

07 Magnets

A file clip has fallen into a glass of water (Fig. 7.1). Can you suggest a way to get it out without either spilling the water or putting your hand in ?

As shown in the figure 7.1 you can get it with the use of a magnet. It is possible to do so because the magnets have the special property of attracting things towards its direction.



Fig.7.1

There are magnets in many things which we use in our day-to-day life. For instance small motors, pencil boxes, some toys etc.

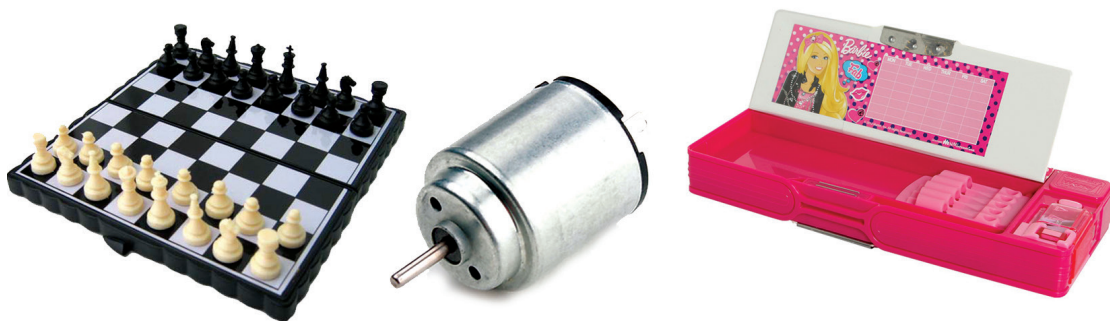


Fig.7.2 ▲ Some examples where magnets are used



Assignment 7.1

Make a report of other instances where you can find magnets in day-to- day life.

7.1 Effects of Magnets

Let us do the following activity to observe the effect created by magnets on other materials.



Activity 7.1

You will need :- a magnet, some iron nails, some brass nails, a piece of Copper wire, a piece of Aluminum sheet, a coin, a piece of plastic, a piece of wood, a piece of paper, a needle

Method :-

- Keep each of the above items near the magnet and observe the changes.
- Then list them in the grid given below.

Things which got attracted towards the magnet	Things which did not get attracted towards the magnet

Through this activity we can understand that some materials get attracted towards the magnet while some others do not.



Assignment 7.2

Take a magnet to your compound and find out the things that get attracted to it.

7.2 Different Types of Magnets

The magnets differ from each other due to their shapes. Also they are used for different purposes.



Horse shoe magnet



Bar magnet



U magnet



Ring magnet



Tabular magnet

Fig.7.3 ▲ Different types of magnets



Assignment 7.3

Collect some magnets from equipment where magnets are used or discarded and categorize them according to their shapes.

7.3 Magnetic Poles

Through the activity in 7.1 you have understood that some materials get attracted to magnets. Let's do the following activity to observe whether the materials get attracted equally to each and every spot of a magnet.



Activity 7.2

Let's identify the poles of a magnet.

You will need :- some file clips, a bar magnet, a piece of cardboard.

Method :

- Spread the file clips evenly on the piece of cardboard.
- Then slowly lower the magnet towards the piece of cardboard.
- Now observe what happens and report the observations.

You will observe that there are more file clips near the two ends of the magnet.

So you must understand that the attractive power of the magnet is more at the ends than the middle. The two ends where the power of attraction is more are called the **magnetic poles**.

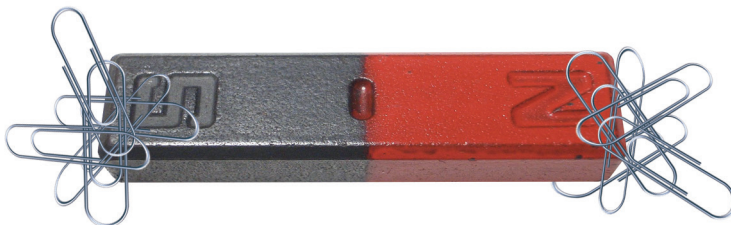


Fig.7.4 ▲ Magnetic poles

7.4 The Behaviour of a Magnet

Activity 7.3

Let's identify the poles of a magnet.

You will need :- a wooden stand, a compass, a string, a magnet without poles marked

Method :-

- Use the compass and mark the North and South on the table with the help of the teacher.
- Then hang the magnet steadily from the string to the stand as shown in the figure.
- After that let the magnet to be still.
- Now find the direction to which the magnet has stopped according to the marked directions on the table.
- Do the activity for several times and observe.

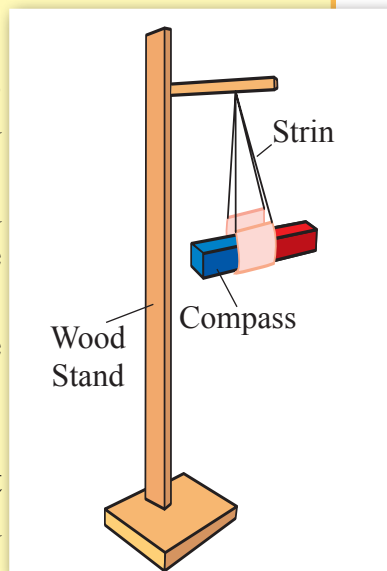


Fig.7.5

You can see that the magnet lies still between the North and South.

Further more you can engage in the following activity too.

Activity 7.4

Let's identify the poles of a magnet

You will need :- a water bath, a piece of regifoam, a bar magnet.

Method :

- Do this activity on the same desk which was used for the activity 7.3.
- Cut the piece of regifoam as shown in the figure.
- Then keep the bar magnet on the piece of regifoam and let it float on the water.

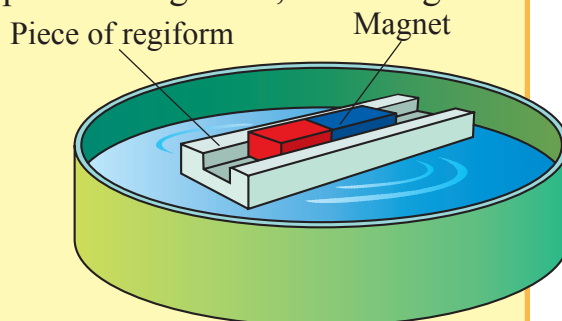


Fig.7.6

- Identify the direction to where the magnet is heading after it goes still.
- Repeat activity and get observations.

From these experiments you can understand that the magnet always stay still in between North and South. We can identify that the North pole of the magnet is the North of the compass and the South pole of the magnet is the South of the compass. We mark the **North pole of a magnet as "N" and the South pole as "S"**.



For Your Extra Knowledge

The pilots, sailors, explorers and soldiers use the compass to find their direction.



Fig.7.7 ▲ a compass

7.5 Interactions between the Poles of Magnets



Activity 7.5

You will need :- two bar magnets with poles marked (Name the magnets as A and B), a wooden stand, strings

Method :

- Fix the magnet "A" as shown in the figure.
- After it becomes still bring the magnet "B" towards it according to the following instructions.

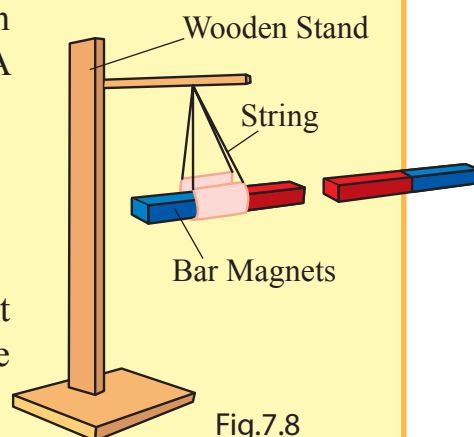


Fig.7.8

North pole of B towards the North pole of A
 South pole of B towards the North pole of A
 South pole of B towards the South pole of A
 North pole of B towards the South pole of A

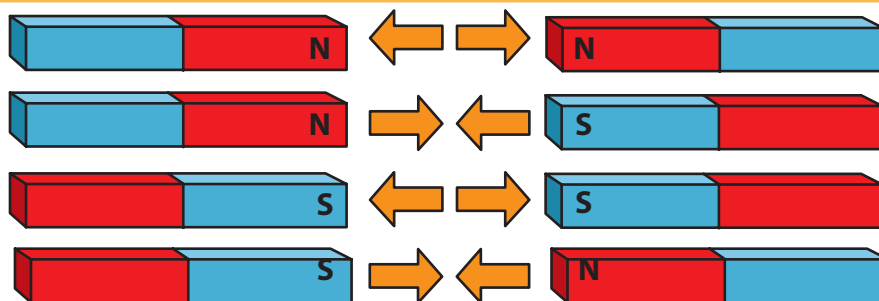


Fig 7.9

The same poles do not get attracted but get repelled and the different poles get attracted.



Assignment 7.4

When you are provided with an unmarked magnet, identify and mark the poles of it by using a marked magnet.



Activity 7.6

Let's identify a magnet from different objects.

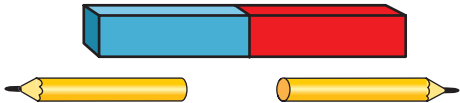
You will need :- a small unmarked bar magnet, an iron nail, a pencil, a marked bar magnet

Method :-

- Take the above mentioned things near the North pole of the marked magnet and observe.
- Then move them near the South pole of the magnet and note down the observations.
- Now tabulate your observations in the following grid.

Substance	When moved near the North pole	When moved near the South pole
Iron nail		
Pencil		
Small bar magnet		

Now compare your observations with the following observations.

	Only an attraction is seen
	Neither an attraction nor a repulsion is seen
	When moved towards the N pole it repels and when it is moved towards the S pole it gets attracted.

The power of repulsion of magnets can be used to identify a magnet among some other objects.



Assignment 7.5

You are provided with an iron nail, a magnet and a piece of plastic wrapped in pieces of paper separately. Suggest a way to identify them using a marked bar magnet.

7.6 Magnetic Forces



Activity 7.7

You will need :- a bar magnet, iron fillings, a white paper

Method :-

- Keep the magnet under the paper and spread the iron fillings on the sheet of paper.
- Now tap the paper slowly.
- Observe carefully.

You will see that the iron fillings are arranged according to a pattern. The iron fillings fallen a little bit away from the magnet are seen in an irregular manner. Accordingly we can understand that the magnetic forces are spread around a limited area of the magnet.



For Your Extra Knowledge

The area which the magnetism is spread around the magnet is called the magnetic field.

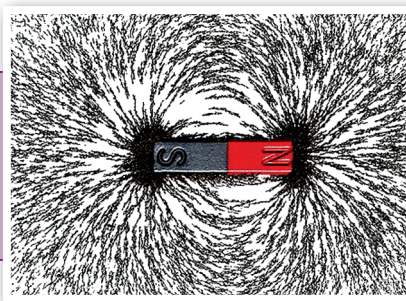


Fig. 7.10 ▲ Spread of magnetic force



Demonstrating the Magnetism



Activity 7.8

You will need :- some magnets and some small nails (you can use either file clips or pins)

Method :-

- Take one magnet at a time and hang each of the nails as shown in the figure.
- Now count the number of nails hung on each magnet.
- Through this you will be able to identify the most powerful magnet.

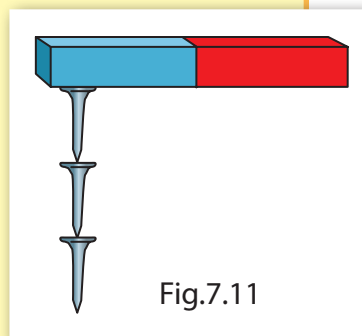


Fig.7.11

We can conclude that the magnet which bears the most number of nails has the highest magnetic power.



Assignment 7.6

List out the events where we use magnets in our day-to-day life.



Activity 7.9

Let's row a boat.

You will need :- a piece of wooden plank, a small magnet, a file clip, a water basin, a small stick, some clay, an iron rod, a triangular piece of paper

Method :-

- Make a small boat using the above materials and keep it on water.
- Fix the magnet to the iron rod.
- Then move it near the boat.
- What can you observe now ?

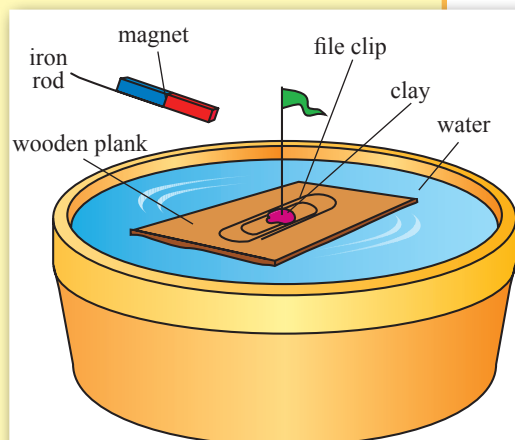


Fig. 7.12



Assignment 7.7

- Engage in some other enjoyable activities using magnets.
- Organize an exhibition with your friends' creations too.



For Your Extra knowledge

Having powerful magnets closer by may cause damages to computers, televisions, mobile phones and land phones.



For Your Extra knowledge

The magnetic poles of tabular magnets and barium ferrite magnets are on top and bottom sides and not at the two ends.



Summary

- Only some materials are attracted to a magnet.
- The area with a higher magnetism is known as the poles of a magnet.
- There are two poles of a magnet, namely North pole and South pole.
- We can easily find the North and South poles of a magnet with the help of a compass.
- Same magnetic poles repel each other.
- Different magnetic poles attract each other.
- We use magnets for various purposes in our day-to-day life.

Exercise

01. Choose which of the given materials will get attracted to a magnet.

iron nails, lead wire, marbles, a glass rod, a blade, a gold ring

02. Mark true (✓) or false (✗)

- Brass is a material which gets attracted to magnets . ()
- All the spots of a magnet have the same power of magnetism. ()
- We can find the North pole of a magnet with the help of a compass. ()
- Any metal is attracted to a magnet. ()
- When a magnet is being hung freely it always lies in the direction of North- South. ()

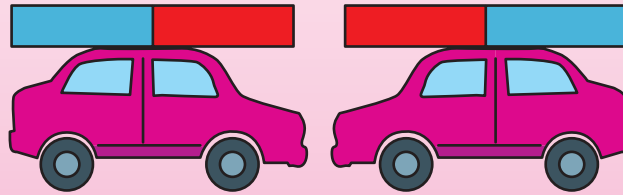
03. Fill in the blanks using the appropriate word from the words given in the brackets.

The is higher at the poles of the magnet. Same types of poles are named as These type of magnetic poles each other. The different types of poles are named as These types of magnetic pole each other.

(attract, repel, magnetism, like poles, unlike poles)

04. Suggest a way to find the most powerful magnet out of two given magnets.

05. What will happen if the two toy cars are kept as above? Give reasons.



Glossary

Magnets	- உலோகம்	- காந்தம்
Bar magnets	- நீண்ட உலோகம்	- சட்டக்காந்தம்
Magnetic poles	- உலோகம் இரு	- காந்த முனைவு
North pole	- வடக்கு முனைவு	- வடமுனைவு
South pole	- தென் முனைவு	- தென்முனைவு
Attraction	- ஈர்க்கும்	- கவர்ச்சி
Repulsion	- விரட்டும்	- தள்ளுதல்
Compass	- அளவியல்	- நோக்காட்டி