5th Grade 3rd Day
Science Content Connection 1

TRB 5:3 - Activity 2: Experimenting with Magnets

Summary:
Students will complete four experiments to investigate how magnets will both attract and repel other magnets.

Main Curriculum Tie:
Science - 5th Grade
Standard 3 Objective 1
Investigate and compare the behavior of magnetism using magnets.

Materials:

- various types and numbers of magnets (bar, horseshoe, circular, disk, magnetic craft tape)
- string or fishing line and tape
- tinker toy stand or scientific ring stand and clamp
- dowels or pencils

Additional Resources:

Books:

Wild Goose
Magnets and Sparks by Wendy Madgwick
Amazing Magnets by David Adler
Magnets by Janice VanCleave

Intended Learning Outcomes:
1-Use science process and thinking skills.

Instructional Procedures:

Invitation to Learn:
Show the simple demonstration of attraction and repulsion using two bar magnets. Place one magnet on the table and then slide the other magnet towards it. The magnet will either be attracted or repelled. Ask questions like: Why are the magnets pulled together or pushed apart? What will happen if I turn the magnet around? Have the students explain what they already know about poles and the principles of attraction and repulsion.

Instructional Procedures:
Any or all of the following four experiments may be done as class demonstrations, or set up into “stations,” where the students rotate from one to the other.

Experiment 1:

1. Using a pencil or wooden dowel, insert two disk magnets over the end of the pencil or dowel and see what happens to them. Do they stick together or are they forced apart?
2. Repeat the experiment by adding several disk magnets to the pencil or dowel. Have the students explain why some attract and some repelled each other.
3. Have the students see if they can make each of the magnets appear to “float ” above each other.”
4. You can try variations of the experiment by adding metal washers between the magnet disks. Do the washers change what is happening to the disks?

Experiment 2:

1. Tie a 12-inch piece of string from the middle of a bar magnet and suspend it from the side of a wooden table using a piece of tape.
2. Hold the other bar magnet close to the end of the first magnet and see what happens. Are the two magnets attracted to each other or are they repelled? Now turn around the magnet in your hand and try the experiment again.
3. Have students record observations in their journals.

Experiment 3:

1. Tape the ends of a thread or small string about 12 inches long to opposite sides of a small piece of magnetic craft tape.
2. Tape the loop formed by the thread to a wooden table so that the magnet strip is suspended over the edge.
3. Do the same with a second piece of magnetic craft tape of equal size. As you hang the magnetic tape, make sure it is as close as possible to the first piece, but not touching.
4. Spin one of the magnets a few times to wind the thread and then release it.
5. Using your knowledge of poles and attraction and repulsion, explain the motion of the two magnets.
6. Have the students record their observations in their journals.

Experiment 4:

1. Using a ring stand and clamp, or an improvised stand made from Tinkertoys, suspend one disk magnet from a string or fishing line so that it is a free-swinging pendulum. You can hang the magnet in any orientation.
2. Arrange three piles of two or three disk magnets stacked together in an equilateral triangle, measuring a couple of inches per side, on the ring base stand.
3. Adjust the length of the pendulum so that the free-swinging magnet will come as close as possible to the magnets on the base without hitting them or the base itself.
4. Give the pendulum magnet a push and watch what happens.
5. Have the students record the results in their journals.
6. Vary the locations and poles of the magnets to develop other patterns. You can arrange the magnets so they all have the same pole up, or you can mix them up. Notice that a tiny change in the location of one of the fixed magnets or in the starting position of the pendulum may cause the pendulum to develop a whole new pattern of swinging.
7. This experiment shows the force of gravity and the simple pushes and pulls of the magnets as they act together. It is difficult to predict where the pendulum is going to go next, even

though you know which magnets are attracting it and which are repelling it.

Conclusion: Magnets will both attract and repel other magnets.

Extensions:

Language:

1. Write 5 “fact” sentences and 5 “opinion” sentences about magnets and their abilities to attract and repel other magnets.

Assessment Plan:

1. Have the students draw the results of Experiment #2 above and label the poles on the magnets.
2. Have the students create machines or toys that push objects using magnetic repulsion. Have the students explain how the machines or toys work and how they are used.

Bibliography:
This lesson is part of the Fifth Grade Science Teacher Resource Book (TRB3) http://www.usoe.org/curr/science/core/5th/TRB5/. The TRB3 is designed to be your textbook in teaching science curriculum to your students. This book covers all the objectives of each standard and benchmark. If taught efficiently, a student should do well on the End-of-Level (CRT) tests. The TRB3 is designed for teachers who know very little about science, as well as for teachers who have a broad understanding of science.

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Created Date :
Nov 05 2002 08:17 AM