DT Scheme of Work

Y5 Battery vehicle	
Links made with other subjects	**Science:** Forces **English:** Link this unit to work on texts where children identify an audience for a particular genre of writing or their own work, considering the effect this has on the use and organisation of language **Art:** Drawing unit in Year 3: eg colour, shape, texture **History –** Local History (mining)
The BIG Question	Can you create a battery powered vehicle?
The BIG Outcome	To create a vehicle that moves using a battery.
DT objectives (link to NC)	**Design** • use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups • generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design **Make** • select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately • select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities **Evaluate** • investigate and analyse a range of existing products • evaluate their ideas and products against their own design criteria and consider the views of others to improve their work • understand how key events and individuals in design and technology have helped shape the world **Technical knowledge** • apply their understanding of how to strengthen, stiffen and reinforce more complex structures • understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages] • understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors] • apply their understanding of computing to program, monitor and control their products.
Prior knowledge What prior knowledge is needed for children to be successful in this unit?	This unit builds on the mechanisms units covered in year 2 (wheeled toy) and year 3 (moving robot). Children will have explored and used axles, wheels and pneumatic systems.
Future learning Consider the conceptual knowledge within a subject that pupils need for future learning not just the recall of facts but the importance of concepts	This unit gives prior knowledge to: Y6 – Design and make a fairground using electronic systems

Resources	Class kit provided: **Parts included in class kit:** ▪ Square section wood (50 lengths) ▪ Wooden wheels 54mm diameter (100) ▪ Wooden wheels mixed (100) ▪ Motors (30) ▪ Rubber bands (454g box) ▪ Toggle switches (30) ▪ Motor mounts (30) ▪ Battery holders (30) ▪ Snap battery connectors (50) ▪ Crocodile leads (90) ▪ Axles supports (500) ▪ Wooden pulleys 34mm (2 packs of 10) ▪ Wooden pulleys 54mm (2 packs of 10) ▪ Small plastic motor pulleys (30) ▪ Dowel (20 lengths of 60 cm) ▪ Jumbo paper straws (200) **Tools needed:** ▪ Ruler ▪ Pencil ▪ Paper ▪ Calculator ▪ Pointed scissors ▪ Low melt glue gun and glue sticks. ▪ Ramp (if you don't have one you can use a length of plywood propped up on some books) ▪ Junior hacksaw, Vice or bench hook ▪ Sandpaper ▪ Cable ties 20 cm long (about 300) ▪ Balloons and/or old bicycle inner tube from mountain bike or similar ▪ Tape measure ▪ Stop watch ▪ Protractor
Vocabulary/ Glossary	General: Design, evaluate, refine, explore, improvement, tools equipment Designing sequence, annotated diagram, sketch, decision, choice, prototype, model, communicate Making fold, adhesive, scoring, cutting, joining, temporary fixing, permanent fixing cutting, shaping, joining, finishing, Knowledge and understanding cam, mechanism, pivot, off-centre, axle, force, framework, follower, guide, offset, shaft Types of movement linear motion, rotary motion

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Knowledge	The knowledge that children will learn and remember: to recognise the movement of a mechanism within a toy or model to understand that a cam will change rotary motion into linear motion show that their knowledge of cams and their movement is reflected in their designs to understand that different shaped cams produce different movements produce step-by-step plans for making their design which include the materials and tools needed to measure and mark out accurately to use tools for cutting safely and effectively to consider the characteristics of the cam mechanism when designing the moving part of their toy to test out their design ideas before proceeding to cut and join with accuracy to ensure a good-quality finish to the product to test the mechanisms and make adjustments where necessary know how to evaluate it personally and seek evaluation from others
SEND expectations	Children will have generated one viable idea after discussion with the teacher; have assembled a simple mechanism as part of the design; have used tools with some accuracy and finished their toy in a design that they have prepared with some assistance.
Questioning Questions you can pose to deepen, consolidate and challenge pupil's understanding	1. *Who is you're the vehicle for? (audience)* 2. *What is the purpose of your vehicle? (persuade, inform, entertain)* 3. *How will your vehicle be decorated? Is it based on a real life model? used to (persuade/ inform/entertain)* 4. *Which parts of your vehicle will move? Why have you chosen these?* 5. Which mechanisms will you choose to create your moving parts? 6. *Does your product do what you intended it to do? (fulfil its purpose)*
Suggested activities	Investigate a collection of moving toys that contain a cam mechanism. Ask questions eg Which parts turn? Which parts move? How are the different parts attached to allow free movement? How are the moving parts guided into place? Look in more detail at the moving part of the toy eg a person moving up and down. Why has the designer chosen this idea? What else could be used to make it move up and down? Make models using construction kits to look more closely at the movement made by a cam. Ask similar questions to those above to guide children in making observations about the movement and how parts are joined together. Discuss the importance of the decoration surrounding the mechanism which gives the product its finished quality. Show the children a model of a cam mechanism and allow them to put together the parts as a practice. Ask them to try out different shaped cams and observe their movement. Demonstrate to the children how to set up the bench hook, G-cramp and measure; mark out and drill a hole off-centre in the wooden wheel. Show how to attach the doweling through the drilled hole and how to mount the mechanism into the cardboard box, emphasising the importance of measuring carefully before gluing into place. Explain the need for a guide to keep the follower in place.

	Show how to use small pieces of plastic tubing pushed onto the doweling to hold the cam in place and to stop the doweling moving once it is in place through the box. Show how a handle can be made by attaching a small wheel to one end of the axle/shaft. The wheel should have a hole drilled off-centre with a small piece of doweling pushed into the hole. Show how a cardboard box can be used to house the cam, encourage the children to measure and mark all the holes needed to fit the doweling through before gluing the box together. This enables them to lay the box flat when making the holes with a punch or paper drill. The box can be glued back in place with PVA or masking tape (which can be painted over). Explain to the children that they are going to make a toy with a moving part, using a cam. Discuss and agree the purpose of the toy with the group. Discuss and prioritise important design criteria, considering both function and visual quality of the product. Recap on the different movements that different shaped cams make, and remind children that they might like to consider these when designing the part of the toy that follows on from the cam. Ask the children to brainstorm ideas for a moving toy for a particular person, sketching their most effective designs. Encourage the children to model their ideas in card and paper first to test their designs, giving them an opportunity to suggest alternatives. When planning, the children should develop a clear sequence of how the materials and tools should be used and how the making of the toy will proceed. This could be done as a storyboard. Remind the children how to use some of the tools safely. Stress the importance of attaching the cam securely to ensure an accurate movement. Remind them to give consideration to the finished design of the box in which the mechanism is cased, to make it as appealing as possible to the person who will receive it, or appropriate for its purpose. Ask the children to evaluate the product against their design criteria and seek evaluations from others.