

## SCHEMES OF WORK

Department Name	Cranbrook School Physics Department	Year Group	Y3/4
Title	Unit 4E Friction	Time period	6 Weeks (11 hours)

Timing	Topic	Learning Objectives	Teaching Strategies	Resources	Extension work	Teacher Note <i>Health and Safety</i>
						<ul style="list-style-type: none"> <li>revisions</li> </ul>
Week 1	Friction	<ul style="list-style-type: none"> <li>to use a forcemeter carefully to measure forces</li> <li>that 'Newton' is the unit of force</li> <li>that there is a force between an object and a surface which may prevent the object moving</li> </ul>	<ul style="list-style-type: none"> <li>review vocabulary from y3 unit magnets &amp; springs</li> <li>Introduce <i>force meter</i>, unit of force, <i>Newton</i>, show how to read the meter.</li> <li>Ask pupils to use the meter to measure and record various activities. Opening and closing draws, pulling a shoe, etc.</li> <li>Introduce the idea of a "stopping" force called <i>friction</i>. Discuss their experiences.</li> <li>What determines the size of the friction force? Discuss</li> </ul>	<ul style="list-style-type: none"> <li>Force meter, push/pull type</li> <li>A range of objects and surfaces</li> <li>Some smooth some rough</li> <li>Some with wheels!</li> </ul>	<ul style="list-style-type: none"> <li>2 meters side by side for large objects or friction</li> <li>And direction for frictional force</li> </ul>	<ul style="list-style-type: none"> <li><i>push, pull, stretch, compress</i></li> <li><i>friction, air/water resistance, force meter, the Newton</i> as unit of force</li> </ul>
Week 2	Friction	<ul style="list-style-type: none"> <li>to decide what evidence to collect</li> <li>to predict what they think will happen and to plan a fair test</li> <li>to make and record careful measurements and present them in a bar chart</li> <li>to relate the results to the prediction</li> <li>to explain conclusions in terms of the roughness or smoothness of the surfaces</li> </ul>	<ul style="list-style-type: none"> <li>Full investigation, to determine which objects slide most easily</li> <li>Predict (discuss reasons)</li> <li>Fair test issues (same speed of pull, pulled object, etc.</li> <li>Record data (which data)</li> <li>Bar chart</li> <li>Review findings in class/group discussion</li> <li>Ask pupils to tell class their group's conclusion</li> </ul>	<ul style="list-style-type: none"> <li>3 surfaces, floor, carpet, playground and same object (or vice versa)</li> <li>An object that will give the fullest range of readings on the force meter when tested on the three surfaces</li> </ul>	<ul style="list-style-type: none"> <li>Could have a variably inclined plane with different surfaces, how steep is the slope until object slides down?</li> </ul>	<ul style="list-style-type: none"> <li>Talk of <i>roughness or smoothness</i> and relate to the <i>force of friction</i> as much as possible</li> </ul>
Week 3	Friction	<ul style="list-style-type: none"> <li>that the force between two moving surfaces in contact is called friction</li> <li>that friction can be useful</li> </ul>	<ul style="list-style-type: none"> <li>Discuss different surfaces', <i>roughness and smoothness</i></li> <li>Group surfaces into <i>high and low friction</i></li> <li>Lots of pictures of roads, ski slopes, etc.</li> <li>This would be good as group work and displayed on a big chart for class to see and talk about</li> </ul>	<ul style="list-style-type: none"> <li>funny video clips of people/vehicles slipping on icy roads</li> </ul>	<ul style="list-style-type: none"> <li>Imagine a world without friction, tell a story or poem</li> <li>Get pupils to write their own tale "my day on world without friction"</li> </ul>	

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		•	•	•	•	• revisions
Week 4	Water resistance	<ul style="list-style-type: none"> <li>• that water resistance slows an object moving through water</li> <li>• to explain what evidence is to be collected and decide whether the test is fair</li> <li>• to identify trends in results and draw conclusions explaining these in terms of the force between the object and the water</li> </ul>	<ul style="list-style-type: none"> <li>• Drop 4/3 different shaped bits of plasticene measuring cylinders.</li> <li>• Predict which falls slowest. Try to say why?</li> <li>• Time how long it takes to fall</li> <li>• Fair test, same height, same water</li> <li>• Present as bar chart (again?)</li> </ul>	<ul style="list-style-type: none"> <li>• Plasticene</li> <li>• Measuring cylinders tall <math>\geq</math> 50cm, clear</li> <li>• stopwatches</li> </ul>	<ul style="list-style-type: none"> <li>• cylinder of thick liquid (oil?) – lots of friction or <i>drag</i></li> <li>•</li> </ul>	
Week 5	Air resistance	<ul style="list-style-type: none"> <li>• that air resistance is a force that slows objects moving through air</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss examples of real objects that move through the air quickly and slowly.</li> <li>• Illustrate common features of each group</li> <li>• Talk about streamlined animals fish, birds</li> </ul>		<ul style="list-style-type: none"> <li>• NASA video clip of Dave Scott from Apollo 15 on moon dropping feather and hammer <a href="http://www.hq.nasa.gov">www.hq.nasa.gov</a></li> </ul>	<ul style="list-style-type: none"> <li>• Audio available if video not possible</li> </ul>
	Air resistance	<ul style="list-style-type: none"> <li>• to plan a fair test saying what they will change, what they will keep the same and what they will measure</li> <li>• to make measurements of time</li> <li>• to identify a pattern in the results and to explain it in terms of air resistance</li> </ul>	<ul style="list-style-type: none"> <li>• Design a parachute test to investigate how area (size) of 'chute affects time of fall.</li> <li>• Competition to fall the slowest</li> <li>• Fair test, constant mass, same plastic, string etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Plastic sheet (bin bags?), cotton/string, plasticene mass or model man (better)</li> <li>• stopwatches</li> </ul>	•	<ul style="list-style-type: none"> <li>• watch out for pupils leaning over stairwells or out of windows</li> <li>• preferably use balcony outside classrooms (check height)</li> </ul>
Week 6	Summary and assessment	<ul style="list-style-type: none"> <li>• Review presentation on topic</li> <li>• Assessment quiz on topic</li> </ul>	<ul style="list-style-type: none"> <li>• y4 friction topic review</li> <li>• class quiz with hand held buttons</li> </ul>	<ul style="list-style-type: none"> <li>• further question?</li> <li>• Software upgrades as available</li> </ul>	•	<ul style="list-style-type: none"> <li>• Check laptop for ok installation of software and for connection to projector at school</li> <li>• Check remotes for batteries</li> </ul>