Design and Technology – Knowledge Progression

Big Idea	Concept	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Humankind	Everyday products	Everyday products are objects that we use every day. These objects have a specific use.	An axle is a rod that is connected to the centre of a wheel, which allows it to turn. A chassis is the frame of a vehicle. A shelter is a structure designed to give protection from weather or danger.	There are many home products made from fabric. Examples of fabric-based products in the home include cushions, curtains, blinds and carpets. Products can be improved in different ways, such as making them easier to use, more hardwearing or more attractive.	Particular products are designed for specific tasks. For example, designing a product to help grow plants will require certain materials.	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. Design features are the aspects of a product's design that the designer would like to emphasise. For example, the use of a particular material or a feature that makes the product durable.	The design of products needs to take into account the culture of the target audience. The ancient Greeks developed the Classical form of architecture that has been copied for thousands of years.	Make Do and Mend was a campaign run by the Ministry of Information during the Second World War to encourage people to recycle and repurpose their old clothes rather than buy new. The Make Do and Mend campaigns aimed to limit the amount of labour and materials used in clothes production, so that it could be used to support the greater war effort. A processed food is changed during preparation and includes processes, such as cooking, freezing, pasteurising, or the addition of ingredients. Processed foods can be convenient and increase availability, but often lack of nutrients and contain unhealthy ingredients when compared to whole foods. Sliced bread is processed. It can contain many more ingredients than

								homemade bread, including preservatives and artificial ingredients. Bridge structures have changed over time. This is due to factors such as technology, design innovation and new and better access to materials.
	Staying safe	Rules keep us safe when using equipment.	Rules are made to keep people safe from danger. Safety rules include always listening carefully, following instructions and using equipment only when told to.	Hygiene rules include washing hands before handling food, cleaning surfaces, tying long hair back, storing food appropriately and wiping up spills.	Safety rules must be followed when using electricity. Fingers and other objects must not be put into electrical outlets, anything with a cord or plug should never be used around water and a plug should never be pulled out by its cord.	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. Chemicals should only be used under adult supervision.	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.	The safety of the user has to be taken into account when designing a new product. Covered
Processes	Mechanisms and movement	Vehicles and machines have wheels and axles to help them move.	Most vehicles that move on land have axles and wheels that are fixed to a chassis. An axle fixed to a chassis has freely moving wheels. A freely moving axle has fixed wheels.	People build machines to make their work easier. A machine is made up of different parts that all work together to perform a task. Individual parts of a machine are called components. The part of a machine that brings about movement is called the mechanism. A slider mechanism moves in a straight line. Real-life examples of slider mechanisms	Cams are devices that can convert circular motion into up-and-down motion. The cam is fixed to the axle and the follower sits on the cam. When the axle is rotated, the follower moves up and down, following the shape of the cam. Different shaped cams produce different patterns of movement in the follower.	Simple machines make physical jobs easier by changing the strength or direction of a force. There are six simple machines: pulley, lever, wheel and axle, wedge, inclined plane and screw. Simple machines can be combined to make complex, compound machines. For example, a wheelbarrow combines a lever with a wheel and axle.	A pneumatic system uses compressed air to exert a force. Pneumatic systems can be used to lift heavy loads, raise and lower platforms or soften a force by acting as a shock absorber.	Mechanical systems can include sliders, levers, linkages, gears, pulleys and cams. Other mechanisms include pneumatics and hydraulics.

				include door bolts and drawers. A lever mechanism is a bar that moves around a fixed point called a pivot. Real-life uses of levers include scissors and seesaws. A linkage mechanism combines levers and sliders. Real-life uses of linkages include toolboxes and scissor lifts.				
	Electricity	Many appliances at home and school need electricity to work. The appliances need to be attached to electricity through a plug and socket, or use batteries.	Electricity is a form of energy. Many household appliances use electricity, such as kettles, televisions and washing machines. They can be switched on by completing the circuit to allow the flow of electricity or off by breaking the circuit to prevent electricity from flowing. This can be a switch on the appliance or a wall socket switch.	A series circuit is made up of an energy source, such as a battery or cell, wires and a bulb. The circuit must be complete for the electricity to flow.	An electric circuit can be used in a model, such as a lighthouse. It can be controlled using a switch.	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.	Electrical circuits can be controlled by a simple on/off switch, or by a variable resistor that can adjust the size of the current in the circuit. Real-life examples are a dimmer switch for lights or volume control on a stereo.	Computer programs can control electrical circuits that include a variety of components, such as switches, lamps, buzzers and motors.
Creativity	Generation of ideas		A product or project is usually guided by a set of design criteria. The project or product must meet the design criteria to be successful.	Ideas can be communicated in a variety of ways, including written work, drawings and diagrams, modelling, speaking and using information and communication technology.	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.	Annotated sketches and exploded diagrams show specific parts of a design, highlight sections or show functions. They communicate ideas in a visual, detailed way.		Ideas can be communicated in a range of ways, including through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design.

	Structures	A bridge is a structure that allows people and vehicles to cross over an open space.	Different materials can be used for different purposes, depending on their properties.	Structures can be made stronger, stiffer and more stable by using cardboard rather than paper and triangular shapes rather than squares.	Diagonal struts create triangular shapes within a frame structure. Adding diagonal struts to a frame structure adds strength and stability.	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.	Support, stiffness and stability can be created by using triangular shapes to create strong frameworks, columns to support roofs and overlapping brickwork patterns. Mechanisms and systems can work together to perform a function. A strong and stable structure is necessary to support mechanisms in a machine.	Strength can be added to a framework by using multiple layers or changing its shape. Triangles do not collapse or distort easily and so are used in architecture to provide support and stability.
	Use of ICT	Digital devices can be used to share information about creations with others.	Computer-aided design is when computers are used to help design products. It has advantages over paper design in that it will show how finished products will look. Different colours and textures can also be trialled.	Computer software can be used to help design or plan a product. Advantages include identifying and solving problems before the product is made and experimenting with different materials and colours. Labels can be added to designs for clarity.	A program is a set of instructions written to perform a specified task on a computer.		Equipment and devices can be controlled by pressing buttons on a control panel, such as on a washing machine or microwave.	Many devices that we see in our homes and elsewhere use programmable sensors that monitor environmental variables, such as light, sound, movement and temperature.
Investigation	Investigation	There are different ways to join materials together.	Some foods need to be prepared before eating. Peeling, slicing, chopping, grating, tearing or mashing are different methods of preparing foods.	Tools have characteristics that make them suitable for specific purposes. For example, a knife is good for cutting food because it has a sharp metal edge.	Specific tools can be used for cutting, such as saws. Wood can be joined using glue, nails, staples, or a combination of these. Safety rules must be followed to prevent injury from sharp blades. These rules include using a bench hook to keep the wood still, using a junior hacksaw with a pistol grip and working under adult supervision.	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.	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.	Deconstructing garments identifies how they were made, the materials used and their properties. Hand stitches include running stitch, blanket stitch and whip stitch.

	Evaluation	Recognise that it is possible to change and alter their designs and ideas as they are making them.	A strength is something that is good about a piece of work. A weakness is an area that could be improved.	A finished product can be checked against design criteria to see how successfully it has been made or to evaluate how well it works. Improvements can then be planned.	Asking questions can help others to evaluate their products, such as asking them whether the selected materials achieved the purpose of the model.	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. The evaluation process can include suggesting improvements and explaining why they should be made.	Testing a product against the design criteria will highlight anything that needs improvement or redesign.	An iterative process starts with requirements and continues by creating a product, testing it, and revising it before creating a better version. The iterative process is a series of steps that are repeated, improving the product with each cycle.
Materials	Cutting and joining textiles		A running stitch is made by passing a needle in and out of fabric. Running stitches are made at equal distances apart.	A running stitch is a basic stitch used to join two pieces of fabric.	Weaving involves interlacing pieces of thread or yarn or other materials.	A hem runs along the edge of a piece of cloth or clothing. It is made by turning under a raw edge and sewing to give a neat and quality finish.	A collage is artwork made by sticking materials, such as scraps of paper or fabric, onto a background.	Pinning with dressmaker pins and tacking with quick, temporary stitches holds fabric together in preparation for and during sewing.
	Materials for purpose	Different materials are suitable for different purposes, such as construction kits for modelling and ingredients for baking.	Different materials are suitable for different purposes, depending on their specific properties. For example, glass is transparent, so it is suitable to be used for windows.	Properties of components and materials determine how they can and cannot be used. Covered x 3	Materials for a specific task must be selected on the basis of their properties. For example greenhouses need transparent or translucent materials. Availability and cost have also got to be considered.	Characteristics of materials, such as rigidity, strength and smoothness will affect the success of a working model. Visual qualities of a yarn can include its colour, elasticity, pattern and texture. Fabrics can be natural or synthetic. Natural fabrics include cotton, silk and wool. Synthetic fabrics include Lycra, polyester and nylon.	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.	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.

	Decorating and embellishing textiles		Decorations can be attached to fabric by gluing, stapling or tying.	Embellishment is a decorative detail or feature added to something to make it more attractive.	A loom weaving is a piece of fabric that has been woven on a loom by interlacing threads. An embellishment is a decorative detail or feature, such as a silk flower, tassel or bow, added to something to make it more attractive.	Block printing and fabric paint are used to create decorative, repeated patterns on fabrics.	Applique is a technique where pieces of material are attached to another material by stitching or gluing.	Fastenings hold a piece of clothing together. Types of fastenings include zips, press studs, Velcro and buttons.
Nature	Food preparation and cooking	When people celebrate they sometimes eat special food. A recipe is a set of instructions that tells us how to make food.	Fruits and vegetables can be mixed to make a healthy salad. Salad dressings can improve the flavour of salads.	Some ingredients need to be prepared before they can be cooked or eaten. There are many ways to prepare ingredients: peeling skins using a vegetable peeler, such as potato skins; grating hard ingredients, such as cheese or chocolate; chopping vegetables, such as onions and peppers and slicing foods, such as bread and apples.	Preparation techniques for savoury dishes include peeling, chopping, deseeding, slicing, dicing, grating, mixing and skinning.	Cooking techniques include baking, boiling, frying, grilling and roasting.	Sweet dishes are usually desserts, such as cakes, fruit pies and trifles. Savoury dishes usually have a salty or spicy flavour rather than a sweet one.	Ingredients can usually be bought at supermarkets, but specialist shops may stock different items such as specialist vegetables or coffees. Greengrocers sell fruit and vegetables, butchers sell meat, fishmongers sell fresh fish and delicatessens usually sell some unusual prepared foods, as well as cold meats and cheeses.
	Nutrition	There are healthy and unhealthy foods. Fruit and vegetables are an important part of a healthy diet.	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.	A healthy diet should include meat or fish, starchy foods (such as potatoes or rice), some dairy foods, a small amount of fat and plenty of fruit and vegetables.	There are five main food groups: fruit and vegetables; carbohydrates (potatoes, bread, rice and pasta); proteins (beans, pulses, fish, eggs and meat); dairy and alternatives (milk, cheese and yoghurt) and fats (oils and spreads). Foods high in fat, salt and sugar should only be eaten occasionally as part of a healthy, balanced diet.	Foods need packaging to keep them fresh, safe to eat and free from damage. Food packaging also provides nutritional information about the food inside.	A balanced diet gives your body all the nutrients it needs to function correctly. This means eating a wide variety of foods in the correct proportions.	Eating a balanced diet is a positive lifestyle choice that should be sustained over time. Food packaging provides important nutritional information about the food inside.

	Origins of food	Food comes from different sources, including from animals, such as meat, fish, eggs and dairy, or from plants, such as fruit and vegetables.	Some foods come from animals, such as meat, fish and dairy products. Some come from plants, such as fruit and vegetables.	Food comes from two main sources: animals and plants. Milk comes mainly from cows but also from goats and sheep. Eggs belong to the animal product category. They are laid by female animals. The most common types eaten by humans include chicken and duck eggs. Honey is made by bees. Most edible oils are made from plant parts. Olive oil, vegetable oil and coconut oil are all made from plant sources. Sugar is made from plants called sugar cane and sugar beet. Plants also give us nuts, such as almonds, walnuts and hazelnuts.		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.	Buying seasonal food is beneficial for many reasons. These include the food having higher nutritional value, reducing transportation and supporting local growers. Seasonality is the time of year when the harvest or flavour of a type of food is at its best.	Whole foods have not been changed from their natural form. Organic whole foods are grown without the use of man-made fertilisers, pesticides, growth regulators or animal feed additives.
Comparison	Compare and contrast	Aspects of designing and making can be compared with others, including inspiration for making a product and the tools and techniques used.	Two products can be compared by looking at a set of criteria and scoring both products against each one.	A brand is a name, term, design, or symbol identifying a seller's products or services.	Work from different designers can be compared by assessing specific criteria, such as their visual impact, fitness for purpose and target market.	A comparison table is an organised way to compare products.		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.

Significance	Significant people	A scarecrow is a model of a person dressed in old clothes and put in a field of growing crops to frighten birds away.	The importance of a product may be that it fulfils its goals and performs a useful purpose.	School kitchen staff are important people because they design and provide healthy meals. The Cath Kidston brand was an important British brand which began in the 1990s. It was easily recognisable for its floral patterned fabric and use of classic British iconography including the Red London Bus and London black cab.	Key inventions in design and technology have changed the way people live.	Food deteriorates due to the growth of microorganisms. Significant scientists such as Louis Pasteur and inventors such as Nicolas Appert have ensured decay can be prevented or delayed by preservation methods, such as drying, salting, pickling, canning, pasteurising, refrigerating or freezing the food. 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. William Morris was a British textile designer, artist and socialist activist associated with the British Arts and Crafts Movement. William Morris was a significant contributor to the revival of traditional British textile arts and methods of production. William Morris' motifs consisted mainly of leaves, flowers, fruits and birds.	A Roman architect called Vitruvius said that successful buildings should have firmitas (stability), utilitas (useful space) and venustas (an attractive appearance).	Significant engineers have improved, safety, people's lives and trade through their constructions. Significant bridges include: the Menai Bridge, Clifton Suspension Bridge and Forth Bridge.