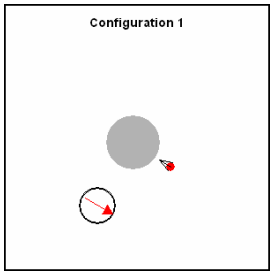
Worksheet for Exploration 27.1: Map Field Lines and Determine Forces



In the animation there is an object underneath the gray circle that creates a magnetic field.

a. Use the compass to determine the direction of the magnetic field. Sketch the vector field and the field lines for each configuration.

Configuration 1 sketch:

Configuration 2 sketch:

b. Check your field-line diagrams by double-clicking on the animation to show a field line at the location of the mouse.

Add a wire with current coming out of the screen (electrons moving into the screen). Click-drag the wire to move it around. The arrow shows the direction of the force on the wire.

It is important to note that you do not have any control over the currents that are added. The size of the currents in the wires generate a very small magnetic field compared to whatever is hidden under the gray area.

c. Explain why the force vector points the way it does at two different locations of the wire for each configuration.
    i. You should discuss the direction of the magnetic field due to the gray region, the direction of the current, and use a right hand rule (or cross product) to determine the direction of force on the wire. Sketch.

d. If the current was in the other direction, what direction would the force be at the two locations you chose? Explain.

e. Check your answer by adding a wire with current going into the screen.