



Design and Technology Progression of skills – **Mechanisms and mechanical systems**

Skills	Design	Year 1		Year 2		Year 3	Year 4	Year 5	Year 6
		Moving storybook	Wheels and axis	Fairground wheel	Moving monster	Pneumatic toys	Slingshot car	Pop-up book	Automata toys
		<ul style="list-style-type: none"> Explaining how to adapt mechanisms, using bridges or guides to control the movement Designing a moving story book for a given audience 	<ul style="list-style-type: none"> Designing a vehicle that includes wheels, axles and axle holders, which will allow the wheels to move Creating clearly labelled drawings which illustrate movement 	<ul style="list-style-type: none"> 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"> Creating a class design criteria for a moving monster Designing a moving monster for a specific audience in accordance with a design criteria 	<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 	<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 	<ul style="list-style-type: none"> Designing a pop-up book which uses a mixture of structures and mechanisms Naming each mechanism, input and output accurately Storyboarding ideas for a book 	<ul style="list-style-type: none"> Experimenting with a range of cams, creating a design for an automata toy based on a choice of cam to create a desired movement Understanding how linkages change the direction of a force Making things move at the same time

						explain ideas clearly			<ul style="list-style-type: none"> • Understanding and drawing cross-sectional diagrams to show the inner-working
	Make	<ul style="list-style-type: none"> • Following a design to create moving models that use levers and sliders 	<ul style="list-style-type: none"> • Adapting mechanisms 	<ul style="list-style-type: none"> • Selecting materials according to their characteristics • Following a design brief 	<ul style="list-style-type: none"> • Making linkages using card for levers and split pins for pivots • Experimenting with linkages adjusting the widths, lengths and thicknesses of card used • Cutting and assembling components neatly 	<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 	<ul style="list-style-type: none"> • Measuring, marking, cutting and assembling with increasing accuracy • Making a model based on a chosen design 	<ul style="list-style-type: none"> • Following a design brief to make a pop up book, neatly and with focus on accuracy • Making mechanisms and/or structures using sliders, pivots and folds to produce movement • Using layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result 	<ul style="list-style-type: none"> • Measuring, marking and checking the accuracy of the jelutong and dowel pieces required • Measuring, marking and cutting components accurately using a ruler and scissors • Assembling components accurately to make a stable frame • Understanding that for the frame to function effectively the components must be cut accurately and the joints of the

						cutting, creasing, folding, weaving			frame secured at right angles • Selecting appropriate materials based on the materials being joined and the speed at which the glue needs to dry/set
	Evaluate	<ul style="list-style-type: none"> • Testing a finished product, seeing whether it moves as planned and if not, explaining why and how it can be fixed • Reviewing the success of a product by testing it with its intended audience 	<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 	<ul style="list-style-type: none"> • Evaluating different designs • Testing and adapting a design 	<ul style="list-style-type: none"> • Evaluating own designs against design criteria • Using peer feedback to modify a final design 	<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 	<ul style="list-style-type: none"> • Evaluating the work of others and receiving feedback on own work • Suggesting points for improvement 	<ul style="list-style-type: none"> • Evaluating the work of others and receiving feedback on own work • Applying points of improvements • Describing changes they would make/do if they were to do the project again



Design and Technology Progression of Knowledge - **Mechanisms and mechanical systems**

Knowledge		Year 1		Year 2		Year 3	Year 4	Year 5	Year 6
		Moving storybook	Wheels and axis	Fairground wheel	Moving monster	Pneumatic toys	Slingshot car	Pop-up book	Automata toys
	Technical	<ul style="list-style-type: none"> • To know that a mechanism is the parts of an object that move together • To know that a slider mechanism moves an object from side to side • To know that a slider mechanism has a slider, slots, guides and an object • To know that bridges and guides are bits of card that purposefully restrict the movement of the slider 	<ul style="list-style-type: none"> • To know that wheels need to be round to rotate and move • 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 	<ul style="list-style-type: none"> • To know that different materials have different properties and are therefore suitable for different uses 	<ul style="list-style-type: none"> • To know that mechanisms are a collection of moving parts that work together as a machine to produce movement • To know that there is always an input and output in a mechanism • To know that an input is the energy that is used to start something working • To know that an output is 	<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 understand that all moving things have kinetic energy • To understand that kinetic energy is the energy that something (object/person) has by being in motion • 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. 	<ul style="list-style-type: none"> • To know that mechanisms control movement • To understand that mechanisms that can be used to change one kind of motion into another • To understand how to use sliders, pivots and folds to create paper-based mechanisms 	<ul style="list-style-type: none"> • To understand that the mechanism in an automata uses a system of cams, axles and followers • To understand that different shaped cams produce different outputs

					<p>the movement that happens as a result of the input</p> <ul style="list-style-type: none"> • To know that a lever is something that turns on a pivot • To know that a linkage mechanism is made up of a series of levers 				
	Additional	<ul style="list-style-type: none"> • To know that in Design and technology we call a 'design' 	<ul style="list-style-type: none"> • To know some real-life items that use wheels such as wheelbarrows, hamster wheels and vehicles 	<ul style="list-style-type: none"> • To know the features of a ferris wheel include the wheel, frame, pods, a base an axle and an axle holder • To know that it is important to test my design as I go 	<ul style="list-style-type: none"> • To know some real-life objects that contain mechanisms 	<ul style="list-style-type: none"> • To understand how sketches, drawings and diagrams can be used to communicate design ideas • To know that exploded-diagrams are used to show how different parts of a 	<ul style="list-style-type: none"> • To understand that products change and evolve over time • To know that aesthetics means how an object or product looks in design and technology • To know that a template is a stencil you can use to help 	<ul style="list-style-type: none"> • To know that a design brief is a description of what I am going to design and make • To know that designers often want to hide mechanisms to make a product more aesthetically pleasing 	<ul style="list-style-type: none"> • To know that an automata is a hand powered mechanical toy • To know that a cross-sectional diagram shows the inner workings of a product • To understand how to use a bench hook and saw safely • To know that a set square can be used

				<p>along so that I can solve any problems that may occur</p>		<p>product fit together</p> <ul style="list-style-type: none"> • To know that thumbnail sketches are small drawings to get ideas down on paper quickly 	<p>you draw the same shape accurately</p> <ul style="list-style-type: none"> • To know that a birds-eye view means a view from a high angle (as if a bird in flight) • To know that graphics are images which are designed to explain or advertise something • To know that it is important to assess and evaluate design ideas and models against a list of design criteria. 		<p>to help mark 90° angles</p>
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