MARVELING IN MAGNETS

Grade Level or Special Area: Second Grade
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Length of Unit: Seven lessons completed in eight days (each lesson is approximately 45 minutes long)

I. ABSTRACT

This unit is an interactive, hands-on approach to learning all about magnets and magnetism. It looks at the origin of magnets along with the important properties of magnetism. Students will participate in activities and experiments that are specifically designed to help them understand magnetism and the laws of magnetic attraction.

II. OVERVIEW

A. Concept Objectives
   1. Students will understand the common properties of magnetic energy. (Adapted from Colorado Model Content Standard #2)
   2. Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations. (Colorado State Science Standard #1)
   3. Students understand conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling. (Colorado State Writing Standard #3)

B. Content from the *Core Knowledge Sequence*
   1. Introduction to Magnetism (Page 20)
      a. Identify familiar everyday uses of magnets.
   2. Magnetism (Page 60)
      a. Magnetism demonstrates that there are forces we cannot see that act upon objects.
      b. Most magnets contain iron.
      c. Lodestones are naturally occurring magnets.
      d. Magnetic poles are north-seeking and south-seeking poles.
      e. A magnetic field is strongest at the poles.
      f. The laws of magnetic attraction are unlike poles attract, like poles repel.
      g. The earth behaves as if it were a huge magnet.
      h. A magnetized needle in a compass will always point north and it can be used for orienteering.

C. Skill Objectives
   1. The students will brainstorm what they know and what they want to know about magnets.
   2. The students will be able to identify ways in which to use magnets safely.
   3. The students will use the scientific process to determine what objects a magnet attracts.
   4. The students will be able to identify that objects must contain iron to attract a magnet.
   5. The students will learn about famous scientists who have studied magnetism.
   6. The students will be able to identify north-seeking and south-seeking poles on a magnet.
   7. The students will be able to demonstrate and describe the words *attract* and *repel*.
   8. The students will be able to identify the strongest part of a magnet.

9. The students will be able to recognize and describe how a magnet can penetrate through an object.
10. The students will be able to effectively predict when a magnet will penetrate through an object.
11. The students will understand that there is an invisible field around a magnet, which will attract any magnetic object.
12. The students will learn that the oldest use of a magnet was a compass, which was used for orienteering.
13. The students will learn that the Earth is a giant magnet with north and south magnetic poles.
14. The students will be able to orientate themselves using a compass.
15. The students will be able to effectively work together in a group to find a solution.

III. BACKGROUND KNOWLEDGE

A. For Teachers
   1. Flaherty, M. *Magnetism and Magnets.* Brookfield, CT: Copper Beech Books, 1999. 0-7613-3257.
   2. Johnstone, L., and Levine, S. *The Magnet Book.* New York, NY: Sterling Publishing Company, 1997. 0-8069-9943-8.
   3. Parker, S. *Magnets*. Milwaukee, WI: Gareth Stevens Publishing, 1997. 0-8368-2086.

B. For Students
   1. The students must have previous knowledge identifying familiar everyday uses of a magnet including cabinet locks, toys, and refrigerator magnets. (Kindergarten)
   2. Students must be familiar with different objects that are and are not attracted to a magnet. (Kindergarten)
   3. Students must be familiar with making predictions and generating hypotheses. (Second Grade)
   4. Students must be independent with writing a paragraph; specifically a 2-point Shurley English paragraph.

IV. RESOURCES

A. Bocknek, J. *The Science of Magnets*. Milwaukee, WI: Gareth Stevens Publishing, 2000. 0-8368-2572-1. (Lessons One and Six)
B. Parker, S. *Magnets.* Milwaukee, WI: Gareth Stevens Publishing, 1997. 0-8368-2086. (Lesson Six)
C. *All About Magnets* (video). Schlessinger Science Library, 1999. (Culminating Activity)

V. LESSONS

Lesson One: What Do We Know?

A. *Daily Objectives*
   1. Concept Objective(s)
      a. Students understand conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling. (Colorado State Writing Standard #3)
   2. Lesson Content
      a. Introduction to magnetism (Page 20)
         i. Identify familiar everyday uses of magnets.

3. Skill Objective(s)
    a. The students will brainstorm what they know and what they want to know about magnets.
    b. The students will be able to identify ways in which to use magnets safely.

B. *Materials*
1. Appendix A - Magnets, Magnets, and More Magnets (one copy for each student)
2. Appendix B - No Magnet Here (six copies cut in half and laminated)
3. Scotch tape
4. *The Science of Magnets*, by Jonathan Bockneks, pages 30-31
5. Poster of Appendix A OR one sheet of butcher paper – approximately 5' x 5'
6. Large marker – any color
7. One pencil for each student
8. A magnetic white board or filing cabinet

C. *Key Vocabulary*
1. Magnet – a piece of iron or steel that attracts certain metals

D. *Procedures/Activities*
1. In advance of the lesson, you will need to make a copy of Appendix A for each student. They will be using Appendix A in this lesson and then finishing it in Lesson Seven.
2. If you are using butcher paper in place of a poster of Appendix A, you will need to draw Appendix A onto the butcher paper using the large marker. You will be using the poster at the front of the room as the children have their copy at their desks.
3. Before the children come into the room, hang up the poster of Appendix A on a magnetic board or filing cabinet. Use magnets to hold up the poster. Put three or four (hidden) magnets behind the poster and hang scissors, paper clips, nails, etc. from the poster.
4. Introduce the unit by asking the children, "What's wrong with this poster?" Give the children about five minutes of discussion time and then show them how the items are hanging from the poster.
5. Hand out the student copies of Appendix A and have the children get out their pencils.
6. Brainstorm five or six things the children "KNOW" about magnets. Have them write these on their papers as you write them on the poster. Give those children that know more about magnets a couple extra minutes to write down one or two things that weren't listed as a whole class. Have those kids share if time allows.
7. Next, brainstorm five or six things the children "WANT TO KNOW" about magnets. Give all children a couple extra minutes to list one or two more things that weren't listed as a whole class. Have kids share if time allows.
8. Collect the student copies of Appendix A for use in Lesson Seven.
9. Read aloud pages 30-31 in *The Science of Magnets*. Discuss with the kids that they will be using magnets in the next two weeks and it is important to use them safely.
10. Show the students the NO MAGNETS! sign (Appendix B). Ask the question, "Do you see areas in our classroom where we need to keep magnets away from?" When a child gives you a correct answer, give them a NO MAGNET sign to hang in that area. Areas in which magnets should be kept away from are: computers, video cassettes, compact discs, telephones, televisions, radios, credit cards, computer discs, and answering machines.

E. *Assessment/Evaluation*

1. Oral evaluation – ask the children to tell you something they learned today or something they know about magnets. Use this to dismiss them back to their seats, to stack chairs, or to line up.

Lesson Two: Attract or Not Attract? – That Is the Question

A. *Daily Objectives*

1. Concept Objective(s)
   a. Students will understand the common properties of magnetic energy. (Adapted from Colorado Model Content Standard #2)
   b. Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations. (Colorado State Science Standard #1)
   c. Students understand conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling. (Colorado State Writing Standard #3)
2. Lesson Content
   a. Magnetism (Page 60)
      i. Magnetism demonstrates that there are forces we cannot see that act upon objects.
      ii. Most magnets contain iron.
3. Skill Objective(s)
   a. The students will use the scientific process to determine what objects a magnet attracts.
   b. The students will be able to identify that objects must contain iron to attract a magnet.
   c. The students will learn about famous scientists who have studied magnetism.

B. *Materials*

1. Appendix C – Attract or Not Attract? (one copy for each student)
2. Appendix D – (made into an overhead)
3. Appendix K – Writing Rubric (one copy per student for the teacher to fill out)
4. Overhead projector
5. 10-15 books on magnets (optional)
6. 10 magnets
7. One pencil per student
8. One crayon per student
9. One 2” x 2” square of aluminum foil
10. One inch long piece of copper wire
11. One glass marble
12. One wooden match
13. One brass fastener
14. One dime
15. One soft drink can
16. One needle
17. Steel wool
18. Small piece of leather

C. *Key Vocabulary*

1. Attract – to pull close

D. *Procedures/Activities*

1. In advance of the lesson, lay out each object on wooden tables or desks. Lay a magnet next to each object.
2. Hand out the "Attract or Not Attract?" worksheet. Tell the kids that they are going to become scientists today to discover what objects a magnet will attract. Choose children to read the directions and the objects out loud.
3. Direct the children to make a prediction as to whether or not a magnet will attract each object by writing yes or no next to each object on their paper.
4. Explain to the kids that they will be traveling around the room doing their scientific experiments and observations. They will be testing 10 objects to see if a magnet will attract. At some point they will most likely have to wait patiently for a short time while another scientist in the room completes the experiment and gets it ready for the next person. Tell the children that they need to wait "3 arms-lengths" behind that person while they complete the experiment. Discuss with the kids what the room will sound like and look like while they are completing their experiments (quiet, kids patiently waiting, etc.). At this time you may have a library of books on magnets out for the kids to look at while they wait for their turn.
5. While they are working, set up the overhead and put up Appendix D. If they finish early they can read about some "real-life" scientists who have studied magnetism.
6. Give the class 20-30 minutes to go through all the objects and complete their short paragraph.
7. Discuss the results that were found and why.
8. Extension (gifted education): Students can research a famous scientist (one who studied magnetism or another field). They can find out the following information about that famous person.
    a. Name, birthdate, city of birth
    b. What did your scientist study?
    c. Why is he/she famous?
    d. What contribution did your scientist make to society?
    e. How would life be different without your scientist's discoveries or inventions?

E. *Assessment/Evaluation*

1. Review the children's short paragraphs on Appendix C. This will help tell you which children understand magnetism and which do not.
2. You can use Appendix K, the writing rubric, to correct their short paragraphs.
2. Ask the following comprehension questions out loud:
    a. What do you know about magnets that will help you make predictions?
    b. What is the most important piece of information about an object that will help you make a good prediction about its magnetic attraction? (whether it is made of iron or not)

Lesson Three: North-seeking and South-seeking

A. *Daily Objectives*

1. Concept Objective(s)
    a. Students will understand the common properties of magnetic energy. (Adapted from Colorado Model Content Standard #2)
    b. Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations. (Colorado State Science Standard #1)

c. Students understand conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling. (Colorado State Writing Standard #3)

2. Lesson Content
   a. Magnetism (Page 60)
      i. Magnetism demonstrates that there are forces we cannot see that act upon objects.
      ii. Magnetic poles are north-seeking and south-seeking poles.
      iii. A magnetic field is strongest at the poles.
      iv. The laws of magnetic attraction are unlike poles attract, like poles repel.
3. Skill Objective(s)
   a. The students will be able to identify north-seeking and south-seeking poles on a magnet.
   b. The students will be able to demonstrate and describe attraction and repelling.
   c. The students will be able to identify the strongest part of a magnet.

B. *Materials*
1. *What Makes a Magnet?* by Franklyn M. Branley
2. 16 strong magnets of any shape
3. One magnet which has the north and south poles colored
4. Marker – any color
5. Compass
6. 15-20 paper clips
7. Appendix E – Investigating Magnetic Poles (one per student)
8. Appendix F – North and South Seekers (one for the teacher)
9. 10 sheets each of blue and red construction paper

C. *Key Vocabulary*
1. Repel – to push away

D. *Procedures/Activities*
1. Read aloud the story *What Makes a Magnet?* by Franklyn M. Branley
2. Pose the following questions aloud to the children:
   a. What are the ends of a magnet called?
   b. Why are they called north-seeking and south-seeking?
3. Tell the children that they will be doing a few experiments in order to see (and feel) the north and south poles of a magnet.
4. First, gather the children together into one group. Tell them that we will be using our own magnet and finding out which is the north and which is the south pole.
5. Tie a string around the middle of a magnet. Hang the magnet from a table. When the magnet stops moving, use a compass to find out which end is pointing north. Tell them that this is the north-seeking pole.
6. Next, choose one child to come and hold a second magnet next to the hanging one so that like colors are together. Ask that child to describe to the class what is happening. (They are repelling each other).
7. Choose another student to come and hold a magnet next to the hanging one so that opposite colors are together. Ask that child to describe to the class what is happening. (They are attracting each other).
8. If time allows, hand out 2 magnets to each child to experiment with this. Have them hold the magnets with like colors together. Then have them hold the magnets with opposite colors together. Discuss what they felt.

9. Ask the children the following question and choose a couple of children to give their answer:
    a. Do you think that every part of a magnet possess the same magnetic strength?
10. Tell the children that they are going to find out. Choose the strongest magnet that you have. Tie a piece of string around the middle of the magnet and allow it to hang from a table.
11. Place paper clips on the magnet starting with the north and south poles. Slowly add paperclips to the poles until you can no longer add any more. Then add paperclips to the center of the magnet until you can add no more. (There should be more paperclips hanging from the poles than from the middle.)
12. Ask the children:
    a. Why do more paperclips hang from the north and south poles of the magnet than from the middle? (The poles are the strongest part of the magnet).
13. Extension – Your class can play a game of North and South Seekers. See Appendix F for the directions.

E. *Assessment/Evaluation*
1. Investigating Magnetic Poles (Appendix E)
    a. After completing Lesson Three, the children should have a strong grasp on north and south poles of a magnet and should be able to complete Appendix E without any teacher help or guidance.

Lesson Four: Through It All

A. *Daily Objectives*
1. Concept Objective(s)
    a. Students will understand the common properties of magnetic energy. (Adapted from Colorado Model Content Standard #2)
    b. Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations. (Colorado State Science Standard #1)
    c. Students understand conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling. (Colorado State Writing Standard #3)
2. Lesson Content
    a. Magnetism (Page 60)
        i. Magnetism demonstrates that there are forces we cannot see that act upon objects.
3. Skill Objective(s)
    a. The students will be able to describe how a magnet can penetrate through an object.
    b. The students will be able to effectively predict when a magnet will penetrate through an object.
    c. The students will recognize that the force of a magnet can penetrate through objects.

B. *Materials*
1. Magazine
2. Piece of cardboard
3. 4” x 4” (or approximate) square piece of wood
4. 4” x 4” (or approximate) square piece of fabric
5. 4” x 4” (or approximate) piece of aluminum foil

6. Homework folder
7. A shoe
8. A student's hand
9. Eight wand magnets
10. Eight paper clips
11. Glass – any size
12. Appendix G - Through It All (one copy per student)
13. Appendix K – Writing Rubric (one copy for each student for the teacher to fill out)

C. *Key Vocabulary*

1. Magnetic force – the push or pull of a magnet; strength of a magnet

D. *Procedures/Activities*

1. Ahead of time divide your class into eight groups. Each group will test the strength of a magnet through the first eight materials listed above. It is easiest if the materials are separated ahead of time into tote trays or shoe boxes. In each shoebox, you will need one paper clip, one wand magnet, and one of the first eight materials listed above.
2. Hand out Appendix G and have the children make predictions as to whether a magnet will attract the paper clip through each item. Tell the children that when everyone is finished and all the results have been recorded, we will be doing an experiment to see if a magnet will attract through water. At this time, they should disregard part 2 on Appendix G.
3. Show the children where each group will be working and call groups one at a time to begin their experiments. Tell the children that at this time they will only be recording the results of their own experiment.
4. If any groups finish ahead of others, tell them that they may come get a different type of magnet to see if it will attract the paper clip.
5. After about 10 minutes, gather the whole class back together and call on each group to verbally give their results to the class. At this time, the other groups should be recording the results on their papers.
6. Discuss with the children the results. Ask the following questions:
   a. Through which materials can you attract and move the paperclip?
   b. What happens when you change the position of the magnet?
   c. How did your results compare with your predictions?
7. Next, tell the children we will be finding out if a magnet will attract through water. Have the children write their predictions under Part 2 of Appendix G.
8. Gather the children in an area in which they will be able to watch you do this experiment. Have them record their results for this when the experiment is completed.

E. *Assessment/Evaluation*

1. Hand out one sheet of writing paper to each student. Write the following question on the board: Why does the force of a magnet pass through some objects and not others?
2. Tell the children that you would like them to answer this question using complete sentences and their best spelling.
3. You can use Appendix K, the writing rubric, to correct their papers.

Lesson Five: A Field of Magnets

A. *Daily Objectives*

1. Concept Objective(s)
   a. Students will understand the common properties of magnetic energy. (Adapted from Colorado Model Content Standard #2)
   b. Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations. (Colorado State Science Standard #1)
   c. Students understand conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling. (Colorado State Writing Standard #3)
2. Lesson Content
   a. Magnetism demonstrates that there are forces we cannot see that act upon objects.
   b. Most magnets contain iron.
   c. Magnetic poles are north-seeking and south-seeking poles
3. Skill Objective(s)
   a. The students will understand that there is an invisible field around a magnet, which will attract any magnetic objects.

B. *Materials*

1. One magnet per student
2. Paper clip
3. One sheet of light-sensitive paper per student (can be found at any craft stores)
4. 9" x 12" piece of cardboard for each student
5. Iron filings or small pieces of steel wool
6. Plastic bowl to hold the iron filings
7. Tap water
8. Two or three 9" x 13" glass dishes
9. One pencil per student
10. Appendix K – The Writing Rubric (one per student for the teacher to fill out)

C. *Key Vocabulary*

1. Magnetic field – a field of force that exists around a magnet

D. *Procedures/Activities*

1. Before the lesson starts discuss with the children what a magnetic field is. Tell them that there is an invisible area around the magnet that will attract anything with iron in it. Use a paper clip and a magnet to show them this. Lay the paperclip on a table and slowly move a magnet to the paperclip. Ask them: Did you have to touch the magnet to the paperclip for the two objects to attract? (No) Tell the children that this is the invisible magnetic field at work.
2. Let the children know that normally you cannot see a magnetic field, but they will be doing an experiment today in which they will be able to see the magnetic field of a magnet.
3. This lesson should take place outside or near a door to get outside quickly.
4. Hand out one piece of light-sensitive paper, one piece of cardboard, and one magnet to each student.
5. Tell the children to lay the magnet on top of the cardboard. Then put the light-sensitive paper over the magnet with the blue side facing up.
6. Carefully sprinkle the iron filings on top of the paper (you may want an adult to do this).

7. Very carefully place the filings, magnet, cardboard, and paper in bright sunlight for about five minutes. If it is cloudy, leave them out in the sun longer. When the paper turns white, the picture is ready.
8. Take all of the materials into a shady area (or inside) and lift the paper away from the magnet. Gently shake the filings into the plastic bowl.
9. Place the light-sensitive paper into a glass pan with approximately 2-3 cups of tap water. Leave it there for several minutes until the paper changes back to blue.
10. Allow the paper to dry on a flat surface with the edges weighted down (with books, scissors, a crayon box, etc.). When it is dry, the pattern of the iron filings will show the magnetic field around the magnet.
11. Compare the magnetic fields of a bar magnet and a horseshoe magnet, a circular magnet and a wand magnet. Choose children to give similarities and differences.

E. *Assessment/Evaluation*

1. The children will write a two-point Shurley English paragraph on the following topic. *Would you rather have a bar magnet, a ring magnet, or a horseshoe magnet?* The students should pick which magnet they would rather have and state two reasons why.
2. A two-point Shurley English paragraph is simply a paragraph stating which magnet the student would rather have with two reasons why. This paragraph should also contain a topic sentence and a concluding sentence.
3. You can use Appendix K, the writing rubric to correct their papers.

Lesson Six: Making a Magnetic Compass

A. *Daily Objectives*

1. Concept Objective(s)
   a. Students will understand the common properties of magnetic energy. (Adapted from Colorado Model Content Standard #2)
   b. Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations. (Colorado State Science Standard #1)
2. Lesson Content
   a. Magnetism (page 60)
      i. Magnetic poles are north-seeking and south-seeking poles.
      ii. A magnetic field is strongest at the poles.
      iii. The laws of magnetic attraction are unlike poles attract, like poles repel.
      iv. The earth behaves as if it were a huge magnet.
      v. A magnetized needle in a compass will always point north and it can be used for orienteering.
3. Skill Objective(s)
   a. The students will learn that the oldest use of a magnet was a compass, which was used for orienteering.
   b. The students will learn that the Earth is a giant magnet with north and south magnetic poles.

B. *Materials*

1. 12 needles
2. 12 1”x 1” pieces of cork
3. One small container of Playdoh
4. 12 magnets
5. 12 Styrofoam or glass bowls of water

6. A marker
7. A compass for checking your homemade one
8. *Magnets,* by Steve Parker
9. *The Science of Magnets,* by Johnathan Bocknek

C. *Key Vocabulary*

1. Compass – a device with a magnetized swinging needle that always points north

D. *Procedures/Activities*

1. Read page 28 in *Magnets,* by Steve Parker. Discuss with the children the differences between the geographic north and south poles and the magnetic north and south poles. Share the pictures to help them visualize the differences. Pages 20-21 in *The Science of Magnets*, by Johnathan Bocknek also describes this.
2. Divide the children into pairs. Each pair of children needs a needle, a magnet, a small ball of Playdoh, a bowl of water, and one piece of cork.
3. One child in each group will stroke the needle on the magnet, going in the same direction, approximately 40-50 times. Demonstrate this for them.
4. Another child in the group should fix the needle to the cork with their ball of Playdoh. First ball up the Playdoh, attach it to the cork, then gently lay the needle in the ball of Playdoh so that it is attached and will not move. Demonstrate this.
5. Have the children carefully place their cork and needle onto the surface of the water. Let it settle and stop moving.
6. Choose one child to come to the front of the room to look on the "bought" compass and tell the class which way north is. Ask the class to raise their hands if one end of their needle is pointing north. Tell them that this is the north-seeking pole in their magnet.
7. The children can carefully use a marker to mark N, E, S, and W (north, east, south, and west) on the piece of cork.
8. Tell the children:

   The compass is an old and well known instrument used to determine directions. It was the first practical use for magnetism. Long ago, sailors used them to guide their way when land was out of sight. Tomorrow, you will use a compass to find your way.

E. *Assessment/Evaluation*

1. Orally assess the children by asking the following questions:
   a. How did we make the compass? (give the steps)
   b. What causes the needle to point to the north? (the magnetic force of the earth)
   c. How is the compass you made like one you would buy in a store? How is it different?
   d. Why couldn't we use a steel bowl instead of the Styrofoam (or glass) one we used?
   e. Who can remind us what a magnetic field is?
   f. What is magnetic force?
   g. Where is a magnet the strongest?

Lesson Seven: Using a Compass

A. *Daily Objectives*

1. Concept Objective(s)
   a. Students will understand the common properties of magnetic energy. (Adapted from Colorado Model Content Standard #2)

2. Lesson Content
    a. Magnetism (Page 60)
        i. The earth behaves as if it were a huge magnet.
        ii. A magnetized needle in a compass will always point north and it can be used for orienteering.
3. Skill Objective(s)
    a. The students will be able to orientate themselves using a compass.
    b. The students will effectively work together in a group to find a solution.

B. *Materials*
1. One compass per two or three children
2. Appendix H - Orienteering My Way Through a Treasure Hunt (cut apart and give one set of directions to each group)
3. Appendix A
4. Pencil (one per student)
5. Seven paper bags
6. Various candy, stickers, pencils, etc. put into paper bags labeled with A, B, C, D, E, F, and G
7. Large field or open area outside of your school

C. *Key Vocabulary*
1. Orienteering – finding your way

D. *Procedures/Activities*
1. Before the activity starts, divide your children into groups of two or three children. Give each group a letter name (A through G). Ahead of time, you will need to go out and lay the filled paper bags out according to the direction for each group on Appendix H.
2. Guide your children outside of your school building. The children will be outside on a "treasure hunt" using their compasses.
3. First practice using the compasses together. Ask them to face north and tell you what they see. Then face east, and tell you what they see. Have them take 2 steps south and four steps west. Give them practice using a compass before handing out Appendix H to each group.
4. Give each group their set of directions and tell them that their job is to find their paper bag labeled with their letter. They MUST use the directions and their compass to find the paper bag. Tell them if they are having difficulty to raise their hands and stay right where they are. You should go to them if they need help.
5. Guide all of them to the starting point and have a couple groups start at a time.
6. When they are finished, they may come back to the starting point and divide the goodies in their bag between all the group members. Remind them – NO ARGUING over the goodies.

E. *Assessment/Evaluation*
1. Today, the children will finish Appendix A – Magnets, Magnets, and More Magnets (first used in Lesson One). They will fill in the "L" portion or what they have learned. Encourage your children to have at least four items listed that they have learned during the unit on magnets.

VI. CULMINATING ACTIVITY

A. The students will watch the video *The Science of Magnets*, by Schlessinger.

B. The students will take a unit test as a culminating assessment of the magnet unit (Appendix I).

VII. HANDOUTS/WORKSHEETS

A. Appendix A: Magnets, Magnets, and More Magnets (Lesson One and Seven)
B. Appendix B: No Magnet Here (Lesson One)
C. Appendix C: Attract or Not Attract? (Lesson Two)
D. Appendix D: Important Scientists (Lesson Two)
E. Appendix E: Investigating Magnetic Poles (Lesson Three)
F. Appendix F: North and South Seekers (Lesson Three)
G. Appendix G: Through It All (Lesson Four)
H. Appendix H: Orienteering My Way Through a Treasure Hunt (Lesson Seven)
I. Appendix I: Magnet Unit Test (Culminating Activity)
J. Appendix J: Magnet Unit Test – Teacher's Key (Culminating Activity)
K. Appendix K: Rubric for Writing Assignments (Lessons Two, Four, and Five)

VIII. BIBLIOGRAPHY

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Appendix A

Name _____

Magnets, Magnets, and More Magnets

What I Know About Magnets	What I Want to Know About Magnets	What I Learned About Magnets

Appendix B

Appendix C

Scientist_____

Attract or Not Attract?

Magnetic attraction is a force that makes some objects move toward a magnet. Your job as a scientist, today, is to find out what types of objects attract a magnet.

1. Make a prediction telling me that yes, an object will attract a magnet or no, the object will not attract the magnet. After testing each object, color in your result.

Prediction	Object	Results	
_____	1. aluminum foil	yes	no
_____	2. copper wire	yes	no
_____	3. glass marble	yes	no
_____	4. wooden match	yes	no
_____	5. brass fastener	yes	no
_____	6. dime	yes	no
_____	7. soft drink can	yes	no
_____	8. needle	yes	no
_____	9. steel wool	yes	no
_____	10. leather	yes	no

In a short paragraph, tell me what kind of an object will attract a magnet.

_____

_____

_____

_____

Appendix D

IMPORTANT SCIENTISTS

William Gilbert

William Gilbert was born in England in 1544. He was a medical doctor but became most famous for his interesting discovery about magnets.

He studied many legends about magnets. In these legends, natural rock magnets were called lodestones. He studied how the earth acted like a huge, natural magnet and made lodestones work like a compass. Without a good compass, sailors sailing the seas would be lost forever!

William Gilbert wrote a famous book called *De Magnete*, which is a latin word for "on the magnet". He died in 1603.

Michael Faraday

Michael Faraday was a British scientist who lived in England two-hundred years ago. He studied different ways to use electromagnets. An electromagnet is a magnet made with a wire and a piece of iron. It only has magnetic power when a current of electricity flows through the wire. A regular magnet is always magnetic; however an electromagnet can be switched on and off. Electromagnets are used in telephones, computers, televisions, and even cars.

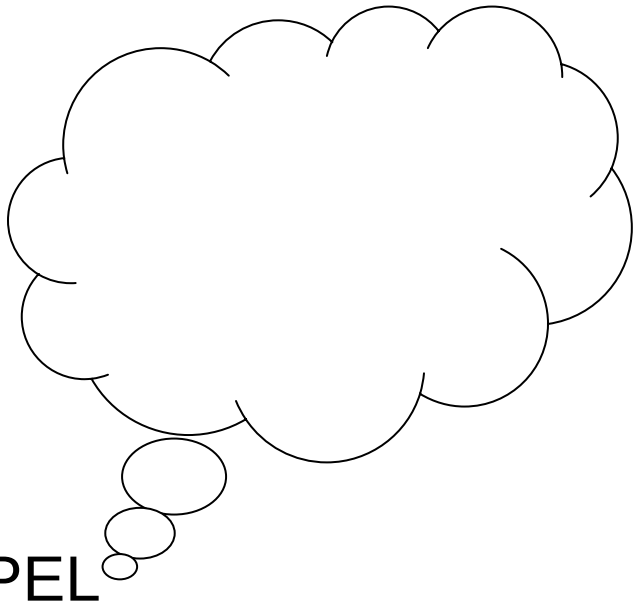
Adapted from *Magnets*, by Jennifer Overend Prior

Appendix E

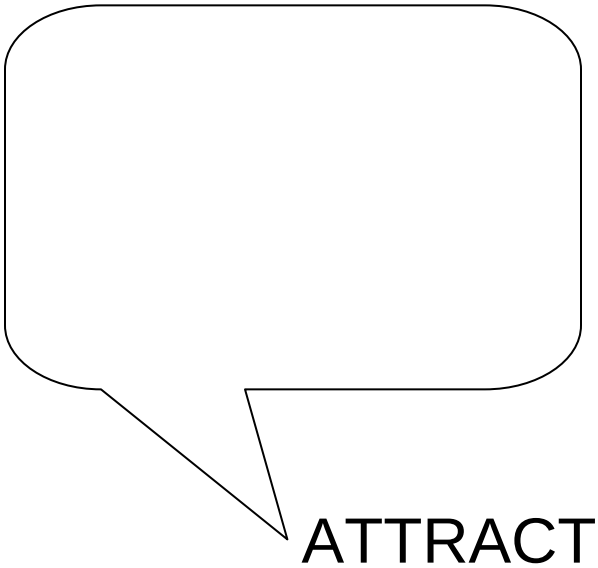
Name_____

Investigating Magnetic Poles

Define the following words using complete sentences in each word balloon.

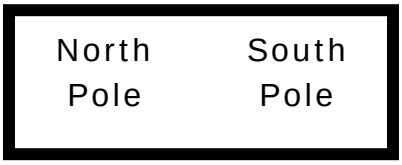


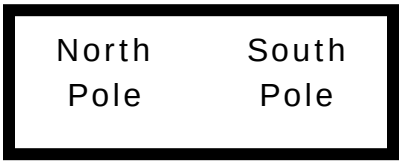
REPEL



ATTRACT

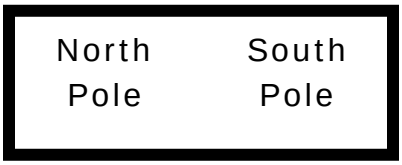
Here are two sets of magnets next to each other. Explain what would happen to the magnets now that you know about magnetic poles. Remember to use complete sentences.

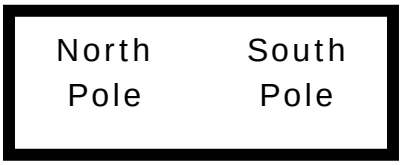




_____

_____





_____

_____

Using the four magnets above, color in the strongest part of each magnet using a green crayon.

Appendix F

NORTH and SOUTH SEEKERS

MATERIALS:

- ✓ **Red construction paper – 12 sheets**
- ✓ **Blue construction paper – 12 sheets**
- ✓ **Black marker**
- ✓ **Masking tape**

PROCEDURES:

1. **Label the twelve sheets of red construction paper with "North."**
2. **Label the twelve sheets of blue construction paper with "South."**
3. **Attach one tag to the front of each child's shirt with masking tape.**
4. **Take the children to a large, open area. Choose one child to be "it."**
5. **The child who is "it" will try to tag another child. If another child is tagged, he/she is now "it." To be "safe," and not able to be tagged, a child must be standing back-to-back with another child who is wearing an *opposite* pole tag. For example, a child wearing a North-pole tag can stand back-to-back with a child wearing a South-pole tag. Two children with the same tags cannot stand together. Paired children can only be standing back-to-back "safe" for 10 seconds. Then they must run to find another opposite pole partner.**
6. **Play continues for a predetermined period of time.**

Adapted from *Magnets*, by Jennifer Overend Prior

Appendix G

Name _____ Item Tested _____

Through It All

Part 1

First, make your predictions by checking yes, a magnet will attract through the object or no, the object will not attract through the object.

OBJECT	PREDICTION		RESULT	
	YES	NO	YES	NO
1. magazine	____	____	____	____
2. cardboard	____	____	____	____
3. wood	____	____	____	____
4. fabric	____	____	____	____
5. aluminum foil	____	____	____	____
6. homework folder	____	____	____	____
7. shoe	____	____	____	____
8. hand	____	____	____	____

Part 2

Next, we will be conducting a class experiment. First, I would like you to make a prediction telling me whether or not a magnet can attract a paper clip through water. Use a complete sentence.

MY PREDICTION:

_____

Use a complete sentence to record our results below.

OUR RESULTS:

_____

Adapted from *Mostly Magnets*, by Aims Education Foundation

Orienteering My Way Through a Treasure Hunt

GROUP A
1. All group members should be at the starting point.
2. Using your compass take 10 steps north.
3. Using your compass take 16 steps west.
4. Using your compass take 5 steps south.
5. Using your compass take 9 steps west.

Does your bag have your group letter on it?

Orienteering My Way Through a Treasure Hunt

GROUP B
1. All group members should be at the starting point.
2. Using your compass take 17 steps south.
3. Using your compass take 10 steps east.
4. Using your compass take 5 steps north.
5. Using your compass take 12 steps east.

Does your bag have your group letter on it?

Orienteering My Way Through a Treasure Hunt

GROUP C
1. All group members should be at the starting point.
2. Using your compass take 15 steps east.
3. Using your compass take 12 steps south.
4. Using your compass take 5 steps west.
5. Using your compass take 10 steps south

Does your bag have your group letter on it?

Orienteering My Way Through a Treasure Hunt

GROUP D
1. All group members should be at the starting point.
2. Using your compass take 12 steps west.
3. Using your compass take 16 steps north.
4. Using your compass take 10 steps east.
5. Using your compass take 5 steps south.

Does your bag have your group letter on it?

Orienteering My Way Through a Treasure Hunt

GROUP E

1. All group members should be at the starting point.
2. Using your compass take 8 steps north.
3. Using your compass take 16 steps east.
4. Using your compass take 12 steps north.
5. Using your compass take 15 steps west.

Does your bag have your group letter on it?

Orienteering My Way Through a Treasure Hunt

GROUP F

1. All group members should be at the starting point.
2. Using your compass take 5 steps east.
3. Using your compass take 20 steps north.
4. Using your compass take 18 steps west.
5. Using your compass take 12 steps north.

Does your bag have your group letter on it?

Orienteering My Way Through a Treasure Hunt

GROUP G

1. All group members should be at the starting point.
2. Using your compass take 24 steps south.
3. Using your compass take 5 steps west.
4. Using your compass take 12 steps south.
5. Using your compass take 18 steps east.

Does your bag have your group letter on it?

Magnet Unit Test

2pts. 1. List two places you might find magnets. Use a complete sentence.

_____

2 pts. 2. Circle the objects that would attract a magnet.

needle leather soft drink can paper clip steel wool

1 pt. 3. What does the word attract mean? Circle your answer.

a. to push away
b. to like
c. to pull close

1 pt. 4. Which famous scientist studied how the earth was like a huge, natural magnet?

a. William Gilbert
b. Steven De Magnete
c. David South

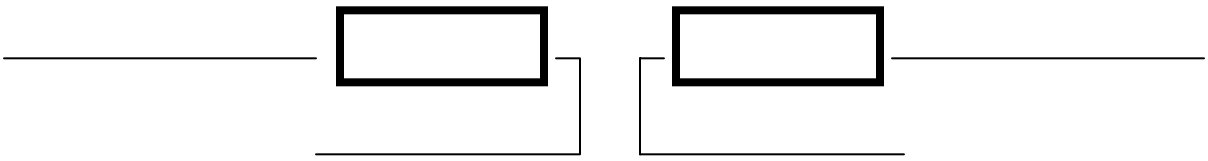
2 pts. 5. What vocabulary word is the opposite of attract? Give its definition.

_____ - _____
word definition

2pts. 6. What are the opposite ends of a magnet called?

_____ _____

2 pts. 7. Label the magnets below to show that they would **attract** each other.



1 pt. 8. Does every part of a magnet have the same strength? Circle your answer.

Yes No

1pt. 9. Using a blue crayon, color in the strongest parts of the magnet below.

3pts. 10. List three items that a magnet's strength can pass through.

1. _____ 2. _____

3. _____

1 pt. 11. In the compass you made, what direction did the magnetized side point? Circle your answer.

north east south west

1 pt. 12. Finish the sentence by telling me what a compass is used for.

A compass is used for_____ .

1pt. 13. What is a magnet made of? Circle your answer.

a. copper
b. iron
c. glass
d. aluminum

1 pt. 14. A natural magnet is called a _____ .

a. bar
b. horseshoe
c. lodestone

4 pts. 13. Using complete sentences, please tell me two things that you have learned during our unit on magnets.

1. _____

_____

2. _____

_____

Magnet Unit Test-Key

2pts. 1. List two places you might find magnets. Use a complete sentence.

compass, lodestones, earth

2 pts. 2. Circle the objects that would attract a magnet.

needle leather soft drink can paper clip steel wool

1 pt. 3. What does the word attract mean? Circle your answer.

a. to push away
b. to like
c. to pull close

1 pt. 4. Which famous scientist studied how the earth was like a huge, natural magnet?

a. William Gilbert
b. Steven De Magnete
c. David South

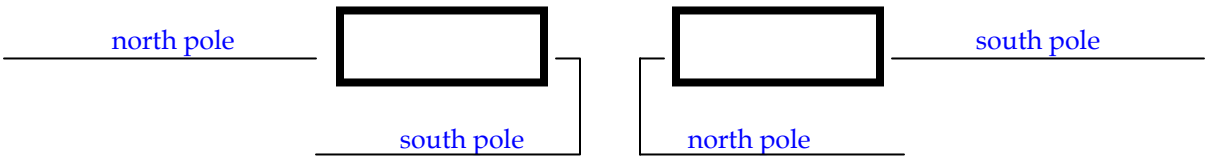
2 pts. 5. What vocabulary word is the opposite of attract? Give its definition.

repel (word) - to push away (definition)

2pts. 6. What are the opposite ends of a magnet called?

north pole and south pole

2 pts. 7. Label the magnets below to show that they would **attract** each other.



1 pt. 8. Does every part of a magnet have the same strength? Circle your answer.

Yes No

1pt. 9. Using a blue crayon, color in the strongest parts of the magnet below.

3pts. 10. List three items that a magnet's strength can pass through.

1. cardboard 2. aluminum foil 3. fabric 4. homework folder

1 pt. 11. In the compass you made, what direction did the magnetized side point? Circle your answer.

north east south west

1 pt. 12. Finish the sentence by telling me what a compass is used for.

A compass is used for - orienteering, or finding directions.

1pt. 13. What is a magnet made of? Circle your answer.

a. copper
b. iron
c. glass
d. aluminum

1 pt. 14. A natural magnet is called a _____ .

a. bar
b. horseshoe
c. lodestone

4 pts. 13. Using complete sentences, please tell me two things that you have learned during our unit on magnets.

1. _____

_____

2. _____

_____

Appendix K

Rubric for Writing Assignments

Advanced

___ Fully focused on prompt
___ Specific, lively details with elaboration
___ Inviting introduction, crafted body, and satisfying conclusion
___ Clear, coherent order with very effective transitions
___ Writing clearly grabs the reader's attention and shows heart and spirit
___ Striking vocabulary with active, precise verbs and figurative language
___ Variety of engaging, crafted, flowing sentences
___ Nearly error-free

Proficient

___ Mostly focused on the prompt
___ Ideas and details are clear, interesting, and purposeful
___ Intentional introduction, organized body, and purposeful conclusion
___ Good pacing and order with ordinary transitions
___ Writing engages and holds the reader's attention and shows commitment
___ General, familiar vocabulary and verbs with some attempts at varied usage
___ Variety of somewhat engaging sentence lengths and structures
___ Some errors, but they do not interfere with reading and meaning

Partially Proficient

___ Some focus on the prompt
___ Ideas and details are sketchy and thinly developed, with little elaboration
___ Begins, and /or ends abruptly while the purpose of the writing is not clear
___ Choppy, rambling writing, with ineffective or obvious transitions
___ Reader may lose interest because writer does not show sincere commitment
___ Uninteresting, vague, repetitious vocabulary that may be misused
___ Awkward sentence structures and/or too many simple constructions
___ Errors interfere with reading and meaning

Unsatisfactory

___ Lacks focus on the prompt
___ Meaningless information with limited and unclear ideas
___ Weak or missing introduction and conclusion with confusing purpose
___ Awkward, distracting pacing with no transitions
___ Reader not engaged because the writer lacks connection to the audience
___ Vague, limited, incorrect vocabulary that is misused
___ Incomplete, incorrect sentence structures with no variety
___ Significant errors make reading difficult