Focus on the New York State Learning Standards

Gravity and Magnetism

PS 5.1c The force of gravity pulls objects toward the center of Earth.
PS 5.1e Magnetism is a force that may attract or repel certain materials
PS 5.2a The forces of gravity and magnetism can affect objects through gases, liquids, and solids.
PS 5.2b The force of magnetism on objects decreases as distance increases.

You can describe the effects of gravity and magnetism.

Gravity is a force of attraction between two objects.

Magnetism is a force that may attract or repel certain materials.

Magnetic field is the space around a magnet where the force of attraction is felt.

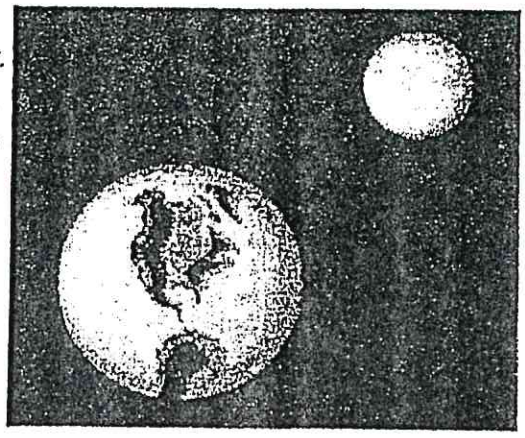
Guided Instruction

Directions Read the following information.

In the 17th century, Isaac Newton wondered why the Moon orbits Earth. He also wondered why apples fall from apple trees. What Newton discovered was the force called **gravity** Gravity is a force of attraction between objects. It pulls apples toward the center of Earth and it also keeps the Moon in orbit around Earth.

The Moon doesn't fall to Earth like an apple. If there were no gravity, the motion of the Moon would be a straight path away from Earth. But the pull of gravity causes the path of the Moon to curve around Earth. The Moon has gravity too. Because the Moon is smaller than Earth, its gravity is less than Earth's.

Gravity works through gases, liquids, and solids. Air stays around Earth because of gravity. Oceans do not fly off into space because of gravity. Rocks and soil stay on Earth because of gravity. You stay on Earth because of gravity too. Without gravity, gases, liquids, and solids would not be pulled to the center of Earth.



Guided Questio

What is **gravity?**

What keeps the Mo
in a path around Ea

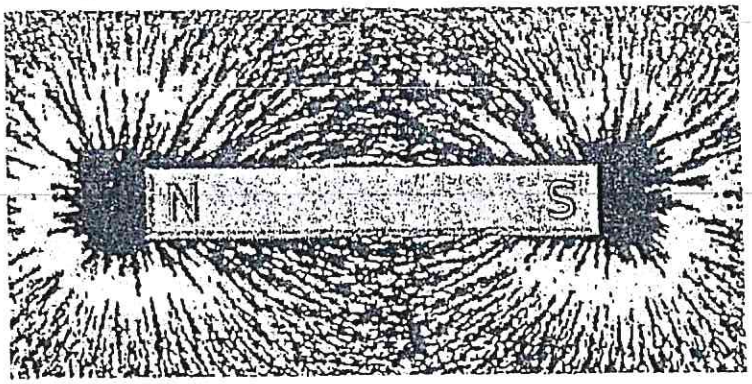
Guided Questions

Magnetism is the force that may attract certain materials. Iron or materials with iron in them such as paper clips and iron nails are attracted to a magnet. And, like gravity, the force of magnetism can have this effect through gases, liquids, and solids. You know a magnet can hold paper on a refrigerator. The magnetic force is going through the solid paper. If you use the magnet to hold two pieces of paper, the magnet will still hold the paper on the refrigerator. What happens if you try to use the magnet to hold ten pieces of paper? The magnet probably would not work. That is because the force of magnetism on objects decreases as the distance increases.

What is **magnetism?**

The **magnetic field** of a magnet is the space around the magnet where its force, or magnetism, can be felt. If you lay a piece of clear plastic over a magnet and sprinkle iron filings on the plastic sheet, the filings line up in a pattern of curved lines as shown in the diagram below. The filings make the pattern because the magnetic field is strongest near the ends, or poles, of the magnet.

What happens when a nail gets close to a **magnetic field?**



Where is the magnetic field the strongest?

If a magnet is hung so that it can move freely, one pole will point north. That is because Earth itself is a large magnet. Magnets have two poles, a north pole and a south pole. If you placed two magnets side by side, you would see that opposite poles attract, or come together, and like poles repel, or move apart from, each other.

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Directions For each question, write your answer in the space provided.

1. How are falling apples and the orbit of the Moon alike? How are they different?

   Alike: _____

   Different: _____

2. How would the motion of the Moon be different if there were no gravity?

   _____

   _____

3. Give an example that shows that gravity affects objects through gases, liquids, and solids.

   Gases: _____

   Liquids: _____

   Solids: _____

4. How are the forces of gravity and magnetism alike?

   _____

5. If you sprinkle iron filings on a plastic sheet that is placed over a magnet, what will you see? Draw your answer.

6. If you use a magnet to pick up steel pins, where on the magnet would you expect the most pins to stick? Why?

Apply the New York State Learning Standards to the State Test

Directions: For each question, write your answer in the spaces provided. Base your answers to questions 7 through 10 on the paragraph and table below.

Your class asks the following question: Are all kinds of objects attracted to a magnet? To test this question, you gather several items and a bar magnet and test each object for its attraction to the magnet. Then you record the data in the following table:

OBJECT	ATTRACTED TO THE MAGNET?
staple	yes
rubber eraser	no
string	no
safety pin	yes
toothpick	no
aluminum foil	no
copper penny (one cent)	no
silver ring	no
paper clip	yes

7 What conclusion can you make about the objects in the table?

8 What conclusions about metal objects can you make from the information in the table?

_____

9 Explain why some metal objects are not attracted to the magnet.

_____

10 Magnets attract some common objects because they are made of steel, which is mostly iron. From the information in the table, which objects might be made of steel?

_____

Directions (11–16): Each question is followed by four choices. Decide which choice is the best answer. Circle the letter of the answer you have chosen.

11 What is gravity?

A the space around a magnet where the force of attraction is felt
B a force that may attract or repel certain materials
C a force of attraction between two objects
D Isaac Newton's middle name

12 What keeps the Moon in orbit around Earth?

A magnetism
B gravity
C a magnetic field
D radiation from the Sun

13 Through which of the followin can magnetic force pass?

A gases
B solids
C liquids
D all of the above

14 Which of the following objects would be attracted to a magnet?

A a shoelace
B a refrigerator door
C a roll of 100 pennies
D a silver necklace

15 Why does a baseball hit up into the air lose force and fall back to Earth?

A The baseball was not hit hard enough.
B The force of gravity causes the baseball to fall to the ground.
C The magnetic outfield attracts the baseball downward.
D It was a foul ball.

The chart below lists some objects and shows if they are picked up by a bar magnet.

OBJECT	ATTRACTED TO THE MAGNET?
eraser	no
string	no
steel wire	yes
pin	yes
staple	yes

16 Which conclusion can be drawn from the information in the chart?

A The eraser was picked up by the magnet.
B The magnet picked up every object.
C The metal objects can be picked up by a magnet.
D The rubber objects can be picked up by a magnet.