Long Term Plan: Design Technology

Structures/Materials Food Electrical & Mechanical Components Textiles

Year band	Autumn Term		Spring Term		Summer Term	
Reception	**Me and My Community** **Autumn Term Outcomes**	**People who help us/Autumn** **Autumn Term Outcomes**	**Once Upon a Time** **Spring Term Outcomes**	**Ready, Steady, Grow** **Spring Term Outcomes**	**Animal Safari** **Summer Term Outcomes**	**On the Beach** **Summer Term Outcomes**
Year 1	**Playgrounds** *Design & make a model of a piece of playground equipment*		**Taxi!**		**Fruit Salad Kebabs** *Designer: Mary Berry*	
Design	• To use my own ideas to design a piece of playground equipment (communicate ideas through talking and drawing) • To explore different joining techniques • To look at and talk about a range of existing playground equipment before designing — what works well, and who is it for? • To design my own piece of playground equipment against simple design criteria (for example: it must be safe, it must be for a chosen age group, it must join at least two materials).		• Design purposeful, functional, appealing products for themselves and other users based on design criteria.		• Design purposeful, functional, appealing products for themselves and other users based on design criteria.	
Make	• To explain to someone else how I want to make my product. • To select and use the correct materials to make my model. • To make a quick paper or card mock-up of my joining technique, test whether it holds together, and improve it before making my final model.		• Explore and use mechanisms (for example, levers, sliders, wheels and axles) in their products.		• To follow procedures for safety and hygiene • To prepare a fruit salad, cutting and peeling fruits • the product fulfils its goals and performs a useful purpose.	

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Evaluate	• To explore the components, features and materials of existing playground equipment and talk about them. • To talk about why playground equipment needs to be safe, durable and looked after, so that it lasts a long time and does not need replacing. • To explain how my product works. • To say what is effective about my product and what could be better. (likes and dislikes)	• To explain how my product works. • To say what is effective about my product and what could be better.	• To say what is effective about my product and what could be better. (likes and dislikes)
Technical Knowledge	• To explore how to make my model stronger and more stable	• An axle is a rod or spindle that passes through the centre of a wheel to connect two wheels.	• To know that all food comes from plants and animals • To know that some fruits are grown in hot countries (Link back to Handa's Surprise Reception) • To know that everyone should eat at least 5 portions of fruit and vegetables a day
Year 2	**Sliders and Leaders**	**Chop, Slice, Tear** **(Healthy Sandwiches)** **Beach Hut**	**Bag Tag** *Designer: Cath Kidson (modern/vintage style)*
Design	• To design a greetings card or picture which incorporates a slider or lever mechanism I	To design a healthy sandwich IL	• Explore and evaluate a range of existing products. • Compare different or the same products from the same or different brands. • Design a purposeful bag tag
Make	• To make a greetings card or picture using a slider or lever	• Select from a range of tools and explain the choices • To follow procedures for safety and hygiene, and explain why they are important • To prepare a sandwich, using a range of techniques including cutting, peeling and grating	• Use different methods of joining fabrics, including glue and running stitch • Add simple decorative embellishments, such as buttons, prints, sequins and appliqué.
Evaluate	• To evaluate my design MR	• Suggest how their products could be improved MR, IL, T	• Explain how closely their finished products meet their design criteria and say what they could do better in the future.

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Technical Knowledge	• To explore how machines and mechanisms are used every day • To make a slider mechanism and describe how it works • To make a lever mechanism and describe how it works	• To know that food has to be farmed, grown elsewhere or caught MR • To understand that foods have to be prepared using different methods • Understand the importance of good hygiene when handling food	• A sewing pattern is a template of the parts needed to make a garment or product. Pattern pieces are usually made from paper. • Embellishment is a decorative detail or feature added to something to make it more attractive.
Supplementary activity — Christmas cards (sliders and levers) • **Design:** design a Christmas card with a moving part, using simple design criteria (must include a slider or lever; must move a picture). • **Make:** cut card accurately and construct a slider or lever mechanism using paper fasteners and card strips. • **Evaluate:** say what is effective about the moving card and what could be improved, comparing with a partner's. • **Technical Knowledge:** sliders and levers can be used to create movement within a fixed frame; a slider moves through a slot, a lever pivots at a fixed point.			
Year 3	**Slow Cooker Stew** *(Use elements from Cook well, Eat well)*	**Making it Move** *Designer: Professor Deborah Greaves OBE (Ocean engineering-wave energy)*	**Greenhouse** *Designer: Sir Nicholas Paxton/Sir Nicolas Grimshaw (gardener and architect – Crystal Palace)*
Design	• Follow a design criteria to inform a design (appearance, cost, target user) (7) • Identify foods that are produced in different places. (4) • Consider different ways of cooking (oven, slow cookers, grill, frying etc) (6)	• Understand and use mechanical systems in their products (for example, gears, pulleys, cams, levers and linkages). • Plan which materials will be needed for a task and explain why • Design and make a moving prototype of a sea-wave energy converter that can transform the up-and-down movement of ocean waves into a back-and-forth mechanical action.	• Investigate and analyse a range of existing products • Design and draw labelled diagrams • Explain the similarities and difference between the work of two designers. • Create shell or frame structures using diagonal struts to strengthen them. • Use a hot glue gun to join pieces together. • Plan materials and consult the design criteria to inform a design. • Generate, develop, model and communicate ideas through discussion, annotated sketches,

			• To discuss how greenhouses help grow food sustainably, by using natural sunlight and reducing the need for heating.
Make	• Discuss hygiene rules associated with food preparation (8) • Use heat appliances safely (10) • Use a range of peeling, chopping, slicing to create a savoury dish. (9)	• Select from and use a wider range of tools and equipment to perform practical tasks • Assemble, join and combine materials and components with some accuracy to create a toy.	• Make a greenhouse structure out of wood using saws and glue to join and assemble together.
Evaluate	• Suggest improvements to their products and describe how to implement them. (11)	• Suggest improvements to their products and describe how to implement them, beginning to take the views of others into account.	• Suggest improvements to their products and describe how to implement them, beginning to take the views of others into account
Technical Knowledge	• To identify the main food groups (Eat well plate) (1) • Explain the importance of a balanced diet (2) • Describe how key events in design and technology have shaped the world (5) • That food is grown (vegetables) reared (pigs, chicken etc) caught (fish) (3)	• Know that different shaped cams produce different patterns of movement in the follower. • Know what an axle is and why it is used (Axles are shafts on which wheels can rotate to make a moving vehicle.) • Know that cams are devices that can convert circular motion into up-and-down motion. • Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future	• Know that specific tools can be used for cutting, such as saws. • Know that diagonal struts create triangular shapes within a frame structure. Adding diagonal struts adds strength and stability. • Discover that materials, such as glass and plastic are suitable for making greenhouse roofs and walls because they are transparent, waterproof and hardwearing.
Year 4	**Fresh Food, Good Food** ***(Healthy Snacks)***	**Tomb Builders**	***Coin Purses*** *Designer: Sir Jonathan Ive – clean, basic and minimal packaging that is both*

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		Designer: Imhotep — ancient Egyptian polymath and architect of the Step Pyramid of Djoser, the world's first known monumental stone building	*aesthetically and functional for container design*
Design	• Design a healthy packaged snack • Plan ingredients and understand that they will have different tastes. • Select the correct material or component for packaging • Evaluate the strength of pre-existing packaging	• Design their own machines to help Ancient Egyptians to move heavy stone blocks.	• Investigate and analyse a range of existing products (fabrics) • Create a realistic design idea focusing on the needs of the user and the design brief • Plan and order the stages of making.
Make	• Discuss hygiene rules associated with food preparation • Make a healthy snack and the packaging • Use a range of techniques such as peel, chop, slice, mash, grate. • Choose from a range of materials, showing an understanding of their different characteristics.	• Choose from a range of materials, showing an understanding of their different characteristics.	• Hand-sew a seam using a running stitch. • Select, name and use tools with adult supervision. • Use a range of stitches (running stitch & back stitch) to join fabric • Add detail and texture to fabric using embellishments • Select from and use a wider range of tools and equipment to perform practical tasks (for example, cutting, shaping, joining and finishing), accurately
Evaluate	• Evaluate their own snacks based upon appearance, texture and consumer use. • Evaluate their own packaging against the design criteria and act on feedback from others.	• Identify what has worked well and what aspects of their products could be improved, acting on their own suggestions and those of others when making improvements.	• Identify what has worked well and what aspects of their products could be improved, acting on their own suggestions and those of others when making improvements.

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Technical Knowledge	• Explain how and why a significant designer or inventor shaped the world • Know that decay can be prevented or delayed by preservation methods, such as drying, salting, pickling, canning, pasteurising, refrigerating or freezing the food. • Investigate features and properties of food packaging (Know that food packaging also provides nutritional information about the food inside, 'use by' and 'best before' dates, and the materials and recyclability of the packaging.)	• Understand how mechanisms can be used to add functionality to a model. (pulleys) • Understand and use mechanical systems in their products (for example, gears, pulleys, cams, levers and linkages). • To learn how the ancient Egyptian architect Imhotep solved the problem of building upwards in stone rather than mud-brick, and how this compares to the machines pupils design to move stone blocks. • Know that the characteristics of materials, such as rigidity, strength and smoothness will affect the success of a working model. • Investigate current machines and how they have been made/designed and how well they work.	• Embroidery, back stitch, over stitch. • Fabrics can be natural or synthetic. Natural fabrics include cotton, silk and wool. Synthetic fabrics include Lycra, polyester and nylon. • Know that a single fabric shape can be used to make 3D products.
Year 5 **(Christmas card with electrical/programmable component)**	**Moving Mechanisms**	**Eat the Seasons** **(Soup)**	**Engineer** *Designer: Isambard Kingdom Brunel (Clifton Suspension)*
Design	• design a prototype for an object, furniture or gadget that uses pneumatics to make life easier or more comfortable around the home. • Critique, evaluate and test their ideas and products and the work of others. • Test a product against the design criteria to highlight anything that needs improvement or redesign. • Know that changes are often made to a design during manufacture.	• Design a recipe, including ingredients and method, using seasonal ingredients. • Include health and safety advice on their design brief.	• Research design features of bridges (suspension, arch, truss and beam) *Split class so that ¼ researches each bridge type then presents findings to class.* • Research and present a detailed account of the significance of an engineer - Isambard Kingdom Brunel (Cross curricular link) • Develop explicit design criteria and design a functional prototype bridge

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Make	• Use a pneumatic mechanical system in a product design • Understand and use mechanical systems in their products (for example, gears, pulleys, cams, levers and linkages). • Apply their understanding of how to strengthen, stiffen and reinforce more complex structures • Build a framework using a range of materials to support mechanisms	• Discuss hygiene rules associated with food preparation • Use an increasing range of preparation and cooking techniques to cook a savoury dish. Dicing, Peeling, grating, boiling, steaming. • Adjust the taste of their recipe as they are cooking – adding any changes to their recipes. • Use boiling/hand blending and other heat sources to create soup.	• Build a stable structure, selecting appropriate materials for the task
Evaluate	• Test and evaluate products against a detailed design specification and make adaptations as they develop the product. • Survey users in a range of focus groups and compare result	• Evaluate meals and consider if they contribute towards a balanced diet. • Taste each other's recipes and offer feedback. • Make any amendments to recipes.	• Critically test and evaluate against the design criteria • Make modifications to a product following evaluation
Technical Knowledge	• Investigate and explain how pneumatic systems work (Pneumatic systems use energy that is stored in compressed air to do work, such as inflating a balloon to open a model monster's mouth. These effects can be achieved using syringes and plastic tubing.) • Experiment with various methods to support a framework. (These include cross braces, guy ropes and diagonal struts. Frameworks can be built using lolly sticks, skewers and bamboo canes.)	• Describe what seasonality means and explain some of the reasons why it is beneficial. • Know that food is grown in the UK, Europe and the Wider world • Work out the nutritional value of their soup.	• Understand how to strengthen, stiffen and reinforce materials

Supplementary activity — Christmas card with a programmable light (electrical systems)

- **Design:** design a Christmas card that includes a controlled light, using design criteria (e.g. the light must switch on and off; must be triggered by an action).
- **Make:** build a simple circuit with a battery, LED and switch; where using a simple programmable controller, write and test a short program to control when the light activates.
- **Evaluate:** test whether the circuit/program works as intended, debug it if it does not, and explain how the control could be adapted for another purpose.
- **Technical Knowledge:** a switch opens and closes a circuit to control current flow; a programmable controller can be given instructions (code) to control an output such as a light — an introduction to programmable/electrical control ahead of Year 6.

Year 6	Food For Life	* Fairground	Make Do and Mend

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	(Wholemeal bread to compare with processed) ***(Own choice of a healthy meal)***	*Designer: John Wardley (theme park rides: Nemesis, Oblivion)*	***The children will design, make and evaluate a bag (upcycle / make-do and mend.)*** *Designer: William Morris (father of the Arts and Crafts movement)*
Design	• Design a healthy 2-course meal using mostly whole foods in comparison to processed foods.	• Look at a range of existing fairground rides and investigate how they move. • Investigate electrical motors to create a rotating part / creating circuits and programming motors. • Create prototype models to investigate stable frameworks • To design a fairground ride with a rotating part.	• Investigate and analyse a range of existing products and explain how upcycled products reduce waste. • Analyse how an invention or product has significantly changed or improved people's lives (sewing machine) & use hand stitches • Explore types of fastenings (include zips, press studs, Velcro and buttons.) • Design a bag to meet a set criteria

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Make	• Discuss hygiene rules associated with food preparation • Make homemade bread using range of techniques such as kneading and baking. • Follow their own recipe that requires a variety of techniques	• Use prototype learning to make fairground ride	• Pin and tack fabrics in preparation for sewing including hem • Know that pinning with dressmaker pins and tacking with quick, temporary stitches holds fabric together in preparation for and during sewing. • Use a sewing machine (building on from Y4 – just hand sewing) Hand sew applique as decoration • Test & evaluate (design, function and sustainability)
Evaluate	• Critically evaluate the design, manufacture and fitness of their products. • Consider views of others and how these ideas will improve their work.	• Critically test and evaluate against the design criteria • Make modifications to a product following evaluation	• Create a detailed comparative report about two or more products or inventions. • Products and inventions can be compared using a range of criteria, such as the impact on society, ease of use, appearance and value for money.
Technical Knowledge	• Understand and apply the principles of a healthy and varied diet. • Know that a processed food is changed during preparation and includes processes, such as cooking, freezing, pasteurising, or the addition of ingredients.	**Mechanical knowledge:** • Rotational to Linear Motion: Understanding that a motor spins in a circle (rotational), but can be used to pull a roller coaster car up a hill in a straight line (linear). • Pulleys and Belts: How to use a rubber band (belt) connecting two wheels (pulleys) to transfer spin from the motor to the ride (e.g., making a Ferris wheel turn). • Gears and Speed: * Connecting a small gear on a motor to a large gear on the ride will make the ride spin slower but with more strength (torque). • Connecting a large gear to a small gear makes it spin faster but with less strength. • Drive Shafts and Axles: The central rod that a wheel or ride rotates around. **Electrical circuits:**	• It is important to understand the characteristics of different materials to select the most appropriate material for a purpose. This might include flexibility, waterproofing, texture, colour, cost and availability. • Pinning with dressmaker pins and tacking with quick, temporary stitches holds fabric together in preparation for and during sewing. • Fastenings hold a piece of clothing together. Types of fastenings include zips, press studs, Velcro and buttons.

		• Complete Circuits: Knowing that electricity must flow in an unbroken loop from the positive terminal of the power source, through the motor/switch, and back to the negative terminal. • Components & Symbols: Identifying cells (batteries), wires, motors, switches, and LEDs. • Short Circuits: Understanding that wires shouldn't connect directly from positive to negative without a component (like a motor) in between, as this drains the battery and causes heat. **Structural knowledge:** • Triangulation: Square and rectangular frames easily wobble and collapse (parallel deformation). Adding a diagonal beam to form triangles makes a structure incredibly rigid and stable. • Centre of Mass & Base Size: A top-heavy ride (like a tall drop tower or a high Ferris wheel) will topple over easily. Students need to know that a wide, heavy base lowers the centre of mass and keeps the ride stable. • Reinforcing Joints: Techniques for strengthening connections, such as using cardboard "gussets" (triangular corners) to reinforce right-angled joins.	