

Mechanisms

Kapow objectives verbatim [tweaked/additional objectives](#)

	Y1	Y1	Y2	Y3	Y3	Y5
Term	Autumn 1	Autumn 2	Spring 2	Spring 1	Summer 1	Autumn 2 and Spring 1 (L1-3: 1 afternoon+1 hour+1 day) (L4-6: 2x40min + 1 day)
Topic or SA	Topic	Stand alone	Richard Trevithick	Mighty Metals	What did the Romans do for us?	Mainly stand alone with decoration linked to History
Unit title	Moving story book	Moving monster	Wheels and axles / Fairground wheel (Y1 and y2 units as they build on from each other)	Pneumatic toys (Robot in a box)	Making a slingshot (Roman chariot)	Moving toys (pop-up book and cam models)
Design skills progression COMMUNICATION discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design	<p>Explaining how to adapt mechanisms, using bridges or guides to control the movement</p> <p>Designing a moving story book for a given audience</p>	<p>Creating a class design criterion for a moving monster</p> <p>Designing a moving monster for a specific audience in accordance with a design criterion.</p>	<ul style="list-style-type: none"> • Designing a vehicle (train) that includes wheels, axles and axle holders, which will allow the wheels to move • Creating clearly labelled drawings which illustrate movement • Selecting a suitable linkage system to produce the desired motions • Designing a wheel Selecting appropriate materials based on their properties 	<ul style="list-style-type: none"> • Designing a toy which uses a pneumatic system • Developing design criteria from a design brief • Generating ideas using thumbnail sketches and exploded diagrams • Learning that different types of drawings are used in design to explain ideas clearly 	<ul style="list-style-type: none"> • Designing a shape that reduces air resistance • Drawing a net to create a structure from • Choosing shapes that increase or decrease speed as a result of air resistance • Personalising a design 	<p>Researching existing mechanisms linked to Y5 Science: levers and cams.</p> <p>Designing toys that use a variety of mechanisms linked to Y5 science.</p> <p>Naming the input and output of each mechanism</p> <p><u>COMMUNICATING IDEAS THROUGH LABELLED DIAGRAMS AND CROSS-SECTIONAL DIAGRAMS.</u></p>

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<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Make skills progression</p>	<p>Following a design to create moving models that use levers and sliders.</p>	<p>Following a design brief. Making linkages using card for levers and split pins for pivots.</p> <p>Experimenting with linkages adjusting the widths, lengths and thicknesses of card used.</p> <p>Cutting and assembling components neatly.</p> <p>Selecting materials according to their characteristics.</p>	<ul style="list-style-type: none"> • Adapting mechanisms • Selecting materials according to their characteristics • Following a design brief 	<ul style="list-style-type: none"> • Creating a pneumatic system to create a desired motion • Building secure housing for a pneumatic system • Using syringes and balloons to create different types of pneumatic systems to make a functional and appealing pneumatic toy • Selecting materials due to their functional and aesthetic characteristics • Manipulating materials to create different effects by cutting, creasing, folding, weaving 	<ul style="list-style-type: none"> • Measuring, marking, cutting and assembling with increasing accuracy • Making a model based on a chosen design 	<p>Following a design brief.</p> <p>Making mechanisms linked to Y5 science: levers and cams, to produce movement.</p> <p>Considering the aesthetics of the final product by hiding the mechanisms e.g. using layers, spacers, box.</p> <p>Selecting materials appropriate for their product aesthetics and function.</p> <p>Measuring, marking and cutting components accurately to ensure thy function correctly.</p>
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<p>Evaluation skills progression</p>	<p>Testing a finished product, seeing whether it moves as planned and if not, explaining why and how it can be fixed.</p> <p>Reviewing the success of a product by testing it with its intended audience.</p>	<p>Evaluating own designs against design criteria.</p> <p>Using peer feedback to modify a final design.</p> <p>Evaluating different designs.</p> <p>Testing and adapting a design.</p>	<ul style="list-style-type: none"> • Testing mechanisms, identifying what stops wheels from turning, knowing that a wheel needs an axle in order to move • Testing and adapting a design • Evaluating different designs 	<ul style="list-style-type: none"> • Using the views of others to improve designs • Testing and modifying the outcome, suggesting improvements • Understanding the purpose of exploded-diagrams through the eyes of a designer and their client 	<ul style="list-style-type: none"> • Evaluating the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance 	<p>Investigate and analyse existing moving toys.</p> <p>Investigate and analyse different folds and mechanisms linked to Y5 Science: levers, cams.</p> <p>Evaluating final product against the design brief.</p> <p>Suggesting and receiving feedback based on improvements to the aesthetics and functionality of the product.</p>
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<p>Technical knowledge progression</p>	<p>Learning that levers and sliders are mechanisms and can make things move.</p> <p>Identifying whether a mechanism is a lever or slider and determining what movement the mechanism will make.</p>	<p>Learning that mechanisms are a collection of moving parts that work together in a machine.</p> <p>Learning that there is an input and output in a mechanism.</p> <p>Identifying mechanisms in everyday objects.</p>	<p>To know that wheels need to be round to rotate and move</p> <ul style="list-style-type: none"> • To understand that for a wheel to move it must be attached to a rotating axle • To know that an axle moves within an axle holder which is fixed to the vehicle or toy • To know that the frame of a vehicle (chassis) needs to be balanced • To know that different materials have different properties and are therefore suitable for different uses 	<ul style="list-style-type: none"> • To understand how pneumatic systems work • To understand that pneumatic systems can be used as part of a mechanism • To know that pneumatic systems operate by drawing in, releasing and compressing air 	<ul style="list-style-type: none"> • To know that air resistance is the level of drag on an object as it is forced through the air • To understand that the shape of a moving object will affect how it moves due to air resistance. 	<p>Knowing that input is the motion used to start a mechanism.</p> <p>Knowing that the output is the motion that happens as a result of starting the input.</p> <p>Knowing that mechanisms control movement.</p> <p>Describing the different movements, motions and directions that different mechanisms can make.</p> <p>Understand and use appropriate mechanical systems in their product.</p> <p>Using scissors, craft knives, cutting mats, rulers, bench hooks, saws and glue guns safely and effectively.</p>
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Sequence of lessons	<p>Lesson 1: Exploring sliders and movement Pupils learn about the direction of movements and explore the mechanisms required to make these work, by creating examples of side-to-side sliders and up-and-down sliders from templates</p> <p>Lesson 2: Design Children plan their moving story books against a Design Criteria using differentiated templates, deciding on the backgrounds, moving parts, mechanisms and direction of movement required</p> <p>Lesson 3: Construction Referring to their design templates from Lesson 2, children make the various elements of their moving storybooks, including bridges and guides to restrict the movement of their sliders where necessary</p>	<p>Lesson 1: Pivots, levers and linkages Looking at everyday objects, children learn that a lever is something that turns on a pivot and that a linkage is a system of levers that are connected by pivots</p> <p>Lesson 2: Making linkages Children experiment with making the linkages that will enable their monsters to move, varying the width, length and thicknesses of the card they use and demonstrating to the class the success of these adaptations.</p> <p>Lesson 3: Designing my monster With levers, linkages and pivots in mind, children design two possible moving monster ideas against a set of design criteria and then carry out a tally survey to see which design is favoured by their peers.</p> <p>Lesson 4: Making my monster Children construct and assemble their</p>	<p>1 = How wheels move</p> <p>2= Fixing broken wheels</p> <p>3= Designing a train</p> <p>4= Building and testing their trains</p> <p>5= Design a Ferris Wheel</p> <p>6= Planning the build</p> <p>7= Building the frame and wheels (needs to be done after Y1 structures)</p> <p>8= Adding pods and decorations</p>	<p>L1: I can understand how pneumatic systems work</p> <p>L2: I can design a toy which uses a pneumatic system</p> <p>L3: I can create a pneumatic system</p> <p>L4: I can test and finalise ideas against a design criteria</p>	<p>L1: I can build a car chassis and launch a mechanism</p> <p>L2: I can design a shape that reduces air resistance</p> <p>L3: I can make a model based on a chosen design</p> <p>L4: I can assemble and test my completed product</p>	<p>L1: I can explore the input and output of mechanisms and structures used in pop-up books and cards. I can make prototypes of some of these structures and mechanisms (levers, slider, pop-up)</p> <p>L2: I can design a pop-up story book incorporating at least 2 of the structures and mechanisms I learnt about.</p> <p>L3: I can make my pop-up book to a high standard, considering the aesthetics. I can evaluate my pop-up book.</p> <p>L4: I can explore more mechanisms and their output (cams).</p> <p>L5: I can design a cam model according to a success criterion.</p> <p>L6: I can make my cam model, selecting appropriate materials and tools to make each component. I can make my cam model to a high standard. I can evaluate my cam model.</p>
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	<p>Lesson 4: Testing and evaluation Pupils test their finished storybooks with their target audience of Reception children and evaluate their end result against the initial design criteria</p>	<p>moving monsters, decorating them as specified in their original designs from Lesson 3 and finally evaluating their efforts against their original Design Brief</p>				
<p>vocabulary</p>	<p>Sliders, mechanism, up, down, left, right, vertical and horizontal to describe movement. Adapt, design criteria, design, Input, model, template</p>	<p>Axle, design Criteria, input, linkage, mechanical, output, pivot, wheel</p>	<p>Design, design criteria, wheel, Ferris wheel, pods, axle, axle holder, frame, mechanism, diagram, equipment, chassis, dowel</p>	<p>Exploded diagram, function, input, linkage, mechanism, motion, net, output, pivot, pneumatic systems, thumbnail sketch, lever, component, research, adapt, properties, reinforce, motion</p>	<p>Air resistance, design, structure, graphics, research, model, chassis, template, aesthetic, design criteria, function, kinetic energy, mechanisms, net</p>	<p>lever, slider, cam, follower, axle, labelled diagrams, cross-sectional diagram, mechanism, mechanical system, input, output</p>

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<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Tools/equipment</p>	<p>Scissors,</p>	<p>Scissors, glue, split pins, rulers, pencils, plasticine, Glue sticks, scissors, masking tape, materials that can be used to make monster features (cotton wool, felt, wool, foil, carrier bags, buttons, lollipop sticks, pipe-cleaners, etc.)</p>	<ul style="list-style-type: none"> • items that have wheels, such as bicycles, tricycles, trundle wheels, toy cars, skateboards, trolleys, arranged around the classroom for the children to inspect (see Attention grabber) • Straws • Paper • Glue or masking tape • Scissors • Materials for making vehicles, such as card boxes, cotton reels, straws, pipe cleaners, • Dowel pre-cut to 20cm lengths for the axles, or alternative suitable materials (two lengths per pupil) • Materials for decorating vehicles, such as tissue paper, glitter, googly eyes (optional) • Ruler • Materials for making vehicles: 	<p>Balloons, tape, small, lightweight toys, syringes, tubing to connect the syringes, disinfectant, masking tape, sandwich bas, a box with a hinged lid, colouring pencils, bottles, elastic bands, glue, scissors, paper fasteners or split pins, egg cartons/tissue/shoe boxes, card, drinking straws, pipe cleaners, cotton wool, buttons, socks</p>	<p>Pre-made demonstration car, wooden dowel, wheels with central holes, drinking straws, paperclips, lollipop sticks, elastic bands, masking tape, glue guns, children's toy cars, drawing and colouring pencils, crash targets (plastic cups, building blocks, cushions etc), coloured card, scissors, stop watches</p>	<p>Scissors, craft knife, cutting mat, ruler, saw, bench hook, glue gun, glue stick</p>
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			<p>Body: cardboard tubes, cardboard boxes, yoghurt pots axle: straws, dowel (cut to size) Wheels: wooden wheels, card discs, plastic cotton reels</p> <p>Materials for the children to create their wheels, such as lolly sticks, dowel, straws, cocktail sticks, cardboard, split pins, cotton reels, paper straws, yoghurt pots – arrange on tables for children to access.</p>			
<p>Key events and/or individuals</p>			<p>Richard Trevithick</p>		<p>The Romans</p>	<p>None</p>