

SCIENCE **YEAR 5-6** Cycle A - Unit 6

Forces: friction & forcemeters

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RANGE

How things work

- 2. forces of different kinds friction and forcemeters
- 3. the ways in which forces can affect movement and how they can be compared

KEY VOCABULARY

gravity mass force weight friction air resistance

newtons (N) variables reliability table average bar chart

line graph axes scale

Developing thinking

(Plan-Develop-Reflect integrated into activities)



LNF - Main Numeracy Strands covered*

Strand:

Developing numerical reasoning.

Element:

Identify processes and connections.

Represent and communicate. Review.

Strand:

Using number skills.

Element:

LNF – Literacy (writing) opportunities

Element: Organising information and ideas Writing accurately

Writing to inform, instruct and explain

Curriculum Cymreig



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

Us	se number facts and relationships.
Cá	alculate using mental and written methods.
Es	stimate and check.
St	rand:
Us	sing measuring Skills.
Ele	ements:
Le	ength, weight/mass, capacity.
St	 rand:
Us	sing data skills.
	ement:
Co	ollect and record data, Present and analyse data, Interpret
re.	sults.

Developing ICT



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	EIG	Torm	Cycle A Heit 6	Unit Title	Earage friction and forcemeters
Year Group	5/6	l erm	Cycle A – Unit 6	Office Fille	Forces – friction and forcemeters
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Range: How things work

within each element.

2. forces of different kinds - friction and forcemeters

*Refer to LNF Numeracy framework for details of specific skills

3. the ways in which forces can affect movement and how they can be compared

Cross Curricular Links:

Skills (Principal skills in bold italics)	Suggested activities	Resources and web links	Assessment Opportunities
COMMUNICATE Communicate clearly using drawings PLAN Identify gaps in prior knowledge	1. Big Question: What do you know about forces? Record diagnostic assessment – mind map, KWL grid or ideas poster etc. Show video clips of different forces in action and/or Concept Cartoon. Discuss. Introduce the skill – Communicate findings. Recap using force arrows Play a true-false card game using statements Active Assessments: Pushes and Pulls. (Page 141) activity.	http://resources.hwb.wales.gov.u k/VTC/2009- 10/science/cripsat/e32- forces/index.html	Use preferred diagnostic strategy/tool Can pupils organise their findings using scientific language? (Level 4))
REFLECT Suggest how the method could have been improved	Practise the skill – Communicate findings. Recap using force arrows Show children forcemeters and point out the spring inside them. Review how they work. Help children to practise reading the forcemeter. Use a graphic organiser to consider the parts of a forcemeter and their function. Complete graphic organiser (whole-and-part relationships) using parts of a forcemeter. Recap on newtons (N). Start a forces glossary in pupils' books – to be completed over forthcoming tasks.	http://www.echalk.co.uk/ http://www.bbc.co.uk/education/s ubjects/z2pfb9q	

COMMUNICATE	2. Big Question: Can we create our own forcemeter?		
Use SI units		Alternative method:	Can pupils record using SI
	Introduce the skill – Plan the process/method	http://www.instructables.com/id/B	units? (Level 4)
PLAN	Challenge: design and build their own forcemeter using card, elastic bands and plastic	e-a-scientist%3A-make-your-	, ,
Plan the	bags. (Idea from the NFER Let's Think Through Science book.)	own-force-meter./	
process/method to be	Attach elastic band to carrier bag and add mass (apples). Can pupils measure extension		
used	as the band stretches? Tabulate findings.		Do pupils use scientific skills
	Attach elastic band to top of a piece of cardboard so that bag/band moves freely in front		and knowledge to plan their
Plan the observations	of cardboard. Record extension of band on cardboard as mass is added in bag.		work? (Level 4)
and measurements to	Empty bag and add small apples (approx 100g). Mark extension; one apple, two apples		
take	etc. Tell pupils small apple = 100g. Can they convert 'appleometer' scale to g?		
	 Tell them 100g = 1N. Can they now convert 100g to 1N, 200g to 2N etc.? 		
<u>DEVELOP</u>	Practise the skill – Plan the process/method		
Make careful observations	Think of ways of designing the forcemeter body/case.		
	Children to set success criteria for their forcemeter design.		
	Pupils make another attempt at making a forcemeter using 100g apples to create a		
	scale.		
	Coalc.		
	To write to instruct		
	Text type: Diagrams and annotation		

PLAN Identify the key variables to be controlled in a fair test DEVELOP Check observations by repeating them in order to collect reliable data Use apparatus and equipment correctly and safely REFLECT Begin to evaluate outcomes against success criteria.	 3. Big Question: Which design of trainers produces most friction? Introduce the skill – Identifying variables/reliability. OAM unit 6 Introduce task 6c. Oral data collection - Are the grips on Nike trainers better than the grips on Reebok trainers? Class vote. Do longer shoes have more grip? Diamond ranking the features of trainers and their construction. Card sort activity - to include statements about the kind of sole, colour of the sole, cost and make etc. What makes a 'good' planning sheet? Question, prediction, identification of all variables etc. Model example from science guidance for pupils. Practise the skill – Identifying variables/reliability. OAM unit 6 Compare the soles of trainers – draw attention to the lines and patterns. Quick questions. Plan an investigation into friction. Ask the pupils what shoes have the best grip and how they intend to prove this (encourage the pupils to drag their trainers across the carpet and/or up a ramp using a forcemeter). Planning sheet – aim for pupils to complete an independent planning sheet. Consider using the pupils' own homemade forcemeter. 	http://resources.hwb.wales.gov.uk/VTC/2009- 10/science/cripsat/e32- forces/index.html http://www.echalk.co.uk/ http://www.bbc.co.uk/education/subjects/z2pfb9q	Can pupils identify key variables? (Level 4) Can pupils take repeat readings to ensure reliability? (Level 5) Can pupils draw their own bar charts? (Level 4) Can pupils identify patterns and trends? (Level 4)
COMMUNICATE Use tables, bar charts and line graphs DEVELOP Form considered opinions and make informed decisions	Concentrate on creating a table in order to repeat the results to ensure accuracy / average (create tables with multiple columns and rows including the average). To write to inform Text type: science write-up/report 4. Big Question: Which design of trainers produces most friction? Cont. Introduce the skill – Line graph or bar graph? • Review results from previous task. • What type of graph does our data give us? • Categoric data (e.g. types of shoes or surface versus force needed to move) gives a bar chart. • Give pupils the 'Which graph' planner. Practise the skill – Line graph or bar graph? • Pupils to construct their own bar charts. • Peer- or self-assess graphs. • Can they identify patterns and trends?	http://www.mrnussbaum.com/coolgraphing.htm http://www.amblesideprimary.com/ambleweb//mentalmaths/grapher.html	Can pupils draw their own tables and bar charts? (Level 4) Do pupils understand reliability? (Level 5) Can pupils identify patterns and trends? (Level 4)
DEVELOP Form considered opinions and make informed decisions REFLECT Suggest how the method could have been improved	5. Big Question: How does our 'homemade' forcemeter compare to the real one? Practise the skill – Make careful observations and review success criteria Repeat the above investigation using pupils' own forcemeter. Compare the results of both devices. In groups, describe what they have learnt and explain which way worked best and why. As above, give every pair 5 different objects, e.g. a cup, a shoe, pencil case, t-shirt, school bag etc, and a forcemeter (with scale of 0-10N) Complete task 6a Science Ideas Form (Optional Assessment Materials 2006: Unit 6) which asks them to measure the mass and weight of 5 different objects. Ask the pupils to suggest improvements in their design.		Can pupils decide whether their method was successful by referring to their success criteria? (Level 4)

Make predictions using prior knowledge didentify the key variables to be controlled in a fair test DEVELOP Use apparatus and equipment correctly and sarely Practise the skill – Identifying key variables in a fair test Ask pupils to choose science roles in groups, e.g., people, equipment and thinking manager to discuss ways of improving the method. Practise the skill – Identifying key variables in a fair test Ask pupils to choose science roles in groups, e.g., people, equipment and thinking manager to discuss ways of improving the method. Practise the skill – Identifying key variables in a fair test Ask pupils to choose science roles in groups, e.g., people, equipment and thinking manager to discuss ways of improving the method. Practise the skill – Identifying key variables in a fair test Ask pupils to choose science roles in groups, e.g., people, equipment and thinking managers etc. Pupils carry out investigation. (SAFETY - do not over-stretch the bands.) Hitp://www.bbc.co.uk/education/subjects/2z/bib/g To write to inform To write to i	· · · ·		1	1
Ask children to explore what happens to the length of an elastic band when different masses are available to be controlled in a fair test Introduce the skill – Identifying key variables in a fair test	<u>PLAN</u>	6. Big Question: Which band stretches the most?		
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COMMUNICATION Communicate clearly using writing, tables and graphs. REFLECT Suggest how the method could have been improved	8. Big Question: Can you write a science report? Introduce the skill – Communicate using writing, tables and charts • Thinking manager to report back to class, including a description of findings. Equipment manager to discuss ways of improving the method. • Recap on language style in science reports. Share examples and ask pupils to mark key aspects with coloured pencils. Practise the skill – Communicate using writing, tables and charts • Ask pupils to determine some success criteria for their science report. • Plan the report and identify evidence they will include (tables and graphs?) • Produce report, share and gauge whether the success criteria have been met. To write to inform and explain Text type: non-chronological report	http://www.sciencekids.co.nz/sciencefacts/scientists.html http://www.bbc.co.uk/sn/	Can pupils organise and communicate their findings using science ideas? (Level 4) Can pupils organise their findings systematically, integrating text, tables and using SI units? (Level 5)
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?	Use preferred AfL strategy	Can pupils describe how they have learned and identify the ways that worked the best? (Level 4) Can pupils identify the thinking/learning strategy they used? (Level 5)
Evaluation			