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|  | **Mechanisms** | **Structures** | **Food** | **Textiles** |
| KS1 | **Skills** |
| **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.• 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.**Milestones**• Design products that have a clear purpose and an intended user.• Make products, refining the design as work progresses.• Use software to design. | **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.• 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.**Milestones**• Design products that have a clear purpose and an intended user.• Make products, refining the design as work progresses.• Use software to design. | **Designing**• Design appealing products for a particular user based on simple design criteria.• Generate initial ideas and design criteria through investigating a variety of fruit and vegetables.• Communicate these ideas through talk and drawings.**Making**• Use simple utensils and equipment to e.g. peel, cut, slice, squeeze, grate and chop safely.• Select from a range of fruit and vegetables according to their characteristics e.g. colour, texture and taste to create a chosen product.**Evaluating**• Taste and evaluate a range of fruit and vegetables to determine the intended user’s preferences.• Evaluate ideas and finished products against design criteria, including intended user and purpose.**Milestones**• Design products that have a clear purpose and an intended user.• Make products, refining the design as work progresses.• Use software to design. | **Designing**• Design a functional and appealing product for a chosen user and purpose based on simple design criteria.• Generate, develop, model and communicate their ideas as appropriate through talking, drawing, templates, mock-ups and information and communication technology.**Making**• Select from and use a range of tools and equipment to perform practical tasks such as marking out, cutting, joining and finishing.• Select from and use textiles according to their characteristics.**Evaluating**• Explore and evaluate a range of existing textile products relevant to the project being undertaken.• Evaluate their ideas throughout and their final products against original design criteria.**Milestones**• Design products that have a clear purpose and an intended user.• Make products, refining the design as work progresses.• Use software to design. |
| **Technical knowledge****and understanding**  |  |  |  |
| **(Levers and Sliders)**• Explore and use sliders and levers.• Understand that different mechanisms produce different types of movement.• Know and use technical vocabulary relevant to the project.**(Wheels and Axles)**• Explore and use wheels, axles and axle holders.• Distinguish between fixed and freely moving axles.• Know and use technical vocabulary relevant to the project.Milestones • Create products using levers, wheels and winding mechanisms.• Cut materials safely using tools provided.• Measure and mark out to the nearest centimetre.• Demonstrate a range of cutting and shaping techniques (such as tearing, cutting, folding and curling).• Demonstrate a range of joining techniques (such as gluing, hinges or combining materials to strengthen). | • Know how to make freestanding structures stronger, stiffer and more stable.• Know and use technical vocabulary relevant to the project.Milestones• Use materials to practise drilling, screwing, gluing and nailing materials to make and strengthen products.• Cut materials safely using tools provided.• Measure and mark out to the nearest centimetre.• Demonstrate a range of cutting and shaping techniques (such as tearing, cutting, folding and curling).• Demonstrate a range of joining techniques (such as gluing, hinges or combining materials to strengthen). | • Understand where a range of fruit and vegetables come from e.g. farmed or grown at home.• Understand and use basic principles of a healthy and varied diet to prepare dishes, including how fruit and vegetables are part of The eatwell plate.• Know and use technical and sensory vocabulary relevant to the project.Milestones• Cut, peel or grate ingredients safely and hygienically.• Measure or weigh using measuring cups or electronic scales.• Assemble or cook ingredients. | • Understand how simple 3-D textile products are made, using a template to create two identical shapes.• Understand how to join fabrics using different techniques e.g. running stitch, glue, over stitch, stapling.• Explore different finishing techniques e.g. using painting, fabric crayons, stitching, sequins, buttons and ribbons.• Know and use technical vocabulary relevant to the project.Milestones• Shape textiles using templates.• Join textiles using running stitch.• Colour and decorate textiles using a number of techniques (such as dyeing, adding sequins or printing). |
| **Vocabulary**  |  |  |  |
| **Sliders and Levers**Mechanism Lever Slider Slot Guide or bridge **Wheels and axles** Axle dowelAxle holder Chassis Friction  | Freestanding structure Frame structure Shell structure Stability Buttress Brick bonding Mock-up  | Fruit Vegetable Nutrients Pith Salad Sensory evaluation Kebab  | Appliqué Design Embroider Evaluate Fray Glove puppet Mock-up Seam Sew Template  |

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|  | **Mechanisms**  | **Structures (CAD)**  | **Food** | **Textiles** | **Electrical Systems**  |
| Lower key stage 2 | **Skills** |  |  |  |  |
| **Designing**• Generate realistic ideas and their own design criteria through discussion, focusing on the needs of the user.• Use annotated sketches and prototypes to develop, model and communicate ideas.**Making**• Order the main stages of making.• Select from and use appropriate tools with some accuracy to cut, shape and join paper and card.• Select from and use finishing techniques suitable for the product they are creating.**Evaluating**• Investigate and analyse books and, where available, other products with lever and linkage mechanisms.• Evaluate their own products and ideas against criteria and user needs, as they design and make.Milestones• Design with purpose by identifying opportunities to design.• Make products by working efficiently (such as by carefully selecting materials).• Refine work and techniques as work progresses, continually evaluating the product design.• Use software to design and represent product designs. | **Designing**• Generate realistic ideas and design criteria collaboratively through discussion, focusing on the needs of the user and the functional and aesthetic purposes of the product.• Develop ideas through the analysis of existing shell structures and use computer-aided design to model and communicate ideas.**Making**• Plan the order of the main stages of making.• Select and use appropriate tools and software to measure, mark out, cut, score, shape and assemble with some accuracy.• Explain their choice of materials according to functional properties and aesthetic qualities.• Use computer-generated finishing techniques suitable for the product they are creating.**Evaluating**• Investigate and evaluate a range of shell structures including the materials, components and techniques that have been used.• Test and evaluate their own products against design criteria and the intended user and purpose.Milestones• Design with purpose by identifying opportunities to design.• Make products by working efficiently (such as by carefully selecting materials).• Refine work and techniques as work progresses, continually evaluating the product design.• Use software to design and represent product designs.. | **Designing**• Generate and clarify ideas through discussion with peers and adults to develop design criteria including appearance, taste, texture and aroma for an appealing product for a particular user and purpose.• Use annotated sketches and appropriate information and communication technology, such as web-based recipes, to develop and communicate ideas.**Making**• Plan the main stages of a recipe, listing ingredients, utensils and equipment.• Select and use appropriate utensils and equipment to prepare and combine ingredients.• Select from a range of ingredients to make appropriate food products, thinking about sensory characteristics.**Evaluating**• Carry out sensory evaluations of a variety of ingredients and products. Record the evaluations using e.g. tables and simple graphs.• Evaluate the ongoing work and the final product with reference to the design criteria and the views of others.Milestones• Design with purpose by identifying opportunities to design.• Make products by working efficiently (such as by carefully selecting materials).• Refine work and techniques as work progresses, continually evaluating the product design.• Use software to design and represent product designs. | **Designing**• Generate realistic ideas through discussion and design criteria for an appealing, functional product fit for purpose and specific user/s.• Produce annotated sketches, prototypes, final product sketches and pattern pieces.**Making**• Plan the main stages of making.• Select and use a range of appropriate tools with some accuracy e.g. cutting, joining and finishing.• Select fabrics and fastenings according to their functional characteristics e.g. strength, and aesthetic qualities e.g. pattern.**Evaluating**• Investigate a range of 3-D textile products relevant to the project.• Test their product against the original design criteria and with the intended user.• Take into account others’ views.• Understand how a key event/individual has influenced the development of the chosen product and/or fabric.Milestones• Design with purpose by identifying opportunities to design.• Make products by working efficiently (such as by carefully selecting materials).• Refine work and techniques as work progresses, continually evaluating the product design.• Use software to design and represent product designs. | **Designing**• Gather information about needs and wants, and develop design criteria to inform the design of products that are fit for purpose, aimed at particular individuals or groups.• Generate, develop, model and communicate realistic ideas through discussion and, as appropriate, annotated sketches, cross-sectional and exploded diagrams.**Making (Simple Circuits & Switches)** • Order the main stages of making.• Select from and use tools and equipment to cut, shape, join and finish with some accuracy.• Select from and use materials and components, including construction materials and electrical components according to their functional properties and aesthetic qualities.**Making (programming and control**• Order the main stages of making.• Select from and use tools and equipment to cut, shape, join and finish with some accuracy.• Connect simple electrical components and a battery in a series circuit to achieve a functional outcome.• Program a standalone control box, microcontroller or interface box to enhance the way the product works.**Evaluating**• Investigate and analyse a range of existing battery-powered products.• Evaluate their ideas and products against their own design criteria and identify the strengths and areas for improvement in their work.Milestones• Design with purpose by identifying opportunities to design.• Make products by working efficiently (such as by carefully selecting materials).• Refine work and techniques as work progresses, continually evaluating the product design.• Use software to design and represent product designs. |
| **Technical knowledge****and understanding**  |  |  |  |  |
| **Levers and Linkages**• Understand and use lever and linkage mechanisms.• Distinguish between fixed and loose pivots.• Know and use technical vocabulary relevant to the project**Pneumatics**Understand and use pneumatic mechanisms.• Know and use technical vocabulary relevant to the project.Milestones• Use scientific knowledge of the transference of forces to choose appropriate mechanisms for a product (such as levers, winding mechanisms, pulleys and gears). | • Develop and use knowledge of nets of cubes and cuboids and, where appropriate, more complex 3D shapes.• Develop and use knowledge of how to construct strong, stiff shell structures.• Know and use technical vocabulary relevant to the project.Milestones• Choose suitable techniques to construct products or to repair items.• Strengthen materials using suitable techniques.Cut materials accurately and safely by selecting appropriate tools.• Measure and mark out to the nearest millimetre.• Apply appropriate cutting and shaping techniques that include cuts within the perimeter of the material (such as slots or cut outs).• Select appropriate joining techniques.• Use software to design and represent product designs. | • Know how to use appropriate equipment and utensils to prepare and combine food.• Know about a range of fresh and processed ingredients appropriate for their product, and whether they are grown, reared or caught.• Know and use relevant technical and sensory vocabulary appropriatelyMilestones• Prepare ingredients hygienically using appropriate utensils.• Measure ingredients to the nearest gram accurately.• Follow a recipe.• Assemble or cook ingredients (controlling the temperature of the oven or hob, if cooking). | • Know how to strengthen, stiffen and reinforce existing fabrics.• Understand how to securely join two pieces of fabric together.• Understand the need for patterns and seam allowances.• Know and use technical vocabulary relevant to the project.Milestones• Understand the need for a seam allowance.• Join textiles with appropriate stitching.• Select the most appropriate techniques to decorate textiles. | **Simple circuits and switches** Understand and use electrical systems in their products, such as series circuits incorporating switches, bulbs and buzzers.• Apply their understanding of computing to program and control their products.• Know and use technical vocabulary relevant to the project.**Programming and Control**Understand and use computing to program and control products containing electrical systems, such as series circuits incorporating switches, bulbs and buzzers.• Know and use technical vocabulary relevant to the project.Milestones• Control and monitor models using software designed for this purpose.• Create series and parallel circuits |
| **Vocabulary**  |  |  |  |  |
| **Levers and Linkages**Mechanism Lever Linkage SlotGuide or bridge Loose pivot Fixed pivot System **Pneumatics** CompressedInput Output Pivot LeverPneumatic Hydraulic PressureInflate Deflate Syringe System  | **CAD – computer-aided design.**Shell structure Edge Face Vertex Font Net Cuboid Prism  | Appearance Texture Sensory evaluation – Preference testStrawberry huller Processed food  | Appliqué Pattern/Template Seam Seam Allowance Prototype Aesthetics  | **Simple circuits and switches**Circuit Conductor Insulator Prototype Push-to-break switch Push-to-make switch Reed switch Toggle switch System Output devices Input devices **Programming and Control** Program Microcontroller Light emitting diode (LED) System Output devices Input devices Process |

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|  | **Mechanical systems** | *Framed* **Structures**  | **Food** | **Textiles (CAD)** | **Electrical Systems**  |
| Upper key stage 2 | **Skills** |  |  |  |  |
| **Designing**• Generate innovative ideas by carrying out research using surveys, interviews, questionnaires and web-based resources.• Develop a simple design specification to guide their thinking.• Develop and communicate ideas through discussion, annotated drawings, exploded drawings and drawings from different views.**Making**• Produce detailed lists of tools, equipment and materials. Formulate step-by-step plans and, if appropriate, allocate tasks within a team.• 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 engineeringcompanies relevant to the project.Technical knowledge and understandingMilestones• Design with the user in mind, motivated by the service a product will offer (rather than simply for profit).• Make products through stages of prototypes, making continual refinements.• Ensure products have a high quality finish, using art skills where appropriate.• Use prototypes, cross-sectional diagrams and computer aided designs to represent designs. | **Designing**• Carry out research into user needs and existing products, using surveys, interviews, questionnaires and web-based resources.• Develop a simple design specification to guide the development of their ideas and products, taking account of constraints including time, resources and cost.• Generate, develop and model innovative ideas, through discussion, prototypes and annotated sketches.**Making**• Formulate a clear plan, including a step-by-step list of what needs to be done and lists of resources to be used.• Competently select from and use appropriate tools to accurately measure, mark out, cut, shape and join construction materials to make frameworks.• Use finishing and decorative techniques suitable for the product they are designing and making.**Evaluating**• Investigate and evaluate a range of existing frame structures.• Critically evaluate their products against their design specification, intended user and purpose, identifying strengths and areas for development, and carrying out appropriate tests.• Research key events and individuals relevant to frame structures.Milestones• Design with the user in mind, motivated by the service a product will offer (rather than simply for profit).• Make products through stages of prototypes, making continual refinements.• Ensure products have a high quality finish, using art skills where appropriate.• Use prototypes, cross-sectional diagrams and computer aided designs to represent designs. | **Designing**• Generate innovative ideas through research and discussion with peers and adults to develop a design brief and criteria for a design specification.• Explore a range of initial ideas, and make design decisions to develop a final product linked to user and purpose.• Use words, annotated sketches and information and communication technology as appropriate to develop and communicate ideas.**Making**• Write a step-by-step recipe, including a list of ingredients, 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.**Evaluating**• Carry out sensory evaluations of a range of relevant products and ingredients. Record the evaluations using e.g. tables/graphs/charts such as star diagrams.• Evaluate the final product with reference back to the design brief and design specification, taking into account the views of others when identifying improvements.• Understand how key chefs have influenced eating habits to promote varied and healthy diets.Milestones• Design with the user in mind, motivated by the service a product will offer (rather than simply for profit).• Make products through stages of prototypes, making continual refinements.• Ensure products have a high quality finish, using art skills where appropriate.• Use prototypes, cross-sectional diagrams and computer aided designs to represent designs. | **Designing**• Generate innovative ideas through research including surveys, interviews and questionnaires.• Develop, model and communicate ideas through talking, drawing, templates, mock-ups and prototypes including using computer-aided design.• Design purposeful, functional, appealing products for the intended user that are fit for purpose based on a simple design specification.**Making**• Produce detailed lists of equipment and fabrics relevant to their tasks.• Formulate step-by-step plans and, if appropriate, allocate tasks within a team.• Select from and use a range of tools and equipment, including CAD, to make products that are accurately assembled and well finished. Work within the constraints of time, resources and cost.**Evaluating**• Investigate and analyse textile products linked to their final product.• Compare the final product to the original design specification.• Test products with intended user, where safe and practical, and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose.• Consider the views of others to improve their work.Milestones• Design with the user in mind, motivated by the service a product will offer (rather than simply for profit).• Make products through stages of prototypes, making continual refinements.• Ensure products have a high quality finish, using art skills where appropriate.• Use prototypes, cross-sectional diagrams and computer aided designs to represent designs.  | **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 Circuits and switches**• Formulate a step-by-step plan to guide making, listing tools, equipment, materials and components.• Competently select and accurately assemble materials, and securely connect 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.**Making (Monitoring and Control)**• Formulate a step-by-step plan to guide making, listing tools, equipment, materials and components.• Competently select and accurately assemble materials, and securely connect electrical components to produce a reliable, functional product.• Create and modify a computer control program to enable their electrical product to res**Evaluating**• Continually evaluate and modify the working features of the product to match the initial design specification.• Test the system to demonstrate itseffectiveness for the intended user and purpose.• Investigate famous inventors who developed ground-breaking electrical systems and components.Milestones• Design with the user in mind, motivated by the service a product will offer (rather than simply for profit).• Make products through stages of prototypes, making continual refinements.• Ensure products have a high quality finish, using art skills where appropriate.• Use prototypes, cross-sectional diagrams and computer aided designs to represent designs. |
| **Technical knowledge****and understanding** **(Mechanical Systems)** | *Framed* **Structures**  | **Food** | **Textiles (CAD)** | **Electrical Systems**  |
| **Pulleys and Gears**• 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.**Cams**• Understand that mechanical systems have an input, process and an output.• Understand how cams can be used to produce different types of movement and change the direction of movement.• Know and use technical vocabulary relevant to the project.Milestones• Convert rotary motion to linear using cams.• Use innovative combinations of electronics (or computing) and mechanics in product designs.• Use scientific knowledge of the transference of forces to choose appropriate mechanisms for a product (such as levers, winding mechanisms, pulleys and gears).• Develop a range of practical skills to create products (such as cutting, drilling and screwing, nailing, gluing, filing and sanding). | • Understand how to strengthen, stiffen and reinforce 3-D frameworks.• Know and use technical vocabulary relevant to the projectMilestones• Cut materials with precision and refine the finish with appropriate tools (such as sanding wood after cutting or a more precise scissor cut after roughly cutting out a shape).• Show an understanding of the qualities of materials to choose appropriate tools to cut and shape (such as the nature of fabric may require sharper scissors than would be used to cut paper).• Develop a range of practical skills to create products (such as cutting, drilling and screwing, nailing, gluing, filing and sanding). | • Know how to use utensils and equipment including heat sources to prepare and cook food.• Understand about seasonality in relation to food products and the source of different food products.• Know and use relevant technical and sensory vocabulary.Milestones• Understand the importance of correct storage and handling of ingredients (using knowledge of micro-organisms).• Measure accurately and calculate ratios of ingredients to scale up or down from a recipe.• Demonstrate a range of baking and cooking techniques.• Create and refine recipes, including ingredients, methods, cooking times and temperatures. | A 3-D textile product can be made from a combination of accurately made pattern pieces, fabric shapes and different fabrics.• Fabrics can be strengthened, stiffened and reinforced where appropriate.Milestones• Create objects (such as a cushion) that employ a seam allowance.• Join textiles with a combination of stitching techniques (such as back stitch for seams and running stitch to attach decoration). • Use the qualities of materials to create suitable visual and tactile effects in the decoration of textiles (such as a soft decoration for comfort on a cushion). | **Circuits and switches** • 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.**Monitoring and Control**Understand and use electrical systems in their products.• Understand the use of computer control systems in products.• Apply their understanding of computing to program, monitor and control their products.• Know and use technical vocabulary relevant to the project.Milestones• Create circuits using electronics kits that employ a number of components (such as LEDs, resistors, transistors and chips).• Write code to control and monitor models or products. |
| **Vocabulary** (Mechanical Systems) | *Framed* **Structures**  | **Food** | **Textiles (CAD)** | **Electrical Systems**  |
| **Pulleys and Gears**Pulley Gear Drive belt Gearing up or down Mechanical system Driver Follower Mesh Motor spindle **Cams**Rotary motionOscillating motionReciprocating motion Cam Follower Lever Slider Guide Spacer  | Modelling CompressionStrut Tension Tie Diagonal Horizontal Vertical Triangulation Frame structure  | Finishing Rubbing in Knead Bran Dough Endosperm Germ YeastUnleavened bread  | Mock up Pattern/template Seam allowance Specification Tacking Working drawingCAD CAM  | **Circuits and switches**Modelling Open switch Closed switch Normally open Normally closed Computer control input Output devices Input devices **Monitoring and Control**Program Light emitting diode (LED) System Output devices Input devices Process  |

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| Aspect | **Mechanisms****FS2**  | **Structures** **FS1 & FS2** | **Food****FS1 & FS2** | **Textiles** **FS1**  |
| EYFS | **EYFS SKILLS** **Designing**Design by talking about what they intend to do, are doing and have done. Say who and what their products are for. Draw what they have made, with some children drawing their ideas before they make. **Making**Opportunities to make their own choices and to discuss the reasons for these. Learn procedures for safety and hygiene. Develop practical skills and techniques using a range of materials including food, textiles and construction materials. **Evaluating**Ask questions about a range of existing products. Explore the designed and made world through the indoor and outdoor environment, and through roleplay.  |
| **MECHANISMS** **Levers and Sliders** -Early experiences of working with paper and card to make simple flaps and hinges.-Experience of simple cutting, shaping and joining skills using scissors, glue, paper fasteners and masking tape.**Wheels and Axles** -Assemble vehicles with movingwheels using construction kits.-Explore moving vehicles through play.-Develop some cutting, joining and finishing skills with card.-Learn and using appropriate technical vocabulary.  | **STRUCTURES**Experience of using construction kits to build walls, towers and frameworks.Experience of using of basic tools e.g. scissors or hole punches with construction materials e.g. plastic, card.Experience of different methods of joining card and paper.Learning and using appropriate technical vocabulary.  | **FOOD**Experience of common fruit and vegetables, undertaking sensory activities i.e. appearance taste and smell.Experience of cutting soft fruit and vegetables using appropriate utensils.Learning and using appropriate technical vocabulary.  | **TEXTILES**Explore and used different fabrics.Cut and join fabrics with simple techniques.Think about the user and purpose of products- e.g. hat, gloves, Cinderella’s slipperLearn and using appropriate technical vocabulary.  |
| **Vocabulary**  |  |  |  |
| **Mechanisms** Flaps vehicleHinge. forwardsJoin backwards Wheels  | **Structures**WallsTowersStable Join  | **Food**TasteSmellFeelSoftHard FruitVegetable  | **Textiles**JoinFabricWaterproofWarm Appearance  |