

Kapow
Primary™

Design and technology

Progression of skills and knowledge

Subject leader overview EYFS (Reception) - Year 6

Introduction

An overview of the **skills** and **knowledge** covered in each year group and strand and how these are developed through our Design and technology scheme of work.

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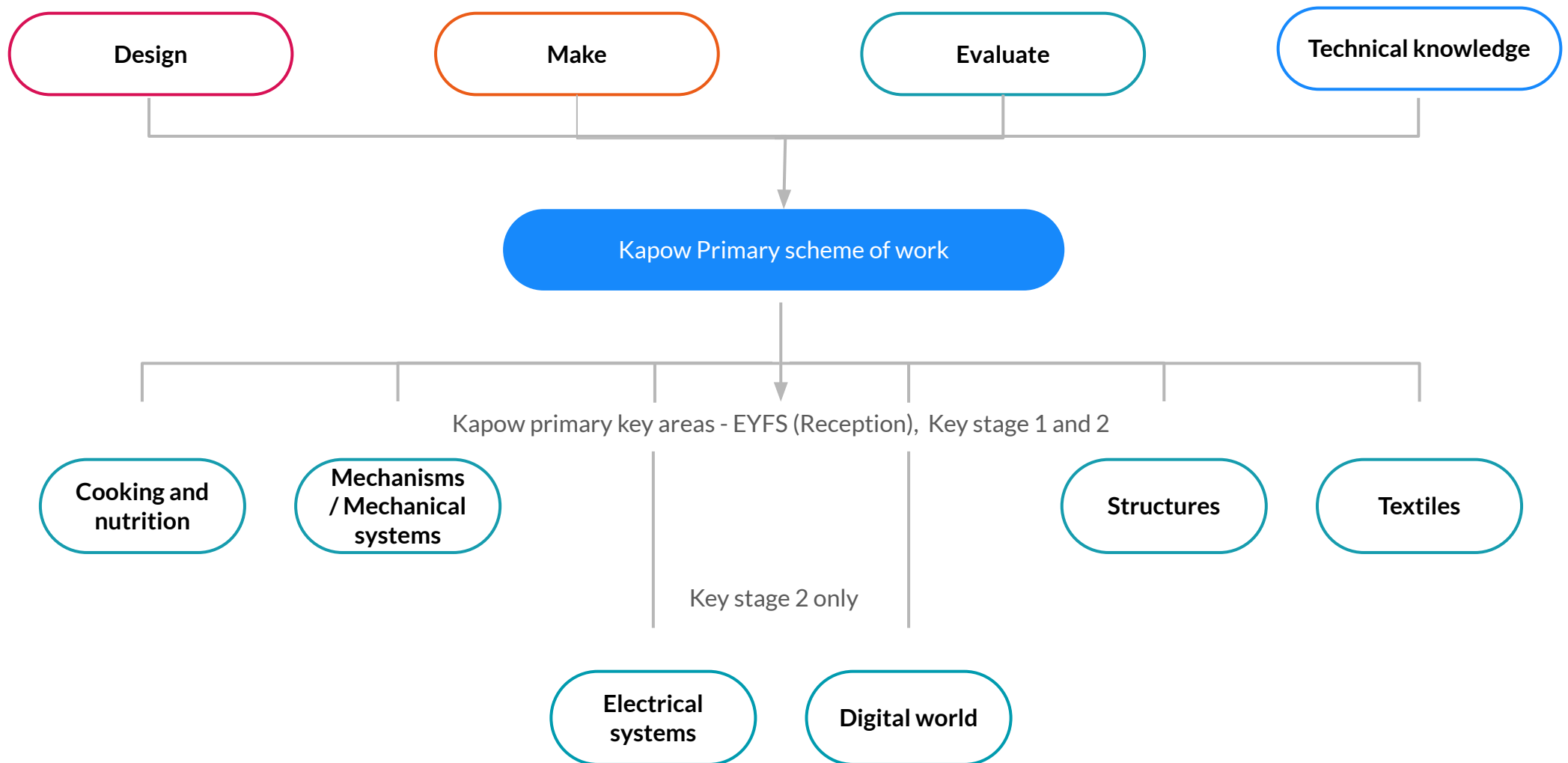
Other related documents:

If you are following our Mixed-age Long-term plan, please use the accompanying: [D&T Progression of skills and knowledge - Mixed-age version](#).

If you are following our Condensed Long-term plan, please use the accompanying: [D&T Progression of skills and knowledge - Condensed version](#).

If you also subscribe to Art and follow our alternating Art and DT Long-term plan, please use the accompanying: [Art and DT Progression of skills and knowledge](#).

How is the Design and technology scheme of work organised?



		EYFS (Reception)	
		<u>Junk modelling</u>	<u>Boats</u>
Skills	Design	• Making verbal plans and material choices. • Developing a junk model.	• Designing a junk model boat. • Using knowledge from exploration to inform design.
	Make	• Improving fine motor/scissor skills with a variety of materials. • Joining materials in a variety of ways (temporary and permanent). • Joining different materials together. • Describing their junk model, and how they intend to put it together.	• Making a boat that floats and is waterproof, considering material choices.
	Evaluate	• Giving a verbal evaluation of their own and others' junk models with adult support. • Checking to see if their model matches their plan. • Considering what they would do differently if they were to do it again. • Describing their favourite and least favourite part of their model.	• Making predictions about, and evaluating different materials to see if they are waterproof. • Making predictions about, and evaluating existing boats to see which floats best. • Testing their design and reflecting on what could have been done differently. • Investigating the how the shapes and structure of a boat affect the way it moves.
Knowledge	Technical	• To know there are a range to different materials that can be used to make a model and that they are all slightly different. • Making simple suggestions to fix their junk model.	• To know that 'waterproof' materials are those which do not absorb water.
	Additional		• To know that some objects float and others sink. • To know the different parts of a boat.

Year 1

Option 1: Stable structures

Skills	Design	- Thinking about what others might want from a design. - Beginning to recognise how products and designs in the world around us solve certain needs. - Considering who they are designing for – identifying the user. - Stating what they intend to make and why – identifying the purpose. - Talking about ideas, with purpose and user in mind. - Talking about existing products when generating ideas. - Using basic drawing skills to communicate ideas.	
	Make	- Choosing between a small number of materials, ingredients or components. - Explaining their choices based on personal experiences. - Requesting equipment appropriate to the purpose. (e.g. scissors for cutting, glue for joining) - Beginning to use objects with a fixed width or length to create even spacing of markings or cuts (e.g. a lolly stick). - Refining their grip to cut competently and confidently. - Cutting straight lines and evenly spaced lines. - Beginning to cut large shapes and thicker materials like card.	
	Evaluate	- Discussing existing products, saying what they like about them. - Comparing two products and discuss which is better for a specific purpose. - Saying what they like about their peers' designs and products. - Accepting feedback and understanding it is meant to improve their work.	
Knowledge	Technical	- Recognising that different structures are used for different purposes. - Exploring the features of structures. - Describing structures as buildings or freestanding structures. - Making stable structures from card. - Creating supporting structures to aid stability. - Using stable objects like cylinders to create structures.	
	Additional	- To know that the 'user' is the person who will use the product. - To know that different users may want different things from a design. - To know that who they are designing for makes a difference to what they design. - To know that the purpose is what something is for. - To know that existing products can help when deciding what to design. - To know that drawings are a way to explain ideas. - To know that a plan is deciding what to do first and next. - To know that different equipment does different things. - To know the names of common pieces of equipment. - To know that some products will be better than others. - To know that their ideas or products can be made better. - To know that their ideas can makes someone else's work better.	- To know that other people's ideas can help make their work better. - To know that a structure is something that has been made and put together. - To know that stable structures do not topple. - To know that shapes and structures with wide, flat bases or legs are the most stable. - To know that adding weight to the base of a structure can make it more stable.

		Year 1
		Option 2: <u>Constructing a windmill</u>
Skills	Design	• Learning the importance of a clear design criteria. • Including individual preferences and requirements in a design.
	Make	• Making stable structures from card. • Following instructions to cut and assemble the supporting structure of a windmill. • Making functioning turbines and axles which are assembled into a main supporting structure. • Finding the middle of an object. • Puncturing holes. • Adding weight to structures. • Creating supporting structures. • Cutting evenly and carefully.
	Evaluate	• Evaluating a windmill according to the design criteria, testing whether the structure is strong and stable and altering it if it isn't. • Suggest points for improvements.
Knowledge	Technical	• To understand that cylinders are a strong type of structure (e.g. the main shape used for windmills and lighthouses). • To understand that axles are used in structures and mechanisms to make parts turn in a circle. • 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 the sails or blades of a windmill are moved by the wind. • To know that a structure is something built for a reason. • To know that stable structures do not topple. • To know that adding weight to the base of a structure can make it more stable.
	Additional	• To know that design criteria is a list of points to ensure the product meets the clients needs and wants. • To know that a windmill harnesses the power of wind for a purpose like grinding grain, pumping water or generating electricity. • To know that windmill turbines use wind to turn and make the machines inside work. • To know that a windmill is a structure with sails that are moved by the wind. • To know the three main parts of a windmill are the turbine, axle and structure. • To know that windmills are used to generate power and were used for grinding flour.

Year 2

Option 1: A chair for a bear

Skills	Design	• Using a simple design brief that outlines the intended use, target user, and key features of the product, to create simple design criteria. • Creating ideas with design criteria in mind. • Referring to specific parts of existing products when generating ideas.
	Make	• Choosing materials, ingredients or components from a wider range of materials, ingredients or components. • Explaining their choices based on the properties of materials and components. • Looking for ways to make cutting easier, like turning the material they are cutting, not fully closing scissors etc. • Choosing known geometric shapes when making. • Beginning to shape objects to improve how they work.
	Evaluate	• Discussing a range of existing products and saying what they like and dislike about them. • Comparing a range of products and explaining why some better meet different design criteria than others. • Evaluating their ideas and creations against simple design criteria.
Knowledge	Technical	• Recognising that different structures are used for different purposes. • Exploring the features of structures. • Making stable structures from card. • Creating supporting structures to aid stability. • Using stable objects like cylinders to create structures. • Building a strong and stiff structure by folding paper. • Folding to strengthen or stiffen. • Comparing the stability of different shapes. • Identifying the weakest part of a structure.
	Additional	• To know that a design brief helps to decide what to make. • To know that design criteria are the steps for making a product successful. • To know that design criteria help when thinking of ideas. • To know that different products work in different ways and have parts that make them work. • To know some properties of materials like hard, soft, flexible, waterproof, strong etc. • To know the names of some geometric shapes, triangle, pyramid, square, cube, circle, sphere. • To know that existing products can be evaluated against design criteria. • To know that design criteria help to decide if their product is a success. • To know that improve means to make something better. • To know that a structure is something that has been made and put together. • To know 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 'strong' structure is one which does not break easily. • To know that a 'stiff' structure or material is one which does not bend easily.

		Year 2	Year 3
		Option 2: <u>Baby bear's chair</u>	<u>Constructing a castle</u>
Skills	Design	- Generating and communicating ideas using sketching and modelling. - Learning about different types of structures, found in the natural world and in everyday objects.	- Designing a castle with key features to appeal to a specific person/purpose. - Drawing and labelling a castle design using 2D shapes, labelling: -the 3D shapes that will create the features - materials needed and colours. - Designing and/or decorating a castle tower on CAD software.
	Make	- 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.	- Constructing a range of 3D geometric shapes using nets. - Creating special features for individual designs. - Making facades from a range of recycled materials.
	Evaluate	- 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.	- 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 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.	- To understand that wide and flat based objects are more stable. - To understand the importance of strength and stiffness in structures.
	Additional	- To know that natural structures are those found in nature. - To know that man-made structures are those made by people.	- To know the following features of a castle: flags, towers, battlements, turrets, curtain walls, moat, drawbridge and gatehouse - and their purpose. - To know that a façade is the front of a structure. - To understand that a castle needed to be strong and stable to withstand enemy attack. - 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 4	
		Option 1: <u>Helmets</u>	Option 2: <u>Pavilions</u>
Skills	Design	• Creating simple design criteria that outline basic functionality and appeal to individual users or target audiences. • Noticing simple problems or needs in everyday life. • Developing drawing and sketching skills with a focus on clarity and simplicity.	• Designing a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect. • Building frame structures designed to support weight.
	Make	• Selecting materials, components or ingredients based on their form as well as their functional properties. • Explaining choices with regard to function and form. • Choosing shapes to suit the function of a product.	• 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.
	Evaluate	• Evaluating designs by comparing them against design criteria. • Considering feedback from peers to suggest improvements. • Evaluating how effective the chosen materials were in fulfilling the design brief.	• Evaluating structures made by the class. • Describing what characteristics of a design and construction made it the most effective. • Considering effective and ineffective designs.
Knowledge	Technical	• Strengthening structures by layering materials (lamination). • Strengthening structures by ribbing. • To know how some different structures are built. • To know that structures can be strengthened by manipulating materials and shapes. • To know a shell structure is a hollow shape with a thin outer layer.	• To understand what a frame structure is. • To know that a 'free-standing' structure is one which can stand on its own.
	Additional	• To know form is the look and shape of something. • To know function is what something does and how it works. • To know that creating accurate shapes improves how they look and sometimes their function. • To know choices of materials and equipment can affect the final product.	• To know that a pavilion is a decorative building or structure 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.

		Year 5	Year 6
		<u>Bridges</u>	<u>Playgrounds</u>
Skills	Design	• Designing a stable structure that is able to support weight. • Creating a frame structure with a focus on triangulation.	• Designing a playground featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs.
	Make	• Making a range of different shaped beam bridges. • Using triangles to create truss bridges that span a given distance and support a load. • 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. • Identifying where a structure needs reinforcement and using card corners for support. • Explaining why selecting appropriating materials is an important part of the design process. • Understanding basic wood functional properties.	• Building a range of play apparatus structures drawing upon new and prior knowledge of structures. • Measuring, marking and cutting wood to create a range of structures. • Using a range of materials to reinforce and add decoration to structures.
	Evaluate	• 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.	• Improving a design plan based on peer evaluation. • Testing and adapting a design to improve it as it is developed. • Identifying what makes a successful structure.
Knowledge	Technical	• 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.	• To know that structures can be strengthened by manipulating materials and shapes.
	Additional	• To understand the difference between arch, beam, truss and suspension bridges. • To understand how to carry and use a saw safely.	• To understand what a 'footprint plan' is. • To understand that in the real world, design, can impact users in positive and negative ways. • To know that a prototype is a cheap model to test a design idea.

Year 1

Option 1: Matching slider game

Skills	Design	- Thinking about what others might want from a design. - Beginning to recognise how products and designs in the world around us solve certain needs. - Considering who they are designing for – by identifying the user. - Stating what they intend to make and why – by identifying the purpose. - Talking about ideas with purpose and user in mind. - Talking about existing products when generating ideas. - Creating mock-ups to communicate designs.	
	Make	- Planning more than one step ahead. - Choosing between a small number of materials, ingredients or components. - Explaining their choices based on personal experiences. - Requesting equipment appropriate to the purpose. (e.g. scissors for cutting, glue for joining). - Explaining in simple terms why certain tools must be handled carefully. - Following and recalling simple safety instructions. - Beginning to use objects with a fixed width or length to create even spacing of markings or cuts. (e.g. a lolly stick). - Refining their grip to cut competently and confidently. - Cutting straight lines and evenly spaced lines. - Beginning to cut large shapes and thicker materials like card. - Puncturing holes. - Applying masking tape to fix something in place or join to edges. - Using tools, like scissors, to create shapes. - Beginning to cut large shapes and thicker materials like card.	
	Evaluate	- Discussing existing products, saying what they like about them. - Discussing how their products could be improved based on personal preferences. - Saying what they like about their peers' designs and products. - Accepting feedback and understanding it is meant to improve their work.	
Knowledge	Technical	- Recognising and exploring everyday objects that have mechanisms. - Recognising everyday objects that use a slider mechanism (eg. drawers, sliding doors, paper trimmer).	
	Additional	- To know that the 'user' is the person who will use the product. - To know that different users may want different things from a design. - To know that designers usually design and make something to solve a problem. - To know that who they are designing for makes a difference to what they design. - To know that the purpose is what something is for. - To know that a mock-up is a model of how something works. - To know that choosing different materials or components will have an effect on what their product does or looks like. - To know that different equipment does different things. - To know the names of common pieces of equipment. - To know that some tools are sharp like scissors and knives. - To know that following instructions helps with safety.	- To know that cutting in a straight line can be helpful when making. - To know that some products will be better than others. - To know that their ideas or products can be made better. - To know that many things that move have parts inside to help them work. - To know that mechanisms usually limit unwanted movement. - To know that a slider mechanism moves an object in a straight line (eg. left/right, up/down). - To know that sliding mechanisms are designed to keep movement in one direction (eg. using guides/rails etc).

		Year 1
		Option 2: <u>Making a moving storybook</u>
Skills	Design	- Explaining how to adapt mechanisms, using bridges or guides to control the movement. - Designing a moving story book for a given audience.
	Make	Following a design to create moving models that use levers and sliders.
	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.
Knowledge	Technical	- 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.
	Additional	To know that in Design and technology we call a plan a 'design'.

		Year 1	
		New Option 1: <u>Wheels and axles</u>	
Skills	Design	- Thinking about what others might want from a design. - Beginning to recognise how products and designs in the world around us solve certain needs. - Considering who they are designing for - by identifying the user.	- Stating what they intend to make and why - by identifying the purpose. - Talking about ideas with purpose and user in mind. - Talking about existing products when generating ideas. - Using basic drawing skills to communicate ideas.
	Make	- Planning more than one step ahead. - Choosing between a small number of materials, ingredients or components. - Explaining their choices based on personal experiences. - Requesting equipment appropriate to the purpose (e.g. scissors for cutting and glue for joining). - Explaining in simple terms why certain tools must be handled carefully. - Following and recalling simple safety instructions.	- Finding the middle of an object. - Refining their grip to cut competently and confidently. - Cutting straight lines and evenly spaced lines. - Beginning to cut large shapes and thicker materials like card. - Puncturing holes. - Recognising the edges of paper and card need to be stuck firmly using a glue stick. - Using tools, like scissors, to create shapes. - Beginning to cut large shapes and thicker materials like card. - Beginning to use controlled painting or colouring techniques to finish a product. - Adding texture to create visual interest.
	Evaluate	- Discussing existing products, saying what they like about them. - Comparing two products and discussing which is better for a specific purpose. - Discussing how their products could be improved based on personal preferences.	- Comparing their finished products with their original designs. - Saying what they like about their peers' designs and products. - Accepting feedback and understanding it is meant to improve their work.
Knowledge	Technical	- Recognising and exploring everyday objects that have mechanisms. - Many things that move have parts inside to help them work.	- Mechanisms usually limit unwanted movement. - An axle allows the wheel to turn without falling off.
	Additional	- To know that the 'user' is the person who will use the product. - To know that different users may want different things from a design. - To know that designers usually design and make something to solve a problem. - To know that who they are designing for makes a difference to what they design. - To know that the purpose is what something is for. - To know that existing products can help when deciding what to design. - To know that drawings are a way to explain ideas. - To know that a plan is deciding what to do first and next. - To know that choosing different materials or components will have an effect on what their product does or looks like.	- To know that different equipment does different things. - To know the names of common pieces of equipment. - To know that some tools are sharp like scissors and knives. - To know that following instructions helps with safety. - To know that cutting in a straight line can be helpful when making. - To know that tools can be used to shape objects. - To know that different materials can be shaped by different tools. - To know that some products will be better than others. - To know that their ideas or products can be made better. - To know that their final product might be different to their original idea. - To know that their ideas can make someone else's work better. - To know that other people's ideas can help make their work better.

		Year 1
		Option 2: <u>Wheels and axles</u>
Skills	Design	• Designing a vehicle that includes wheels, axles and axle holders, that when combined, will allow the wheels to move. • Creating clearly labelled drawings that illustrate movement.
	Make	• Adapting mechanisms, when: • they do not work as they should. • to fit their vehicle design. • to improve how they work after testing their vehicle.
	Evaluate	• Testing wheel and axle mechanisms, identifying what stops the wheels from turning, and recognising that a wheel needs an axle in order to move.
Knowledge	Technical	• 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.
	Additional	• To know some real-life items that use wheels such as wheelbarrows, hamster wheels and vehicles.

		Year 2	
		<u>Fairground wheel</u>	<u>Making a moving monster</u>
Skills	Design	- Conducting simple surveys or discussions to gather opinions on what others need or like in a design. - Knowing that a survey is used to find out what people like. - Using a simple design brief that outlines the intended use, target user, and key features of the product, to create simple design criteria. - Knowing that a design brief helps to decide what to make. - Knowing that design criteria are the steps for making a product successful. - Creating ideas with design criteria in mind. - Referring to specific parts of existing products when generating ideas. - Knowing that the design criteria help when thinking of ideas. - Using labels to explain parts of a design, label materials, etc. - Using labels to explain parts of a design, label materials, etc. - Knowing that drawings can help explain how something works. - Knowing that a label explains part of a drawing.	- Creating a class design criteria for a moving monster. - Designing a moving monster for a specific audience in accordance with a design criteria.
	Make	- Choosing materials, ingredients or components from a wider range of materials, ingredients or components. - Explaining their choices based on the properties of materials and components. - Knowing some properties of materials like hard, soft, flexible, waterproof, strong etc. - Following and recalling simple safety instructions. - Knowing that some tools are sharp like scissors and knives. - Choosing known geometric shapes when making. - Beginning to shape objects to improve how they work. - Knowing the names of some geometric shapes: triangle, pyramid, square, cube, circle, sphere. - Considering balance in their finishing, like evenly spaced decoration.	- 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.
	Evaluate	- Discussing a range of existing products and saying what they like and dislike about them. - Evaluating existing products against design criteria. - Evaluating their ideas and creations against simple design criteria. - Knowing that design criteria help to decide if their product is a success. - Suggesting improvements to their peers' designs and products. - Knowing that improve means to make something better. - Knowing that their suggestions can improve someone else's work.	- Evaluating own designs against design criteria. - Using peer feedback to modify a final design.
Knowledge	Technical	- To know everyday objects have mechanisms. - To know many things that move have parts inside to help them work. - To know mechanisms usually limit unwanted movement. - To know everyday objects utilise wheels and axles. - To know wheels must be able to turn to work effectively. - To know axles allow wheels to turn without falling off.	- 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 the movement that happens as a result of the input. - 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	To know the features of a fairground wheel include the wheel, frame, pods, a base an axle and an axle holder.	To know some real-life objects that contain mechanisms.

Year 3

Option 1: *New* Pneumatic toys

Skills	Design	• Creating simple design criteria that outline basic functionality and appeal to individual users or target audiences. • Taking part in structured idea blasting sessions. • Coming up with more ideas and considering the feasibility of their ideas in the classroom. • Developing drawing and sketching skills with a focus on clarity and simplicity. • Developing designs by adding detail and justifications about materials, tools, methods. • Beginning to recognise the benefit of a range of diagram types or prototypes to communicate ideas. (eg. sketches, cross-sectional diagram, thumbnail sketches and exploded diagrams).
	Make	• Selecting equipment required for a series of tasks based on the plan. Explain why each piece is suitable for each stage. • Suggesting simple safety rules based on their understanding of tool dangers. • Participating in discussions about classroom safety procedures. • Cutting out more complex shapes accurately. • Handle different sizes and types of scissors with confidence. • Using PVA glue to join corrugated card and light wood (e.g. balsa wood). • Choosing shapes to suit the function of a product. • Painting or colouring precisely to improve the finish. • Making facades from a range of materials. • Sealing edges with tape to cover gaps in joins.
	Evaluate	• Analysing why specific products, designers or inventors are successful. • Evaluating their designs by comparing them against design criteria and considering feedback from peers to suggest improvements. • Explaining why they think certain aspects of a peer's design are effective or why they suggested specific improvements. • Reflecting on feedback to decide if and how it could be used to improve future iterations.
Knowledge	Technical	• Beginning to understand how mechanisms work. • Recognising pneumatic systems in everyday objects (e.g. car boot, adjustable chair.)
	Additional	• To know that a problem or need is something that a designer can help to solve. • To know that extra information on drawings or diagrams can help the user understand a design or idea. • To know that thumbnail sketches are less detailed quick sketches. • To know that a cross-sectional diagram shows the inside of a product. • To know that an exploded diagram shows how the parts of a product fit together. • To know that different pieces of equipment will be used at different stages in a plan. • To know that different tools and equipment have different dangers. • To know that scissors are useful for cutting out complex shapes, • To know that designers and inventors create products. • To know that choices of materials and equipment can affect the final product. • To know that feedback is ideas and suggestions from other people that can help improve their work. • To know that they can choose to use feedback or not. • To understand that a mechanical system can allow us to move something more easily. • To know that mechanical systems have more than one mechanism that moves to make them work. • To know that mechanical systems are often hidden in products to make them look more appealing. • To know that pushing air can be used to move a mechanism. • To know that pivots can be used to create more movement in the mechanical system. • To know that a combination of mechanisms can improve a product.

		Year 3	Year 4
		Option 2: <u>Pneumatic toys</u>	<u>Making a slingshot car</u>
Skills	Design	• 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.	• 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.
	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 toy. • Selecting materials due to their functional and aesthetic characteristics. • Manipulating materials to create different effects by cutting, creasing, folding and weaving.	• Measuring, marking, cutting and assembling with increasing accuracy. • Making a model based on a chosen design.
	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.	• Evaluating the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance.
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.	• 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.
	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 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 you draw the same shape accurately. • 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.

		Year 4
		New <u>Mechanical cars</u>
Skills	Design	• Taking part in structured brainstorming sessions. • Developing drawing and sketching skills with a focus on clarity and simplicity. • Beginning to recognise the benefit of a range of diagram types or prototypes to communicate ideas. (eg. sketches, cross-sectional diagram, thumbnail sketches and exploded diagrams) • Creating prototypes using materials with similar properties to their final design. • Creating simple design criteria that outline basic functionality and appeal to individual users or target audiences. • Developing designs by adding detail and justifications about materials, tools, methods.
	Make	• Following detailed safety instructions. • Using a ruler as a measuring tool with increasing accuracy by creating spaced marks using millimetres and measuring lengths of objects. • Handle different sizes and types of scissors with confidence. • With close supervision using a hot glue gun to join wooden materials (e.g. lolly sticks). • Selecting equipment required for a series of tasks based on the plan. Explain why each piece is suitable for each stage. • Selecting materials, components or ingredients from a wider choice but within a limited design space (e.g. seasonal ingredients from May and June in the UK).
	Evaluate	• Explaining why they think certain aspects of a peer's design are effective or why they suggested specific improvements. • Reflecting on feedback to decide if and how it could be used to improve future iterations. • Investigating and analysing a range of existing products by looking at their functionality and appeal. • Analysing why specific products, designers or inventors are successful. • Evaluating their designs by comparing them against design criteria and considering feedback from peers to suggest improvements. • Evaluating how effective their chosen materials and tools were in fulfilling the design brief.
Knowledge	Technical	• To understand that a mechanical system can allow us to move something more easily. • To know that mechanical systems have more than one mechanism that moves to make them work. • To know that mechanical systems are often hidden in products to make them look more appealing.
	Additional	• To know that extra information on drawings or diagrams can help the user understand a design or idea. • To know that an exploded diagram shows how the parts of a product fit together. • To know that a prototype is a detailed model that helps a user understand how a product will work. • To know that a target audience is a group of people that might like the idea. • To know that different tools and equipment have different dangers. • To know that a ruler can be used to measure length. • To know that a hot glue gun can be used to join materials. • To know that better suggestions of improvements mean better feedback. • To know that they can choose to use feedback or not. • To know that some products are more successful than other because of their function. • To know that choices of materials and equipment can affect the final product. • To know that feedback is ideas and suggestions from other people that can help improve their work.

		Year 5
		New <u>Gears and pulleys</u>
Skills	Design	- Noticing wider-reaching problems or needs in the community. - Identifying a wide range of needs and potential barriers through market research. - Writing more complex problem statements that consider multiple factors and constraints. - Creating more complex design criteria that require considering detailed user needs, environmental impact, materials and cost. - Coming up with a broader range of ideas and deeper innovation, requiring pupils to think critically about their ideas' practicality and originality. - Beginning to use more complex annotated sketches, such as cross-sectional and exploded diagrams and pattern pieces in design. - Using a series of prototypes to refine and improve their designs.
	Make	- Consistently apply safety instructions. - Select appropriate scissors to handle delicate cutting tasks and challenging materials. - Cutting patterns and drawings accurately. - In supervised groups, using hot glue guns safely. - Recognising that hot glue is useful for joining materials that need a strong bond that sets quickly. - Choosing PVA glue over hot glue for its safety when joining materials in less intensive projects.
	Evaluate	- Reflecting on the usability, aesthetics, innovation and sustainability of products and discussing how design choices impact these aspects. - Assessing their designs against a more complex set of design criteria that includes functionality, aesthetics, user experience, sustainability and cost. - Considering alternative materials, tools or techniques that could enhance the product. - Providing feedback that is helpful, specific, and encouraging. - Incorporating feedback from peers or users improve their product further, explaining the changes they made and the impact they had.
Knowledge	Technical	- That mechanical systems that use gears in everyday objects (eg bicycle, clock). - That gears and pulleys allow us to transfer movement and force from one part of a mechanical system to another. - That gears allow us to increase the output of a mechanism.
	Additional	- That market research is a way of collecting information about problems or needs. - That constraints are things that might stop our ideas being successful. - That original and innovative ideas are different from what has been made before. - That annotations are detailed labels and comments on diagrams. - That risks are things that might happen. - That hot glue creates a strong bond quickly. - That is often better to choose safer equipment. - That sustainability means thinking about the materials that were used to make a product and how the product was made. - That their final product can still be improved by different materials or techniques. - That evaluating their designs in detail will help them understand its successful and less successful parts. - That feedback should be positive, helpful and specific. - That explaining how they used feedback to improve their design can help them create better products in the future.

		Year 5	Year 6
		<u>Pop up book</u>	<u>Automata toys</u>
Skills	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 book.	• Noticing wider-reaching problems or needs in the community. • Coming up with a broader range of ideas and deeper innovation, requiring pupils to think critically about their ideas' practicality and originality. • Beginning to use more complex annotated sketches, such as cross-sectional and exploded diagrams and pattern pieces in design.
	Make	• 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.	• Producing lists of equipment, materials and tools that they need for a task. • Selecting materials, components or ingredients based on research or user needs. • Explaining their choices, referring to their research. • Considering which equipment will work well together. • Choosing from the known range of equipment available to them with little guidance. • Assessing risks associated with different tools and equipment. • Understanding and explaining the importance of each safety rule. • Consistently apply safety instructions. • Cutting jelutong or other harder wood with a coping saw or a tenon saw in small groups. • Cutting in a back-and-forth sawing motion where appropriate. • In supervised groups, using hot glue guns safely. • Recognising that hot glue is useful for joining materials that need a strong bond that sets quickly.
	Evaluate	• Evaluating the work of others and receiving feedback on own work. • Suggesting points for improvement.	• Assessing their designs against a more complex set of design criteria that includes functionality, aesthetics, user experience, sustainability and cost. • Providing feedback that is helpful, specific and encouraging. • Incorporating feedback from peers or users to improve their product further, explaining the changes they made and the impact they had.
Knowledge	Technical	• To know that mechanisms control movement. • 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.	• To know that the mechanism in an automata uses a system of cams, axles and followers. • To know that different shaped cams produce different outputs. • To know which mechanisms are working together to make a mechanical system. • To know that there are different directions of movement. • To know that mechanisms can change one type of movement to another.
	Additional	• 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.	• 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.

		EYFS (Reception)	Year 1	Year 2
		<u>Soup</u>	<u>Smoothies</u>	<u>Balanced diet</u>
Skills	Design	- Designing a soup recipe as a class. - Designing soup packaging.	- Designing smoothie carton packaging by-hand. - Learning where and how fruits and vegetables grow.	Designing three wrap ideas.
	Make	- Chopping plasticine safely. - Chopping vegetables with support.	- Chopping fruit and vegetables safely to make a smoothie. - Juicing fruits safely to make a smoothie. - Identifying if a food is a fruit.	- Chopping foods safely to make a wrap. - Constructing a wrap that meets a design brief. - Grating foods to make a wrap. - Snipping smaller foods instead of cutting. - Spreading soft foods to make a wrap. - Identifying the five food groups. - Learning about balanced diet.
	Evaluate	- Tasting the soup and giving opinions. - Describing some of the following when tasting food: look, feel, smell and taste. - Choosing their favourite packaging design and explaining why.	- Tasting and evaluating different food combinations. - Describing appearance, smell and taste. - Suggesting information to be included on packaging. - Comparing their own smoothie with someone else's.	- Describing appearance, smell and taste. - Taste and evaluating different food combinations. - Describing the information that should be included on a label.
Knowledge		- To know that soup is ingredients (usually vegetables and liquid) blended together. - To know that vegetables are grown. - To recognise and name some common vegetables. - To know that different vegetables taste different. - To know that eating vegetables is good for us. - To discuss why different packages might be used for different foods.	- To know that a blender is a machine which mixes ingredients together into a smooth liquid. - To know that a fruit has seeds and a vegetable does not. - To know that fruits grow on trees or vines. - To know that vegetables can grow either above or below ground. - To know that vegetables is any edible part of a plant.	- To know that 'diet' means the food and drink that a person or animal usually eats. - To know what makes a balanced diet. - To know that the five main food groups are: Carbohydrates, fruits and vegetables, protein, dairy and foods high in fat and sugar. - To know that I should eat a range of different foods from each food group, and roughly how much of each food group. - To know that 'ingredients' means the items in a mixture or recipe. - To know how to cut, grate, snip and spread to prepare foods. - To know how to review and give a score to evaluate.

		Year 3	Year 4
		<u>Eating seasonally</u>	<u>Adapting a recipe</u>
Skills	Design	• Describing how climate affects where foods grow.	• Designing a biscuit within a given budget. • Conducting market research.
	Make	• Identifying seasonal ingredients from the UK. • Following the instructions within a recipe. • Tasting seasonal ingredients. • Peeling foods by hand or with a peeler. • Cutting ingredients safely. • Choosing ingredients based on a design brief.	• Following a baking recipe. • Understanding safety and hygiene rules. • Adapting a recipe.
	Evaluate	• Describing the texture and flavour of ingredients. • Describing the benefits of seasonal fruits and vegetables and the impact on the environment.	• Evaluating an adapted recipe. • Evaluating and comparing a range of products. • Suggesting modifications.
Knowledge		• To know that seasonal means foods that grow in a given season in a given country. • To know some seasonal foods that grow in the UK and what season they grow in. • To know that eating seasonal foods can have a positive impact on the environment. • To know how to describe the flavour and texture of foods. • To know how to cut a peel safely. • To know that the appearance of food is as important as taste. • To know that similar coloured fruits and vegetables often have similar nutritional benefits.	• To know that the amount of an ingredient in a recipe is known as the 'quantity.' • To know that safety and hygiene are important when cooking. • To know the following cooking techniques: sieving, measuring, stirring, cutting out and shaping. • To know the importance of budgeting while planning ingredients for a recipe. • To know that products often have a target audience.

		Year 5	Year 6
		<u>Developing a recipe</u>	<u>Come dine with me</u>
Skills	Design	• Researching existing recipes. • Suggesting alternative ingredients. • Designing a jar label.	• Writing a recipe, explaining the key steps, method and ingredients. • Including facts and drawings from research undertaken.
	Make	• Writing an alternative recipe. • Understanding cross-contamination. • Using preparation skills. • Making a developed recipe.	• Following a recipe, including using the correct quantities of each ingredient. • Adapting a recipe based on research. • Working to a given timescale. • Working safely and hygienically with independence.
	Evaluate	• Explaining the farm to fork process. • Analysing nutritional content.	• Evaluating a recipe, considering: taste, smell, texture and origin of the food group. • Taste testing and scoring final products. • Suggesting and writing up points of improvements in productions. • Evaluating health and safety in production to minimise cross contamination.
Knowledge		• To know that beef comes from cows reared on farms. • To know that recipes can be adapted to suit nutritional needs and dietary requirements. • To know that nutritional information is found on food packaging. • To know that coloured chopping boards can prevent cross-contamination. • To know that food packaging serves many purposes.	• To know that 'flavour' is how a food or drink tastes. • To know that many countries have 'national dishes' which are recipes associated with that country. • To know that 'processed food' means food that has been put through multiple changes in a factory. • To understand that it is important to wash fruit and vegetables before eating to remove any dirt and insecticides. • To understand what happens to a certain food before it appears on the supermarket shelf (Farm to Fork).