

Project Title: Design, make and evaluate a shelter for a woodland creature to use as a safe, secure home.

Length of unit – 2 afternoon sessions and 1 deep learning day

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	- Experience of using measuring, marking out, cutting, joining, shaping and finishing techniques with construction materials. - Know what structures are and how they can be made stronger, stiffer and more stable.	- frame structure - stiffen - strengthen - reinforce - triangulation - stability - join,	- Children investigate and make annotated drawings of a range of portable and permanent frame structures, e.g. bridges, tents, bus shelters, umbrellas. - Use photographs and web-based research to extend the range e.g. How well does the frame structure meet users' needs and purposes? Why were materials chosen? What methods of construction have been used? How has the framework been strengthened, reinforced and stiffened? How does the shape of the framework affect its strength? How innovative is the design? When was it made? Who made it? Where was it made? - Research key events and individuals related to their study of frame structures - Stephen Sauvestre – a designer of the Eiffel Tower. - Use a construction kit consisting of plastic strips and paper fasteners to build 2-D frameworks. Compare the strength of square frameworks with triangular frameworks. - Ask the children to reinforce square frameworks using diagonals to help develop an understanding of using triangulation to add strength to a structure. - Demonstrate the accurate use of tools and equipment. Develop skills and techniques using junior hacksaws, G-clamps, bench hooks, square section wood, card triangles and hand drills to construct wooden frames, as appropriate.
Learning in this unit	To know that: Technical Knowledge - Existing structures have frames which hold them up and strengthen them. - Key events and individuals relevant to frame structures (Stephen Sauvestre, Eiffel Tower) Know how to: Technical Knowledge - Strengthen, stiffen and reinforce 3-D frameworks. <u>Designing</u> - Develop a simple design specification to guide their thinking to create purposeful, functional, appealing products for the intended user that are fit for purpose. - Communicate ideas through discussion, exploded drawings and drawings from different views. <u>Making</u> - Formulate a clear plan, including a list of what needs to be done and lists of resources to be used. - Select from and use appropriate tools to accurately measure, mark out, cut, score, shape, join and assemble. - Use finishing and decorative techniques suitable for the product they are designing and making. <u>Evaluating</u> - Evaluate the final product with reference back to the design brief and design specification, considering the views of others when identifying improvements. - Test the product to demonstrate its effectiveness for the intended user and purpose.		- Discuss the brief of designing and making a small-scale frame structure – a shelter to add to the woodland area. - Spend time in the woodland area to research the animals that would need shelter there, existing shelters and colours. - Use this research to develop a simple design specification to guide their thinking – this should include ensuring that frameworks are reinforced and strengthened. - Sketch drawings of different views of their product – front, back/side/top, bottom etc. Include an exploded sketch of how they will make each framework. Annotate sketches to help develop and communicate their ideas. - Produce a detailed, step-by-step plan to make their product, listing tools and materials.
Resources	- products, photographs, web-based resources of existing frame structures - card, paper straws, newspaper, square sectioned wood, masking tape, PVA glue pencils, rulers, right/left handed scissors, bench hooks, G-clamp, junior hacksaws, glass paper - finishing media and materials		- Children will select from and use appropriate tools to accurately measure, mark out, cut, shape and use joining techniques to make frameworks using wood, saws and glue guns. - Children will use finishing and decorative techniques suitable for the product they are designing and making in order to make it appealing. - They should regularly evaluate their work and their completed product, drawing on their design specification, and thinking about the intended purpose and user. - Evaluate the final product with reference back to the design brief and design specification, taking into account the views of others when identifying improvements.

Project Title: Design, make and evaluate a device holder for themselves to protect a personal device.

Length of unit – 2 afternoon sessions and 1 deep learning day

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	• Experience of basic stitching, joining textiles and finishing techniques. • Experience of making and using simple pattern pieces. • Experience of simple computer-aided design applications.	• Seam • seam allowance • Reinforce • Template • Pattern pieces • Computer aided design (CAD)	• Look at existing textiles products, including a variety of bags. Use questions to develop understanding -. Is the product functional or decorative? Who would use this product? What is its purpose? What design decisions have been made? Do the textiles used match the intended purpose? How has it been made? What has been used to enhance the appearance? Is the design innovative? • Consider the user, purpose and appeal of each of the products, can you tell which ones have been designed for a child or an adult? Do they have any clear differences which show their intended user or purpose? • Evaluate the stitches used and look at any fastenings – buttons, zips etc. Introduce Whitcomb Judson, the inventor of the zip. Discuss the impact this had on modern lives • Children investigate simple bags and purses (linked to Y3 textiles work) and how they have been constructed by using disassembly. Evaluate what the fabric shapes look like, how the parts have been joined, how the product has been strengthened and stiffened, what fastenings have been used and why. Consider the different fabric shapes that have been used to create the different products, do they use the same shape or a variety of shapes? • Develop skills of 2-D paper pattern making using grid or tracing paper to create a 3-D dipryl mock-up of a chosen product. Teach how to pin a pattern on to fabric ensuring limited wastage and the importance of leaving a seam allowance. • Sew dipryl product together. Develop skills of threading needles and joining textiles using a range of stitches. This activity must build upon children's earlier experiences of stitches (running stitch, back stitch) and introduce a new stitch (blanket stitch). Focus on improving appearance and consistency of stitches. Learn how to start and finish off a row of stitches.
Learning in this unit	To know that: Technical Knowledge • Investigate and analyse textile products linked to their final product. • A 3-D textile product can be made from a combination of accurately made pattern pieces, fabric shapes and different fabrics. • Fabrics can be joined or enhanced using a range of stitches and decorative techniques. Know how to: Technical Knowledge • Investigate and analyse textile products linked to their final product. <u>Designing</u> • Develop a simple design specification to guide their thinking to create purposeful, functional, appealing products for the intended user that are fit for purpose. • Communicate ideas through discussion, exploded drawings and drawings from different views. <u>Making</u> • Formulate a clear plan, including a list of what needs to be done and lists of resources to be used. • Select from and use appropriate tools to accurately measure, mark out, cut, score, shape, join and assemble. • Use finishing and decorative techniques suitable for the product they are designing and making. <u>Evaluating</u> • Evaluate the final product with reference back to the design brief and design specification, considering the views of others when identifying improvements. • Test the product to demonstrate its effectiveness for the intended user and purpose.		• Prior to lesson, ask children to bring in a product that they would like to use for their design – phone, tablet, etc. Explain that children are going to create a holder to protect this device. Develop a design specification for their product. • Explore a variety of materials, consider their properties: waterproof, rigidity, strength. Consider their finish, would it be a suitable or appealing product for a bag? E.g. silk/satin would not be suitable for a bag that would carry heavy items but may be suitable as a small coin purse. • Communicate ideas through detailed, annotated diagrams. Drawings should indicate design decisions made, the type of fabrics to be used and the types of stitching that will be incorporated. • Investigate using art packages on the computer (Canva) to design prints that can be applied to textiles using iron transfer paper. Recognise that designs can be easily modified and repeated on the computer without the need for a physical product. • Produce step-by-step plans, lists of tools equipment, fabrics and components needed.
Resources	• computer software such as Google Draw • existing textile products for investigation and deconstruction		• Encourage children to make their device holders with accuracy. Children will select from and use appropriate tools to accurately measure, mark out, cut, shape, join and strengthen their bags using fabric, scissors, needles and thread.

	• selection of textiles including reclaimed and reusable fabrics, Dipryl, paper for making mock-ups • pins, needles, thread, measuring tape, left/right handed fabric scissors, pinking shears, iron, iron transfer paper • range of fastenings • finishing materials e.g. sequins, buttons, fabric paints		• <i>Incorporate simple computer-aided design - printing on iron-transfer paper and transferring onto the product.</i> • <i>Use a range of decorating techniques to ensure a well-finished final product that matches the intended user and purpose.</i> • <i>They should regularly evaluate their work and their completed product, drawing on their design specification, and thinking about the intended purpose and user.</i> • <i>Evaluate the final product with reference back to the design brief and design specification, taking into account the views of others when identifying improvements.</i>
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Medium Term Plan – DT – Year 5 Summer: **Mechanisms – Pulleys and Gears**

Project Title: Design, make and evaluate a moving fairground ride prototype for Gulliver's Word

Length of unit – 2 afternoon sessions and 1 deep learning day

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	• Experience of axles, axle holders and wheels that are fixed or free moving. • Basic understanding of electrical circuits, simple switches and components. • Experience of cutting and joining techniques with a range of materials including card, plastic and wood. • Know how to strengthen and stiffen structures.	• Pulley • Drive belt • Gear • Rotation • Spindle • Driver • Follower • Transmit • Axle • Motor	• <i>Explore a variety of images/objects that use gears or pulleys- what is the function of gears and pulleys in these mechanical systems? To make work easier e.g. gears: non-digital clocks, vehicles, drills, manual can openers and bicycles. Pulleys: wells, elevators, construction vehicles. Discuss similarities and differences between the two. Work out which mechanism each object uses and what the effect is? Which direction do they move?</i> • <i>Learn about the inventor of pulleys – Archimedes. Pulleys date back at least to Archimedes, the great Greek mathematician, physicist, and engineer. He designed a block-and-tackle system to move massive ships.</i> • <i>Research and, if possible, visit Gulliver's World. Look at the fairground attractions there and how they work. Use observational drawings and questions to develop understanding of each attraction e.g. 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?</i> • <i>Using a construction kit, investigate combinations of two different sized pulleys to learn about direction and speed of rotation. Explore combinations of two different size gears meshed together. Investigate the direction and speed of rotation focusing on how the size of the driver gear affects the speed of the follower gear. Experiment creating a pulley using simple designs e.g. A pulley system to move a marble in a plastic cup from one table to another. Experiment using and making gears, ensuring measurements are accurate.</i>
Learning in this unit	To know that: <u>Technical Knowledge:</u> • Famous manufacturing and engineering companies build fairground rides. (Gulliver's) • Gears and pulleys can be used to speed up, slow down or change the direction of movement. To know how to: <u>Technical Knowledge</u> • Generate, develop and model innovative ideas, through the analysis of existing products. <u>Designing</u>		

	- Develop a simple design specification to guide their thinking to create purposeful, functional, appealing products for the intended user that are fit for purpose. - Communicate ideas through discussion, exploded drawings and drawings from different views. <u>Making</u> - Formulate a clear plan, including a list of what needs to be done and lists of resources to be used. - Select from and use appropriate tools to accurately measure, mark out, cut, score, shape, join and assemble. - Use finishing and decorative techniques suitable for the product they are designing and making. <u>Evaluating</u> - Evaluate the final product with reference back to the design brief and design specification, considering the views of others when identifying improvements. - Test the product to demonstrate its effectiveness for the intended user and purpose.	- Tell children that they are going to design a prototype for a new Gulliver's Ride. Generate innovative ideas by carrying out research using web-based resources - Develop a design specification for their product – ensure that children understand that gears and pulleys need to be included. Consider - Who is the intended user and what is the purpose of the mechanical system? What materials will you use? How will it be joined? How will it move, which direction, how fast/slow? How will it be finished? - Recap on electrical systems from Year 4 to construct circuits including a motor. Attach the motor to the pulley/gear system for movement. - Communicate ideas through detailed, annotated diagrams. Drawings should indicate the design decisions made, the location of the mechanical/electrical components, how they work as a system with an input, process and output, and the appearance/finishing techniques for the product. - Produce detailed step-by-step plans and lists of tools, equipment and materials needed. If appropriate allocate tasks within a team.
Resources	- videos, photographs and everyday products or toys with pulleys or gears - batteries, battery holders, wires, crocodile clips, motors, switches, aluminium foil, paper fasteners, paper clips, card, motors, motor stands, dowel, paper sticks - construction kit pulleys or gears of different sizes, elastic bands - PVA glue, sticky pads, masking tape, dowel, double-sided tape, card triangles, square section wood, card, finishing media https://planbee.com/products/fairground	- Select from and use a range of tools and equipment to make products that are accurately assembled and well finished: cardboard, elastic bands, paper, glue, scissors, pulleys and gears kits, etc. Ensure the designs are followed and the design criteria is considered throughout. Ensure the product is finished to a high standard to make it appealing. Test regularly to make any necessary changes as they go along. - Compare the final product to the original design specification. Critically evaluate the quality of the design, manufacture, functionality and fitness for purpose. Test to see if they move in the right direction, speed and rotation. Evaluate the final product with reference back to the design brief and design specification, taking into account the views of others when identifying improvements.