Teaching About Magnets in Kindergarten

Grade Level or Special Area: Kindergarten
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Length of Unit: Five lessons (approximately two weeks) (15 – 30 minutes each)

I. ABSTRACT

This unit will give students an opportunity to explore magnets. Through exploration, group discussions, and teacher-directed activities, students will be able to identify everyday uses of magnets. Students will also develop an awareness of magnetic attraction, strength, poles, and force.

II. OVERVIEW

A. Concept Objectives
   1. Students will develop an understanding for the processes of scientific investigation and design. Students will engage in exploration, communication and evaluation of such investigations. Adapted from the Colorado State Standards for Science – Standard 1.
   2. Students will develop an awareness that science involves a particular way of knowing and understanding common connections among scientific disciplines. Adapted from the Colorado State Standards for Science – Standard 6.

B. Content from the *Core Knowledge Sequence*
   1. Introduction to Magnetism, p. 20

C. Skill Objectives
   1. Learn to operate scientific equipment in order to gather data.
   2. Identify familiar everyday uses of magnets.
   3. Classify materials according to whether they are or are not attracted by a magnet.
   4. Discuss as class data results.

III. BACKGROUND KNOWLEDGE

A. For Teachers
   1. Core Knowledge Foundation. *Core Knowledge Sequence: Content Guidelines For Grades K-8*. Core Knowledge Foundation. Charlottesville, VA. 1999. 1-890517-20-8. p. 20.
   2. Hirsch, Jr. E.D. and Holdren, John. *What Your Kindergartner Needs to Know.* New York: Dell Publishing, 1996. 0-385-31841-3. pp. 271 – 274.
   3. Core Knowledge Foundation. *Core Knowledge Preschool: Content and Skill Guidelines for Preschool.* Core Knowledge Foundation. Charlottesville, VA. 1997. 1-8905/7-21-6. pp. 77 – 81.

B. For Students
   1. Core Knowledge Foundation. *Core Knowledge Preschool: Content and Skill Guidelines for Preschool.* Core Knowledge Foundation. Charlottesville, VA. 1997. 1-8905/7-21-6. pp. 71 – 81.

IV. RESOURCES

A. Core Knowledge Foundation. *Core Knowledge Sequence: Content Guidelines For Grades K-8*. Core Knowledge Foundation. Charlottesville, VA. 1999. 1-890517-20-8. (All lessons)

B. Hirsch, Jr. E.D. and Holdren, John. *What Your Kindergartner Needs to Know.* New York: Dell Publishing, 1996. 0-385-31841-3. (All lessons)

C. Core Knowledge Foundation. *Core Knowledge Preschool: Content and Skill Guidelines for Preschool.* Core Knowledge Foundation. Charlottesville, VA. 1997. 1-8905/7-21-6. (All lessons)

D. Editors of Scholastic Inc. *"Scholastic Children's Dictionary"* New York: Usborne Publishing Ltd., 1996. 0-590-25271-2. (All lessons)

E. Freeman, Sara. *Magnets and Electricity-Primary*. MI: The Woods Publishing Group, 1999.1-56451-303-3. (All lessons)

F. Althouse, Rosemary, & Main, Cecil. *Science Experiences for Young Children: Magnets*. New York: Teachers College Press, 1975. 0-8077-2459-9. (All lessons)

V. LESSONS

Lesson One: What Can We Discover About Magnets? (15 – 30 minutes) (two – three days)

A. *Daily Objectives*

1. Concept Objective(s)
   a. Students will develop an understanding for the processes of scientific investigation and design. Students will engage in exploration, communication and evaluation of such investigations.
   b. Students will develop an awareness that science involves a particular way of knowing and understanding common connections among scientific disciplines.
2. Lesson Content
   a. Introduction to Magnetism
3. Skill Objective(s)
   a. Learn to operate scientific equipment in order to gather data.
   b. Identify familiar everyday uses of magnets.
   c. Classify materials according to whether they are or are not attracted by a magnet.
   d. Discuss as a class data results.

B. *Materials*

1. A variety of magnets, such as bar magnets, horseshoe magnets, disc magnets, ball magnets, wand magnets…
2. A shallow tub big enough to hold all the magnets and with enough room for student exploration (I use a sand and water table)
3. Chart paper and a marker
4. Appendix A – Identify Different Types of Magnets for each student
5. Pencils each student
6. Crayons each student

C. *Key Vocabulary*

1. Magnet – a piece of metal that attracts iron and steel

D. *Procedures/Activities*

1. Ask students, "What is a magnet?" Accept all possible answers.
2. Define 'magnet' from the *Key Vocabulary* words above.
3. Ask students, "What kind of magnets do you have in your home?" Allow students time to answer.
4. Give students some examples of magnets you may have in your own home: magnets on cabinet doors, refrigerator magnets, a magnetic screwdriver…
5. Ask students, "Do we have any magnets in our classroom?" Give students time to answer.
6. Give students some examples of magnets you may have in your classroom: magnetic letters or numbers, a magnetic paper clip holder, a magnetic bulletin board…

7. Explain to students that there will be a tub of magnets in the science area for them to explore over the next few days.
8. Hold up each magnet, one at a time, and give the students the name of the particular magnet you are holding up. (bar magnet, horseshoe magnet, disc magnet…)
9. Encourage students to call the different magnets by their name as they are exploring with them.
10. Set the tub of magnets in the science area for students to explore on their own.
11. Students can carry out this activity themselves throughout the next few days during center time.
12. Write each student's name on a separate line of the chart paper, skipping a line in between each name.
13. Hang the chart paper up in the science area.
14. Encourage students to come to you with their discoveries so that you can write them down on the chart paper next to their name.
15. Some things students should discover are: one magnet can pick up another magnet, magnets will stick together, some magnets are stronger than others, magnets come in different shapes and sizes, sometimes magnets may not stick to each other.
16. After two or three days of student exploration with the magnets, bring students together for a group discussion.
17. Discuss the various discoveries you have written up on the chart paper.
18. Explain to students that the class will be doing a variety of activities with magnets.
19. Pass out Appendix A, pencils and crayons to each student.
20. You will need to read directions for students, giving them time to draw between each item.

E. *Assessment/Evaluation*
1. Teacher observation
2. Class discussion
3. Appendix A - Identify Different Types of Magnets

Lesson Two: What Will magnets attract? (15 – 30 minutes) (two - three days)

A. *Daily Objectives*
1. Concept Objective(s)
   a. Students will develop an understanding for the processes of scientific investigation and design. Students will engage in exploration, communication and evaluation of such investigations.
   b. Students will develop an awareness that science involves a particular way of knowing and understanding common connections among scientific disciplines.
2. Lesson Content
   a. Introduction to Magnetism
3. Skill Objective(s)
   a. Learn to operate scientific equipment in order to gather data.
   b. Identify familiar everyday uses of magnets.
   c. Classify materials according to whether they are or are not attracted by a magnet.
   d. Discuss as a class data results.

B. *Materials*

1. A variety of magnets, such as bar magnets, horseshoe magnets, disc magnets, ball magnets, wand magnets…
2. A shallow tub big enough to hold all the magnets and with enough room for student exploration
3. Objects magnets will attract, such as nuts and bolts, small pair of scissors, small toys…
4. Objects magnets will not attract, such as keys, crayons, erasers, coins…
5. Two shoeboxes (one labeled 'Yes' on green paper and one labeled 'No' on red paper)
6. Appendix B – What Do Magnets Attract? for each student
7. Pencils for each student
8. Crayons for each student
9. A magnet for each student

C. *Key Vocabulary*

1. Attract – to pull in the direction of the magnet

D. *Procedures/Activities*

1. Add new objects to the tub of magnets.
2. Get shoeboxes ready and set them next to the tub of magnets and other objects.
3. Have students sit at their desks.
4. Explain that you have added objects to the tub that will and will not attract to the magnets.
5. Define 'attract' from *Key Vocabulary* words above.
6. Explain that you have also set out two shoeboxes, one marked with the word 'Yes' on green paper and one marked 'No' on red paper.
7. Say, "As you explore the magnets and other objects, separate the objects into the shoeboxes. You will put any objects that attract to the magnets in the 'Yes' box and any objects that do not attract in the 'No' box. When you're done, put everything back into the magnet tub so it will be ready for the next person."
8. Students can carry out this activity themselves throughout the next two or three days during center time.
21. After two or three days of student exploration with the magnets and other objects, bring students together for a group discussion.
9. Have the tub of magnets and other objects as well as the two shoeboxes sitting close by so they are visible to all students.
10. Say, "Today we are going to go explore the magnets and other objects together."
11. Go through the tub of magnets and other objects separating them into the 'Yes' and 'No' boxes as appropriate.
12. Once all the objects are separated say, "Let's go through the objects from the 'Yes' box." Go through the box and talk about each object.
13. Say, "The objects in the 'Yes' box all attract to the magnets therefore they must be made of iron or steel.
14. "Let's look at the objects in the 'No' box and talk about what they are made of." Go through the box and talk about each object.
15. Say, "The objects in the 'No" box are made out of many different materials and none of them attract to the magnets."
16. Students may wonder why some of the objects in the 'No' box are metal but do not attract to the magnets.
17. Say, "Magnets will not pick up all metal objects, but only those made of iron or steel." "This means that the metal objects in the 'Yes' box contain iron or steel and the metal objects in the 'No' box do not."
18. Pass out Appendix B, pencils, crayons and a magnet to each student.

E. *Assessment/Evaluation*
   1. Teacher observation
   2. Class discussion
   3. Appendix B – What Do Magnets Attract? (Read the directions (on side 2) and work closely with students as they explore what magnets will attract.)

Lesson Three: Are Some Magnets Stronger Than Others? (15–30 minutes) (two–three days)

A. *Daily Objectives*
   1. Concept Objective(s)
      a. Students will develop an understanding for the processes of scientific investigation and design. Students will engage in exploration, communication and evaluation of such investigations.
      b. Students will develop an awareness that science involves a particular way of knowing and understanding common connections among scientific disciplines.
   2. Lesson Content
      a. Introduction to Magnetism
   3. Skill Objective(s)
      a. Learn to operate scientific equipment in order to gather data.
      b. Identify familiar everyday uses of magnets.
      c. Classify materials according to whether they are or are not attracted by a magnet.
      d. Discuss as a class data results.

B. *Materials*
   1. A variety of magnets, such as bar magnets, horseshoe magnets, disc magnets, ball magnets, wand magnets…
   2. A shallow tub big enough to hold all the magnets and with enough room for student exploration
   3. Objects magnets will attract, such as nuts and bolts, small pair of scissors, small toys…
   4. Chart paper and marker
   5. An extra box of nuts (the small metal rings that screw onto the end of a bolt to hold it in place)
   6. Appendix C – Which Magnet Is Stronger? for each student
   7. Pencils for each student
   8. Crayons for each student

C. *Key Vocabulary*
   1. Strongest – the most powerful
   2. Nut – the small metal ring that screw onto the end of a bolt to hold it in place

D. *Procedures/Activities*
   1. Hang up chart paper so that it is visible to all students.
   2. Take the objects that won't attract to the magnets out of the magnet tub.
   3. Have students sit at their desks.
   4. Say, "We have been exploring with magnets for a few days now."
   5. Ask, "Which magnet in the tub do you think is the strongest?" Give students time to answer.
   6. Write their answers on the chart paper.
   7. Define 'strongest' from the *Key Vocabulary* words above.
   8. Ask, "Why do you think that the magnet(s) I listed on the chart paper is the strongest?" Give students time to answer.

9. Tell the students that they will have a couple of days to explore with the magnets, to see which one is actually the strongest.
10. As you observe students in exploration with the magnets, encourage them to use different magnets to pick up the same object.
11. Ask students questions like:
    a. "Will the smallest magnet pick up the same objects as the biggest magnet?"
    b. "Is the biggest magnet the one that picks up the heaviest or most objects?"
    c. "How can you figure out which magnet is the strongest?"
12. After two or three days of student exploration, gather students together for a group discussion.
13. Have the tub of magnets and other objects sitting close by so they are visible to all students.
14. Say, "Today we are going to go explore which magnet is strongest."
15. Say, "Remember that I wrote the name of the magnet(s) on the chart paper."
16. Ask, "Have any of you changed your mind about which one(s) is the strongest?" Give students time to answer.
17. If answers vary from the students' first answers, write them up on the chart paper.
18. Using the top two answers from the students, choose those magnets from the tub. Draw a picture of these two magnets on the chart paper.
19. Say, "Let's see which of these magnets can pick up the most 'nuts'."
20. Define 'nuts' from *Key Vocabulary* words above.
21. Chose one of the top two magnets.
22. Say, "Let's add 'nuts' so they are dangling from the end of this magnet."
23. Say, "Count with me as I add the 'nuts' to the magnet."
24. When you can't dangle any more 'nuts' from that magnet, draw (counting as you do) the number of 'nuts' you were able to dangle from that magnet you drew on your chart paper.
25. Repeat these steps with the second magnet.
26. Ask, "Which magnet was able to hold the most 'nuts'?" Give students time to answer.
27. Say, "The (name the strongest magnet) was able to hold the most 'nuts'."
28. Ask, "Which of these two magnets is the strongest?" Give students time to answer.
29. Ask, "Why do you think this magnet is the strongest?" Give students time to answer.
30. Say, "Yes, the (name of the strongest magnet) is the strongest of these two because it can hold the most 'nuts'."
31. Pass out Appendix C, two different types of magnets, 'nuts' and pencils to each student.

E. *Assessment/Evaluation*
1. Teacher observation
2. Class discussion
3. Appendix C – Which Magnet Is Strongest? (Read the directions (on side 2) and work closely with students as they explore which of their two magnets is the strongest.)

Lesson Four: Magnetic Poles (15 – 30 minutes)

A. *Daily Objectives*
   1. Concept Objective(s)
      a. Students will develop an understanding for the processes of scientific investigation and design. Students will engage in exploration, communication and evaluation of such investigations.
      b. Students will develop an awareness that science involves a particular way of knowing and understanding common connections among scientific disciplines.
   2. Lesson Content
      a. Introduction to Magnetism
   3. Skill Objective(s)
      a. Learn to operate scientific equipment in order to gather data.
      b. Identify familiar everyday uses of magnets.
      c. Classify materials according to whether they are or are not attracted by a magnet.
      d. Discuss as a class data results.

B. *Materials*
   1. Two bar magnets labeled with an N and an S – for each student
   2. One bar magnet that is not labeled – for each student
   3. Appendix D – Magnetic Poles for each student
   4. Pencils for each student

C. *Key Vocabulary*
   1. Magnetic poles – the strongest area of a magnet
   2. Repel – to push away
   3. Opposite – different
   4. Alike – the same

D. *Procedures/Activities*
   1. Have students sit at their desks.
   2. Pass out two of the labeled bar magnets to each student.
   3. Say, "Today we are going to explore magnets together."
   4. Ask, "What can you tell me about these magnets?" Give students time to answer.
   5. Say, "These magnets are called bar magnets." "They are each labeled with an 'N' and an 'S'."
   6. Ask, "Why do you think these magnets are labeled with these letters?" Give students time to answer.
   7. Explain that the 'N' and 'S' on the magnet stand for the North and South poles of the magnet and are called the Magnetic poles.
   8. Define 'magnetic poles' from the *Key Vocabulary* words above.
   9. Say, "Let's explore with our magnets and see what we can find out about the magnetic poles."
   10. Say, "Push the north pole of one magnet near the south pole of the other magnet."
   11. Ask, "What happens?" Give students time to answer.
   12. Say, "The magnets attract and stick together." "Opposite letters attract."
   13. Define 'opposite' from the *Key Vocabulary* words above.
   14. Say, "Push the North Pole of one magnet near the North Pole of the other magnet."
   15. Ask, "What happens?" Give students time to answer.
   16. Say, "The magnets repel and push apart. Alike letters repel."
   17. Define 'alike' from the *Key Vocabulary* words above.

18. Say, “Push the south pole of one of the magnets near the south pole of the other magnet.”
19. Ask, “What happens?” Give students time to answer.
20. Say, “The magnets repel and push apart. Alike letters repel.”
21. Define ‘repel’ from the *Key Vocabulary* words above.
22. Pass out one bar magnet that is not labeled to each student.
23. Pick up one labeled magnet so that students have only two magnets.
24. Say, “Put the magnet that doesn’t have the poles labeled next to the other magnet.”
25. Ask, “How can you find the south pole of the magnet that is not labeled?” Give students time to answer.
26. Say, “Explore with your magnets and try to find the South Pole on the magnet that is not labeled.”
27. While giving students time to do this, walk around and give help where necessary.
28. Say, “The south pole of the unlabeled magnet will be the pole that repels from the south pole of the labeled magnet. Alike letters repel.”
29. Ask, “How can you find the north pole of the magnet that is not labeled?” Give students time to answer.
30. Say, “Explore with your magnets and try to find the North Pole on the magnet that is not labeled.”
31. While giving students time to do this, walk around and give help where needed.
32. Say, “The north pole of the unlabeled magnet will be the pole that repels from the north pole of the labeled magnet. Alike letters repel.”
33. Say, “Put the unlabeled magnet next to the north pole of the labeled magnet so that the unlabeled magnet attracts to the north pole of the labeled magnet.”
34. Ask, “What pole on the unlabeled magnet is attracted to the north pole of the labeled magnet?” Give students time to answer.
35. Say, “The north pole of the labeled magnet will attract to the south pole of the unlabeled magnet. Opposites attract.”
36. Say, “Put the unlabeled magnet nest to the south pole of the labeled magnet so that the unlabeled magnet attracts to the south pole of the labeled magnet.”
37. Ask, “What pole on the unlabeled magnet is attracted to the south pole of the labeled magnet?” Give students time to answer
38. Say, “The south pole of the labeled magnet will attract to the north pole of the unlabeled magnet. Opposites attract.”

E. *Assessment/Evaluation*
   1. Teacher observation
   2. Class discussion
   3. Appendix D – Magnetic Poles

Lesson Five: Magnetic Force Will Go Through Things (15-30 minutes) (two – three days)

A. *Daily Objectives*
   1. Concept Objective(s)
      a. Students will develop an understanding for the processes of scientific investigation and design. Students will engage in exploration, communication and evaluation of such investigations.
      b. Students will develop an awareness that science involves a particular way of knowing and understanding common connections among scientific disciplines.
   2. Lesson Content

a. Introduction to Magnetism

3. Skill Objective(s)
   c. Learn to operate scientific equipment in order to gather data.
   d. Identify familiar everyday uses of magnets.
   a. Classify materials according to whether they are or are not attracted by a magnet.
   e. Discuss as a class data results.

B. *Materials*
1. Tub of magnets
2. Mittens
3. Small shoe boxes
4. Plastic cups
5. Envelopes
6. Small thin books
7. Small magnetic objects that attract to magnets
8. A baby food jar per student
9. A wooden ruler per student
10. A pencil per student
11. An index card per student
12. A paper clip per student
13. Appendix E – Magnetic Forces Will Go Through Things for each student
14. Pencils for each student

C. *Key Vocabulary*
1. Magnetic force – it's what makes magnets attract or repel (it's invisible like a force field)

D. *Procedures/Activities*
1. Take out everything but the magnets and objects that will attract to the magnets from the magnet tub.
2. Place the objects (2 – 6 listed in Materials from above) in the tub.
3. Have students sit at their desks.
4. Say, "Magnetic force will go through things."
5. Show an example of how magnetic force can go through things by placing a magnet in the pointer finger of a mitten. Put the mitten on and use the magnet to pick up some paper clips. Explain to students that the magnetic force is moving through the mitten.
6. Say, "I have added some new materials to the magnet tub for you to explore with."
7. Give the students time to explore with these new materials during center time.
8. After all the students have had time to explore with the new materials gather them together for a group discussion.
9. Ask, "What kinds of things did you learn about magnets when you explored with these new materials?" Give students time to answer.
10. Give another example of how magnetic force can go through things by placing a ball magnet on the top of a student desk and move it around by placing another magnet under the desktop, so that you can move the ball magnet around by moving the magnet under the desktop.
11. Pass out Appendix E, a pencil, a magnet, a paper clip, an index card, and baby food jar to each student.

E. *Assessment/Evaluation*
1. Teacher observation
2. Class discussion

3. Appendix E – Magnetic Force Will Go Through Things.

VI. CULMINATING ACTIVITY

A. Using Appendix F, make one fish per student out of colored construction paper. Cut them out and write questions on them that pertain to the last five lessons. Some examples of questions are:
   1. What kind of magnet is this? (Draw a horse shoe magnet on the fish)
   2. What does a magnet attract to?
   3. What does attract mean?
   4. What does repel mean?
   5. Do opposite magnetic poles attract?
   6. Can magnetic force go through things?

   Then make a small fishing pole for each student using a twig and some fishing string with a small magnet attached to the end of the string. Empty out the magnet tub and put the fish in it. Each student will take a turn at the 'fishing tub' and has to answer the question on the fish they catch. Let students take home their fish and pole.

B. Make a copy of Appendix G for each student. Gather students together at their desks. Students will need a pencil. Pass out Appendix G and have students write their names. You will need to read each question to the students. Students will draw a happy face at the end of the question if the answer is yes and a sad face if the answer is no.

VII. HANDOUTS/WORKSHEETS

A. Appendix A: Identify Different Types of Magnets
B. Appendix B: What Do Magnets Attract?
C. Appendix C: Which Magnet is Stronger?
D. Appendix D: Magnetic Poles
E. Appendix E: Magnetic Forces Will Go Through Things
F. Appendix F: Fish for Culminating Activity
G. Appendix G: Culminating Questions

VIII. BIBLIOGRAPHY

A. Core Knowledge Foundation. *Core Knowledge Sequence: Content Guidelines For Grades K-8*. Core Knowledge Foundation. Charlottesville, VA. 1999. 1-890517-20-8.
B. Core Knowledge Foundation. *Core Knowledge K-8 Guide: A Model Monthly Topic Organizer*. Core Knowledge Foundation. Charlottesville, VA. 2000. 1-890517-26-7.
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H. Althouse, Rosemary, & Main, Cecil. *Science Experiences for Young Children: Magnets*. New York: Teachers College Press, 1975. 0-8077-2459-9.

Appendix A

Name _____

Identify Different Types of Magnets

1. Draw a Horseshoe magnet.

2. Draw a bar magnet.

3. Draw a wand magnet.

4. Draw some ball magnets.

5. Draw your favorite magnet.

Appendix B – Side 1

Name _____

What Do Magnets Attract?

Attracts to Magnet	Does Not Attract to Magnet

Appendix B – Side 2 (Directions)

Walk around the room and gather five small items. Bring them back to your desk and explore if they do or do not attract to your magnet. On the front of your worksheet, draw the items that attract to the magnet in the left hand column and the items that do not in the right hand column. (Hint: Your pointer finger and thumb of your left hand form a capital L and most people write with their right hand.)

Appendix C – Side 1

Name _____

Which Magnet Is Stronger?

Appendix C - Side 2 (Directions)

Draw a picture of your magnets in the boxes on the front side of your worksheet. Draw one magnet in the box on the left and one magnet in the box on the right. (Hint: Your pointer finger and thumb of your left hand form a capital L and most people write with their right hand). Add 'nuts' to the first magnet until you can't add any more. Count the nuts as you go along. When you can't add any more, draw that number of 'nuts' dangling from the magnet you drew in the box on your left. Repeat these steps with the second magnet. Circle the box with the strongest magnet.

Appendix D

Name _____

Magnetic Poles

Circle the poles that will attract. (Hint: Opposites attract)
Put an X on the poles that will repel. (Hint: Alike letters repel)

S **N**	**S** **N**

S **N**	**N** **S**

N **S**	**S** **N**

Appendix E

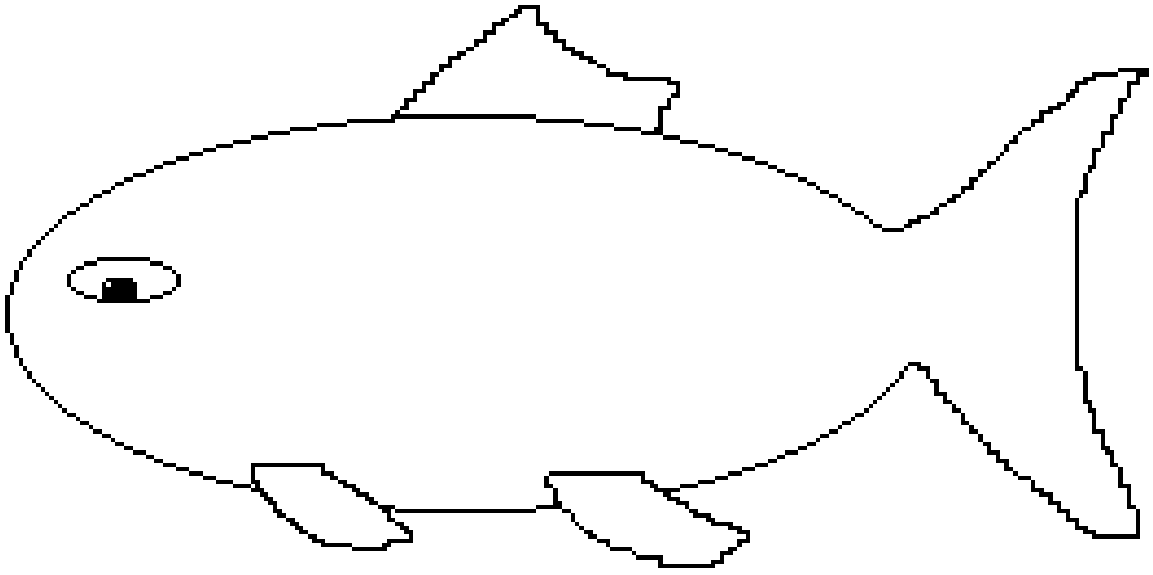
Name _____

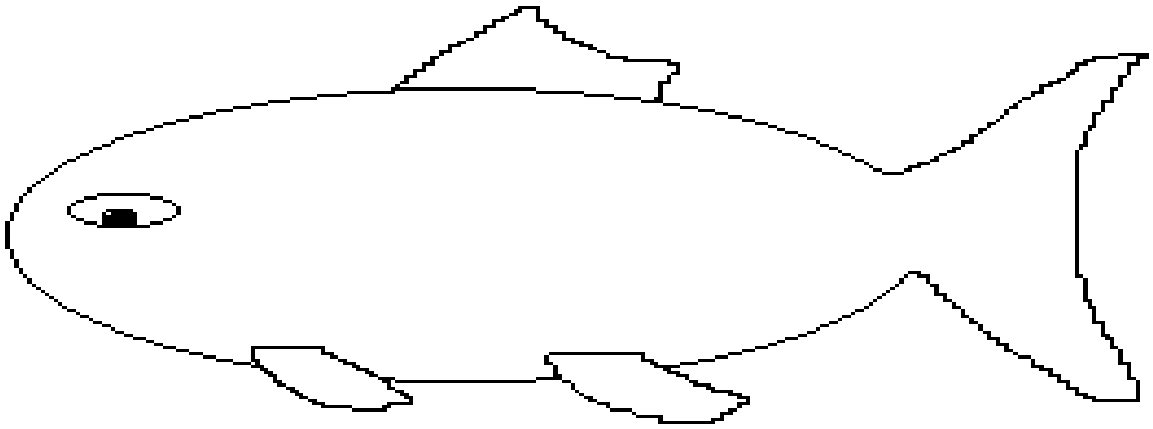
Magnetic Force Will Go Through Things

Read the question, explore it, and draw your answer. Draw a happy face for Yes and a sad face for No.

Can a magnet move a paper clip through an index card?	
Can a magnet move a paper clip through a wooden ruler?	
Can a magnet move a paper clip through a baby food jar?	

Appendix F





Appendix G

Name _____

Listen to the question and draw your answer. Draw a happy face for yes and a sad face for no.

1. A magnet is a piece of metal that attracts to iron and steel?

2. A magnet will attract to an eraser?

3. A magnet will attract to a paper clip?

4. Are some magnets stronger than others?

5. Do magnets have magnetic poles?

6. Opposite poles do not attract?

7. Can magnetic force go through things?