# **Materials**

-50 male and 50 female fruit flies

-25 vials

-25 foam stoppers

-FlyNap (liquid that knocks flies out for hour)

-Q-tips (saturate with FlyNap and place in vials to knock out flies)

-1 bag of banana flake (food for flies)

-125 yeast grains

-1 plastic tub (store vials)

-water

-graduated cylinder (measure 1 ml of water per vial)

-200 ft. 20 gauge copper wire

-200 ft. 22 gauge insulated copper wire

-funnel (pour water in vial)

-wire cutter

-cardboard (separate control vials from EMFs)

-aluminum foil (cover cardboard and block EMFs)

-electrical tape (cover wire connections)

-masking tape (label vials)

-writing pen

-plain white paper (dump flies onto to count)

-torn piece of paper (allows for safe and easy separation of flies)

-light bulb (acts as a resistor)

-light bulb holder

-5 watt transformer (1st attempt)

-25 watt transformer (2nd attempt)

-multimeter

-electrical cord

-knife

-scissors

-screwdriver

# **Procedure (1st attempt)**

1. Obtain 25 vials.
2. Set aside 5 vials as controls.
3. Wrap the remaining vials in wire coils (5 with 5 coils, 10 coils, 20 coils, and 50 coils).
4. Tape the coils in place with electrical tape.
5. Add one scoop of banana flake and 10 ml of tap water to each vial.
6. Add five grains of yeast to each vial.
7. Obtain 50 male and 50 female fruit flies from the teacher.
8. FlyNap flies in original vials.
9. Poor flies onto plain white paper.
10. Sort through flies, separating red eyes and white eyes.
11. Place two red eye and two white eye flies in each vial. (red = male, white = female)
12. Place foam stoppers on each vial.
13. Assure each fly recovers from the FlyNap.
14. Cut strands of wire approximately six inches.
15. Attach wires to each wire coil surrounding each vial, making a complete circuit.
16. Place two lead-end connecting wires in each end of the transformer.
17. Plug in 5-watt transformer into wall.

**Procedure (2nd Attempt)**

1. Leave flies in vials.
2. Strip off all previous wire from vials.
3. Wrap insulated 22-gauge wire around each of the test vials (5 with 5 coils, 10 coils, 20 coils, and 50 coils), making sure to keep the same number of coils consistent to previous setup.
4. Leave a wire lead at each end of coil on each vial.
5. Attach the 5-coil group and use multimeter to insure there is no break in the ciruit.
6. Repeat step 5 for the 10 coil, 20 coil, and 50 coil groups.
7. Connect four groups together and use multimeter to make sure there is no break in the completed circuit of 20 vials.
8. Cut electrical cord near non-forking end and strip each lead so bare wire is showing.
9. Hotwire the leads of the extension cord to 25-watt transformer.
10. Attach one lead of transformer to light bulb holder (screw underneath holds wire in place).
11. Attach the other lead of transformer to lead on the 50-wrap vial.
12. Attach lead from 5-wrap vial to screw underneath light bulb holder. The wire circuitry should now be complete (from transformer: one lead to light bulb holder, other lead to 50-coil vials on through to 5-coil vials; from light bulb: one lead from transformer screwed underneath, one lead from 5-coil vials screwed underneath).
13. Screw light bulb into holder.
14. Plug extension cord into wall.
15. Check to make sure light bulb is illuminated.
16. Check resistance running through the newly completed circuit.
17. Tape wire connections.

# **Using the FlyNap**

1. Open box and remove liquid and wand.
2. Unscrew top off bottle and place wand in liquid.
3. Remove saturated wand promptly.
4. Recap bottle.
5. Pick up vial of flies to be FlyNapped and gently tap on counter to knock flies to the bottom of the vial.
6. Insert saturated wand into vial to the side of the foam stopper.
7. Wait for five minutes to be sure the flies are knocked out.
8. For convenience sake, q-tips can also be used as wands to FlyNap more the one vial of flies (more than one vial at a time).

Using Ohm’s law, we are able to ensure that one ampere of current is running through the setup. These are the steps we went through:

* + We first measured the resistance of the loop of wire.
  + The wire itself did not have enough resistance and therefore pulled too much current. This would blow out the circuit.
  + We already know the transformer converts 120 volts from the wall to 25 volts of alternating current.
  + The light bulb acts as a resistor in a series.
  + Once the new resistance was measured (with the light bulb), we obtain a reading of 25 ohms
  + We then use ohm’s law

V = 25 volts

I = unknown

R = 25 ohms

V = I x R

I = V / R

I = 25 / 25 = 1 amp

**Voltage** - Voltage is the electrical force, or "pressure", that causes current to flow in a circuit. It is measured in VOLTS (V or E). Take a look at the diagram.  Voltage would be the force that is pushing the water (electrons) forward.

**Current** - Current is the movement of electrical charge - the flow of electrons through the electronic circuit.  Current is measured in AMPERES (AMPS, A or I). Current would be the flow of water moving through the tube (wire).

**Resistance** - Resistance is anything that causes an opposition to the flow of electricity in a circuit. It is used to control the amount of voltage and/or amperage in a circuit. Everything in the circuit causes a resistance (even wire). It is measured in OHMS (Ω).