



Aylburton and English Bicknor C of E Primary Schools Design and Technology Curriculum



Christian Vision and Values

‘Through God’s love we learn and flourish together’ Corinthians 16:14

Thankfulness Perseverance Compassion Trust Courage Respect

Curriculum Drivers in Design and Technology

World Aware Through our scheme of work, we aim to build an awareness of the impact of design and technology on our lives.

Belonging Our Design and Technology curriculum encourages pupils to become resourceful, enterprising citizens who will have the skills to contribute to future design advancements.

Well-being We want pupils to develop the confidence to take risks, through drafting design concepts, modelling, and testing and to be reflective learners who evaluate their work and the work of others. The success of pupils in Design and Technology will be celebrated.

Spirituality Our Design and Technology curriculum provides children with opportunities to explore the awe and wonder of life and the universe.

Possibilities Through our scheme of work, we aim to inspire pupils to be innovative and creative thinkers who have an appreciation for the product design cycle through ideation, creation, and evaluation.

What we teach and why: Intent

At Aylburton and English Bicknor C of E Primary Schools we follow the Kapow scheme of work for our Design and Technology. The Design and technology scheme of work aims to inspire pupils to be innovative and creative thinkers who have an appreciation for the product design cycle through ideation, creation, and evaluation. We want pupils to develop the confidence to take risks, through drafting design concepts, modelling, and testing and to be reflective learners who evaluate their work and the work of others. Through our scheme of work, we aim to build an awareness of the impact of design and technology on our lives and encourage pupils to become resourceful, enterprising citizens who will have the skills to contribute to future design advancements. Our Design and technology scheme of work enables pupils to meet the end of key stage attainment targets in the National curriculum and the aims also align

with those in the National curriculum. The units provide opportunities for pupils' to work towards the Development matters statements and the Early Learning Goals in EYFS (Reception). The lessons we teach have an intention of providing a high-quality, coherent and progressive experience of the subject, with scope for cross-curricular learning.

How it's taught: Implementation

The Design and technology National curriculum outline the three main stages of the design process: design, make and evaluate. Each stage of the design process is underpinned by technical knowledge which encompasses the contextual, historical, and technical understanding required for each strand. Cooking and nutrition has a separate section, with a focus on specific principles, skills and techniques in food, including where food comes from, diet and seasonality.

The National curriculum organises the Design and technology attainment targets under five subheadings or strands:

- Design
- Make
- Evaluate
- Technical knowledge
- Cooking and nutrition

Our progression document shows a clear progression of skills and knowledge within these five strands across each year group. It shows the skills and knowledge that are taught within each year group and how these skills develop to ensure that attainment targets are securely met by the end of each key stage. Through our Design and technology scheme, pupils respond to design briefs and scenarios that require consideration of the needs of others, developing their skills in six key areas:

- Mechanisms
- Structures
- Textiles
- Food
- Electrical systems (KS2) and
- Digital world (KS2)

Each of our key areas follows the design process (design, make and evaluate) and has a particular theme and focus from the technical knowledge or cooking and nutrition section of the curriculum. It is a spiral curriculum, with key areas revisited again and again with increasing complexity, allowing pupils to revisit and build on their previous learning. Lessons incorporate a range of teaching strategies from independent tasks, paired and group work including practical hands-on, computer-based and inventive tasks. This variety means Trust, Friendship, Respect, Forgiveness, Courage, Truthfulness that lessons are engaging and appeal to those with a variety of learning styles. Differentiated guidance is available for every lesson to ensure that lessons can be accessed by all pupils and opportunities to stretch pupils' learning are available when required. Knowledge organisers for each unit support pupils in building a foundation of factual knowledge by encouraging recall of key facts and vocabulary. Each lesson is underpinned by Rosenshine's Principles.

What we see as a result: Impact

The impact of Kapow Primary's scheme can be constantly monitored through both formative and summative assessment opportunities. Each lesson includes guidance to support teachers in assessing pupils against the learning objectives. Furthermore, each unit has a unit quiz and knowledge catcher which can be used at the start and/ or end of the unit. After the implementation of Kapow Primary Design and technology, pupils should leave Aylburton and English Bicknor C of E Primary Schools equipped with a range of skills to enable them to succeed in their secondary education and be innovative and resourceful members of society. The expected impact of following the Kapow Primary Design and technology scheme of work is that children will:

- Understand the functional and aesthetic properties of a range of materials and resources.
- Understand how to use and combine tools to carry out different processes for shaping, decorating, and manufacturing products.
- Build and apply a repertoire of skills, knowledge and understanding to produce high quality, innovative outcomes, including models, prototypes, CAD, and products to fulfil the needs of users, clients, and scenarios.
- Understand and apply the principles of healthy eating, diets, and recipes, including key processes, food groups and cooking equipment.
- Have an appreciation for key individuals, inventions, and events in history and of today that impact our world.
- Recognise where our decisions can impact the wider world in terms of community, social and environmental issues.
- Self-evaluate and reflect on learning at different stages and identify areas to improve.
- Meet the end of key stage expectations outlined in the National curriculum for Design and technology.
- Meet the end of key stage expectations outlined in the National curriculum for Computing

By the end of year 6 children at Aylburton and English Bicknor C of E Primary Schools should demonstrate the following essential characteristics:

- *The ability to 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.*
- *The ability to generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design.*
- *The ability to select from and use a wider range of tools and equipment to perform practical tasks accurately.*
- *The ability to select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities.*
- *To ability to investigate and analyse a range of existing products,*
- *The ability to evaluate their ideas and products against their own criteria and consider the views of others to improve their work.*
- *Have a secure understanding of how key events and individuals in design and technology have helped shape the world.*
- *Have a secure understanding of how to strengthen, stiffen and reinforce more complex structures.*
- *Have a secure understanding of how to use mechanical systems in their products.*
- *Have a secure understanding of how to use electrical systems in their products.*
- *The ability to apply their understanding of computing to program, monitor and control their products.*

Year A	EYFS	Yr1&2	Yr3&4	Yr5&6
<u>Structures</u>				
	<u>Junk Modelling</u>	<u>Constructing a windmill</u>	<u>Constructing a castle</u>	<u>Bridges</u>
<i>Skills: Design</i>	Making verbal plans and material choices. Developing a junk model.	Learning the importance of a clear design criteria. Including individual preferences and requirements in a design.	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.	Designing a stable structure that is able to support weight. Creating a frame structure with a focus on triangulation.
<i>Skills: Make</i>	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.	Make stable structures from card, tape and glue. Learning how to turn 2D nets into 3D structures. 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.	Constructing a range of 3D geometric shapes using nets. Creating special features for individual designs. Making facades from a range of recycled materials.	Making a range of different shaped beam bridges. Making triangles to create truss bridges that span 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 saw safely. 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. Understanding basic wood functional properties.
<i>Skills: Evaluate</i>	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.	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.	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.	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.

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	Describing their favourite and least favourite part of their model.			
<i>Knowledge: Technical</i>	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 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 windmills and lighthouses). To understand that axles are used in structures and mechanisms to make parts in 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 understand that wide and flat based objects are more stable. To understand the importance of strength and stiffness in structures.	To understand some different ways to reinforces 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.
<i>Knowledge: Additional</i>		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 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 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 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.	To understand the difference between arch, beam, truss and suspension bridges. To understand how to carry and use a saw safely.

Mechanisms/ Mechanical systems

		<u>Making a moving storybook</u>	<u>Wheels and axles</u>	<u>Pneumatic toys</u>	<u>Making a pop-up book</u>
<i>Skills: Design</i>		Explaining how to adapt mechanisms, using bridges or guides to control	Designing a vehicle that includes wheels, axles and axle holders, that	Designing a toy which uses a pneumatic system. Developing design criteria from a design brief.	Designing a pop-up book which uses a mixture of structures and mechanisms. Naming each mechanism, input and output accurately.

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		the movement. Designing a moving story book for a given audience.	when combined, will allow the wheels to move. Creating clearly labelled drawings that illustrate movement.	Generating ideas using thumbnail sketches and exploded diagrams. Learning that different types of drawings are used in design to explain ideas clearly.	Storyboarding ideas for a book.
<i>Skills: Make</i>		Following a design to create moving models that use levers and sliders.	Adapting mechanisms when: They do not work as they should. To fit their vehicle design. To improve how they work after testing their vehicle.	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.	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.
<i>Skills: Evaluate</i>		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.	Testing wheel and axle mechanisms, identifying what stops the wheels from turning, and recognising that a wheel needs an axle in order to move.	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 work of others and receiving feedback on own work. Suggesting points for improvement.
<i>Knowledge: Technical</i>		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 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 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 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.

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		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.	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.		
<i>Knowledge: Additional</i>		To know that in Design and Technology we call a plan a 'design'.	To know some real-life items that use wheels such as wheelbarrows, hamster wheels and vehicles.	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 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.

Cooking and Nutrition

	<u>Soup</u>	<u>Fruit and vegetables</u>	<u>Eating seasonally</u>	<u>What could be healthier?</u>
<i>Skills: Design</i>	Designing a soup recipe as a class. Designing soup packaging.	Designing smoothie carton packaging by-hand or on ICT software.	Creating a healthy and nutritious recipe for a savoury tart using seasonal ingredients, considering the taste, texture, smell and appearance of the dish.	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.
<i>Skills: Make</i>	Chopping plasticine safely. Chopping vegetables with support.	Chopping fruit and vegetables safely to make a smoothie. Identifying if a food is a fruit or vegetable. Learning where and how fruits and vegetables grow.	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.	Cutting and preparing vegetables 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.

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<i>Skills: Evaluate</i>	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 appearances, smell and taste. Suggesting information to be included on packaging.	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.	Identifying the nutritional differences between different products and recipes. Identifying and describing healthy benefits of food groups.
<i>Knowledge</i>	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.	Understanding the differences between fruits and vegetables. To understand that some foods typically known as vegetables are actually fruits (e.g. cucumber). 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 can come from different parts of the plant (e.g. roots: potatoes, leaves, lettuce, fruit: cucumber).	To know that not all fruits and vegetables can be grown in the UK. To know that climate affects food growth. To know that vegetables and fruit grow in certain areas. To know that cooking instructions are known as a 'recipe.' To know that imported food is food which has been brought into the country. To understand that exported food is food which has been sent to another country. To understand that imported foods travel from far away and this can negatively impact the environment. To know that each fruit and vegetable gives us nutritional benefits because they contain vitamins, minerals and fibre. To understand that vitamins, minerals and fibre are important for energy, growth and maintaining health. To know safety rules for using, storing and cleaning a knife safely. To know that similar coloured fruits and vegetables often have similar nutritional benefits.	To understand where meat comes from – learning that beef is from cattle and how beef is reared and processed, including key welfare issues. To know that I can adapt a recipe to make it healthier by substituting ingredients. To know that I can use a nutritional calculator to see how healthy a food option is. 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.

Textiles

	<u>Bookmarks</u>	<u>Puppets</u>	<u>Egyptian collars</u>	<u>Stuffed toys</u>
<i>Skills: Design</i>	Discussing what a good design needs. Designing a simple pattern with paper.	Using a template to create a design for a puppet.	Designing and making a template from an existing cushion and applying individual design criteria.	Designing a stuffed toy, considering the main component shapes required and creating an appropriate template.

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	Designing a bookmark. Choosing from available materials.			Considering the proportions of individual components.
<i>Skills: Make</i>	Developing fine motor/cutting skills with scissors. Exploring fine motor/threading and weaving (under, over technique) with a variety of materials. Using a prepared needle and wool to practise threading.	Cutting fabric neatly with scissors. Using joining methods to decorate a puppet. Sequencing the steps taken during construction.	Following design criteria to create an Egyptian collar. Selecting and cutting fabrics with ease using fabric scissors. Threading needles with greater independence. Tying knots with greater independence. Sewing cross stitch to join fabric. Decorating fabric using applique. Completing design ideas by embellishing the collars based on design ideas.	Creating a 3D stuffed toy 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 applique 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.
<i>Skills: Evaluate</i>	Reflecting on a finished product and comparing to their design.	Reflecting on a finished product, explaining likes and dislikes.	Evaluating an end product and thinking of other ways in which to create similar items.	Testing and evaluating an end product and giving point for further improvements.
<i>Knowledge</i>	To know that a design is a way of planning our idea before we start. To know that threading is putting one material through an object.	To know that 'joining technique' means connecting two pieces of material together. To know that there are various temporary methods of joining fabric by using staples, glue or pins. To understand that different techniques for joining materials can be used for different purposes. To understand that a template (or fabric pattern) is used to cut out the same shape multiple times. To know that drawing a design idea is useful to see how an idea will look.	To know that applique is a way of mending or decorating a textile by applying smaller pieces of fabric to larger pieces. To know that when two edges of fabric have been joined together it is called a seam. To know that it is important to leave space on the fabric for the seam. To understand that some products are turned inside out after sewing so the stitching is hidden.	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 soft toys are often made by creating appendages separately and then attaching them to the main body. To know that small, neat stitches which are pulled taut are important to ensure that the soft toy is strong and holds the stuffing securely.

Electrical Systems (KS2 Only)

			<u>Electric poster</u>	<u>Doodlers</u>
<i>Skills: Design</i>			Carry out research based on a given topic (e.g. Stone Age, Iron Age, Bronze Age) to develop a range of initial ideas. Generate a final design for the electric poster with consideration to the client's needs and design criteria.	Identifying factors that could be changed on existing products and explaining how these would alter the form and function of the product. Developing design criteria based on findings from investigating existing products.

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			Design an electric poster that fits the requirements of a given brief. Plan the positioning of the bulb (circuit component) and its purpose.	Developing design criteria that clarifies the target user.
<i>Skills: Make</i>			Create a final design for the electric poster. Mount the poster onto corrugated card to improve its strength and allow it to withstand the weight of the circuit on the rear. Measure and mark materials out using a template or ruler. Fit an electrical component (bulb). Learn ways to give the final product a higher quality finish (e.g. framing to conceal a roughly cut edge).	Altering a product's form and function by tinkering with its configuration. Making a functional series circuit, incorporating a motor. Constructing a product with consideration for the design criteria. Breaking down the construction process into steps so that others can make the product.
<i>Skills: Evaluate</i>			Learning to give and accept constructive criticism on own work and the work of others. Testing the success of initial ideas against the design criteria and justifying opinions. Revisiting the requirements of the client to review developing design ideas and check that they fulfil their needs.	Carry out a product analysis to look at the purpose of a product along with its strengths and weaknesses. Determining which parts of a product affect its function and which parts affect its form. Analysing whether changes in configuration positively or negatively affect an existing product. Peer evaluating a set of instructions to build a product.
<i>Knowledge: Technical</i>			To understand that an electrical system is a group of parts (components) that work together to transport electricity around a circuit. To understand common features of an electric product (switch, battery or plug, dials, buttons etc). To list examples of common electric products (kettle, remote control etc). To understand that an electric product uses an electrical system to work (function).	To know that series circuits only have one direction for the electricity to flow. To know when there is a break in a series circuit, all components turn off. To know that an electric motor converts electrical energy into rotational movement, causing the motor's axle to spin. To know a motorised product is one which uses a motor to function.

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			To know the name and appearance of a bulb, battery, battery holder and crocodile wire to build simple circuits.	
Knowledge: Additional			To understand the importance and purpose of information design. To understand how material choices (such as mounting paper to corrugated card) can improve a product to serve its purpose (remain rigid without bending when the electrical circuit is attached).	To know that product analysis is critiquing the strengths and weaknesses of a product. To know that 'configuration' means how the parts of a product are arranged.

Digital World (KS2 Only)

			<u>Electronic charm</u>	<u>Monitoring devices</u>
Skills: Design			Problem solving by suggesting potential features on a Micro:bit and justifying my ideas. Developing design ideas for a technology pouch. Drawing and manipulating 2D shapes, using computer-aided design, to produce a point of sale badge.	Researching (books, internet) for a particular (user's) animal's needs. Developing design criteria based on research. Generating multiple housing ideas using building bricks. Understanding what a virtual model is and the pros and cons of traditional and CAD modelling. Placing and manoeuvring 3D objects, using CAD. Changing the properties of, or combining one or more 3D objects, using CAD.
Skills: Make			Using a template when cutting and assembling the pouch. Following a list of design requirements. Selecting and using the appropriate tools and equipment for cutting, joining, shaping and decorating a foam pouch. Applying functional features such as using foam to create soft buttons. Writing a program to control (button press) and/or monitor (sense light) that will initiate a flashing LED algorithm.	Understanding the functional and aesthetic properties of plastics. Programming to monitor the ambient temperature and coding an (audible or visual) alert when the temperature rises above or falls below a specified range.
Skills: Evaluate			Analysing and evaluating an existing product. Identifying the key features of a pouch.	Stating an event or fact from the last 100 years of plastic history.

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				Explaining how plastic is affecting planet Earth and suggesting ways to make more sustainable choices. Explaining key functions in my program (audible alert, visuals). Explaining how my product would be useful for an animal carer including programmed features.
Knowledge: Technical			To understand that, in programming, a 'loop' is code that repeats something again and again until stopped. To know that a Micro:bit is a pocket-sized, codeable computer.	To know that a 'device' means equipment created for a certain purpose or job and that monitoring devices observe and record. To know that a sensor is a tool or device that is designed to monitor, detect and respond to changes for a purpose. To understand that conditional statements (and, or, if Booleans) in programming are a set of rules which are followed if certain conditions are met.
Knowledge: Additional			To know what the 'Digital Revolution' is and features of some of the products that have evolved as a result. To know that in Design and Technology the term 'smart' means a programmed product. To know the difference between analogue and digital technologies. To understand what is meant by 'point of sale display'. To know that CAD stands for 'Computer-aided design'.	To understand key developments in thermometer history. To know events or facts that took place over the last 100 years in the history of plastic, and how this is changing our outlook on the future. To know the 6Rs of sustainability. To understand what a virtual model is and the pros and cons of traditional vs CAD modelling.

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Year B	EYFS	Yr1&2	Yr3&4	Yr5&6
<u>Structures</u>				
	<u>Boats</u>	<u>Baby Bear's Chair</u>	<u>Pavilions</u>	<u>Playgrounds</u>
<i>Skills: Design</i>	Designing a junk model boat. Using knowledge from exploration to inform 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 stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect. Building frame structures designed to support weight.	Designing a playground featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs.
<i>Skills: Make</i>	Making a boat that floats and is waterproof, considering material choices.	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.	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.	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.
<i>Skills: Evaluate</i>	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.	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 structures made by the class. Describing what characteristics of a design and construction made it the most effective. Considering effective and ineffective designs.	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.
<i>Knowledge: Technical</i>	To know that 'waterproof' materials are those which do not absorb water.	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 understand what a frame structure is. To know that a 'free-standing' structure is one which can stand on its own.	To know that structures can be strengthened by manipulating materials and shapes.

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		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.		
<i>Knowledge:</i> <i>Additional</i>	To know that some objects float and others sink. To know the different parts of a boat.	To know that natural structures are those found in nature. To know that man-made structures are those made by people.	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 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 what a 'footprint plan' is. To understand what 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.

Mechanisms/ Mechanical systems

		<u>Fairground wheel</u>	<u>Making a moving monster</u>	<u>Making a slingshot car</u>	<u>Automata toys</u>
<i>Skills: Design</i>		Selecting a suitable linkage system to produce the desired motion. Designing a wheel.	Creating a class design criteria for a moving monster. Designing a moving monster for a specific audience in accordance with a design criteria.	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.	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.

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<i>Skills: Make</i>		Selecting materials according to their characteristics. Following a design brief.	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.	Measuring, marking, cutting and assembling with increasing accuracy. Making a model based on a chosen design.	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.
<i>Skills: Evaluate</i>		Evaluating different designs. Testing and adapting a design.	Evaluating own designs against design criteria. Using peer feedback to modify a final design.	Evaluating the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance.	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.
<i>Knowledge: Technical</i>		To know that different materials have different properties and are therefore suitable for different uses.	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 use to start something working. To know that an output is the movement that happens as a result of the input.	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 a object as it is forces through the air. To understand that the shape of a moving object will affect how it moves due to air resistance.	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.

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			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.		
<i>Knowledge:</i> <i>Additional</i>		To know the features of a ferris wheel include the wheel, frames, pods, a base, an axle and an axle holder. To know that it is important to test my design as I go along so that I can solve any problems that may occur.	To know some real-life objects that contain mechanisms.	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.	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.

Cooking and Nutrition

	<u>Soup</u>	<u>A balanced diet</u>	<u>Adapting a recipe</u>	<u>Come dine with me</u>
<i>Skills: Design</i>	Designing a soup recipe as a class. Designing soup packaging.	Designing a healthy wrap based on a food combination which works well together.	Designing a biscuit within a given budget, drawing upon previous taste testing judgements.	Writing a recipe, explaining the key steps, method and ingredients. Including facts and drawings from research undertaken.
<i>Skills: Make</i>	Chopping plasticine safely. Chopping vegetables with support.	Slicing food safely using the bridge or claw grip. Constructing a wrap that meets a design brief.	Following a baking recipe, from start to finish, including the preparation of ingredients. Cooking safely, following basic hygiene rules. Adapting a recipe to improve it or change it to meet new criteria (e.g. from savoury to sweet).	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.

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<i>Skills: Evaluate</i>	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.	Describing the taste, texture and smell of fruit and vegetables. Taste testing food combinations and final products. Describing the information that should be included on a label. Evaluating which grip was most effective.	Evaluating a recipe, considering: taste, smell, texture and appearance. Describing the impact of the budget on the selection of ingredients. Evaluating and comparing a range of food products. Suggesting modification to a recipe (e.g. this biscuit has too many raisins, and it is falling apart, so next time I will use less raisins).	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 when scoring others' dishes, and when evaluating their own throughout the planning, preparation and cooking process. Evaluating health and safety in production to minimise cross contamination.
<i>Knowledge</i>	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 'diet' means the food and drink that a person or animal usually eats. To understand what makes a balanced diet. To know where to find the nutritional information on packaging. To know that the five main food groups are: carbohydrates, fruits and vegetables, protein, dairy and foods high in fat and sugar. To understand that I should eat a range of different foods from each food group, and roughly know how much of each food group. To know that nutrients are substances in food that all living things need to make energy, grow and develop. To know that 'ingredients' means the items in a mixture or recipe. To know that I should only have a maximum of five teaspoons of sugar a day to stay healthy. To know that many food and drinks we do not expect to contain sugar; we call these 'hidden sugars'.	To know that the amount of an ingredient in a recipe is known as the 'quantity'. To know that it is important to use oven gloves when removing hot food from an oven. To know the following cooking techniques: sieving, creaming, rubbing method, cooling. To understand the importance of budgeting while planning ingredients for biscuits.	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).

Textiles

	<u>Bookmarks</u>	<u>Pouches</u>	<u>Fastenings</u>	<u>Waistcoats</u>
<i>Skills: Design</i>	Discussing what a good design needs.	Designing a pouch.	Writing design criteria for a product, articulating decisions made.	Designing a waistcoat in accordance to a specification linked to a set of design criteria.

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	Designing a simple pattern with paper. Designing a bookmark. Choosing from available materials.		Designing a personalised book sleeve.	Annotating designs, to explain their decisions.
<i>Skills: Make</i>	Developing fine motor/cutting skills with scissors. Exploring fine motor/threading and weaving (under, over technique) with a variety of materials. Using a prepared needle and wool to practise threading.	Selecting and cutting fabrics for sewing. Decorating a pouch using fabric glue 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.	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.	Using a template when cutting fabric to ensure they achieve the correct shape. Using pins effectively to secure a template to fabric without creases or bulges. Marking and cutting fabric accurately, in accordance with their design. Sewing a strong running stitch, making small, neat stitches and following the edge. Tying strong knots. Decorating a waistcoat, attaching features (such as applique) using thread. Finishing the waistcoat with a secure fastening (such as buttons). Learning different decorative stitches. Sewing accurately with evenly spaced, neat stitches.
<i>Skills: Evaluate</i>	Reflecting on a finished product and comparing to their design.	Troubleshooting scenarios posed by the teacher. Evaluating the quality of the stitching on others' 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 explaining why.	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.	Reflecting on their work continually throughout the design, make and evaluate process.
<i>Knowledge</i>	To know that a design is a way of planning our idea before we start. To know that threading is putting one material through an object.	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 my fingers when sewing.	To know that a fastening is something which holds two pieces of material together e.g. a zipper, toggle, button, press stud and Velcro. To know that different fastening types are useful for different purposes.	To understand that it is important to design clothing with the client/ target customer in mind. To know that using a template (or clothing pattern) helps to accurately mark out a design on fabric. To understand the importance of consistently sized stitches.

			To know that creating a mock up (prototype) of their design is useful for checking ideas and proportions.	
<u>Electrical Systems (KS2 Only)</u>				
			<u>Torches</u>	<u>Steady hand game</u>
<i>Skills: Design</i>			Designing a torch, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas.	Designing a steady hand game – identifying and naming the components required. Drawing a design from three different perspectives. Generating ideas through sketching and discussion. Modelling ideas through prototypes. Understanding the purpose of products (toys), including that is meant by ‘fit for purpose’ and ‘form over function.’
<i>Skills: Make</i>			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.	Constructing a stable base for a game. Accurately cutting, folding and assembling a net. Decorating the base of the game to a high quality finish. Making and testing a circuit. Incorporating a circuit into a base.
<i>Skills: Evaluate</i>			Evaluating electrical products. Testing and evaluating the success of a final product.	Testing own and others finished games, identifying what went well and making suggestions for improvement. Gathering images and information about existing children’s toys. Analysing a selection of existing children’s toys.
<i>Knowledge: Technical</i>			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 batteries contain acid, which can be dangerous if they leak. To know the names of the components in a basic series circuit, including a buzzer.

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			To know that an electrical circuit must be complete for electricity flow. To know that a switch can be used to complete and break an electrical circuit.	
Knowledge: Additional			To know the features of a torch: case, contacts, batteries, switch, reflector, lamp, lens. To know facts from the history and invention of the electric light bulb(s) – by Sir Joseph Swan and Thomas Edison.	To know that 'form' means the shape and appearance of an object. To know the difference between 'form' and 'function'. To understand that 'fit for purpose' means that a product works how it should and is easy to use. To know that form over purpose means that a product looks good but does not work very well. To know the importance of 'form follows function' when designing: the product must be designed primarily with the function in mind. To understand the diagram perspectives 'top view', 'side view' and 'back'.

Digital World (KS2 Only)

			<u>Mindful moments timer</u>	<u>Navigating the world</u>
Skills: Design			Writing design criteria for a programmed timer (Micro:bit). Exploring different mindfulness strategies. Applying the results of my research to further inform my design criteria. Developing a prototype case for my mindful moment timer. Using and manipulating shapes and clipart by using computer-aided design (CAD), to produce a logo. Following a list of design requirements.	Writing a design brief from information submitted by a client. Developing design criteria to fulfil the client's request. Considering and suggesting additional functions for my navigation tool. Developing a product idea through annotated sketches. Placing and manoeuvring 3D objects, using CAD. Changing the properties of, or combining one or more 3D objects, using CAD.
Skills: Make			Developing a prototype case for my mindful moment timer. Creating a 3D structure using a net. Programming a micro:bit in the Microsoft micro:bit editor, to time a set	Considering materials and their functional properties, especially those that are sustainable and recyclable (e.g. cork and bamboo). Explaining material choices and why they were chosen as part of a product concept.

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			number of seconds/ minutes upon button press.	Programming an N, E, S, W cardinal compass.
<i>Skills: Evaluate</i>			Investigating and analysing a range of timers by identifying and comparing their advantages and disadvantages. Evaluating my Micro:bit program against points on my design criteria and amending them to include any changes I made. Documenting and evaluating my project. Understanding what a logo is and why they are important in the world of design and business. Testing my program for bugs (errors in the code). Finding and fixing the bugs (debug) in my code).	Explaining how my program fits the design criteria and how it would be useful as part of a navigation tool. Developing an awareness of sustainable design. Identifying key industries that utilise 3D CAD modelling and explaining why. Describing how the product concept fits the client's request and how it will benefit the customers. Explaining the key functions in my program, including any additions. Explaining how my program fits the design criteria and how it would be useful as part of a navigation tool. Explaining the key functions and features of my navigation tool to the client as part of a product concept pitch.
<i>Knowledge: Technical</i>			To understand what variables are in programming. To know some of the features of a Micro:bit. To know what an algorithm is – a set of instructions to be followed by the computer. To know that it is important to check my code for errors (bugs). To know that a stimulator can be used as a way of checking your code works before installing in onto an electronic device.	To know that accelerometers can detect movement. To understand that sensors can be useful in products as they mean the product can function without human input.
<i>Knowledge: Additional</i>			To understand the terms 'ergonomic' and 'aesthetic'. To know that a prototype is a 3D model made out of cheap materials, that allows us to test design ideas and make better decisions about size, shape and materials.	To know that designers write design briefs and develop design criteria to enable them to fulfil a client's request. To know that 'multifunctional' means an object or product has more than one function.



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				To know that magnetometers are devices that measure the Earth's magnetic field to determine which direction you are facing.
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