Albert Bradbeer Primary Academy

Design and Technology Curriculum

Intention: At Albert Bradbeer our aim is to encourage children to use their creativity and imagination to design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. Through the DT curriculum, the children will be inspired by engineers, designers, chefs and architects to enable them to create a range of structures, mechanisms, textiles, electrical systems and food products with a real-life purpose. The children are given opportunities to explore, reflect upon and evaluate past and present design technology.

Overview

	Autumn 2	Spring 2	Summer 2
Nursery	Using and selecting materials/Joining materials/ Safety with tools		
Reception	Junk modelling/Textiles/Structures		
Year 1	**Unit 1**: Structures: Constructing Windmills **Unit 2**: Mechanisms: Moving story book	**Unit 3** :Mechanisms: Wheels and axles **Unit 4:** Textiles: Puppets	**Unit 5**: Cooking and Nutrition: Smoothies
Year 2	**Unit 1**: Mechanisms: Fairground wheel	**Unit 2** :Cooking and nutrition: Balanced Diet **Unit 3**:Structures:Baby bear's chair	**Unit 4**: Textiles: Pouches **Unit 5**: Mechanisms: Moving Monster
Year 3	**Unit 1:** Textiles: Cross stitch and applique **Unit 2**: Constructing a Castle	**Unit 3**:Cooking and nutrition: Eating Seasonally	**Unit 4:** Digital World: Wearable Technology **Unit 5:** Mechanical System: Pneumatic toys
Year 4	**Unit 1:** Mechanical Systems: Making a slingshot **Unit 2:** Textiles: Fastenings	**Unit 3**: Structures: Pavilions **Unit 5**: Electrical Systems: Torches	**Unit 4**: Cooking and Nutrition: adapting a Recipe
Year 5	**Unit 1**: Cooking and Nutrition: Developing a Recipe	**Unit 3:** Mechanical systems option 1: Making a popup book /Mechanical systems option 2: Gears and Pulleys **Unit 4:** Digital World: Monitoring Devices	**Unit 2**: Electrical Systems: Doodlers **Unit 5**: Structures: Bridges
Year 6	**Unit 1:** Structure: Playgrounds **Unit 2:** Mechanical Systems: Automata toys	**Unit 3:** Electrical systems: Steady hand game **Unit 5**: Cooking and nutrition: Come dine with me	**Unit 4**: Digital World: Navigating the world

	Intent	Implementation		Impact
In Foundation stage, Children will learn DT through first-hand experiences. They are encouraged to explore, observe, solve problems, think critically, make decisions and talk about why they have made those decisions.	**Nursery-** *Creating with Materials* To use a range of art and DT materials, joining and colour mixing purposefully and freely	**Substantive Knowledge:** • Model safety with tools and other equipment. • To understand that tools have a purpose and to select and use them carefully. • To be able to create designs and select materials adapting designs when necessary. • To join materials together. • To use the textures of materials in own designs. • To be aware of own personal preferences for design. • To understand why materials and tools have been selected in own designs.	**Vocabulary:** • Tape • Stick • Join • Fold • Cut • Junk modelling • Design • Weave • Stick • Glue • Paint • Brush • Spreader • Scissors • Wool • Sticky tape • Pencils • String • Card • Paper • Model	**Disciplinary Knowledge:** **Physical development** Develop fine motor skills so that they can use a range of tools competently, safely and confidently **EAD** **Opportunities to design** – exposure to designing own projects. **Use of materials**-Using and selecting materials. Explore a range of materials and join materials together. **Opportunities to draw** –exploration with chalk, wax crayons, pencil crayons, felt tips. **Opportunities to paint** –using a brush and or tools (sponges/rollers): printing with a range of resources e.g. string, veg, bubble wrap and natural materials; mixing and experimenting with the paint. **Characteristics of Effective Learning** Playing and exploring Active learning Creating and thinking critically
	Reception • Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.	**Substantive Knowledge:** **Junk modelling, textiles and structures** • Encourage independence of using tools and other equipment safely. • Use a variety of materials to join. • Weave a range of materials (wool/ribbons/string/wires)	**Vocabulary:** • Slot • Tabs • Sew • Junk modelling • Design • Make • Build • Evaluate • Knit	**Disciplinary Knowledge:** **Physical development** Develop fine motor skills so that they can use a range of tools competently, safely, confidently and independently. **EAD** **Opportunities to design, plan and evaluate** – planning, designing and evaluating own projects.

	• Share their creations, explaining the process they have used.	• Share own creations, explaining the process they have used. • Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.	• Weave • Hinge • Stick • Glue • Paint • Brush • Spreader • Scissors • Wool • Sticky tape • Pencils • String • Card/paper • Model	**Use of materials**-Using and selecting the correct materials independently. Explore a range of materials, join materials together and creating structures. **Opportunities to draw** – exposure to modelling and step by step pictures of how to draw. Use of chalk, wax crayons, pencil crayons, felt tips. **Opportunities to paint** –using a brush and or tools (sponges/rollers): printing with a range of resources e.g. string, veg, bubble wrap and natural materials; mixing and experimenting with the paint and techniques, such as drip painting/bubble painting/blow painting/ Experiment making sculptures with a range of resources e.g., with dough and clay, weaving **Characteristics of Effective Learning** Playing and exploring Active learning Creating and thinking critically
In KS1 **Design** • Design purposeful, functional, appealing products for themselves and other users based on design criteria • Generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where	**In Y1 the children will develop their knowledge and skills through designing, making and evaluating;** **Structures**: Constructing Windmills **Mechanisms**:	**Substantive Knowledge:** **Constructing a windmill** • 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.	**Vocabulary:** • Client • Design • Evaluation • Net • Stable • Strong • Test • Weak • windmill	**Disciplinary Knowledge:** **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.

appropriate, information and communication technology **Make** • Select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing] • Select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics **Evaluate** • Explore and evaluate a range of existing products • Evaluate their ideas and products against design criteria **Technical knowledge**	Moving story book/Wheels and axles **Textiles**: Puppets **Cooking and Nutrition**: Smoothies			• Creating supporting structures. • Cutting evenly and carefully.
		Making a moving story book • 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 •To know that in Design and technology we call a plan a 'design' **Assessing progress and understanding**	**Vocabulary** • Assemble • Design • Evaluation • Mechanism • Model • Sliders • Stencil • Target audience • Template • Test	**Disciplinary Knowledge:** **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. **Evaluating** • 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.
		Mechanisms-wheels and axles • 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. • To know some real-life items that use wheels such as wheelbarrows, hamster wheels and vehicles. .	**Vocabulary** • Axle • Axle holder • Chassis • Design • Evaluation • Fix • Mechanic • Mechanism • Model • Test • Wheel	**Disciplinary Knowledge:** **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.

• Build structures, exploring how they can be made stronger, stiffer and more stable • Explore and use mechanisms [for example, levers, sliders, wheels and axles], in their products **Cooking and nutrition** • Use the basic principles of a healthy and varied diet to prepare dishes • Understand where food comes from.		**Textiles: Puppets** • 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.	**Vocabulary** • Decorate • Design • Fabric • Glue • Model • Hand puppet • Safety pin • Staple pin • Staple • Stencil • Template	**Disciplinary Knowledge:** **Design** • Using a template to create a design for a puppet. **Make** • Cutting fabric neatly with scissors. • Using joining methods to decorate a puppet. • Sequencing steps for construction. **Evaluate** • Reflecting on a finished product, explaining likes and dislikes.
		Cooking and nutrition: Smoothies • To know that a blender is a machine which mixes ingredients together into a smooth liquid. • To know that a fruit has seeds. • 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 (e.g. roots: potatoes, leaves: lettuce, fruit: cucumber).	**Vocabulary** • blender • carton • fruit • healthy • ingredients • peel • peeler • recipe • slice • smoothie • stencil • template • vegetable	**Disciplinary Knowledge:** **Design** • Designing smoothie carton packaging by-hand or on ICT software. **Make** • Chopping fruit and vegetables safely to make a smoothie. • Identifying if a food is a fruit or a vegetable. • Learning where and how fruits and vegetables grow. **Evaluate** • Suggesting information to be included on packaging
	In Y2 the children will develop their knowledge and skills through designing, making and evaluating; **Structures**: Baby bears chair **Mechanisms**: Fairground wheel Moving monster **Textiles**:	**Substantive Knowledge:** **Mechanisms: Fairground wheel** ● 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 the features of a fairground wheel include the wheel, frame, pods, a base an axle and an axle holder.	**Vocabulary** • Axle • Decorate • Evaluation • Ferris wheel • Mechanism • Stable • Strong • Test • Waterproof • Weak	**Disciplinary Knowledge:** **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.

	Pouches **<u>Cooking and Nutrition</u>**: Balanced Diet			● 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. **<u>Make</u>** ● 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. **<u>Evaluate</u>** ● 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
		Substantive Knowledge: **Cooking and Nutrition : Balanced Diet** • 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 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 how much of each food group. • To know that 'ingredients' means the items in a mixture or recipe.	**Vocabulary** • Alternative • Diet • Balanced diet • Evaluation • Expensive • Healthy • Ingredients • Nutrients • Packaging • Refrigerator • Sugar • Substitute	**Disciplinary Knowledge:** **Design** • Designing a healthy wrap based on a food combination which works well together **Make** • Slicing food safely using the bridge or claw grip. • Constructing a wrap that meets a design brief. **Evaluate** • Taste testing food combinations and final products. • Describing the information that should be included on a label. • Evaluating which grip was most effective.
		Substantive Knowledge: **Structures:Baby Bear's Chair** • 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.	**Vocabulary** • Function • Man-made • Mould • Natural • Stable • Stiff • Strong • Structure • Test • Weak	**Disciplinary Knowledge:** **Design** • Generating and communicating ideas using sketching and modelling **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. **Evaluate** • Testing the strength of own structure. • Identifying the weakest part of a structure. • Evaluating the strength, stiffness and stability of own structure
		Substantive Knowledge: **Textiles: Pouches** • 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.	**Vocabulary** • Accurate • Fabric • Knot • Pouch • Running-stitch • Sew • Shape	**Disciplinary Knowledge:** **Design** • Designing a pouch. **Make** • Selecting and cutting fabrics for sewing. • Decorating a pouch using fabric glue or running stitch. • Threading a needle.

		• To know that a thimble can be used to protect my fingers when sewing	• Stencil • Template • Thimble	• Sewing running stitch, with evenly spaced, neat, even stitches to join fabric. • Neatly pinning and cutting fabric using a template. **Evaluate** • Troubleshooting scenarios posed by 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 why.
		Substantive Knowledge: **Mechanisms: Moving Monster** • 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. • To know some real-life objects that contain mechanisms. Progression of skills and knowledge Mechanisms / Mechanical systems	**Vocabulary** • Evaluation • Input • Lever • Linear motion • Linkage • Mechanical • Mechanism • Motion • Oscillating motion • Output • Pivot • Reciprocating motion • Rotary motion • Survey	**Disciplinary Knowledge:** **Design** •Creating a class design criteria for a moving monster. • Designing a moving monster for a specific audience in accordance with a design criteria. **Make** • 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** • Evaluating own designs against design criteria. • Using peer feedback to modify a final design.
In KS2 **Design** • 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	**In Y3 the children will develop their knowledge and skills through designing, making and evaluating;** **Structures**: Constructing a castle **Mechanisms**: Pneumatic toys	**Substantive Knowledge:** **Textiles: Cross stitch and applique** •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.	**Vocabulary** • Accurate • Applique • Cross-stitch • Cushion • Decorate • Detail • Fabric • Patch • Running stitch • Seam • Stencil • Stuffing	**Disciplinary Knowledge:** **Design** • Designing and making a template from an existing cushion and applying individual design criteria. **Make** • Following design criteria to create a cushion or 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 appliqué.

• Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design **Make** • Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately • Select from and use a wider range of materials and components, including construction	**Digital world:** Wearable technology **Textiles**: Cross Stitch and Applique **Cooking and Nutrition**: Eating seasonally		• Target audience • Target customer • Test	• Completing design ideas with stuffing and sewing the edges (Cushions) **Evaluate** • Evaluating an end product and thinking of other ways in which to create similar items
		Substantive Knowledge: **Constructing a Castle** • To understand that wide and flat based objects are more stable. • To understand the importance of strength and stiffness in structures • 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.	**Vocabulary** • 2D shapes • 3D shapes • Castle • Design criteria • Evaluate • Façade • Feature • Flag • Net • Recyclable • Scoring • Stable • Strong • Structure • Tab • Weak	**Disciplinary Knowledge:** **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. **Make** • Constructing a range of 3D geometric shapes using nets . • Creating special features for individual designs. • Making facades from a range of recycled materials. **Evaluate** • Evaluating own work and the work of others based on the aesthetic of the finished product and in comparison to the original design. • Suggesting points for modification of the individual designs

materials, textiles and ingredients, according to their functional properties and aesthetic qualities **Evaluate** • Investigate and analyse a range of existing products • Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work • Understand how key events and individuals in design and technology have helped shape the world Technical knowledge • Apply their understanding of how to strengthen, stiffen and reinforce more complex structures • Understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]		**Substantive Knowledge:** **Cooking and Nutrition-Eating Seasonally** • To know that vegetables and fruit grow in certain seasons. • 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 know that exported food is food which has been sent to another country.. • To know that eating seasonal foods can have a positive impact on the environment. • To know that similar coloured fruits and vegetables often have similar nutritional benefits. • To know that the appearance of food is as important as taste.	**Vocabulary** • Climate • Dry climate • Exported • Imported • Mediterranean climate • Nationality • Nutrients • Polar climate • Recipe • Seasonal food • Seasons • Temperature climate • Tropical climate	**Disciplinary Knowledge:** **Design** • Creating a healthy and nutritious recipe for a savoury tart using seasonal ingredients, considering the taste, texture, smell and appearance of the dish. **Make** • Knowing how to prepare themselves and a work space to cook safely in, learning the basic rules to avoid food contamination. • Following the instructions within a recipe. **Evaluate** • Establishing and using design criteria to help test and review dishes. • Describing the benefits of seasonal fruits and vegetables and the impact on the environment. • Suggesting points for improvement when making a seasonal tart.
		Substantive Knowledge: **Digital World-Wearable Technology** • 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, codable computer. • To know that a simulator can replicate the functions of an existing piece of technology. • To understand what is meant by 'point of sale display.' • To know that CAD stands for 'Computer-aided design'.	**Vocabulary** • Analogue • Badge • Design criteria • Digital revolution • Electronic • Feature • Function • Monitor • Point of scale • Analyse • Computer aided design (CAD) • Develop • Digital world • Electronic products • Feedback • Initiate • Net • Product • Annotate	**Disciplinary Knowledge:** **Design** • Problem solving by suggesting which features on a micro: bit might be useful and justifying my ideas. • Drawing and manipulating 2D shapes, using computer-aided design, to produce a point-of-sale badge. • Developing design ideas through annotated sketches to create a product concept. • Developing design criteria to respond to a design brief. **Make** • Following a list of design requirements. • Writing a program to control (button press) and/or monitor (sense light) that will initiate a flashing LED algorithm.

• Understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors] • Apply their understanding of computing to program, monitor and control their products **Cooking and nutrition** • Understand and apply the principles of a healthy and varied diet • Prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques • Understand seasonality, and know where and how a variety of ingredients are grown, reared,			• Control • Digital • Display • Fastening • Form • Layers • Opinion • Product design	
		Substantive Knowledge: **Mechanical System: Pneumatic Toys** • 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 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.	**Vocabulary** • Exploded-diagram • Function • Input • Lever • Linkage • Mechanism • Motion • Net • Output • Pivot • Pneumatic system • Thumbnail sketch	**Disciplinary Knowledge:** **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. **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. **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.

caught and processed	**In Y4 the children will develop their knowledge and skills through designing, making and evaluating;** **Structures**: Pavilions **Mechanisms**: Making a slingshot car **Textiles**: Fastenings **Electrical systems:** Torches **Cooking and Nutrition**: Adapting a recipe	**Substantive Knowledge:** **Mechanical Systems :Making a slingshot car** • 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. • 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.	**Vocabulary** • Aesthetic • Air resistance • Chassis • Design • Design criteria • Function • Graphics • Kinetic energy • Mechanism • Net • Structure	**Disciplinary Knowledge:** **Design** • 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** • Measuring, marking, cutting and assembling with increasing accuracy. • Making a model based on a chosen design. **Evaluate** • Evaluating the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance.
		Substantive Knowledge: **Textiles: Fastenings** • To know that a fastening is something which holds two pieces of material together for example a zipper, toggle, button, press stud and Velcro. • To know that different fastening types are useful for different purposes. • To know that creating a mock up (prototype) of their design is useful for checking ideas and proportions.	**Vocabulary** • Aesthetic • Assemble • Book sleeve • Design criteria • Evaluation • Fabric • Fastening • Mock up • Net • Running stitch • Stencil • Target audience • Target customer • Template	**Disciplinary Knowledge:** **Design** • Writing design criteria for a product, articulating decisions made. • Designing a personalised book sleeve. **Make** • Making and testing a paper template with accuracy and in keeping with the design criteria. • Measuring, marking and cutting fabric using a paper template. • Selecting a stitch style to join fabric, working neatly by sewing small, straight stitches. • Incorporating fastening to a design. **Evaluate** • Testing and evaluating an end product against the original design criteria. • Deciding how many of the criteria should be met for the product to be considered successful. • Suggesting modifications for improvement. • Articulating the advantages and disadvantages of different fastening types.

		Substantive Knowledge: **Structures: Pavilions** • 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 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.	**Vocabulary** • Aesthetic • Cladding • Design criteria • Evaluation • Frame structure • Function • Inspiration • Pavilion • Reinforce • Stable • Structure • Target audience • Target customer • Texture • Theme	**Disciplinary Knowledge:** **Design** • 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 • 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 structures made by the class. • Describing what characteristics of a design and construction made it the most effective. • Considering effective and ineffective designs.
		Substantive Knowledge: **Electrical Systems: Torches** • To know that an electrical circuit must be complete for electricity to flow. • To know that a switch can be used to complete and break an electrical circuit • 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.	**Vocabulary** • Battery • Bulb • Buzzer • Cell • Component • Conductor • Copper • Design criteria • Electrical item • Electricity • Electronic item • Function • Insulator • Series circuit • Switch • Test • Torch	**Disciplinary Knowledge:** **Design** • Designing a torch, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas **Make** • Making a torch with a working electrical circuit and switch. • Using appropriate equipment to cut and attach materials. • Assembling a torch according to the design and success criteria. **Evaluate** • Evaluating electrical products.

			• Wire	• Testing and evaluating the success of a final product.
		Substantive Knowledge: **Cooking and Nutrition-Adapting a recipe** • 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 understand the importance of budgeting while planning ingredients for biscuits. • To know that products often have a target audience.	**Vocabulary** • Adapt • Budget • Equipment • Evaluation • Flavour • Ingredients • Method • Net • Packaging • Prototype • Quantity • Recipe • Target audience • Unit of measurement • Utilities	**Disciplinary Knowledge:** **Design** • Designing a biscuit within a given budget, drawing upon previous taste testing judgements. **Make** • 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) **Evaluate** • Describing the impact of the budget on the selection of ingredients. • Evaluating and comparing a range of food products.
	In Y5 the children will develop their knowledge and skills through designing, making and evaluating; **Structures**: Bridges **Mechanisms**: Making a pop up book **Digital world:** Monitoring Devices **Textiles**:	**Substantive Knowledge:** **Cooking and Nutrition: Developing a Recipe** • To know that recipes can be adapted to suit nutritional needs and dietary requirements. • 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. • To know that coloured chopping boards can prevent cross-contamination. • To know that nutritional information is found on food packaging.	**Vocabulary:** • Beef • Cross-contamination • Diet • Ethical issues • Farm • Healthy • Ingredients • Methos • Nutrients • Packaging • Reared • Recipe • Research • Substitute • Supermarket • Vegan • Vegetarian • Welfare	**Disciplinary Knowledge:** **Design** • Adapting a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients. • Writing an amended method for a recipe to incorporate the relevant changes to ingredients. **Make** • 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 **Evaluate** • Identifying the nutritional differences between different products and recipes. • Identifying and describing healthy benefits of food groups

	Cooking and Nutrition: Developing a recipe **Electrical systems:** Doodlers			
		Substantive Knowledge: **Mechanical Systems-Making a pop up book** • 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 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	**Vocabulary:** • Aesthetic • Computer aided design (CAD) • Caption • Design • Design brief • Design criteria • Exploded-diagram • Function • Input • Linkage • Mechanism • Motion • Output • Pivot • Prototype • Slider • Structure • Template	**Disciplinary Knowledge:** **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. **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.
		Substantive Knowledge: **Digital world-Monitoring Devices** • 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. • 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.	**Vocabulary** • Alert • CAD • Device • Loop • Monitoring device • Programming comment • Synthetic • Ungroup • Versatile • Ambient • Design brief • Electronic • Model • Plastic	**Disciplinary Knowledge:** **Design** • 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 **Make** • Understanding the functional and aesthetic properties of plastics. • Programming to monitor the ambient temperature and coding an (audible or visual) alert

		• To understand what a virtual model is and the pros and cons of traditional vs CAD modelling.	• Sensor • Thermometer • Value • Workplane • Boolean • Design criteria • Group • Monitor • Plastic pollution sustainability • Tinkercard	when the temperature rises above or falls below a specified range. **Evaluate** • Stating an event or fact from the last 100 years of plastic history. • 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.
		Substantive Knowledge: **Electrical Systems-Doodlers** • 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. • 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.	**Vocabulary:** • Circuit component • Configuration • Current • Develop • DIY • Investigate • Motor • Motorised • Problem solve • Product analysis • Series circuit • Stable • Target user	**Disciplinary Knowledge:** **Design** • 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. • Developing design criteria that clarifies the target user **Make** • 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. **Evaluate** • 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.

		Substantive Knowledge: **Structures-Bridges** • 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 understand the difference between arch, beam, truss and suspension bridges. • To understand how to carry and use a saw safely.	**Vocabulary:** • Abutment • Accurate • Arched bridge • Beam bridge • Bridge • Compression • Coping saw • Evaluation • File • Forces • Mark out • Measure • Predict • Reinforce • Research • Right angle • Sandpaper • Set square • Shape • Strong structure • Suspension bridge • Tenon saw • Tension • Test • Truss bridge • Weak	**Disciplinary Knowledge:** **Design** • Designing a stable structure that is able to support weight. • Creating a frame structure with a focus on triangulation. **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. **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.
	In Y6 the children will develop their knowledge and skills through designing, making and evaluating; **Structures**: Playgrounds **Mechanisms**:	**Substantive Knowledge:** **Structures: Playgrounds** • To know that structures can be strengthened by manipulating materials and shapes. • 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.	**Vocabulary:** • Adapt • Apparatus • Bench hook • Cladding • Coping saw • Design • Dowel • Evaluation • Feedback • Idea • Jelutong	**Disciplinary Knowledge:** **Design** • 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** • 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.

	Automata Toys **Cooking and Nutrition**: Come dine with me **Elecrical systems:** Steady hand game **Digital world** Navigating the world		• Landscape • Mark out • Measure • Modify • Natural materials • Plan view • Playground • Prototype • Reinforce • Sketch • Strong • Structure • Tenon saw • Texture • User • Vice • Weak	• Using a range of materials to reinforce and add decoration to structures. **Evaluate** • 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.
		Substantive Knowledge: **Mechanical Systems: Automata Toys** • 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. • 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	**Vocabulary:** • Accurate • Assembly-diagram • Automata • Axle • Bench hook • Cam • Clamp • Component • Cutting list • Diagram • Dowel • Drill bits • Exploded-diagram • Finish • Follower • Frame • Function • Hand drill • Jelutong • Linkage • Mark out	**Disciplinary Knowledge:** **Design** ● 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** ● 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.

			• Measure • Mechanism • Model • Research • Right-angle • Set square • Tenon saw	● 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** ● 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.
		Substantive Knowledge: **Electrical Systems-Steady Hand game** • 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 • To understand the diagram perspectives 'top view', 'side view' and 'back'	**Vocabulary:** • Assemble • Battery • Battery pack • Bulb • Bulb holder • Buzzer • Circuit • Circuit symbol • Component • Conductor • Copper • Design • Design criteria • Evaluation • Function • Insulator • LED • Magnetic field • Net • Perspective drawing • Plan • Pliers	**Disciplinary Knowledge:** **Design** • 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. **Make** • 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. **Evaluate** • Testing own and others finished games, identifying what went well and making suggestions for improvement.

			• Prototype • Series circuit • Slide view • Steady hand game • Switch • Symmetrical • Target audience • Test • Top view • Wire cutters	
		Substantive Knowledge: **Cooking and Nutrition-Come dine with me** • 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).	**Vocabulary:** • Accompaniment • Adjective • Caption • Collaboration • Cookbook • Cross-contamination • Equipment • Farm • Flavour • Illustration • Imperative verb • Ingredients • Method • Nationality • Preparation • Processed • Reared • Recipe • Research • Storyboard • Target audience • Top-tips • Unit of measurements	**Disciplinary Knowledge:** **Design** • Writing a recipe, explaining the key steps, method and ingredients. • Including facts and drawings from research undertaken. **Make** • 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** • 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.

		Substantive Knowledge: **Digital world: Navigating the world** • 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. • 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. • To know that magnetometers are devices that measure the Earth's magnetic field to determine which direction you are facing.	**Vocabulary:** • Application • Cardinal compass • Design brief • Environmentally friendly • GPS tracker • Loop • Pedometer • Program • Smart • Biodegradable • Client • Design criteria • Equipment • If statement • Moudable • Product lifecycle • Recyclable • Smartphone • Boolean • Corrode • Duplicate • Function • Lightweight • Navigation • Product lifespan • Replica • Sustainable design	**Disciplinary Knowledge:** **Design** • 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. **Make** • Considering materials and their functional properties, especially those that are sustainable and recyclable (for example, cork and bamboo). • Explaining material choices and why they were chosen as part of a product concept. • Programming an N,E, S, W cardinal compass. **Evaluate** • 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. • Demonstrating a functional program as part of a product concept pitch.