Design and Technology at Moat Hall Primary Academy

Intent

At Moat Hall we intend 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.

Implementation

The design and technology national curriculum outlines 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.
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.
The Moat Hall scheme of work is a spiral curriculum, with key areas revisited again and again with increasing complexity, allowing pupils to revisit and build on their previous learning.
Lesson 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 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.
Every class carries out three Design and Technology projects per year, some of them are food-based projects. In Key Stage 2 children are given the opportunity to look at key events and individuals in Design and Technology that have helped shape the world.
Pupils will be involved in at least one project each year to develop their cooking skills and enhance their knowledge and understanding of healthy eating.

Impact

The expected impact of following the Moat Hall 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 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.

D & T overview of topics

2023 – 2024

	Autumn term	Spring term	Summer term
Reception	Soup (cooking and nutrition)	Bookmarks (textiles)	Junk modelling (structures)
Year 1	Making a moving book (mechanisms / mechanical systems)	Fruit and vegetables (cooking and nutrition)	Puppets (textiles)
Year 2	Baby Bear's Chair (structures)	Making a moving monster (mechanisms / mechanical systems)	Pouches (textiles)
Year 3	Constructing a castle (structures)	Egyptian collars (textiles)	Electronic charm (digital world)
Year 4	Making a slingshot car (mechanisms / mechanical systems)	Torches (electrical systems)	Adapting a recipe (cooking and nutrition)
Year 5	Bridges (structures)	Stuffed toys (textiles)	Monitoring devices (digital world)
Year 6	Automata cars (mechanisms / mechanical systems)	Steady hand game (electrical systems)	Come dine with me (cooking and nutrition)

Design Technology progression map

<table>
<tr><td colspan="2">EYFS</td></tr>
<tr><td>Expressive Arts and Design (Exploring and using media and materials)
Children safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</td><td>Expressive Arts and Design (Being Imaginative)
Children use what they have learnt about media and materials in original ways, thinking about uses and purposes. They represent their own ideas, thoughts and feelings through design and technology, art, music, dance, role play and stories.</td></tr>
<tr><td>Physical Development (Moving and Handling)
Children handle equipment and tools effectively, including pencils for writing.</td><td></td></tr>
<tr><td colspan="2">Key Stage 1 National Curriculum Expectations</td></tr>
<tr><td>Design
Pupils should be taught to:
Design purposeful, functional, appealing products for themselves and other users based on design criteria;
Generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology.
Make
Pupils should be taught to:
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
Pupils should be taught to:
Explore and evaluate a range of existing products;</td><td>Technical Knowledge
Pupils should be taught to:
Build structures, exploring how they can be made stronger, stiffer and more stable;
Explore and use mechanisms (for example, levers, sliders, wheels and axis), in their products.
Cooking and Nutrition
Pupils should be taught to:
Use the basic principles of a healthy and varied diet to prepare dishes;
Understand where food comes from.</td></tr>
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• Evaluate their own ideas and products against design criteria	
Key Stage 2 National Curriculum Expectations	
Design Pupils should be taught 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; • Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided designs. **Make** Pupils should be taught to: • 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 materials, textiles and ingredients according to their functional properties and aesthetic qualities. **Evaluate** Pupils should be taught to: • 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** Pupils should be taught to: • 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, cam, levers and linkages); • Understand and use electrical systems in tehri 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** Pupils should be taught to: • Understand and apply the principles of a healthy and varied diet; • Prepare and cook a variety of predominately savoury dishes using a range of cooking techniques; • Understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.

Progression in DT skills			
Reception & KS1			
Skills	Reception	Year 1	Year 2
Design	**Structures** • Make verbal plans and material choices • Use knowledge from exploration to inform design.	**Structures** • Learn the importance of a clear design criteria. • Include individual preferences and requirements in a design.	**Structures** • Generate and communicating ideas using sketching and modelling. • Learn about different types of structures found in the natural world and in everyday objects.
	[redacted]	**Mechanisms/mechanical systems** • Explain how to adapt mechanisms, using bridges or guides to control the movement. • Create clearly labelled drawings that illustrate movement.	**Mechanisms/mechanical systems** • Select a suitable linkage system to produce the desired motion. • Design for a given audience.
		Cooking and nutrition • Designing packaging.	**Cooking and nutrition** • Design a wrap based on food combination which works well.
	Textiles • Discuss what a good design needs. • Design a simple pattern with paper. • Choose from available materials	**Textiles** • Use a template	**Textiles** • Design a pouch
Make	**Structures** • Improve fine motor/scissor skills with a variety of materials. • Join materials in a variety of ways • Describe their junk model and how they intend to put it together	**Structures** • Make stable structures from card and glue. • Learn how to turn 2D nets into 3D shapes	**Structures** • Make a structure according to design criteria. • Create joints and structures from paper/card and tape. • Build a strong and stiff structure by folding paper.
	[redacted]	**Mechanisms/mechanical systems** • Follow a design to create moving models that use levers and sliders. • Adapt mechanisms when they do not work.	**Mechanisms/mechanical systems** • Select materials according to their characteristics. • Make linkages using card for levers and split pins for pivots. • Experiment with linkages and card.

		Cooking and nutrition • Chop fruit and vegetables safely.	**Cooking and nutrition** • Slice food safely using the bridge or claw grip.
	Textiles • Explore threading and weaving. • Use a prepared needle and wool to practice threading.	**Textiles** • Cut fabric neatly with scissors • Use joining methods to decorate.	**Textiles** • Select and cut fabrics for sewing. • Decorate using fabric glue or running stitch. • Thread a needle • Sew running stitch. • Neatly pin and cut fabric using a template.
Evaluate	**Structures** • Give verbal evaluation of their own and others' junk models. • Check if their model matches their plan. • Describe their favourite and least favourite part of the model. • Make predictions about models. • Test their models.	**Structures** • Evaluate product and test whether the structure is strong and stable. • Suggest points for improvements.	**Structures** • Explore the features of structures. • Compare stability of different shapes. • Test the strength and identify weaknesses of own structures. • Evaluate strength, stiffness and stability of own structure.
		Mechanisms/mechanical systems • Test the finished product. • Review the success of the product.	**Mechanisms/mechanical systems** • Evaluate the different designs • Test and adapt the designs. • Use peer feedback to modify final design.
		Cooking and nutrition • Taste and evaluate different food combinations. • Describe appearance, smell and taste.	**Cooking and nutrition** • Describe the taste, texture and smell of fruit and vegetables. • Taste test food combinations. • Evaluate which grip was most effective.
	Textiles • Reflect on finished product and compare to their design.	**Textiles** • Reflect on the finished product, explaining likes and dislikes.	**Textiles** • Evaluate the quality of the stitching on others' work. • Identify aspects of their peers' work that they particularly like and why.

Technical	**Structures** • To know there are a range of different materials that can be used to make a model and that they are all slightly different. • Make simple suggestions to fix their junk model.	**Structures** • 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. • To understand that axles are used in structures and mechanisms to make parts turn in a circle. • To begin to understand that different structures are used for different purposes. • To know that a structure is something that has been made and put together.	**Structures** • To know that shapes and structures with wide, flat bases or legs are the most stable. • To understand that the shape of a structure affects its strength. • To know that materials can be manipulated to improve strength and stiffness. • To know that a structure is something which has been formed or made from parts. • To know that a 'stable' structure is one which is firmly fixed and unlikely to change or move. • To know that a 'strong' structure is one that does not break easily. • To know that a 'stiff' structure or material is one which does not bend easily.

	[redacted]	**Mechanisms/mechanical systems** • 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 the bits of card that purposefully restrict the movement of the slider.	**Mechanisms/mechanical systems** • 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 movements. • To know that there is always an input and output in a mechanism. • To know that an input is the energy and 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.

	Cooking and nutrition • To know that soup is ingredients blended together. • To know that vegetables are grown. • To recognize 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.	**Cooking and nutrition** • Understanding the difference 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).	**Cooking and nutrition** • 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 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 foods and drinks we do not expect to contain sugar do; we call these 'hidden' sugars.

	Textiles • 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.	**Textiles** • 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.	**Textiles** • 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.

Progression in DT skills		
Lower KS2		
Skills	Year 3	Year 4
Design	**Structures** • Design with key features to appeal to a specific person/purpose. • Draw and label a design using 2D shapes.	**Structures** • Design a stable structure that is aesthetically pleasing and select materials to create a desired effect.
	Mechanisms / mechanical Systems • Design a toy which uses a pneumatic system. • Develop design criteria from a design brief. • Generate ideas using thumbnail sketches and exploded diagrams. • Learn that different types of drawings are used in design to explain ideas clearly.	**Mechanisms / mechanical Systems** • Design a shape that reduces air resistance. • Draw a net to create a structure form. • Choose shapes that increase or decrease speed as a result of air resistance. • Personalise a design.
	Electrical Systems • Carry out research based on a given topic to develop a range of initial ideas. • Generate a final design with consideration to the client's needs and design criteria.	**Electrical Systems** • Design an item, giving consideration to the target audience and creating both design and success criteria focusing on features of individual design ideas.
	Cooking and Nutrition	**Cooking and Nutrition**

	• Create a healthy and nutritious recipe using seasonal ingredients, considering the taste, texture, smell and appearance of the dish.	• Design a biscuit within a given budget, drawing upon previous taste testing judgements.
	Textiles • Design and make a template from an existing item and apply individual design criteria.	**Textiles** • Write design criteria for a product, articulating decisions made.
	Digital World • Problem solve by suggesting potential features on a Micro: bit and justify ideas. • Develop design ideas • Draw and manipulate 2D shapes, using computer-aided design.	**Digital World** • Write design criteria for a programmed timer (Micro:bit). • Explore different mindfulness strategies. • Apply the results of research to further inform the design criteria. • Develop a prototype. • Use and manipulate shapes and clipart by using computer-aided design (CAD), to produce a logo. • Follow a list of design requirements.
Make	**Structures** • Construct a range of 3D geometric shapes using nets. • Create special features for individual designs. • Make facades from a range of recycled materials.	**Structures** • Create a range of different shaped frame structures. • Make a variety of free-standing frame structures of different shapes and sizes. • Select appropriate materials to build a strong structure and cladding. • Reinforce corners to strengthen a structure. • Create a design in accordance with a plan. • Learn to create different textural effects with materials.
	Mechanisms / mechanical Systems • Create a pneumatic system to create a desired motion. • Build secure housing for a pneumatic system. • Use syringes and balloons to create different types of pneumatic systems to make a functional and appealing pneumatic toy. • Select materials due to their functional and aesthetic characteristics. • Manipulate materials to create different effects by cutting, creasing, folding and weaving.	**Mechanisms / mechanical Systems** • Measure, mark, cut and assemble with increasing accuracy. • Make a model based on a chosen design.
	Electrical Systems • Measure and mark materials out using a template or ruler. • Fit an electrical component (bulb).	**Electrical Systems** • Make a torch with a working electrical circuit and switch. • Use appropriate equipment to cut and attach materials.

	• Learn ways to give the final product a higher quality finish (e.g. framing to conceal a roughly cut edge).	
	Cooking and Nutrition • Know how to prepare themselves and a work space to cook safely in, learning the basic rules to avoid food contamination. • Follow the instructions within a recipe.	**Cooking and Nutrition** • Follow a baking recipe, from start to finish, including the preparation of ingredients. • Cook safely, following basic hygiene rules. • Adapt a recipe to improve it or change it to meet new criteria.
	Textiles • Follow design criteria. • Select and cut fabrics with ease using fabric scissors. • Thread needles with greater independence. • Tie knots with greater independence. • Sew cross stitch to join fabric. • Decorate fabric using appliqué. • Complete design ideas with stuffing and sewing the edges.	**Textiles** • Make and test a paper template with accuracy and in keeping with the design criteria. • Measure, mark and cut fabric using a paper template. • Select a stitch style to join fabric. • Work neatly by sewing small, straight stitches. • Incorporate a fastening to a design.
	Digital World • Use a template when cutting and assembling. • Follow a list of design requirements. • Select and use the appropriate tools and equipment for cutting, joining, shaping and decorating. • Apply functional features.	**Digital World** • Develop a prototype case. • Create a 3D structure using a net. • Program micro:bit in the Microsoft micro:bit editor, to time a set number of seconds/minutes upon button press.
Evaluate	**Structures** • Evaluate own work and the work of others based on the aesthetic of the finished product compared to the original design. • Suggest points for modification of the individual designs.	**Structures** • Evaluate structures made by the class. • Describe what characteristics of a design and construction made it the most effective. • Consider effective and ineffective designs.
	Mechanisms / mechanical Systems • Use the views of others to improve designs. • Test and modify the outcome, suggesting improvements. • Understand the purpose of exploded-diagrams through the eyes of a designer and their client.	**Mechanisms / mechanical Systems** • Evaluate the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance.
	Electrical Systems • Learn to give and accept constructive criticism on own work and the work of others. • Test the success of initial ideas against the design criteria and justify opinions.	**Electrical Systems** • Evaluate electrical products. • Test and evaluate the success of a final product.

	• Revisit the requirements of the client to review developing design ideas and check that they fulfil their needs.	
	Cooking and Nutrition • Establish and use design criteria to help test and review dishes. • Describe the benefits of seasonal fruits and vegetables and the impact on the environment. • Suggest points for improvement.	**Cooking and Nutrition** • Evaluate a recipe, considering: taste, smell, texture and appearance. • Describe the impact of the budget on the selection of ingredients. • Evaluate and compare a range of food products. • Suggest modifications to a recipe.
	Textiles • Evaluate an end product and think of other ways in which to create similar items.	**Textiles** • Test and evaluate an end product against the original design criteria. • Decide how many of the criteria should be met for the product to be considered successful. • Suggest modifications for improvement. • Articulate the advantages and disadvantages of different fastening types.
	Digital World • Analyse and evaluate an existing product.	**Digital World** • Investigate and analyse a range of timers by identifying and comparing their advantages and disadvantages. • Evaluate my Micro:bit program against points on my design criteria and amend them to include any changes. • Document and evaluate my project. • Understand what a logo is and why they are important in the world of design and business. • Test my program for bugs (errors in the code). • Find and fix the bugs (debug) in the code.
Technical	**Structures** • To understand that wide and flat based objects are more stable. • To understand the importance of strength and stiffness in structures.	**Structures** • To understand what a frame structure is. • To know that a ‘free-standing’ structure is one which can stand on its own.
	Mechanisms / mechanical Systems • 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.	**Mechanisms / mechanical Systems** • To understand that all moving things have kinetic energy. • To understand that kinetic energy is the energy that something (object/person) has by being in motion.

		• To know that air resistance is the level of drag on an object as it is forced through the air. • To understand that the shape of a moving object will affect how it moves due to air resistance.
	Electrical Systems • 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 the name and appearance of a bulb, battery, battery holder and crocodile wire to build simple circuits.	**Electrical Systems** • To understand that electrical conductors are materials which electricity can pass through. • To understand that electrical insulators are materials which electricity cannot pass through. • To know that a battery contains stored electricity that can be used to power products. • To know that an electrical circuit must be complete for electricity to flow. • To know that a switch can be used to complete and break an electrical circuit.
	Cooking and Nutrition • 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 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 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.	**Cooking and Nutrition** • 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.

	Textiles • 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.	**Textiles** • 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.
	Digital World • 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.	**Digital World** • To understand what variables are in programming. • To know some of the features of a Micro:bit. • To know that 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 simulator can be used as a way of checking your code works before installing it onto an electronic device.

Progression in DT skills		
Upper KS2		
Skills	Year 5	Year 6
Design	**Structures** • Design a stable structure that is able to support weight. • Create a frame structure with a focus on triangulation.	**Structures** • Design a playground featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs.
	Mechanisms / mechanical Systems • Design a pop-up book which uses a mixture of structures and mechanisms. • Name each mechanism, input and output accurately. • Storyboard ideas for a book.	**Mechanisms / mechanical Systems** • Experiment with a range of cams, creating a design for an automata toy based on a choice of cam to create a desired movement. • Understand how linkages change the direction of a force. • Make things move at the same time. • Understand and draw cross-sectional diagrams to show the inner-workings of the design.

	Electrical Systems • Identify factors that could be changed on existing products and explain how these would alter the form and function of the product. • Develop design criteria based on findings from investigating existing products. • Develop design criteria that clarifies the target user.	**Electrical Systems** • Draw a design from three different perspectives. • Generate ideas through sketching and discussion. • Model ideas through prototypes. • Understand the purpose of products (toys), including what is meant by 'fit for purpose' and 'form over function'.
	Cooking and Nutrition • Adapt a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients. • Write an amended method for a recipe to incorporate the relevant changes to ingredients. • Design appealing packaging to reflect a recipe.	**Cooking and Nutrition** • Write a recipe, explaining the key steps, method and ingredients. • Include facts and drawings from research undertaken.
	Textiles • Consider the proportions of individual components.	**Textiles** • Annotate designs, to explain decisions.
	Digital World • Develop design criteria based on research. • Generate multiple housing ideas using building bricks. • Understand what a virtual model is and the pros and cons of traditional and CAD modelling. • Place and manoeuvre 3D objects, using CAD. • Change the properties of, or combine one or more 3D objects, using CAD.	**Digital World** • Write a design brief from information submitted by a client. • Develop design criteria to fulfil the client's request. • Consider and suggest additional functions for a navigation tool. • Develop a product idea through annotated sketches. • Place and manoeuvre 3D objects, using CAD. • Change the properties of, or combine one or more 3D objects, using CAD.
Make	**Structures** • Make a range of different shaped beam bridges. • Use triangles to create truss bridges that span a given distance and support a load. • Build a wooden bridge structure. • Independently measure and mark wood accurately. • Select appropriate tools and equipment for particular tasks. • Use the correct techniques to saw safely. • Identify where a structure needs reinforcement and using card corners for support. • Explain why selecting appropriating materials is an important part of the design process.	**Structures** • Build a range of play apparatus structures drawing upon new and prior knowledge of structures. • Measure, mark and cut wood to create a range of structures. • Use a range of materials to reinforce and add decoration to structures.

	• Understand basic wood functional properties.	
	Mechanisms / mechanical Systems • Follow a design brief to make a pop-up book, neatly and with focus on accuracy. • Make mechanisms and/or structures using sliders, pivots and folds to produce movement. • Use layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result.	**Mechanisms / mechanical Systems** • Measure, mark and check the accuracy of the jelutong and dowel pieces required. • Measure, mark and cut components accurately using a ruler and scissors. • Assemble components accurately to make a stable frame. • Understand that for the frame to function effectively the components must be cut accurately and the joints of the frame secured at right angles. • Select appropriate materials based on the materials being joined and the speed at which the glue needs to dry/set.
	Electrical Systems • Alter a product's form and function by tinkering with its configuration. • Make a functional series circuit, incorporating a motor. • Construct a product with consideration for the design criteria. • Break down the construction process into steps so that others can make the product.	**Electrical Systems** • Construct a stable base for a game. • Accurately cut, fold and assemble a net. • Decorate the base of the game to a high-quality finish. • Make and test a circuit. • Incorporate a circuit into a base.
	Cooking and Nutrition • Cut and prepare vegetables safely. • Use equipment safely, including knives, hot pans and hobs. • Know how to avoid cross-contamination. • Follow a step by step method carefully to make a recipe.	**Cooking and Nutrition** • Follow a recipe, including using the correct quantities of each ingredient. • Adapt a recipe based on research. • Work to a given timescale. • Work safely and hygienically with independence.
	Textiles • Measure, mark and cut fabric accurately and independently. • Create strong and secure blanket stitches when joining fabric. • Thread needles independently. • Use appliqué to attach pieces of fabric decoration. • Sew blanket stitch to join fabric. • Apply blanket stitch so the spaces between the stitches are even and regular.	**Textiles** • Use a template when cutting fabric to ensure they achieve the correct shape. • Use pins effectively to secure a template to fabric without creases or bulges. • Mark and cut fabric accurately, in accordance with their design. • Sew a strong running stitch, making small, neat stitches and following the edge. • Tie strong knots. • Learn different decorative stitches.

		• Sew accurately with evenly spaced, neat stitches.
	Digital World • Understand the functional and aesthetic properties of plastics. • Program to monitor the ambient temperature and coding an (audible or visual) alert when the temperature rises above or falls below a specified range.	**Digital World** • Consider materials and their functional properties, especially those that are sustainable and recyclable (for example, cork and bamboo). • Explain material choices and why they were chosen as part of a product concept. • Program an N, E, S, W cardinal compass.
Evaluate	**Structures** • Adapt and improve own bridge structure by identifying points of weakness and reinforcing them as necessary. • Suggest points for improvements for own bridges and those designed by others.	**Structures** • Improve a design plan based on peer evaluation. • Test and adapt a design to improve it as it is developed. • Identify what makes a successful structure.
	Mechanisms / mechanical Systems • Evaluate the work of others and receiving feedback on own work. • Suggest points for improvement.	**Mechanisms / mechanical Systems** • Evaluate the work of others and receiving feedback on own work. • Apply points of improvement to their toys. • Describe changes they would make/do if they were to do the project again.
	Electrical Systems • Carry out a product analysis to look at the purpose of a product along with its strengths and weaknesses. • Determine which parts of a product affect its function and which parts affect its form. • Analyse whether changes in configuration positively or negatively affect an existing product. • Peer evaluate a set of instructions to build a product.	**Electrical Systems** • Test own and others finished games, identify what went well and make suggestions for improvement. • Gather images and information about existing children's toys. • Analyse a selection of existing children's toys.
	Cooking and Nutrition • Identify the nutritional differences between different products and recipes. • Identify and describe healthy benefits of food groups.	**Cooking and Nutrition** • Evaluate a recipe, consider: taste, smell, texture and origin of the food group. • Taste test and score final products. • Suggest and write up points of improvements when scoring others' dishes, and when evaluating their own throughout the planning, preparation and cooking process. • Evaluate health and safety in production to minimise cross contamination.
	Textiles	**Textiles**

	• Test and evaluate an end product and giving point for further improvements.	• Reflect on their work continually throughout the design, make and evaluate process.
	Digital World • State an event or fact from the last 100 years of plastic history. • Explain how plastic is affecting planet Earth and suggest ways to make more sustainable choices. • Explain key functions in my program (audible alert, visuals). • Explain how my product would be useful for an animal carer including programmed features.	**Digital World** • Explain how my program fits the design criteria and how it would be useful as part of a navigation tool. • Develop an awareness of sustainable design. • Identify key industries that utilise 3D CAD modelling and explaining why. • Describe how the product concept fits the client's request and how it will benefit the customers. • Explain the key functions in my program, including any additions. • Explain the key functions and features of my navigation tool to the client as part of a product concept pitch. • Demonstrate a functional program as part of a product concept pitch.
Technical	**Structures** • 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.	**Structures** • To know that structures can be strengthened by manipulating materials and shapes.
	Mechanisms / mechanical Systems • 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.	**Mechanisms / mechanical Systems** • 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.
	Electrical Systems • 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.	**Electrical Systems** • 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 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.	
	Cooking and Nutrition • 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.	**Cooking and Nutrition** • 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 • 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.	**Textiles** • 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.
	Digital World • 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.	**Digital 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.