Unit 5P.4: Magnetic Forces

- What magnets do
- What are magnets?

Skills you will be using:

- Observing
- Experimenting

By the end of this unit you should :

- Know that only certain metals such as iron and nickel can be made into magnets.
- Know that magnets have two poles.
- Unlike poles attract and like poles repel.
- Magnets attract objects that contain iron, steel and nickel.

What magnets do?

Materials attracted to magnets.

Magnets attract metals containing iron, such as steel.

Activity 1:

You will need:

A bar or horseshoe magnet and a variety of household objects.

Steps:

1. Test house hold objects by seeing whether a magnet attracts them.
2. Try pins, needles, paper and paper clips.
3. Try similar things made of different materials: paper, wood, plastic etc…
4. Try different sorts of coins and lots of different metal objects.
5. Make a table of your results.

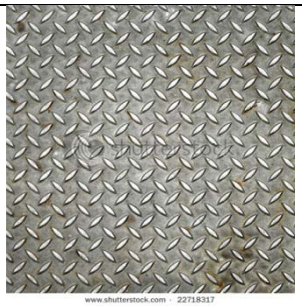
Things that are magnetic	Things that are not magnetic

6. What sorts of materials were the magnetic things made of.

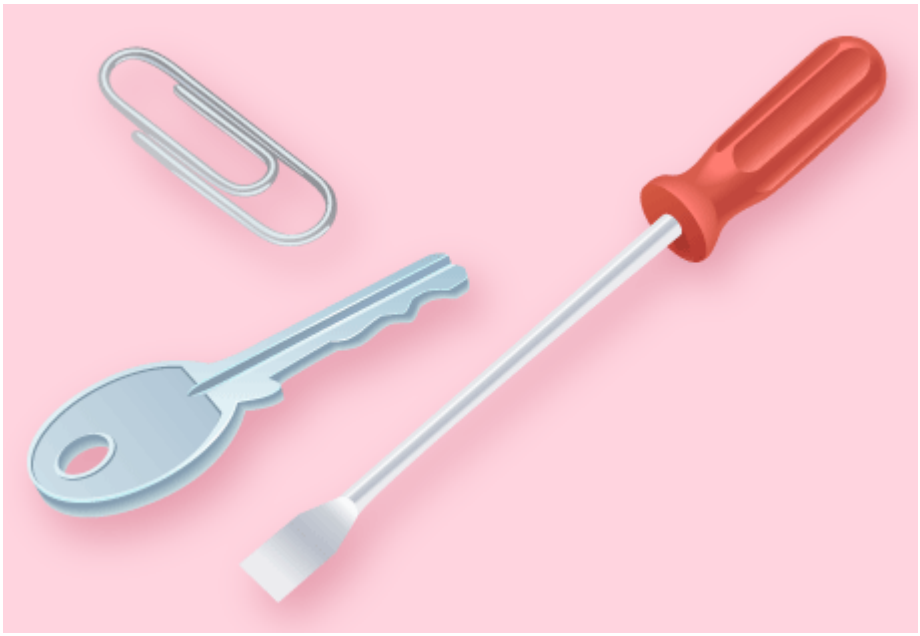
_____

Conclusion:

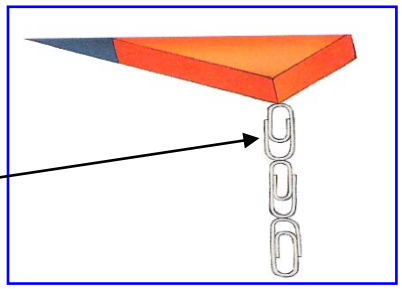
- The objects that were attracted to your magnet were all types of METALS. But NOT all metals were magnetic right? ONLY iron, steel or nickel.
- The objects that were not attracted to your magnet were made of copper and aluminum foil or non-metals such as paper.

Non- magnetic metals!		
	COPPER	ALUMINIUM
Magnetic metals!		
	IRON	STEEL

Write magnetic or non-magnetic under the correct picture!



Activity 2: How strong is YOUR magnet?



You will need:

- 2 bar magnets of different strengths.
- Paper clips.

Steps:

Test the strength of the two magnets by finding out how many paper clips each one attracts.

Record your data:

Magnet 1	Magnet 2

Draw your results here as a bar graph. Remember to choose a good scale!

The more paper clips the magnet holds, the stronger it is.

In our experiment Magnet ____ was the strongest.

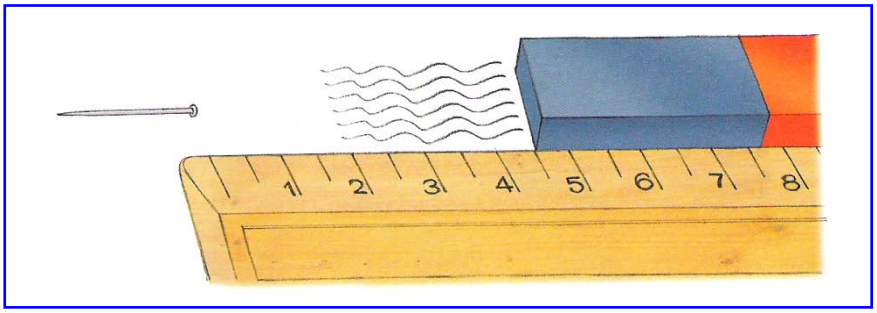
Activity 3: Magnetic forces act at a distance

You will need:

- A ruler
- A pin
- A magnet

Steps:

Place a pin next to a ruler and move the magnet towards it, noting the distance between the clip and the magnet.



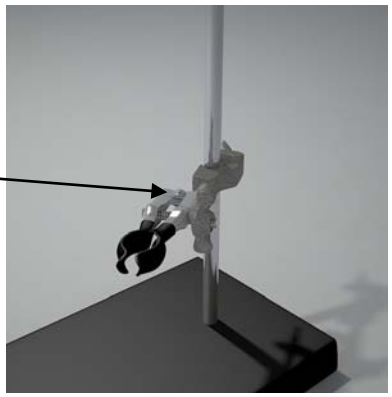
- The magnet is moved slowly toward the pin. When the pin moves towards the magnet, measure the distance. Watch carefully it moves fast!

Conclusion: Magnets can act at a distance.

Activity 4:

What materials can the magnetic force act through?

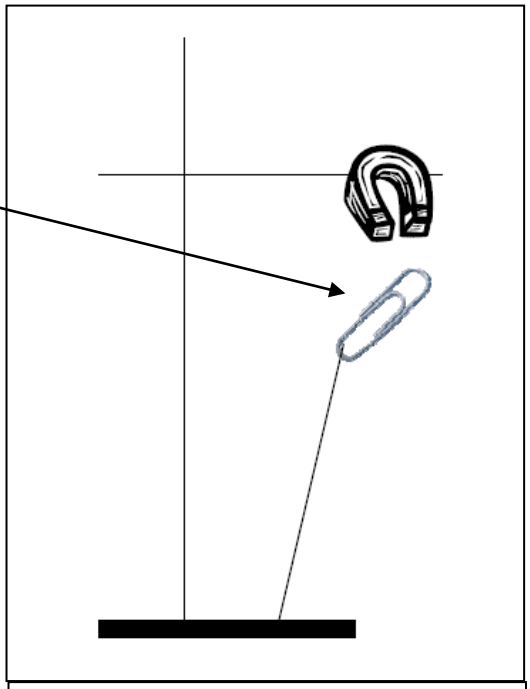
You will need – a strong magnet, string, paper clips, stand and clamp, variety of different materials – card, cloth, paper, metal sheet, leather, glass.



Set up the Apparatus as show in the diagram:

Put different materials in between The magnet and the paper clip and Observe if the paper clip falls.

Complete the table:



Material	Does the paper clip fall? Yes/no

Conclusion:
We found the following materials stopped the magnetic force:

Activity 5:
Where is the magnet the strongest?

Get a bar magnet and drop a box of paper clips on it… what do you notice about where the paper clips stick on the magnet!

Draw what happened on this magnet and write your conclusion.

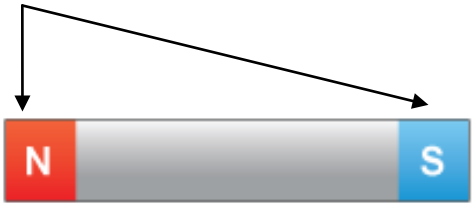
5.13.4

Magnetic poles

The force of the magnet as it works is an invisibile force, you can't see it!

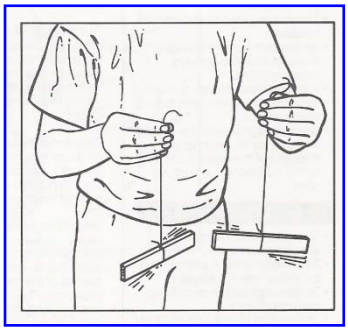
The two ends of each magnet are called poles.

This is where the effect of the magnet is felt strongest. Magnets have a north pole and a south pole.



Magnets are not equally strong all over.

Activity 6: Are the Poles the same?



You will need:

Two threads with the same length, two magnets. Make sure the you have the S and N clearly marked.

Steps:

1. Tie each thread to the center of a magnet.
2. Hold the threads with the magnets next to each other.
3. Twirl the magnets.

- What happens when N side comes close the S side?

_____

- What happens when the same two poles (NN and SS) come close?

_____

Activity 7: (Draw)

1. Hold two magnets under the paper with the north poles facing each other. Pour some iron filings over them.

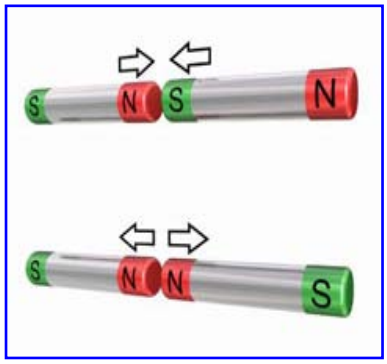
- Draw a picture a picture of the pattern made by the iron fillings on the diagram below.

2. Hold two magnets under the paper with the North Pole touching the South Pole.

- Draw a picture of the pattern made by the iron fillings.

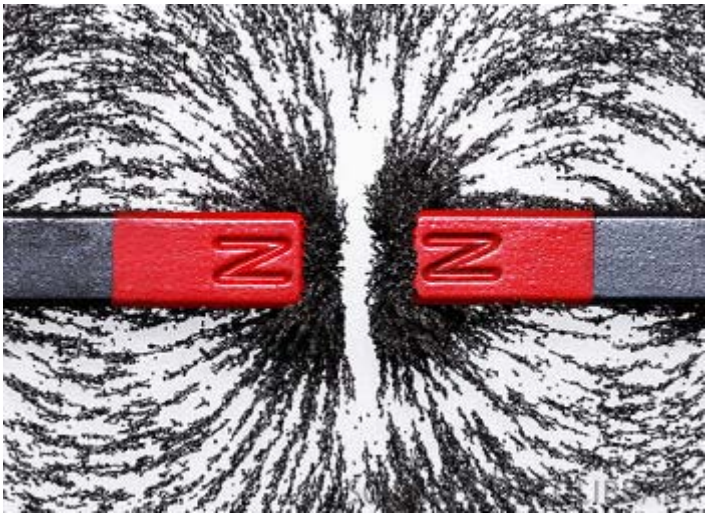
1.	2.
	

Conclusion:

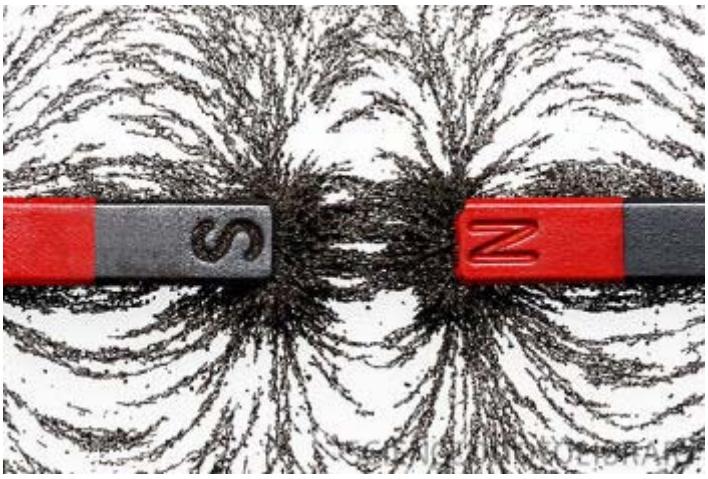


- _____ poles attract each other
- _____ poles repel each other

- If you put two poles, that are the same, together (north + north or south + south), you can feel the magnets pushing away from each other.
- We call this repulsion.



- If you put two opposite poles together (north + south) you can feel the magnets pull towards each other.
- We call this attraction.



Key Words:

- South Pole
- North Pole
- Attraction
- Repulsion

Key ideas:

- Magnets have two poles (South + North).
- Unlike poles attract.
- Like poles repel.

Key Questions

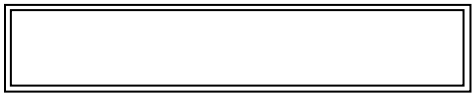
1. Mona has a steel screwdriver and she wants to test to find out whether it is a magnet. She brings a magnet up to it and the screwdriver is attracted. She concluded that the screwdriver was a magnet. Is her conclusion correct? If it is not, what else must she do to test the screwdriver?

---

2. Fill the gaps by choosing the correct words.
Magnetism is a f_ _ _ _ that acts only between magnetic materials like i _ _ _, s_ _ _ _, c_ _ _ _ _ and n_ _ _ _ _. Magnets have 2 p_ _ _ _ – a n__ _ _ and a s_ _ _ _ _.
If two magnets are put together the poles that are the same will r_ _ _ _ each other. If two magnets are put together the poles that are different will a _ _ _ _ _ _ each other.

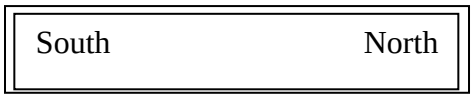
NORTH	REPEL	FORCE	
SOUTH	COBALT	IRON	NICKEL
STEEL	POLES	ATTRACT	

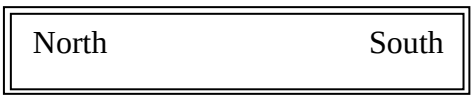
3. a . Draw the magnetic field around this magnet:



b. Where is the strongest area of magnetism in the field? - colour this area RED

c. Draw the magnetic fields around the repelling magnets.





4. Cross out the words so the sentences make sense.

a. If you put two north poles together, they will repel/ reply each other.

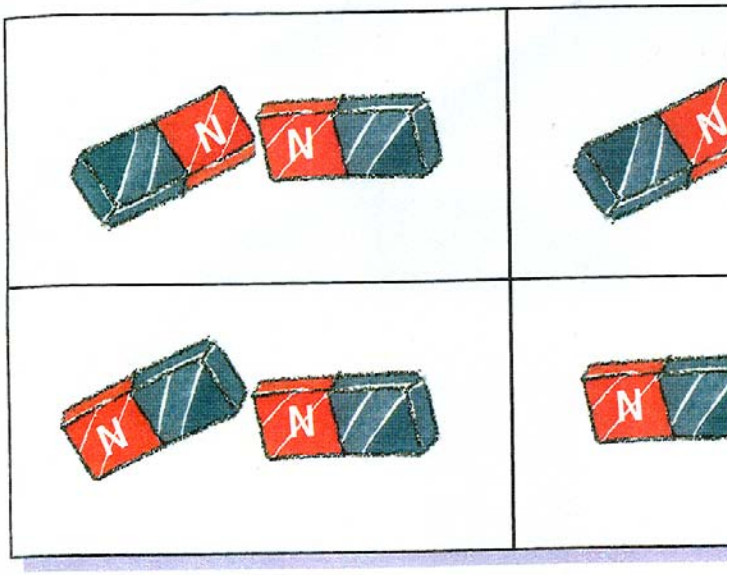
b. If you put a North and South Pole together, they will detract/ attract each other.

c. Not all metals are attracted to a magnet/ magazine.

d. Metals containing iron/ copper are attracted to magnets.

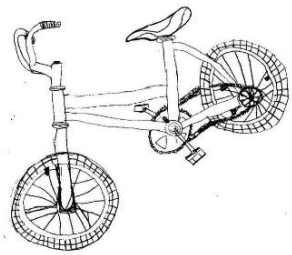
e. If you put like/ unlike poles together, they will be attracted to each other.

3. Can you decide how these magnets will move? REPEL or ATTRACT? Write under the picture



5. Jimmy drew a picture of his bike and attached it to the refrigerator with a magnet. Which of the following is true?

A. The refrigerator is plastic.
B. The paper Jimmy drew his picture on is magnetic.
C. Jimmy drew a bike which is made of metal so it stuck.
D. The refrigerator is metal.



What are magnets?

What are magnets made of?

Activity:

You will need:

Each group will have three types of magnet as listed below.

1. A Horseshoe magnet
2. A Bar magnet
3. A Ceramic fridge magnets
4. A Plastic strips

Steps:

1. Predict what the material is that each magnet is made of Observe it closely, see if it bends? Is heavier? Etc

Magnet type	What do you think it is made of?
A Horseshoe magnet	
A Bar magnet	
A Ceramic fridge magnets	
A Plastic strips	

2. Are any of these magnets made out of other metals that you know about, such as copper or aluminium? Explain your answer.

3. What other materials do you think have been used in making some of the magnets?

Conclusion

Only one or two metals can be made into magnets and the most common one is the metal iron, which is the main component of steel.

Once they are magnets, they are then mixed with other substances depending on what they are needed for.
For example with rubber, in order to be flexible,
Or ceramic to be heavy and strong.

Flexible magnets!

Hard, heavy magnets!

Making Magnets

Magnets can be made from objects that contain **iron** or **steel**.

Make your own magnet by following the steps below:

You will need:

A long iron or steel nail (be careful of the sharp end!), a bar magnet and some metal paper clips.

Steps:

1. Check that the nail is not already magnetized. (See if it will pick up the paper clips).

2. Rub one pole of the bar magnet along the nail repeatedly, always in the same direction.

3. After doing this about 40 times, see whether the nail will pick up paper clips.

4. Write down your observation.

Investigation:

You will need:

- Paper clips
- Magnet
- Iron nail

Steps:

Stroke the nail 40 times with the magnet and then test it with the paper clips.

a- How many paper clips did you pick up with the nail the first time you magnetized it?

---

b- How can you tell when the nail is demagnetized?

---

c- How can you make the nail a stronger magnet using only the materials you have?

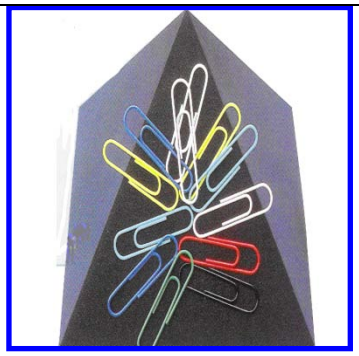
Using magnets

- **Magnets** can be very useful! Write down 3 ways you use magnets in your life!

- _____

- _____

- _____

	
Fridge magnets can be useful.	Magnets help to keep small metal objects from getting lost.

Magnets are in most electrical things. If there is a motor there are magnets! Speakers, motors, laptops etc..

If you can find an old motor from a toy, see if you can open it and see the magnets inside!

	Once you open the back you find magnets inside the main shell!	

Key Words:

Steel

Copper

Nickel

Aluminum

Strength

Key ideas:

- Magnets attract some metals like iron, steel and nickel.
- Magnets do not attract non-metals and some metals like copper and aluminum.

Project: (Your teacher will organize how you will do this)

Try to contribute to a display on magnets, use actual examples and also pictures. The displays should be carefully labeled and the new words should be placed in a box on the poster.

Key Questions

1. Which of the following objects are magnetic?

a. Wooden stick

b. A pair of steel scissors

c. A plastic yoghurt pot

d. A copper coin

e. An iron nail

2. Why can a magnet pick up a nail, but not a soda can or bottle? Explain your answer

---

---

3. Make a list of all the everyday objects, that you can think of, that contain a magnet. For each one, explain the purpose of the magnet.

Objects	Purpose/uses

4. Classify the objects in the table below into the following three categories in a table:

1- Objects that are not made of metal;

2- Objects that are made of metal and will be attracted to a magnet;

3- Objects that are made of metal and will not be attracted to a magnet

Drawing pin – coin – silver bracelet – pencil – CD – shoe – Plastic spoon – gold ring – paper clip – nail – brass screw

Not made of metals	Made of metal and attracted to magnet	Made of metal and not attracted to magnet