

4. Construct a circuit that contains the power supply, a current meter, a $1\ \Omega$ resistor, and a switch, all wired in series with the galvanometer. Connect the galvanometer so that the direction of the current will be from south to north through the segment of the loop above the compass needle. **Do not close the switch until your teacher has approved your circuit.**
5. Set the power supply to its lowest output. When your teacher has approved your circuit, close the switch briefly. Using the potentiometer on the power supply, adjust the current in the circuit to 1.5 A. Use the potentiometer to maintain a current of 1.5 A throughout the lab. Record the current, the current direction, and the compass reading in your data table. *Open the switch as soon as you have made your measurements so that the power supply and wires don't overheat.*
6. Reverse the direction of the current in the segment of the loop above the needle by reversing the wires connecting to the power supply.
7. Close the switch. Adjust the power supply to 1.5 A. Record your observations in your data table, and then immediately open the switch.
8. Remove the galvanometer from the circuit. Add a second turn of wire, and reconnect the galvanometer to the circuit so that the current direction will be south to north.
9. Close the switch. Adjust the power supply to 1.5 A. Record your observations in your data table. Open the switch immediately.
10. Repeat Steps 6 and 7 for two turns of wire.
11. Repeat the experiment for three turns and then four turns of wire. For each, connect the circuit so that the direction of the current is from south to north and then north to south. Record all information.
12. Clean up your work area. Put equipment away safely.

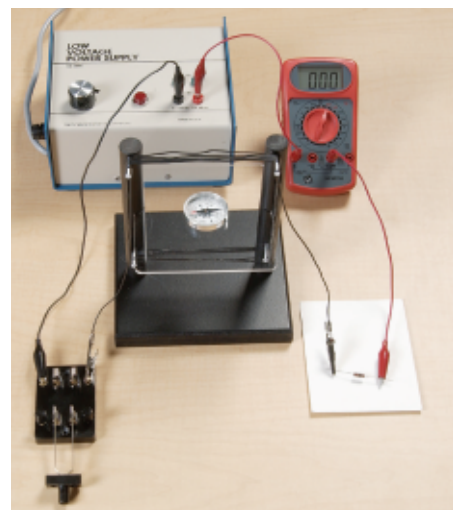


Figure 1

Step 3: Use the support pins on the galvanometer to wrap the wire into a loop. Adjust the apparatus so that the needle and wire are in the north-to-south plane.

ANALYSIS

1. **Organizing Data** For each trial, find the tangent of the angle of the compass needle's deflection.
2. **Constructing Graphs** Use a computer, graphing calculator, or graph paper to plot the tangents (item 1) against the number of turns in the wire.

CONCLUSIONS

3. **Drawing Conclusions** What is the relationship between the tangent of the angle and the number of turns? Explain.
4. **Drawing Conclusions** What is the relationship between the direction of current in the wire and the direction of the magnetic field? Explain.