	Design and Technology Progression of Knowledge

National Curriculum aims:

- develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
- build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
- critique, evaluate and test their ideas and products and the work of others
- understand and apply the principles of nutrition and learn how to cook.

Key Stage 1 – Design and Technology

National Curriculum subject content KS1:

Design

- design purposeful, functional, appealing products for themselves and other users based on design criteria
- generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where 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.

Cooking and Nutrition

- use the basic principles of a healthy and varied diet to prepare dishes
- understand where food comes from.

Structures		
Year 1 and 2	Year A – Constructing a Windmill	Year B – Baby bear's chair
Technical knowledge	• To understand that the shape of materials can be changed to improve the strength and stiffness of structures • To understand that cylinders are a strong type of structure (e.g. the main shape used for windmills and lighthouses)	• To 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 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		• To know that materials can be manipulated to improve strength and stiffness • To know that a structure is something which has been formed or made from parts • To know that a 'stable' structure is one which is firmly fixed and unlikely to change or move • To know that a 'strong' structure is one which does not break easily • To know that a 'stiff' structure or material is one which does not bend easily	
Additional Knowledge	• To know that a client is the person I am designing for • To know that the design criteria is a list of points to ensure the product meets the client's needs and wants • To know that a windmill harnesses the power of wind for a purpose like grinding grain, pumping water or generating electricity • To know that windmill turbines use wind to turn and make the machines inside work • To know that a windmill is a structure with sails that are moved by the wind • To know the three main parts of a windmill are the turbine, axle and structure		• To know that natural structures are those found in nature • To know that man-made structures are those made by people	
Mechanisms/Mechanical Systems				
Year 1 and 2	Year A		Year B	
	Making a moving story book	Wheels and axles	Making a moving monster	Fairground wheel
Technical Knowledge	• To know that a mechanism is the parts of an object that move together •To know that a slider mechanism moves an object from side to side • To know that a slider mechanism has a slider, slots, guides and an object • To know that bridges and guides are bits of card that purposefully restrict the movement of the slider	• To know that wheels need to be round to rotate and move • To understand that for a wheel to move it must be attached to a rotating axle • To know that an axle moves within an axle holder which is fixed to the vehicle or toy • To know that the frame of a vehicle (chassis) needs to be balanced	• To know that mechanisms are a collection of moving parts that work together as a machine to produce movement • To know that there is always an input and output in a mechanism • To know that an input is the energy that is used to start something working • To know that an output is the movement that happens as a result of the input	• To know that different materials have different properties and are therefore suitable for different uses

			• 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	
Additional Knowledge	• To know that in Design and technology we call a plan a 'design'	• To know some real-life items that use wheels such as wheelbarrows, hamster wheels and vehicles	• To know some real-life objects that contain mechanisms	• To know the features of a Ferris wheel, include the wheel, frame, pods, a base an axle and an axle holder • To know that it is important to test my design as I go along so that I can solve any problems that may occur
Cooking and Nutrition				
Year 1 and 2	Year A – Fruits and vegetables		Year B – A balanced diet	
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)		• 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				
Year 1 and 2	Year A – Puppets		Year B – Pouches	
Technical Knowledge	• 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 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 understand that different techniques for joining materials can be used for different purposes • To understand that a template (or fabric pattern) is used to cut out the same shape multiple times • To know that drawing a design idea is useful to see how an idea will look	• To know that a thimble can be used to protect my fingers when sewing

Key Stage 2 – Design and Technology

National Curriculum subject content KS2:

Design

- use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups
- 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.

Cooking and Nutrition

- understand and apply the principles of a healthy and varied diet
- prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques
- understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed

Lower Key Stage 2

Structures

Year 3 and 4	Year A – Constructing a castle	Year B – Pavilions
Technical Knowledge	• To understand that wide and flat based objects are more stable • To understand the importance of strength and stiffness in structures	• To understand what a frame structure is • To know that a ‘free-standing’ structure is one which can stand on its own

	Know that paint colours can be mixed using natural substances, and that prehistoric peoples used these paints.	
Additional Knowledge	• To know the following features of a castle: flags, towers, battlements, turrets, curtain walls, moat, drawbridge and gatehouse - and their purpose • To know that a façade is the front of a structure • To understand that a castle needed to be strong and stable to withstand enemy attack • To know that a paper net is a flat 2D shape that can become a 3D shape once assembled • To know that a design specification is a list of success criteria for a product	• To know that a pavilion is a decorative building or structure for leisure activities • To know that cladding can be applied to structures for different effects. • To know that aesthetics refers to how a product looks • To know that a product's function means its purpose • To understand that the target audience means the person or group of people a product is designed for • To know that architects consider light, shadow and patterns when designing
Mechanisms/Mechanical systems		
Year 3 and 4	Year A – Pneumatic toys	Year B – Making a slingshot car
Technical Knowledge	• To understand how pneumatic systems work • To understand that pneumatic systems can be used as part of a mechanism • To know that pneumatic systems operate by drawing in, releasing and compressing air	• To understand 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
Additional Knowledge	• To understand how sketches, drawings and diagrams can be used to communicate design ideas • To know that 'exploded diagrams' are used to show how different parts of a product fit together • To know that thumbnail sketches are small drawings to get ideas down on paper quickly	• To understand that products change and evolve over time • To know that aesthetics means how an object or product looks in design and technology • To know that a template is a stencil you can use to help you draw the same shape accurately • To know that a birds-eye view means a view from a high angle (as if a bird in flight) • To know that graphics are images which are designed to explain or advertise something •To know that it is important to assess and evaluate design ideas and models against a list of design criteria
Electrical systems		
Year 3 and 4	Year A – Electric Poster	Year B – Torches
Technical Knowledge	• 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 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 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	• 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
Additional Knowledge	• To understand the importance and purpose of information design • To understand how material choices (such as mounting paper to corrugated card) can improve a product to serve its purpose (remain rigid without bending when the electrical circuit is attached).	• To know the features of a torch: case, contacts, batteries, switch, reflector, lamp, lens • To know facts from the history and invention of the electric light bulb(s) - by Sir Joseph Swan and Thomas Edison
Cooking and Nutrition		
Year 3 and 4	Year A – Eating seasonally	Year B – Adapting a recipe
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	• 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		
Year 3 and 4	Year A – Cross-stitch and appliqué (Egyptian collars)	Year B - Fastenings
Technical Knowledge	•To know that applique is a way of mending or decorating a textile by applying smaller pieces of fabric •To know that when two edges of fabric have been joined together it is called a seam	• 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 it is important to leave space on the fabric for the seam •To understand that some products are turned inside out after sewing so the stitching is hidden	• To know that creating a mock up (prototype) of their design is useful for checking ideas and proportions
Digital World		
Year 3 and 4	Year A – Electronic charm	Year B – Mindful moments timer
Technical Knowledge	• 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 • Writing a program to control (button press) and/or monitor (sense light) that will initiate a flashing LED algorithm	• 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
Additional Knowledge	•To know what the 'Digital Revolution' is and features of some of the products that have evolved as a result •To know that in Design and technology the term 'smart' means a programmed product •To know the difference between analogue and digital technologies • To understand what is meant by 'point of sale display' • To know that CAD stands for Computer-aided design	•Understand the terms 'ergonomic' and 'aesthetic' •Know that a prototype is a 3D model made from cheap materials, that allows us •To test design ideas and make better decisions about size, shape and materials

Upper Key Stage 2		
Structures		
Year 5 and 6	Year A – Bridges	Year B – Playgrounds
Technical Knowledge	• 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 their properties • To understand the material (functional and aesthetic) properties of wood	• To know that structures can be strengthened by manipulating materials and shapes
Additional Knowledge	• To understand the difference between arch, beam, truss and suspension bridges • To understand how to carry and use a saw safely	• To understand what a 'footprint plan' is • To understand that in the real world, design , can impact users in positive and negative ways • To know that a prototype is a cheap model to test a design idea

Mechanisms/Mechanical systems		
Year 5 and 6	Year A – Making a pop up book	Year B – Automata toys
Technical Knowledge	• To know that mechanisms control movement • To understand that mechanisms that can be used to change one kind of motion into another • To understand how to use sliders, pivots and folds to create paper-based mechanisms	• To understand that the mechanism in an automaton uses a system of cams, axles and followers • To understand that different shaped cams produce different outputs
Additional Knowledge	• To know that a design brief is a description of what I am going to design and make • To know that designers often want to hide mechanisms to make a product more aesthetically pleasing	• To know that an automata is a hand powered mechanical toy • To know that a cross-sectional diagram shows the inner workings of a product • To understand how to use a bench hook and saw safely • To know that a set square can be used to help mark 90° angles
Electrical systems		
Year 5 and 6	Year A – Doodlers	Year B – Steady hand game
Technical Knowledge	• To know that series circuits only have one direction for the electricity to flow • To know when there is a break in a series circuit, all components turn off • To know that an electric motor converts electrical energy into rotational movement, causing the motor's axle to spin • To know a motorised product is one which uses a motor to function	• To know that 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
Additional Knowledge	• To know that product analysis is critiquing the strengths and weaknesses of a product • To know that 'configuration' means how the parts of a product are arranged	•To know that 'form' means the shape and appearance of an object •To know the difference between 'form' and 'function' •To understand that 'fit for purpose' means that a product works how it should and is easy to use • To know that form over purpose means that a product looks good but does not work very well • To know the importance of 'form follows function' when designing: the product must be designed primarily with the function in mind • To understand the diagram perspectives 'top view', 'side view' and 'back'
Cooking and Nutrition		
Year 5 and 6	Year A – What could be healthier?	Year B – Come dine with me
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 '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 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 that bacteria and germs have been passed onto ready-to-eat foods and it happens when these foods mix with raw meat or unclean objects	• To know that '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		
Year 5 and 6	Year A – Stuffed toys	Year B - Waistcoats
Technical Knowledge	• 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	• 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		
Year 5 and 6	Year A – Monitoring devices	Year B – Navigating the world
Technical Knowledge	• To know that a 'device' means equipment created for a certain purpose or job and that monitoring devices observe and record • To know that a sensor is a tool or device that is designed to monitor, detect and respond to changes for a purpose • To understand that conditional statements (and, or, if booleans) in programming are a set of rules which are followed if certain conditions are met	• To 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
Additional Knowledge	• To understand key developments in thermometer history • To know events or facts that took place over the last 100 years in the history of plastic, and how this is changing our outlook on the future • To know the 6Rs of sustainability • To understand what a virtual model is and the pros and cons of traditional vs CAD modelling	• To know that designers write design briefs and develop design criteria to enable them to fulfil a client's request • To know that 'multifunctional' means an object or product has more than one function • To know that magnetometers are devices that measure the Earth's magnetic field to determine which direction you are facing