Mendell Primary School

Aspire Challenge Achieve

Medium Term Plan Design Technology

Year Group: 6	Term: Autumn #2 2021	Teacher: Sarah Wearing Dionne Sanati	Subject lead: Catherine O'Neill Edwards	Overview: **Mechanical Systems; Pulleys/Gears** Design, make and evaluate a vehicle incorporating gears or pulleys for children in reception class	Key End Points: **By the end of this unit children will be able to:** - Understand and use a gear system - Use tolls such as bench hook and saw safely - incorporate an electrical system in to their product

Links to other learning:	Relevant Prior Learning:	Future Learning:	High Quality Text:	Risk Assessment:	Teacher CPD:
Maths Ratio	•Y2 Y5 axles, axle holders and wheels that are fixed or free moving. • Y4 electrical circuits, simple switches and components (DT& science) • Y1,3,5 understand how to strengthen and stiffen structures. • Experience of cutting and joining techniques with a range of materials including card, plastic and wood.		Get in Gear *Sholly Fisch*	Electrical circuits. Friction generating heat – pulleys. Pupils should be taught to work safely, using tools, equipment, materials, components and techniques appropriate to the task e.g. children have been taught how to use bench hooks and saws and glue guns safely. Revisit safety usage. Personalised class risk assessments should be carried out prior to undertaking this project.	Please read the DATA project on a page sheets attached at the end of this plan prior to teaching. https://www.youtube.com/watch?v=3LssCrLKeXU CPD for working out gear ratios. For pulleys watch: https://www.youtube.com/watch?v=r3Ru1zZjvug Exploded diagrams: https://www.data.org.uk/faq/how-should-we-teach-exploded-diagrams-to-children-in-ks2/

	Learning Intention	Lesson Outline (Key Questions in colour)	Resources	Vocabulary	Lowest 20% Adaptations
1	• Understand that mechanical and electrical systems have an input, process and an output.	**This is a DT lesson. In DT we design and make to solve problems. The skills we will be using this lesson are researching existing products to find out about gears and pulleys** Investigative and Evaluative Activities (IEAs) • Investigate, analyse and evaluate existing everyday products and existing or pre-made toys that incorporate gear or pulley systems. Use videos and photographs of products that cannot be explored through first-hand experience. • Use observational drawings and questions to develop understanding of each product in the collection. Investigate using the following prompt questions: How innovative is the product? What design decisions have been made? What type of movement can be seen? What types of mechanical components are used and where are they positioned? What are the input, process and output of the system? How well does the product work? Why have the materials and components been chosen? How well has it been designed? How well has it been made? https://www.youtube.com/watch?v=r3Ru1zZjvug Watch this video for explanation on how pulleys works and link to real life examples of pulleys - Record learning via sketches and notes in book	existing everyday products and toys that use gear or pulley systems videos and photographs or products that's use gear and pulley systems	**Mechanism gear** **Innovative pulley** Design Input Output Movement Product Materials drive belt rotation spindle driver follower ratio transmit axle motor circuit switch circuit diagram	

2	• Understand that mechanical and electrical systems have an input, process and an output. • Understand how gears and pulleys can be used to speed up, slow down or change the direction of movement.	**This is a DT lesson. In DT we design and make to solve problems. The skills we will be using this lesson are investigating how gears and pulleys work** Focused Tasks (FTs) *liaise with SWHS to share resources Aoife Taylor taylora@southwirral.wirral.sch.uk* • Using a construction kit, investigate combinations of two different sized pulleys to learn about direction and speed of rotation. How many times does the smaller pulley turn each time the larger pulley turns once? Do the pulleys move in the same direction? How can you reverse the direction of rotation? AND • Using a construction kit, explore combinations of two different size gears meshed together. Investigate the direction and speed of rotation focusing on How does the size of the driver gear affects the speed of the follower gear? Can you use the number of teeth on each gear to decide upon the gear ratios? e.g. 10 tooth driver gear meshed with a 20 tooth follower gear produces a ratio of 2:1 https://www.youtube.com/watch?v=3LssCrLKeXU AND Build a working circuit that incorporates a battery, a motor and a handmade switch, such as a reversing switch. Demonstrate the accurate use of tools and equipment including cutting and stripping wire, and making secure electrical connections. Remind children about the dangers of mains electricity. Draw a pictorial representation of the circuit and draw a circuit diagram using correct symbols. What are the benefits of each type of diagram?	Pulley construction kits Gear construction kits	**Pulley speed** **Rotation Gear ratio** **Circuit** Gear up Gear down Driver Driven Turn Anticlockwise Clockwise Reverse drive belt spindle follower transmit axle motor circuit switch circuit diagram	
3	Children could research and, if possible, visit engineering and manufacturing companies that are relevant to the product they are designing and making e.g. Jaguar Land Rover – Halewood https://jlrdxforms.jaguarlandrover.com/jlr-xi-en/servlet/SmartForm.html?formCode=jlr-kmi-xi-en or Vauxhall – Ellesmere port				
4	• Generate ideas by carrying out research • Develop design specification • Develop ideas through discussion, annotated drawings, exploded drawings	**This is a DT lesson. In DT we design and make to solve problems. The skill we will be using this lesson is designing** Design, Make and Evaluate Assignment (DMEA) • Share design brief with class: Design, make and evaluate a fairground ride or vehicle incorporating gears or pulleys for children in reception class. Identify purpose, product, user. Record in books. • Children generate innovative ideas by carrying out research including surveys, interviews and questionnaires and develop a design specification/criteria for their product, carefully considering the purpose and intended user for their product. Plan what questions to ask and what information is needed to then develop design criteria. Carry out research with intended users (reception children) and develop design criteria. Record in books. *Example design criteria: 1) Must be safe with components hidden 2) mechanisms and/or electrics must work 3) must be sturdy so it can withstand being played with 4) must be finished with Peppa Pig design 4)* • Communicate ideas and design development in books through detailed, annotated drawings from different views and/or exploded diagrams. The drawings should indicate the design decisions made, including the location of the mechanical and/ or electrical components, how they work as a system with an input, process and output, and the appearance and finishing techniques for the product. - Children choose final design and clearly record in books	Sketch books/sketching paper DT books batteries, battery holders, wires, crocodile clips, motors, switches, aluminium foil, paper fasteners, paper clips, card, motors, motor stands, dowel, paper sticks consumable and construction kit pulleys or gears of different sizes, elastic bands junior hacksaws, glass paper, G-clamps, bench hooks, hand drill, automatic wire strippers PVA glue, sticky pads, masking tape, dowel,	annotated drawings, exploded diagrams mechanical system, electrical system, input, process, output design decisions, functionality, innovation, authentic, user, purpose, design specification, design brief	
5	- I can write a production plan with lists of tools, equipment and materials. • I can select from and use a range of tools and equipment to make products that	**This is a DT lesson. In DT we design and make to solve problems. The skill we will be using this lesson is planning** • revisit safety guidance on how to use various tools correctly: glue gun, clamp, junior hack saw, bench hooks etc - Produce detailed step-by-step plans and lists of tools, equipment and materials needed, record in books. Children also note down safety guidance. If appropriate, allocate tasks within a team. Encourage and guide children to work within the constraints of time, resources and cost.			

	that are accurately assembled and well finished.	• Make high quality products, applying knowledge, understanding and skills from IEAs and FTs. Children should use a range of decorative finishing techniques to ensure a well-finished final product that matches the intended user and purpose.	double-sided tape, card triangles, square section wood, card, corrugated plastic, finishing media		
6	Compare final product to design specification. • Test products with intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose.	**This is a DT lesson. In DT we design and make to solve problems. The skill we will be using this lesson is evaluating** Children complete evaluation of product by themselves, with partner and with their users: Consider the following questions. Children record evaluations in their books including drawings where appropriate. Did you make your product as planned? Does your design work? If not, do you know why? Did you have to change anything about the way you made your product? Does your product look how you intended? What was the best feature? What could be better? How would you adapt your design next time? How many stars out of 5 would you give your product and why? What was that the most difficult thing about the project? What have you learned? How can what you have learned in this project help you as an adult? Does your product meet all your design criteria? What was the feedback from the user? Children take photograph of the user with the product and put in books	Completed models Time with buddies Books Prompt questions on board or printed up to aid discussion and reflection	Evaluate assess Design criteria Change Improve	