The Magnet Maze

Whether it is on a refrigerator in the kitchen, a toy at home, or a latch on a door, children love playing with magnets. Magnets provide young learners an opportunity to explore invisible forces in their world, such as attraction and repulsion, and ignite curiosity as they attempt to understand how they work. In this experiment, students will have an opportunity to explore some of the properties of magnets, and use their knowledge to guide a paper clip through a maze.

Materials

- Magnets
- Paper clips
- Maze template (included below)
- Cardboard (8.5”x 11”)
- Glue
- Scissors
- Metal samples (i.e.: aluminum foil, stainless steel spoon, pennies, steel pot, etc.)
- Non-metal samples (i.e.: wooden ruler, plastic container, Styrofoam cup, rock, hand-held mirror, etc.)

Directions

1) Print out a copy of the maze for each student. Each person should receive at least two magnets and one paper clip for the experiment.
2) Cut out maze template and glue to cardboard base.
3) Pass out metal and non-metal samples to groups of students. Everyone can share the samples and take turns using them among the groups.
4) Have each student test what kinds of materials magnets are attracted to by placing a magnet on the metal and non-metal samples and investigating whether they attract to one another.

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5) Once students determine what kinds of materials magnets attract to (only certain metals), have them test magnets with other magnets. They should look for a way to bring the magnets together that will result in both a pushing and pulling force.
6) Now that students have investigated some of the qualities of magnets, it is time for the magnet maze. Start by placing one paper clip at the "start" point.
7) Working in pairs, have one student hold the maze level, while the other student holds a magnet underneath the maze and presses it flush against the cardboard where the paper clip is resting.
8) Carefully slide the magnet across the bottom of the cardboard to help guide the paper clip through the maze.
9) Once the students complete the maze, the pair can switch roles so that both students have an opportunity to solve the maze and feel the attractive force between the paper clip and the magnet through the cardboard.

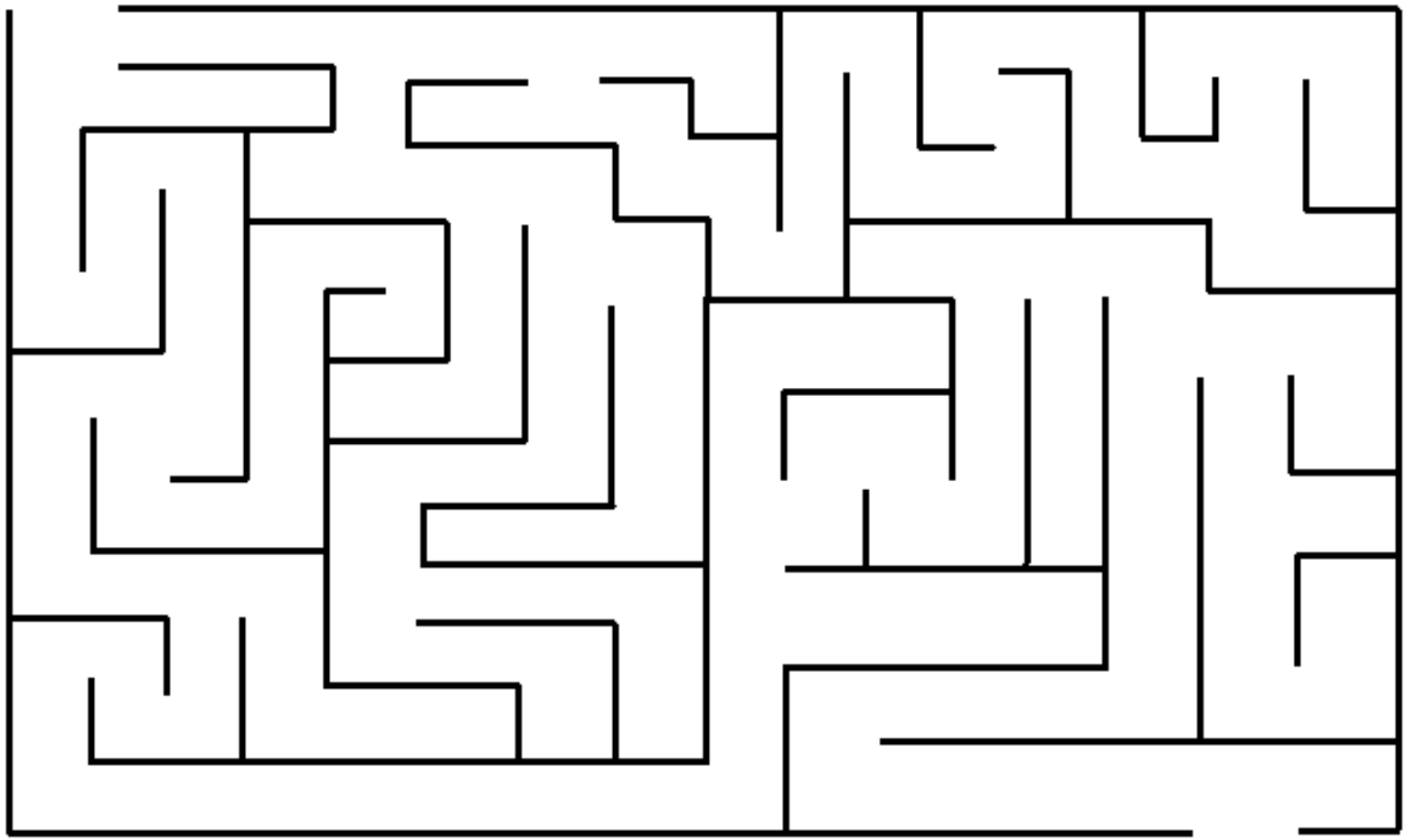
Background Information

All magnets have magnetic fields because the molecules in them have moving electrons, which create an electric current, and according to Maxwell's Equations, moving electric charges will create a magnetic field. Basically, each atom acts like an electromagnet. Although this magnetic field is invisible, it can be detected by investigating the North and South poles of a magnet, which are produced when the magnetic fields align in the same way. When two like-poles come into contact with one another, they repel. Conversely, when two unlike-poles come into contact with one another, they attract. As a result, students will notice that when they bring their magnets close to one another, they will either push apart or pull towards one another, depending on how they orient the poles.

Magnets will also attract to certain kinds of metals, such as iron, nickel, steel, and cobalt. These metals belong to a group called ferromagnetic metals, which can be made to act like a magnet when an actual magnet is brought near. Since the magnetic fields are often very strong, magnets will still attract to these metals even if they are separated by another material (i.e.: cardboard). The important thing is not that the magnet and ferromagnetic metal touch one another, but that their magnetic fields are close enough to come in contact with one another.

As students work through this activity, they will be able to observe these characteristics of magnets and metals in action, but a more advanced understanding of what is going on the molecular level is better suited for older grades. The inclusion of the maze activity will help young learners combine their learning about magnets with the development of problem-solving skills, as well as aid them in the development of hand muscles for their writing skills.

START



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