

Project Title: Design, make and evaluate a moving toy for a younger child to play with.

Length of unit – 2 afternoon sessions and 1 deep learning day

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	• Experience of axles, axle holders and wheels that are fixed or free moving. • Know that there are different types of movement. • Experience of cutting and joining techniques with a range of materials including card, plastic and wood. • Know how to strengthen and stiffen structures.	• CAMs • rotary • oscillating • reciprocating • input • process • output • centre • off centre • follower • axle • shaft • crank • handle • housing • framework	• Discuss different types of movement: rotary, oscillating and reciprocating. • Explore a variety of toys which use CAMs to make the various types of movement. Use videos, photographs and computer animations of products that cannot be explored through first-hand experience • Use observational drawings and questions to develop understanding of the products in the handling collection and those that children have researched 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 movement, process and output movement 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? • Give children pre-cut cams made from MDF or wooden wheels to mount on a piece of board and observe their movement with a follower. Consider the CAMs, how do they move? Is the hole centre or off centre? What is the input/output movement? • Develop measuring, marking, cutting, shaping and joining skills using junior hacksaws, G-clamps, bench hooks, square section wood, card triangles and hand drills to make cam mechanisms and construct wooden frames or card housings, as appropriate. Demonstrate the accurate and safe use of tools and equipment. • Make simple models of different types of cams or have toys in which the cam mechanisms can be seen.
Learning in this unit	To know that <u>Technical knowledge</u> • Mechanical systems have an input, process and an output. • Cams can be used to produce different types of movement and change the direction of movement. To know how to <u>Designing</u> • Generate and develop innovative ideas through research and discussion with peers and adults to develop a design brief and criteria for a design specification. • Develop a simple design specification to guide the development of their ideas and products, taking account of constraints including time, resources and cost. • Develop, model and communicate ideas through talking, drawing, templates, mock-ups and prototypes, choosing an appropriate model for the task. <u>Making</u> • Write a step-by-step plan or recipe to guide making, listing tools, equipment, materials and components, and, if appropriate, allocate tasks within a team. • Competently 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. <u>Evaluating</u> • Continually evaluate and modify the working features of the product to match the initial design specification. • Test products with the intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose, recording evaluations using star diagrams.		• Develop an authentic and meaningful design brief with the children. • Children generate innovative ideas by carrying out research including surveys, interviews and questionnaires and develop a design specification for their product, carefully considering the purpose and intended user for their product. • Communicate ideas through detailed, annotated sketches from different views and/or exploded diagrams. The drawings should indicate the design decisions made, including the location of the components, how they work as a system and the appearance and finishing techniques for the product. • Produce detailed step-by-step plans and lists of tools, equipment and materials needed. If appropriate, allocate tasks within a team. • Make a high-quality toy with CAMs applying knowledge, understanding and skills from earlier sessions. • Children should consider the movement and evaluate as they make to ensure they follow the plan • Children should use a range of decorative finishing techniques to ensure a well finished final product that matches the intended user and purpose. • Evaluate throughout and the final product in use, comparing it to the original design specification. Critically evaluate the quality of the design, the manufacture, functionality, innovation shown and fitness for the intended user and purpose. Record evaluations using a star diagram.
Resources	• videos and photographs of cams, models or toys with different cam mechanisms • MDF, card or wooden wheels, plastic or wooden cams, dowel, card boxes, PVA glue, masking tape, double-sided tape, square section wood, card, corrugated plastic, finishing media • junior hacksaws, glass paper, G-clamps, bench hooks, hand drill		

Project Title: Design, make and evaluate soup for their household to enjoy as part of a family meal.

Length of unit – 2 afternoon sessions and 1 deep learning day

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	• Know about food hygiene, nutrition, healthy eating and a varied diet. • Know how to use appropriate equipment and utensils, and apply a range of techniques for measuring out, preparing and combining ingredients.	• Ingredients • Spice • herbs • nutrition • healthy • allergy • intolerance • seasonality	• Learn about Campbell's soup company and Raymond Blanc. • Learn how to use a seasonal calendar correctly to find out when different fruit and vegetables are at their ripest in the United Kingdom. Demonstrate how to measure out, cut, shape and combine ingredients and how to use appropriate utensils and equipment that the children may use safely and hygienically. Techniques could be practised following a basic recipe to prepare and cook a savoury food product (vegetable tart). • Evaluate existing soups. Discuss the taste and texture of the soups, are they sweet, sour, hot, spicy? Discuss the ingredients used – which ones are more popular in the class? Which ones taste, smell and look the nicest/best appearance? Which are the healthiest? Discuss if the ingredients used are grown, reared or caught. Are the ingredients fresh or processed? • Ask questions about which ingredients could be changed or added in a basic recipe such as spices, herbs etc. Consider texture, taste, appearance and smell. • Briefly discuss any potential allergies/intolerances/dietary requirements in relation to soup e.g. dairy free, non-gluten containing, vegetarian, vegan etc. Consider their audience and if any of these apply and how they can overcome them e.g.. Vegetarian – use of meat alternatives, vegetables or lentils instead. • Carry out research to find out the favourite soups of the targeted audience and use it to inform design choices. • Use correct technical/sensory vocabulary (following sensory evaluations) to describe food ingredients and products. Discussions could include: What ingredients help to make the product spicy/crisp/crunchy etc? What is the impact of added ingredients/finishes/shapes on the finished product?
Learning in this unit	To know that: <u>Technical Knowledge</u> • Key chefs have influenced eating habits to promote varied and healthy diets. • Food products are seasonal and come from different sources. To know how to <u>Technical Knowledge</u> • Use utensils and equipment including heat sources to prepare and cook food <u>Designing</u> • Generate and develop innovative ideas through research and discussion with peers and adults to develop a design brief and criteria for a design specification. • Develop a simple design specification to guide the development of their ideas and products, taking account of constraints including time, resources and cost. • Develop, model and communicate ideas through talking, drawing, templates, mock-ups and prototypes, choosing an appropriate model for the task. <u>Making</u> • Write a step-by-step plan or recipe to guide making, listing tools, equipment, materials and components, and, if appropriate, allocate tasks within a team. • Competently 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. <u>Evaluating</u> • Continually evaluate and modify the working features of the product to match the initial design specification. • Test products with the intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose, recording evaluations using star diagrams.	• Through research and discussion with peers and adults develop a design criterion, considering: Who is the intended recipient? What is the purpose of the food item? What ingredients will you use (are they in season?)? What techniques will be used? • Link to work on North America (geography). Pose the problem that the soup they design should have a North American feel to it to appeal to a guest that is visiting this country – chowder, gumbo, etc. • Explore a range of initial ideas and make design decisions to develop a final product linked to user and purpose. • Use annotated sketches to communicate ideas of how their savoury dish will look. Consider ingredients, amounts, length of time to cook, equipment and utensils. • Select and use appropriate utensils and equipment accurately to measure and combine appropriate ingredients. • Make, decorate and present the food product appropriately for the intended user and purpose identified in the design criteria. • Evaluate the final product with reference back to the design criteria, taking into account the views of others when identifying improvements. Consider: How is the savoury dish suited to the different cultures/seasons? What are the areas of strength and improvement?	

Resources	• range of relevant examples of foods to taste and evaluate • basic recipes • suitable equipment and utensils to make and cook recipes such as: weighing scales, measuring jugs, bowls, spoons – various sizes, baking trays, parchment paper, plastic film		
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Medium Term Plan – DT – Year 6 Summer: **Electrical Systems – More Complex Switches; Programming and Control**

Project Title: Design, make and evaluate an alarm system prototype for a community member to provide security and warning.

Length of unit – 2 afternoon sessions and 1 deep learning day

	Disciplinary and Substantive Knowledge	Vocabulary	Learning Sequence
Pre-learning	• Know how to use computer control software and an interface box, a standalone box or microcontroller, e.g. Crumble. • Some experience of writing and modifying a program to make a light turn on or flash on and off. • Know the essential characteristics of a series circuit and experience of creating a battery-powered, functional, electrical product.	• series circuit • parallel circuit • input device • output device • system • monitor • control • program • crumble • light dependent resistors (LDRs) • push-to-make switches • push-to-break switches, • toggle switches, • micro switches • reed switches.	• Discuss a range of relevant products (such as nightlights, garden lights, alarm systems, security lighting, electronic moneyboxes) that respond to changes in the environment using a computer control program e.g. <i>Why is a computer control program used to operate the products? What are the advantages of using computer control? What input devices, e.g. switches, and output devices, e.g. bulbs and buzzers, have been used? Who have the products been designed for and for what purpose?</i> • Investigate sensors such as light dependent resistors (LDRs) and a range of switches such as push-to-make, push-to-break, toggle, micro and reed switches. To gain an understanding of how they are operated by the user and how they work, ask the children to use each component to control a bulb in a simple circuit. Remind children about the dangers of mains electricity. • Children could research famous inventors related to the project e.g. Thomas Edison – light bulb. • Through teacher demonstration and explanation, recap measuring, marking out, cutting and joining skills with construction materials that children will need to create their electrical products. • Using a model circuit, demonstrate and enable children to practise using different input and output devices. Allow them to practise methods for making secure electrical connections e.g. using wire strippers, twist and tape connections, screw connections, crocodile clips and connecting blocks. • Demonstrate and enable children to practise methods for making secure electrical connections e.g. using automatic wire strippers, twist and tape electrical connections, screw connections and connecting blocks. • Drawing on science understanding, ask the children to 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. • Drawing on related computing activities, ensure that children can write and modify computer control programs that include inputs, outputs and decision making. Test out the programs using electrical components connected to microcontrollers, interface boxes or standalone boxes. • Remind children how to avoid making short circuits.
Learning in this unit	To know <u>Technical Knowledge</u> • Famous inventors who developed ground-breaking electrical systems and components. To know how to <u>Technical Knowledge</u> • Use electrical systems in products. • Use computer control systems in products. <u>Designing</u> • Generate and develop innovative ideas through research and discussion with peers and adults to develop a design brief and criteria for a design specification. • Develop a simple design specification to guide the development of their ideas and products, taking account of constraints including time, resources and cost. • Develop, model and communicate ideas through talking, drawing, templates, mock-ups and prototypes, choosing an appropriate model for the task. <u>Making</u> • Write a step-by-step plan or recipe to guide making, listing tools, equipment, materials and components, and, if appropriate, allocate tasks within a team. • Competently 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.		• Develop an authentic and meaningful design brief with the children. • Ask 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. • Communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams, including the microcontroller, interface box or standalone box to be used. Drawings should indicate the design decisions made, including the

	<u>Evaluating</u> Continually evaluate and modify the working features of the product to match the initial design specification. Test products with the intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose, recording evaluations using star diagrams.		location of the electrical components and how they work as a system with an input, process and output. Reference should be made to the control program used and how it will operate to control the inputs and outputs. Produce detailed step-by-step plans and lists of tools, equipment and materials needed. If appropriate, allocate tasks within a team.
Resources	- batteries, crocodile leads, bulbs, bulb holders, buzzers, light emitting diodes (LEDs), micro switches, reed switches and magnets, light dependent resistors (LDRs), wire, masking tape, construction materials and tools as required - microcontroller or standalone control box or interface box - collection of battery-powered, manually controlled and programmable products		- Make high quality products, applying knowledge, understanding and skills. Create and modify a computer control program to enable the product to work automatically in response to changes in the environment - Critically evaluate throughout and the final product, comparing it to the original design specification. Test the system to demonstrate its effectiveness for the intended user and purpose. Record evaluations using star diagrams.