Grange Primary Academy
The best in everyone™
Part of United Learning

D&T and Food Expectations 2026-2027

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United Curriculum: D&T and Food

	N3-4	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Autumn	**Marvellous Me & Look at Me** Using scissors, glue, Sellotape and playdough. **Its Getting Cold Outside & Bears** Den building, materials and properties. **Polar Express & Special Days** Making biscuits and cakes, tasting hot chocolate.	**My Heroes** Hammering nails into vegetables, chopping vegetables and making soup. Constructing emergency vehicles and superhero dens.	**Food** **Eat a Rainbow** Block 2 Preparing a colourful fruit kebab, fruit jelly pots, crudités and dips.		**How we Make Things** **Block 1** Introduction to different manufacturing techniques. Making frame structures, chocolates and chocolate boxes.	**Cams, Pulleys & Gears** Block 2 Introduction and modelling of cam, pulley and gear mechanisms. The Action Aid Squashed Tomato Challenge - Design, prototype and test a pulley system.	**Sustainable Products** Block 1 Analysing the sustainability of food packaging and developing textiles skills. Making a re-usable sandwich wrap or pouch.	**Upcycled Products** Block 1 Consolidation unit to apply knowledge and develop skills. Designing and making "pop bottle products".
Spring	**On the Move & Toys** Describing 3D shapes, making 3D models of vehicles and flying machines, exploring pushes and pulls. **On the Farm & Food Glorious Food** Building structures from building blocks. Making salad and fruit salad, tasting fruit and vegetables, five-a-day.	**Spring in Our Step** Tasting raw and cooked vegetables. Making fruit salads, fruit kebabs or fruit smoothies.		**Wheels & Axles** Block 2 Introduction to wheels and axles. Vehicle Design Challenge – Design, prototype and test a vehicle model to travel the furthest.			**Food** **Sauces** Block 3 Building foundational cooking skills with a range of staple sauces.	**Renewable Energy** Block 2 Consolidation unit to apply knowledge and develop skills. Designing and making functioning wind turbines to generate electricity.
Summer	**Once Upon a Time 1 and 2** Making models using playdough and other materials. Constructing bridges. Making cakes and gingerbread biscuits Sorting natural and human-made materials.	**Where We Live** Folding paper to make 2D shapes.	**Simple Machines** **Block 4** Introduction to mechanisms (sliders, levers and linkages). Making a simple linkages (levers) to prototype a grabber mechanism.	**Materials & Textiles** **Block 4** Introduction to textiles and basic sewing techniques. Designing buttons and making a re-usable heat pack.	**Food** **Sandwiches** Block 3 Making sandwiches with a balance of proteins fats & carbohydrates.	**Lighting Up** Block 4 Introduction to electronic systems. Using a Micro:bit to programme lights. Designing and making a miniature LED torch.	.	

United Curriculum Principles

Building on the Framework for Excellence, The United Learning Primary Curriculum has six core principles:

- **Entitlement**
  All pupils have the right to learn what is in the United Learning curriculum, and schools have a duty to ensure that all pupils are taught the whole of it.
- **Coherence**
  Taking the National Curriculum as its starting point, our curriculum is carefully sequenced so that powerful knowledge builds term by term and year by year. We make meaningful connections within subjects and between subjects.
- **Mastery**
  We ensure that foundational knowledge, skills and concepts are secure before moving on. Pupils revisit prior learning and apply their understanding in new contexts.
- **Adaptability**
  The core content – the 'what' – of the curriculum is stable, but schools will bring it to life in their own local context, and teachers will adapt lessons – the 'how' – to meet the needs of their own classes.
- **Representation**
  All pupils see themselves in our curriculum, and our curriculum takes all pupils beyond their immediate experience.
- **Education with Character**
  Our curriculum - which includes the taught subject timetable as well as spiritual, moral, social and cultural development, our co-curricular provision and the ethos and 'hidden curriculum' of the school – is intended to spark curiosity and to nourish both the head and the heart.

Subject-specific rationales are built on these six principles.

United Curriculum Principles: D&T & Food

The Relationship Between Design & Technology and Cooking & Nutrition (Food)

The National Curriculum is clear that Cooking & Nutrition is a discrete part of the Design & Technology curriculum. In one strand of D&T, the aims of the curriculum are to:

- 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 ideas, products and the work of others.

However, the aim of Cooking & Nutrition is distinct:

- Understand and apply the principles of nutrition and learn how to cook.

The purpose of the Cooking & Nutrition strand within Design & Technology is not to design dishes. While this is ultimately the skill of a chef, there is a huge amount of prerequisite knowledge that needs to be mastered before new dishes can be designed. Chefs need to know about nutrition and dietary requirements; equipment and techniques; source and characteristics of ingredients; an awareness of the principles of cooking (which Ashbee in *Curriculum: Theory, Culture and Subject Specialisms* (2021) describes as bases, thickening, reduction, seasoning, layering, topping, balance, contrast etc.); and a growing knowledge of tried-and-tested recipes. The knowledge that pupils are taught in Primary school should therefore focus more on this prerequisite knowledge – the basics of cooking and nutrition – and less on the design elements of the subject.

For this reason, we have a separate set of principles for Design & Technology and Cooking & Nutrition, and a separate set of sequencing documents to show how pupils will progress in each discipline.

The Right Balance of Design & Technology and Cooking & Nutrition (Food)

Historically, schools have tended to teach Cooking & Nutrition much less frequently than the rest of D&T and, when it is taught, Cooking & Nutrition has tended to include 'design' skills such as surveys and designing dishes. This limits the time available to explicitly teach aspects of Cooking & Nutrition.

The aim of the United Curriculum for Cooking & Nutrition is to ensure that all pupils leave primary school with the ability to cook a selection of healthy dishes using a variety of techniques, and to be able to make choices about what they eat based on values like source, seasonality, and nutritional value. These life skills are even more important in the context of rising obesity and climate change.

The practical and conceptual knowledge of Cooking & Nutrition needs to be explicitly taught and practised, so sufficient time needs to be allocated to it. Therefore, there is one Cooking & Nutrition unit per year, and two D&T units per year. This allows sufficient time for pupils to master important Cooking & Nutrition skills, while ensuring there is still time to deliver all the required D&T.

United Curriculum Principles: D&T

The United Curriculum for Design & Technology provides all children, regardless of their background, with:

Substantive (conceptual) knowledge: 'Knowing that…' (Vertical Concepts):

- This is the core technical knowledge and understanding that students need to grasp. It includes the fundamental principles, theories, and concepts that underpin the subject. 'Knowing that' involves students being aware of specific facts, information, and ideas related to Design & Technology. This foundational knowledge is crucial as it enables students to apply what they have learned to practical tasks and problem-solving activities within the curriculum.
- Ensuring pupils **master** core content through the development of **conceptual knowledge** of designing (including responsibility and design in the past, present and future), making, and technical knowledge (including materials, structures, mechanical and electrical systems) in small steps, and the timely revisiting of this key knowledge.
- Making explicit and deliberate links to other curriculum subjects – particularly science – to ensure that pupils use and apply scientific concepts in a Design & Technology setting at the appropriate time. Pupils also draw on and further develop knowledge and skills first taught in Mathematics, Computing, Art & Design, History and Geography due to the multi-disciplinary nature of Design & Technology.

Substantive (procedural) knowledge: 'Being able to…' (Making):

- This focuses on the skills and techniques that students need to develop and involves the practical application of conceptual knowledge. These procedural skills are essential as they enable students to translate their conceptual understanding into tangible outcomes.
- Ensuring that pupils are explicitly taught and have time to master procedural knowledge (including tools, materials, components and processes), **safely being able to make** and **follow the making process** (measuring, marking, cutting, shaping, refining, joining and finishing) and **think like an engineer** to solve problems through focused practical tasks, engineering challenges and making prototypes and products that meet design criteria.

Disciplinary knowledge: 'Being able to…' (Designing and Critiquing)

- This focuses on being able to critique (through product analysis and evaluation) and design, applying the **iterative design process** and allowing pupils to build their understanding and ability to analyse products, apply design values to develop design criteria, design, test, iterate and evaluate prototypes and products gradually from EYFS to Key Stage 2 and beyond.
- Ensuring that pupils know **they are designers and engineers**, who design a solution to fit a specific user and need; they are not led by outcomes. Pupils should be encouraged to design products using all of the knowledge they have developed across the curriculum.
- **Explicitly teaching** ways of designing, ways of generating ideas and ways of identifying user needs, to give pupils the tools they need to thrive as designers of the future.

United Curriculum Principles: D&T

The United Curriculum for Design & Technology provides all children, regardless of their background, with:

Curiosity and excitement about the possibilities offered by Design & Technology:

- Ensuring that all pupils **can see themselves reflected** in the Design & Technology curriculum, by exploring the contributions made by a wide range of designers and engineers, past and present.
- Opportunities to **develop character** by understanding the difficulties faced by those designers and seeing how characteristics such as resilience and risk-taking contributed towards success.
- Understanding the contribution that Design & Technology makes to creativity, culture, wealth and the well-being of a nation and that **more opportunities exist** than ever before due to technological advances.
- Preparing pupils for future careers in design, engineering, manufacturing and technology industries by equipping them with the practical skills and awareness needed to innovate responsibly and sustainably, taking advantage of the new and emerging technology available to them.

Responsibility:

- Pupils will learn to make responsible design decisions, considering environmental, ethical, personal, social, and economic impacts.
- By critiquing existing products, they will become informed and responsible consumers.

United Curriculum Principles: Food

The United Curriculum for Food provides all children, regardless of their background, with:

Substantive knowledge:

- Ensuring pupils **master** core content through the development of **conceptual knowledge** of food sources, safety, hygiene and nutrition in small steps, and the timely revisiting of this key knowledge.
- Ensuring that pupils are explicitly taught and have time to master **procedural knowledge**, including the cooking skills of chopping, preparing, combining and heating in focused practical tasks.
- Making explicit and deliberate links to other curriculum subjects – particularly science – to ensure that pupils use and apply scientific concepts, such as nutrition and food chains, in a 'food setting' at the appropriate time.

Disciplinary knowledge:

- Ensuring that pupils are taught how to make **food choices** based on qualities like nutritional value; dietary requirements; cost; seasonality; food miles and carbon footprint of production; time to prepare; and quantities. These qualities are introduced in small steps but applied cumulatively so that by Year 6, pupils are able to make decisions based on a selection of them.

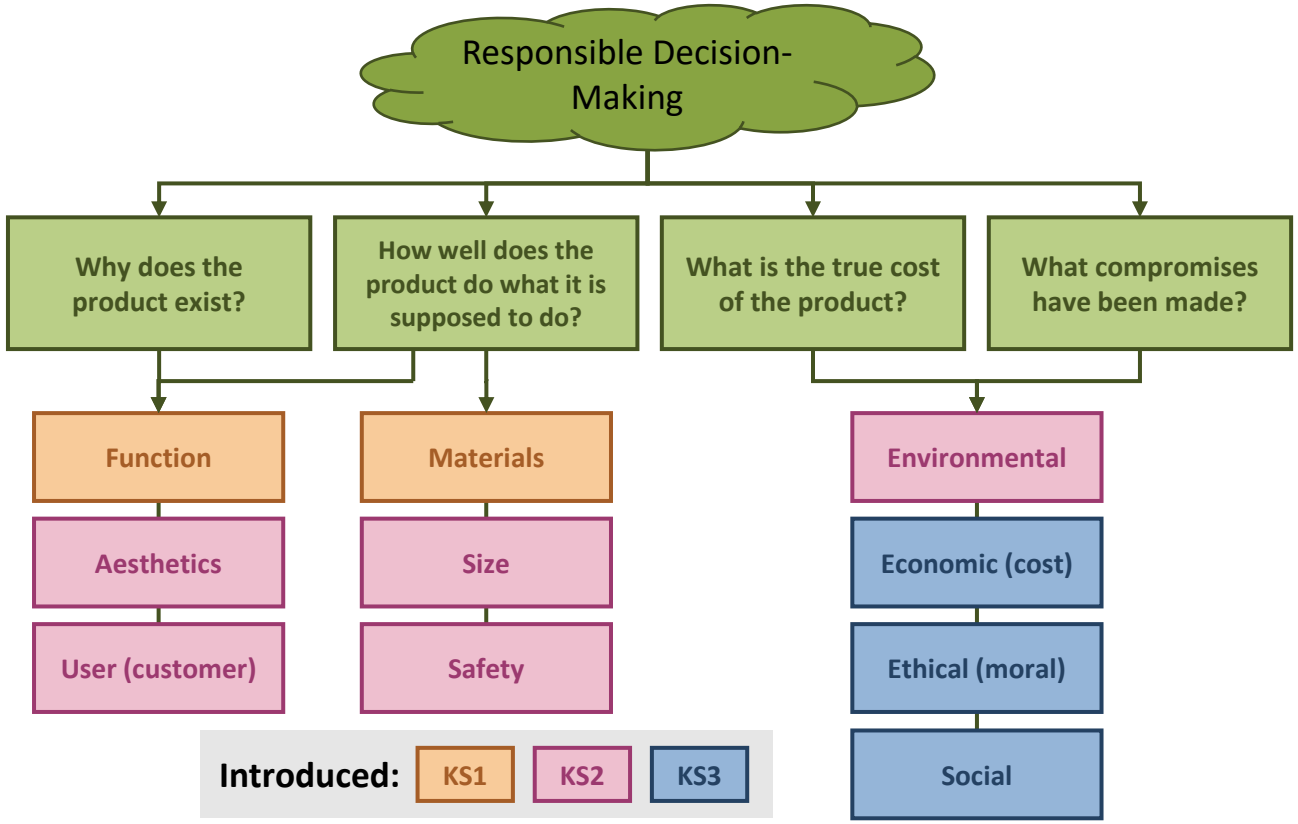
The ability, and desire, to cook balanced, sustainable meals for themselves and their family:

- Providing pupils with plentiful opportunities to taste, experience and evaluate a variety of foods using all their senses to broaden their palette and encourage a love of healthy foods.
- Ensuring that the recipes and foods chosen reflect relevant cuisines from the local context, the UK and around the world.
- Providing recipes that are low cost, balanced and sustainable, which can be cooked (and easily adapted) by pupils after school in a family context.

United Curriculum Principles: Responsibility

The Responsible Decision-Making Framework:

- The Responsible Decision-Making Framework considers why a product exists, how well it does what it is supposed to do, the true cost of a product and what compromises have been made. The framework of design values is gradually introduced and used throughout the curriculum for product analysis, developing design criteria, designing and evaluating prototypes and products.



NB. The Responsible Decision-Making Framework builds upon the ACCESSFM framework often used in D&T (**A**esthetics **C**ost, **C**ustomer, **E**nvironment, **S**ize, **S**afety, **F**unction, **M**aterial).

Resourcing

Responsible use of materials:

Design & Technology can use a lot of materials and other resources. It is important that pupils are given the opportunity to learn and develop practical making skills, so material and resource use (and waste) is inevitable. The curriculum has been designed to minimise resource use and waste through the following principles:

- Pupils will learn about responsible use of materials and how to minimise waste.
- The outputs of many focused practical tasks are not designed to be taken home, so materials and resources can be salvaged and reused the following year.
- Take-homes will be small, use minimal materials and resources and/or utilise recycled materials.
- 3D printing will be utilised to make high quality prototypes and products. This has the advantage of almost zero waste and uses low-cost bioplastics (made from corn starch) that are available as recycled materials and that can be recycled.

United Curriculum Principles: Responsibility

Take-Homes:

Pupil's work in Design & Technology often results in a take-home product.

To minimise resource use and waste, these will be limited to **one high quality take-home per academic year**.

Take-homes from the United Curriculum adhere to one or more of the following principles:

- Pupils (or parents/carers) need it – it's handy/functional and they will use it.
- Pupils (or parents/carers) want it – they will be proud of it and care about it.
- It will be fairly timeless – they will keep it.
- It can be tested and has scope to be re-designed – they can make decisions about it.
- It can be made (relatively) cheaply, but is also worth investing budget in.
- It might change parental perceptions about D&T (for the better).

During the year, pupils will be making other prototypes as they develop their skills and work on design challenges which teachers may choose for pupils to take home or not. In most cases, many of the materials and components from these focused practical tasks and prototypes can be salvaged for re-use in subsequent years.

Year 1
Mechanical Grabber

Year 2
Re-usable Heat/Cool Pack

Year 3
Zip Pull

Year 4
LED Mini Torch

Year 5
Sandwich Wrap/Pouch

Year 6
Pop Bottle Product

Structuring the United Curriculum: D&T

The United Curriculum for Design & Technology has three strands:

Substantive (conceptual) knowledge: Knowing that… (Vertical Concepts)

Conceptual knowledge includes the principles that designers and engineers must have a solid understanding of before attempting to design any product.

The conceptual knowledge is structured into these vertical concepts:

- **Responsibility**
- **Design in the Past, Present & Future**
- **Designing**
- **Materials**
- **Making**
- **Structures**
- **Mechanical Systems**
- **Electrical Systems**

These have each been sequenced so that pupils are explicitly taught aspects in small steps, allowing pupils to gradually build their understanding and mastery of conceptual knowledge. Progression in each area of conceptual knowledge is outlined in Slides 63-71.

*Vertical Concepts

Design & Technology is a very practical subject, and it is useful to consider the substantive knowledge (i.e. the knowledge that all designers and engineers need) as conceptual and procedural. These could be likened to knowledge and skills.

However, in the context of the United Learning Curriculum, the **conceptual knowledge** could be considered as the '**Vertical Concepts**'.

As they progress through the curriculum, pupils build their understanding of conceptual concepts like mechanisms; they revisit and add layers to their understanding throughout the curriculum.

Progression journeys for each vertical concept, mapped to individual D&T units are provided on Slides 48-62.

Substantive (procedural) knowledge: Being able to… (Making)

Procedural knowledge includes the skills and craftsmanship of designers and engineers. It includes:

- **Tools, Materials & Components**
- **Processes**

As above, these have each been sequenced so that pupils watch teachers model a small number of key procedures in each unit, and pupils carry out focused practical tasks to master the skills. Progression in procedural knowledge is outlined in Slides 72-74.

Disciplinary knowledge: Being able to… (Designing and Critiquing)

In the United Curriculum, the third strand focuses on application of the design process to design products, parts and systems. It includes:

- **Product Analysis**
- **Design Values & Criteria**
- **Designing**
- **Design Communication**
- **Evaluating**

Progression in disciplinary knowledge is outlined on Slides 75-79.

Structuring the United Curriculum: Food

The United Curriculum for Food has three strands:

Conceptual knowledge (Substantive/Vertical Concepts*)

Conceptual knowledge – knowing that – includes the ideas and principles that cooks and chefs must have an understanding of. The conceptual knowledge is structured into:

- **Ingredients**
- **Nutrition** (including dietary requirements and restrictions)
- **Safety**
- **Food hygiene**

These have each been sequenced so that pupils are explicitly taught aspects in small steps, allowing pupils to gradually build their understanding and mastery of conceptual knowledge. Progression in each area of conceptual knowledge for Food is outlined in Slides 84-85.

Procedural knowledge (Substantive)

Procedural knowledge covers cooking skills and techniques (making), including:

- **Processes** (including preparing, combining, assembling and cooking ingredients to make dishes)
- **Safety**
- **Food hygiene**

As above, these have each been sequenced so that pupils watch teachers model a small number of key techniques in each unit, and pupils follow recipes that help them master the skills. Progression in each strand is outlined in Slide 87.

Disciplinary knowledge (Procedural)

In the United Curriculum for Food, the third strand focuses on designing. This includes developing and evaluating dishes and food choices: how cooks make choices about food based on qualities like nutritional value; dietary requirements; cost; seasonality; food miles and carbon footprint of production; time to prepare; and quantities.

Progression in Food Choices is outlined on Slide 88.

*Vertical Concepts

Food is a very practical subject, and it is useful to consider the substantive knowledge (i.e. the knowledge that all cooks need) as conceptual and procedural. These could be likened to knowledge and skills or knowing that and knowing how.

However, in the context of the United Curriculum, the **conceptual knowledge** could be considered as the '**Vertical Concepts**'.

As they progress through the curriculum, pupils build their understanding of conceptual concepts like nutrition and food source; they revisit and add layers to their understanding throughout the curriculum.

Progression journeys for each vertical concept, mapped to individual Food units, are provided on Slides 80-83.

United Curriculum: Design & Technology

Year 1: Block 2

Food: Eat a Rainbow

Pupils will learn that fruit and vegetables come from plants, and the importance of **eating a rainbow** and 5 portions of fruit and vegetables a day. They will learn the basics of food hygiene and how to safely chop a variety of fruit and vegetables. Pupils will make fruit kebabs, fruit jelly pots, crudités and dips.

		Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive Knowledge	Conceptual	**Science:** • A plant is a living thing that grows in one place. A tree is a type of plant. (Y1 Aut1) • The basic parts of a plant include leaves, flowers, roots, stem (or trunk). (Y1 Aut1) • There are four seasons: spring, summer, autumn and winter. (Y1 Aut2) • The weather changes gradually as we move from season to season. (Y1 Aut2)	**Ingredients:** • Fruits and vegetables come from plants (including trees). • Fruits contain a plant's seeds. Vegetables are other parts of the plant. • Food can come from farms, allotments and gardens. • Fruits and vegetables are usually harvested in a particular season. Different foods are in season at different times of the year. **Nutrition:** • We should eat five portions of fruit or vegetables each day. • 'Eating a rainbow' means to eat different types of fruits and vegetables, that might have lots of different colours. • Fruits and vegetables both contain lots of good things for our bodies. Fruits contain more sugar, so we should eat less of them. **Food Hygiene:** • Wash hands and tie hair back to stop the tiny living things on our hands getting onto the food and into our bodies. • Wear an apron to protect our clothes and stop the tiny living things on them getting into food and into our bodies.	**Ingredients**: • Foods come from a range of sources, including plants (fruits and vegetables) and animals (meat and dairy products). (Y2) **Nutrition**: • Humans need to eat a healthy and balanced diet. This should include all the nutrients that we need, should be high in fruits and vegetables and low in fats, salt and sugars. (Y2) **Food Hygiene**: • Tie hair back and wash hands after sneezing, coughing and going to the toilet to stop the tiny living things on our hands getting into our bodies. (Y2) • Cheese, cooked meats and eggs are high-risk foods. (Y3) Pasta and couscous are also high-risk. (Y5) • Consider the importance of the refrigerator in terms of food safety. (Y3)
	Procedural	**Nutrition:** • Eating a range of fruits and vegetables. (EYFS)	**Processes:** • Wash and drain fruits. • Chop using the claw and the bridge technique. • Chop a range of foods, including bananas, strawberries, grapes, cucumber or courgette, carrots and prepared apples or pears, pineapple or melon, peppers and celery. • Peel bananas and satsumas. • Mash with a fork. • Mix with a spoon. • Follow simple recipes. **Food Hygiene:** • Wash up items by removing excess food, washing, rinsing and drying.	**Processes**: • Chop a wider range of foods, more accurately using the claw and the bridge technique. (Y2) • Dress a salad using utensils and layer food on a salad bed. (Y2) **Food Hygiene**: • Wash up items in the most appropriate order, starting with least dirty, and change washing up water as required. (Y4)
DK			**Food Choices:** • Make food choices based on colour and quantity of sugar.	**Food Choices:** • Make food choices based on Y1 plus quantities of fat and salt and dietary requirements (vegans and vegetarians). (Y2)

Year 1: Block 4

Simple Machines

Pupils will be introduced to mechanisms. They will learn about sliders, levers and linkages and the basic making process. Through the context of helping hands, they will make, test and iterate a simple cardboard linkage to prototype a **grabber mechanism (take home)** that can pick up a variety of objects.

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive / Conceptual	**Designing:** • **Materials** are an important design value because materials can affect the **function** of a product. (Y1 Spr) • **Function** is an important design value because it affects how well a product works and if it does what it is supposed to do. (Y1 Spr) • Designing involves different steps including identifying a problem and generating ideas. (Y1 Spr) • Designing is about trying something and seeing what works and then trying again. (Y1 Spr) **Structures:** • Free-standing structures can be made stronger with stiffer materials, thicker materials, by folding materials or with more layers of material (laminating). (Y1 Spr)	**Designing:** • A prototype is a model of a design idea that you make so that you can test your ideas, see what works and what can be improved. • **Testing** is where we look at a product (or prototype) and see if it looks and works as expected and that it is easy and safe to use. **Materials:** • Paper and card are exceptionally good at being shaped, formed and layered. **Making:** • We must listen to and follow safety instructions. • We need to keep our work area tidy to stay safe. • There is a basic making process: this includes **measuring**, **marking**, **cutting** (or adding) materials and **assembling**. **Mechanical Systems:** • A **machine** is something that does work for us to help us do things more easily. For example, scissors help us to cut materials easier and vacuum cleaners help us to clean the floor. • A **mechanism** is a single part of a machine. Mechanisms make changes to movement or make movement easier. • There are different types of movement. These include **linear**, **reciprocating** and **oscillating** movement. • A **slider** is a simple mechanism. It is a rigid beam that moves back and forth on a straight line. For example: drawers, sliding doors and extending ladders. • A **lever** is a simple mechanism. It is a rigid beam that pivots (turns). For example: door handles, see-saws, scissors and windscreen wipers. • A **linkage** mechanism is a system of levers that are joined together to control movement. For example: umbrellas, scissor lifters, tool-boxes and camping chairs.	**Designing:** • Designing involves different steps including identifying a problem, generating ideas, making, testing and **evaluating** your designs. (Y2 Spr2) • A 2D sketch is a flat drawing that shows how something will look from just one side. (Y2 Spr2) **Materials:** • Wood is a natural material made from trees. It can be re-used or recycled into new products such as paper, cardboard and fibreboard. (Y2 Spr2) **Making:** • Tools can be dangerous if not used correctly. Different tools have specific safe ways to be used and some need adult supervision. (Y2 Spr2) • We must wear safety equipment when told to. (Y2 Spr2) • There is a basic making process: this includes measuring, marking, cutting (or adding) materials, assembling and **finishing**. (Y2 Sum) **Mechanical Systems:** • A **wheel** is a round part that turns on a stick (called an **axle**). It is a mechanism that makes it easier to move things. (Y2 Spr2) • Wheeled vehicles have different parts including the body, wheels, axles, axle holders and a chassis. (Y2 Spr2) • There are different types of movement, including linear, reciprocating, oscillating and **rotary** movement. (Y2 Spr2) • There are two types of axle: fixed and free. **Fixed axles** attach to the chassis and can not rotate. **Free axles** are not attached to the chassis and can rotate within the chassis. (Y2 Spr2)

Year 1: Block 4

Simple Machines

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive Procedural	**Processes:** • Join like and different materials including paper and card semi-permanently using tape. (Y1 Spr)	**Tools, Materials & Components:** • Work safely when using different hand tools such as scissors. **Processes:** • Mark out using a 1cm grid as a measure. • Mark the centre of holes using a bradawl. • Cut straight lengths and curved shapes using scissors. • Cut holes using a pencil and blue tack. • Join like and different materials including paper and card permanently using glue. • Join like and different materials including paper and card semi-permanently using split pins. • Add surface designs to paper and card using coloured pencils, pens, felt tips and markers. • Make simple slider, lever and linkage mechanisms.	**Tools, Materials & Components:** • Identify and select appropriate materials for different purposes based on their properties. (Y2 Spr) • Select appropriate tools for measuring, marking out and cutting paper and card. (Y2 Spr) • Select appropriate tools and processes for shaping, joining and finishing paper and card. (Y2 Spr) **Processes:** • Measure and mark out lengths using a ruler (cm). (Y2 Spr) • Shape paper and card by folding and gluing. (Y2 Spr) • Add surface designs to paper and card using coloured pencils, pens, felt tips and markers. (Y2 Spr)
Disciplinary	**Designing:** • Design a solution to solve a given problem that meets shared design criteria. (Y1 Spr) **Design Communication:** • Draw simple 2D sketches. (Y1 Spr)	**Product Analysis:** • Explain how a simple existing product works. **Designing:** • Develop design ideas by testing a product prototype and suggesting improvements that could be made to its design. **Evaluating:** • Evaluate by explaining if a product is easy to use and if it does what it is supposed to do (function). • Evaluate products or prototypes based on function.	**Product Analysis:** • Analyse the materials, function and **aesthetics** of existing products by describing and identifying product features. (Y2 Sum) **Designing:** • Use chooser charts to generate ideas. (Y2 Spr) **Evaluating:** • Test a product or prototype to see if it works properly (function testing). (Y2 Spr) • Evaluate products or prototypes based on materials and function. (Y2 Spr)

Year 2: Block 2

Wheels & Axles

Pupils will be introduced to wheels and axles. They will explore the parts of a vehicle and learn how to use a saw safely to cut lengths of wood and make free and fixed axle models. The unit culminates in a vehicle design challenge where they will design, prototype and test a junk vehicle model to travel the furthest.

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive / Conceptual	**History:** • The wheel was an important invention in the development of transport. (Y1 Spr) **Science:** • How **slow**/**fast** a vehicle moves along a track depends on how **hard**/**gently** it is **pushed**/**pulled**, **how** steep the slope is, or whether there is an **obstacle** in its way. (N3-4 Spr) • **Sustainability** means meeting the needs of the people today, whilst meeting the needs of people of the future. (Y2 Spr1) **Designing:** • **Design values** are all the things you need to think about when designing (or redesigning) something. They can include values such as materials and function. (Y1 Spr) • Designing is about trying something, seeing what works and then trying again. (Y1 Spr) • **Testing** is where we look at a product (or prototype) and see if it looks and works as expected and that it is easy and safe to use. (Y1 Sum) **Making:** • We must listen to and follow safety instructions. (Y1 Sum) • We need to keep our work area tidy to stay safe. (Y1 Sum) • There is a basic making process: this includes **measuring**, **marking**, **cutting** (or adding) materials and **assembling**. (Y1 Sum) **Mechanical Systems:** • A **machine** is something that does work for us to help us do things more easily. (Y1 Sum) • A **mechanism** is a single part of a machine. Mechanisms make changes to movement or make movement easier. (Y1 Sum) • There are different types of movement. These include **linear**, **reciprocating** and **oscillating** movement. (Y1 Sum)	**Responsibility:** • **Re-using** and **re-purposing** things we no longer want or need helps to protect our planet by making less rubbish and saving natural resources. **Designing:** • Designing involves different steps, including: identifying a problem, generating ideas, making, testing and evaluating your designs. • A 2D sketch is a flat drawing that shows how something will look from just one side. **Materials:** • Wood is a natural material made from trees. It can be re-used or recycled into new products such as paper, cardboard and fibreboard. **Making:** • Tools can be dangerous if not used correctly. Different tools have specific safe ways to be used and some need adult supervision. • We must wear safety equipment when told to. **Mechanical Systems:** • A **wheel** is a round part that turns on a stick (called an **axle**). It is a mechanism that makes it easier to move things. • Wheeled vehicles have different parts, including the body, wheels, axles, axle holders and a chassis. • There are different types of movement including linear, reciprocating, oscillating and **rotary** movement. • There are two types of axle: fixed and free. **Fixed axles** attach to the chassis and can not rotate. **Free axles** are not attached to the chassis and can rotate within the chassis.	**Responsibility:** • The **'Responsible Decision-Making Framework'** can be used when analysing existing products, developing design criteria and evaluating. (Y3 Sum1) **Designing:** • 2D refers to flat designs with width and height only, 3D adds depth, creating objects with volume and perspective. 2D designs often serve as planning tools before developing them into 3D forms. (Y3 Sum1) **Materials:** • Cotton, wool, linen and bamboo are all natural materials that can be used to make fabrics. (Y2 Spr2) • Natural textiles are exceptionally good at producing fabrics that work well with the body as they are comfortable, flexible and strong. (Y2 Spr2) • Felt is made from short fibres matted together and can be natural (using wool fibres) or human-made (using plastic fibres). (Y2 Spr2) **Making:** • There is a basic making process: this includes measuring, marking, cutting (or adding) materials, assembling and **finishing**. (Y2 Spr2) **Mechanical Systems:** • A component is a standard mechanical or electrical part. (Y4 Spr) • (Mechanical) systems have an input, a process and an output. They use mechanisms (the process) to change an input movement (or force) to an output movement (or force). (Y4 Spr) • Mechanisms are components in a mechanical system that change the input movement (or force) to the output movement (or force). (Y4 Spr) • A machine is a collection of mechanisms that helps people do work more easily. (Y4 Spr) • Cam, pulley and gear mechanisms. (Y4 Spr)

Year 2: Block 2

Wheels & Axles

		Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive	Procedural	**Tools, Materials & Components:** • Work safely when using different hand tools such as scissors. (Y1 Sum) **Processes:** • Mark the centre of holes using a bradawl. (Y1 Sum) • Cut straight lengths and curved shapes using scissors. (Y1 Sum) • Cut holes using a pencil and blue tack. (Y1 Sum) • Join like and different materials, including paper and card, permanently using glue. (Y1 Sum)	**Tools, Materials & Components:** • Identify and select appropriate materials for different purposes based on their properties. • Select appropriate tools for measuring, marking out and cutting paper and card. • Select appropriate tools and processes for shaping, joining and finishing paper and card. **Processes:** • Measure and mark out lengths using a ruler (cm). • Cut holes using a hole punch. • Shape paper and card by folding and gluing. • Add surface designs to paper and card using coloured pencils, pens, felt tips and markers. • Make vehicle models with free and fixed axles. • Make products and prototypes by re-using waste materials e.g. waste packaging.	**Tools, Materials & Components:** • Work safely when using different hand tools such as scissors and needles. (Y2 Sum) • Select appropriate tools for measuring, marking out and cutting paper, card and **textiles**. (Y2 Sum) • Select appropriate tools and processes for shaping, joining and finishing paper, card and **textiles**. (Y2 Sum) **Processes:** • Position paper templates or patterns on materials in a way that reduces waste. (Y2 Sum) • Mark out materials using a paper template or pattern. (Y2 Sum) • Mark out fabrics using tailors' chalk. (Y2 Sum) • Join like and different materials temporarily using paperclips and Velcro. (Y2 Sum) • Join like and different fabrics semi-permanently using a running stitch. (Y2 Sum) • Join like and different materials including paper, card and fabrics permanently using glue. (Y2 Sum) • Add surface designs by attaching decorations to materials e.g. stickers, buttons, ribbons. (Y2 Sum)
Disciplinary			**Designing:** • Use chooser charts to generate ideas. **Design Communication:** • Draw simple 2D sketches. • Add labels to sketches. • Create a storyboard to communicate the steps to make or assemble a vehicle model. **Evaluating:** • Test a product or prototype to see if it works properly (function testing). • Evaluate products or prototypes based on materials and function.	**Designing:** • Use sketching and/or modelling as a copy technique to generate ideas. (Y3 Sum 1) • Develop design ideas by testing a product prototype and making improvements to its design (iterating). (Y3 Sum1) **Design Communication:** • Use CAD to design in 2D and move to 3D. (Y2 Sum) **Evaluating:** • Test the appearance and surface quality of a product (visual testing). (Y2 Sum) • Evaluate products or prototypes based on materials, function and **aesthetics**. (Y2 Sum)

Year 2: Block 4

Materials & Textiles

Pupils will be introduced to textiles and learn how to position paper templates (patterns) onto fabric and to sew fabric using a basic running stitch. They will make a **re-usable heat pack (take home)**, design buttons and sew buttons and other surface decorations on their heat packs.

		Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive	Conceptual	**Science:** • Properties of materials include malleable, waterproof, windproof and absorbent. (Y2 Spr2) **Designing:** • **Design values** are all the things you need to think about when designing (or redesigning) something. They can include values such as **materials** and **function**. (Y1 Spr) • **Design criteria** are a list of the things that are important for designing (or redesigning) a specific product and can include different design values. (Y1 Spr) **Materials:** • **Materials** are an important design value because materials can affect the **function** of a product. (Y1 Spr) **Making:** • There is a basic making process: this includes **measuring**, **marking**, **cutting** (or adding) materials and **assembling**. (Y1 Spr)	**Designing:** • **Aesthetics** is an important design value because it affects how people relate to a product. • Materials are an important design value because materials can affect both the **aesthetics** and the function of a product. **Materials:** • Cotton, wool, linen and bamboo are all natural materials that can be used to make fabrics. • Natural textiles are exceptionally good at producing fabrics that work well with the body as they are comfortable, flexible and strong. • Felt is made from short fibres matted together and can be natural (using wool fibres) or human-made (using plastic fibres). **Making:** • There is a basic making process: this includes measuring, marking, cutting (or adding) materials, assembling and **finishing**.	**Designing:** • **Users** are an important design value because it ensures that products meet their needs. (Y3 Sum1) • **Size** is an important design value because it ensures that a product fits well in its intended space and is comfortable and practical for users to handle and use. (Y3 Sum1) **Materials:** • Wood is exceptionally good at supporting a load and being shaped. (Y3 Spr) • Concrete and steel are excellent 'all-round' materials so are often used as construction materials for structures like bridges and buildings. (Y3 Spr) **Making:** • There is a basic making process: this includes measuring, marking, cutting (or adding) materials, **refining,** assembling and finishing. (Y5 Spr2)

Year 2: Block 4

Materials & Textiles

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive Procedural	**Tools, Materials & Components:** • Select appropriate tools for measuring, marking out and cutting paper and card. (Y2 Spr2) • Select appropriate tools and processes for shaping, joining and finishing paper and card. (Y2 Spr2) **Processes:** • Join like and different materials including paper and card permanently using glue. (Y1 Sum)	**Tools, Materials & Components:** • Work safely when using different hand tools such as scissors and needles. • Select appropriate tools for measuring, marking out and cutting paper, card and textiles. • Select appropriate tools and processes for shaping, joining and finishing paper, card and textiles. **Processes:** • Thread a needle and tie knots for joining fabrics. • Position paper templates or patterns on materials in a way that reduces waste. • Mark out materials using a paper template or pattern. • Mark out fabrics using tailors' chalk. • Join like and different materials temporarily using paperclips and vlcro. • Join like and different fabrics semi-permanently using a running stitch. • Join like and different materials including paper, card and fabrics permanently using glue. • Add surface designs by attaching decorations to materials e.g. stickers, buttons, ribbons.	**Tools, Materials & Components:** • Conduct a simple risk assessment to ascertain the potential hazards involved with using a tool. (Y3 Spr) • Work safely and reduce risk to yourself and others when using different hand tools such as scissors and saws. (Y3 Spr) • Select appropriate tools for measuring and marking out and cutting paper, card, textiles **and wood**. (Y3 Spr) • Select appropriate tools and processes for shaping, joining, refining and finishing paper, card, textiles **and wood**. (Y3 Spr) **Processes:** • Accurately draw a pattern or template to the correct size (in mm) on paper. (Y5 Spr2) • Mark out fabrics to include a seam allowance. (Y5 Spr2) • Join like and different materials temporarily using pins, safety pins and fasteners (e.g. buttons). (Y5 Spr2) • Join like and different fabrics semi-permanently using an overstitch and a backstitch. (Y5 Spr2) • Add surface designs by embroidering or using decorative stitching. Edge finish by hemming. (Y5 Spr2)
Disciplinary		**Product Analysis:** • Analyse the materials, function and **aesthetics** of existing products by describing and identifying product features. **Design Values & Criteria:** • Use shared design criteria based on the design values of materials, function and **aesthetics** when designing. **Design Communication:** • Use CAD to design in 2D and move to 3D. **Evaluating:** • Test the appearance and surface quality of a product (**visual testing**). • Evaluate products or prototypes based on materials, function and **aesthetics**.	**Product Analysis:** • Analyse the materials, function, aesthetics, **user** and **size** of existing products by describing and identifying product features, comparing products and identifying design criteria. (Y3 Sum1) **Design Values & Criteria:** • Use design criteria based on the design values of user when designing. (Y3 Sum1) • Create design criteria based on the design values of size (with exact measurements to meet user needs) when designing. (Y3 Sum1) **Design Communication:** • Use CAD to design a new 3D shape by positioning, resizing, aligning and combining existing shapes. (Y3 Sum1) • Use CAD to create a 3D design of a single part or product. (Y3 Sum1) **Evaluating:** • Test a product to see if it is easy to use (user testing). (Y3 Sum1) • Evaluate products or prototypes based on materials, function, aesthetics, **user** and **size**. (Y3 Sum1)

Year 3: Block 1

How We Make Things

Pupils will be introduced to different manufacturing techniques including folding, laminating (additive manufacturing), cutting (subtractive manufacturing), forming and casting. They will make **chocolates and chocolate boxes (take-home)** and frame structures that can be used for bug hotels/hedgehog homes.

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive / Conceptual	**Science:** • There are three states of matter: solids, liquids and gases. (Y2 Sum1) • Solids keep their shape unless a force is put on it. They will change their shape if you cut them or squash them. (Y2 Sum1) **Making:** • There is a basic making process: this includes measuring, marking, cutting (or adding) materials, assembling and **finishing**. (Y1 Sum) • Tools can be dangerous if not used correctly. Different tools have specific safe ways to be used and some need adult supervision. (Y2 Spr2) **Structures:** • 2D shapes have a length and width, 3D shapes have a length, width and height. (Y1 Spr) • Free-standing structures can be made stronger with stiffer materials, thicker materials, by folding materials or with more layers of material (laminating). (Y1 Spr) • Free-standing structures can be made more stable by having a wider or heavier base. (Y1 Spr)	**Materials:** • Wood is exceptionally good at supporting a load and being shaped. • Concrete and steel are excellent 'all-round' materials so are often used as construction materials for structures like bridges and buildings. **Making:** • We can reduce risk through proper behaviour and procedures. Safe working practices include preparation and cleanup. • Personal protective equipment (PPE) protects specific body parts. Examples include aprons, goggles and oven gloves. • Tools have specific hazards we need to understand. Some tools require training before use. Different materials can also require different safety approaches. • Emergency procedures exist for different situations. • Materials can be shaped by folding to make a new 3D shape. • Materials can be shaped by building up layers of materials - for example, by laminating. • Materials can be shaped by removing from a block of material (subtractive manufacturing), for example by cutting or carving. • Materials can be shaped by forming. This is where the material is pushed and squashed into a new 3D shape. A mould can be used for forming. • Materials can be shaped by 'casting'. This is where the material is melted and poured into a mould so when the material cools down it solidifies in the new 3D shape. **Structures:** • **Triangulation** makes structures and joints stronger and more stable. • A **shell structure** has a continuous outer 'shell' and does not have a frame, like an eggshell or a dome in a building. • A **frame structure** is made from separate pieces of material called members that form a frame, like climbing frames or houses.	**Materials:** • Metals are natural materials mined from the ground; most metals can be recycled into new products. (Y4 Sum2) • Metals excel at providing strength and durability while conducting heat and electricity. (Y4 Sum2) • Copper is a good example of a highly conductive metal; it is used for electronic circuits and wires. (Y4 Sum2) • Aluminium is the most sustainable metal; it is lightweight and is easy to re-use and recycle. (Y4 Sum2) **Making:** • Materials can be shaped by extruding and by building up layers of materials (additive manufacturing), for example by laminating or 3D printing. (Y3 Sum1) **Structures:** • Free-standing structures can be made more stable by adding, stands, ties or buttresses. (Y6 Sum1)

Year 3: Block 1

How We Make Things

		Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive	Procedural	**Tools, Materials & Components:** • Work safely when using different hand tools such as scissors. (Y1 Sum) • Select appropriate tools for measuring, marking out and cutting paper and card. (Y2 Spr2) • Select appropriate tools and processes for shaping, joining and finishing paper and card. (Y2 Spr2) **Processes:** • Measure and mark out lengths using a ruler (cm). (Y2 Spr2) • Cut straight lengths and curved shapes using scissors. (Y1 Sum) • Cut holes using a hole punch. (Y2 Spr2) • Shape paper and card by folding and gluing. (Y2 Spr2) • Join like and different materials including paper and card permanently using glue. (Y1 Sum)	**Tools, Materials & Components:** • Conduct a simple risk assessment to ascertain the potential hazards involved with using a tool. • Work safely and reduce risk to yourself and others when using different hand tools such as scissors and saws. • Select appropriate tools for measuring and marking out and cutting paper, card, textiles and wood. • Select appropriate tools and processes for shaping, joining, refining and finishing paper, card, textiles and wood. **Processes:** • Measure and mark out lengths using a ruler (mm/cm). • Mark out 90-degree angles on materials using a set square. • Cut straight lengths using a junior hacksaw. • Shape paper and card by folding, gluing and laminating (gluing layers together). • Join like and different materials including paper, card and wood semi-permanently using tape. • Join like and different materials including paper, card, fabrics and wood permanently using glue. • Make 3D shell structures by folding 2D nets from paper or card. • Make frame structures by joining lengths of materials. • Strengthen structures and joints using triangulation. • Edge finish by dry sanding (e.g. glass paper). • Shape materials by forming (by hand) and into a mould and by casting into a mould.	**Tools, Materials & Components:** • Conduct a simple risk assessment to ascertain the potential hazards involved with using a tool or **machine**. (Y3 Sum1) **Processes:** • Shape materials by additive manufacturing (3D printing). (Y3 Sum1) • Join like and different components and materials semi-permanently (for example to create a circuit) using copper tape. (Y4 Sum2) • Experiment with free standing structures using different techniques to make them more stable. (Y6 Sum1)
Disciplinary			**Product Analysis:** • Identify and analyse a range of freestanding structures for function - including strength, stability and type of structure (shell or frame).	**Product Analysis:** • Analyse the materials, function, aesthetics, **user** and **size** of existing products by describing and identifying product features, comparing products and identifying design criteria. (Y3 Sum1)

Year 3: Block 3

Food: Sandwiches

Pupils will learn the sources of meat, how bread is made and about food allergies. They will learn the differences between best before and use-by dates and how to check and safely store food. Pupils get the opportunity to make bread, boil an egg and prepare and assemble ingredients to make a range of sandwiches.

		Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive Knowledge	Conceptual	*Science: • The main food groups are carbohydrates (starch and sugars), proteins, fats, fibre, vitamins and minerals. Humans need a balanced diet. (Y3 Spr1) Ingredients: • Foods come from a range of sources, including plants (fruits and vegetables) and animals (meat and dairy products). (Y2) Nutrition: • Vegetarians choose not to eat animal meat. Vegans do not eat any animal product. (Y2) Food Hygiene: • Wear an apron, tie hair back (Y1) and wash hands after sneezing, coughing and going to the toilet to stop the tiny living things on our hands getting into our bodies. (Y2)	Ingredients: • Bread is made from flour, which is ground seeds of the wheat plant. • Sources of meat include chicken, sheep (lamb), pigs (pork products), tuna and other fish. Nutrition: • Some people are allergic to certain types of food, like nuts or gluten. This means their body reacts when they eat or are in contact with these foods. Some food allergies are mild, and some can be very serious. Safety: • Food should not be eaten after the 'use by' date. Foods can be eaten after the 'best before' date, but we should check them first. • High risk foods with a 'use by' date should be kept in the fridge. • Cheese, cooked meats and eggs are high-risk foods. • Consider the importance of the refrigerator for food safety. Food Hygiene: • Hands should be washed after handling raw eggs to stop the tiny things living there getting into our bodies, because they can make us unwell.	Ingredients: • Knowledge of where other foods come from, such as pasta being made from wheat flour and water (and sometimes egg). (Y5) Nutrition: • Some people are intolerant to certain types of food, like gluten or dairy products. This means their bodies cannot digest the foods. It can cause discomfort. (Y4) Food Hygiene: • The tiny living things that we need to stop getting into food are bacteria and viruses. They can sometimes make us unwell. (Sci Y6 Spr2)
	Procedural	Processes: • Chop a wider range of foods more accurately using the claw and bridge technique. (Y2) • Use a colander to sieve and drain canned foods. (Y2) • Follow simple recipes. (Y1) Food Hygiene: • Wash up items by removing excess food, washing, rinsing and drying. (Y2) Safety: • Use senses (sight, smell and touch) to check foods for any bits that should not be eaten. (Y2)	Processes: • Additional – Option A Only: Measure volumes in millilitres and litres using a measuring jug. • Additional – Option A Only: Knead to make a dough. • Additional – Option A Only: Use an oven to bake (bread). • Chop an increasingly complex selection of foods (e.g. hard-boiled eggs). • Peel hard-boiled eggs. • Stir with a teaspoon or tablespoon. • Spread butter/ margarine with a knife. • Use a hob to boil (an egg). Food Hygiene: • Independently maintain a clean and organised workspace.	Processes: • Chop (dice) foods into smaller pieces (e.g. carrots, celery)(Y4). Chop an increasingly complicated selection of foods (e.g. onions, cauliflower).(Y5) • Use a hob to boil other foods (vegetables and pasta) and to sauté and simmer. (Y4) Food Hygiene: • Wash up items in the most appropriate order, starting with least dirty, and change washing up water as required. (Y4)
Disc.		Food Choices: • Make food choices based on colour and quantity of sugar, quantities of fat and salt, and dietary requirements (vegans and vegetarians). (Y2)	Food Choices: • Make food choices based on colour; quantities of sugar, fat, and salt; dietary requirements and knowledge of food allergies.	Food Choices: • Make food choices based on Y1-3 plus knowledge of food miles. (Y4)

** Moving to Aut Term Delivery for the 2025/26 pilot affects science pre-requisite knowledge, so this will need to be covered explicitly rather than reviewed in the pilot year.*

Year 4: Block 2

Cams, Pulleys & Gears

Pupils will be introduced to cams, pulleys and gears and will model simple cam, pulley and gear mechanisms. The unit culminates in the Action Aid Squashed Tomato Challenge where they will design, prototype and test a pulley system to transport tomatoes down a mountainside.

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive / Conceptual	**Designing:** • Problem definition means clearly identifying and articulating what specifically needs to be solved before attempting to create design solutions. (Y3 Sum1) • Ideation involves generating and exploring multiple potential design solutions through creative techniques. (Y3 Sum1) • Design development can be a cycle where you make (or prototype) an idea, test it and try to improve it. (Y3 Sum1) • A prototype is a model of a design idea that you make so that you can test your ideas, see what works and what can be improved. (Y3 Sum1) **Mechanical Systems:** • A **wheel** is a round part that turns on a stick (called an **axle**). It is a mechanism that makes it easier to move things. (Y2 Spr2) • There are different types of movement, including linear, reciprocating, oscillating and **rotary** movement. (Y2 Spr2)	**Designing:** • The design process is **iterative** and includes generating and developing ideas; evaluating; testing and **refining** (making improvements). **Mechanical Systems:** • A **component** is a standard mechanical or electrical part. • (Mechanical) systems have an input, a process and an output. They use mechanisms (the process) to change an input movement (or force) to an output movement (or force). • **Mechanisms** are components in a mechanical system that change the input movement (or force) to the output movement (or force). • A **cam** is a simple mechanism that changes rotary motion to reciprocating motion. It is a shaped wheel that pushes a stick (called a follower) up and down as it rotates. Examples of cams are in the pop-up mechanism of a mechanical toy or a toaster. • Different-shaped cams produce different follower movements. • A **pulley** is a simple mechanism. It is a grooved wheel that spins on an **axle**, with a rope around it that helps to lift or move heavy things more easily. Pulleys are used on flagpoles for raising flags, for lifting heavy objects on cranes and in elevators. • A **drive belt** can connect two pulleys and transfers movement from one pulley to another. Pulleys and drive belts are used in window blinds and cable cars. • A **gear** is a simple mechanism. It is a wheel with teeth that connects with other gears to help machines move. Gears can make things move more easily or can be used to change the speed (or direction) of movement. Examples of gears include bicycle gears that make it easier to pedal up hills. • A **machine** is a collection of mechanisms that helps people do work more easily.	**Science:** • Levers, pulleys and gears allow a smaller force to have a greater effect. Examples of levers, pulleys and gears include wheelbarrows, lifts, bicycle gears and in construction (cranes). (Y5 Sum1) • Levers consist of a beam and a fulcrum (pivot). Effort lifts a load. The greater the distance from the effort to the fulcrum, the less effort is required to move the load. (Y5 Sum1) **Designing:** • **Safety** is an important design value as it protects both the manufacturer and the user from injury. (Y4 Sum2) • An **exploded diagram** shows all the parts of something floating apart like they've been pulled away from each other, so you can see exactly how they all fit together. (Y4 Sum2) • A **cross-sectional diagram** shows what something looks like if you cut it in half and look inside. (Y4 Sum2) **Mechanical Systems:** • Connecting different-sized gears will change the output speed of a shaft by making it spin faster or slower than the input shaft. (Y6 Sum1)

Year 4: Block 2

Cams, Pulleys & Gears

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive Procedural	**Tools, Materials & Components:** • Select appropriate tools for measuring, marking out and cutting paper, card, textiles and wood. (Y3 Spr) • Select appropriate tools and processes for shaping, joining, refining and finishing paper, card, textiles and wood. (Y3 Spr)	**Tools, Materials & Components:** • Select and use an appropriate mechanism in a mechanical system. **Processes:** • Select from different shaped cams and make a simple cam and follower mechanism. • Make a simple pulley mechanism. • Make a simple gear mechanism. • Make a functioning prototype containing a mechanical system.	**Tools, Materials & Components:** • Identify and select appropriate materials for different purposes based on their properties and design criteria. (Y4 Sum2) • Select appropriate tools for cutting paper, card, textiles, wood and metal (aluminium foil, wire and copper tape). (Y4 Sum2) **Processes:** • Make a functioning prototype containing an electrical system. (Y5 Sum)
Disciplinary	**Designing:** • COPY-TRANSFORM-COMBINE is a framework you can use for ideation. (Y3 Sum1) • Use sketching and/or modelling as a copy technique to generate ideas. (Y3 Sum1) **Design Communication:** • Add dimensions to sketches. (Y3 Sum1)	**Design Values & Criteria:** • Create own design criteria based on the design values of materials, function, aesthetics, user and size when designing. **Designing:** • Design a simple mechanical system and explain how it functions. • Design using part or all of a design process e.g. make > test > re-design.	**Design Values & Criteria:** • Use design criteria based on the design values of **safety** when designing. (Y4 Sum2) **Designing:** • Use existing product analyses as a copy technique to generate ideas. (Y4 Sum2) • Design a solution that meets design criteria to improve an existing product. (Y4 Sum2) • Test designs with real users, watch how people use products, ask users what they like and don't like. Discuss with others how an existing product can be improved. (Y4 Sum2)

Year 4: Block 4

Lighting Up

Pupils will learn about electronic systems through the context of lighting. They will make simple switches and cardboard circuits, design and simulate basic circuits containing lights and switches and use a Micro:bit to programme multiple lights. They will then design and make a **miniature LED torch (take-home)**.

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive / Conceptual	**Science:** • Components include wire, lamp, buzzer, motor or switch. (Y4 Sum1) • A complete (closed) circuit must have at least one cell and have all the components connected in a loop. If it is missing any of these things it is an incomplete (open) circuit. (Y4 Sum1) • A cell (or battery) in a complete circuit can make a bulb light or buzzer sound. This will not happen without a cell (or battery). (Y4 Sum1) • A short circuit can be created by accident by connecting just the wire to the cell in a circuit. They can be dangerous. (Y4 Sum1) • Switches complete or break a circuit. (Y4 Sum1) • Properties of materials include electrical conductivity. Materials that allow electricity to pass through them easily are called electrical conductors. (Y4 Sum1) **Responsibility:** • The 'Responsible Decision-Making Framework' can be used when analysing existing products, developing design criteria and evaluating. (Y3 Sum1)	**Responsibility:** • The 'Responsible Decision-Making Framework' considers why the product exists and how well it does what it is supposed to do (user, function, aesthetics, materials, size and safety). **Designing:** • **Safety** is an important design value as it protects both the manufacturer and the user from injury. • An **exploded diagram** shows all the parts of something floating apart like they've been pulled away from each other, so you can see exactly how they all fit together. • A **cross-sectional diagram** shows what something looks like if you cut it in half and look inside. **Materials:** • Metals are natural materials mined from the ground; most metals can be recycled into new products. • Metals excel at providing strength and durability while conducting heat and electricity. • Copper is a good example of a highly conductive metal; it is used for electronic circuits and wires. • Aluminium is the most sustainable metal; it is lightweight and is easy to re-use and recycle. **Electrical Systems:** • A **cell** contains chemicals that react to provide an electrical power supply (electrical energy). A **battery** is made from multiple cells and provides more electrical power than a single cell. • Batteries and cells have an **anode** (positive side) and a **cathode** (negative side). • Switches can be used as **input** components as they can connect and disconnect the electrical power supply to different parts of a circuit. • **Output** devices are components that produce something in an electrical circuit such as a lamp that lights up or a buzzer that makes a sound. • An **LED** is a type of light often used as an output component that uses very little electrical power and is available in different colours. • LED's have an anode leg and a cathode leg; they need to be connected the right way round in a circuit to work. • Circuits are made by using conducting materials (e.g. metal, wire) to join electronic components together.	**Responsibility:** • The 'Responsible Decision-Making Framework' considers the true cost of a product (environmental). (Y5 Spr2) • There is a growing focus on sustainable and 'responsible' design. (Y5 Spr2) **Designing:** • Design Values help us to make responsible decisions and include why the product exists, how well the product does what it is supposed to do and what the environmental, economic, ethical and social cost of the product is. (Y5 Spr2) • **Environmental** is an important design value because it ensures that products are designed in a way that conserves the Earths natural resources. (Y5 Spr2) • Designers can design for self, for others or for groups. (Y5 Spr2) **Materials:** • The properties of materials are important when designing and making different products. (Y5 Spr2) • All materials are a compromise of different factors such as properties, cost, sustainability. (Y5 Spr2) • Plastics are human-made materials made from oil; many plastics can be recycled to produce more plastic. (Y5 Spr2) **Electrical Systems:** • Electronic systems have **inputs, processes** and **outputs**. (Y5 Sum) • **Microcontrollers** (such as a Micro:bit or a Crumble) are **process** devices that can be programmed to respond to changes to inputs and control output devices. (Y5 Sum) • An electronic **input** device, like a switch or sensor, is something that helps a machine know when to turn on or off, or when something is happening. (Y5 Sum)

Year 4: Block 4

Lighting Up

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive / Procedural	**Processes:** • Shape paper and card by folding, gluing and laminating (gluing layers together). (Y3 Spr) • Join like and different materials including paper, card and wood semi-permanently using tape. (Y3 Spr) • Join like and different materials including paper, card, fabrics and wood permanently using glue. (Y3 Spr)	**Tools, Materials & Components:** • Conduct a simple risk assessment to ascertain the potential hazards involved with using a tool, machine or product. • Identify and select appropriate materials for different purposes based on their properties and design criteria. • Select appropriate tools for cutting paper, card, textiles, wood and metal (aluminium foil, wire and copper tape). **Processes:** • Join like and different components and materials semi-permanently (for example, to create a circuit) using copper tape. • Make a simple switch. • Make and test a functioning circuit where an output device responds to a switch.	**Tools, Materials & Components:** • Work safely and reduce risk to yourself and others when using different hand tools such as scissors, saws and needles. (Y5 Spr2) • Identify and select appropriate materials for different purposes based on their properties, design criteria and user wants and needs. (Y5 Spr2) **Processes:** • Create, test and modify a simple programme for a microcontroller that will turn output components on and off in a repeating pattern, then a programme that will monitor input devices and control output components depending upon different input conditions. (Y5 Sum) • Join like and different components and materials semi-permanently (for example to create a circuit) using copper tape and crocodile clips. Make a functioning prototype containing an electrical system. (Y5 Sum)
Disciplinary	**Designing:** • COPY-TRANSFORM-COMBINE is a framework you can use for ideation. (Y3 Sum1) **Design Communication:** • Add dimensions to sketches. (Y3 Sum1)	**Product Analysis:** • Analyse the materials, function, aesthetics, user, size and **safety** of existing products by describing and identifying product features, comparing products and identifying design criteria. **Design Values & Criteria:** • Use design criteria based on the design values of **safety** when designing. **Designing:** • Use existing product analysis as a copy technique to generate ideas. • Design a solution that meets design criteria to improve an existing product. • Test designs with real users, watch how people use products, ask users what they like and don't like and discuss with others how an existing product can be improved. **Design Communication:** • Sketching - accurately draw in cm using a ruler. • Add notes to sketches to describe main features. • Draw a **cross-sectional diagram** to show the position of the internal parts of an assembled product. Draw an **exploded diagram** of a product to show how the parts fit together and use CAD to create an exploded diagram. • Use CAD to design, simulate and modify a simple electrical circuit. Create and simulate circuits containing switches and different output devices. **Evaluating:** • Evaluate by comparing two or more products or prototypes and explaining which one (or which features) you think works the 'best' and why. • Evaluate products or prototypes based on User, Function, Aesthetics, Materials, Size and Safety.	**Product Analysis:** • Analyse the materials, function, aesthetics, user, size, safety and **environmental** of existing products by describing and identifying product features, comparing products and identifying design criteria. (Y5 Spr2) **Design Values & Criteria:** • Use design criteria based on the **environmental** design values (including **sustainability** and **the 6Rs**) when designing. (Y5 Spr2) • Create own design criteria based on the design values of materials, function, aesthetics, user, size and safety when designing. (Y5 Spr2) **Designing:** • Re-design an everyday product to make it more sustainable. (Y5 Spr2) • Design for themselves, for others and for groups. (Y5 Spr2) **Design Communication:** • Use CAD to design, programme and simulate an electrical control circuit containing a microprocessor. • Design simple block diagrams to communicate inputs, processes and outputs of a simple monitoring and control (system). **Evaluating:** • Evaluate products or prototypes by conducting user tests to gather detailed feedback. (Y5 Spr2) • Test a product prototype by comparing it to the design criteria. (Y5 Spr2) • Evaluate products or prototypes based on materials, function, aesthetics, user, size, safety and **environmental** design values. (Y5 Spr2)

Year 5: Block 1

Sustainable Products

Pupils will learn about sustainable and responsible design and develop their sewing skills further to learn new stitches, hemming and applying fasteners to fabrics. They will analyse the sustainability of various food packaging and design and make a **re-usable sandwich wrap or pouch (take-home)**.

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive / Conceptual	**Science:** • Sustainability means meeting the needs of the people today, whilst meeting the needs of people of the future. (Y2 Spr1) • One way to use materials more sustainably is to reduce, reuse and recycle wherever possible. (Y2 Spr1) **Geography:** • **Fossil fuels** are materials made from fossils over millions of years, like coal and oil. Humans use these to run cars and electrical items. (Y5 Aut) • **Natural resources** are unevenly distributed across the world and can be renewable or non-renewable (finite). (Y5 Aut) **Designing:** • COPY-TRANSFORM-COMBINE is a framework you can use for ideation. (Y3 Sum1) **Materials:** • Cotton, wool, linen and bamboo are all natural materials that can be used to make fabrics. (Y2 Sum)	**Responsibility:** • The 'Responsible Decision-Making Framework' considers the true cost of a product (environmental). • There is a growing focus on sustainable and 'responsible' design. **Design in the Past, Present and Future:** • Why we design has changed: From pure functionality to considering sustainability, inclusivity, and social impact. **Designing:** • Design Values help us to make responsible decisions and include why the product exists, how well the product does what it is supposed to do and what the environmental, economic, ethical and social cost of the product is. • **Environmental** is an important design value because it ensures that products are designed in a way that conserves the Earth's natural resources. • Designers can design for self, for others or for groups. **Materials:** • The properties of materials are important when designing and making different products. • All materials are a compromise of different factors such as properties, cost and sustainability. • Plastics are human-made materials made from oil; many plastics can be recycled to produce more plastic. • Polyester, acrylic and nylon are types of human-made plastics that can be used to make fabrics. **Making:** • There is a basic making process: this includes measuring, marking, cutting (or adding) materials, **refining**, assembling and finishing.	**Responsibility:** • To design in a more sustainable way consider **the 6 R's**: Reduce, Reuse, Refill, Repair, Recycle, Refuse. (Y6 Spr1) • Responsible design involves making choices that are complicated and difficult - there are many different conflicting factors and choices to be made. (Y6 Spr1) **Designing** • Design values are personal/organisational guiding principles about what makes a design worthwhile, considering its economic, social, environmental, and cultural impacts. (KS3) **Design in the Past, Present and Future:** • What we design has changed: From physical objects to services, systems, and experiences. (Y5 Sum) **Materials:** • Bio-plastics are made from plants (like corn, potato, seaweed) instead of oil. They are better for the environment because they break down naturally and don't leave harmful plastic waste behind. (Y6 Spr1) **Making:** • In industry, 3D printers are often used to make quick prototypes of products directly from 3D CAD designs to test their form or function. (Y6 Spr1)

Year 5: Block 1

Sustainable Products

		Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive / Procedural		**Tools, Materials & Components:** • Work safely when using different hand tools such as scissors and needles. (Y2 Sum) **Processes:** • Thread a needle and tie knots for joining fabrics. (Y2 Sum) • Mark out materials using a paper template or pattern. (Y2 Sum) • Mark out fabrics using tailors' chalk. (Y2 Sum) • Join like and different materials temporarily using paperclips and Velcro. (Y2 Sum) • Join like and different fabrics semi-permanently using a running stitch. (Y2 Sum) • Add surface designs by attaching decorations to materials e.g. stickers, buttons, ribbons. (Y2 Sum)	**Tools, Materials & Components:** • Work safely and reduce risk to yourself and others when using different hand tools such as scissors, saws and needles. • Compare different materials against a variety of criteria to make informed material selections. • Identify and select appropriate materials for different purposes based on their properties, design criteria and user wants and needs. **Processes:** • Accurately draw a pattern or template to the correct size (in mm) on paper. • Mark out fabrics to include a seam allowance. • Join like and different materials temporarily using pins and safety pins. • Join like and different materials temporarily using fasteners (for example buttons). • Join like and different fabrics semi-permanently using an overstitch. • Join like and different fabrics semi-permanently using a backstitch. • Add surface designs by embroidering or using decorative stitching. • Edge finish by hemming. • Make products and prototypes from recycled materials.	**Tools, Materials & Components:** • Make 'better' (informed) material choices. (Y6 Spr1) • Explain why specific materials have been selected. (Y6 Spr1) **Processes:** • Join like and different components and materials semi-permanently (for example to create a circuit) using copper tape and crocodile clips. (Y5 Sum) • Make decisions where it's appropriate to 'not' make things. (Y6 Spr1) • Make products and prototypes by recycling materials to give them a new use. (Y6 Spr1)
Disciplinary		**Design Communication:** • Sketching - accurately draw in cm using a ruler. (Y4 Sum2)	**Product Analysis:** • Analyse existing products using the 'Responsible Decision-Making Framework' to see if they meet design criteria and identify problems or improvements that could be made. • Analyse the materials, function, aesthetics, user, size, safety and **environmental** aspects of existing products by describing and identifying product features, comparing products and identifying design criteria. **Design Values & Criteria:** • Use design criteria based on the **environmental** design values (including **sustainability** and **the 6Rs**) when designing. • Create own design criteria based on the design values of materials, function, aesthetics, user, size and safety when designing. **Designing:** • Re-design an everyday product to make it more sustainable. • Design for themselves, for others, and for groups. **Evaluating:** • Evaluate products or prototypes by conducting user tests to gather detailed feedback. • Test a product prototype by comparing it to the design criteria. • Evaluate products or prototypes based on materials, function, aesthetics, user, size, safety and **environmental** design values.	**Product Analysis:** • Carry out product analysis using the 'Responsible Decision-Making Framework' to identify its characteristics, performance, design decisions, and context of use. (KS3) **Design Values & Criteria:** • Use design criteria based on the design values of environment (including sustainability, the 6Rs and the **product lifecycle**) when designing. (Y6 Spr1) • Create own design criteria based on the design values of materials, function, aesthetics, user, size, safety and environmental when designing. (Y6 Spr1) **Designing:** • Design using traditional and digital tools (like CAD and AI). (Y6 Spr1) **Evaluating:** • Make value-based judgements based on a range of criteria e.g. cost vs environmental impact. (KS3)

Year 5: Block 3

Food: Sauces

Pupils will learn the sources of beans and lentils, mushrooms and herbs and spices and about food intolerances. They will learn to safely use a blender and a hob to sauté, simmer and boil food. Pupils get the opportunity to prepare a variety of ingredients, make a soup base, tomato soup and other soups.

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive / Conceptual	**Science**: • The main food groups are fruit and vegetables, carbohydrates (starch and sugars), proteins, dairy and alternatives, fats and oils. (Y3 Spr1) • Humans need a balanced diet containing a variety of food groups and also fibre, vitamins and minerals. (Y3) • Poor thermal conductors (thermal insulators) do not allow energy to be transferred through them easily when heated. (Y4 Sum2) Use a Venn diagram to classify items into two or three sets based on properties. (Y1 Sum1) **Ingredients**: • Foods come from a range of sources, including plants (fruits and vegetables) and animals (meat and dairy products). (Y2) Seasoning adds to the flavour of food. We can season with spices and herbs. (Y4) **Nutrition**: • Vegetarians do not eat animal meat. Vegans do not eat any animal product. (Y2) Some people are allergic to foods, which means their body has a reaction when they eat them. (Y3) Some people are intolerant to foods, which means they cannot digest them. (Y4) **Food Hygiene**: • Wear an apron and tie hair back (Y1) and wash hands after sneezing, coughing and going to the toilet to stop the tiny living things on our hands getting into our bodies. (Y2) **Safety:** • Cheese, cooked meats and eggs are high-risk foods. (Y3)	**Ingredients:** • Sauce is a liquid or semi-liquid mixture served with food to add flavour, moisture, texture and colour. • Pasta is made from wheat flour and water (and sometimes egg). • Couscous is a type of pasta. **Nutrition:** • Apply the principles of a healthy and varied diet. **Safety:** • Cooked pasta and couscous are high-risk foods and should be eaten immediately or kept in the fridge. • Use a material that is a poor thermal conductor (thermal insulator) when stirring hot food or removing food from the oven.	**Ingredients**: • Knowledge of where other foods come from, and how they can be minimally, moderately, significantly or ultra processed. (Y6) **Nutrition**: • A healthy diet is made up of mostly minimally and moderately processed foods. Too many ultra-processed foods should be avoided. (Y6) **Safety**: • The tiny living things that we need to stop getting into food are bacteria and viruses. They can sometimes make us unwell. (Sci Y6 Spr2)

Year 5: Block 3

Food: Sauces

		Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive	Procedural	**Processes**: • Chop a range of foods using the claw and bridge technique. (Y1) • Use senses (sight, smell and touch) to check foods for any bits that should not be eaten. (Y2) • Measure volumes in millilitres and litres using a measuring jug. (Y4) • Peel and grate carrots. (Y2) • Use a hob to sauté and simmer food, and to boil (vegetables). (Y4) • Follow simple recipes. (Y1) **Food Hygiene:** • Wash up items in the most appropriate order (Y3) by removing excess food, washing, rinsing and drying, (Y2) and independently maintain a clean and organised workspace. (Y3)	**Processes:** • Measure mass in grams and kilograms using a balance. • Chop a range of foods, including onions and cauliflower. • Use a tin opener. • Know when to use estimation. • Use a hob to boil pasta. • Use a kettle to prepare couscous. • Combine a wider range of ingredients with increased confidence. • Make a roux and whisk ingredients to make a Bechamel sauce. • **Additional:** Grate cheese using a grater. • **Additional:** Use an oven to bake.	**Processes**: • Chop an increasingly complicated selection of foods. • Use an oven to roast vegetables. (Y6)
Disciplinary		**Developing:** • Use prototyping and constraints (size and colour). • Make food choices based on colour; quantities of sugar, fat, and salt; dietary requirements; knowledge of food allergies and food miles (Y4).	**Food Choices:** • Make food choices based on colour; quantities of sugar, fat, and salt; dietary requirements; knowledge of food allergies; food miles and time taken to prepare. **Developing:** • Use constraints (cooking ingredients). **Evaluating:** • Evaluate foods based on colour; quantities of fat and salt; dietary requirements; knowledge of food allergies; food miles and time taken to prepare.	**Food Choices:** • Make food choices based on Y1-5 plus carbon footprint of production and transport; occasion; and cost. (Y6)

Year 6: Block 1

Upcycled Products

This is a consolidation unit providing the opportunity for pupils to apply their knowledge and develop their skills introduced in previous units further. Pupils will learn more about responsible design, then apply the complete design process to design and make upcycled **"pop bottle products" (take-home)**.

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive / Conceptual	**Science:** • One way to use materials more sustainably is to reduce, reuse and recycle wherever possible. (Y2 Spr1) **Responsibility:** • Re-use means using something again instead of throwing it away. Re-purpose means using something we no longer want or need in a new way. (Y2 Spr2) • Re-using and re-purposing things we no longer want or need helps to protect our planet by making less rubbish and saving natural resources. (Y2 Spr2) • The 'Responsible Decision-Making Framework' considers the true cost of a product (environmental). (Y5 Spr2) **Designing:** • **Users** are an important design value because it ensures that products meet their needs. (Y3 Sum1) • COPY-TRANSFORM-COMBINE is a framework you can use for ideation. (Y3 Sum1)	**Responsibility:** • To design in a more sustainable way consider **the 6 R's**: Reduce, Reuse, Refill, Repair, Recycle, Refuse. • **Recycling** means turning the materials from things we no longer want or need into new material that can be used to make new things. • **Upcycling** is where we re-purpose a product in a way that creates a new product of higher quality or value than the original. • A **product's life cycle** is the whole 'life' of the product, from its design, production, use and disposal. • Responsible design involves making choices that are complicated and difficult - there are many different conflicting factors and choices to be made. **Design in the Past, Present and Future:** • Design is the intentional act of creating solutions and systems that solve problems through planning, creativity, and decision making. • The digital revolution has enabled new forms of design across almost all industries, such as fashion, agriculture and architecture. **Materials:** • Bio plastics are made from plants (like corn, potato, seaweed) instead of oil. They are better for the environment because they break down naturally and don't leave harmful plastic waste behind. **Making:** • In industry, 3D printers are often used to make quick prototypes of products directly from 3D CAD designs to test their form or function.	**Responsibility:** • Environmental responsibility includes considering a product's entire lifecycle from materials to disposal. (KS3) • Social, ethical and economic responsibility. (KS3) • Designers should consider how products can be reused, recycled or biodegraded at end of life. (KS3) **Design in the Past, Present and Future:** • Design includes re-designing: the intentional transformation of an existing design through critical analysis, reimagining, and purposeful modification. (KS3) **Materials:** • A composite is a material made by combining two or more different materials together to take advantage of the properties of both materials. (KS3) **Making:** • A laser cutter can be used to cut holes, straight lengths and shapes. (KS3)

Year 6: Block 1

Upcycled Products

	Required Prior Knowledge	Knowledge to be Explicitly Taught	How Knowledge will be Built Upon
Substantive Procedural	**Tools, Materials & Components:** • Conduct a simple risk assessment to ascertain the potential hazards involved with using a tool, machine or product. (Y4 Sum2)	**Tools, Materials & Components:** • Make 'better' (informed) material choices. • Explain why specific materials have been selected. **Processes:** • Make decisions where it's appropriate to 'not' make things. • Make products and prototypes by recycling materials to give them a new use.	**Tools, Materials & Components:** • Select appropriate tools and processes for refining and finishing paper, card, textiles, wood and metal (aluminium foil, wire and copper tape). (Y6 Sum1) **Processes:** • Experiment with free standing structures using different techniques to make them more stable. (Y6 Sum1)
Disciplinary	**Design Communication:** • Add dimensions to sketches. (Y3 Sum1) • Add notes to sketches to describe main features. (Y4 Sum2) • Use CAD to create a 3D design of a single part or product. (Y3 Sum1)	**Design Values & Criteria:** • Use design criteria based on the design value of environmental (including sustainability, the 6Rs and the **product lifecycle**) when designing. • Create own design criteria based on the design values of materials, function, aesthetics, user, size, safety and environmental when designing. **Designing:** • Use Crazy Eights as a transform and combine technique to generate ideas. • Design using traditional, and digital tools (like CAD and AI). **Design Communication:** • Draw simple three-dimensional sketches.	**Design Values & Criteria:** • Create own design criteria based on the design value of **cost** (environmental, economic, ethical and social) when designing. (KS3) • Consider and make compromises (environmental, economic, ethical and social) when creating design criteria. (KS3) **Designing:** • Use SCAMPER as a transform and combine technique to generate ideas. (KS3) • Use Abstraction as a transform and combine technique to generate ideas. (KS3) **Design Communication:** • Use CAD to create a 3D design of a single part or product with specific dimensions. (Y6 Sum1)

Year 6: Block 2

Renewable Energy

This is a consolidation unit providing the opportunity for pupils to apply their knowledge and develop the skills introduced in previous units further. Pupils will learn more about structures, gears and motors and then design and make freestanding structures and functioning wind turbines that will generate electricity.

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive / Conceptual	**Science:** • **Renewable energy resources** quickly replenish themselves, meaning that we can use them again and again and we will not run out. **Wind**, **solar**, **geothermal** and **hydrological** power are all examples of renewable energy resources. (Y6 Aut1) **Geography:** • **Mitigation** includes actions that help to prevent – or mitigate – the impacts of climate change. (Y6 Aut1) • Examples of mitigation include wind power and using other sources of renewable energy (to reduce greenhouse gas emissions). (Y6 Aut1) • Wind power is renewable and does not emit **carbon dioxide;** however, it does create visual and noise **pollution**. (Y6 Aut1) **Mechanical Systems:** • A **gear** is a simple mechanism. It is a wheel with teeth that connects with other gears to help machines move. Gears can make things move more easily or can be used to change the speed (or direction) of movement. (Y4 Spr) **Electrical Systems:** • **Motors** are components often used as output devices that turn electricity into rotational movement by spinning a shaft. (Y5 Sum)	**Structures:** • Free-standing structures can be made more stable by adding stands, ties or buttresses. **Mechanical Systems:** • Connecting different-sized gears will change the output speed of a shaft by making it spin faster or slower than the input shaft. **Electrical Systems:** • Solar cells are devices that convert sunlight to electricity. A solar panel is made up of lots of solar cells. • Wind turbines are machines that convert wind power to electricity. • Motors can be used to generate electricity by spinning the shaft.	**Structures:** • Different forces (compression, tension, bending, torsion, shear) and their effects on structures. (KS3) • Static and dynamic forces and their effects on structures. (KS3) **Mechanical Systems:** • The six simple machines are the lever (using a rigid bar and fulcrum), wheel and axle (connected wheel and shaft), pulley (wheel with rope), inclined plane (angled flat surface), wedge (two inclined planes back-to-back), and screw (wrapped inclined plane), which form the basis of most mechanical devices. (KS3) • Systems can be mechanical, electrical, electro-mechanical or a hybrid of other types. (KS3) **Electrical Systems:** • A microcontroller is a small, programmable computer that combines a processor, memory, and input/output ports - it's designed to control specific operations in embedded systems like appliances, toys, or electronic devices. (KS3)

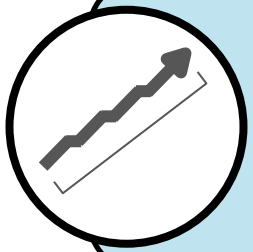
Year 6: Block 2

Renewable Energy

	Required Prior Knowledge	Knowledge to Be Explicitly Taught	How Knowledge Will Be Built Upon
Substantive Procedural	**Tools, Materials & Components:** • Select appropriate tools for measuring, marking out and cutting paper, card, textiles and wood. (Y3 Spr) • Select appropriate tools and processes for shaping, joining, refining and finishing paper, card, textiles and wood. (Y3 Spr) **Processes:** • Join like and different components and materials semi-permanently (for example to create a circuit) using copper tape and crocodile clips. (Y5 Sum)	**Processes:** • Experiment with free standing structures using different techniques to make them more stable. • Join like and different components and materials semi-permanently (for example to create a circuit) using copper tape, crocodile clips, connectors and by splicing (e.g. twisting wire). • Make a functioning prototype containing an electro-mechanical system. • Select appropriate tools and processes for refining and finishing paper, card, textiles, wood and metal (aluminium foil, wire and copper tape).	**Tools, Materials & Components:** • Select and use safely appropriate tools for measuring, marking out, cutting, shaping, joining, refining and finishing paper, card, textiles, wood, plastics and metals. (KS3) **Processes:** • Make structures by forming and joining material such as wood and plastic. (KS3) • Design, simulate, make and test intelligent products that use a microcontroller to control outputs that respond to different input sensors. (KS3)
Disciplinary		**Design Communication:** • Use CAD to create a 3D design of a single part or product with specific dimensions. • Write a detailed description of how a more complex electro-mechanical system works.	**Design Communication:** • Use CAD to design in 2D and move to 3D, and vice versa. (KS3) • Add detailed annotations to sketches to explain design decisions, product functionality and provide manufacturing notes. (KS3)

Using the United Curriculum for D&T

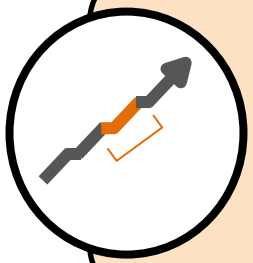
To get the most value from the United Curriculum, we recommend that teachers adhere to the sequencing and teaching of the 'what', adapting the 'how' and the lesson delivery to meet the needs of their pupils.



Within the Subject

The United Curriculum for Design & Technology has been very carefully sequenced to ensure coverage and appropriate progression through substantive (conceptual and procedural) and disciplinary knowledge and ensuring that pupils create a balanced range of outcomes and are exposed to a broad range of designers/engineers.

Implement the longer-term subject plan; avoid swapping units or 'pick and mixing' with other schemes.



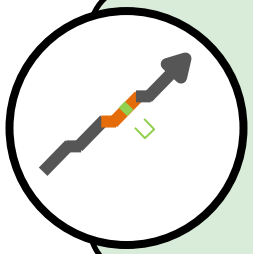
Within the Unit

Each unit clearly sets out the knowledge that should be taught and reviewed in the sequence of lessons. Suggested designers/engineers for each unit are provided, but these could be supplemented and replaced with those from the teacher's own local context where appropriate.

Each unit is planned to cover six one-hour lessons; this allows time before and after the unit for teachers to fill gaps or address misconceptions as required. A sequence of four one-hour lessons is also provided for each unit; this allows teachers to teach the core, non-negotiable knowledge for the unit while allowing additional time to fill gaps if required.

Teach the core content in the order suggested in the lesson sequence, filling gaps and addressing misconceptions as required.

Where appropriate, teachers should supplement or replace suggested designers with artists from their local area.



Within the Lesson

Some lesson slides and printable resources are provided, which follow the principles of the Great Teaching Toolkit. Where applicable, content is broken down into small steps and 'I', 'We', and 'You' sections allow for modelling, guided and independent practice.

Lesson resources provide **just one way** to teach the required knowledge. Teachers should adapt these slides as much or as little as is required to meet the needs of their class.

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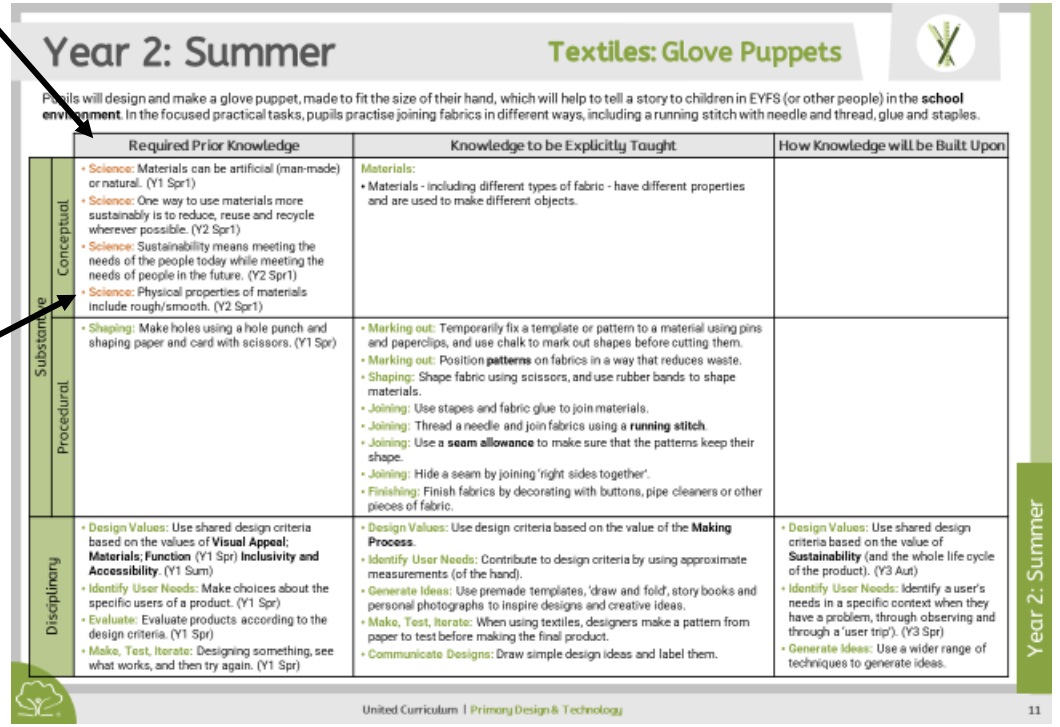
Transitions

To support schools with transitioning to the United Curriculum, the prior knowledge required for each unit is set out clearly in the overviews.

Teachers should assess whether pupils are confident in this prior knowledge, and plan to fill any gaps before or during the unit. Teachers can do this in the time prior to teaching the six-week unit. Alternatively, if it is a short half of term or if there is lots of prerequisite content, teachers can spend more time filling gaps and teach the shortened, four-week sequence of lessons that is also provided in the unit overview.

Some of the context for the unit, or the prerequisite substantive and disciplinary knowledge, is first taught in history, geography, science or mathematics. Teachers should follow the same process of using resources from these units to review and fill gaps where required.



Year 2: Summer — Textiles: Glove Puppets

Pupils will design and make a glove puppet, made to fit the size of their hand, which will help to tell a story to children in EYFS (or other people) in the **school environment**. In the focused practical tasks, pupils practise joining fabrics in different ways, including a running stitch with needle and thread, glue and staples.

		Required Prior Knowledge	Knowledge to be Explicitly Taught	How Knowledge will be Built Upon
Substantive	Conceptual	• Science: Materials can be artificial (man-made) or natural. (Y1 Spr1) • Science: One way to use materials more sustainably is to reduce, reuse and recycle wherever possible. (Y2 Spr1) • Science: Sustainability means meeting the needs of the people today while meeting the needs of people in the future. (Y2 Spr1) • Science: Physical properties of materials include rough/smooth. (Y2 Spr1)	Materials: • Materials - including different types of fabric - have different properties and are used to make different objects.	
	Procedural	• Shaping: Make holes using a hole punch and shaping paper and card with scissors. (Y1 Spr)	• Marking out: Temporarily fix a template or pattern to a material using pins and paperclips, and use chalk to mark out shapes before cutting them. • Marking out: Position **patterns** on fabrics in a way that reduces waste. • Shaping: Shape fabric using scissors, and use rubber bands to shape materials. • Joining: Use staples and fabric glue to join materials. • Joining: Thread a needle and join fabrics using a **running stitch**. • Joining: Use a **seam allowance** to make sure that the patterns keep their shape. • Joining: Hide a seam by joining 'right sides together'. • Finishing: Finish fabrics by decorating with buttons, pipe cleaners or other pieces of fabric.	
Disciplinary		• Design Values: Use shared design criteria based on the values of **Visual Appeal; Materials; Function** (Y1 Spr) **Inclusivity and Accessibility**. (Y1 Sum) • Identify User Needs: Make choices about the specific users of a product. (Y1 Spr) • Evaluate: Evaluate products according to the design criteria. (Y1 Spr) • Make, Test, Iterate: Designing something, see what works, and then try again. (Y1 Spr)	• Design Values: Use design criteria based on the value of the **Making Process**. • Identify User Needs: Contribute to design criteria by using approximate measurements (of the hand). • Generate Ideas: Use premade templates, 'draw and fold', story books and personal photographs to inspire designs and creative ideas. • Make, Test, Iterate: When using textiles, designers make a pattern from paper to test before making the final product. • Communicate Designs: Draw simple design ideas and label them.	• Design Values: Use shared design criteria based on the value of **Sustainability** (and the whole life cycle of the product). (Y3 Aut) • Identify User Needs: Identify a user's needs in a specific context when they have a problem, through observing and through a 'user trip'). (Y3 Spr) • Generate Ideas: Use a wider range of techniques to generate ideas.

Year 2: Summer

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Impact

Assessing impact is assessing how well pupils have learned the required knowledge from the implemented curriculum. It is not about lots of tests or meticulously comparing pupils' outcomes at the start and end of each unit.

If pupils can keep up with a well-sequenced curriculum that has progression built in, they are making progress!

The United Curriculum has this progression built in, and so teachers and subject leads just need to be confident that pupils are keeping up with it.

This can be done through:

- **Books/products/floor books and pupil-conferencing**

  Talking to pupils about their work allows teachers to assess how much of the curriculum content is secure. These conversations are used most effectively to determine whether pupils have a good understanding of the vertical concepts, and if they can link recently taught content to learning from previous units. (They should not be used to assess whether pupils can recall information, as low-stakes quizzes can gather this information more efficiently).

- **Formative assessment in lessons**

  There are opportunities for formative assessment in the lesson slides provided, and teachers should continually adapt their lesson delivery to address misconceptions and ensure that pupils are keeping up with the content.

- **Low-stakes summative assessment**

  Teachers may also want to use multiple-choice questions or another low-stakes quiz at the end of the unit to assess whether pupils have learned the core knowledge for that unit. These should also be used formatively, and teachers should plan to fill gaps and address misconceptions before moving on.