Design Technology Curriculum Map

Design & Technology

During each key stage, pupils complete projects focused on an area of design & technology as part of their curriculum. The projects are organised in a three-year cycle in KS1 and a four-year cycle in KS2. Pupils learn specific knowledge in each project and deepen their understanding across each key stage, including the use of key concepts.

National Curriculum Aims

The national curriculum for design and technology aims to ensure that all pupils:

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

Key Concepts

During each design & technology project pupils explore the following key concepts:

- Pupils learn to design a purposeful and functional product based on a design criteria.
- Pupils learn to use range of tools for different processes and materials to make their product.
- Pupils learn to evaluate their product based on their design criteria.
- Pupils learn to use technical knowledge related to their product

Rationale

Learning is defined as an alteration in long-term memory. If nothing has altered in long-term memory then nothing has been learned.
Sweller
Over the course of study, teaching is designed to help learners to remember in the long term the content they have been taught and to integrate new knowledge into larger concepts.
Ofsted Framework 2019
When students' brains link background knowledge with new text, they are better at making inferences and retain information more effectively.
Vacca and Vacca (2002)

Retrieval is built into the teaching cycle in order to ensure that children activate what they already know and can then build on their existing knowledge, making connections, securing key concepts and deepening learning. Retrieval practice will help teachers to remind pupils of their previous learning and what they know from other subjects, as well as identifying what personal knowledge they bring to the new learning.

The key concepts enable pupils to reinforce and build upon prior learning, make connections and develop subject specific language. Pupils use their creativity and imagination to design and make products that solve problems in a range of contexts. Pupils learn how to take risks, becoming resourceful, innovative and capable individuals. They will research and evaluate designers and existing products to inspire them to create their own ideas and designs. Pupils will focus on each stage of the design process individually and understand why they are all equally important.

Reception

Learning within our reception year provides the knowledge, skills and understanding bedrock for future learning. Pupils;

- investigate and experience things, and 'have a go'
- concentrate and keep on trying if they encounter difficulties, and enjoy achievements
- have and develop their own ideas, make links between ideas, and develop strategies for doing things

By the end of reception year, children will have developed knowledge and skills in all areas of the EYFS, with provision and learning opportunities in each area, but with specific foundations for Design and Technology through:

ELG: Expressive Art and Design/Creating with Materials:

Children at the expected level of development will:

- Safely use and explore a variety of materials, tools, and techniques, experimenting with colour, design, texture, form, and function
- Share their creations, explaining the process they have used

Adapting Teaching for SEND

The Code of Practice says that every teacher is a teacher of SEND. The teachers have overall responsibility for those children and must ensure that they make appropriate progress. Children with identified SEND will have adjustments made in QFT in line with the Mainstream Core Standards. In addition, when planning and teaching the teaching sequence for each project, teachers will consider what adaptations can be made in order for all children to access teaching and learning. Where this is an adaptation beyond the MSC's, teachers will consider, in particular, how specific skills are being developed.

Adaptive teaching will be considered and identified by teachers in the medium-term plan for each project. Subject leaders, alongside the SENDCo, will monitor the effectiveness of these adaptations.

KS1 Specific knowledge within the projects

Year A	Toys (Mechanism) https://classroom.thenational.academy/lessons/to-explore-a-range-of-sliders-and-levers-69jkgc	Landing on the moon D&T History (Mechanism)
	Pupils learn how to design, make and evaluate a toy which moves, including how to use levers and sliders. Pupils learn how to use textiles. Children will explore and evaluate a collection of everyday products that have moving parts, including those with levers and sliders. e.g. What is it? Who is it for? What is it for? What do you think will move? How will you make it move? What part of the product moved and how did it move? How do you think the mechanism works? What else could move in the product? How well does it work? Children will learn about simple mechanisms work: sliders which move in a straight line, levers which move in a curve and wheels and axles which turn (teacher demonstration). They will learn, with support, how to decide which type of mechanism they need to create the type of movement they want in their products. With scaffolding, children will generate simple design criteria, e.g. the mechanism should work smoothly, it should make the right type of movement. Children will make connections between their designs and the intended audience for their product. Children will learn to use simple drawings to support their designing with the inclusion of labels to identify materials, components and parts of their products. Children select from a range of tools and equipment and explain their choices. Children develop their skills and knowledge in measuring, cutting and shaping materials and components to make their toy. They learn to assemble, join and combine materials. Children will be supported in using spoken language to imagine possibilities, explain and	*Mixed project – strong recap of prior learning as there will be a shorter learning journey.* Pupils learn how to design, make and evaluate a vehicle to move around on the moon, including how to use wheels and axles. They will draw upon their learning in history and will be encouraged to talk about products they have seen as part of their own experiences, drawing on these as a basis for generating their own design ideas. Children learn how parts are put together in order to make a moving vehicle and how wheels and axels can be assembled in different ways. They learn how wheels work and how the wheel and axel are positioned. Children explore various moon buggies and generate ideas with scaffolding: what are the differences between these vehicles and road vehicles? Why are their differences? (eg: wide tyres to travel on difficult terrain). Who is the audience for their product? Children might use different construction toys to help them in the decisions they might make when drawing and deciding the design of their vehicle. Children will learn to use simple drawings to support their designing with the inclusion of labels to identify materials, components and parts of their products. Children try out different ways of making axle holders eg, punched holes in card or boxes, using large drinking straws. They practise joining wheels and axels to allow movement. Children select from a range of tools and equipment and explain their choices. Children develop their skills and

	evaluate their ideas, build technical vocabulary appropriate to the product they are designing and making, and listen to what others have to say. They will evaluate their developing ideas and final products against the original design criteria. Pupils will be taught to work safely, using tools, equipment, materials, components and techniques appropriate to the task.	knowledge in measuring, cutting and shaping materials and components to make their toy. They learn to assemble, join and combine materials. Discuss how the children might add finishing techniques to their product with reference to their design ideas and criteria. Children will be supported in using spoken language to imagine possibilities, explain and evaluate their ideas, build technical vocabulary appropriate to the product they are designing and making, and listen to what others have to say. They will evaluate their developing ideas and final products against the original design criteria. Pupils will be taught to work safely, using tools, equipment, materials, components and techniques appropriate to the task Pupils will be taught to work safely, using tools, equipment, materials, components and techniques appropriate to the task.
Project Endpoints		
	Designing • Generate ideas based on simple design criteria and their own experiences, explaining what they could make • Develop, model and communicate their ideas through drawings and mock-ups with card and paper **Making** • Plan by suggesting what to do next. • Select and use tools, explaining their choices, to cut, shape and join paper and card. Join materials and components in different ways • Use simple finishing techniques suitable for the product they are creating **Evaluating** • Explore a range of existing books and everyday products that use simple sliders and levers • Evaluate their product by discussing how well it works in relation to the purpose and the user and whether it meets design criteria **Technical knowledge and understanding** • Explore and use sliders and levers • Understand that different mechanisms produce different types of movement • Know and use technical vocabulary relevant to the project	**Designing** • Design a vehicle that includes functioning wheels, axles and axle holders • Generate, model and communicate their ideas through talking, drawing, templates or mock-ups and, where appropriate, ICT **Making** • Select from and use a range of tools and equipment to perform the task: eg. Joining and finishing • Make a moving vehicle with working wheels and axles **Evaluating** • Explore and evaluate the product against the design criteria **Technical knowledge and understanding** • Recognise that wheels and axles are used in everyday life • Explain that wheels move because they are attached to an axle • Identify and explain vehicle design flaws using the correct vocabulary • Explain what must be changed if there are any operational issues • Know how to work safely
Year B	**Healthy Lunch Box** **(Cook it)** **https://www.foodafactoflife.org.uk/5-7-years/cooking-5-7-years/**	**Dover Castle** **D&T** **History (Structure)**
	Pupils learn how to design, make and evaluate healthy dishes for a packed lunch box. Pupils learn where food for the healthy lunch box comes from. – ***teachers can use the above website to support this project***. Children learn to name and sort foods into the five groups from the Eatwell Guide.	Pupils learn how to design, make and evaluate a model of an aspect of Dover Castle. *Mixed project – strong recap of prior learning as there will be a shorter learning journey.* Pupils explore the structure and features of a castle/Dover Castle-What are the structures called and what is their purpose? Who might use them?

	They learn that a healthy diet comprises food and drinks from each of the food groups: • Fruit and vegetables; • Bread, rice, potatoes, pasta and other starchy foods; • Milk and dairy foods; • Meat, fish, eggs, beans and other non-dairy sources of protein; • Foods and drinks high in fat and/or sugar. Children might discuss what foods should be in each group and then sort foods, identifying the largest and smallest group. Children will discuss what the implications are for the foods that they design and make. Children learn that everyone should eat at least five portions of fruit and vegetables every day. A portion is what fits into the palm of a hand. Variety is important and different types of fruit and vegetables count, for example: • fresh, e.g. tomatoes • frozen, e.g. frozen peas • dried, e.g. raisins • canned, e.g. sweetcorn or carrots • juice, e.g. orange juice Children will design their own balanced meal for a lunch box and use simple drawings to support their design ideas with the inclusion of labels to identify the various foods. Children learn how to use skills and techniques such as cutting, peeling and grating. Pupils will be taught to work safely, using tools, equipment, materials, components and techniques appropriate to the task. They are taught that we need certain skills and techniques to be able to make food products. This might include washing, peeling, juicing, grating and cutting (e.g. snipping herbs and spring onions with kitchen scissors suitable for children's use). **These skills and techniques will be demonstrated correctly and safely to the children by the teacher.** Children will be supported in using spoken language to imagine possibilities, explain and evaluate their ideas, build technical vocabulary appropriate to the product they are designing and making, and listen to what others have to say.	What materials have been used? Why have these been chosen? How have the parts been joined together? How have the structures been made strong enough? How have they been made stable? Children either draw or use a photograph of the structure they have been exploring and label with the correct technical vocabulary in relation to the structure, materials used and shapes e.g. wall, tower, framework, base, joint, metal, wood, plastic, brick, triangle, square, rectangle, cuboid, cube They learn how freestanding structures can be made stronger, stiffer and more stable and rigid. Freestanding structures may be assembled using construction kits to help develop children's understanding and include walls, buttresses, towers and frameworks. Children will be taught measuring, marking out, cutting, shaping, joining and finishing techniques with a range of tools and new and reclaimed materials that they are likely to use to make their structures. Discuss the suitability of materials for their products according to their characteristics. Pupils learn to fold and join paper and card to create simple structures, making joins with masking tape where necessary, to explore the concepts of strength, stiffness and stability. Pupils will be taught to work safely, using tools, equipment, materials, components and techniques appropriate to the task. Children will learn to use simple drawings to support their designing ideas with the inclusion of labels to identify materials, components and parts of their products. Children will be supported in using spoken language to imagine possibilities, explain and evaluate their ideas, build technical vocabulary appropriate to the product they are designing and making, and listen to what others have to say.
Project Endpoints Nutrition		
	Pupils know: **Designing** • How to apply understanding of what they have learnt to make purposeful selections and explain choices. Making • how to prepare simple dishes safely and hygienically, without using a heat source • how to use techniques such as cutting, peeling and grating Evaluating	**Designing** • Generate ideas based on simple design criteria and their own experiences, explaining what they could make • Develop, model and communicate their ideas through talking, mock-ups and drawings Making • Plan by suggesting what to do next. • Select and use tools, skills and techniques, • explaining their choices • Select new and reclaimed materials and construction kits to build their structures

	• How to evaluate their lunch box and suggest ways it could be modified or improved in the future • How to comment on appearance and taste • How to assess how they could improve their breakfast pot next time, based on appearance and taste Technical knowledge and understanding • that all food comes from plants or animals • that food has to be farmed, grown elsewhere (e.g. home) or caught • how to name and sort foods into the five groups in the Eatwell Guide • that everyone should eat at least five portions of fruit and vegetables every day	• Use simple finishing techniques suitable for the structure they are creating Evaluating • Explore a range of existing freestanding structures in the school and local environment e.g. everyday products and buildings • Evaluate their product by discussing how well it works in relation to the purpose, the user and whether it meets the original design criteria Technical knowledge and understanding • Know how to make freestanding structures stronger, stiffer and more stable • Know and use technical vocabulary relevant to the project
KS1 Outcomes		
	Designing-Children can: • work confidently within a range of contexts, such as imaginary, story-based, home, school, gardens, playgrounds, local community, industry and the wider environment • state what products they are designing and making • say whether their products are for themselves or other users • describe what their products are for • say how their products will work • say how they will make their products suitable for their intended users • use simple design criteria to help develop their ideas • generate ideas by drawing on their own experiences • use knowledge of existing products to help come up with ideas • develop and communicate ideas by talking and drawing • model ideas by exploring materials, components and construction kits and by making templates and mock- ups • use information and communication technology, where appropriate, to develop and communicate their ideas **Making-Chidren can:** • plan by suggesting what to do next • select from a range of tools and equipment, explaining their choices • select from a range of materials and components according to their characteristics • follow procedures for safety and hygiene • use a range of materials and components, including construction materials and kits, textiles, food ingredients and mechanical components • measure, mark out, cut and shape materials and components • assemble, join and combine materials and components • use finishing techniques, including those from art and design **Evaluating-Chidren can:** talk about their design ideas and what they are making • make simple judgements about their products and ideas against design criteria • suggest how their products could be improved **Technical knowledge and understanding-Chidren know:** • about the simple working characteristics of materials and components • about the movement of simple mechanisms such as levers, sliders, wheels and axles • how freestanding structures can be made stronger, stiffer and more stable • that a 3-D textiles product can be assembled from two identical fabric shapes • that food ingredients should be combined according to their sensory characteristics • the correct technical vocabulary for the projects they are undertaking	
LKS2 Specific knowledge within the projects		
Year A	**Program it!** **(Computing to program)** https://www.stem.org.uk/elibrary/resource/36036	**Around the globe** **(Cooking and nutrition)** https://www.foodafactoflife.org.uk/

		https://www.foodafactoflife.org.uk/7-11-years/where-food-comes-from-7-11-years/world-food-7-11-years/
	Pupils learn how to design, make and evaluate a product that uses computing within part of the design. They learn to create a sound monitor for their classroom. *The sound monitors they create are examples of control programs - they take information from an input sensor (a microphone), and use this information to alter the output of the program (displaying a warning message if pupils are too noisy).* Children recap/discuss how sounds are made and travel. They explore and discuss common input devices in school and beyond. They explore how to use the input from a microphone in Scratch and how a computer monitor can be used as the output devise for their sound monitors. Children learn to formulate design criteria, stating what their product has to do in order to be successful – what is the purpose? Children make connections with knowledge and skills in maths and science. Pupils design their sound monitor and create- • An annotated sketch or flow chart showing what they will use for their sound monitor and what will happen when the volume changes • A simple algorithm describing how their sound monitor will work e.g. 'if sound is too loud, say be quiet!', or, 'when the volume increases, the arrow moves up the scale and when the volume decreases, the arrow moves down the scale.' Pupils think about and discuss what commands might be useful to program the simulation and to jot these down under their design. Children learn how to program their sound monitor. *Control is creating instructions that cause changes to a physical system using real world sensors.* Pupils create a control program that senses the volume of sound and uses this to change an output such as a message saying 'too loud!' • Pupils use a microphone as an input device • Pupils use the computer monitor (and possibly Lego Education WeDo motors) as an output device • Pupils program a sound monitor control program Children test, and then evaluate their program against the design criteria, to include peer evaluation in order to support reflections on successes and improvements for the future.	Pupils learn how to design, make and evaluate food which has been improvised on from food around the world. Children design and make a food to reflect a culture. What defines a culture? Children explore some national food cultures eg: Maexican and Italian foods. Children evaluate their creations. Children will learn that a healthy balanced diet needs to include carbohydrates. They recognise pasta in a range of forms and perform simple food skills safely such as cutting with scissors, measuring and mixing. Teachers may support their lessons with the following lesson suite found at: https://www.stem.org.uk/resources/elibrary/resource/462672/pleasing-pasta Children make connections with knowledge and skills in maths and science. The important difference is that, although pupils will use pre-cooked pasta (see above lesson plans), **pupils need to be given a choice of foods to make up their Italian Pleasing Pasta Salad:** eg: peppers/tomatoes/mozzarella cheese/other cheese choices/olives/onions/sweetcorn/tuna etc. **Children need to select so that they can design and be creative with choice, colour, smells etc. With this in mind,** children will make a list of all the various foods that could make up their pasta salad and create a short survey for their parents who will be their audience. They will learn that recipes can be adapted to suit different criteria (obtained through carrying out their survey at home). Children will use the following headings in their survey: Needs and preferences-needs may address a dietary requirement of a parent, preferences will address likes and dislikes/taste preferences etc. These short surveys can go home to parents to help pupils make their choices. Pupils may also consider the look of the dish: colours together and smells. Children will learn how to safely slice/chop/open a can of tune etc. These skills will be demonstrated by the teacher. Once pupils have made their choices, they will create a recipe card that details their chosen recipe and their design criteria (why they have chosen specific items based on their survey-this also includes consideration of a healthy diet). Pupils will then make their salad, supported in developing skills and working safely. Pupils will evaluate their chosen salad using their design criteria, after taking it home for parents to sample. What was the greatest success? What would they change to improve further next time?
	Project Endpoints	
	Designing • Formulate design criteria based on what the product must do (modelled by the teacher if appropriate)	**Designing** • can use strategies to help identify the needs, wants, preferences and values of particular individuals/groups

	• Children use the design criteria to inform their ideas • Children refer to the criteria as they design and make • Children can create an annotated sketch/or flow diagram to explain their device **Making** • Create a program that uses an input from a device **Evaluating** • Can evaluate their design based on their design criteria **Technical knowledge and understanding** • know how to program a computer to control products they have designed and made • physically control 'input' and 'output' devices • describe, in some detail, the purpose of the products they have designed and made • use annotated sketches to communicate design ideas • can explain what an input device is • can write a program that uses input from an input device • can describe common uses of input devices in school and beyond school.	• can formulate design criteria based on needs and wants of their audience • can consider taste, appearance and aroma, and can think about how the ingredients contribute to a healthy and varied diet **Making** • can use peeling, chopping, slicing, grating, and spreading techniques safely • can use tools such as round-ended knives, vegetable peelers, can openers and graters safely Evaluating • can evaluate their design based on feedback from their audience (once salads have been sampled at home) **Technical knowledge and understanding** • can use skills and techniques such as: peeling, chopping, slicing, grating, mixing, spreading, kneading and baking • know that we need to eat a variety and balance of food and drinks to stay healthy • children use key technical vocabulary to share ideas, to explain preferences and to evaluate products
Year B	**Bridge Bonanza!** **(Structures)** **https://www.stem.org.uk/resources/elibrary/resource/467665/bridge-bonanza** Use the above link for teacher support resources.	**Tremors** **DT and Geography**
	Pupils learn how to design, make and evaluate a structure. Pupils learn how to make the model stable. Children learn about the foundations of bridge building and what creates a strong structure. They learn about famous Bridge Designers, Architects and Engineers- http://www.historyofbridges.com/bridges-history/famous-bridge-designers/ . They learn about their most famous achievements. Who designed the product/when and where was it designed? They are challenged to build the strongest structure that they can using the resources made available to them. Children make connections with knowledge and skills in maths and science. Research informs design decisions. Children Sketch out different options and experiment with different approaches, thinking about the design principles that can be found in the six main bridge types. They create their design criteria. Children select materials and components and create their structure, using their design for support and collaborating to solve problems where appropriate.	Children will use a range of modelling materials and tools to design and construct their own 3-D model volcano. Add special effects, perhaps creating lava that lights up or a volcano that rumbles and shakes (use of circuits, buzzers and bulbs). *Mixed project – strong recap of prior learning as there will be a shorter learning journey.* https://www.stem.org.uk/resources/elibrary/resource/35188/what-volcano https://spaceplace.nasa.gov/volcanoes2/en/ -children explore what a volcano is, how a volcano is formed watching the above video. https://www.theguardian.com/world/video/2015/jan/17/icelands-bardarbunga-erupting-five-months-later pupils watch an erupting volcano and discuss what they have learned from the previous video, using precise and technical vocabulary-what is happening when the volcano erupts? Children learn some of the places where volcanoes are found and can name some of the most famous volcanoes eg: Mount Vesuvius.

	Children explore different approaches to making a structure stronger: https://www.bbc.co.uk/teach/class-clips-video/design-and-technology-ks2-making-structures-stronger/z626hbk This above video links nicely to the concepts for making a stronger structure as explained in the lesson overview/worksheet which can be used by teachers to support the teaching of this project. Can they adapt their product and apply developing knowledge of how to make a structure stronger? Children test, and then evaluate their structures against the design criteria, to include peer evaluation.	https://sciencebob.com/make-your-own-volcano/ children watch a home-made, giant volcano erupt. Children select from and use a wider range of construction materials and ingredients according to their functional and aesthetic qualities-they design their volcano using a cross-sectional diagram to communicate ideas and resources/materials/tools required for the project. Pupils use this and modelling materials to construct their own working 3d volcano model and add special effects so lava lights up.They explain how different parts of their structure work to achieve the intended effect/purpose. Children engage in peer evaluation against design criteria.
Project Endpoints		
	Designing • Formulate design criteria based on what the product must do (modelled by the teacher if appropriate) • Children use the design criteria to inform their ideas • Children refer to the criteria as they design and make • Children can create an annotated sketch/or flow diagram to explain their ideas **Making** • demonstrate 'some accuracy' when they are measuring, marking out, cutting, shaping, assembling, joining, combining and applying finishing techniques • adapt structure to solve problems and increase its strength – consideration of use of shapes that effectively support strength **Evaluating** • children evaluate against their design criteria and can share how effectively their finished product achieves its intended purpose **Technical knowledge and understanding** • know and understand the simple concept behind shapes used in structures and which shape makes a stronger structure • can use specific vocabulary when sharing ideas and providing explanations of concepts eg: strut/load/polygon	**Designing** • Formulate design criteria based on what the product must do (modelled by the teacher if appropriate)-this includes creativity in painting of the structure • Children use the design criteria to inform their ideas • Children refer to the criteria as they design and make • Children can create a cross-sectional diagram to explain their ideas **Making** • demonstrate 'some accuracy' when they are measuring, marking out, cutting, shaping, assembling, joining, combining and applying finishing techniques • adapt structure to solve problems and increase its strength or stability– consideration of use of shapes that effectively support strength **Evaluating** • children evaluate against their design criteria and can share how effectively their finished product achieves its intended purpose **Technical knowledge and understanding** • know what a volcano is and can explain what is happening when a volcano erupts, using precise technical vocabulary to share concepts etc. • pupils demonstrate their knowledge of science applied within the project (chemical reaction between an acid and a base)
Lower KS2 Outcomes		
	Pupils know: **Designing** • refer to their design criteria as they design and make • use their design criteria to evaluate their completed products • when exploring existing products, pupils: know who designed and made the products/where products were designed and made/when products were designed and made/whether products can be recycled or reused • gather information about the needs and wants of particular individuals and groups	

	• develop their own design criteria and use these to inform their ideas • describe the purpose of their products • indicate the design features of their products that will appeal to intended users • explain how particular parts of their products work **Making** • select tools and equipment suitable for the task • explain their choice of tools and equipment in relation to the skills and techniques they will be using • select materials and components suitable for the task • explain their choice of materials and components according to functional properties and aesthetic qualities • order the main stages of making • measure, mark out, cut and shape materials and components with some accuracy • assemble, join and combine materials and components with some accuracy • apply a range of finishing techniques, including those from art and design, with some accuracy • how to prepare and cook a variety of predominantly savoury dishes safely and hygienically including, where appropriate, the use of a heat source • how to use a range of techniques eg: peeling/chopping • follow procedures for safety and hygiene **Evaluating** • identify the strengths and areas for development in their ideas and products • consider the views of others, including intended users, to improve their work • refer to their design criteria as they design and make • use their design criteria to evaluate their completed products **Technical knowledge and understanding** • how mechanical systems such as levers and linkages or pneumatic systems create movement • how simple electrical circuits and components can be used to create functional products • how to program a computer to control their products • how to make strong, stiff shell structures • how to use learning from science to help design and make products that work • how to use learning from mathematics to help design and make products that work • that materials have both functional properties and aesthetic qualities • know a variety of inventors-what they are famous for designing/making • know who designed an existing product, and when and where it was designed • that mechanical and electrical systems have an input, process and output • that food ingredients can be fresh, pre-cooked and processed • that a recipe can be adapted a by adding or substituting one or more ingredients • that food is grown (such as tomatoes, wheat and potatoes), reared (such as pigs, chickens and cattle) and caught (such as fish) in the UK, Europe and the wider world • that a healthy diet is made up from a variety and balance of different food and drink, as depicted in the Eatwell Guide • that to be active and healthy, food and drink are needed to provide energy for the body

UKS2 Specific knowledge within the projects		
Year A	**Move it! (Mechanisms)**	**Victorians DT and History**
	Pupils learn how to design, make and evaluate a mechanism that uses gears, pulleys and levers that can be used for leisure. Eg: fairground ride with gears or pulleys e.g. carousel, Ferris wheel / controllable toy vehicle with gears or pulleys e.g. dragster, off-road vehicle, sports car, lorry / window display with moving parts e.g. lifting or turning items for sale Children investigate, analyse and evaluate existing everyday products and existing or pre-made toys that incorporate gear or pulley systems. Use videos and photographs of products that cannot be explored	Children will plan, design and make a Victorian toy using mechanisms- gears, moving cams and wheels. They will evaluate and reflect on their design and product. *Mixed project – strong recap of prior learning as there will be a shorter learning journey.* Enrichment possibility: https://www.tts-group.co.uk/moving-toys-dt-class-kit/1000369.html Children make connections with prior learning (Move it!).

	through first-hand experience. Who have the products been designed for and for what purpose? How innovative is the design? Are the materials used sustainable? They learn to use observational drawings and questions to develop understanding of each of/or one of the products in the collection. e.g. How innovative is the product? What design decisions have been made? What type of movement can be seen? What types of mechanical components are used and where are they positioned? What are the input, process and output of the system? How well does the product work? Why have the materials and components been chosen? How well has it been designed? How well has it been made? Children research and, if possible, visit engineering and manufacturing companies that are relevant to the product they are designing and making e.g. Jaguar Land Rover, JCB, local companies. Children make connections with knowledge and skills in maths and science. ***Focused task***: Using a construction kit, children investigate combinations of two different sized pulleys to learn about direction and speed of rotation e.g. How many times does the smaller pulley turn each time the larger pulley turns once? Do the pulleys move in the same direction? How can you reverse the direction of rotation? Pupils develop a design specification for their product, carefully considering the purpose and intended user for their product- who the intended user is, what the purpose of the product is, information about the requirements for the product and how the product is to be assembled. Children produce detailed step-by-step plans and lists of tools, equipment and materials needed. Pupils also communicate ideas through detailed, annotated drawings from different views and/or exploded diagrams. The drawings should indicate the design decisions made, including the location of the mechanical and electrical components, how they work as a system and the appearance and finishing techniques for the product. Children make high quality products, applying knowledge, understanding and skills. Children should use a range of decorative finishing techniques to ensure a well finished final product that matches the intended user and purpose. Children evaluate the final product in use, comparing it to the original design specification. They critically evaluate the quality of the design, the manufacture, functionality, innovation shown and fitness for the intended user and purpose.	They explore a range of Victorian toys and investigate how they work/move. Who have the products been designed for and for what purpose? How innovative is the design? Are the materials used sustainable? Pupils investigate CAM mechanisms and design, make and evaluate a Victorian toy that moves with a CAM mechanism. They learn that when you turn the handle, the axle turns and the cam rotates on the axle. Children learn that the cam and follower work together to create the movement - as the cam turns, it moves the follower. Children discuss and select their audience for the intended toy. They make step-by-step plans which include a design spec and what the toy has to do to be successful, along with aesthetic intentions for the design and quality of the finish. Children make connections with knowledge and skills in maths and science. Children learn how to make prototypes (if there is time). They make improvements as they work, scaffolded where appropriate by the teacher. The pupils measure and mark out accurately and use tools correctly and safely. Pupils make adjustments to improve their toy as they work. Pupils are supported in developing their knowledge of how to strengthen their product or re-inforce part of their product, where appropriate. Children evaluate own toy, thinking about what went well, what didn't go so well, and ways that they could change to improve the moving toy. They Listen to other people's feedback about what worked well and what could be improved and support each other in identifying improvements for the future.
Project Endpoints		
	Designing • Generate innovative ideas by carrying out research using surveys, interviews, questionnaires and web-based resources	**Designing** • Generate innovative ideas by carrying out research using artefacts and web-based resources

	• Develop a detailed design specification to guide their thinking • Produce detailed lists of tools, equipment and materials. Formulate step-by-step plans • Develop and communicate ideas through discussion, annotated drawings, exploded drawings and drawings from different views **Making** • Select from and use a range of tools and equipment to make products that that are accurately assembled and well finished • Work within the constraints of time, resources and cost **Evaluating** • Compare the final product to the original design specification • Test products with intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose • Consider the views of others to improve their work • Investigate famous manufacturing and engineering companies relevant to the project **Technical knowledge and understanding** • Understand that mechanical and electrical systems have an input, process and an output • Understand how gears and pulleys can be used to speed up, slow down or change the direction of movement • Know and use technical vocabulary relevant to the project	• Develop a detailed design specification and step-by-step plans to guide their thinking • Develop and communicate ideas through discussion and step-by-step plans **Making** • Select from and use a range of tools, materials and equipment to make products that that are accurately assembled and well finished • Can measure and join accurately and effectively to ensure that the toy works and intentions prove successful in practice **Evaluating** • Compare the final product to the original design specification • Test products with intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose • Consider the views of others to improve their work • know how to strengthen a product by stiffening a given part or reinforce a part of the structure **Technical knowledge and understanding** • Understand that mechanical and electrical systems have an input, process and an output • Understand how cams can be used to create movement and that different shaped cams produce different movements • Know that cam changes rotary motion into linear motion • Know and use technical vocabulary relevant to the project
Year B	**Power it!** **(Electrical Systems)**	**France – Mougins** **Geography and DT**
	Pupils learn how to design, make and evaluate an electrical system that uses bulbs or buzzers to entertain or provide a practical solution, eg: . vehicle alarm security lighting system/alarm for valuable artefact/automatic nightlight electrical board game alarm for school shed. Children research famous inventors related to the project e.g. Thomas Edison – light bulb Using research, children learn about relevant products that respond to changes in the environment using a computer control program such as automatic nightlights, alarm systems, security lighting e.g. Who have the products been designed for and for what purpose? How innovative is the design? Are the materials used sustainable? How and why is a computer control program used to operate the products? What input devices, e.g. switches, and output devices, e.g. bulbs, have been used? They Investigate electrical sensors such as light dependent resistors (LDRs) and a range of switches such as push-to-make switches, push-to-break switches, toggle switches, micro switches and reed switches. To gain an understanding of how they are operated by the user and how they work, the children use each component to control a bulb in a	Pupils learn how to design, make and evaluate seasonal healthy food from France-Croque monsieur. *Mixed project – strong recap of prior learning as there will be a shorter learning journey.*  https://www.foodafactoflife.org.uk/recipes/11-14-l2c/croque-monsieur/ - recipe. Pupils research the origin and history of this staple dish within French cuisine, including the fact that the Croque Monsieur was invented in Paris in the early 1900s. They explore the ingredients used to make this food product and reflect on their contribution to a healthy diet and the Eatwell Plate.They will be taught about safety awareness in a kitchen environment and good food hygiene, which includes personal hygiene, cleanliness of

	simple circuit. Remind children about the dangers of mains electricity. The children explore a range of electrical systems that could be used to control their products, including a simple series circuit where a single output device is controlled, a series circuit where two output devices are controlled by one switch and, where appropriate, parallel circuits where two output devices are controlled independently by two separate switches. The teacher will demonstrate and enable children to practise methods for making secure electrical connections e.g.using automatic wire strippers. **Drawing computing activities, ensure that children can write computer control programs that include inputs, outputs and decision making. Test out the programs using electrical components connected to interface boxes or standalone boxes.** The children generate innovative ideas by drawing on research and develop a design specification for their product, carefully considering the purpose and needs of the intended user. They communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams. Drawings should indicate the design decisions made, including the location of the electrical components and how they work as a system with an input, process and output. Children produce detailed step-by-step plans and lists of tools, equipment and materials needed. Children make high quality products, applying knowledge, understanding and skills. They modify a computer control program to enable the product to work automatically in response to changes in the environment. Test the system to demonstrate its effectiveness for the intended user and purpose. Pupils critically evaluate throughout and the final product, comparing it to the original design specification.	equipment and working areas, food handling, cooking and storage. Pupils are encouraged to be creative in their selection of foods (refer to the recipe suggestions) eg: different types of bread/cheesefruit and/or vegetables – these choices may be based on personal preference or an intended audience (dependent on project time and if pupils have the time to create a questionnaire to collect data on the preferences of an audience such as parents). Pupils will create a design brief, focusing on ingredients that they select, safety procedures, and ways in which top present their dish (teachers will need to show pupils examples of ways in which toasted sandwiches etc can be presented for aesthetic purposes). Pupils will learn to use a grill for toast, hob to boil/simmer poach eggs. Pupils will refine their skills in cutting, trimming, slicing, spreading, grating, and accurate and safe use of tools. Pupils will explore peers' final products and will evaluate their dish after sampling and after gaining further ideas for presentation. What was the greatest success? What would they change to improve further next time?
Project Endpoints		
	Designing • Use research to develop a design specification for a functional product that responds automatically to changes in the environment. Take account of constraints including time, resources and cost • Generate and develop innovative ideas and share and clarify these through discussion • Communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams **Making** • Formulate a step-by-step plan to guide making, listing tools, equipment, materials and components • Competently select and accurately assemble materials, and securely connect	**Designing** • describe, in some detail, the purpose of the products they are designing and making • explain selection choices **Making** • Refine skills and techniques such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking • work 'accurately' when they are measuring, marking out, cutting, shaping, assembling, combining and applying finishing techniques • follow a given recipe to create a dish (making selective choices to innovate) **Evaluating** • peer evaluation in order to reflect on design choices and make changes to the dish in

	electrical components to produce a reliable, functional product • Create and modify a computer control program to enable an electrical product to work automatically in response to changes in the environment • make a product which uses both electrical and mechanical components • links scientific knowledge by using lights, switches or buzzers **Evaluating** • Continually evaluate and modify the working features of the product to match the initial design specification • Test the system to demonstrate its effectiveness for the intended user and purpose • Investigate famous inventors who developed ground-breaking electrical systems and components **Technical knowledge and understanding** • Understand and use electrical systems in their products • Apply their understanding of computing to program, monitor and control their products • Know and use technical vocabulary relevant to the project	the future-pupils discuss their response to the dish and what they might like to try in the future, after listening to their peers' evaluation of the dish-what are the strenths of their design and dish? What improvements might be made? **Technical knowledge and understanding** • understand the difference between a savoury and sweet dish • talk about which food is healthy and which food is not • there are five main food groups in the Eatwell Guide • Food products are sometimes made from two or more of these food groups • Know that the Eatwell Guide shows us the proportions of different food groups we should eat, e.g. compared to the other food groups, we should eat more fruit and vegetables and bread, rice, potatoes, pasta and other starchy foods • Can distinguish between the physical or functional properties of materials that enable products to work effectively and the aesthetic qualities of materials that give products their appearance, texture, taste and aroma • thought about how the ingredients would contribute to a healthy and varied diet by making links to the food groups illustrated in the Eatwell Guide • that recipes can be adapted to change the appearance, taste, texture and aroma
	UKS2 Outcomes	
	Designing • work confidently within a range of contexts, such as the home, school, leisure, culture, enterprise, industry and the wider environment • describe the purpose of their products • indicate the design features of their products that will appeal to intended users • explain how particular parts of their products work • carry out research, using surveys, interviews, questionnaires and web-based resources • identify the needs, wants, preferences and values of particular individuals and groups • develop a detailed design specification to guide their thinking • share and clarify ideas through discussion • model their ideas using prototypes and pattern pieces • use annotated sketches, cross-sectional drawings and exploded diagrams to develop and communicate their ideas • use computer-aided design to develop and communicate their ideas **Making** • select tools and equipment suitable for the task • explain their choice of tools and equipment in relation to the skills and techniques they will be using • select materials and components suitable for the task • explain their choice of materials and components according to functional • properties and aesthetic qualities • produce appropriate lists of tools, equipment and materials that they need • formulate step-by-step plans as a guide to making • follow procedures for safety and hygiene • use a wider range of materials and components than KS1, including construction materials and kits, food ingredients, mechanical components and electrical components • accurately measure, mark out, cut and shape materials and components • accurately assemble, join and combine materials and components	

- accurately apply a range of finishing techniques, including those from art and design
- use techniques that involve a number of steps
- demonstrate resourcefulness when tackling practical problems

Evaluating

- identify the strengths and areas for development in their ideas and products
- consider the views of others, including intended users, to improve their work
- critically evaluate the quality of the design, manufacture and fitness for purpose of their products as they design and make
- evaluate their ideas and products against their original design specification
- investigate existing products- how innovative products are/how sustainable the materials in products are/ what impact products have beyond their intended purpose

Technical knowledge and understanding

- know about inventors, designers, engineers, chefs and manufacturers who have developed ground breaking products
- how to use learning from science to help design and make products that work
- how to use learning from mathematics to help design and make products that work
- that materials have both functional properties and aesthetic qualities
- that materials can be combined and mixed to create more useful characteristics
- that mechanical and electrical systems have an input, process and output
- know the correct technical vocabulary for the projects they are undertaking
- how mechanical systems such as cams or pulleys or gears create movement
- how more complex electrical circuits and components can be used to create functional products
- how to program a computer to monitor changes in the environment and control their products
- how to reinforce and strengthen a 3D framework
- that a recipe can be adapted by adding or substituting one or more ingredients
- that seasons may affect the food available
- how food is processed into ingredients that can be eaten or used in cooking
- that different food and drink contain different substances – nutrients, water and fibre – that are needed for health

Deepening Understanding

When learning during the design & technology projects pupils will deepen their knowledge in:

- creative approaches to solving problems, including taking risks
- researching existing products to help them with designing their product
- the skills required to design products
- the use of tools and different processes involved in the making of a product
- working collaboratively to enhance their and other peoples' work through critical reflection and evaluation

Key Vocabulary

Year 1

Desing process: planning, investigating, design, evaulate, make, user, purpose, ideas, product

Cooking and nutrition: fruit and vegetable names, names of equipment and utensils, ingredients, sensory vocab e.g. soft, juicy, crunchy, sweet, sour, hard, sticky etc, slicing, peeling, chopping, squeezing.

Structures: cut, fold, join, fix structure, wall, tower, framework, weak, strong, base, top, underneath, side, edge, surface, thinner, thicker, corner, point, straight, curved, metal, wood, plastic circle, triangle, square, rectangle, cuboid, cube, cylinder

Mechanisms: slider, lever, pivot, slot, bridge/guide, card, masking tape, paper fastener, join, pull, push, up, down, straight, curve, forwards, backwards

Year 2

Design process: investigating, planning, design, make, evaluate, user, purpose, ideas, design criteria, product, function

Cooking and nutrition: fruit and vegetable names, names of equipment and utensils, ingredients, sensory vocab e.g. soft, juicy, crunchy, sweet, sour, hard, sticky etc, slicing, peeling, chopping, squeezing.

Structures: cut, fold, join, fix structure, wall, tower, framework, weak, strong, base, top, underneath, side, edge, surface, thinner, thicker, corner, point, straight, curved, metal, wood, plastic circle, triangle, square, rectangle, cuboid, cube, cylinder.

Mechanisms: vehicle, wheel, axle, axle holder, chassis, body, cab assembling, cutting, joining, shaping, finishing, fixed, free, moving, mechanism names of tools, equipment and materials used.

Year 3

Design process: user, purpose, design, model, evaluate, prototype, annotated sketch, functional, innovative, investigate, label, drawing, function, planning, design criteria, annotated sketch, appealing

Cooking and nutrition: name of products, names of equipment, utensils, techniques and ingredients texture, taste, sweet, sour, hot, spicy, appearance, smell, preference, greasy, moist, cook, fresh, savoury, hygienic, edible, grown, reared, caught, frozen, tinned, processed, seasonal, harvested healthy/varied diet

Structures: shell structure, three-dimensional (3-D) shape, net, cube, cuboid, prism, vertex, edge, face, length, width, breadth, capacity, marking out, scoring, shaping, tabs, adhesives, joining, assemble, accuracy, material, stiff, strong, reduce, reuse, recycle, corrugating, ribbing, laminating, font.

Mechanisms: mechanism, lever, linkage, pivot, slot, bridge, guide system, input, process, output linear, rotary, oscillating, reciprocating

Electrical systems: series circuit, fault, connection, toggle switch, push-to-make switch, push-to-break switch, battery, battery holder, bulb, bulb holder, wire, insulator, conductor, crocodile clip, control, program, system, input device, output device

Year 4

Design process: evaluating, design brief design criteria, innovative, prototype, user, purpose, function, prototype, design criteria, innovative, appealing, design brief, planning, annotated sketch, sensory evaluations

Cooking and nutrition: name of products, names of equipment, utensils, techniques and ingredients texture, taste, sweet, sour, hot, spicy, appearance, smell, preference, greasy, moist, cook, fresh, savoury, hygienic, edible, grown, reared, caught, frozen, tinned, processed, seasonal, harvested healthy/varied diet

Structures: shell structure, three-dimensional (3-D) shape, net, cube, cuboid, prism, vertex, edge, face, length, width, breadth, capacity, marking out, scoring, shaping, tabs, adhesives, joining, assemble, accuracy, material, stiff, strong, reduce, reuse, recycle, corrugating, ribbing, laminating, font.

Mechanisms: mechanism, lever, linkage, pivot, slot, bridge, guide system, input, process, output linear, rotary, oscillating, reciprocating

Electrical systems: series circuit, fault, connection, toggle switch, push-to-make switch, push-to-break switch, battery, battery holder, bulb, bulb holder, wire, insulator, conductor, crocodile clip, control, program, system, input device, output device

Year 5

Design process: design decisions, functionality, authentic, user, purpose, design specification, design brief, innovative, research, evaluate, design criteria, annotate, evaluate, mock-up, prototype

Cooking and nutrition: ingredients, yeast, dough, bran, flour, wholemeal, unleavened, baking soda, spice, herbs fat, sugar, carbohydrate, protein, vitamins, nutrients, nutrition, healthy, varied, gluten, dairy, allergy, intolerance, savoury, source, seasonality utensils, combine, fold, knead, stir, pour, mix, rubbing in, whisk, beat, roll out, shape, sprinkle, crumble

Structures: frame structure, stiffen, strengthen, reinforce, triangulation, stability, shape, join, temporary, permanent

Mechanisms: pulley, drive belt, gear, rotation, spindle, driver, follower, ratio, transmit, axle, motor, circuit, switch, circuit diagram, annotated drawings, exploded diagrams, mechanical system, electrical system, input, process, output

Electrical systems: reed switch, toggle switch, push-to-make switch, push-to-break switch, light dependent resistor (LDR), tilt switch, light emitting diode (LED), bulb, bulb holder, battery, battery holder, USB cable, wire, insulator, conductor, crocodile clip control, program, system, input device, output device, series circuit, parallel circuit

Year 6

Design process: design decisions, functionality, authentic, user, purpose, design specification, design brief, innovative, research, evaluate, design criteria, annotate, evaluate, mock-up, prototype

Cooking and nutrition: ingredients, yeast, dough, bran, flour, wholemeal, unleavened, baking soda, spice, herbs fat, sugar, carbohydrate, protein, vitamins, nutrients, nutrition, healthy, varied, gluten, dairy, allergy, intolerance, savoury, source, seasonality utensils, combine, fold, knead, stir, pour, mix, rubbing in, whisk, beat, roll out, shape, sprinkle, crumble

Structures: frame structure, stiffen, strengthen, reinforce, triangulation, stability, shape, join, temporary, permanent

Mechanisms: pulley, drive belt, gear, rotation, spindle, driver, follower, ratio, transmit, axle, motor, circuit, switch, circuit diagram, annotated drawings, exploded diagrams, mechanical system, electrical system, input, process, output

Electrical systems: reed switch, toggle switch, push-to-make switch, push-to-break switch, light dependent resistor (LDR), tilt switch, light emitting diode (LED), bulb, bulb holder, battery, battery holder, USB cable, wire, insulator, conductor, crocodile clip control, program, system, input device, output device, series circuit, parallel circuit