Progression of Skills and Knowledge – Structures

		Year 1 Rain sticks	Year 2 Houses
Skills	Design	Learning the importance of a clear design criteria. Including individual preferences and requirements in a design.	Generating and communicating ideas using sketching and modelling. Learning about different types of structures, found in the natural world and in everyday objects.
	Make	Making stable structures from card, tape and glue . Learning how to turn 2D nets into 3D structures. Following instructions to cut and assemble the structures.	Making a structure according to design criteria. Creating joints and structures from paper/card and tape. Building a strong and stiff structure by folding paper.
	Evaluate	Evaluating a structure according to the design criteria, testing whether the structure is strong and stable and altering it if it isn't. Suggest points for improvements.	Exploring the features of structures. Comparing the stability of different shapes. Testing the strength of own structures. Identifying the weakest part of a structure. Evaluating the strength, stiffness and stability of own structure.
Knowledge	Technical	To understand that the shape of materials can be changed to improve the strength and stiffness of structures. To understand that cylinders are a strong type of structure (e.g. the main shape used for towers). To begin to understand that different structures are used for different purposes. To know that a structure is something that has been made and put together.	To know that shapes and structures with wide, flat bases or legs are the most stable. To understand that the shape of a structure affects its strength. To know that materials can be manipulated to improve strength and stiffness. To know that a structure is something which has been formed or made from parts. To know that a 'stable' structure is one which is firmly fixed and unlikely to change or move. To know that a 'strong' structure is one which does not break easily. To know that a 'stiff' structure or material is one which does not bend easily.
	Additional	To know that a client is the person I am designing for. To know that design criteria is a list of points to ensure the product meets the client's needs and wants.	To know that natural structures are those found in nature. To know that man-made structures are those made by people.

		Year 3 Net Monsters (Shell Structures)	Year 4
Skills	Design	Designing monsters with key features to appeal to a specific person/purpose. Drawing and labelling an exciting monster, labelling: -the 3D shapes that will create it - materials needed and colours.	
	Make	Constructing a range of 3D geometric shapes using nets. Creating special features for individual designs.	
	Evaluate	Evaluating own work and the work of others based on the aesthetic of the finished product and in comparison to the original design.	

		Suggesting points for modification of the individual designs.	
Knowledge	Technical	To understand that wide and flat based objects are more stable. To understand the importance of strength and stiffness in structures.	
	Additional	To understand that the monsters need to be strong to hold their shape. To know that a paper net is a flat 2D shape that can become a 3D shape once assembled. To know that a design specification is a list of success criteria for a product.	

		Year 5 Playgrounds	Year 6 Bridges
Skills	Design	Designing a stable playground structure that is aesthetically pleasing and selecting materials to create a desired effect. Building frame structures designed to support weight.	Designing a stable structure that is able to support weight. Creating a frame structure with a focus on triangulation.
	Make	Creating a range of different shaped frame structures. Making a variety of free standing frame structures of different shapes and sizes. Selecting appropriate materials to build a strong structure and cladding. Reinforcing corners to strengthen a structure. Creating a design in accordance with a plan. Learning to create different textural effects with materials.	Making a range of different shaped beam bridges. Using triangles to create truss bridges that span a given distance and support a load. Identifying where a structure needs reinforcement and using card corners for support. Explaining why selecting appropriate materials is an important part of the design process. **If resourcing/time allows:** **(NB Children work with wood in Forest School so will practise many of these skills there).** Building a wooden bridge structure. Independently measuring and marking wood accurately. Selecting appropriate tools and equipment for particular tasks. Using the correct techniques to saws safely. Understanding basic wood functional properties.
	Evaluate	Evaluating structures made by the class. Describing what characteristics of a design and construction made it the most effective. Considering effective and ineffective designs.	Adapting and improving own bridge structure by identifying points of weakness and reinforcing them as necessary. Suggesting points for improvements for own bridges and those designed by others.
Knowledge	Technical	To understand what a frame structure is. To know that a 'free-standing' structure is one which can stand on its own	To understand some different ways to reinforce structures. To understand how triangles can be used to reinforce bridges. To know that properties are words that describe the form and function of materials. To understand why material selection is important based on properties. To understand the material (functional and aesthetic) properties of wood..

	Additional	To know that a playground is made up of different structures for leisure activities. To know that cladding can be applied to structures for different effects. To know that aesthetics are how a product looks. To know that a product's function means its purpose. To understand that the target audience means the person or group of people a product is designed for. To know that architects consider light, shadow and patterns when designing.	To understand the difference between arch, beam, truss and suspension bridges. To understand how to carry and use a saw safely.

Progression of Skills and Knowledge - Mechanisms

		Year 1 Sleighs	Year 2 Wheeled Windmill
Skills	Design	Explaining how to make a moving mechanism on their sleigh. Designing a moving sleigh for a given audience.	Selecting a suitable linkage system to produce the desired motion. Designing a windmill.
	Make	Following a design to create moving models that use levers.	Selecting materials according to their characteristics. Following a design brief.
	Evaluate	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.	Evaluating different designs. Testing and adapting a design.
Knowledge	Technical	To know that a mechanism is the parts of an object that move together.	To know that different materials have different properties and are therefore suitable for different uses.
	Additional	To know that in design and technology we call a plan a 'design'.	To know the features of a windmill include the wheel, frame, a base, an axle and an axle holder. To know that it is important to test the design to solve any problems that may occur.

		Year 3 Pneumatic Rainforest Animals	Year 4 Slingshot Cars
Skills	Design	Designing an animal, 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.	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 and CAD.
	Make	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 animal toy. Selecting materials due to their functional and aesthetic characteristics.	Select from and use a wider range of tools and equipment to perform practical tasks accurately e.g. cutting, shaping, joining and finishing. Select from and use a wider range of materials and components, including construction materials, according to their functional and aesthetic qualities.

	Evaluate	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.	Investigate and analyse a range of existing products. Understand how key events in design and technology have helped shape the world e.g. the invention of the wheel.
Knowledge	Technical	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.	Apply their understanding of how strengthen, stiffen and reinforce more complex structures. Understand and use mechanical systems e.g. wheels and axles in their products.
	Additional	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 product fit together. To know that thumbnail sketches are small drawings to get ideas down on paper quickly.	To understand that all moving things have kinetic energy. To understand that kinetic energy is the energy that something has by being in motion. To understand 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.

		Year 5 Automata Toys	Year 6 A Moving Book
Skills	Design	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. Understanding and drawing cross-sectional diagrams to show the inner-workings of my design.	Designing a pop-up book, which uses a mixture of structures and mechanisms. Naming each mechanism, input and output accurately. Storyboarding ideas for a moving book.
	Make	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 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.	Following a design brief to make a moving book, neatly and with focus on accuracy. Making mechanisms and/or structures using sliders, pivots and folds to produce movement. To know that bridges and guides are bits of card that purposefully restrict the movement of the slider. Using layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result.
	Evaluate	Evaluating the work of others and receiving feedback on own work. Applying points of improvement to their toys. Describing changes they would make/do if they were to do the project again.	Evaluating the work of others and receiving feedback on own work. Suggesting points for improvement.
	Technical	To understand that the mechanism in an automata uses a system of cams, axles and followers.	To know that mechanisms control movement.

Knowledge		To understand that different shaped cams produce different outputs.	To understand that mechanisms 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.
	Additional	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 to help mark 90° angles.	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.

Progression of Skills – Electrical Systems

		Year 3	Year 4
			Torches
Skills	Design		Designing a torch, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas.
	Make		Making a torch with a working electrical circuit and switch. Using appropriate equipment to cut and attach materials. Assembling a torch according to the design and success criteria.
	Evaluate		Evaluating electrical products. Testing and evaluating the success of a final product.
Knowledge	Technical		To understand that electrical conductors are materials which electricity can pass through. To understand that electrical insulators are materials which electricity cannot pass through. To know that a battery contains stored electricity that can be used to power products. To know that an electrical circuit must be complete for electricity to flow. To know that a switch can be used to complete and break an electrical circuit.
	Additional		To know facts from the history and invention of torches – David Misell

Progression of Skills – Cooking and Nutrition

		Year 1	Year 2
		A Healthy Sundae	
Skills	Design	Designing carton packaging by-hand or on ICT software.	
	Make	Chopping fruit safely to make a sundae.	
	Evaluate	Tasting and evaluating different food combinations. Describing appearance, smell and taste. Suggesting information to be included on packaging.	
Knowledge		Understanding the difference between fruits and vegetables. To know that a fruit has seeds and a vegetable does not. To know that fruits grow on trees or vines.	

		Year 3	Year 4
		Eating Seasonally	
Skills	Design	Creating a healthy and nutritious recipe for a savoury tart using seasonal ingredients, considering the taste, texture, smell and appearance of the dish.	
	Make	Knowing how to prepare themselves and a work space to cook safely in, learning the basic rules to avoid food contamination. Following the instructions within a recipe.	
	Evaluate	Establishing and using design criteria to help test and review dishes. Describing the benefits of seasonal fruits and vegetables and the impact on the environment. Suggesting points for improvement when making a seasonal tart.	

Knowledge		To know that not all fruits and vegetables can be grown in the UK as climate affects food growth. To know that vegetables and fruit grow in certain seasons. To know that cooking instructions are known as a 'recipe'. To know the difference between imported/exported food. To understand that imported foods travel from far away and this can negatively impact the environment. To know that each fruit and vegetable contain vitamins, minerals and fibre important for energy, growth and health. To know safety rules for using, storing and cleaning a knife. To know that similar coloured fruits and vegetables often have similar nutritional benefits.	

		Year 5	Year 6
		What could be healthier?	
Skills	Design	Adapting a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients. Writing an amended method for a recipe to incorporate the relevant changes to ingredients. Designing appealing packaging to reflect a recipe.	
	Make	Cutting and preparing foods safely. Using equipment safely, including knives, hot pans and hobs. Knowing how to avoid cross-contamination. Following a step by step method carefully to make a recipe.	
	Evaluate	Identifying the nutritional differences between different products and recipes. Identifying and describing healthy benefits of food groups.	
Knowledge		To know that recipes can be adapted to make them healthier by substituting ingredients. To understand that 'cross-contamination' means bacteria and germs have been passed onto ready-to-eat foods and it happens when these foods mix with raw meat or unclean objects.	

Progression of Skills – Textiles

		Year 1	Year 2
			A Mother's Day Gift
Skills	Design		Designing a Mother's Day card/bookmark
	Make		Selecting and cutting fabrics for sewing. Decorating using fabric glue and/or running stitch. Threading a needle. Sewing running stitch, with evenly spaced, neat, even stitches to join fabric. Neatly pinning and cutting fabric using a template.
	Evaluate		Evaluating the quality of the stitching on work. Discussing as a class, the success of their stitching against the success criteria. Identifying aspects of their peers' work that they particularly like and why.
Knowledge			To know that sewing is a method of joining fabric. To know that different stitches can be used when sewing. To understand the importance of tying a knot after sewing the final stitch. To know that a thimble can be used to protect fingers when sewing.

		Year 3	Year 4
			Book Covers and Fasteners
Skills	Design		Writing design criteria for a product, articulating decisions made. Designing a personalised book sleeve.
	Make		Making and testing a paper template with accuracy and in keeping with the design criteria. Measuring, marking and cutting fabric using a paper template. Selecting a stitch style to join fabric. Working neatly by sewing small, straight stitches. Incorporating a fastening to a design.
	Evaluate		Testing and evaluating an end product against the original design criteria. Deciding how many of the criteria should be met for the product to be considered successful. Suggesting modifications for improvement. Articulating the advantages and disadvantages of different fastening types.
Knowledge			To know that a fastening is something which holds two pieces of material together for example a zipper, toggle, button, press stud and velcro. To know that different fastening types are useful for different purposes. To know that creating a mock up (prototype) of their design is useful for checking ideas and proportions.

		Year 5	Year 6
			Christmas Tree Decorations
Skills	Design		Designing a stuffed decoration, considering the main component shapes required and creating an appropriate template. Considering the proportions of individual components.
	Make		Creating a 3D stuffed decoration from a 2D design. Measuring, marking and cutting fabric accurately and independently . Creating strong and secure blanket stitches when joining fabric. Threading needles independently. Using appliqué to attach pieces of fabric decoration. Sewing blanket stitch to join fabric. Applying blanket stitch so the spaces between the stitches are even and regular.
	Evaluate		Testing and evaluating an end product and giving point for further improvements.
Knowledge			To know that blanket stitch is useful to reinforce the edges of a fabric material or join two pieces of fabric. To understand that it is easier to finish simpler designs to a high standard. To know that small, neat stitches which are pulled taut are important to ensure that the decoration is strong and holds the stuffing securely.