF COILS** in data section



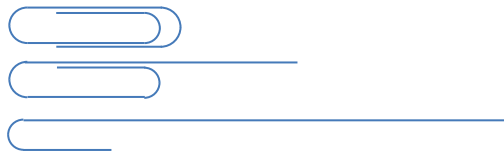
- 6) Remove coil from paper ring and hold onto tightly.



- 7) Wrap loose ends through the coil twice to hold coil together.
- 8) Make sure loose ends stick straight out.



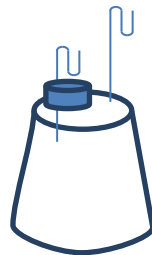
- 9) Straighten 2 Paper Clips except for inner bend.



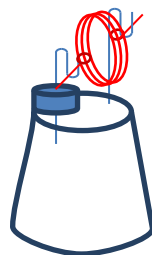
- 10) Create a "hook" from inner bend.



- 11) Place cup upside down. Tape two hooks to bottom of the cup.
- 12) Place magnet on bottom side of cups. Be sure to **NOT** have it in the center of the cup.



- 13) Place coil on hook and connect positive and negative to each of the "hooks".



Data:

Number of coils: _____

Number of Magnets	Number of Batteries	Rank Speed (1-fastest, 4 slowest)
1	1	
2	1	
1	2	
2	2	

Analysis:

- 1) Does the motor spin in the direction you start it off in? If not, why not?
Answer: _____

- 2) Do the number of magnets or batteries affect the speed of the motor? Why or why not?
Answer: _____

- 3) What would happen if you switched the polarity of the batteries? Will anything change?
Answer: _____

- 4) What else **besides** the number of batteries or magnets would affect speed of the motor?
Answer: _____

Conclusion:
