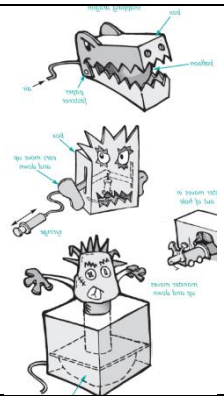
ST LAWRENCE C.E. PRIMARY SCHOOL LEARNING JOURNEY

SUBJECT: DT UNIT: Moving Monsters -Gears and Leavers TERM: Autumn 2
YEAR GROUP: 4

THE BIG QUESTION	
How can we use pulleys and leavers to create a moving monster?	
END OF UNIT OUTCOME	Create a Moving Monster using a pulley and a leaver? 
OBJECTIVES	**<u>Design</u>** • Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups. • Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design. **<u>Make</u>** • Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately. • Select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities **<u>Evaluate</u>** • Investigate and analyse a range of existing products • Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work • Understand how key events and individuals in design and technology have helped shape the world **<u>Technical knowledge</u>** • Apply their understanding of how to strengthen, stiffen and reinforce more complex structures • Understand and use mechanical systems in their products [for example, **gears, pulleys,** cams, levers and linkages]
CONCEPT: Conflict	Is there a link?
LESSON 1 QUESTION	**What is a gear or a pulley?**
KEY KNOWLEDGE	<u>What is a gear?</u>

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	A gear is a wheel with little bumps around the edge. When one gear turns, its little bumps push the little bumps of another gear, making it turn too. Gears are used to: -Make things go faster or slower -Make things stronger (more force) -Change the direction of movement You can find gears in bikes, clocks, cars, wind-up toys, and many machines. <u>What is a Pulley?</u> A pulley is a wheel with a groove (a little dip) around the edge, with a rope, chain, or belt running through it. When you pull one end of the rope, the pulley helps you: -Lift something heavy more easily -Change the direction of your pull (for example, pulling down to lift something up) Pulleys are used in flagpoles, cranes, blinds, lifts, and many kinds of machinery.
RICH TASK	Introduce The Big Question – what do they already know? Children bring in real life examples of gears and pulleys products to explore and use as research. Ideas to research: -Clocks or wind-up toys (gears) -Cranes (pulleys) Children record their research and find out: -What does the product do? -Who is it for? (children, adults, workers, etc.) -How do the gears or pulleys help it work better? -What problems does the product solve? Create a list of must-have features based on what they learned. Design criteria examples: -It must use at least one gear or pulley. -It must be safe and stable. -It must be easy for the user to operate. -It must be strong enough to lift or move something. -It must look appealing (nice colours, neat finish).

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	-It must solve the user's problem. Criteria help children stay focused and judge whether their design works.		
SUPPORT AND CHALLENGE	Support: Pre-labelled diagrams and discussion in a small group. Challenge: Explain why a pulley or lever improves movement		
KEY VOCABULARY	Gear Pulley Force Movement Design criteria	**RESOURCES**	Real-life examples Images and videos of gears and pulleys
LESSON 2 QUESTION	**What do I know about how a Monster moves?**		
KEY KNOWLEDGE	Monsters can move different body parts Movement can show emotion or conflict Designs must be linked to purpose		
RICH TASK	Retrieval practice activity Hold a research session with different resources around the classroom for children to sketch three monsters of their choice focusing on what they look like and their different features. **<u>Find Out What Monsters Look Like</u>** Children can explore different monsters from: -Storybooks -Films -Myths and legends They can look for: -Shape (tall, short, wide, thin) -Number of arms, legs, wings, tails -Different features (claws, horns, eyes, tentacles) -Textures (scaly, furry, slimy)		
SUPPORT AND CHALLENGE	Support: Monster templates Challenge: Label possible lever or pulley movements		
KEY VOCABULARY	Monster Features Movement Sketch	**RESOURCES**	Storybooks Films Images of mythical creatures

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LESSON 3 QUESTION	**How can I use a gear or pulley in my design?**		
KEY KNOWLEDGE	A box could be used to house the pneumatic mechanism. Lids can be attached with a hinge so that they lift up and down, or holes could be cut in the box for something to move up and down or in and out. The children can blow air on their hands and feel the flow of air. If balloons are blown up the force of the air coming out is stronger. Let the children feel the force of air that comes out of a squeezed washing up liquid bottle, a bicycle pump, foot pumps etc. The balloon needs to be securely fixed to the tubing. Use a tight elastic band wound several times or use masking tape. A tight fit is also needed when attaching the tubing to the syringe, otherwise air will escape. If the tubing is difficult to get onto the syringe, soak the end in hot water to allow the plastic to soften slightly – it will tighten as it cools down.		
RICH TASK	Retrieval practice activity Revise KO Show children the equipment they have to use. - Boxes - Balloons - Syringe - Paper fastening Children plan their own Monster using a gear or pulley. Show children different mock ups. Children use their research on Monsters to help them. Children sketch their designs and write a list of the equipment they will need.		
SUPPORT AND CHALLENGE	Support: Example plans and mock-ups Challenge: Explain why they chose a lever or pulley		
KEY VOCABULARY	Lever Pulley Mechanism Force	**RESOURCES**	Design templates Model examples
LESSON 4 QUESTION	**What are the steps to creating a gear or pulley in a design?**		

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KEY KNOWLEDGE	Syringes come in a variety of sizes. Experiment with two different sized syringes to observe the movement, taking care not to point them at anyone! The movement may be slow. This is because the air is being compressed inside the tube. When it can be compressed no more, it pushes out the opposite plunger. Join the two syringes so that one is fully compressed and the other is slightly compressed. This will ensure that the syringes do not push out of the tubing. Put a balloon or syringe inside an egg box and the children can make the hinged lid move up and down. Join two pieces of Lego to make a simple lever. The syringe can be tried in different positions to observe the movement.		
RICH TASK	Retrieval practice activity Revise KO Children create their designs using their plans to support.		
SUPPORT AND CHALLENGE	Support: Adult guidance during construction Challenge: Modify movement for better effect		
KEY VOCABULARY	Build Assemble Test Adjust	**RESOURCES**	Tools Construction materials
LESSON 6 QUESTION	**How successful is my moving monster?**		
KEY KNOWLEDGE	Designs are evaluated against criteria Feedback helps improve designs Mechanisms solve problems.		
END OF UNIT OUTCOME	Revision of key knowledge Outcome linked to The Big Question What links to our concept have you found?		

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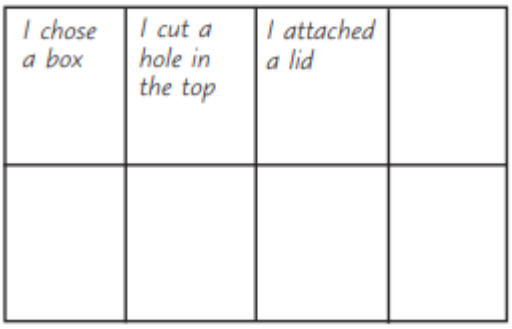
<table>
<tr><td></td><td colspan="3">A storyboard made at the end of the assignment allows the children to reflect on how they made their model and the skills they needed and acquired during the process.


Children fill in their own storyboard to reflect on how they made their model. Hold a Moving Monsters gallery where all the children go round and look at each others designs. Children evaluate their final designs.</td></tr>
<tr><td>SUPPORT AND CHALLENGE</td><td colspan="3">Support: Sentence starters for evaluation

Challenge: Suggest improvements using technical language</td></tr>
<tr><td>KEY VOCABULARY</td><td>Evaluate
Improve
Mechanism
Design</td><td>RESOURCES</td><td>Evaluation sheets
Display space</td></tr>
</table>