SCIENCE
YEAR 3-4
Cycle A – Unit 6

Forces - magnets

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RANGE

How things work

2. forces of different kinds – **magnets**
3. the ways in which forces can affect movement and how forces can be compared

KEY VOCABULARY

force	copper
magnetism	aluminium
attract	iron
repel	steel
poles	brass
north	
south	
table	
bar chart	
axis	
tally	
scale	

Developing thinking

(Plan-Develop-Reflect integrated into activities)

LNF – Main Numeracy Strands covered*

Strand:
Developing numerical reasoning
Elements:
Identify process and connections
Represent and communicate
Review

Strand:
Using data skills
Elements:
Collect and record data
Present and analyse data
Interpret results

**Refer to LNF numeracy framework for details of specific skills within each element.*

LNF – Literacy (writing) opportunities

Element: Organising information and ideas
Writing accurately

Writing to inform, instruct and find out

Developing ICT

School to identify and provide opportunities for developing this skill within the scope of the unit.

Curriculum Cymreig

School to identify and provide opportunities for developing this skill within the scope of the unit.

Personal and social education

School to identify and provide opportunities for developing this skill within the scope of the unit.

Science – Medium Term Planning (half term)

Year Group	**3-4**	Term	**Cycle A – Unit 6**	Unit Title	**Forces - magnets**

RANGE

How things work

2. forces of different kinds – **magnetism**
3. the ways in which forces can affect movement and how forces can be compared

Cross Curricular Links:

Skills (Principal skills in bold italics)	**Suggested activities**	**Resources and web links**	**Assessment Opportunities**
PLAN Identify gaps in prior knowledge **DEVELOP** ***Make comparisons and identify and describe trends*** Make careful observations and measurements **REFLECT**	**1. Big Question: What do you already know about magnetism?** Intro to topic and discussion of what pupils understand by magnetism. **Introduce the skill – sorting strategies 'Forces' activities: NGfL KS2 science** • Review what the pupils already know about forces, pushing and pulling. • Use a collection of pictures showing different actions e.g. turning on a tap, closing a door, lifting a feather, closing a zip etc. use a Venn diagram to sort. • More able: sort examples into greater and lesser force required as well • Play true-false activity using selected statements to trigger misconceptions and/or sort materials according to magnetic/non magnetic. • Do magnets push or pull, or both? • Do magnets work through water? • Create a mind map in order to discover what they know. • Give pupils selection of magnets. Explore the effect of moving magnets near other magnets. Allow pupils to explore effect of moving magnets under paper topped with iron filings. • Allow pupils to explore compasses and magnets floating on water. • Review key vocabulary and observations. • Record diagnostic assessment – mind map, KWL grid or ideas poster etc. **To write to inform and explain** **Text type: notes and diagrams**	Selection of magnets: horse, bar, circular. Iron filings Various materials http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html http://www.echalk.co.uk/	Use preferred diagnostic strategy/tool ***Can pupils identify simple patterns and trends? (Level 3)*** Can pupils explain using scientific ideas? (Level 4)

PLAN Plan the observations and measurements to take **DEVELOP** ***Make comparisons and identify and describe patterns and trends in data*** **REFLECT** Linking learning to similar situations within and outside school	**2. Big Question: Which materials are magnetic?** Give pupils a wide range of metallic and non-metallic materials/objects to sort according to their own criteria. Challenge pupils to sort a range of materials into magnetic and non-magnetic. • Are all metals magnetic? • Are all magnetic objects made of metal? • Are all coins magnetic? **Introduce the skill – sorting strategies. 'Carroll diagrams': NGfL KS2 Maths** • Ask pupils how they sorted the materials. • Show pupils alternative methods of sorting that allow for more sub-groups to be identified, e.g. Venn and Carroll diagrams **Practise the skill – sorting strategies** • Challenge pupils to select a sorting strategy in order to sort/re-sort materials. • Can some materials block a magnetic field? Paper, bubble wrap, aluminium foil etc? • Which ones are better at blocking the magnetic force? Why?	http://resources.hwb.wales.gov.uk/VTC/2009-10/science/cripsat/e32-forces/index.html http://www.woodlands-junior.kent.sch.uk/revision/Science/physical.htm http://resources.hwb.wales.gov.uk/VTC/carroll_diagrams/eng/introduct/default.htm Selection of magnets: horse, bar, circular. Iron filings Various materials	Can pupils plan with some independence? (Level 3) Can pupils display findings in a given format? (Level 3) ***Can pupils begin to identify simple patterns and trends in data? (Level 3)***

PLAN ***Find evidence, information and ideas*** **DEVELOP** Form considered opinions and make informed decisions **REFLECT** Link learning to similar situations within and outside school.	**3. Big Question: How do magnets help us?** Review class ideas on where magnets are used around the home, in school and in recycling centres. **Introduce the skill – Find evidence/information** Ask pupils to find out information about magnetism using a selection of sources • Help pupils set a series of simple questions to answer – relate to misconceptions in first session, e.g. What's inside a magnet? How are magnets used in recycling centres? • How will pupils gather information? Which source will they use? • Agree on simple success criteria with pupils. **Practise the skill – Find evidence/information** • Pupils gather required information to answer chosen questions. • Consider communicating findings using either a letter, email or oral presentation. • Link to Ted Hughes's novel – The Iron Man. **To write to inform and explain** **Text type: non-chronological report/letter/email**	http://www.bbc.co.uk/learningzone/clips/ http://www.woodlands-junior.kent.sch.uk/revision/Science/physical.htm Selection of websites, books etc.	***Can pupils suggest where to find information? (Level 3)*** Can pupils make decisions by weighing up evidence? (Level 3) Can pupils link learning to familiar situations? (Level 3)
PLAN ***Plan the method to be used in an investigation, recognising key variables.*** **DEVELOP** ***Make careful observations and measurements*** **REFLECT** Suggest how the method could have been improved	**4. Big Question: Which magnet is the strongest?** Recap on prior learning. What have pupils learned so far? Set pupils challenge – Can you find out which magnet is the strongest? Use Concept Cartoon 11.3 for discussion. What do pupils understand by the term 'strongest'? **Introduce the skill – Planning an investigation** • Ask the pupils which magnet they think is the strongest. How can they prove it is the strongest? (Pupils could measure number of paper clips picked up or distance between the magnet and the paper clips). • Use interactive planning board to plan a simple investigation as a whole class. What are we measuring? What do we need to change? What do we need to keep the same so that the test is fair? Identify variables. • More able: select available resources so the pupils can choose their preferences independently. **Practise the skill – Planning an investigation** • Use planning board template to organise variables (or print out from whiteboard depending upon ability). • Make a prediction and record in workbooks/group record e.g. *I think the horseshoe magnet will be the strongest because it is the biggest.* • Carry out the investigation in small groups. • Tabulate findings • Discuss results in relation to predictions. **To write to inform** **Text type: science write-up/report**	Selection of magnets: horse, bar, circular. Iron filings Various materials Planning boards Card sort variables	Can pupils use everyday ideas to make predictions? (Level 3) ***Can pupils recognise the main variables to control in a fair test? (Level 4)*** ***Can pupils record measurements using simple equipment? (Level 3)*** Can pupils suggest how the method could be improved? (Level 3)

PLAN Ask relevant questions **DEVELOP** Communicate findings using relevant scientific language ***Form considered opinions and make informed decisions*** **REFLECT** ***Suggest how the method could have been improved***	**5. Big Question: Which magnet is the strongest? …continued** Review findings from previous activity. **Introduce the skill – Conclusions and decisions** • Review findings from groups. Discuss which magnet is the strongest. • Model examples of conclusions. Use KS2 science guidance document • What makes a good conclusion? **Practise the skill – Conclusions and decisions** • Pupils write conclusions and swap between groups to self assess • Consider challenging pupils to write an email or letter to a factory manager explaining which is the strongest magnet to use for a device. Use writing template if required. • More able: work without template and select genre to communicate **To write to inform** **Text type: science write-up/report**	KS2 science guidance document Ginn Star Science – teaching scientific enquiry book	***Can pupils say what they have found out from their work and make decisions by weighing up evidence? (Level 3)*** ***Can pupils suggest simple improvements? (Level 3)***
PLAN Select success criteria **DEVELOP** Make careful observations and measurements ***Organize findings and display them using tables and bar charts*** **REFLECT** Begin to evaluate outcome against success criteria	**6. Big Question: Which material is best at blocking the force from a magnet?** Review work on strongest magnets. Introduce new question: which material best blocks a magnetic force? • Ask the pupils to predict which material will block the force. Why? • How can we test this? Can we add layers of materials and record how the force of attraction changes at a distance? Discuss. • Use interactive planning board to plan a simple investigation as a whole class. What are we measuring? What do we need to change? What do we need to keep the same so that the test is fair? Identify key variables. • Pupils carry out investigation and tabulate results. **Introduce the skill – Using tables and bar charts** • Model how bar charts are constructed – interactive planning boards are a valuable tool here. Ideas from Ginn Star Science – teaching scientific enquiry book **Practise the skill – Using tables and bar charts** • Use pre-labelled bar chart axes for pupils/groups to add data. • More able: construct own axes • Pupils peer asses bar charts • What makes a good bar chart?	Interactive planning boards Ginn Star Science – teaching scientific enquiry book	Can pupils agree on some basic success criteria? (Level 3) ***Can pupils display findings using tables and bar charts with axes given? (Level 3)***

PLAN ***Select success criteria*** Suggest how to find relevant information and ideas. **DEVELOP** Use apparatus and equipment safely **REFLECT** ***Link outcomes to success criteria and identify what worked and what didn't***	**7. Big Question: How can we create a magnetic toy?** Discuss how magnets are used in toys. Challenge pupils to design and construct a simple toy/game which uses magnets, e.g. • 'fishing game' where small magnets are dropped into a pool of paper clip fish • 'mysterious dancing dragon' where a decorated paperclip dragon (tethered to the desk via thread) is attracted upwards using a magnet attached to a small rod/ruler **Introduce the skill – Determine success criteria** • Model examples of success criteria. • What must our toy be able to do? • Plan the toy design. **Practise the skill – Determine success criteria** • Pupils agree/select some basic success criteria. • Construct the toy. • Evaluate and review initial success criteria. • How could the method be improved? • More able: select own success criteria • Consider a 'Dragon's Den' activity where pupils promote their toy design. **To write to inform and explain** **Text type: non-chronological report/notes**		***Can pupils agree on some basic success criteria? (Level 3)*** ***Can pupils link learning with support to familiar situations? (Level 3)***

REFLECT ***Describe how they have learned, and identify the ways that worked the best.*** Link the learning to similar situations, within and outside school.	Revisit initial diagnostic assessment. Can pupils demonstrate understanding at end of topic and discuss new skills learned and/or practised? Can pupils create fact cards about magnets? Can pupils add new knowledge to the class learning tree?	Use preferred AfL strategy	***Can pupils say what worked and didn't work? (Level 3)***
Evaluation			