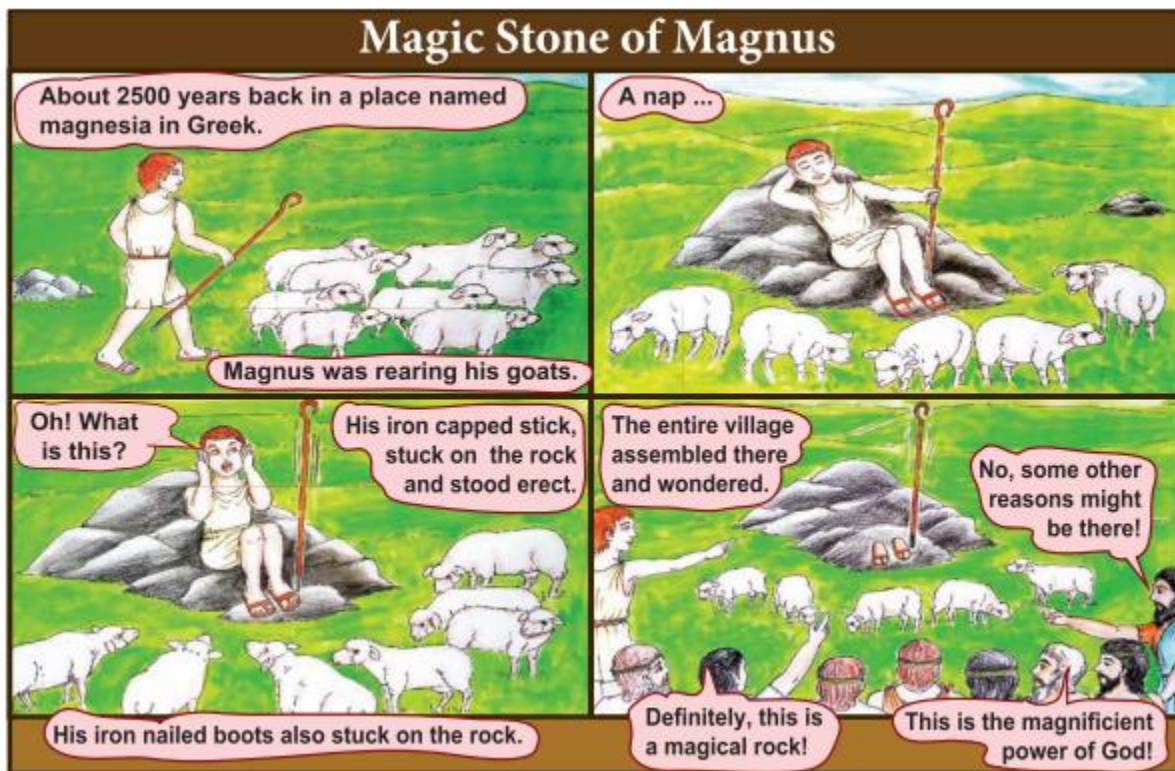


6th Science Lesson 13 Notes in English

13] Magnetism

Discovery of Magnets



- People wondered about this incident, each and everyone expressed their views.
- What might be the reason for the stick, to get stuck on the rock?
- Yes, you are right. That is a **magnetic rock**. People found it attracting not only for the stick of Magnus, but also for the materials made of iron.
- The more rocks of these kinds were found worldwide.
- These magnetic rocks were named '**Magnets**' and the ore is called as '**Magnetite**' after the name of the boy **Magnus**.
- The name is also supposed to come after the name of the place (Magnesia) in which it was found.
- Magnetite was the ore with attracting property found in that region. **Magnetites** are **natural magnets**. They are called **magnetic stones**.
- Natural magnets do not have a definite shape.
- Since, they are used for finding direction, they are also called '**leading stones**' or '**lode stones**'.

Magnet of different shapes



Magnetite



Bar-magnet



Horseshoe magnet



Ring magnet



Needle magnet

Oval-shape, Disc shapes Cylindrical and magnets are also available.



Oval-shape



Disc shape



Cylindrical shape

- After learning the method of changing the piece of iron into magnet (**magnetization**) we have been making and using several kinds of magnets.
- Such man-made magnets are called **artificial magnets**.
- Bar-magnet, Horseshoe magnet, Ring magnet and Needle magnet are generally used artificial magnets
- Oval-shape, Disc shapes Cylindrical and magnets are also available.

Magnetic and Non Magnetic Materials

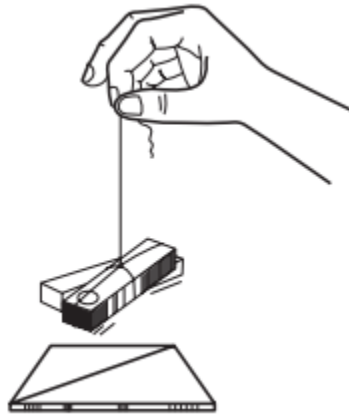


- Substances which are attracted by magnet are called **magnetic substances**. Iron, cobalt, nickel are magnetic substances.
- Substances which are not attracted by magnet are called **non-magnetic substances**. Paper, plastic are called **non- magnetic substances**.

Magnetic Poles

- Place some iron filings on a paper. Place a bar magnet horizontally in the filings and turn it over a few times.
- Now lift the magnet.
- What do you see?
- Which part of the magnet has more iron filings sticking to it?
- Which part of the magnet has almost no filings sticking to it?
- The parts of the magnet those attract the largest amount of iron filings are called as its poles.
- The attractive force of the magnet is very large near the two ends. These two ends are called its **poles**.
- If you have a horseshoe magnet, or any other type of magnet at home, find the position of its poles by this experiment.
- In experiments with magnets you will need to use iron filings again and again.
- You can do this by placing a magnet in a pile of sand and turning it around in the sand.
- The small pieces of iron present in the sand will stick to the magnet. If you cannot find sand you can look for iron pieces in clayey soil as well.
- If you don't have iron filings, you can collect small pieces of iron and they will serve the purpose as well.

Finding directions with a magnet



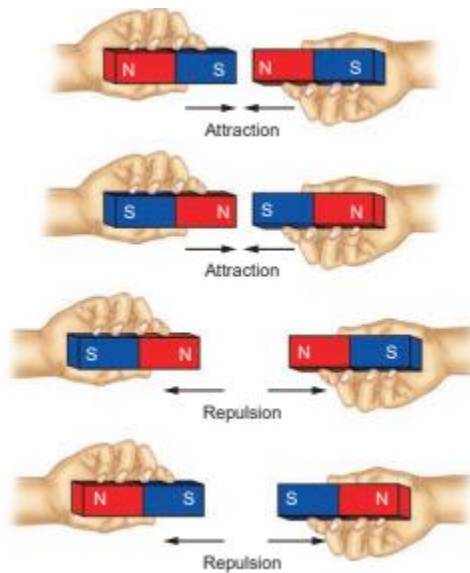
- Tie a piece of thread to the centre of a bar magnet and suspend it. Note, in which direction the magnet stops.
- Draw a line on a sheet of cardboard or the table along the direction in which the bar magnet stops
- This is roughly the north-south direction. The end of the magnet that points to the north is called **the North Pole**.
- The end that points to the south is called **the South Pole**.
- A freely suspended magnet always comes to rest in north-south direction.
- The directive property of magnets has been used for centuries to find directions.
- Around 800 years ago, the Chinese discovered that a suspended lode stone stops in the north-south direction.
- Chinese used these lode stones to find directions.
- The navigators of that country used to keep a piece of lode stone suspended in their boats and during a storm or mist, they used the lode stone to locate directions.

Magnetic compass



- A **compass** is an instrument which is used to **find directions**.
- It is mostly used in ships and airplanes.
- As a rule, mountaineers also carry a compass with them so that they do not lose their way in unknown places.
- The compass has a magnetic needle that can rotate easily. The marked end of the needle is the **North Pole of the magnet**.
- Can you use **magnetic compass** to find west direction?

- Ask your teacher to help you in using magnetic compass.



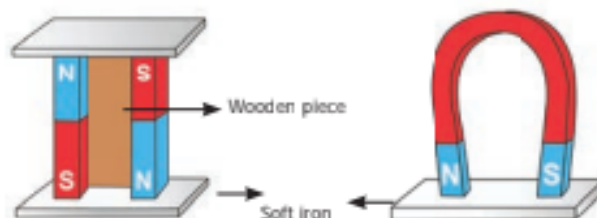
Properties of Magnets

Attraction or Repulsion

- Take two similar magnets, place them in four different ways as shown in Figure.
- Do magnets lose their properties? When?
- Magnets lose their properties if they are heated or dropped from a height or hit with a hammer.
- Magnets lose their properties when they are placed near Cellphone, Computer, DVDs. These objects will also get affected by **magnetic field**.

Storage of Magnets

- Improper storage can also cause magnets to lose their properties.
- To keep them safe, bar magnets should be kept in pairs with their unlike poles on the same side.
- They must be separated by a piece of wood and two pieces of soft iron should be placed across their ends.



- For a **horse-shoe magnet** a single piece of soft iron can be used as a magnetic keeper across the poles.

Usage of Magnets



In speakers



In small electric motors



In some door locks



Bags



In some toys



In compasses



In pencil boxes



Stickers on refrigerators



Phone covers



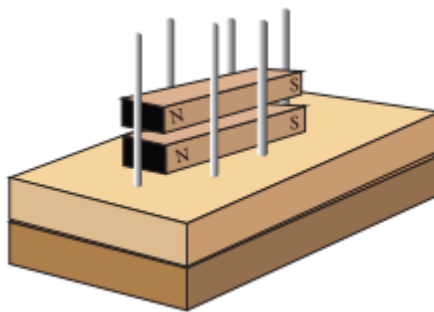
Pin holders



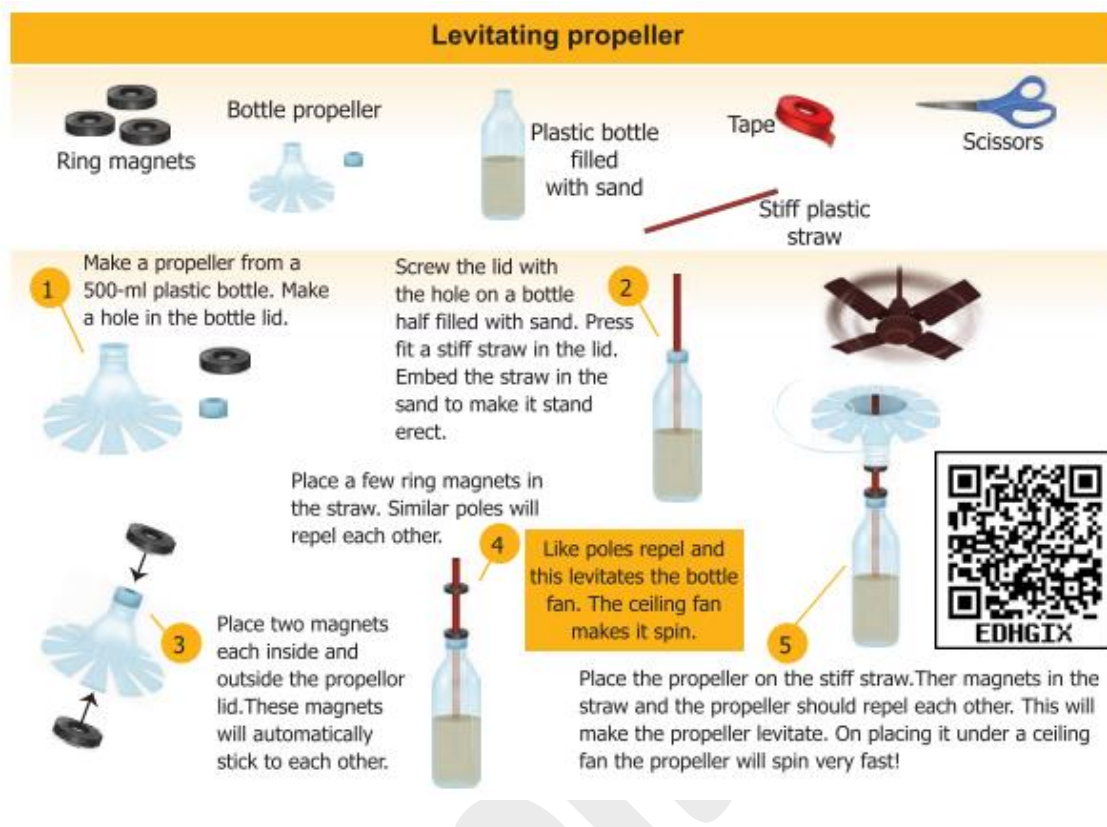
Magnetic crane

- We use various equipment with magnets in day to day life.
- Discuss with your friends about the usage of the magnets in the following instances.

Science Today - Bullet Trains



- We know that like **poles of the magnets** repel each other.
- keep two **Bar magnets** as shown in figure.
- By using repulsion we can levitate a magnetic object. Let us make a toy and enjoy magnetic levitation.



Have you enjoyed with this toy? Electromagnetic train is working in the same principle. Have you heard about it?

Electromagnetic train is called as suspension train and also called as flying train. It does not require diesel or petrol. This technology uses the property of magnetic attraction and repulsion to run these super fast electromagnetic trains.



Levitation

up to 10 cm

Like poles repel each other

• By using attraction and repulsion at the same time the train move forward. The magnets are controlled by electricity.

attraction S repulsion N

displacement

N S

Unlike poles attracts each other

Like poles repel each other

Propulsion

Which Countries?

China Japan South Korea

These three countries are currently using Maglev Trains for public transport. Many countries explore possibilities to use it.

Key features

No friction

High speed

No noise

How much Speed?

	Maximum Operating Speed (km/h)	Speed Record (km/h)
Japan SCMaglev	320 km/h	603 km/h
China Shanghai Maglev Train	350 km/h	501 km/h
South Korea KTX	300 km/h	421 km/h

In India

Mumbai-Delhi, Mumbai-Nagpur, Chennai-Bengaluru-Mysuru routes are considered for proposal.

How does the electromagnetic train work?

- Electromagnets are used in **Electromagnetic train**.
- **Electromagnets** are magnetised only when current flows through them.
- When the direction of current is changed the poles of the electromagnets are also changed.
- Like poles of the magnets which are attached at the bottom of the train and rail track repel each other. So, the train is lifted from the track up to a height of 10 cm.
- We know that we can move any magnetic object with the force of attraction or repulsion properties of magnets.
- This train also moves with the help of the magnets attached on the sides of track and the magnets fitted at the bottom sideway of the train.
- By controlling the current we can control the magnets and movement of the train.
- As there are no moving parts, there is no friction. So, the train can easily attain a speed of 300 km per hour. These trains are capable of running up to 600 km/ hour.
- They do not make any noise.
- They require less energy and they are eco-friendly.
- Even though, many countries have taken effort to use these trains, such trains are used for public transport only in China, Japan and South Korea.
- In India the possibilities of introducing these trains are under consideration.