

Danson Primary School - Design and Technology – Mechanisms & Mechanical Systems

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		Mechanisms: Moving story book Mechanisms: Wheels & axles	Mechanisms: Moving monster Mechanisms: Fairground wheel	Mechanical Systems: Pneumatic Toys	Mechanical Systems: Making a Slingshot	Mechanical Systems: Pop-up book	Mechanical Systems: Automata toys
Skills	Design	<ul style="list-style-type: none"> I can design a moving story book for a given audience. I can explain how to adapt mechanisms, using bridges or guides to control the movement. I can design a vehicle that includes wheels, axles, and axle holders, that when combined, will allow the wheels to move. I can create and clearly label drawings that illustrate movement. 	<ul style="list-style-type: none"> I can contribute to a class design criterion for a moving monster. I can design a moving monster for a specific audience in accordance with a design criterion. I can select a suitable linkage system to produce the desired motion. I can design a wheel. 	<ul style="list-style-type: none"> I can design a toy which uses a pneumatic system. I can develop design criteria from a design brief. I can generate ideas using thumbnail sketches and exploded diagrams. I can understand that there are different types of drawings used in design to explain my ideas clearly. 	<ul style="list-style-type: none"> I can design a shape that reduces air resistance. I can draw a net to create a structure from. I can choose shapes that increase or decrease speed because of air resistance. I can personalise a design. 	<ul style="list-style-type: none"> I can design a pop-up book which uses a mixture of structures and mechanisms. I can name each mechanism, input and output accurately. I can storyboard ideas for a book. 	<ul style="list-style-type: none"> I can experiment with a range of cams, creating a design for an automata toy based on a choice of cam to create a desired movement. I can understand how linkages change the direction of a force. I can make things move at the same time. I can understand and draw cross-sectional diagrams to show the inner-workings of my design.
	Make	<ul style="list-style-type: none"> I can follow a design to create moving models that use levers and sliders. <i>I can adapt mechanisms when they do not work as they should.</i> <i>I can adapt mechanisms to fit my vehicle design.</i> <i>I can adapt mechanisms to improve how they work after testing my vehicle.</i> 	<ul style="list-style-type: none"> I can make linkages using card for levers and split pins for pivots. I can experiment with linkages adjusting the widths, lengths and thicknesses of card used. I can cut and assemble components neatly. <i>I can select materials according to their characteristics.</i> <i>I can follow a design brief.</i> 	<ul style="list-style-type: none"> I can create a pneumatic system to create a desired motion. I can build secure housing for a pneumatic system. I can use syringes and balloons to create different types of pneumatic systems to make a functional and appealing pneumatic toy. I can select materials due to their functional and aesthetic characteristics. I can manipulate materials to create different effects by cutting, creasing, folding and weaving. 	<ul style="list-style-type: none"> I can measure, marking, cutting and assembling with increasing accuracy. I can make a model based on a chosen design. 	<ul style="list-style-type: none"> I can follow a design brief to make a pop-up book, neatly and with focus on accuracy. I can make mechanisms and/or structures using sliders, pivots and folds to produce movement. I can use layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result. 	<ul style="list-style-type: none"> I can measure, marking and checking the accuracy of the jelutong and dowel pieces required. I can measure, marking and cutting components accurately using a ruler and scissors. I can assemble components accurately to make a stable frame. I can understand that for the frame to function effectively the components must be cut accurately and the joints of the frame secured at right angles. I can select 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"> I can test a finished product, seeing whether it moves as planned and if not, explaining why and how it can be fixed. I can review the success of a product by testing it with its intended audience. I can test wheel and axle mechanisms, identifying what stops the wheels from turning, and recognising that a wheel needs an axle to move. 	<ul style="list-style-type: none"> I can evaluate my own designs against design criteria. I can use peer feedback to modify a final design. I can evaluate different designs. I can test and adapt a design. 	<ul style="list-style-type: none"> I can use the views of others to improve designs. I can test and modify 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"> I can evaluate 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"> I can evaluate the work of others and receive feedback on my own work. I can apply points of improvement to my toy. I can describe changes they would make/do if they were to do the project again.

Knowledge	<ul style="list-style-type: none"> • I know that a mechanism is the parts of an object that move together. • I know that a slider mechanism moves an object from side to side. • I know that a slider mechanism has a slider, slots, guides and an object. • I know that bridges and guides are bits of card that purposefully restrict the movement of the slider. • I know that in Design and Technology we call a plan a 'design'. • I know that wheels need to be round to rotate and move. • I understand that for a wheel to move it must be attached to a rotating axle. • I know that an axle moves within an axle holder which is fixed to the vehicle or toy. • I know that the frame of a vehicle (chassis) needs to be balanced. 	<ul style="list-style-type: none"> • I know that mechanisms are a collection of moving parts that work together as a machine to produce movement. • I know that there is always an input and output in a mechanism. • I know that a lever is something that turns on a pivot. • I know that a linkage mechanism is made up of a series of levers. • I know that different materials have different properties and are therefore suitable for different uses. • I know the features of a ferris wheel. • I know that it is important to test my design as I go along so that I can solve any problems that may occur. 	<ul style="list-style-type: none"> • I can understand how pneumatic systems work. • I can understand that pneumatic systems can be used as part of a mechanism. • I know that pneumatic systems operate by drawing in, releasing and compressing air. • I understand how sketches, drawings and diagrams can be used to communicate design ideas. • I know that exploded-diagrams are used to show how different parts of a product fit together. • I know that thumbnail sketches are small drawings to get ideas down on paper quickly. 	<ul style="list-style-type: none"> • I know that air resistance is the level of drag on an object as it is forced through the air. • I know that the shape of a moving object will affect how it moves due to air resistance. • I know that aesthetics means how an object or product looks in design and technology. • I know that it is important to assess and evaluate design ideas and models against a list of design criteria. 	<ul style="list-style-type: none"> • I know that mechanisms control movement. • I understand that mechanisms can be used to change one kind of motion into another. • I understand how to use sliders, pivots and folds to create paper-based mechanisms. • I know that a design brief is a description of what I am going to design and make. • I know that designers often want to hide mechanisms to make a product more aesthetically pleasing. 	<ul style="list-style-type: none"> • I understand that the mechanism in an automata uses a system of cams, axles and followers. • I understand that different shaped cams produce different outputs. • I know that an automata is a hand powered mechanical toy. • I know that a cross-sectional diagram shows the inner workings of a product. • I understand how to use a bench hook and saw it safely. • I know that a set square can be used to help mark 90° angles.
Vocabulary	<p>sliders, mechanism, adapt design criteria, design, input, model, template, assemble, test</p> <p>axle, axle holder, chassis, diagram, dowel, equipment, mechanism, wheel</p>	<p>design, design criteria, wheel, Ferris wheel, pods, axle, axle holder, frame, mechanism</p> <p>axle, design criteria, input, linkage, mechanical, output, pivot, wheel</p>	<p>mechanism, lever, pivot, linkage system, pneumatic system, input, output, component, thumbnail sketch, research, adapt, properties, reinforce, motion</p>	<p>chassis, energy, kinetic mechanism, air resistance, design, structure, graphics, research, model, template</p>	<p>design, input, motion, mechanism, criteria, research, reinforce, model</p>	<p>accurate, assembly-diagram, automata, axle, bench hook, cam, clamp, component, utting list, diagram, dowel, drill bits, exploded-diagram, finish, follower, frame, function, hand drill, jelutong linkage, mark out, measure, mechanism, model, research, right-angle, set square, tenon saw</p>
National Curriculum	<ul style="list-style-type: none"> • Design purposeful, functional, appealing products for themselves and other users based on design criteria • Generate, develop, model and communicate their ideas through talking, drawing, templates, mock- ups and, where appropriate, information and communication technology • Select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing] 	<ul style="list-style-type: none"> • Design purposeful, functional, appealing products for themselves and other users based on design criteria • Generate, develop, model and communicate their ideas through talking, drawing, templates, mock- ups and, where appropriate, information and communication technology • Select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing] 	<ul style="list-style-type: none"> • 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 • Select from and use a wider range of tools and equipment to perform practical tasks [for 	<ul style="list-style-type: none"> • 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 • Select from and use a wider range of tools and 	<ul style="list-style-type: none"> • 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 • Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately 	<ul style="list-style-type: none"> • 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 • Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping,

	<ul style="list-style-type: none"> ● Select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics ● Explore and evaluate a range of existing products ● Evaluate their ideas and products against design criteria ● Explore and use mechanisms [for example, levers, sliders, wheels and axles], in their products. 	<ul style="list-style-type: none"> ● Select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics ● Explore and evaluate a range of existing products ● Evaluate their ideas and products against design criteria ● Explore and use mechanisms [for example, levers, sliders, wheels and axles], in their products. ● Ferris Wheel only: Build structures, exploring how they can be made stronger, stiffer and more stable 	<ul style="list-style-type: none"> ● example, cutting, shaping, joining and finishing], accurately ● Select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics ● 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 ● Understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages] 	<ul style="list-style-type: none"> ● equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately ● Select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics ● 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 ● Understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages] 	<ul style="list-style-type: none"> ● Select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics ● 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 and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages] 	<ul style="list-style-type: none"> ● joining and finishing], accurately ● 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 ● Understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
--	---	--	---	---	--	--