Design & Technology KNOWLEDGE

This is how our children's design and technology knowledge build from Year 3 to Year 6, taking into account, prior learning (Year 2) and next stage

For pupils to become confident designers they need to become imaginative problem solvers who design and make products for a variety of needs, wants and values. They must acquire a wide range of subject knowledge through the key stage and draw on mathematical, computing, art and engineering knowledge. The progression plan will inform planning to ensure that learning is built within the lesson sequence, within the topic, within the year and overtime. We want our children to move from being a novice to becoming an expert designer and assertive cook.

The National Curriculum (KS2)
Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts [for example, the home, school, leisure, culture, enterprise, industry, and the wider environment]. When designing and making, pupils should be taught to:

Pillars of our Design and Technology curriculum:

Research & Design	Make	Evaluate	Cooking and nutrition
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	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.	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.	As part of their work with food, pupils should be taught how to cook and apply the principles of nutrition and healthy eating. Instilling a love of cooking in pupils will also open a door to one of the great expressions of human creativity. Learning how to cook is a crucial life skill that enables pupils to feed themselves and others affordably and well, now and in later life.

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.

Unit of work	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Autumn		Cooking and nutrition		Cooking and nutrition	Cooking and nutrition	
Spring			Cooking and nutrition			
Summer		Technical knowledge	Technical knowledge	Technical knowledge	Technical knowledge	
Area of Study	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
Research & Designing	-Know what a **purposeful** product is and why it is **functional** -Know what makes product **appealing** and say why -Use knowledge of existing products to generate designs -Know and describe the purpose of their product, who their target **audience** is -Know that through drawing and labels you can describe how their product will work **Ideas** **Design** **Research** **Label** **Product** **Target audience** **Model** **Materials** **Purpose** **Construction** **Templates** **Appealing** **Criteria**	**-**Know that **researching** information about the needs and wants of individuals or groups is needed prior to designing -Know how to use **research** to explore the purpose of the product -Indicate design **features** of their products -Know how to generate ideas for a design, that fits a purpose -Know how to use **research** to generate a **criteria** of success for the product -Know how to use **annotation** to communicate design ideas **Ideas** **Research** **Generate** **Features Annotation** **Design criteria** **Functional** **Purposeful** **Successful**	-Know how to use **research** to indicate design features of a product that will **appeal** to the intended purpose **-**Know how to use **evaluations** of products to identify **criteria** that can be used for their own designs -Know how to make design decisions that take account of the availability of resources and given **criteria** -Know how to annotated designs and uses sketching to support planning --Know how to develop a clear idea of the steps within the product process -Know that designs can be **adapted** during the making process **Ideas** **Research** **Adapt**	-Know that products have developed overtime and use this **information** within their designs -Know that ideas from other people can be used within designs -Know and **indicate** the design **features** of their products that will **appeal** to intended users, to include **functions** and why it is **appealing** -Know how to draw a **specification** for their design -Know that original ideas may not work and can be **adapted,** explaining why -Communicate design ideas in a range of ways **Ideas**	-Know that all aspects of a design must lead to the specific need/**purpose.** -Know how to identify and solve design problems -know how to use market **research** to inform designs -Know that ICT can enhance and develop the design **process**. -Know how to Follow and refine original plans, explaining the **rationale** for changes and how these impacts on the final product. -Know how to communicate ideas in a range of ways including photos, detailed sketches, annotated drawings, mock ups, 3D models **Research** **Generate** **Purpose** **Enhance**	Know how to use research and exploration, such as the study of different cultures, to identify and understand user needs - Know how to develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations -Know how to identify and solve their own design problems and understand how to reformulate problems given to them -Know how to develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations, and computer-based tools

	Functional	**Appeal** **Model** **Pattern Methods,** **Decision, Availability**	**Features Annotation** **Design criteria** **Functional** **Purposeful** **Appeal** **Methods,** **Proposals** **Sketches** **Cross sectional drawing** **Prototypes** **Innovative** **Evaluations**	**Research** **Generate** **Features** **Appeal** **Users** **Communicate** **Adapted** **Properties** **Alternatives** **Results** **Equipment Materials** **Proposals** **Processes Methods** **Investigations** **Techniques** **Specification**	**Identify** **Solve** **Process** **Rationale** **Impact** **Communicate** **Product** **Sketches** **Annotations** **Models** **Alternatives** **Equipment Materials** **Proposals** **Processes Methods** **Investigations** **Techniques** **Specification**	
Making	-Know how to select tools and **materials** and explain why -Know which **resources** and **tools** to choose and state reasons for choice -With support, know how to measure, cut and score with some accuracy -Know how to **assemble**, **join** and **combine materials** in order to make a product -Choose and use appropriate finishing **techniques** -Know how to use chosen **tools** safely and **hygienically** with support **Tools** **Materials** **Construct** **Join** **Assemble** **Combine** **Methods** **Resources** **Safely** **Techniques** **Measure** **Cut** **Score** **Appearance** **Product** **Sew**	-Know which tools and **techniques** are suitable for the task and explain their choices **-**Know that all **components** have a **function** -Know how to explain their choice of **materials** and **components** according to **functional properties** and aesthetic qualities -Know how to measure, mark out, cut, score and **assemble components** with increased accuracy -Know they can change things if this helps them improve their work - Use finishing **techniques** to improve the **appearance** of their product -Know and follow **procedures** for safety and hygiene **Components** **Procedures** **Function** **Appearance** **Measure** **Mark out** **Cut** **Score** **Assemble** **Progress Equipment** **Safely** **Accurate** **Shape** **Join** **Fabric** **Product**	-Know which **tools** and **equipment** are suitable for the task and explain why they have been chosen -Know that all **components** have a **function** and these may need to be **assembled** in a particular order -Know how to measure, with accuracy, mark out, cut and shape a range of **materials,** using appropriate **tools, equipment** and **techniques.** -Know that **adaption** is an acceptable, if it arises -Use finishing **techniques** to improve the strength and **appearance** of their product -Know and follow **procedures** for safety and hygiene **Components** **Procedures** **Function** **Appearance** **Measure** **Mark out** **Cut** **Shape** **Assemble** **Equipment** **Temporary** **Permanent** **Logical, Expertise,** **Adapt** **strength** **Sew** **Stitch** **Weave** **Knit**	**-**Know which **tools, equipment** and **techniques** are suitable for the task and understand the importance of accurate use -Explain their choice of **materials** and **components** according to **functional** properties and **aesthetic** qualities -Know to order the stages of the making process, in logical steps. -Begin to **formulate** step-by-step plans as guide to making -Know that accuracy with cutting and joining will ensure a good-quality finish to the product -Explain how **tools** should be used with an understanding of health and safety. Know and explain hygiene **procedures** **Equipment** **Techniques** **Accurate** **Materials** **Components** **Functional** **Aesthetics** **Formulate** **Quality** **Procedures** **Appropriate materials** **Mark out** **Weigh** **Quality** **Perseverance**	-Know the assets and benefits of **tools,** explaining why a specific **tool** has been used. -Confidently use a wide range of **materials** during a project and justify choices based on **aesthetics** and **function** and **purpose** -Know the logical order of the stages of the making process -Know that they must have a **functional** product finished to a quality standard at the end of the making process by accurately **assembling** components -**Formulate** step-by-step plans as guide to making -Know and explain safety and hygiene **procedures** and justify why they are in place **Explain** **Techniques** **Accurate** **Materials** **Aesthetics** **Function** **Purpose** **Logical** **Quality** **Construct** **Assembling** **Components** **Procedures** **Formulate** **Appropriate** **Perseverance** **Modifications**	Know how to select from and use specialist tools, techniques, processes, equipment, and machinery precisely, including computer-aided manufacture -Know how to select from and use a wider, more complex range of materials and components considering their properties. -Explain how a range of tools should be used with an understanding of health and safety. Know and explain hygiene procedures and justify why they are in place.
Evaluating	-Know how to evaluate existing products through discussions, **comparisons** and simple written evaluations -Know how to evaluate their work against their design **criteria** with support. -Know how to evaluate their products as they are developed, identifying what went well and possible **changes** they might make next time **Materials** **Make** **Improve** **Change** **Evaluate**	-Know how to investigate and analyse existing products and processes against a **criteria** and explain why -Know how to evaluate their work against a specific design **criteria** -Know how to improve work through peer evaluation -Know how well products meet user needs and wants -Consider their design **criteria** as they make progress and be willing to alter their plans, if necessary **Investigate** **Analyse** **Products**	- Know how to investigate and analyse existing products (materials/ ingredients) suggest reasons for chosen **characteristics** -Know how to evaluate their work and others against a specific design **criteria,** identifying success and areas for improvement -Know how to evaluate finished products against **existing** key products -Know how well products work and achieve their purposes **Investigate** **Analyse** **Products** **Components**	- Know what materials/ ingredients products are made from and suggest **alternatives** -Know how to investigate, analyse and compare existing products -Know how to test, evaluate their work and others against a specific design **criteria** and refine their ideas -Know how to evaluate finished products against existing, key products -Explain why they have made their choices referring to existing products **Alternatives** **Investigate** **Analyse**	-Know what materials/ ingredients products are made from and analyse **alternatives** -Know how to test, evaluate their work and others against a specific design **criteria** and refine their ideas taking into account the intended user or group -Know how to investigate and analyse existing products which are ground breaking and learn about inventors/designers relevant to the project -Know how to evaluate finished products against existing, key products and improve their work justifying	-Know how to test, **evaluate,** and refine their ideas and products against a specification, considering the views of intended users and other interested groups -Know how to **analyse** the work of past and present professionals and others to develop and broaden their understanding - Know how to **investigate** new and emerging technologies

	Product **Purposeful Target audience** **Compare** **Suitable** **Criteria** **Functional** **Appealing**	**Components** **Design criteria** **Evaluation** **Improve** **User** **Alter** **Features** **Function** **Appealing Decision** **Innovative** Existing	**Design criteria** **Evaluation** **Innovative** **Identify** **Successful** **Improve** **User** **Existing** **Characteristics** **Purposes** **Adapt**	**Compare** **Existing** **Design criteria** **Aesthetics** **Characteristics** **Properties** **Mechanisms** **Processes** **Methods Specification** **Purpose**	what **improvements** they have made and why **Alternatives** **Investigate** **Analyse** **Compare** **Existing** **Design criteria** **Aesthetics** **Characteristics** **Properties** **Processes** **Methods Specification** **Purpose** **Inventors** **Designers** **Justify** **Improve**	
Technical knowledge and skills	**Structures** • Know how to build structures, exploring how they can be made stronger, stiffer, and more stable. •Know and identify natural and man-made structures. • Know that shapes and structures with wide, flat bases or legs are most stable. • Know that the shape of a structure affects its strength. **Mechanisms** •Know that mechanisms are a collection of moving parts that work together in a machine. •Know and identify mechanisms in everyday objects. •Know that a lever is something that turns on a pivot. •Know that a linkage is a system of levers that are connected by pivots. •Know that axles help wheels to move a vehicle. **Textiles** • Know how to sew a running stitch,	Know how to tie a knot at the end of a thread. Know how to use a stitch to join fabrics together, ie a running stitch, backward stitch or cross stitch with equal spacing Know how to tape or pin and join fabric with some accuracy Know that fabric can be joined in temporary or permanent ways Know that fabrics have different properties.	Know how to make a simple electrical circuit. Know how to make a switch. Know that electricity flows through a circuit. Know how to connect and disconnect the flow of electricity. Know how to work safely when working with electricity. Know how electrical circuits can be used within a product Know how to join and combine materials accurately in temporary and permanent ways	Know how mechanical systems work. Know how to measure, mark, cut, saw and drill accurately with wood. Know how to strengthen, reinforce, and stiffen the wooden frame. Know how to use a workbench and tools safely.	Know how to make a complex electrical circuit. Know how to strengthen, reinforce, and stiffen a 3D frame Know how to measure, mark, cut, saw, and drill accurately. Know how to work safely when working with electricity. Know the purpose of an alarm.	• Know and understand how more advanced mechanical systems used in their products enable changes in movement and force. • Know and understand how more advanced electrical and electronic systems can be powered and used in their products [for example, circuits with heat, light, sound and movement as inputs and outputs] • Know how to apply computing and use electronics to embed intelligence in products that respond to inputs [for example, sensors], and control outputs [for example, actuators], using programmable components [for example, microcontrollers].
Cooking and nutrition **Technical knowledge and skills**	Know what makes a balanced diet and know the five food groups. Know where to find the nutritional information on packaging and describe the information that should be included on a label. Know that all food comes from plants or animals. Know how to prepare food safely and hygienically without using a heat source	**Fruit Salad** Know the names of food groups (carbohydrates, protein, dairy, fruits and vegetables, fats, and sugars). Know and identify the names of fruits and vegetables. Know that fruits are sweet, and vegetables are savoury. Know that fruits and vegetables are seasonal and understand how a variety are grown. Know how to cut raw fruits and vegetables safely with a knife. Know how to peel fruit.	**Indian Breads** Know that bread is made using flour, yeast, sugar, and water (some breads require oil or don't use yeast). Know that yeast gives the bread air and helps it to rise and understand why. Know that there are different types of flour (strong flour, plain flour and self-raising flour) and how it is produced. Know that bread is a carbohydrate. Know how to weigh out ingredients using a weighing scale. Know how to knead bread and proof it. Know how to use oven gloves to remove items from the oven and work safely around an oven.	**Cookery- Biscuits** Know what constitutes healthy eating and a balanced diet. Know the proportions of each food group which make up a balanced diet. Know the principal ingredients for making a biscuit. Know how to weigh out ingredients using a weighing scale. Know how to prepare and cook a dish safely and hygienically, including where appropriate the use of a heat source	**Cookery-Soup** Know what constitutes healthy eating and a balanced diet. Know the proportions of each food group which make up a balanced diet. Know that fruits and vegetables are seasonal and understand how a variety are grown. Know how to prepare and cook a dish safely and hygienically, including where appropriate the use of a heat source Know which foods were available during World War Two. Know how to use a range of techniques such as peeling, chopping, slicing, grating and mixing Know how to cook on a stove and adjust the temperature to boiling or simmering.	Know and apply the principles of nutrition and health Know how to cook a repertoire of predominantly savoury dishes so that they can feed themselves and others a healthy and varied diet Become competent in a range of cooking techniques [for example, selecting and preparing ingredients; using utensils and electrical equipment; applying heat in different ways; using awareness of taste, texture, and smell to decide how to season dishes and combine ingredients; adapting and using their own recipes]. Know and understand the source, seasonality, and characteristics of a broad range of ingredients.