


Learning Journey	Science	Forces that Oppose Motion	Year 5 Spring 1/2	
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Building on prior learning	Theme overview	Preparing for future learning	Vocabulary
<p>In KS1 children will have learned about the terms push, pull and their effects on materials changing shape.</p> <p>In Y3 children will have learnt about magnets. This will have included that magnets affect how things move so are forces, but non-contact.</p>	<p>Chapter 1: Water and air resistance.</p> <p>Chapter 2: Friction.</p> <p>Chapter 3: Managing forces.</p>	<p>In KS3 children will learn about</p> <ul style="list-style-type: none"> ♣ using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces ♣ moment as the turning effect of a force ♣ forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water ♣ forces measured in newtons, ♣ force-extension linear relation; Hooke’s Law as a special case ♣ work done and energy changes on deformation ♣ non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity. Pressure in fluids ♣ atmospheric pressure ♣ pressure in liquids, increasing with depth; upthrust effects, floating and sinking ♣ opposing forces and equilibrium: ♣ forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) 	<p>Force, friction, resistance, grip,</p> <ul style="list-style-type: none"> • Movement, slow, oppose. • Rubbing, rough, surface, interlocking, heat. • Air resistance, water resistance, density, weight, viscosity, drag, streamlined, air, liquid. • Cog, gear, lever, fulcrum, pulley.

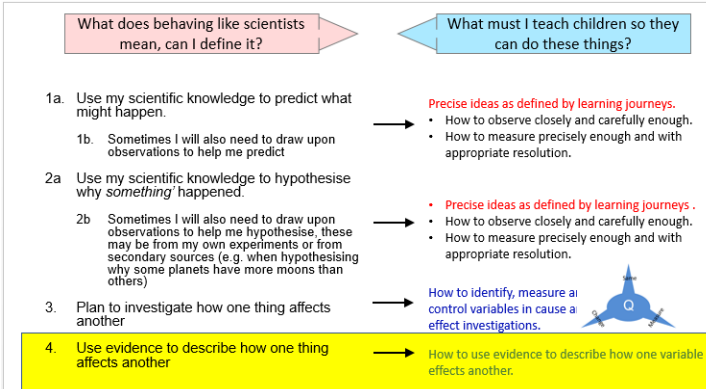
NC coverage and HWJS skills development

National curriculum coverage for Science

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

HWJS skills development

Details of the skills that will be taught within the unit. These should match up with the skills progression documentation



A Model of Skills Progression.

1. Pose problems that require the application of knowledge being taught.
2. Deconstruct the problem to define what a child must understand and be able to do to tackle the problem (including

Knowledge organisers

This contains the key knowledge that the children will be taught during the unit of work – this should match up with the knowledge organiser overview

Chapter 1: Water and air resistance.

- When objects move through air and water they have to push it out of the way. The water and air push back with forces called water resistance and air resistance. The harder it is to push the material out of the way the greater the resistance.
- Gases weigh less than liquids and so water resistance is greater than air resistance

Chapter 2: Friction.

• Friction is a force against motion caused by two surfaces rubbing against each other. It occurs because no surfaces are perfectly smooth; they have bumps and undulations that can interlock when placed on top of each other.

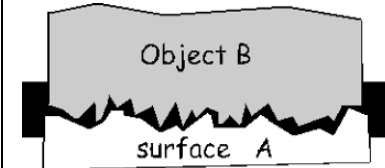
• To move one interlocking surface over another one of three things must happen:

1. The surfaces must rise slightly
 2. The bumps on the surface must bend
 3. The bumps on the surface must break
- All of these actions require a force - this is what causes friction.

Chapter 3: Managing forces.

- Some objects require large forces to make them move; gears, pulley and levers can

This contains any key pictures or images that are used within the delivery of the unit



<p>what they need to observe and measure), teach these skills and knowledge at that point.</p> <p>3. As children progress through the curriculum they will tackle problems using new ideas, and when the problem requires with closer observation and more precise measurement.</p> <p>Good enough progression is being able to tackle these problems</p> <p>Children gather evidence to describe the relationship between variables (cause and effect) by identifying what must be changed, what measured and what must be kept the same.</p> <p>In Year 5 &6, using evidence to describe how one thing affects another is key. Children should be taught how to describe patterns and give a judgement on how sure they are. Key features of this are:</p> <ul style="list-style-type: none"> • Recognise that conclusions may be uncertain due to difficulties controlling and measuring variables accurately. • That measurement always introduces some error. Understand that repeating experiments helps to identify what the true value is and that data points far from the mean are likely to be inaccurate and should be discounted. • Adapting experiments to produce more precise conclusions when the question requires it, especially when seeking to find maximum, minimum or specific values 	<p>reduce the force needed to make things move.</p> <ul style="list-style-type: none"> • (These are particularly complex ideas. It might be better to teach them through a design technology project where children make toys using cogs, pulleys and levers) 	
<p><u>Connections / deepening understanding</u></p> <p>How is the understanding of this area deepened in other areas of the curriculum? What links are there in the other subjects in the curriculum?</p>	<p><u>RADE</u></p> <p>Are the rights of the child relevant in this area of study - do they get referred to in the work?</p>	<p><u>Assessment</u></p> <p>By the end of the unit the children will be able to ...</p> <p>Details of the objectives that they will have covered within this unit of work</p>
<p>D&T – Making models that use gear, pulleys and levers. Link to D&T unit: <i>Structures (9) Frames - Wind turbines</i></p>		<p>1. When objects move through air or water they have to push it out of the way.</p>

<p>(linked to energy and sustainability) English – Note making and report writing Geography – earthquakes, landslides wind power, gravity, Maths- simple graphs to measure force</p>		<ol style="list-style-type: none"> 2. The water or air push back with forces called water resistance and air resistance. 3. The harder it is to push the material out of the way the greater the resistance. 4. Friction is a force against motion caused by two surfaces rubbing against each other. 5. Through an associated D&T Project children notice that some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move.
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Assessment recording for the unit - checking the level of pitch of the work

<u>Key skill(s)/ knowledge to be assessed by the end of the unit</u>	<u>Lower attaining</u>	<u>Middle attaining</u>	<u>Higher attaining</u>
<p>Details of the key knowledge that the children will have at the end of the unit</p> <ol style="list-style-type: none"> 1. When objects move through air or water they have to push it out of the way. 2. That water or air push back with forces called water resistance and air resistance. 3. The harder it is to push the material out of the way the greater the resistance. 4. Friction is a force against motion caused by two surfaces rubbing against each other. 5. <i>Through an associated D&T Project children notice that some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move.</i> 	<p>Pupils can explain that pushing a sheet of paper through the air, dropping a parachute or dropping a plasticene ball into water will push the air or water out of the way.</p> <p>They begin to understand that the water or air pushed back.</p> <p>They begin to understand that the harder they push the greater the push back (resistance). They begin to verbally describe this.</p> <p>Pupils understand that friction is a rubbing force caused by two surfaces rubbing against each other.</p>	<p>Pupils can explain that pushing a sheet of paper through the air, dropping a parachute or dropping a plasticene ball into water will push the air or water out of the way. They can draw and label predictive diagrams that show and begin to explain this.</p> <p>They begin to understand that the water or air pushed back and that this is called resistance. They begin to recognise that if the paper or ball is moving then that is the stronger of the two forces.</p> <p>They begin to understand that the harder they push the greater the push back (resistance). They verbally describe this and can</p>	<p>Pupils can explain that pushing a sheet of paper through the air, dropping a parachute or dropping a plasticene ball into water will push the air or water out of the way. They can draw and label predictive diagrams that show and begin to explain this.</p> <p>They begin to understand that the water or air pushed back and that this is called resistance. They begin to recognise that if the paper or ball is moving then that is the stronger of the two forces.</p> <p>They begin to understand that the harder they push the greater the push back (resistance). They verbally describe this and can draw labelled diagrams to help explain.</p>

	<p>They begin to explain how gears, pulleys or levers reduce force in a D&T model.</p>	<p>draw labelled diagrams to help explain.</p> <p>Pupils understand that friction is a rubbing force caused by two surfaces rubbing against each other. They also understand that it occurs because no surfaces are perfectly smooth</p> <p>They begin to explain how gears, pulleys or levers reduce force in a D&T model and can draw diagrams to help explain this.</p>	<p>Pupils understand that friction is a rubbing force caused by two surfaces rubbing against each other. They also understand that it occurs because no surfaces are perfectly smooth.</p> <p>They can explain that to move one interlocking surface over another one of three things must happen:</p> <ol style="list-style-type: none"> 1.The surfaces must rise slightly 2.The bumps on the surface must bend 3.The bumps on the surface must break <p>All of these actions requires a force, this is what causes friction</p> <p>They begin to explain how gears, pulleys or levers reduce force in a D&T model and can draw diagrams to help explain this.</p> <p>Children decide how they are going to adapt an experiment, e.g. testing parachutes to see how quickly they fall and what affects their fall.</p> <p>They can make reasoned predictions (including the use of predictive diagrams and graphs) to</p>
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			<p>explain what they think will happen and why</p> <p>They can log results, describe patterns in results, use evidence to describe how one variable effects another and begin to make judgements on the accuracy of any patterns seen.</p>
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NB: The assessments are completed for two reasons – to enable the class teacher and in turn the subject leader to evaluate the pitch of the learning within the unit in order to consider any necessary updates and for the class teacher to report to parents on the attainment of pupils in the end of year reports.