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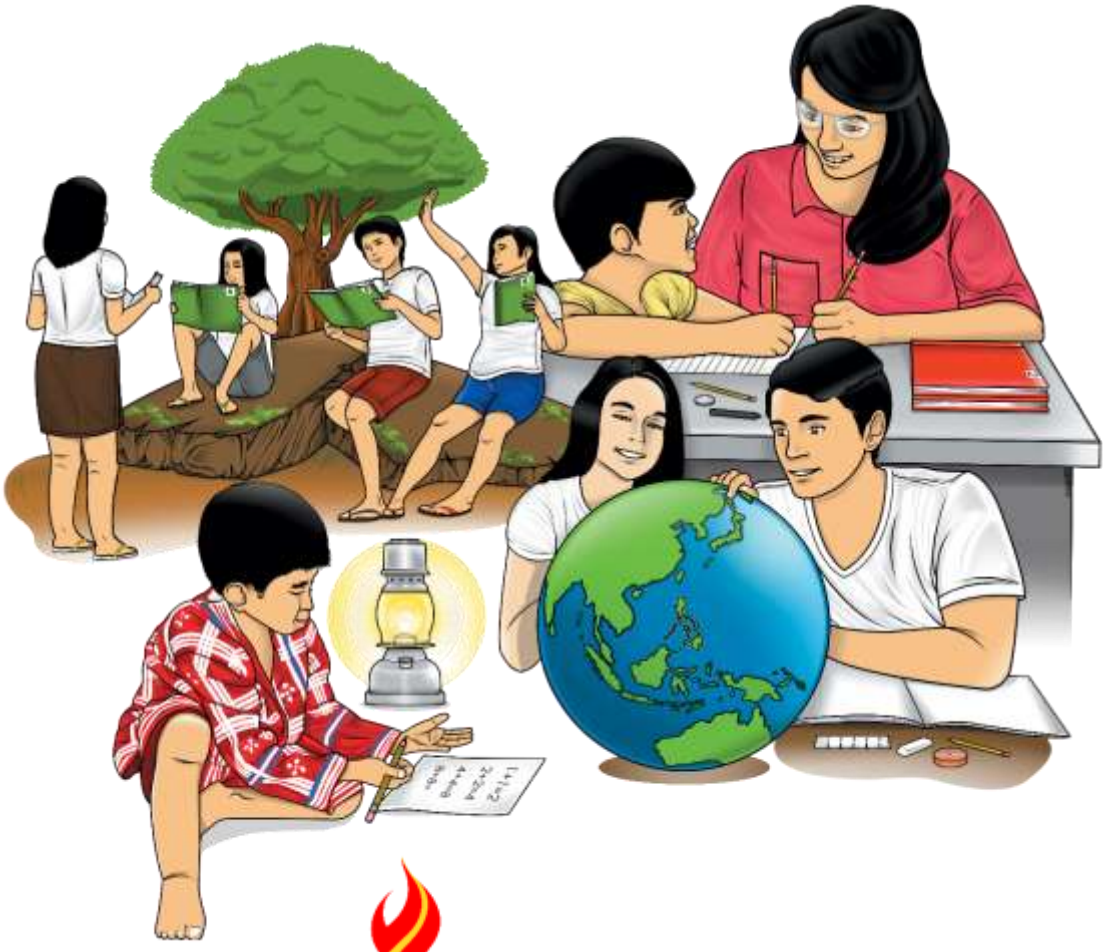
Science

Quarter 3 – Module 2:
Magnetic Force



ALTERNATIVE DELIVERY MODE
ADM

Science – Grade 4
Alternative Delivery Mode
Quarter 3 – Module 2: Magnetic Force
First Edition, 2020

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Rechilda B. Torrero

Editors: Noel V. Ibis, Christian M. Espiritu

Reviewers: Chozara P. Duroy

Illustrator: Jotham D. Balonzo, Kristal Grace C. Ilao

Layout Artist: Jogene Alilly C. San Juan, Edgardo D. Pamugas III

Management Team: Gilbert T. Sadsad
Francisco B. Bulalacao Jr.
Grace U. Rabelas
Ma. Leilani R. Lorico
Emma T. Soriano
Amy B. Dumail

Printed in the Philippines by _____

Department of Education – Region V

Office Address: Regional Center Site, Rawis, Legazpi City 4500
Telefax: 0917 178 1288
E-mail Address: region5@deped.gov.ph

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

In this module, you will familiarize of the different characteristics of magnets. But do you know that these magnets play important roles in our daily lives? Magnets have been proving its worth every day with its function by making difficult tasks easier. Magnets also play an important role in various devices we use at home. Series of activities were provided that can help you attain your learning targets. Please be guided by the instructions in each activity.

The lesson will focus on:

- Lesson 1 – Characterize magnetic force (S4FE-III d-e-3)

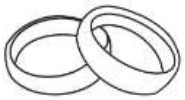
After going through this, you are expected to be able to:

1. determine if an object is magnetic or non-magnetic;
2. identify the types of a magnet; and
3. characterize magnetic force.

What I Know

A. Directions: Put a check mark (✔) if the object can be attracted to a magnet and a cross mark (✖) if it does not. Write your answers in your Science notebook.

1.  nickel knife

2.  gold rings

3.  wooden chair

4.  steel paper clip

5.  steel spoon

B. Directions: Write **TRUE** if the statement is correct and **FALSE** if it is not. Write your answers in your notebook.

1. Magnets attract all metals.
2. Opposite poles of magnets will repel.
3. All magnets have two north poles.
4. The same poles of magnets will attract.
5. A magnet can repel an object made of paper.
6. Most objects made up of iron are attracted to magnets.
7. Magnetic field is an area around the magnet where there is magnetic force.
8. The pulling or pushing force is strongest at the North Pole of the magnet.
9. The force of attraction of a magnet is greater at its poles than in the middle.
10. If you break a magnet into two pieces, you will have two magnets with two North poles (N-N).

Please check your answers. Did you get 11-15 correct answers? That is a good start! If not, it is okay, at least you tried it.

Lesson 1

Magnetic Force

Good day! Do you know that magnets have been known for centuries and used by many different cultures throughout this time? You do not usually see them or know they are working, but magnets power almost everything you use in your regular life. They are objects that attract certain metals. In fact, magnets are one of the fundamental forces in nature and is indeed incredibly important. Do you want to know more about magnets? This module will give you information about magnets.

Please be ready for more exciting adventure. Good luck and happy learning!

What's In

Directions: Read the following statements. Explain the effects of force base on the changes that happen in the object. Write your answer in your notebook.

1. pushing a toy car- _____
2. pounding eggshells- _____
3. folding your clothes- _____
4. kicking a soccer ball- _____
5. throwing a ball upward- _____
6. squeezing a calamansi- _____
7. cutting a piece of paper- _____
8. tearing a biscuit wrapper- _____
9. blocking a moving toy car- _____
10. rolling a marble on the floor- _____

Great! Get ready for more. This time, you will know more about magnets by performing these activities.

What's New

Note to Parent/Learning Facilitator: Guide your children in doing these activities. Remind them to be careful in handling the materials while performing the activity**.**

Directions: Perform the activities below and answer the guide questions. Write your answers in your Science notebook.

Activity 1: Hook me up!

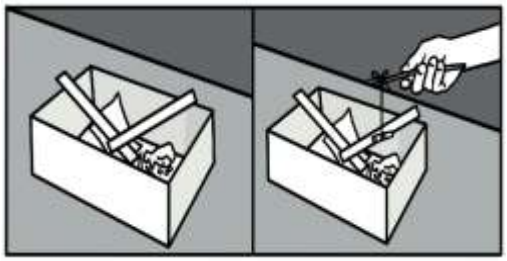
What you need:

Materials in making the fishing rod: bar magnet (alternative: ref magnets), 5-inches yarn and small stick

Materials to place inside the box: paper clip, iron nail, index card, plastic ruler, wooden ruler, copper wire, thumbtacks, pin, cellophane, aluminum foil

What to do:

1. To make a fishing rod, tie the magnet to one end of a yarn and tie the small stick on the other end of the yarn.
2. Place the materials inside a box.
3. Fish out the materials one by one using the suspended magnet tied at the end of the yarn.
4. List down the materials attracted by the magnet.
5. List down the materials which cannot be attracted by the magnet.



Guide Questions:

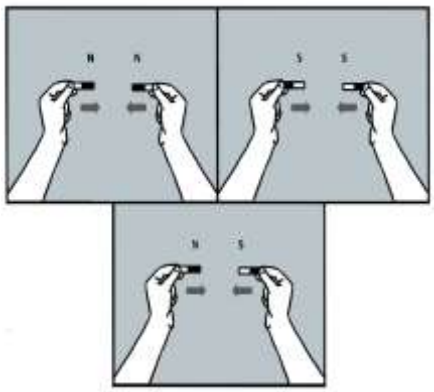
1. What material/s is/are attracted by the magnet? What are these materials made of?
2. What material/s is/are not attracted by the magnet? What are these materials made of?
3. What does this mean about the materials attracted or not attracted to magnets?

Activity 2: Attract or Repel?

What you need:

2 bar magnets, paper and pen

What to do:



1. Identify the north pole (N) and the south pole (S) at the ends of the bar magnets.
2. Place the two bar magnets on the table 5 cm away from each. Both the north poles of each magnet should be facing each other. Observe what happens as you try moving one magnet closer to the other.
3. Repeat Step 2 but with both south poles of the bar magnets facing each other. Observe what happens as you try moving one magnet closer to the other magnet.
4. Repeat Step 2 with the north pole and the south pole of the bar magnets facing each other. Observe what happens as you try moving one magnet closer to the other magnet.
5. Illustrate the direction of the movement of the magnets for Step 2, 3 and 4 using arrows.

Guide Questions:

1. What happened to the magnets when similar poles were brought closer to each other?
2. What happened to the magnets when dissimilar poles were brought closer to each other?
3. What general statement can be formulated?

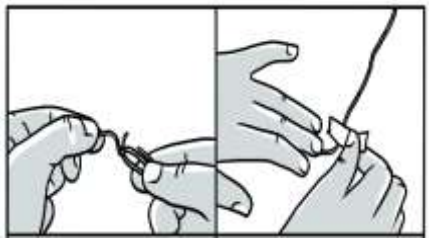
Activity 3: The Floating Paper Clip Trick

What you need:

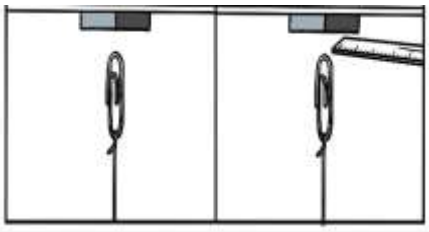
bar magnet, stand and clamp, paper clip, thread, iron nail, index card, plastic ruler, wooden ruler, coin

What to do:

1. Make your own floating paper clip by clamping a bar magnet vertically.
2. Tie a paper clip to a thread and tape the other end of the thread to the base of the stand, such that the clip is still help up by the magnet, but leaving a gap between the two.



   Please compare your set up with the picture below. Are they the similar? If they are, you may proceed performing the activity.



3. Slide on the gap between the paper clip and the magnet on the following materials one at a time: iron nail, plastic ruler, wooden ruler and index card. Observe what will happen to the paper clip each time.

Guide Questions:

1. What material/s could be slid through the gap without dropping the paper clip?
2. What material/s will definitely "cut" out the magnetic force?
3. What does it say about magnetic force?

Excellent! Now, it's time to know more about the characteristics of magnets and magnetic force.

What is It

Points to Remember:

- Magnets have an invincible magnetic field. Magnets will not attract all kinds of metals. Only objects made of **iron, cobalt** and **nickel** will be attracted to magnets.

iron

cobalt

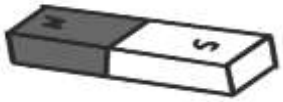
nickel

- There are several types of magnets like ring magnets, rectangular magnets, horseshoe magnets and bar magnets.

ring magnet

horseshoe magnet

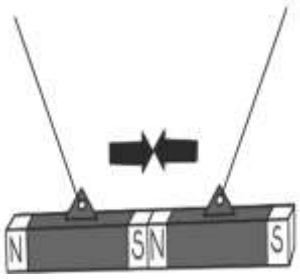
rectangular magnet



bar magnet

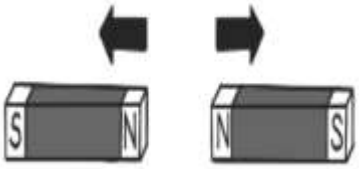
- The ends of the magnets are called poles. One pole is called north pole (N), the other is south pole (S). A magnet has always both north pole and south pole though you break it. So, when we cut a magnet into two parts, two new magnets are formed each with a north pole and a south pole (magnetic dipole).

- When the poles of the two magnets are placed near each other, they have a force that will either pull them together or push them apart. The push and pull of a magnet is called the magnetic force.



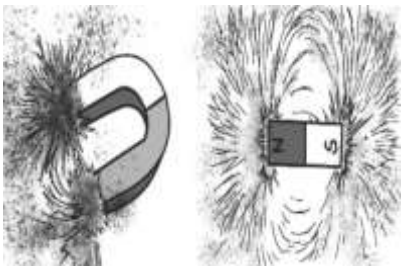
- If the poles of a magnet are the same and placed near each other, then they will be pushed away or will repel each other. Either both south poles or both north poles will result to repulsion (like poles repel).

- If the poles of a magnet are different and placed near each other, then they will be pulled together or will attract each other. Thus, a nearby south pole and a north pole will result to attraction (unlike poles attract).

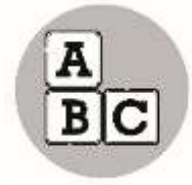


- The force of attraction of a magnet is greater at its poles than in the middle.

- The following illustrations shows the north and south poles of magnets attracting metallic objects.
- The magnetic field is the area around the magnet where the magnetic force of attraction or repulsion exists. It is strongest near the poles and its strength decreases with distance.



Good job! I hope you got all the concepts. You may now proceed to the next activities. Good luck!



What's More

Activity 1- Attracted or Not?

Directions: Identify the objects attracted by a magnet. Gather all the materials on the table, place each one of them near the end of the magnet. Observe what happens and record your observations on the table below.

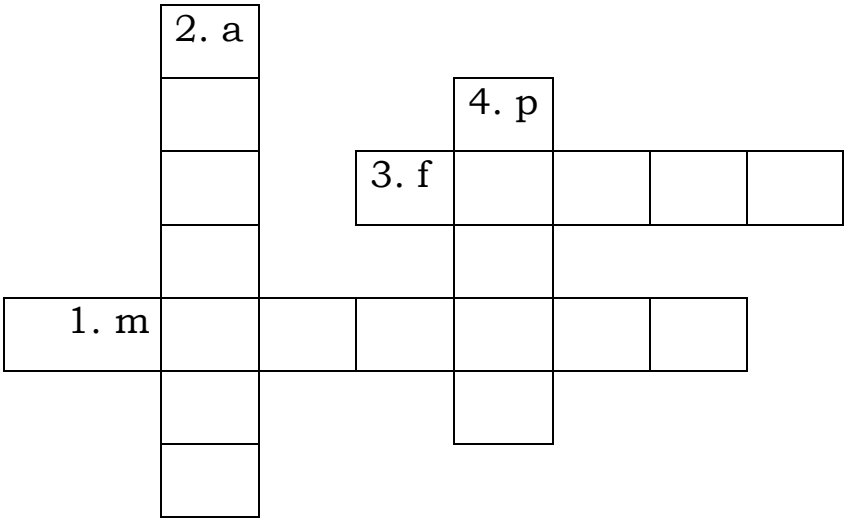
Materials:

magnet, ball pen cap, bits of paper, can opener, coins, eraser, nails, sharp pencil, paper clips, piece of cloth, plastic spoon, rubber band, plastic ruler, thumbtacks, tin can, copper wire

Objects attracted by the magnet	Objects not attracted by the magnet

Activity 2- Crossword Puzzle

Directions: Answer the puzzle in a minute. First letter was given for you to solve it. Do this in your notebook.



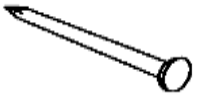
1. They attract some kind of metals.
2. It is being closer together.
3. It is a push or a pull.
4. Regions found at each end of a magnet.

Activity 3- Magnetic or Not Magnetic

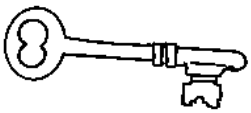
B. Directions: In your notebook write whether the following objects are **magnetic** or **non-magnetic.**

1. 

disposable plastic spoon

2. 

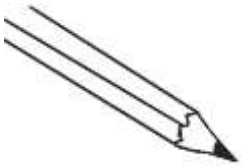
iron nail

3. 

copper key

4. 

glass

5. 

pencil

6. 

copper kettle

Great! Get ready for more. This time, you will know more about magnets by performing these activities.

What I Have Learned

Directions: Complete the following Science concepts. Write your answers in your notebook.

I learned that:

1. A _____ can pull objects from a distance. These objects are metal and are made up of either _____, _____, or _____.
2. A magnet comes in different shapes such as _____, _____, and _____.
3. A magnet always has ____ poles however you break it.
4. Two intersecting magnets will _____ when two unlike poles are brought closer together. While two like poles are brought closer the magnets will _____ each other.

Very good! Now, it's time to apply what you have learned.

What I Can Do

Directions: Read and answer the following questions. Write your answer in your notebook.

1. Cite situation/s in your daily life showing the application of magnets.

2. Which among the following can be attracted by a magnet? Why?

- an iron _____
- a piece of paper _____

3. The north pole of a bar magnet is placed near the south pole of another bar magnet. Will they attract or repel each other? Why?

Wow! You did it! It's time to test on what you have learned from this topic. Ready? Best of luck!

Assessment

Directions: Choose the letter of the correct answer. Write your answers in your notebook.

1. Which of the following cannot be attracted by magnets?
   a. cobalt b. gold c. iron d. nickel

2. Which of the following can be attracted by magnets?
   a. nickel coin
   b. copper wire
   c. gold bar
   d. aluminum pole

3. Earth is considered as a giant magnet. How is Earth's magnetic field similar to that of a magnet?
   a. It is made in Earth's core.
   b. It is shaped like a horseshoe.
   c. It has North and South poles.
   d. It is hundreds of kilometers long.

4. It is a magnet that is shaped like the letter "U."
   a. ring magnet
   b. bar magnet
   c. rectangular magnet
   d. horseshoe magnet

5. What is the area around a magnet where a magnetic force is found?
   a. North Pole
   b. magnetic field
   c. South Pole
   d. magnetic axis

6. Which of the following statement is correct?
   a. Magnets do not have force.
   b. Papers are attracted by magnets.
   c. All metals are attracted by magnets.
   d. The push and pull of magnets is called magnetic force.

7. Which of the following is NOT true about magnetic force?
   a. Like poles of two magnets repel each other.
   b. The force of attraction is greater at the middle.
   c. Opposite poles of two magnets attract each other.
   d. Magnets attract objects made up of iron, cobalt and nickel.

8. Which of the following pairs refer to magnetic poles?
   a. east and west
   b. north and south
   c. north and west
   d. east and south

9. When the same poles of two magnets whether North or South are placed to each other, they _____.
   a. do not move.
   b. pull each other.
   c. touch each other.
   d. are not attracted to each other.

10. Which of the following statements is TRUE?
   a. All magnets have two north poles.
   b. All magnets have two south poles.
   c. Magnets can attract an object made of paper.
   d. Most objects with iron are attracted to magnets.

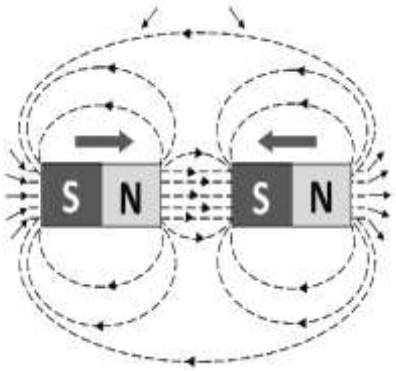
11. What substance is attracted to a magnet?
   a. iron b. lead c. silver d. water

12. What characteristics to magnetic substances have?
   a. They are always black and cold to touch.
   b. They can give a “shock” when you touch them.
   c. They can push or pull objects they are not touching.
   d. They fall faster than other objects when you drop them.

13. What happens when opposite poles of two magnets are place near each other?
    a. They do not move.
    b. They break each other.
    c. They push each other.
    d. They attract each other.

14. If you break a magnet into pieces, what will happen to the force that will be exerted by the magnet when in use?
    a. Force will be doubled.
    b. Force remains the same.
    c. Force exerted will decrease.
    d. Force of each magnet will not be affected.

15. Which statement correctly describes the picture?
    a. The two poles are attracted to each other.
    b. The iron filings formed a shape around the magnet.
    c. The iron filings show that magnetic field is strongest at both poles.
    d. The North pole of one bar magnet attracts the south pole of another bar magnet. seeking



Good job! It's time to make your learning more challenging.

Additional Activities

Directions: Answer the questions found in the flowchart. Do it in your notebook.

If you break a magnet into two pieces, what happens to its magnetic field?

↓

Prediction:

↓

Reason for prediction:

↓

Try it with the help of an older person

↓

Effects/results:

↓

Reasons:

Congratulations! You did great! Now, you may proceed to the next module. Good luck, keep learning

Answer Key

What's More

Activity 1- Attracted or Not?

Objects attracted by the magnet	Objects not attracted by the magnet
can opener coins nails paper clips thumbtacks tin can	ballpen cap bits of paper eraser sharp pencil piece of cloth rubber band plastic ruler copper wire

Activity 2- Crossword Puzzle

1. magnets 2. attract 3. force 4. poles

Activity 3- Magnetic or Not Magnetic

1. X 2. ✓ 3. X 4. X 5. X 6. X

What I Have Learned

1. magnet, iron, cobalt, nickel 3. two
2. ring, horseshoe, rectangular 4. attract, repel

What I Can Do

1. Pupils' answers may vary.
2. Iron can be attracted by a magnet because it is magnetic.
3. They will attract because opposite poles of magnets attract.

Assessment

1. b	2. a	3. c	4. d	5. b
6. d	7. b	8. b	9. d	10. d
11. a	12. c	13. d	14. c	15. d

Additional Activities

Prediction: Magnetic force will become weaker.
Reason for prediction: smaller size
Effects/results: The magnets have 2 poles but with weaker magnetic force.
Reasons: They attract each other. The magnets' size becomes smaller.

What I Know

A. 1. ✓ 2. X 3. X 4. ✓ 5. ✓

B. 1. FALSE 2. TRUE 3. FALSE 4. FALSE
5. FALSE 6. TRUE 7. TRUE 8. TRUE
9. TRUE 10. FALSE

What's In

1. The toy car will move forward.
2. The eggshells will be broken in smaller pieces, changing its size and shape.
3. The clothes will change in size and shape.
4. The ball will move along the direction of the force.
5. The ball will move upward.
6.The calamansi will change in size and shape.
7. The paper will change in size and shape.
8. The wrapper will change in size and shape.
9. The toy car will stop from moving.
10. The marble will roll on the floor.

What's New

Activity 1: Hook me up!

1. The materials attracted to magnet are paper clip, iron nail, thumbtacks, and pin. They are made up of metals like iron.
2. The materials not attracted to magnet are index card, plastic ruler, wooden ruler, copper wire, cellophane, and aluminum foil. They are made up of wood, plastic and other metals.
3. There are materials attracted to magnets like some metals and there are those that are not like plastics, wood, and other metals. Not all metals are attracted to magnets.

Activity 2: Attract or Repel?

1. The magnets did not attract each other.
2. The magnets attracted each other.
3. When the same poles of two magnets were brought closer, they repel. When unlike poles of two magnets were brought closer, they attract.

Activity 3: The Floating Paper Clip Trick

1. iron nail
2. plastic ruler, wooden ruler, and index card
3. Materials made up of iron cannot affect the magnetic force while materials made up of plastic and wood cut the magnetic force.

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For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph