Year : 5	Term : 1	Topic : Fairgrounds	
Learning Objectives (What will the children learn?)	**Class Activities** (What will the children do?)	**Resources** (What will I need?)	**Assessment** (Opportunities)
Investigative Disassembly and Evaluative Activities (IDEAs),			
Children will learn: • that there is a variety of products which incorporate a gear system and are driven by a motor and sometimes controlled by a computer chip e.g. video recorder, washing machine, Toy Furby. • the appropriate vocabulary related to control systems; • how computer control systems are used in everyday life; ▪ how control systems are used in everyday life; ▪ **to challenge and evaluate the attributes or features of existing products.** **(Progression in Design Skills R5, E3)**	▪ Visit a fairground, or use a video or photographs of rides that have rotating parts. Discuss the children's experience of such rides. – *How does the ride turn?* – *Can you see the mechanism that turns the ride?* – *What are the different parts called?* – *How are the components joined together?* • The children could examine a collection of toys and other appliances in which there are electric motors *eg toy vehicles, battery-operated fan, battery-operated shaver, cassette player.* • With the children, look at mechanisms in which a gear system is used. ▪ What computer control systems can the children identify e.g. traffic lights, central heating.	• Toys that have gear systems incorporated in them.	Can the children: • identify products which incorporate gears and are driven by a motor or are computer controlled; ▪ identify control systems in everyday life and name the key elements of a system?
Focused Practical Tasks (FPTs)			
Children will learn: • that they can model their ideas for their own product using mechanisms, by using construction kits or making a model from a set of instructions; • how the direction of rotation and speed of an electric motor can be controlled; • how a worm gear reduces speed.	▪ Use a hardboard base and cardboard circles with off-centre holes. Investigate the relationship between position of holes and up & down movement. • Recap previous knowledge of gears i.e. Using suitable construction kit components, demonstrate the construction of a simple gear system (spur) and one that changes the direction of movement through 90° (bevel). Look carefully at the ways in which the axles are supported and aligned to allow them to mesh accurately. Demonstrate how an electric motor turns very fast and gears need to be used to slow it down and to increase its turning power (torque). Spur gears would need complex systems (called a compound gear system) to reduce the speed sufficiently. A worm gear reduces speed quickly and simply. Pupils will experiment with gears to see this for themselves.	▪ construction kit or components including pulleys, pulley wheels, cotton reels ▪ wood which might be used as a base, construction material suitable for making a framework *ie wood strips and card corners OR card boxes* • doweling or stiff wire for making spindles or axles, motors, bevel, spur, worm gears ▪ variety of materials for making the rides, • hardboard, cardboard, paper fasteners	Can the children: ▪ connect an electric motor in a circuit to make it work in various ways; • use a construction kit or components to model their ideas for parts of a product they would like to make?

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		▪ assorted paper, ribbon, string, elastic bands, paper plates, adhesive, sticky tape, saws, drills and bits ▪ tools for cutting and shaping the above materials	
Design and Make Assignment (DMA)			
Children will learn: • to make decisions with regard to the type of ride they will make; • to model their intended fairground ride; • to make modifications as they go along • to evaluate against their original criteria and suggest ways that their ride could be improved. • produce a more complex sequence of drawings with text • (Progression in Design Skills DR3) Listen to and offer sensible ideas. Generate a range of initial ideas. **(Progression in Design Skills GI 1 & 3)** Produce annotated drawings (text describing function, components, materials etc) Produce drawings with dimensions and exploded diagrams **(Progression in Design Skills DR1&2)**	▪ Give the children the following basic design brief: **design and make a model fairground ride:** ➢ **With moving parts controlled by a computer using outputs;** ➢ **which incorporates a gear or cam system;** • Make, support and align axles and gears from pre made mechanical components, suitable doweling, square section timber, card triangles or any other items that they may think are useful. Record initial ideas using sketches and text • They should brainstorm some ideas for how their simple gear system can be fitted to allow for rotation of the ride. They should recognise from previous work that they would need to transfer horizontal movement to vertical movement by gears and cams accurately. They should then produce, individually, appropriately annotated and simply dimensioned sketches to support their ideas, justifying their final choice.	***See above***	Can the children: • apply what they have learnt through IDEAs/FPTs in their designing and making; • decide which type of ride they will make; model their design using temporary fixings; • identify criteria for their ride against which it will be evaluated both during and at the end of the making stage;

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Plan the processes, materials and tools necessary to make their product **before** construction. **(Progression in Design Skills P1)** Analyse how well their design meets the detail of the design brief and specification, possibly by including tests. Suggest changes. **(Progression in Design Skills E1)**	▪ The children should ask: - what will the base be made from and how will it be connected to the gear system? What items would they like to rotate/move and how will these items be made / joined to the base? How will the ride be fixed to the gear system to ensure that it rotates effectively? ▪ The children should then be encouraged to model these ideas using annotated and dimensioned sketches and / or working with card to represent ideas three-dimensionally. They should be encouraged to modify ideas as they make progress and give reasons for the changes they make. ▪ They should then select, measure, mark out, cut and fix the materials and components necessary to add the gear system to their framework. • The group should now produce a plan of action to demonstrate their understanding of the materials, tools, techniques and stages of manufacture that they will employ as they finalise their model • They should also decide, as a group, on what responsibilities they would take for finishing the product. • Children's models can be connected to the computer via an interface. Using appropriate software, features *eg movement, flashing bulbs and buzzers* can be controlled. ▪ When the children's work has been completed they should each be asked to comment on both the process and their product.		• make a product in which an electric motor successfully drives a rotating part; • control a model using an interface connection to a computer; ▪ evaluate the effectiveness of their design and are able to adjust it to improve efficiency or effectiveness?