

Theme – **Magnetism**

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1. Introduction

Science Week Ireland takes place from 11th-18th November 2001 and aims to promote science, technology and innovation to the general public (particularly young people and their parents), teachers, third level institutions, industry and the media.

Whether it is an opportunity for employment, a new way to learn or a leisure time activity science impacts on all our lives.

After the success of the pilot scheme in 1999, this year we are delighted to run **Primary Science Day** as a national event in all primary schools as part of Science Week Ireland. The theme for this year is **Magnetism** and the chosen day is Tuesday 13th November. We would ask teachers, if at all possible, to devote part of this day to teaching science.

It would not have been possible to develop this pack without the invaluable support, advice and sheer hard work of the following people:

Colm O'Cheallacháin & Carmel O'Doherty, Department of Education & Science.

Marion Palmer, Dun Laoghaire Institute of Art, Design and Technology.

Edna Jordan & Síle Chuinneagáin of the Irish National Teachers' Organisation.

Cliona Murphy, St. Colmcilles Senior National School, Knocklyon, Dublin 16 (seconded to PCSP).

Mary Stuart, Principal of Monkstown Educate Together, National School, Monkstown, Co. Dublin.

A lot of hard work went into the development of the pack. The theme of magnetism was chosen and it was important to ensure its content complemented the revised curriculum. It is hoped that the pack will be used as a permanent resource within the school after **Primary Science Day**.

The STI Awareness Programme would like to thank all who contributed to this project in giving of their time and expertise so willingly.

An evaluation form has been prepared to take your views into account for future programmes so we would appreciate if you would take the time to fill it in and return it in the enclosed envelope.

We hope you enjoy using the pack with your children and look forward to receiving your feedback.

Stephanie O'Neill

STI Awareness Programme

2. Supporting Information

2.1 How to use this pack

Each school receives a pack that consists of:

- ◆ A teacher's booklet.
- ◆ Magnets – the magnets are appropriate for use at all class levels.

The booklet contains information on magnetism in the curriculum, background information on magnetism, caring for magnets, sample lesson plans and follow-up activities on the topic of magnetism.

Using the pack

The following are some suggestions for using the pack:

- ◆ copy the booklet for each member of staff.
- ◆ check and see if there are any magnets in the school.
- ◆ decide which classes will undertake the activities. Some of the activities developed for the junior classes may be useful as an introduction to magnetism for the senior classes.
- ◆ ask the children to bring in any spare magnets at home e.g. old fridge magnets.
- ◆ before undertaking the work in class check the magnets, the activities and copy the worksheets for the children.
- ◆ timetable the materials on the chosen day.
- ◆ review the activities and fill in the evaluation form. The children's work could be displayed in their classrooms or throughout the school.
- ◆ send the evaluation form to Forfás.

Any classes that cannot use the pack on the suggested day could use it at another time in Science Week. The pack is for use on Primary Science Day and is also a permanent resource for schools.

2.2 Magnetism in the primary science curriculum

Science in the primary curriculum aims to introduce children to the wonder of science, to develop a lasting interest in science and to provide opportunities for children to work scientifically. Learning science should stimulate curiosity and be fun. The curriculum for science aims to develop children's skills and their understanding of science concepts. There are four content strands: Living things, Energy and forces, Materials, Environmental awareness and care. Children are encouraged to develop the skills of working scientifically and designing and making. The approach to science is to start from the children's ideas and to work in an active and collaborative way investigating the world in which we live.

Magnetism in the curriculum

Children meet magnets in their everyday lives, whether as fridge magnets or as means of keeping cupboards shut. Magnetism is part of the **Magnetism and electricity** strand unit in **Energy and forces**. In infant classes children are encouraged to play with magnets and to investigate their effects on different materials. As they become older children explore the effects of magnets and become aware that magnets attract i.e. pull or push materials such as iron and steel. Then in third and fourth classes children start to explore the poles of magnets and relationship between magnets and compasses. They begin to classify materials as magnetic or non-magnetic and investigate how magnets attract certain materials through other materials. Terms such as poles and magnetic begin to be used. In the senior classes children investigate how magnets may be made and explore the use of magnets to lift and hold objects. At each class level children should explore magnets as an introduction to the topic. Magnets are great fun. The SESE: Science Teacher Guidelines have an exemplar on magnetism for first and second class on page 106 (as Gaeilge leathanach 110). Exemplar 4 on page 42 (as Gaeilge leathanach 44) illustrates how a unit of work on magnetism can be developed with children in middle classes.

Links with other areas of the curriculum

The topic of magnetism has many links with other areas of the curriculum. Here are some suggestions:

- ◆ **Geography** – use of compasses for navigation. Finding our way about the Earth using a compass contributes to the skills and concepts development for the senior primary classes e.g. the strand unit *A sense of space* and the **Natural environments** strand.
 - ◆ **History** – discovering our world depended on our ability to navigate. The great explorers used compasses to find the way north or south. This linking of technology to discovery can contribute to **Life, society, work and culture in the past** and to **Continuity and change over time** in the senior classes. The children could develop their understanding by finding out the history of magnetism and compasses.
 - ◆ **Language** – explaining how magnets attract and repel other magnets develops children's **Confidence and competence in using language**. Discussing magnetism contributes to **Developing cognitive abilities through language**. Children can create poems or pieces of writing about magnets.
 - ◆ **ICT** – children can use computers to present their work on magnetism.
 - ◆ **SPHE** – magnets can be used to hold cupboard doors shut and make kitchens and other rooms safe for children and their families. Children could discuss, in collaborative groups, how to use magnets to make their homes and classrooms safe. This would contribute to Safety issues in the **Myself** strand of the curriculum.
 - ◆ **Visual arts** – children can design and make fridge magnets from a variety of materials. These would incorporate a small magnet.
-

Magnetism in Primary Science – Content strands

Content Strand	Infants	First class/Second class	Third class/Fourth class	Fifth class/Sixth class
Energy and forces Magnetism	<p>The child should be enabled to</p> <ul style="list-style-type: none"> use magnets of different shapes and sizes in purposeful play to explore their effects on different materials investigate the fact that magnets attract certain materials <p><i>design and make a container (incorporating a magnet) that will keep all teacher's paper clips together</i></p>	<p>The child should be enabled to</p> <ul style="list-style-type: none"> use magnets of different shapes and sizes in purposeful play to explore their effects on different material <p><i>design and make a fishing game using a magnet</i></p> <ul style="list-style-type: none"> investigate that magnets attract magnetic materials, such as iron and steel investigate that magnets attract certain materials through other materials <p><i>magnets attracting materials through water, glass, plastic</i></p>	<p>The child should be enabled to</p> <ul style="list-style-type: none"> learn that magnets can push or pull magnetic materials explore how magnets have poles and investigate how these poles attract and repel each other explore the relationship between magnets and compasses examine and classify objects and materials as magnetic and non-magnetic investigate that magnets attract certain materials through other materials <p><i>magnets attracting materials through water, glass, plastic</i></p>	<p>The child should be enabled to</p> <ul style="list-style-type: none"> learn that magnets can push or pull magnetic materials investigate how magnets may be made <p><i>stroking a piece of iron or steel with a magnet</i></p> <p><i>passing electricity through a coil around a piece of iron or steel (electromagnet)</i></p> <ul style="list-style-type: none"> explore the use of magnets to lift and hold objects <p><i>how magnets can be used in cranes, door catches</i></p> <p><i>how magnets may be used to sort materials</i></p>

Skill Development

The lessons and follow-up activities in the pack develop the skills of working scientifically and designing and making.

2.3 Background information on magnetism

Magnetism is a force. Iron and steel are the only common materials that are attracted (pulled) towards a magnet. Nickel and cobalt, which are less common, are also attracted towards magnets. Most other metals are not magnetic. Magnets will attract magnetic materials through other materials. Magnets have two poles a North Pole or north-seeking pole and a South Pole or south-seeking pole. Like poles repel and unlike attract. Magnets come in a variety of shapes e.g. bar magnets, horseshoe magnets and ring magnets. In each case there is a North and South Pole. The earth itself acts like a huge bar magnet. A magnet left to hang freely will come to rest with the North Pole facing north. Compasses work on this principle. Magnets are found in many everyday devices e.g. televisions, loudspeakers and anything containing a motor.

Types of magnets

Disc magnet



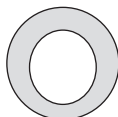
Bar magnet



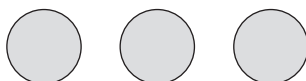
Magnetic wand



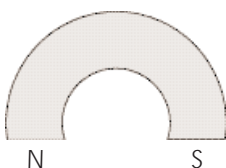
Ring magnet



Magnetic marbles



Horseshoe magnet



Children's ideas about magnets

Children can feel the pull and push of magnets and can think that magnets stick to objects because they have some kind of glue or some magical properties. In primary science children are provided with opportunities to change their ideas and to develop more scientific understandings.

2.4 Caring for magnets

Magnets will last quite a long time if looked after. Magnets should be handled carefully. If they are heated or dropped they can lose their magnetism. They need to be stored carefully and with keepers if they have them. Do not place or store them near computers, videos or televisions. Finally, after a number of years it may be necessary to replace your magnets.

3. Sample Lesson Plans

3.1 SCIENCE ACTIVITY – TEACHER'S NOTES FOR INFANT CLASSES

Theme	Magnetism
Objective	The child should be enabled to use magnets of different shapes and sizes in purposeful play to explore their effects on different materials.
Background	When we bring magnets near magnetic materials we can experience the pull of the magnet.
Materials	<ul style="list-style-type: none"> ◆ Large and small items i.e. toy car, small plastic bottle, metal spoons, bottle opener, variety of bottle tops, plastic bricks, selection of keys, jigsaw pieces, card/wood, soft toy, paper clips, selection of coins etc. ◆ Two trays or hoops for classifying items. ◆ Selection of magnets.
Introduction	Discuss with the group the items on the table, how they are alike/unlike. Talk about how they could move the objects. Teacher could introduce the wand magnets and allow children to describe, size, shape, colour, how they feel, what they might be used for etc.
Development of lesson	Children are asked to guess what will happen when the wand magnet is placed near an item. Children take turns to place a wand magnet near the item of their choice. They are encouraged to describe what happened, what they saw, felt etc. You may get the following words, stick, pull, move, jump. The children could be encouraged to name the wand magnet. The other magnets may be introduced and children continue to explore as with wand magnet.
Follow up activities	Children classify materials by placing items that the magnet picked up/did not pick up into the appropriate hoop/tray. Senior infants could complete the worksheet.

JUNIOR AND SENIOR INFANTS

Magnetism

Name:

WHAT WILL THE MAGNET PICK UP?

FIND OUT AND CIRCLE YOUR ANSWER.

key

spoon

car

brick

toy

wood

3.2 SCIENCE ACTIVITY – TEACHER’S NOTES FOR FIRST AND SECOND CLASSES

Theme	Magnetism
Objective	The child should be enabled to investigate that magnets attract magnetic materials such as iron and steel.
Background	Magnets will attract/pick up objects made of magnetic materials.
Suggested Materials and Equipment	<ul style="list-style-type: none"> ◆ Magnets. ◆ Selection of items that are magnetic/non magnetic, preferably classroom based everyday objects. ◆ Worksheet, pencils/colouring pencils/crayons.
Introduction	Teacher brainstorms children on the word MAGNET. Response might include the terms magnetic/non magnetic, force, stick, pull, move, jump, fridge magnets, white board, poles, compass, attract, repel, magnetic field etc., depending on their experiences. Record responses for reference. Magnets are introduced and children are given the opportunity (in groups) to explore their effect on selected items.
Development of lesson	The children are asked to predict 8 to 10 objects in the classroom, which they think might be attracted by a magnet. The term attract should be explored with the children reference being made to the brainstorm session. Children record their predictions.
Task	The children identify through practical activity 8 to 10 objects in the room, which are attracted by magnets. They will use a selection of magnets.
Recording	The children record their findings on paper or the worksheet. To enhance presentation the objects could be coloured.
Analysing	<p>The children discuss their findings referring to their predictions. Can they find ‘something in common’ among the items on their list?</p> <p>Note: samples apparently made out of zinc or tin will in fact have steel underneath!</p>
Follow up activities	Second class could write two or three sentences saying what they have discovered about magnetism. They could design and make a boat, see Section 4.

FIRST AND SECOND CLASSES

Magnetism

NAME:

My magnet will stick to...	My magnet stuck to...	My magnet did not stick to...

My Sentences

3.3 SCIENCE ACTIVITY – TEACHER’S NOTES FOR THIRD AND FOURTH CLASSES

Theme	Magnetism
Objective	Children will examine and classify objects and materials as magnetic and non-magnetic.
Background	Some materials are magnetic and some are not. The magnet attracts only materials made from iron and steel (nickel and cobalt are less common).
Suggested Materials and Equipment	<ul style="list-style-type: none"> ◆ A selection of materials e.g. a cork, paper clips, a straw, marbles, nails, various coins, paper, a pencil, rubber bands and bottle tops. The materials can be stored in a small box or bag. This list is not exhaustive. ◆ A selection of magnets. ◆ Worksheet for each child.
Introduction	Talk about the shapes of the different magnets and describe them. Pose the questions: What kinds of objects do you think the magnet will pick up (attract)? Why will the magnet pick up certain objects and not others?
Development	A group of children will look at a collection of objects. They will describe the objects. Pose the questions: What are the objects made of? Which objects will be picked up (attracted) or not picked up (repelled) by the magnet?
Task Predict Experiment	<p>Arrange the children in a group. Get them to predict what object will be picked up/not picked up by the magnet.</p> <p>The children take it in turns to put the magnet near an object. If it picks up the object it is magnetic. If the magnet does not pick up the object it is not magnetic. Place the objects in a magnetic and a non-magnetic group.</p>
Recording	Record the results on the worksheet or by any other means. Children could draw the magnetic objects and the non-magnetic objects on a sheet of paper.
Analysing Discuss	Discuss the different materials that the objects are made of. Pose the question: Why are some objects magnetic and some not?
Follow up activities	Section 4 has suggestions for further activities.

FIFTH AND SIXTH CLASSES

Magnetism

Name:

Date:

Draw a picture of each magnet in the space provided.

How strong are magnets?

How many paper clips can you pick up with each magnet?

Predict first and then test.

Magnets	My prediction Number of paperclips	My result Number of paperclips

Which is the strongest magnet?

Why do you think it is the strongest?

4. Follow-up activities

Here are some suggestions for follow-up activities. For each activity class levels are suggested.

4.1 The Fishing Game (Infant and junior classes)

Materials: A thin piece of garden cane, thin card, paper clips, a large shoe box, string, scissors and small magnets.

Ten fish shapes could be cut out, they could be numbered and/or coloured and paper clips placed on each one. A large box could be decorated to make it look like a fish tank and the fish placed inside. The small magnets should be attached to the cane using the string. The children take turns to use the magnet rod to pull a fish out of the box.

4.2 Cork/polystyrene boats (Junior classes)

The children could make boats from small pieces of cork or polystyrene, a toothpick and material for sail. Some boats could have thumbtacks/paper clips on the bottom. The boats could be placed in margarine containers with water. The children could observe if there is any movement when a magnet is placed near a container. The children could find out which boats can be controlled by magnets.

4.3 Where do we find magnets? (Junior, middle and senior classes)

The children could do a survey to see where magnets are used e.g. at home, in school, in public buildings or in the community. They could research the reasons for using magnets. They could draw the different types of magnets.

4.4 Magnetism works through lots of materials e.g. cardboard, glass (Junior, middle and senior classes)

Question: Does magnetism work through cardboard?

The children could draw a maze (or another design) on a piece of cardboard e.g. a shoebox lid. A paper clip could be attached to a toy mouse (from the pet section in a supermarket) and the mouse placed on the cardboard. The children could find out if they can use a magnet to guide the mouse through the cardboard.

Question: Does the magnetism work through water?

A paper clip could be placed into a clear container full of water. The children could be asked to get the paper clip out of the container without getting their fingers or magnets wet.

The children could be asked to design and make games to see if magnets work through plastic, paper or wood.

4.5 Stopping the force (Middle classes)

Question: Can the force of the magnet be blocked by putting something in its way or by wrapping something around the magnet?

Equipment: Strong magnet, paper, aluminium foil, handkerchief, plastic and paper clips.

The children could wrap the magnet in paper and see if it will pick up any paper clips. They could repeat this with the magnet wrapped in plastic, foil or a handkerchief.

Investigate: How many layers of each material do you need to stop the magnet picking up paper clips.

4.6 Attracting and repelling activities

(Middle classes)

Bar magnets could be strapped with sellotape on to the top of toy cars. If attracted to each other the cars will 'crash' and if repelled by each other the cars will 'move away' from each other.

4.7 Indian rope trick

(Middle classes)

A paper clip could be tied to a piece of string and Blu tack used to attach the other end of the string to the side of a desk. The paper clip should be hanging down. A magnet could be used to attract the paper clip up in the air without touching it.

4.8 Investigating poles

(Middle and senior classes)

Children can investigate where the poles are on the magnets. Using paper clips children can find out where they stick best to the magnet – these are the poles. On bar magnets the poles are at each end, but on the ring magnets they are on each side. Children can then investigate what happens when two poles are placed near each other. Hang one magnet from a rod and bring another magnet near. Sometimes the two poles are attracted – pull together and other times they repel – push away. Poles are called north and south poles. Like poles repel and unlike poles attract.

4.9 Compasses

(Middle and senior classes)

How does a compass work?

Materials: Needle/paper clip, bar magnet, blu tack, thin piece of cork, a dish of water.

The children could make compasses. They would straighten out a paper clip and stroke it with one end of a bar magnet with wide strokes. They should stroke the straightened paper clip along the whole length in the same direction about 20 times. This lines up all the particles inside and magnetises the paperclip. Then they would lay the magnetised paperclip on a thin section of a cork and secure it with a piece of Blu-tack. The compass is floated on a dish of water, it will automatically float in a north / south direction. The children could check this with a compass. A compass is just a small magnet on a pivot, free to lie in a north / south direction.

4.10 Making a magnetic game

(Senior classes)

A teacher wants a magnetic game for her class of senior infants. Children in fifth and sixth classes could design and make a game for the younger children. They could *explore* the kind of games the children like and the teacher wants by talking to the children and the teacher and looking at the kind of games they play. Then they could *plan* a game. They would work out the materials and the tools they need for the game and then *make* it. Finally they could *evaluate* it by testing the game on each other, the teacher and the children. This activity works well with small magnets and everyday materials. It is quite an extensive activity with many cross-curricular links.

5. References

Government of Ireland. **Primary Curriculum. SESE: Science.** Dublin: Stationery Office, 1999. ISBN 0 7076 6327 X.

Government of Ireland. **Primary Curriculum. SESE: Science Teacher Guidelines.** Dublin: Stationery Office, 1999. ISBN 0 7076 6337 7.

Association for Science Education. **Be Safe: Third Edition.** ASE: Hatfield, 2001. ISBN: 0 86357 324 X.

Hollins, Martin and Whitby Virginia, **Progression in Primary Science. A guide to the Nature and Practice of Science in Key Stages 1 and 2,** London: David Fulton Publishers, 1998. ISBN 1 85346 498 8

Nuffield Primary Science. **Understanding Science Ideas. A Guide for Primary Teachers,** London: Collins Educational, 1997. ISBN 0 00 310018 9.

Peacock, G.A., **Teaching Science in Primary Schools,** London: Letts Educational, 1999. ISBN 1 85805 351 X

Childrens science series such as the **Kingfisher** books, **Star Science, Hands On Science** are useful references for magnetism.

6. Evaluation Form

Please complete and return to STI Awareness Programme, Forfás, Wilton Park House, Wilton Place, Dublin 2 in the stamped addressed envelope provided with this teacher's pack.

Part 1 School information

- 1.1 School Name
- 1.2 School Address
- 1.3 Roll No.
- 1.4 School Phone No.
- 1.5 Email
- 1.6 Did you use the pack in English or as Gaelige? English Gaelige

Part 2 Evaluating the pack

Please rate the following sections of the pack for their clarity, usefulness etc. by circling 1-5. 5 = your most positive score: 1 = your most negative score

Section 2 Supporting information

	Poor	Fair	Good	Vgood	Excellent
2.1 How to use this pack	1	2	3	4	5
2.2 Magnetism in the primary science curriculum	1	2	3	4	5
2.3 Background information on magnetism	1	2	3	4	5
2.4 Caring for magnets	1	2	3	4	5
2.5 Comment					

Section 3 Sample lesson plans

	Poor	Fair	Good	V good	Excellent
3.1 Sample lesson plan for infants	1	2	3	4	5
3.2 Reaction of children to the activity	1	2	3	4	5
3.3 Supplied magnets	1	2	3	4	5
3.4 Comment					

3.5 Sample lesson plan for first and second classes	1	2	3	4	5
3.6 Reaction of the children to the activity	1	2	3	4	5
3.7 Supplied magnets	1	2	3	4	5
3.8 Comment					

3.9	Sample lesson plan for third and fourth classes	1	2	3	4	5
3.10	Reaction of the children to the activity	1	2	3	4	5
3.11	Supplied magnets	1	2	3	4	5
3.12	Comment					

3.13	Sample lesson plan for fifth and sixth classes	1	2	3	4	5
3.14	Reaction of the children to the activity	1	2	3	4	5
3.15	Supplied magnets	1	2	3	4	5
3.16	Comment					

Section 4 Follow-up activities

4.1 Were any of the suggested follow-on activities included in the pack used by any teachers and pupils in your school?

Yes No

If yes, please specify.

Activity	Class level
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____

4.2 What other science topics would you like to see included in a similar pack in the future?

4.3 Primary Science Day is part of Science Week in November each year. Does this suit your school? When would Primary Science Day suit your school?

4.4 If you have any suggestions for the development of this pack please specify.

Thank you for taking time to complete this questionnaire.

