D&T Medium Term Plan – Year 5

Pulleys and Gears		
1. Investigative and Evaluative Activities (IEAs)	**2. Focused Practical Tasks (FPTs)**	**3. Design, Make, Evaluate Assignment (DMEA)**
Lesson 1 • 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 questions to develop understanding of each product in the collection 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? How well has it been designed? How well has it been made? After seeing a range of products, children to select one and evaluate in their booklets.	***Lessons 2 and 3*** • Using a construction kit, investigate combinations of two different sized pulleys to learn about direction and speed of rotation e.g. 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? • Using a construction kit, 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. Ask the children to 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. • Select one mechanism to evaluate in detail in booklet. ***Lessons 2 and 3*** • Children to have a go at making a simple pulley/gear mechanism to	***Lesson 4*** • Develop an authentic and meaningful design brief with the children. • Children generate innovative ideas by carrying out research to develop a design specification for their product, carefully considering the purpose and intended user for their product. • Communicate ideas 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 electrical components, how they work as a system with an input, process and output, and the appearance and 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. • Children to complete the design part of their booklet. ***Lesson 5*** • Make high quality products, applying knowledge, understanding and skills from IEAs and FTs. Children should

	practise the skills required when making their product. • Take a picture and complete evaluation in booklet. • Lesson may involve developing measuring, marking, cutting, shaping and joining skills using junior hacksaws, G-clamps, bench hooks, square section wood, card triangles and hand drills to construct wooden frames, as appropriate. Teacher to demonstrate the accurate use of tools and equipment.	use a range of decorative finishing techniques to ensure a well finished final product that matches the intended user and purpose. • Take photo of final piece for booklet. ***<u>Lesson 6</u>*** • Children to have the opportunity to look at their peers' work and give positive and constructive feedback. • Children to evaluate their own final product in relation to the design brief and how successful they felt in the make stage. • Children to complete evaluation in booklet. • Compare product to the original design specification. Critically evaluate the quality of the design, the manufacture, functionality, innovation shown and fitness for the intended user and purpose.

D&T Key Learning				
Prior Learning	**Designing**	**Making**	**Evaluating**	**Technical knowledge and understanding**
• Experience of axles, axle holders and wheels that are fixed or free moving. *I know what a wheel and axle is. I can talk about how wheels and axles work.* • Experience of cutting and joining techniques with a	• Generate innovative ideas by carrying out research using web-based resources. *I can come up with innovative ideas using research from the internet to help me.*	• Produce detailed lists of tools, equipment and materials. Formulate step-by-step plans and, if appropriate, allocate tasks within a team. *I can create a list of tools, equipment and materials I will need to complete my design. I can*	• Compare the final product to the original design specification. *I can compare my final product to the original design criteria I created against. I can talk about where my product fits and doesn't fit the original design criteria.*	• Understand that mechanical systems have an input, process and an output. *I can begin to talk about how mechanical systems work.* • Understand how gears and pulleys can be used to

range of materials including card, plastic and wood. *I have cut and joined a range of different materials.* • An understanding of how to strengthen and stiffen structures. *I know how to make a structure stronger and stiffer.*	• Develop a simple design specification to guide their thinking. *I can work with a small group of peers to develop a simple design criteria, informed by my research.* • Develop and communicate ideas through discussion, annotated drawings, exploded drawings and drawings from different views. *I can talk, draw and write about my design ideas. I use annotations to add extra detail to my design ideas.*	*create the step-by-step plan I will follow to create my product. I work well within a team to create the product.* • Select from and use a range of tools and equipment to make products that that are accurately assembled and well finished. *I can select the tools and equipment I need to create my product from a wide range. My product is accurately assembled and looks aesthetically pleasing.*	• Test products with intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose. *I can test the product I created, commenting on how the mechanism works.* • Consider the views of others to improve their work. *I can give feedback to peers on what was good about their work and how it could be improved. I can listen to my peers' views on my own work.* • Investigate famous manufacturing and engineering companies relevant to the project. *I can name some everyday examples of pulleys and gears. I have researched some manufacturing and engineering companies that design products that include pulley and gear mechanisms.*	speed up, slow down or change the direction of movement. *I know what pulleys and gears can be used to speed up, slow down or change the direction of movement. I can give examples of everyday products that operate using pulleys and gears.* • Know and use technical vocabulary relevant to the project. *I can use some of the key vocabulary related to the project.*
Key Vocabulary				
Pulley, drive belt, gear, rotation, spindle, driver, follower, ratio, transmit, axle, motor, circuit, switch, circuit diagram, annotated drawings, exploded diagrams, mechanical system, electrical system, input, process, output				