Burford Primary School: **Design Technology - Curriculum sequence and progression of skills**

	EYFS Physical Development	Lower School Vocabulary		
Vocabulary	cutting, tools, hammers, safe, 3D, slot, join, baking, decorating, modelling, junk. build, scene, masks, puppets, sewing, cooking, handwashing, ingredients	**Chop, Mash and Mash:** appearance, chop, dairy, flowering, head, fruit, grate, leaf, mash, peel, product, root, salad, salad dressing, sandwich, seed, slice, stem, tear, texture, tool **Rio:** agogos, bunting, carnival, cutting, embellishments, fabric, headdress, join, measure, sticking, stitching, textiles, **Beach Hut:** apex, roof, beach hut, bench hook, box frame, bunting, butt joint, cladding, design criteria, dowel, frame, structure, G clamp, joining, junior hacksaw, mitre joint, sand, score, stilts, strengthen, triangular corner **Moon Zoom:** axle, connect, design criteria, improve, join, junk materials, moon buggies, rod, space rockets, spindle, sturdy, test, voids, wheels **Cut, Stitch and Join:** appliqué, bag tag, Binca, blanket stitch, button, designer, embellishment, fabric, kitchenware, motif, needle, running stitch, sequin, sewing pattern, template, textile, thread, vintage, whip stitch designer: Cath Kidston **Bright Lights Big City:** baking, ingredients, measure, flour, Tudor-style houses, buildings, moving model, rotating, London Eye, construction kit, shape, structure, spindles, axle, sketch		
	EYFS Learning	**Lower School Learning**		
National Curriculum	ELG: Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function ELG: Use a range of small tools, including scissors and paint brushes ELG: Share their creations, explaining the process they have used ELG: Return to and build on their previous learning, refining ideas and developing their ability to represent them	**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 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:** 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.		
Knowledge Content	**Move it!** Papers, fabrics and recycled materials can be used to create 3D forms, including tearing, cutting and sticking. **Materials can be soft and easy to shape, like dough, or harder and more difficult to shape, like wire.** **Signs of Spring:** Materials can be soft and easy to shape, like dough, or harder and more difficult to shape, like wire. **Different materials are suitable for different purposes, such as construction kits for modelling and ingredients for baking.** **Winter Wonderland:** Different tools are needed for different tasks. **Vehicles and machines have wheels and axles to help them move.** **Big Wide World:** There are healthy and unhealthy foods. Fruit and vegetables are an important part of a healthy diet. **Sparkle and Shine:** **Rules keep us safe when using equipment. Safety rules include always listening carefully and following simple instructions, using equipment only for the tasks they are designed for and washing hands before touching food.** Materials can be soft and easy to shape, like dough, or harder and more difficult to shape, like wire. Papers, fabrics and junk materials can be used to create 3D models, including tearing, cutting and sticking. **All about Me:** **Recognise that it is possible to change and alter their designs and ideas as they are making them.** Different materials have different properties and can be used for different purposes.	**Chop, slice and mash:** *Sources of food; Food preparation techniques; Hygiene rules; Designing and making salads and sandwiches* Design criteria are the explicit goals that a project must achieve. **The importance of a product may be that it fulfils its goals and performs a useful purpose.** Rules are made to keep people safe from danger. Safety rules include always listening carefully and following instructions, using equipment only as and when directed, wearing protective clothing if appropriate and washing hands before touching food. **Using non-standard measures is a way of measuring that does not involve reading scales. For example, weight may be measured using a balance scale and lumps of plasticine. Length may be measured in the number of handspans or pencils laid end to end.** Fruit and vegetables are an important part of a healthy diet. It is recommended that people eat at least five portions of fruit and vegetables every day. **Fruits and vegetables can be mixed to make a healthy salad. Salad dressings can improve the flavour of salads.** Knives are used for slicing and chopping, a grater is used for grating, a vegetable peeler is used for peeling and a masher is used for crushing. **Some foods come from animals, such as meat, fish and dairy products. Other foods come from plants, such as fruit, vegetables, grains, beans and nuts.** A strength is a good quality of a piece of work. A weakness is an area that could be improved. **Rio:** *Carnival instruments; Making flags;* Different materials can be used for different purposes, depending on their properties. For example, cardboard is a stronger building material than paper. Plastic is light and can float. Clay is heavy and will sink. **Specific tools are used for particular purposes. For example, scissors are used for cutting and glue is used for sticking.** Design criteria are the explicit goals that a project must achieve.	**Beach Hut:** *Structures – strengthening and joining* Properties of components and materials determine how they can and cannot be used. For example, plastic is shiny and strong but it can be difficult to paint. **Finished products can be compared with design criteria to see how closely they match. Improvements can then be planned.** Structures can be made stronger, stiffer and more stable by using cardboard rather than paper and triangular shapes rather than squares. A broader base will also make a structure more stable. **Ideas can be communicated in a variety of ways, including written work, drawings and diagrams, modelling, speaking and using information and communication technology.** Different tools have characteristics that make them suitable for specific purposes. For example, scissors are used for cutting paper because they have sharp, metal blades that can cut through thin materials. **Tools for working with wood include a junior hacksaw, for cutting; a bench hook, for supporting the wood and as a guide to cut; and a G clamp, for holding the bench hook and wood securely.** **Moon Zoom:** *Designing and making space-themed vehicles; Evaluating toys; Using mechanisms* Different materials can be used for different purposes, depending on their properties. For example, cardboard is a stronger building material than paper. Plastic is light and can float. Clay is heavy and will sink. **Everyday products are objects that are used routinely at home and school, such as a toothbrush, cup or pencil. All products are designed for a specific purpose.** A strength is a good quality of a piece of work. A weakness is an area that could be improved. **An axle is a rod or spindle that passes through the centre of a wheel to connect two wheels.** Design criteria are the explicit goals that a project must achieve. **Two products can be compared by looking at a set of criteria and scoring both products against each one.** Different materials are suitable for different purposes, depending on their specific properties eg glass is transparent, so it is suitable to be used for windows.	**Cut, Stitch and Join:** *Everyday fabric products; Significant designer – Cath Kidston; Sewing patterns; Running stitch; Adding embellishments; Designing and making a bag tag* Embellishment is a decorative detail or feature added to something to make it more attractive. **Properties of components and materials determine how they can and cannot be used eg plastic is shiny and strong but it can be difficult to paint.** Products can be compared by looking at particular characteristics of each and deciding which is better suited to the purpose. **Products can be improved in different ways, such as making them easier to use, more hardwearing or more attractive.** There are many fabric home products. These include bedding, tea towels, cushions, tea cosies, toiletry bags and other containers. **Finished products can be compared with design criteria to see how closely they match. Improvements can then be planned.** Many key individuals have helped to shape the world. These include engineers, scientists, designers, inventors and many other people in important roles. **A brand is a name, term, design, or symbol identifying a seller's products or services. Famous brands include Coca Cola, Kellogg's and Apple.** Cath Kidston is an influential British home products brand famous for making textiles, clothing, and furnishings. The Cath Kidston brand is significant as her products are popular worldwide, inspiring modern craftspeople and designers. **Ideas can be communicated in a variety of ways, including written work, drawings and diagrams, modelling, speaking and using information and communication technology.** Different tools have characteristics that make them suitable for specific purposes. For example, scissors are used for cutting paper because they have sharp, metal blades that can cut through thin materials. **A sewing pattern is a template of the parts needed to make a garment or product. Pattern pieces are usually made from paper.** A running stitch is a basic stitch that is used to join fabric. It is made by passing a needle in and out of fabric at an even distance. **Bright Lights Big City:** *Exploring mechanisms; Constructing moving models; Understanding where food comes from; Designing and making souvenirs; Models of London landmarks* **Different materials can be used for different purposes, depending on their properties. For example, cardboard is a stronger building material than paper. Plastic is light and can float. Clay is heavy and will sink.** Using non-standard measures is a way of measuring that does not involve reading scales. For example, weight may be measured using a balance scale and lumps of plasticine. Length may be measured in the number of handspans or pencils laid end to end. **Design criteria are the explicit goals that a project must achieve.** Specific tools are used for particular purposes. For example, scissors are used for cutting and glue is used for sticking. **Some foods come from animals, such as meat, fish and dairy products. Other foods come from plants, such as fruit, vegetables, grains, beans and nuts.** A strength is a good quality of a piece of work. A weakness is an area that could be improved

Upper School Vocabulary

Vocabulary

Fresh Food, Good Food: best before date, canning, chop, cling film, decay, design criteria, drying, food poisoning, freezing, grate, healthy snack, mash, microorganism, net, packaging, pasteurising, peel, pickling, preservation, refrigerating, salting, slice, tear, use by date
designers, inventors & inventions: Earl Tupper, Henry D Thatcher, Jacob Perkins, Louis Pasteur, Peter Durand, Nicholas Appert, Ralph Wiley, Tetra Pak, Tupperware, William Cullen, William Kellogg
Make Do and Mend: bias, binding, blanket stitch, bunting, coupon, darn, fastening, Make Do and Mend campaign, ration book, rationing, recycle, running stitch, sewing pattern, tacking stitch, utility, whip stitch
Moving Mechanisms: actuator, compress, compressor, deflate, force, gas, inflate, jack, lever, liquid, nozzle, particle, piston, plunger, pneumatic system, pneumatics pressure, reservoir, solid, states of matter, syringe, system, valve
Groundbreaking Greeks / Architecture: Ancient Egyptian, architecture, Baroque, Callicrates, capital, caryatids, Classical, column, computer-aided design, Corinthian column, cornice, Doric column, Early Industrial, entablature, frieze, Gothic, Industrial Revolution, Ionic column, limestone, lintel, marble, Modernist, pediment, post and lintel, Postmodern Prehistoric, Renaissance, stability, stiffness, support, sustainable
architects in history: Andrea Palladio Erich Mendelsohn, Eugène-Emmanuel, Viollet-le-Ducfluting, Frank Gehry, Gianandrea Barreca, Giovanni La Varra, Cass Gilbert, James Wardrop, Jules Hardouin-Mansart, Philip Hudson, Serge Chermayeff, Leo van Klenze, Sir Robert Smirke, Stefano Boeri, Thomas Farnolls, Pritchard Vitruvius, Vlado Milunić
1066 & Beyond: axles, cams, castles, cutting, durability, drawbridge, joining, levers, linkages, gears, helmets, nose guard, pulleys, sliders
Electrical Circuits and Components: 3-core flexible cable, appliance, battery, battery holder, brass, buzzer, cartridge fuse, cell, circuit, coding, complete, circuit, component, conductive, conductor, copper, core, crocodile clip, earth wire, electrical conductivity, electric current, electric shock, electricity, filament, incandescent, light bulb, incomplete circuit, insulator, lamp, light bulb, light-emitting, diode (LED), live wire, mains electricity, material, micro:bit, motor, neutral wire, non-conductive, power station, programmable push-to-break switch, push-to-make switch, pylon, rechargeable, reed switch, resistance, rocker switch, sensor, series circuit, socket, source, switch, three-pin plug, toggle switch, tungsten, wire
Flow: axles, cams, component, diagonal, frame structure, hollow, rigid, shape, shell structure, sliders, strengthen, strut, support, tent frame, wheels
Misty Mountain, Winding River: component, design criteria, design feature, durable
Tremors: component, design criteria, diagonal, electric circuit, frame structure, hollow, product use, rigid, shell structure, strengthen, strut, switch, target user, tent frame

Upper School Learning

National Curriculum

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
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 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]
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

Knowledge Content

Make Do and Mend: *Investigating clothing; Sewing – running stitch, whip stitch and blanket stitch; Repairing clothes; Making products from recycled materials*
People's lives have been improved in countless ways due to new inventions and designs. For example, the Morrison shelter, designed by John Baker in 1941, was an indoor air-raid shelter used in over half a million homes during the Second World War. It saved the lives of many people caught in bombing raids.
In 1941, the British government introduced clothes rationing. This was to limit the amount of labour and materials used in clothes production, so that it could be used to support the greater war effort.
Make Do and Mend was a campaign run by the Ministry of Information to encourage people to recycle and repurpose their old clothes rather than buy new.
It is important to understand the characteristics of different materials to select the most appropriate material for a purpose. This might include flexibility, waterproofing, texture, colour, cost and availability.
Mrs Sew and Sew was a character promoted by the Make Do and Mend campaign to encourage people to be more efficient and creative with their old clothing.
Products and inventions can be compared using a range of criteria, such as the impact on society, ease of use, appearance and value for money.
Pinning with dressmaker pins and tacking with quick, temporary stitches holds fabric together in preparation for and during sewing.
Precision is important in producing a polished, finished product. Correct selection of tools and careful measurement can ensure the parts fit together correctly.
Deconstructing garments identifies how they were made, the materials used and their properties.
Hand stitches include running stitch, blanket stitch and whip stitch.
Fastenings hold a piece of clothing together. Types of fastenings include zips, press studs, Velcro and buttons.
Design is an iterative process, meaning alterations and improvements are made continually throughout the manufacturing process.
Evaluating a product while it's being manufactured, and explaining these evaluations to others, can help to refine it.

Electrical Circuits & Conductors / Components: *Making switches; Programmable technologies; Programming a micro:bit; Designing and making a nightlight; Incorporating programming and circuits in products*
A comparison table can be used to compare products by listing specific criteria on which each product can be judged or scored.
Evaluation can be done by considering whether the product does what it was designed to do, whether it has an attractive appearance, what changes were made during the making process and why the changes were made. Evaluation also includes suggesting improvements and explaining why they should be made.
Components can be added to circuits to achieve a particular goal. These include bulbs for lighthouses and torches, buzzers for burglar alarms and electronic games, motors for fairground rides and motorised vehicles and switches for lights and televisions.
Design features are the aspects of a product's design that the designer would like to emphasise, such as the use of a particular material or feature that makes the product easier to use or more durable.
A switch makes or breaks a circuit. When a switch is closed or 'on', the circuit is complete. When a switch is open or 'off', the circuit is incomplete.
A programmable device is a machine that is able to be provided with coded instructions for the automatic performance of a task.
A nightlight is a small electric light that gives out a dim glow. Design features of nightlights include a switch, light source and an attractive casing.
Annotated sketches and exploded diagrams show specific parts of a design, highlight sections or show functions. They communicate ideas in a visual, detailed way.
Remote control is controlling a machine or activity from a distance. Computers can be used to remotely control a device, such as a light, speaker or buzzer.

Flow: *Mechanical systems; Structures*
Levers consist of a rigid bar that rotates around a fixed point, called a fulcrum. They reduce the amount of work needed to lift a heavy object. Sliders move from side to side or up and down, and are often used to make moving parts in books. Axles are shafts on which wheels can rotate to make a moving vehicle. Cams are devices that can convert circular motion into up-and-down motion.
Materials for a specific task must be selected on the basis of their properties. These include physical properties as well as availability and cost.
Shell structures are hollow, 3-D structures with a thin outer covering, such as a box. Frame structures are made from thin, rigid components, such as a tent frame. The rigid frame gives the structure shape and support. Diagonal struts can strengthen the structure.
Asking questions can help others to evaluate their products, such as asking them whether the selected materials achieved the purpose of the model.

Moving Mechanisms: *Pneumatic systems; Joining and finishing; Iterative design process; Building pneumatic machine prototypes*
Various methods can be used to support a framework. These include cross braces, guy ropes and diagonal struts. Frameworks can be built using lolly sticks, skewers and bamboo canes.
Different mechanisms and systems can work together to perform a function. A strong and stable structure is necessary to support different mechanisms in a machine.
Culture is the language, inventions, ideas and art of a group of people. A society is all the people in a community or group. Culture affects the design of some products eg knives and forks are used in the western world, whereas chopsticks are used mainly in China and Japan. The design of products needs to take into account the culture of the target audience eg colours might mean very different things in different cultures.
Safety features are often incorporated into products that might cause harm. Some examples include the child-safety caps on medicine bottles, seatbelts in cars, covers for electrical sockets and finger guards on doors.
There are many rules for using tools safely and these may vary depending on the tools being used. For example, someone using a chisel should chip or cut with the cutting edge pointing away from their body. All tools should be cleaned and put away after use, and should not be used if they are loose or cracked.
Materials should be cut and combined with precision. For example, pieces of fabric could be cut with sharp scissors and sewn together using a variety of stitching techniques.
A focus group is a small group of people whose reactions and opinions about a product are taken and studied. Evaluations can be made by asking product users a selection of questions to obtain data on how the product has met its design criteria.
Testing a product against the design criteria will highlight anything that needs improvement or redesign. Changes are often made to a design during manufacture.
Design is an iterative process, meaning that once an initial prototype has been designed it is continually tested and improved until the final product is deployed.
Pneumatic systems use energy that is stored in compressed air to do work, such as inflating a balloon to open a model monster's mouth. These effects can be achieved using syringes and plastic tubing.

1066 and beyond: *Making Norman helmets; Designing drawbridges and castles; Making a Domesday Book*
Different materials and components have a range of properties, making them suitable for different tasks. It is important to select the correct material or component for the specific purpose, depending on the design criteria.
Mechanisms can be used to add functionality to a model eg sliders or levers can be used in moving pictures, storybooks or simple puppets; linkages in moving vehicles or puppets; gears in motorised vehicles or spinning toys; pulleys in cable cars or transport systems and cams in 3-D moving toys or pictures.
Evaluation can be done by considering whether the product does what it was designed to do, whether it has an attractive appearance, what changes were made during the making process and why the changes were made. Evaluation also includes suggesting improvements and explaining why they should be made.
Design features are the aspects of a product's design that the designer would like to emphasise, such as the use of a particular material or feature that makes the product easier to use or more durable.
A prototype is a mock-up of a design that will look like the finished product but may not be full size or made of the same materials. Shell and frame structures can be strengthened by gluing several layers of card together, using triangular shapes rather than squares, adding diagonal support struts and using 'Jinks' corners (small, thin pieces of card cut into a right-angled triangle and glued over each joint to straighten and strengthen them).
Annotated sketches and exploded diagrams show specific parts of a design, highlight sections or show functions. They communicate ideas in a visual, detailed way.
Useful tools for cutting include scissors, craft knives, junior hacksaws with pistol grip and bench hooks. Useful tools for joining include glue guns. Tools should only be used with adult supervision and safety rules must be followed.

Misty Mountain, Winding River: *Mountain climbing equipment*
Different materials and components have a range of properties, making them suitable for different tasks. It is important to select the correct material or component for the specific purpose, depending on the design criteria.
Design features are the aspects of a product's design that the designer would like to emphasise, such as the use of a particular material or feature that makes the product easier to use or more durable.

Fresh Food, Good Food: *Food preservation techniques; Exploring food packaging; Prototypes; Designing, making and packaging healthy snacks*
Different materials and components have a range of properties, making them suitable for different tasks. It is important to select the correct material or component for the specific purpose, depending on the design criteria. Recipe ingredients have different tastes and appearances. They look and taste better and are cheaper when in season.
Healthy snacks include fresh or dried fruit and vegetables, nuts and seeds, rice cakes with low-fat cream cheese, homemade popcorn or chopped vegetables with hummus. A healthy packed lunch might include a brown or wholemeal bread sandwich containing eggs, meat, fish or cheese, a piece of fresh fruit, a low-sugar yoghurt, rice cake or popcorn and a drink, such as water or semi-skimmed milk.
Foods need packaging to keep them fresh, safe to eat and free from damage. Food packaging also provides nutritional information about the food inside, 'use by' and 'best before' dates, and the materials and recyclability of the packaging.
Food deteriorates due to the growth of microorganisms. Decay can be prevented or delayed by preservation methods, such as drying, salting, pickling, canning, pasteurising, refrigerating or freezing the food.
Food packaging plays an important role in keeping foods fresh. The 'use by' date shows when the food is no longer safe to eat. The 'best before' date shows the date after which the food will lose some flavour or texture.
Particular areas of the world have conditions suited to growing certain crops, such as coffee in Peru and citrus fruits in California in the United States of America.
Cooking techniques include baking, boiling, frying, grilling and roasting.
Evaluation can be done by considering whether the product does what it was designed to do, whether it has an attractive appearance, what changes were made during the making process and why the changes were made. Evaluation also includes suggesting improvements and explaining why they should be made.
Design features are the aspects of a product's design that the designer would like to emphasise, such as the use of a particular material or feature that makes the product easier to use or more durable.
Food packaging provides physical protection for foods and can prevent contamination from microorganisms.
Materials, including plastic, paper, cardboard, foil and metal, can be used to package food. Some types of packaging, such as tin cans, can significantly extend the shelf life of some foods. Some packaging is more environmentally friendly than others.
A prototype is a mock-up of a design that will look like the finished product but may not be full size or made of the same materials. Shell and frame structures can be strengthened by gluing several layers of card together, using triangular shapes rather than squares, adding diagonal support struts and using 'Jinks' corners (small, thin pieces of card cut into a right-angled triangle and glued over each joint to straighten and strengthen them).
Most cardboard packaging is produced from a net. Packages can be strengthened by using thicker cardboard or multiple layers.
Annotated sketches and exploded diagrams show specific parts of a design, highlight sections or show functions. They communicate ideas in a visual, detailed way.
Chemicals are used in the home every day. They include cleaning products, such as bleach and disinfectant, but also paints, glues, oils, pesticides and medicines. Most chemical products carry a hazard symbol showing in what way the chemical could be harmful. Chemicals should only be used under adult supervision. Appropriate safety precautions, such as wearing goggles and gloves, working in a well-ventilated room, wiping up spills and tying back long hair, should be taken.

Groundbreaking Greeks / Architecture: *Architecture over time; Greek architecture; Structural support, stiffness and stability; Computer-aided design; Building design*
Various methods can be used to support a framework. These include cross braces, guy ropes and diagonal struts. Frameworks can be built using lolly sticks, skewers and bamboo canes.
Support, stiffness and stability can be created by using triangular shapes to create strong frameworks, columns to support roofs and overlapping brickwork patterns.
Many new designs and inventions influenced society eg labour-saving devices in the home reduced the amount of housework, which was traditionally done by women. This enabled them to have jobs.
Culture is the language, inventions, ideas and art of a group of people. A society is all the people in a community or group. Culture affects the design of some products. For example, knives and forks are used in the western world, whereas chopsticks are used mainly in China and Japan. The design of products needs to take into account the culture of the target audience. For example, colours might mean very different things in different cultures.
Architecture styles and technology have changed over time. Key periods include Classical architecture with the use of columns, order and symmetry, Gothic architecture, with more delicate stonework, large windows and flying buttresses, and modern architecture, where function is more important than form or attractiveness.
The ancient Greeks developed the Classical form of architecture. They used columns to support roofs, which had three main orders; Doric, Ionic and Corinthian. Ancient Greek buildings were symmetrical and beautiful. Roofs had a triangular shaped part, called the pediment, and a wide horizontal part, usually decorated with a frieze, called the entablature. Greek buildings were usually made from limestone or marble.
Materials should be cut and combined with precision eg pieces of fabric could be cut with sharp scissors and sewn together using a variety of stitching techniques.
Testing a product against the design criteria will highlight anything that needs improvement or redesign. Changes are often made to a design during manufacture.
A pattern piece is a drawing or shape used to guide how to make something. There are many different computer-aided design packages for designing products.

Tremors: *Structures, Electrical Systems*
Shell structures are hollow, 3-D structures with a thin outer covering, such as a box. Frame structures are made from thin, rigid components, such as a tent frame. The rigid frame gives the structure shape and support. Diagonal struts can strengthen the structure.
Design criteria are the exact goals a project must achieve to be successful. These criteria might include the product's use, appearance, cost and target user.
Materials for a specific task must be selected on the basis of their properties. These include physical properties as well as availability and cost.
An electric circuit can be used in a model, such as a lighthouse. It can be controlled using a switch.
Asking questions can help others to evaluate their products, such as asking them whether the selected materials achieved the purpose of the model.

Skills: design	Select appropriate materials when constructing and making. **Create collaboratively, share ideas and use a variety of resources to make products inspired by existing products, stories or their own ideas, interests or experiences.** Talk about what they want to make	Create a design to meet simple design criteria. **Select the appropriate tool / ingredient for a simple practical task.** Describe the similarities and differences between two products. **Select and use a range of materials, beginning to explain their choices.** Describe why a product is important. **Name and explore a range of everyday products and describe how they are used.**	Choose appropriate components and materials and suggest ways of manipulating them to achieve the desired effect. **Generate and communicate their ideas through a range of different methods.** Select the appropriate tool for a task and explain their choice. **Compare different or the same products from the same or different brands.** Explain why a designer or inventor is important.	Develop design criteria to inform a design. **Explain how an existing product benefits the user.** Plan which materials will be needed for a task and explain why. **Describe how key events in design and technology have shaped the world.**	Choose from a range of materials, showing an understanding of their different characteristics. **Investigate and identify the design features of a familiar product.** Use annotated sketches and exploded diagrams to test and communicate their ideas. **Create and complete a comparison table to compare two or more products.**	Explain how the design of a product has been influenced by the culture or society in which it was designed or made. **Explain the functionality and purpose of safety features on a range of products.** Select and combine materials with precision. **Describe the social influence of a significant designer or inventor.** Use pattern pieces and computer-aided design packages to design a product.	Analyse how an invention or product has significantly changed or improved people's lives. **Choose the best materials for a task, showing an understanding of their working characteristics.** Create a detailed comparative report about two or more products or inventions. **Select appropriate tools for a task and use them safely and precisely.** Develop design criteria for a functional and appealing product that is fit for purpose, communicating ideas clearly in a range of ways.
Skills: make	Follow rules and instructions to keep safe. **Structures:** **Cut, tear, fold and stick a range of papers and fabrics.** Manipulate malleable materials into a variety of shapes and forms using their hands and other simple tools. **Construct simple structures and models using a range of materials.** **Food:** Suggest healthy ingredients that can be used to make simple snacks. **Textiles:** **Cut, fold and stick a range of fabrics.** **Mechanisms:** Explore, build and play with a range of resources and construction kits with wheels and axles.	Follow the rules to keep safe during a practical task. **Structures:** **Construct simple, stable structures using a range of materials** Follow instructions to cut and assemble the supporting structure **Food:** **Measure and weigh food items using non-standard measures, such as spoons and cups.** **Textiles:** Design and make a simple headdress using pictures to inspire purposeful design **Mechanisms** Design and make a model with a rotating function from a construction kit **Use wheels and axles to make a simple moving model.**	Work safely and hygienically in construction and cooking activities. **Structures:** **Explore how a structure can be made stronger, stiffer and more stable.** Make facades from a range of recycled materials **Food:** slice food safely using the bridge or claw grip **construct a sandwich that meets a design brief** **Textiles:** Use different methods of joining fabrics, including glue and running stitch. **Mechanisms:** **follow a design to create a model that use a lever and rotating function**	Use tools safely for cutting and joining materials and components. **Structures:** Create shell or frame structures using diagonal struts to strengthen them. **Create special features for individual designs** Explore and use a range of mechanisms (levers, sliders, axles, wheels and cams) in models or products. **Food:** **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 **Identify and name foods that are produced in different places.** Prepare and cook a simple savoury plate. **Textiles:** **Use a range of stitching techniques to join fabrics** **Mechanisms:** Design and make a model that uses a range of mechanisms (levers, sliders, axles, wheels)	Work safely with everyday chemical products under supervision, such as disinfectant hand wash and surface cleaning spray. **Structures:** Create prototype shell and frame structures, showing awareness of how to strengthen, stiffen and reinforce them. **Food:** Design a healthy snack or packed lunch and explain why it is healthy. **Identify and use a range of cooking techniques to prepare a simple meal or snack.** **Textiles:** follow design criteria to create a finished product **select and cut fabrics with ease using fabric scissors** thread needle with greater independence **tie knots with greater independence** hand sew a hem or seam using a running stitch **Mechanisms:** **measure, mark, cut and assemble with increasing accuracy** explore and use a range of mechanisms (levers, axles, cams, gears and pulleys) in models or products **make a model based on a chosen design** **Electrical Systems:** Incorporate circuits that use a variety of components into models or products. **Write a program to control a physical device, such as a light, speaker or buzzer.**	Select, name and use tools with adult supervision. **Structures:** **Build a framework using a range of materials to support structure.** **Food:** Describe what seasonality means and explain some of the reasons why it is beneficial. **Evaluate meals and consider if they contribute towards a balanced diet.** Use an increasing range of preparation and cooking techniques to cook a savoury dish. **Textiles:** **complete design ideas, embellishing the finished product to customise** decorate fabrics with applique **sew cross stitch to join fabric** **Mechanisms:** follow a design brief to make a finished product neatly and with focus on accuracy **make mechanisms and/or structures using sliders, pivots and folds to produce movement** use mechanical systems in their products, such as pneumatics. **Electrical Systems:** **construct a product with consideration for the design criteria** break down the construction process into steps so that others can make the product **alter a product's form and function by tinkering with its configuration** make a functional series circuit, incorporating a motor	Name and select increasingly appropriate tools for a task and use them safely. **Structures:** **Select the most appropriate materials and frameworks for different structures, explaining what makes them strong.** **Food:** evaluate health and safety in production to minimise cross contamination **evaluate a recipe, considering: taste, smell, texture and origin of the food group** taste test and score final products **Plan a healthy daily diet, justifying why each meal contributes towards a balanced diet** **Textiles:** Pin and tack fabrics in preparation for sewing and more complex pattern work. **Use different methods of fastening for function and decoration, including press studs, Velcro and buttons.** **Mechanisms:** use layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result **Electrical Systems:** **understand and use electrical circuits that incorporate a variety of components (switches, lamps, buzzers and motors) and use programming to control their products.** Use a sensor to monitor an environmental variable, such as temperature, sound or light.
Skills: evaluate	Be excited about what they have made **Adapt and refine their work as they are constructing and making.**	Talk about their own and each other's work, identifying strengths or weaknesses and offering support.	Explain how closely their finished products meet their design criteria and say what they could do better in the future.	Suggest improvements to their products and describe how to implement them, beginning to take the views of others into account.	Identify what has worked well and what aspects of their products could be improved, acting on their own suggestions and those of others when making improvements.	Test and evaluate products against a detailed design specification and make adaptations as they develop the product.	Demonstrate modifications made to a product as a result of ongoing evaluation by themselves and to others.

Technical knowledge		**Food:** Sort foods into groups by whether they are from an animal or plant source. **Structures:** **know that a structure is something that has been made and put together** understand that wide and flat based objects are more stable **Mechanisms:** **know that wheels need to be round to rotate and move** understand that for a wheel to move it must be attached to a rotating axle **know that an axle moves within an axle holder which is fixed to the vehicle or toy** **Textiles:** know that 'joining technique' means connecting two pieces of material together	**Food:** understand what makes a balanced diet **know where to find the nutritional information on packaging** know that the five main food groups are: carbohydrates, fruits and vegetables, protein, dairy and foods high in fat and sugar **understand that i should eat a range of different foods from each food group and roughly how much of each food group** 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** **Structures:** understand that the shape of materials can be changed to improve the strength and stiffness of structures **Mechanisms:** **know that a mechanism is the parts of an object that move together** know that a slider mechanism moves an object from side to side **Textiles:** **know that there are various temporary methods of joining fabric by using staples, glue or pins and that stitching provides a more permanent method** understand that different techniques for joining materials can be used for different purposes	**Food:** know that not all fruits and vegetables can be grown in the UK **know that imported food is food which has been brought into the country** know that exported food is food which has been sent to another country **understand that imported foods travel from far away and this can negatively impact the environment** know that each fruit and vegetable gives us nutritional benefits because they contain vitamins, minerals and fibre **Structures:** **understand the importance of strength and stiffness in structures** **Mechanisms:** Know how a range of mechanisms (levers, sliders, axles, wheels) are used in models or products **Textiles:** **understand that a template (or fabric pattern) is used to cut out the same shape multiple times** know that drawing a design idea is useful to see how an idea will look	**Food:** Identify and name foods that are produced in different places in the UK and beyond. **understand that vitamins, minerals and fibre are important for energy, growth and maintaining health** understand that it is important to wash fruit and vegetables before eating to remove any dirt and insecticides **Structures:** know that a 'free-standing' structure is one which can stand on its own **understand what a frame structure is** **Mechanisms:** **understand that all moving things have kinetic energy** understand that kinetic energy is the energy that something (object/person) has by being in motion **know that air resistance is the level of drag on an object as it is forced through the air** understand that the shape of a moving object will affect how it moves due to air resistance **Textiles:** **know different techniques for mending and decorating a textile by applying smaller pieces of fabric to larger pieces** know that when two edges of fabric have been joined together it is called a seam **Electrical Systems:** understand that electrical conductors are materials which electricity can pass through **understand that electrical insulators are materials which electricity cannot pass through** know that a battery contains stored electricity that can be used to power products **know that an electrical circuit must be complete for electricity to flow** know that a switch can be used to complete and break an electrical circuit	**Food:** **know that many countries have 'national dishes' which are recipes associated with that country** know that vegetables and fruit grow in certain seasons **know that climate affects food growth** **Structures:** **understand some different ways to reinforce structures** understand how triangles can be used to reinforce structures **know that properties are words that describe the form and function of materials** understand why material selection is important based on properties **understand the functional and aesthetic properties of different materials** **Mechanisms:** know that mechanisms control movement **understand that mechanisms can be used to change one kind of motion into another** understand how to use sliders, pivots and folds to create paper-based mechanisms **Textiles:** know that it is important to leave space on the fabric for the seam **understand that some products are turned inside out after sewing so the stitching is hidden** **Electrical Systems:** know when there is a break in a series circuit, all components turn off **know a motorised product is one which uses a motor to function** know that an electric motor converts electrical energy into rotational movement, causing the motor's axle to spin **know that series circuits only have one direction for the electricity to flow**	**Food:** know that 'flavour' is how a food or drink tastes **know that 'processed food' means food that has been put through multiple changes in a factory** understand what happens to a certain food before it appears on the supermarket shelf (Farm to Fork) **Structures:** know why riangles are a strong shape used by engineers to add strength to a structure. **explain why when a force is applied to a triangle, it is distributed down each side, making triangles difficult to distort or collapse.** **Mechanisms:** know a pneumatic system uses air to exert a force. This force is used in pneumatic jacks to lift vehicles, in paint sprayers to force paint out at high speed, in jackhammers to break up pavements and in train and bus brakes. **understand pneumatic systems are low maintenance, compact and safe as only air can leak from the system.** know pneumatic systems can be used to lift heavy loads, raise and lower platforms or soften a force by acting as a shock absorber. **Textiles:** understand that it is important to design clothing with the client/ target customer in mind **know that using a template (or clothing pattern) helps to accurately mark out a design on fabric** understand the importance of consistently sized stitches **Electrical Systems** **know that computer monitoring uses sensors as a scientific tool to record information about environmental changes over time and that computer monitoring can also log data from sensors and record the resulting information in a table or graph.** identify that many devices that we see in our homes and elsewhere use programmable sensors that monitor environmental variables, such as light, sound, movement and temperature. **know that a Micro:bit can be programmed to switch on an LED in a circuit when light level falls below a certain value.**