MAGNETS LESSON PLAN

GRADE/SUBJECT: 4th/ Science **LESSON # 1**
UNIT: Magnets and Magnetism **DATE:**
LESSON TITLE: Introduction to Magnets
Lesson Objectives – At the end of this lesson, the students should be able to:

1. Describe common characteristics of magnetic and non-magnetic objects
2. Recognize key vocabulary words related to magnetism (see attached vocabulary list)
3. Navigate Brain Pop software independently to ???
4. Recognize and list everyday objects around their house that can or cannot be attracted by magnets

State Standards:

1.f: Students know that magnets have two poles (north and south) and that like poles repel each other while unlike poles attract each other. **6.b**: Students will develop a testable question and indicate whether further information is needed to support a specific conclusion. **6.h**: Students will draw conclusions from scientific evidence

Time	Lesson Content	Materials/ Equip.	Ref.
0:00-0:05	I. Introduction A. [Pair discussion/Integrating technology] *"What do we know about magnets?"* (Mixed groups, language ability) Using Inspiration software, students write down their ideas about magnets. B. [Whole class discussion] Discuss students' ideas from Inspiration maps	Magnet folders	
0:05-0:10	II. Development A. [Mini-Lecture/Integrating technology] Show brain pop video on magnets (whole class) B. [P-O-E] Exploring magnetic objects (same gender groups of 2) Using a magnet, students investigate which items can be	www.brainpop.com (1) science journal (2) Various items for each group (3) 2 marked magnets (N/S) (4) Handout # 1	

	magnetizetized C. Brain Pop (same groups as above) Students explore Brain Pop software as related to magnets (videos, quizzes, etc.) D. [Input chart (mini-lecture)/discussion] *"What causes certain materials to be magnetized?"* (whole group)	(5) Sticky Arrows (6) Whiteboard (7) Handout #2	
0:35-0:40	III. Closure A. [Science Journals] *"3 things I learned about magnets and 3 things I want to learn. "* B. [Homework] Students investigate which everyday objects (at home) can or cannot be attracted by magnets	(1) Science Journals (2) Handout # 3 (3) Magnet for each student	

HANDOUT # 1

Name:_____#____

Date:_____

Magnetism Exploration Lab

Materials: magnet, baggy with a variety of metal and non-metal objects, student worksheet, pencil

Directions:

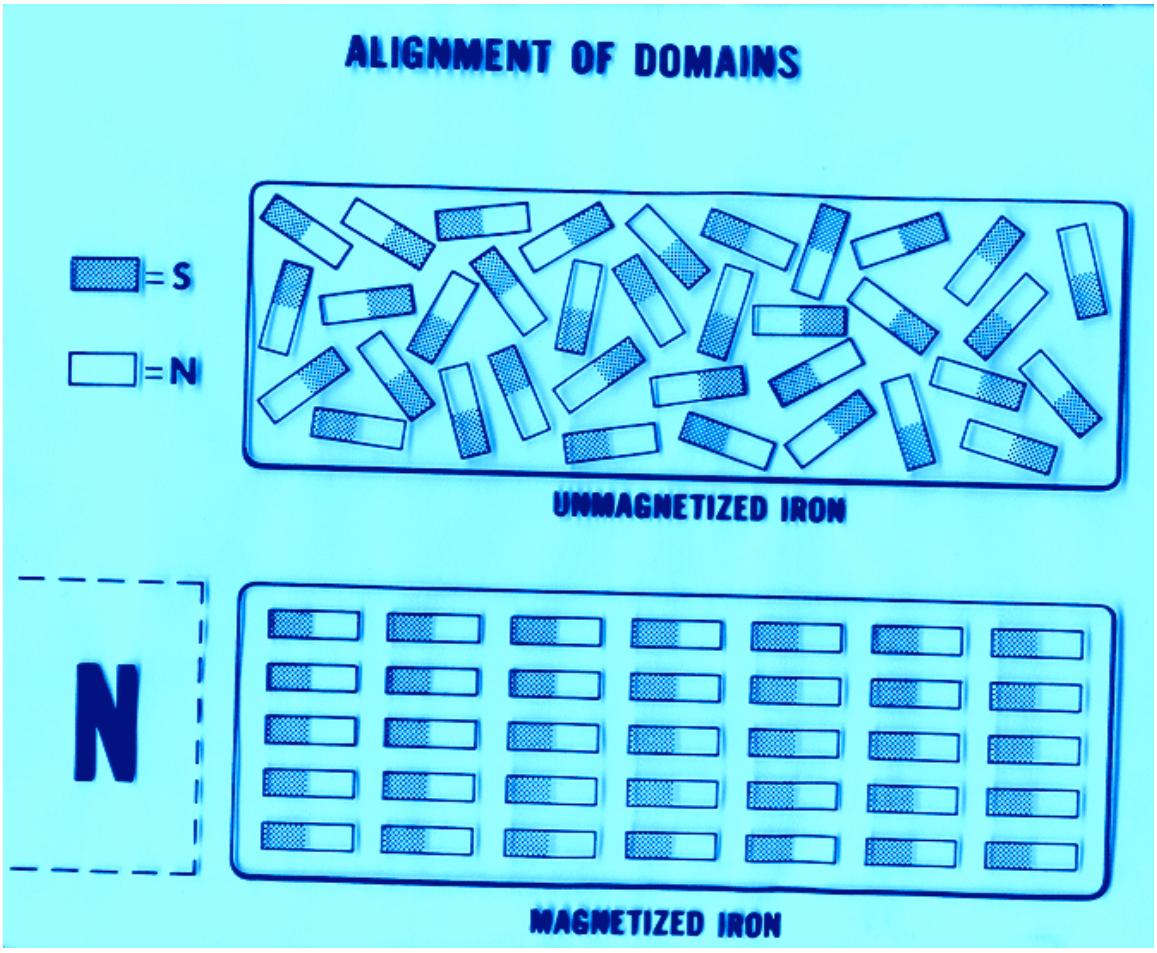
1. With your partner, draw a picture and write the name of each object in your baggy.
2. **Predict** for each object if it is **magnetic** or **non-magnetic**.
3. Use the magnet to **test** whether each item in the bag is magnetic or not.
4. When finished testing all objects, try to find connections between the objects to **explain** why some are magnetic and others are not.

Object name	Illustration (picture)	**Predict (P)** Magnetic or Non-magnetic	**Observe (O)**	**Explain (E)**

TEACHER RESOURCES # 1

Mini-Lecture Key Points: WHAT CAUSES CERTAIN MATERIALS TO BE MAGNETIZED?

- A magnet always has 2 poles- a north pole and a south pole.
- The north pole attracts the south pole, and the south attracts the north pole. Like poles (north-north or south-south) REPEL.
- A magnet is a special type of iron that has all the DOMAINS pointing in the same direction (see below).
- Any item that contains IRON has the potential to be magnetized.



- MAGENTIZED IRON can be used to align the domains of unmagnetized iron and make it magnetized.
    - Example: A paperclip is unmagnetized. Its NORTH and SOUTH POLES face in all different directions. When it is placed next to a magnet, the magnet aligns all the domains. It makes all the north poles face in one direction, and all the south poles in the other direction. The paperclip is now magnetized.

HANDOUT #2
Name _____

Date _____

Magnetism Exploration Home Lab

Find, list and draw 5-10 items from around your house that are magnetic.

Object Name	Object Drawing	Original Prediction	Final Result

MAGNETISM LESSON PLAN

GRADE/SUBJECT: 4th/ Science
LESSON # 2
UNIT: Magnets and Magnetism
DURATION: 2 periods of 1 hour
LESSON TITLE: More Magnets!

Lesson Objectives – At the end of this lesson, the students should be able to:

1. list social uses of magnets
2. name a multicultural scientist who researched magnets/magnetism
3. use CORRECTLY AT LEAST #? OF THE FOLLOWING vocabulary words when describing magnets and magnetism:
4. draw a diagram of a magnet

State Standards:

1.f: Students know that magnets have two poles (north and south) and that like poles repel each other while unlike poles attract each other **6.g**: Students will record data by using appropriate graphic representations and make inferences based on those data.

Time	Lesson Content	Materials/ Equip.	Ref.
0:00-0:05	I. Tie-in A. Review yesterday's lesson [Think-pair-share] Students share findings from homework Which objects at home are attracted by magnets? B. [Whole class discussion] Discuss overall findings, agreements and disagreements amongst students.	Chart Handout #3-Lesson #1	
0:05-0:25 0:26-0:46	II. Development A. [Cooperative learning] in 5 centers. 1."What happens when we break a magnet?" 2. Earth's magnetic field	(1) Breakable magnets (2) Handout # 1: Breaking up is hard to do (3) Handout: Magnetic lines	

0:47-1:07 1:08-1:28 1:29-1:49	3. Mining for magnets 4. [Brainstorm] in pairs: “Social uses of magnets.” 5. [Research] multicultural scientists who influenced what we know about magnetism	(4) Handout: (5) Magnet (6) Sand (7) laptop (8) Inspiration (9) Computer (10) Internet (11) Handout #	
1:50-2:00	III. Closure Day 1: [Exit slip] Day 2: [Science journals]	journal	

HANDOUT #3

Scientist _____

Date _____

July 6, 2006

Dear Scientist,

I own a jewelry store and recently I have made a lot of money using magnets to make earrings, necklaces, and even bracelets. Unfortunately, I only have one big magnet left, but I need to make 3 different pieces of magnetic jewelry. Since I only make money if my jewelry is magnetic, I was wondering if breaking the big magnet into smaller pieces will damage the magnet and make it non-magnetic, or if breaking the big magnet will actually make a few smaller magnets.

Please respond as soon as possible!

Thanks,
Immagnetisa Irona

Your job as a scientist is to respond to the letter above and answer Immagnetisa's questions as accurately as possible. Use the magnet provided to investigate.

To organize your investigation, use the POE chart on the next page to get started.

When you have an answer to Immagnetisa's question, and can justify your response, write a response letter to Immagnetisa (on a separate piece of paper). You must include an answer to her questions and your explanation. Staple your POE chart behind the letter.

HANDOUT # 3 (CONTINUED)

Predict	Observe	Explain
What will happen when we break the magnet?	Draw or write what you see…	What is happening and why?

HANDOUT #4

Geologist_____ Date_____

How is the Earth like a giant magnet?

1. Place this map of the Earth on a flat surface in front of you.
2. Place a bar magnet along the dotted line, in line with the poles of the Earth.
3. Put plastic on top of the map and magnet.
4. Slowly sprinkle iron filings over the top of the map.
5. Sketch what you see!
6. In your science journal answer the following questions: **What do you think is happening?**

How is the Earth like a giant magnet?

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HANDOUT #4 (Spanish)

Geologa (o)_____ Fecha_____

¿Cómo es la Tierra parecida a un iman gigante?

1. Pon este mapa de la Tierra en una superficie plana.
2. Pon un iman en la linea perforada, y pon un extremo en linea con el polo norte y el otro en linea con el polo sur.
3. Pon el plástico encima del mapa y del iman.
4. Lentamente salpica con los pedacitos de hierro.
5. Dibuja lo que ves.
6. En tu diario de ciencias, responde a las preguntas siguientes: **¿Qué crees que está pasando? ¿Como es la Tierra parecida a un iman gigante?**

HANDOUT # 5

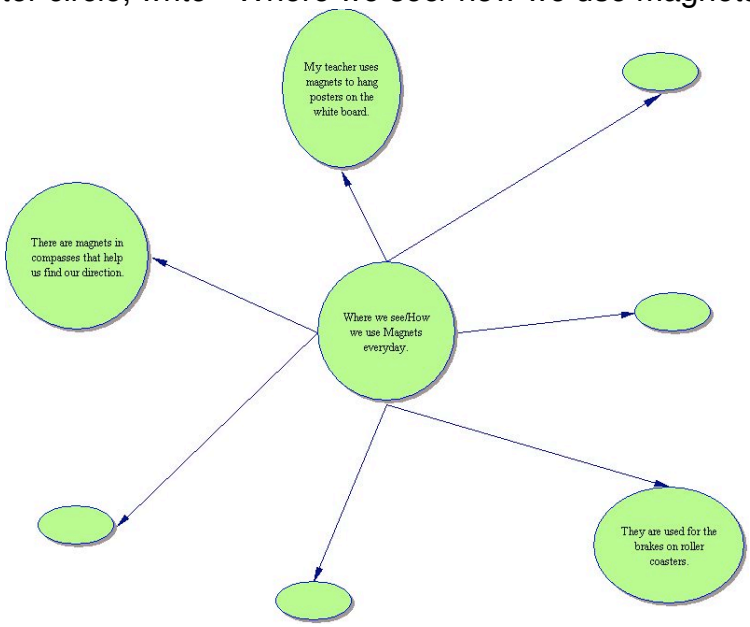
Name:_____#___
Date:_____

Everyday Use of Magnets Using INSPIRATION

In your cooperative group of two, each person will use an iBook to create a concept map that shows **where we see** and **how we use** magnets in our everyday lives.

Steps:

1. With your partner, each of you needs to draw your concept map on paper before using the computer.
2. In the center circle, write " Where we see/ how we use magnets everyday." (See example below)



3. Then, list as many ways that we use or see magnets in our everyday lives.

   - These will be the circles on the outside of the middle circle. There are 3 already included. You need to think of more. **Include at least 7 outside circles.**

4. When you finish drawing your concept map on paper, think about pictures that you could include for each idea. **Sketch the pictures next to the words.**
5. Show your completed concept map to your partner for editing and revising.
6. **When you have checked each other's work to make sure it's PERFECT, you can start INSPIRATION.**

HANDOUT # 5 (continued)

Draw your concept map here:

HANDOUT # 5 (continued)

Steps for using INSPIRATION:

1. Get an i-Book (laptop). Turn it on and open Inspiration on the Menu Bar (Look for a Big Yellow Star).
2. Before you begin creating your concept map, go to **File – Save as** -- **(make sure you save on the desktop, Name your file:** (your nameMagnets) **-- Save.** (Example of name to save: **CarolynMagnets**)
3. You will see a circle with "Main Idea" written inside. Click on the circle, and type your title. (Don't forget to delete the words, "Main Idea")
4. Click on center circle so that you see it outlined with small white squares.
5. Click the **Create** icon. This will automatically create another circle.
6. **Don't forget to save!!**
7. Follow steps #3 and #4 until you have finished creating your concept map.
8. If you finish early, you can use the **Basic** icon to insert pictures. (They need to be related to your ideas.)
9. **Don't forget to save!!**
10. If time permits, print your work to share with the rest of the class.

***If you make a mistake, **Edit—Undo:**

***If you get stuck, review your notes on how to use INSPIRATION, then, if you are still stuck, ask three people in your team for help, and if you still need help, ask an adult or the teacher.

HANDOUT # 6

Name:_____#___
Date:_____

Mining for Magnets

Today you will be a miner looking for iron, the main component in magnets. It is your job to collect small bits of iron filings from four different substances: Total cereal, Imperial Beach sand, dirt from the playground, and one of your choice. These will be used in your research of how magnets work. Good luck!

1. Complete your predictions first. Which bucket do you think you will find more iron? Will you find any iron at all? Write or sketch in the PREDICT column.
2. Using the magnet inside the baggy, gently glide it through each bucket. Draw a sketch and write what you observed in the OBSERVE column.
3. Write your explanations or conclusions in the EXPLAIN column. Were your predictions correct? Are you amazed? What did you learn?

HANDOUT # 6 (continued)

	Predict	**Observe**	**Explain**
Total Cereal			
Sand			
Dirt			
_____			

Handout # 7
Name _____

Date _____

Investigating Diverse Scientists

You and your partner will be doing a webquest in which you will be researching a diverse scientist that uses the principles of magnetism in his or her work.

Instructions:

1. Choose one of the scientists below.
2. Using an internet search engine, such as www.google.com or www.yahoo.com search for the scientist that you chose.
3. Answer the questions on the following page regarding you scientist.

Hint: DO NOT lose your research information. We WILL be doing another class activity about diverse scientists.

Choose one:

1) Chryssa Kouveliotou- NASA scientist who is studying the magnetic fields of stars.
2) Akio Arakawa- meterologist who uses magnetism to predict weather patterns and global warming
3) Alaa Ibrahim- NASA scientist who is studying the most magnetic object in the universe.
4) Rakesh Kumar Bhandari- scientist who made a superconducting magnet
5) Carlos Vallbona- doctor who is studying the pain management capabilities of magnets
6) Carlos Gutierrez- physicist who is developing materials to coat magnetic sensors.

GRADE/SUBJECT: 4th/ Magnets LESSON # 4
UNIT: magnets and Magnetism DATE:
LESSON TITLE: Making a Compass
Lesson Objectives – At the end of this lesson, the students should be able to:

1. make a compass using the materials provided.
2. explain how a compass works.
3. use digital cameras and iPhoto to make a Quicktime movie about their compass
4. demonstrate how they would use a compass and why it is important

State Standards:

1.b: Students know how to build a simple compass and use it to detect magnetic effects, including the Earth's magnetic field.

Time	Lesson Content	**Materials/Equip.**	**Ref.**
0:00-0:05	IV. Tie-in [Demonstration] Show example Quicktime	Quicktime	
	V. Development [Class discussion/review]:"How is the Earth like a magnet?" [Think/pair/share]: What is a compass? How/why would you need one? [Mini-lecture] Basic components of a compass [Problem solving scenario] Review technology: -Digital cameras -iPhoto -Quicktime movie Studentss make Quicktime movie [Share/present] Students present Quicktime movie	Compass Handout: problem solving Handout/ rubric	

	VI. Closure [Exit slip] in Science journals.	Science journals	

What is a compass and how does it work?

How would you find your way if you were lost, and all your other electronic devices have failed?

There are some animals that use the magnetic field of the Earth as their guide in migration. The Leatherback turtle who is hatched in Costa Rica and the Galapagos Island, travels around the world and uses an "internal compass" as a way to find the exact spot on the beach again many years later.

Researchers outfitted loggerhead sea turtle hatchlings with turtle wearing a "bathing suit." Explain that scientists placed this suit onto baby sea turtles to monitor where they swam. The suits are tied to devices that send information back to the scientists about the turtles' location. Scientists have learned from this experiment that the turtles probably find their way in the ocean using an "internal compass." The blue harnesses tethered to an electronic tracking unit that recorded the turtles' position. The study was done to investigate the turtles' response to magnetic fields, as clues to ingrained navigation ability. The turtles have a special way of thinking that is sort of like the way a compass works. The turtles can therefore figure out which direction is north or south without using a plastic or metal compass as people sometimes have to do.

Unfortunately we do not have the same luxury as the sea turtles. No GPS unit, no trusty husband, but luckily, you've got a compass in your pocket. Your compass will seldom, if ever, fail to get you where you need to go.

Observations concerning the phenomena and behavior of magnets were mentioned in early Chinese writings. The literature makes reference to the "attractive power" of the lodestone. Lodestone was found to be magnetic because it attracted metal objects. Another name for lodestone is magnetite. Magnetite is iron ore which is a "rock" embedded with iron.

It has been said that a Chinese general initially used a piece of lodestone as a compass. Since lodestone always points in a north-south direction if allowed to freely rotate, a piece of lodestone might have been placed on a section or piece of wood or in a floating bowl. Placed either way, the lodestone would point north. From these applications, the lodestone was probably used as an early compass.

Military commanders during the Han dynasty (206 BC to 220 AD) used compasses. Although lodestone compasses were used for hundreds of years before they were used on ships, during the 1200s Chinese navigators began to use compasses on ships.

Primitive compasses became more accurate when the idea of a compass needle was applied. A strip of metal was magnetized by stroking it with a permanent magnet. Balancing this needle on a pivot allowed for free rotation. After settling, the needle would point to the north.

A compass needle will point north since the earth acts as a very large magnet with two poles, the magnetic North Pole and the magnetic South Pole. Invisible magnetic lines of force exist between and connect these two poles.

The magnetic needle on a compass aligns itself with the magnetic lines of force that surround the earth. This is the reason why you can always determine the direction of north with a compass.

Why do you think it would be important to know how to use a compass in your everyday life? That's right, the use of a compass may one day enable you to find your way if lost.

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Problem Solving Scenario

Lost!

Have you ever wondered how a compass might be used in the 21st century? With all the technology we have, does it sometimes seem like a GPS unit or even a cell phone is just easier to use, and more convenient than an old-fashioned compass? Your task is to choose one of the following 21st century scenarios, make a compass, and return home alive!

Scenario 1: You and your team are researching whales in Baja California. You finally collected enough data and are returning home to San Diego when your GPS unit falls overboard. You know that you need to head North, but you have no idea where North is! Luckily, you found the following supplies on your boat- a piece of cork, a needle, a cup, a magnet, and water. Your team's job is to make a compass with these materials so that you can return home as quickly as possible!

Scenario 2: You and your team study rattlesnakes in Death Valley. Since you did not want to disturb the desert habitat by driving through it, you all jumped out of a helicopter and plan on hiking to a pick-up 25 miles North once all your data has been collected. Unfortunately, the compass was left in the helicopter that you all jumped out of! You are all ready to go home, but don't know which way to start walking. You open up your emergency kit and find some food, water, and sunscreen, but NO compass. Strangely, there is a baggie marked "Compass" but all it contains is a needle, a cork, a cup, a magnet, and the words "Just Add Water." What is your team going to do?

Scenario 3: Make up your own scenario here!

Intended Learning Outcomes:

In this lesson you will:

- Build a simple compass and use it to detect magnetic effects, including the Earth's magnetic field.
- Create a Quick Time movie using the concepts of magnetism and magnetic poles.
- Illustrate how magnets are relevant in today's society.

Roles:

- Facilitator- This person must ensure that each team member is part of the "invention" process.
- Artist: Each team member must sketch 2 different storyboard frames.
- Photographer: Each team member must take at least 3 photos.
- Techie: During the editing process, this job entails "driving" the computer. The team member driving must change every 10 minutes.

Activity Part 1:

Step # 1. Solve the problem by creating a compass out of the materials provided.

Step # 2. Storyboard the Quick Time movie using the rubric provided.

Step # 3. Take photos using the digital camera following your storyboard. You may want to take a few of each frame in case some don't turn out.

Step # 4. Use Inspiration to write the words to be used in your movie.

Activity Part 2:

Step #1. Editing using iPhoto.
-cropping
-rotating
Step #2. Importing text frames from Inspiration.
Step #3. Add music
Step #4. Present to your classmates!

Compass-Quick-time Movie Rubric

Your task for completing the Quicktime movie:

- Must be 60 seconds or less.
- Must demonstrate the scenario you chose.
- Show your completed compass.
- Show how the compass works.
- Finish writing scenario by importing text from Inspiration. Use at least two slides of text that are at least three sentences.
- Must include title slide with group member's names.
- Must include transitions and music.