Magnetic Minesweeper

Exploration

In the Magnetic Minesweeper Lab, you will recreate the classic computer game Minesweeper in real life! Using PocketLab's magnetometer, you will try to discover hidden mines and mark their locations on a grid. You can do this lab with two people to create a Minesweeper competition. One partner hides mines in different grid locations while the other partner tries to locate the mines to not get blown up!

Materials

- PocketLab
- 2 dipole circular magnets
- Minesweeper grid, found in lab book
- Small cardboard box with top large enough for minesweeper grid to fit on top.

Objective

In this experiment, students will:

1. Use the magnetometer to survey an area for magnets.
2. Determine location and predict size of magnets relative to each other.

Method:

1. Print off two copies of the minesweeper grid. (You can scale the print size so the grid will fit on the top of your box. Note: If you are using the maker kit box, the grid is already sized for it. If printing it off, select "Actual Size" in your printer settings when printing).
2. Cut out the grids. Tape one of the grids to the bottom, inside of the box. Tape the other grid to the top, outside of

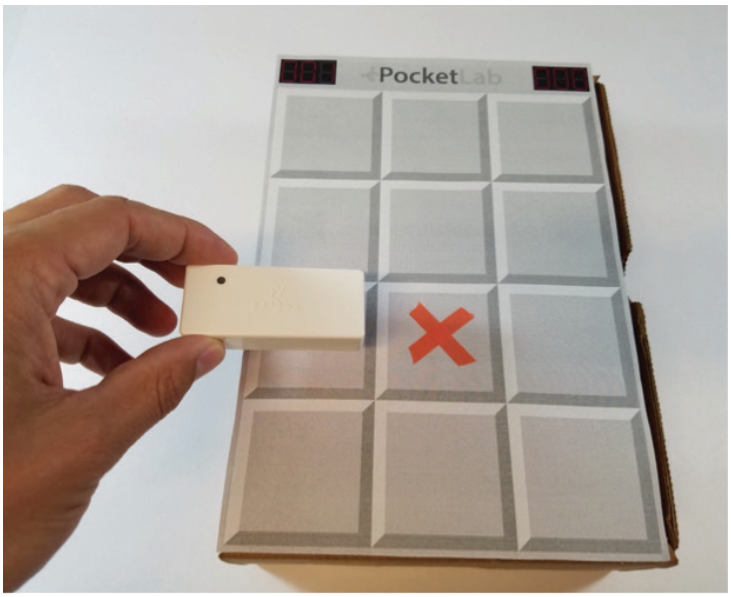
the box. The grids should be lined up with each other.

3. Place one magnet in the center of the top grid.
4. Connect the PocketLab sensor and app. Select Magnetic Field Magnitude from the graph list.
5. Place the PocketLab sensor in the lower left square.
6. On the PocketLab app screen, press the zero button to calibrate the Magnetic Field Magntiude graph.
7. Move the PocketLab sensor to different squares and observe how the graph changes.

What happens when the sensor gets closer to the magnet? What happens when the sensor moves from the left to the right of the magnet?

8. Now that you are familiar with the Magnetic Field graph, put the magnet inside the box in the center of one of the squares. Close the lid of the box and then scan over the top grid with the PocketLab sensor. Slowly move the sensor left and right or up and down across the grids.

What happens when the PocketLab sensor is on the grid directly on top of the magnet? What happens when you move the PocketLab to the left of squares to the left of the magnet?



9. Have your lab partner place the magnet to a different grid inside the box without you seeing where the magnet is placed. Cover your eyes or turn your head, so that you do not know where the magnet is located. Have your lab partner close the lid.

10. Scan up and down and left to right over the top grid with the PocketLab sensor. Using your observations from earlier, predict where you think the magnet is located. When you have a good prediction, mark an X on the grid where you think the magnet is located.
11. Open up the box and see if your prediction is correct.
12. Switch roles so that you hide the magnet and your lab partner tries to predict the location.
13. Place two magnets of different size inside the box and try to find both locations.

Data Analysis and Observations/Conclusions:

- After conducting the sweep and analyzing the graph. Draw conclusions about the size of each magnet and its relative magnetic field.
- Is the size and distance from the magnet related to the magnetic field strength? How does your data support your answer?

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