



## Year 3 Medium Term Planning for the Learning Challenge Curriculum

**Term: Summer**

**DT Project: Pulley Cranes**

<p style="text-align: center;"><b><u>Previous Learning</u></b></p> <p>Using sliders to create a moving picture (simple lever mechanism) and creating a wheeled axel by combining and strengthening materials.</p>	<p style="text-align: center;"><b><u>New Knowledge /Consolidation</u></b></p> <p>Building on mechanisms to look at lifting rather than moving items/content.</p>	<p style="text-align: center;"><b><u>End of Project Outcome</u></b></p> <p>To create a simple crane that distributes the weight it lifts using a fixed pulley mechanism.</p>	<p style="text-align: center;"><b><u>Environmental Links</u></b></p> <p>Discuss use of recycling to create "junk models". Consider materials used and their green credentials.</p>	<p style="text-align: center;"><b><u>Key Inventors/People</u></b></p> <p>Explore the development of the crane from vertical fixed devices to the development of pivoting cranes and the impact of the industrial revolution (through the work of William Armstrong).</p>	<p style="text-align: center;"><b><u>Project Vocabulary</u></b></p> <p>Plan, choose/select investigate &amp; decide Explore &amp; compare design equipment &amp; tools build, cut, construct &amp; make review/evaluate &amp; improve arrange, assemble &amp; attach mechanism &amp; movement direction Connection</p>
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Section	Lesson	Key Skills	Learning Objective & Activity
Explore	1	<ul style="list-style-type: none"> <li>Begin to evaluate existing products, considering: how well they have been made, materials, whether they work, how they have been made, fit for purpose</li> <li>Begin to understand by whom, when and where products were designed</li> <li>Learn about some inventors/designers/ engineers/chefs/ manufacturers of ground - breaking products</li>   <li>Describe purpose the of a product</li>   <li>Have at least one idea about how to create a product</li> </ul>	<p><b><u>To investigate how pulleys, work and how they are used to support different jobs/activities.</u></b></p> <p>Use internet services to investigate how pulleys are used in the "real world".</p> <p>Pass around K'Nex ship model to investigate how a double pulley is used to distribute weight.</p> <p>PowerPoint used to consolidate how pulleys are applied in different ways (both modern application and historical).</p>
Plan	2	<ul style="list-style-type: none"> <li>Show how the design meets a range of requirements</li> <li>Follow a given design criterion</li> </ul>	<p><b><u>To plan out which materials you will use to create a pulley crane, how you will combine them and where they will be positioned.</u></b></p> <p>Use a pre-prepared Seesaw template to list the materials used to create their crane.</p>

		<ul style="list-style-type: none"> <li>• Describe the design using an accurately labelled sketch and words</li> <li>• Make design decisions in the planning stage</li> <li>• Explain how a product will work</li> <li>• Use a range of media to show the design including ICT software</li> </ul>	<p>Consider how to combine, attach &amp; position these materials to create a pulley and winch (including how to strengthen).  Use text boxes to explain how to strengthen the techcard pillars (e.g. wrapping tape, folding, attaching splints) and which size pulley they will use.  Discuss how to measure if the crane is a success and create a class list for “What my crane will need” &amp; “What my crane needs to do”. Details to be added to Seesaw template.  Add a description of how the pulley will function (linked to “What my crane needs to do”).</p>
<p><b>Make</b></p>	<p><b>3 &amp; 4</b></p>	<ul style="list-style-type: none"> <li>• Select appropriate materials, fit for purpose.</li> <li>• Work through a plan in order &amp; look at design criteria while designing and making</li> <li>• Begin to measure, mark out, cut and shape materials and components with some accuracy</li> <li>• Begin to assemble, join and combine materials and components with some accuracy</li> <li>• Work accurately to make <b>cuts and holes</b>, with support.</li> <li>• Begin to handle tools safely</li> <li>• Begin to develop techniques to reinforce and strengthen structures</li> <li>• <b><i>Begin to use pulleys to create movement, with support.</i></b></li> </ul>	<p><b><u>To combine materials to create a winch &amp; pulley</u></b>  Work in pairs to prepare the base of the crane by shaping an appropriate piece of packaging (i.e. cracker box). Work as a class to create a winch – exploring different ways to attach the string to the straw:</p> <ol style="list-style-type: none"> <li>1) Through the end</li> <li>2) Through a hole in the middle.</li> </ol> <p>Use appropriate tools (screwdriver and/or compass, pliers, scissors) to create a bar for the pulley and winch using kebab sticks.</p> <p>Add pillars using tech card and strengthen using appropriate materials and methods (e.g. wrapping tape, attaching splints or cross bars, folding).</p> <p>Create a winch (by either threading string along the length of the cross bar or through the middle).</p> <p>Insert reusable pulley wheel and fix in place using milk tops.</p> <p>Consider &amp; revisit how to strengthen both the base and mechanism (e.g. layering materials, adding tape, combining different materials, cladding, rendering).</p>

			Test the suitability of design choices at each stage and alter in necessary (with reference to the design criteria and planning).
<b>Evaluate</b>	<b>5</b>	<ul style="list-style-type: none"> <li>• Use design criteria to evaluate finished product</li> <li>• Say what I would change to make design better</li> </ul>	<p><b><u>Evaluate how well the crane worked &amp; changes they made &amp; would make.</u></b></p> <p>Test the crane using a given weight (100g from maths resources) and indicate if the model created was fit for purpose (tick box in Seesaw template).</p> <p>Revisit planning and outline any changes they were made from the design and why then consider how the crane could be improved – what changes would be made.</p>
<b>Explore</b>	<b>5</b>	<ul style="list-style-type: none"> <li>• Learn about some inventors/designers/ engineers/chefs/ manufacturers of ground - breaking products</li> </ul>	<p><b>To appreciate how crane design has changed over time.</b></p> <p>Watch Evolution of Cranes – Cranes from 3000BC to Present - <a href="https://www.youtube.com/watch?v=kinrJXi2-1s">https://www.youtube.com/watch?v=kinrJXi2-1s</a>.</p> <p>Discuss the following: How the Ancient Greeks adapted the Egyptian shaduf, adding a pulley to move stones; the Romans added treadmills to lift larger weights, how different forms of treadmill (water, animal) were used in the Middle Ages &amp; how William Armstrong incorporated hydraulics during the Industrial Revolution.</p>