UNIT 8 MAGNETS AND THEIR USES

SCHEME OF WORK

Suggested time frame: 8 periods (1 period is approximately 40 minutes.)

Lesson	No. of Periods	Learning Objective(s)	Process Skill(s)	Vocabulary	Resource(s) and Material(s)
1	2	• Identify the properties of magnets. • Present reports on the results of experiments on the properties of magnets and their uses.	• Analysing • Classifying • Communicating • Generating possibilities • Inferring • Observing	• Like poles • Magnetic • Non-magnetic • Unlike poles	• **Textbook,** pp. 116–117 • **Activity Book,** pp. 70–73 • Picture of a compass (or actual object if available) • Bar magnets, aluminium can tabs, cotton wool, erasers, glass marbles, plastic spoons, steel clips, wooden sticks • Different types of magnets (e.g. U-shaped magnet, ring magnet, bar magnet and horseshoe magnet) Optional: • Sheets of card paper, rulers, scissors, sewing needles (about 5 cm long), small bar magnets, markers, sticky tape, flat trays filled with water, store-bought compasses • Different types of magnets, sheets of white paper, steel clips, pencils

Lesson	No. of Periods	Learning Objective(s)	Process Skill(s)	Vocabulary	Resource(s) and Material(s)
2	3	• Understand that magnets can be made using electricity. • Construct an electromagnet. • Investigate the factors that affect the strength of an electromagnet.	• Analysing • Communicating • Comparing • Inferring • Observing	• Electromagnet • Magnetise	• **Textbook**, pp. 118–119 • **Activity Book**, pp. 74–76 • Picture of a scrap metal crane with other magnetic objects attracted to it • 1 m long wires, iron nails, sticky tape, steel clips, batteries, stapler with staples
3	3	• Know some uses of magnets and electromagnets.	• Analysing • Communicating • Comparing • Evaluating • Generating possibilities • Inferring • Observing • Predicting	• Levitate	• **Textbook**, pp. 115, 120–126 • **Activity Book**, pp. 77–78 • Internet • Pencils, copper wires, sticky tape, sandpaper, D-size batteries with battery holders, safety pins, button magnets • Picture of the set-up of a simple motor

Note: This unit is supported by PowerPoint Slides and an online Question Bank, which can be found at: *www.MCEduHub.com*

8.1 What Are Magnets?

Lesson 1

Duration of lesson: 2 periods

Learning objectives

- Identify the properties of magnets.
- Present reports on the results of experiments on the properties of magnets and their uses.

Process skills

- Analysing, classifying, communicating, generating possibilities, inferring, observing

Vocabulary

- Like poles, magnetic, non-magnetic, unlike poles

5E	Lesson	Resource(s) and Material(s)
Engage (10 min)	*(Process skills: Observing, analysing, communicating)* • Show pupils a picture of a compass from the Internet (or actual object if available). • Ask pupils the following questions: ➢ What is a compass used for? ➢ What does it use to do so? • Tell pupils that a compass uses a magnetic needle to help us look for directions. • Share with pupils that the Earth is similar to a giant magnet with a magnetic north pole and magnetic south pole, and the magnetic needle of the compass rotates freely such that its poles are attracted to the magnetic north pole and magnetic south pole of the Earth. • Ask pupils the following question: ➢ What property of magnets does a compass make use of?	• Picture of a compass (or actual object if available)
Explore (30 min)	*(Process skills: Observing, classifying, communicating, generating possibilities)* • Ask pupils the following question: ➢ What are some properties and uses of magnets? • Get pupils to carry out Activity 1 on Activity Book pp. 71–73 to find out.	• **Activity Book**, Activity 1, pp. 71–73 • Bar magnets, aluminium can tabs, cotton wool, erasers, glass marbles, plastic spoons, steel clips, wooden sticks
Explain (15 min)	*(Process skills: Observing, communicating, analysing)* • Show pupils different types of magnets (e.g. U-shaped magnet, ring magnet, bar magnet and horseshoe magnet). • Guide pupils to recognise that magnets come in various sizes and shapes. • Ask pupils the following questions: ➢ What is magnetic force? ➢ Where is the region of magnetic force of a magnet? • Get pupils to use Flashback on Textbook p. 116 to recall that a magnet can attract magnetic materials but not non-magnetic materials. • Get pupils to also recall that magnetic force is caused by the pushing and pulling actions of magnets.	• **Textbook**, pp. 116–119 • Different types of magnets (e.g. U-shaped magnet, ring magnet, bar magnet and horseshoe magnet)

5E	Lesson	Resource(s) and Material(s)
	• Use Textbook p. 116 to explain the region of magnetic force of a magnet. • Get pupils to use Flashback on Textbook p. 117 to recall that a magnet has two poles — north pole and south pole. • Ask pupils the following question: ➢ How can we differentiate between a magnet and a magnetic object? • Tell pupils that we can use the properties of magnets to differentiate a magnet from a magnetic object. • Use Textbook p. 117 to explain the properties of magnets.	
Elaborate (20 min)	*(Process skills: Communicating, analysing)* • Get pupils to carry out Creative Science on Activity Book p. 70 to make a picture using a magnet. • Get pupils to use Research on Textbook p. 116 to find out how an aurora is formed.	• **Textbook**, Research, p. 116 • **Activity Book**, Creative Science, p 70
Evaluate (5 min)	*(Process skill: Generating possibilities)* • Get pupils to answer the question in Quick Check on Textbook p. 117.	• **Textbook**, Quick Check, p. 117
Additional Activity	*(Process skills: Observing, communicating, inferring)* • Divide pupils into groups of four or five. • Get pupils to carry out the following activity to make a compass: ➢ Cut out a circle about 7 cm in diameter from a sheet of card paper. ➢ Hold a bar magnet by its north pole. ➢ Stroke a sewing needle with the south pole of the bar magnet in the same direction for 20 times. The needle will be magnetised. ➢ Mark the end of the needle where the bar magnet last touch using a marker. This is the north pole of the magnetised needle. ➢ Tape the magnetised needle on top of the card paper. ➢ Carefully place the card paper with the needle above a tray filled with water. The card paper should float around the water surface freely. • Get pupils to place a store-bought compass beside the compass they have made and observe what happens. ➢ The north pole of the magnetised needle points in the same direction as the needle of the compass. • Get pupils to bring a bar magnet close to the magnetised needle of their compass and observe what happens. ➢ The magnetised needle is attracted / repelled by the bar magnet.	• Sheets of card paper, rulers, scissors, sewing needles (about 5 cm long), small bar magnets, markers, sticky tape, flat trays filled with water, store-bought compasses
Reinforcement for Struggling Learners	*(Process skill: Observing)* • Get pupils to carry out the following activity to help them visualise the region of magnetic force of a magnet: ➢ Place a sheet of white paper on a flat surface. ➢ Place a bar magnet on the white paper. ➢ Place a small steel clip near to the bar magnet. ➢ Slowly move the steel clip around the bar magnet to find out the region of magnetic force where the steel clip is affected by the magnet. ➢ Trace the region with a pencil. ➢ Repeat the procedure, using other types of magnets.	• Different types of magnets, sheets of white paper, steel clips, pencils

8.2 How Do We Make a Magnet Using Electricity?

Lesson 2

Duration of lesson: 3 periods

Learning objectives

- Understand that magnets can be made using electricity.
- Construct an electromagnet.
- Identify and investigate the factors that affect the strength of an electromagnet.

Process skills

- Analysing, communicating, comparing, inferring, observing

Vocabulary

- Electromagnet, magnetise

5E	Lesson	Resource(s) and Material(s)
Engage (10 min)	*(Process skills: Observing, inferring, communicating)* • Show pupils a picture of a scrap metal crane with other magnetic objects attracted to it. • Ask pupils the following questions: ➢ The scrap metal crane has an iron plate. Why is the iron plate able to attract other magnetic objects? ○ The iron plate on the scrap metal crane is magnetised when electricity is switched on. The magnetised iron plate now acts like a magnet to attract other magnetic objects. • Tell pupils that the iron plate has been made into a magnet called an electromagnet using electricity, that is why it is able to attract other magnetic objects.	• Picture of a scrap metal crane with other magnetic objects attracted to it
Explore (70 min)	*(Process skills: Observing, analysing)* • Get pupils to carry out Activity 2 (A) on Activity Book p. 74 to make an electromagnet. • Warn pupils to not touch any exposed parts of the wire with their hands and not connect the electromagnet to the battery for too long. • Get pupils to carry out Activity 2 (B) on Activity Book pp. 75–76 to find out how changing the number of batteries and the number of coils of wire affect the number of staples attracted to the electromagnet made.	• **Activity Book**, Activity 2, pp. 74–76 • 1 m long wires, iron nails, sticky tape, steel clips, batteries, stapler with staples
Explain (10 min)	*(Process skills: Inferring, communicating)* • Use Textbook p. 118 to explain how to make a magnet using electricity. • Use the speech bubble on Textbook p. 118 to warn pupils that they should not try to make electromagnets using electricity directly from the electrical socket. • Ask pupils the following question: ➢ How can we make an electromagnet stronger? • Use Textbook p. 119 to explain some factors that the strength of an electromagnet.	• **Textbook**, pp. 118–119

5E	Lesson	Resource(s) and Material(s)
Elaborate (20 min)	*(Process skills: Comparing, communicating)* • Get pupils to use Explore on Textbook p. 118 to make a magnet using a different method (the stroke method). • Get pupils to discuss how the two methods of making a magnet are similar and different. • Get some pupils to present their answers.	• **Textbook**, Explore, p. 118
Evaluate (10 min)	*(Process skill: Inferring)* • Get pupils to answer the question in Quick Check on Textbook p. 119. • Get pupils to complete Reflection and Conclusion of Activity 2 on Activity Book pp. 74–76.	• **Textbook**, Quick Check, p. 119 • **Activity Book**, Activity 2, pp. 74–76
Enrichment for Advanced Learners	*(Process skill: Generating possibilities)* • Tell pupils that iron is a common material used to make electromagnets. • Get pupils to research on the advantages of using iron instead of other magnetic materials to make electromagnets.	