Year : 4	Term : 1	Topic : Powered Vehicles	
Learning Objectives (What will the children learn?)	**Class Activities** (What will the children do?)	**Resources** (What will I need?)	**Assessment**
Investigative, Disassembly and Evaluate Activities (IDEAs)			
Children will learn: • to investigate and disassemble products in order to learn how they work and how they are made. **(Progression in Design Skills R5, E2)** • how a vehicle moves using wheels and axles; • to communicate through labelled drawings **(Progression in Design Skills DR5)** • that there are different types of switches. (Progression in Design Skills M2)	• Provide some examples of controllable toy vehicles for children to investigate *eg models made from construction kits.* • Ask questions about how the models work *eg Where does the power come from? How are the wheels driven? What are their similarities and differences? Discuss new vocabulary.* • Ask the children to observe carefully how the model is constructed, how it works and how the components are joined together. Ask them to record their findings through labelled drawings *eg drawings from different views, exploded diagrams.* • The children will investigate examples of switches and how they work.	• examples of a variety of controllable toy vehicles • construction kits . • a range of switches	Can the children: • describe accurately how toy vehicles work using appropriate vocabulary; • identify component parts and their functions; • make clear and accurate drawings of toy vehicles; • identify different sorts of switches and explain how they work?
Focused Practical Tasks (FPTs)			
Children will learn: • to assemble components to make working models; • how to control the speed and direction of movement using pulleys and belts; ▪ how electrical circuits with switches can be used to achieve functional results; ▪ to use tools safely and accurately; ▪ to use on-screen control program.	• Ask the children to use construction kits to make models of vehicles incorporating motors. *How can the attached axle be made to turn faster or slower?* • Give the children a series of practical activities related to circuits and pulleys: - revise circuits, ensure children understand the need for a complete circuit; - revise pulleys, children will make simple pulley systems using card; - incorporate a motor into the circuit – *Which way does it turn? How can the direction be changed?* - add a small pulley to the motor spindle. Use an elastic band to make a belt drive. Place the belt around another pulley fixed to an axle secured in a box. *Is the belt turning quickly or slowly? What happens if you change the size of the pulley?* - ask the children to add switches to control the circuit. Use the results of their investigations to make their own circuits and switches.	• wire, crocodile leads, switches, aluminium foil • batteries, battery holders, battery snaps • motors, motor mounting clips • pulleys (large and small), elastic bands • square section wood, dowel rod, wheels, card triangles, glue ▪ plastic tubing ▪ thin and thick card, corrugated plastic materials for finishing eg *coloured papers, foil,*	Can the children: • use construction kits to make working models and to investigate movement; • control the speed and direction of a motor; • assemble circuits incorporating motors and switches; • use tools safely and accurately to construct a simple frame?

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	• The children could investigate axle speed using a motor and pulleys. • Demonstrate the use of tools, equipment and components that children might need to use *e.g. wire strippers, connector strip, motor mounting clips.* Show the children how to make a wooden frame from square section wood joined with card triangles or diagonals and how to add wheels and axles. Children practice cutting wood. • Demonstrate the use of inputs and outputs to control on-screen simulations. Children to investigate the uses of input and output to control e.g. pelican crossing, lighthouse, zebra crossing.	• A suitable Computer Program	
Design and Make Assignment (DMA)			
Children will learn: • to generate and model ideas through discussion and drawing ; • to design and make as part of a team • to select appropriate tools, materials, components and techniques; • to plan the main stages of making; • to evaluate their work according to their design criteria and to suggest improvements.	Give the children the following deign brief: **design and make a vehicle:** ➢ Incorporating pulleys and belts ➢ Incorporating a motor ➢ That can be controlled using a computer ➢ That is able to change direction • Discuss with the children the possibilities for different sorts of toy vehicles, *eg moon buggies, lorries, circus vehicles.* Discuss how these might be made from a basic chassis with cladding. *What could you do? How could you do this? What does the vehicle need to do? What will it look like? What need does the vehicle meet?* • Discuss how the design should reflect the needs and/or style of the person who will use it. *Who are you designing for? How will you make the vehicle appear to say 'I belong to...'?*		Can the children: • apply what they have learnt through IDEAs/FPTs in their designing and making; • work together to discuss and evaluate ideas; • use drawing as a way of modelling ideas; • select appropriate tools, materials, components and techniques for the task while considering constraints? *E.g. time or availability of resources.*

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	• Ask the children to work in pairs to discuss their ideas, to set criteria and then to make labelled drawings to show how they would construct their toy vehicle, including how the electrical components would be incorporated. *Are there different ways of making this? Which could give the best results? What could we use?* • Ask the children to list the materials and components, and tools and equipment they would need and to identify their main stages of making. *What tools would be best for this? What do you need to do first? What else could you do if it doesn't work?* • Ask the children to draw the frame of their vehicle on grid paper (Actual size) and then check the children's design proposals before starting to make. • Encourage the children to test their models during development and to adapt where necessary. *What do the users think about? What could you do to make it better?* • Show the children how to connect their vehicle to a buffer box and control the vehicle by using inputs to make their vehicle move forwards, stop and then move backwards. • Ask the children to evaluate their finished models against their design criteria and to suggest improvements.	COCO, LOGICATOR or similar control programme, buffer box	Can the children: • identify the main stages of making; • work together to make a quality product evaluate their vehicle according to the design criteria and suggest improvements?