Speakers Lab

CA Science Standards Addressed:

Physics  4a,4b,5f,5h

Introduction:

André-Marie Ampère, a French physicist, discovered that magnetic fields are created when electricity runs through a copper wire. How we can predict the direction of the magnetic field can be remembered through what we call “the Right-hand Rule”.

If we were to wrap a straight wire into a coil (spiral), we see that the magnetic fields overlap in a small area in the center of the coil. So, one can increase the magnetic field by either increasing the current to a coil with a certain number of turns or alternatively, increasing the number of turns in the coil while keeping the current the same.
Abstract:
By sending electrical current through a wire, can we generate a magnetic field? What happens to this magnetic field when we coil the wire and keep the current the same? What happens when we place a magnet in the middle of the coil when there is a current (magnetic field) present in the coil?

Materials:
1) Paper Plates or Cups
2) Index Card
3) Rare Earth Magnetics or Neodymium Magnets
4) Masking Tape
5) Audio source
6) Audio Amplifier
7) 8ft of Magnet wire.

Procedure:

1) Cut template out. You should have three 1”by 6” strips.
2) Wrap one of the paper strips to create a tight ring around the magnet. Tape in place.
3) Repeat paper strips two more times. You should have to 3 paper rings around the magnets.
4) Scrap off 1inch of enamel (using scissors) off of the magnet wire from both ends.
5) Take magnet wire and coil around the paper rings VERY tightly. Do not overlap until at least half of the paper ring is covered.
6) Tape magnet wire onto paper coil carefully.
   RECORD NUMBER OF COILS in data section below.
7) Remove magnet from center. Remove TWO inner paper rings.
   Only one should be left.
8) Tape magnet stack onto table.
9) Cut index card in half lengthwise. (Hot-Dog Style)
10) Fold each piece of index card to look like an M.
11) Tape one end of each index card piece on table next to magnet.
12) Securely tape paper ring and wire onto bottom of plate/cup.
13) Tape other ends of M index cards to plate.
   Paper ring and wire coils should fit loosely around magnets.
14) Bring speaker up to instructor to test.
Data:
Number of magnets used: ____________________________
Number of coils made: ____________________________

Analysis:
1) Does the speaker move up and down?
   Answer: ____________________________

2) What does the paper plate/cup serve to do?
   Answer: ____________________________

3) What would happen if more magnets are added?
   Answer: ____________________________

4) What would happen if no magnets were present?
   Answer: ____________________________

5) Explain how the speaker is creating waves that reach your ear.
   Answer: ______________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________

6) How times did coil your wire? What would happen if more coils were added?
   Answer: ____________________________

7) What would happen if there were only 2 coils? What would have to happen to make the speaker
   sound the same if only 2 coils were available?
   Answer: ______________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________
Conclusion:

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
