

## Progression in Design Technology

### Intent:

We aim for children to have acquired the essential characteristics of designers/engineers:

- Significant levels of originality and the willingness to take creative risks to produce innovative ideas and prototypes.
- An excellent attitude to learning and independent working.
- The ability to use time efficiently and work constructively and productively with others.
- The ability to carry out thorough research, show initiative and ask questions to develop an exceptionally detailed knowledge of users' needs.
- The ability to act as responsible designers and makers, working ethically, using finite materials carefully and working safely.
- A thorough knowledge of which tools, equipment and materials to use to make their products.
- The ability to apply mathematical knowledge.
- The ability to manage risks exceptionally well to manufacture products safely and hygienically.
- A passion for the subject and knowledge of, up-to-date technological innovations in materials, products and systems.

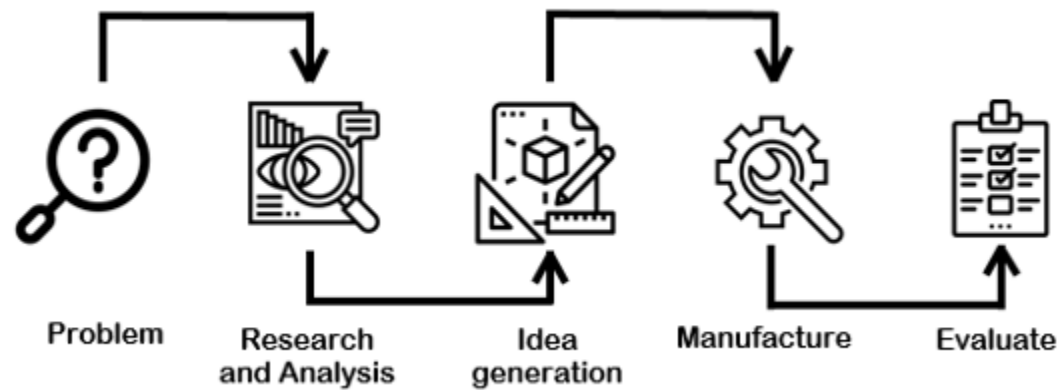
### Implementation:

- 1 Curriculum drivers shape our curriculum breadth in design technology. They are derived from an exploration of the backgrounds of our students, our beliefs about high quality education and our values. They are used to ensure we give our students appropriate and ambitious curriculum opportunities.  
**Our curriculum drivers are community, spirituality, culture, democracy and possibilities.**
- 2 Cultural capital gives our students the vital background knowledge required to be informed and thoughtful members of our community who understand and believe in British values.
- 3 Curriculum breadth is shaped by our curriculum drivers, cultural capital, subject topics and our ambition for students to study the best of what has been thought and said by many generations of academics and scholars.
- 4 Our curriculum distinguishes between subject topics and 'threshold concepts'. Subject topics are the specific aspects of subjects that are studied.
- 5 **Threshold concepts** tie together the subject topics into meaningful schema. The same concepts are explored in a wide breadth of topics. Through this 'forwards-and-backwards engineering' of the curriculum, students return to the same concepts over and over and gradually build understanding of them. In design and technology, these threshold concepts are; **Master practical skills** (Developing the skills needed to make high quality products); **Design, make, evaluate and improve** (thinking and seeing design as a process); **Take inspiration from design throughout history** (Appreciating the design process that has influenced the products we use in everyday life).
- 6 **Knowledge categories:** These categories help students to relate each topic to previously studied topics and to form strong, meaningful schema. In design and technology these knowledge categories include: **Technical Knowledge, Practical Knowledge, Design Inspiration, Design Process**
- 7 Cognitive science tell us that working memory is limited and that cognitive load is too high if students are rushed through content. This limits the acquisition of long-term memory. Cognitive science also tells us that in order for students to become creative thinkers, or have a greater depth of understanding they must first master the basics, which taken time.
- 8 **Milestones:** For each of the threshold concepts three Milestones, each of which includes the procedural and Knowledge categories in each subject give students a way of expressing their understanding of the threshold concepts. Milestone 1 is to taught across Years 1 and 2, milestone 2 is taught across Year 3 and 4 and milestone 3 is taught across Year 5 and Year 6

9. **Cognitive Domains:** Within each Milestone, students gradually progress in their procedural fluency and semantic strength through three cognitive domains: basic, advancing and deep. The goal for students is to display sustained mastery at the 'advancing' stage of understanding by the end of each milestone and for the most able to have a greater depth of understanding at the 'deep' stage.

Progression through the Cognitive Domains		
Basic	Advancing	Deep
Acquiring knowledge.	Applying knowledge.	Reasoning with knowledge.
Knowledge is explicit and unconnected.	Knowledge is explicit and connected.	Knowledge is connected and tacit.
Relying on working memory.	Drawing on long-term memory, freeing working memory to consider application.	Relies on long-term memory, freeing working memory to be inventive.
Procedures processed one at a time with conscious effort.	Procedures being automatic.	Automatic recall of procedures.
Understands only in the context in which the materials are presented.	Sees underlying concepts between familiar contexts.	Uses conceptual understanding in unfamiliar situations.
New information does not readily stick. Schemes are limited.	New information is linked to prior knowledge. Schemas are strong.	Readily assimilates new information into rapidly expanding schemas.
Struggles to search for problem solutions. Relies on means-end analysis.	Combines searching for problem solutions with means-end analysis.	Draws on a vast store of problem solutions.
Requires explicit instructions and models.	Uses models effectively.	Prefers discovery approaches to learning.

10. **Pedagogical Content Knowledge and Strategies:** As part of our progression model we use a different pedagogical style in each of the cognitive domains of basic, advancing and deep. This is based on the research of Sweller, Kirschner and Rosenshine who argue to direct instruction in the early stages of learning and discovery based approaches later. We use direct instruction in the basic domain and problem based discovery in the deep domain. This is called the reversal effect.
11. Also as part of our progression model we use POP tasks (Proof of Progress) which shows our curriculum expectations in each cognitive domain.
12. Our curriculum design is based on evidence from cognitive science; three main principles underpin it:
- Learning is most effective with spaced repetition.
  - Interleaving helps pupils to discriminate between topics and aids long-term retention.
  - Retrieval of previously learned content is frequent and regular, which increases both storage and retrieval strength.
13. In addition to the three principles we also understand that learning is invisible in the short-term and that sustained mastery takes time.
14. Our content is subject specific. We make intra-curricular links to strengthen schema.
15. Continuous provision, in the form of daily routines, replaces the teaching of some aspects of the curriculum and, in other cases, provides retrieval practice for previously learned content.



## St George's and St Benedict's Design Process - Designed with Progression into KS3/4 in mind

### Breadth Of Study

#### Breadth of Study – Key Stage 1 (Milestone 1)

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts, such as the home and school, gardens and playgrounds, the local community, industry and the wider environment. When designing and making, pupils should be taught to:

#### Design

- design purposeful, functional, appealing products for themselves and other users based on design criteria.
- generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology.

#### Make

- select from and use a range of tools and equipment to perform practical tasks such as cutting, shaping, joining and finishing.
- select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics.

#### Evaluate

- explore and evaluate a range of existing products.
- evaluate their ideas and products against design criteria.

#### Technical knowledge

- build structures, exploring how they can be made stronger, stiffer and more stable.
- explore and use mechanisms, such as levers, sliders, wheels and axles, in their products.

Cooking and nutrition • use the basic principles of a healthy and varied diet to prepare dishes. • understand where food comes from.

### Breadth of Study – Key Stage 2 (Milestones 2 and 3)

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts, such as the home, school, leisure, culture, enterprise, industry and the wider environment.

When designing and making, pupils should be taught to:

#### Design

- use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups.
- generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design.

#### Make

- select from and use a wider range of tools and equipment to perform practical tasks, such as cutting, shaping, joining and finishing, accurately.
- select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities.

#### Evaluate

- investigate and analyse a range of existing products.
- evaluate their ideas and products against their own design criteria and consider the views of others to improve their work.
- understand how key events and individuals in design and technology have helped shape the world.

#### Technical knowledge

- apply their understanding of how to strengthen, stiffen and reinforce more complex structures.
- understand and use mechanical systems in their products, such as gears, pulleys, cams, levers and linkages.
- understand and use electrical systems in their products, such as series circuits incorporating switches, bulbs, buzzers and motors.
- apply their understanding of computing to programme, monitor and control their products.
- understand and apply the principles of a healthy and varied diet.
- prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques.
- understand seasonality and know where and how a variety of ingredients are grown, reared, caught and processed.

	Milestone 1 Key Stage 1	Milestone 2 Lower Key Stage 2	Milestone 3 Upper Key Stage 2
<b>Master Practical Skills</b>			
Food	<ul style="list-style-type: none"> <li>• Cut, peel or grate ingredients safely and hygienically.</li> <li>• Measure or weigh using measuring cups or electronic scales.</li> <li>• Assemble or cook ingredients.</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare ingredients hygienically using appropriate utensils.</li> <li>• Measure ingredients to the nearest gram accurately.</li> <li>• Follow a recipe.</li> <li>• Assemble or cook ingredients (controlling the temperature of the oven or hob, if cooking).</li> </ul>	<ul style="list-style-type: none"> <li>• Understand the importance of correct storage and handling of ingredients (using knowledge of micro-organisms).</li> <li>• Measure accurately and calculate ratios of ingredients to scale up or down from a recipe.</li> <li>• Demonstrate a range of baking and cooking techniques.</li> <li>• Create and refine recipes, including ingredients, methods, cooking times and temperatures.</li> </ul>

Materials:	<ul style="list-style-type: none"> <li>• Cut materials safely using tools provided.</li> <li>• Measure and mark out to the nearest centimetre.</li> <li>• Demonstrate a range of cutting and shaping techniques (such as tearing, cutting, folding and curling).</li> <li>• Demonstrate a range of joining techniques (such as gluing, hinges or combining materials to strengthen).</li> </ul>	<ul style="list-style-type: none"> <li>• Cut materials accurately and safely by selecting appropriate tools.</li> <li>• Measure and mark out to the nearest millimetre.</li> <li>• Apply appropriate cutting and shaping techniques that include cuts within the perimeter of the material (such as slots or cut outs).</li> <li>• Select appropriate joining techniques.</li> </ul>	<ul style="list-style-type: none"> <li>• 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).</li> <li>• 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).</li> </ul>
Textiles	<ul style="list-style-type: none"> <li>• Shape textiles using templates.</li> <li>• Join textiles using running stitch.</li> <li>• Colour and decorate textiles using a number of techniques (such as dyeing, adding sequins or printing).</li> </ul>	<ul style="list-style-type: none"> <li>• Understand the need for a seam allowance.</li> <li>• Join textiles with appropriate stitching.</li> <li>• Select the most appropriate techniques to decorate textiles.</li> </ul>	<ul style="list-style-type: none"> <li>• Create objects (such as a cushion) that employ a seam allowance.</li> <li>• Join textiles with a combination of stitching techniques (such as back stitch for seams and running stitch to attach decoration).</li> <li>• 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).</li> </ul>
Electricals and Electronics	<ul style="list-style-type: none"> <li>• Diagnose faults in battery operated devices (such as low battery, water damage or battery terminal damage).</li> </ul>	<ul style="list-style-type: none"> <li>• Create series and parallel circuits</li> </ul>	<ul style="list-style-type: none"> <li>• Create circuits using electronics kits that employ a number of components (such as LEDs, resistors, transistors and chips).</li> </ul>
Computing	<ul style="list-style-type: none"> <li>• Model designs using software.</li> </ul>	<ul style="list-style-type: none"> <li>• Control and monitor models using software designed for this purpose.</li> </ul>	<ul style="list-style-type: none"> <li>• Write code to control and monitor models or products.</li> </ul>
Construction	<ul style="list-style-type: none"> <li>• Use materials to practise drilling, screwing, gluing and nailing materials to make and strengthen products.</li> </ul>	<ul style="list-style-type: none"> <li>• Choose suitable techniques to construct products or to repair items.</li> <li>• Strengthen materials using suitable techniques.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop a range of practical skills to create products (such as cutting, drilling and screwing, nailing, gluing, filing and sanding).</li> </ul>
Mechanics	<ul style="list-style-type: none"> <li>• Create products using levers, sliders, wheels and winding mechanisms.</li> </ul>	<ul style="list-style-type: none"> <li>• Use scientific knowledge of the transference of forces to choose appropriate mechanisms for a product (such as levers, winding mechanisms, pulleys and gears).</li> </ul>	<ul style="list-style-type: none"> <li>• Convert rotary motion to linear using cams.</li> <li>• Use innovative combinations of electronics (or computing) and mechanics in product designs.</li> </ul>

<b>Design, make, evaluate and improve</b>			
	<ul style="list-style-type: none"> <li>• Design products that have a clear purpose and an intended user.</li> <li>• Make products, refining the design as work progresses.</li> <li>• Use software to design.</li> </ul>	<ul style="list-style-type: none"> <li>• Design with purpose by identifying opportunities to design.</li> <li>• Make products by working efficiently (such as by carefully selecting materials).</li> <li>• Refine work and techniques as work progresses, continually evaluating the product design.</li> <li>• Use software to design and represent product designs.</li> </ul>	<ul style="list-style-type: none"> <li>• Design with the user in mind, motivated by the service a product will offer (rather than simply for profit).</li> <li>• Make products through stages of prototypes, making continual refinements.</li> <li>• Ensure products have a high quality finish, using art skills where appropriate.</li> <li>• Use prototypes, cross-sectional diagrams and computer aided designs to represent designs.</li> </ul>
<b>Take Inspiration from the Greats</b>			
	<ul style="list-style-type: none"> <li>• Explore objects and designs to identify likes and dislikes of the designs.</li> <li>• Suggest improvements to existing designs.</li> <li>• Explore how products have been created.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify some of the great designers in all of the areas of study (including pioneers in horticultural techniques) to generate ideas for designs.</li> <li>• Improve upon existing designs, giving reasons for choices.</li> <li>• Disassemble products to understand how they work.</li> </ul>	<ul style="list-style-type: none"> <li>• Combine elements of design from a range of inspirational designers throughout history, giving reasons for choices.</li> <li>• Create innovative designs that improve upon existing products.</li> <li>• Evaluate the design of products so as to suggest improvements to the user experience.</li> </ul>



## Early Years

Three and Four-Year-Olds	Personal, Social and Emotional Development		<ul style="list-style-type: none"> <li>Select and use activities and resources, with help when needed. This helps them to achieve a goal they have chosen or one which is suggested to them.</li> </ul>
	Physical Development		<ul style="list-style-type: none"> <li>Use large-muscle movements to wave flags and streamers, paint and make marks.</li> <li>Choose the right resources to carry out their own plan.</li> <li>Use one-handed tools and equipment, for example, making snips in paper with scissors.</li> </ul>
	Understanding the World		<ul style="list-style-type: none"> <li>Explore how things work.</li> </ul>
	Expressive Arts and Design		<ul style="list-style-type: none"> <li>Make imaginative and complex 'small worlds' with blocks and construction kits, such as a city with different buildings and a park.</li> <li>Explore different materials freely, in order to develop their ideas about how to use them and what to make.</li> <li>Develop their own ideas and then decide which materials to use to express them.</li> <li>Create closed shapes with continuous <u>lines, and</u> begin to use these shapes to represent objects.</li> </ul>
Reception	Physical Development		<ul style="list-style-type: none"> <li>Progress towards a more fluent style of moving, with developing control and grace.</li> <li>Develop their small motor skills so that they can use a range of tools competently, safely and confidently.</li> <li>Use their core muscle strength to achieve a good posture when sitting at a table or sitting on the floor.</li> </ul>
	Expressive Arts and Design		<ul style="list-style-type: none"> <li>Explore, use and refine a variety of artistic effects to express their ideas and feelings.</li> <li>Return to and build on their previous learning, refining ideas and developing their ability to represent them.</li> <li>Create collaboratively, sharing ideas, resources and skills.</li> </ul>
ELG	Physical Development	Fine Motor Skills	<ul style="list-style-type: none"> <li>Use a range of small tools, including scissors, paintbrushes and cutlery.</li> </ul>
	Expressive Arts and Design	Creating with Materials	<ul style="list-style-type: none"> <li>Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</li> <li>Share their creations, explaining the process they have used.</li> </ul>

Milestone 1 (Basic) Year 1	Milestone 1 (Advancing and Deep) Year 2	Milestone 2 (Basic, Advancing and Deep) Year 3 and 4	Milestone 3 (Basic, Advancing and Deep) Year 5 and 6
<b>(Year A) for KS2</b>			
<p><b>What is design and technology? (1.1)</b>  <u>Knowledge Category – Design Inspiration; Design Process</u>  <i>List a range of inventions and describe what it is for and who might use it.</i></p> <p><i>Introduce St George’s design process and get the children to experience the design process by making up their own invention to solve a problem.</i></p> <hr/> <p><b>Learning Objectives</b>            (Take inspiration from the greats)            Explore objects and designs to identify likes and dislikes of the designs.            • Suggest improvements to existing designs.            • Explore how products have been created.</p> <hr/> <p><b>Structures Introduction 1.2</b>  <u>Knowledge Category – Technical Knowledge</u></p> <p><i>Pop Tasks</i></p>	<p><b>Frame Structures – 1.3 Making a chair for a soft toy</b>  <u>Knowledge Category – Technical Knowledge; Design Inspiration; Practical Knowledge; Design Process</u></p> <p><u>The Design Process - Researching</u></p> <ul style="list-style-type: none"> <li>• What are the three things a frame structure is usually made up of?               <ul style="list-style-type: none"> <li>• Sort out natural and manmade frame structure pictures.</li> </ul> </li> <li>• List five examples of a natural frame structure.</li> <li>• List five examples of a manufactured frame structure.</li> </ul> <p>Draw a labelled diagram of a manufactured frame structure to point out its features.</p> <p><u>The Design Process - Researching</u></p> <p><b>Finger fluency</b>            Using art straws, experiment with making lots of different frames*, starting with flat frames (2-D) then 3-D. • Draw and annotate diagrams of your frames, explaining the methods you have used to make the structure strong and stable. • Adapt your work as you go, making improvements. • Refine the joins you make. • Compare and contrast your first</p>	<p><b>Frame Structures 2.6 Bridges and then frame structure extension task</b>  <u>Knowledge Category – Technical Knowledge; Design Inspiration; Practical Knowledge; Design Process</u></p> <p><u>The Design Process - Researching</u>            Get the children to compare square frames and triangular frames. Introduce the vocab on p243. Focus on which structure is more rigid (triangular) and why.</p> <ul style="list-style-type: none"> <li>• What is the theory of triangulation? • Define the word ‘rigid’.</li> <li>• What is a truss? • What is a strut? • What is a joining plate? • Draw annotated diagrams showing the theory of triangulation.</li> </ul> <p><u>The Design Process - Researching</u></p> <p><b>Finger fluency</b>            Making frame structures in lots of difference ways using both types of joining techniques: Tape over or around / Triangular corners / square care / rubber bands etc as per on p245</p> <ul style="list-style-type: none"> <li>• Apply your knowledge of frame structures to make products. • Explain how the frames are made</li> </ul>	<p><b>Food -Bolognese (3.10)</b>  <u>Knowledge Category: Technical Knowledge, Design Inspiration, Design Process,</u>  <u>The Design Process: Research and Analysis</u></p> <p><i>Lesson 1</i>  <i>Children explore a range of dishes that contain bolognese, thinking about the ingredients, preparation and how they are presented.</i></p> <p><i>Label and annotate pictures of the following dishes showing their design features:</i></p> <ul style="list-style-type: none"> <li>• spaghetti bolognese</li> <li>• lasagna</li> <li>• pasta al forno (bolognese sauce mixed with rigatoni pasta, sprinkled with mozzarella cheese and baked in the oven).</li> </ul> <p><i>Describe the safety features to be taken into account when preparing one of these dishes.</i></p> <ul style="list-style-type: none"> <li>• List the ingredients that one of the dishes is made from.</li> </ul> <p><b>Learning Objectives</b></p> <ul style="list-style-type: none"> <li>• Combine elements of design from a range of inspirational designers throughout history, giving reasons for choices.</li> </ul>



<p><i>List the four types of structure (Shell, frame, solid and combined)</i></p> <p><i>Name different examples of the structures above and identify which are natural and which are manmade.</i></p>	<p>and final frame. • Explain why it is important to continually improve your work as you go.</p> <p>Label and annotate pictures of the following frame structures, showing their design features: • a climbing frame • a step ladder • a table • a chair • a bicycle Describe the safety features for the user of a swing and a climbing frame. • List the materials that one of the structures is made from. • Apply your knowledge of frame structures to make a model of a chair based on the picture below.</p>	<p>and joined, using annotated diagrams. • Experiment with a variety of 3-D shapes in your products.</p> <p><u>The Design Process – Research and analysis / c</u> <b>Next lesson – p253</b> Adapt the design diagram on the previous page to make your own design diagram for a truss bridge. • Organise your diagram so that it is clear and gives enough detail for someone else to understand. • Arrange your diagram to include annotations where they are helpful. • Experiment with different ways to present your diagram.</p>	<p><b>Lesson 2</b> <u>Design Process - Researching, Practical Knowledge</u> Children revisit technical skills linked to preparing foods that would be used in a bolognese. Have a focus on food safety and food hygiene.</p>
<p><b><u>Textiles Introduction</u></b> Technical Knowledge Practical Knowledge</p> <p>Children to explore fabrics and simple running stitch</p>	<p><u>The Design Process – Research and analysis</u> Practise step 1 of the design process (thinking) by completing your own product outline for a chair for a soft toy. • Apply your knowledge of techniques to decide which will be most appropriate for this task. • Decide which materials you will need to include.</p> <p><u>The Design Process – Idea generation and manufacture.</u> Apply your knowledge of frame structures to: 1. draw sketches of how the chair will be constructed 2. make the first prototype of your frame structure 3. decorate the chair so that it looks attractive.</p>	<p>Next lesson – p254 Apply your knowledge of frame structures to: 1. draw sketches of your bridge 2. show how the frame will be constructed 3. make the first prototype of your bridge.</p> <p><u>The Design Process – Evaluation</u> • Test your design ideas to see if they work. • Re-think your design decisions by applying your technical and practical knowledge of frame structures. • Modify your design. • Explain your decisions.</p> <p><u>Extension for all – Design challenge</u> • Design and make a frame structure of your choice, remembering to include: 1. a product overview sheet (think) 2 a design sheet (think) 3. pictures of</p>	<p><b>Lesson 3</b> <u>Design Process –Idea generation</u> Children to consider their own ideas and design their bolognese meal, considering ingredients, presentation and method.</p> <p>• Practise step 1 of the design process (thinking) by completing your own product outline for a bolognese sauce. • Apply your knowledge of techniques to decide which will be most appropriate for this task. • Decide which ingredients you will need to include.</p> <p><b>Learning Objectives:</b> • Design with the user in mind, motivated by the service a product will offer (rather than simply for profit). • Demonstrate a range of baking and cooking techniques. • Create and refine recipes, including ingredients, methods, cooking times and temperatures.</p> <p><b>Lesson 4</b></p>

	<p><b>Problem:</b> Pushing the back of the chair makes it bend. The back would not support the weight of the toy sitting on the chair. Introduce the idea of strengthening the structure using laminated sheets and folding it.</p> <p><u>The Design Process – Evaluation</u></p> <ul style="list-style-type: none"> <li>• Test your chair to see if it has any weaknesses.</li> <li>• Re-think your design decisions by applying your technical and practical knowledge of structures.</li> <li>• Modify your design.</li> <li>• Explain your decisions.</li> </ul> <p><u>Learning Objectives</u></p> <ul style="list-style-type: none"> <li>• Use materials to practise drilling, screwing, gluing and nailing materials to make and strengthen products.</li> <li>• Cut materials safely using tools provided.</li> <li>• Measure and mark out to the nearest centimetre.</li> <li>• Demonstrate a range of cutting and shaping techniques (such as tearing, cutting, folding and curling).</li> <li>• Demonstrate a range of joining techniques (such as gluing, hinges or combining materials to strengthen).</li> <li>• Design products that have a clear purpose and an intended user.</li> <li>• Make products, refining the design as work progresses.</li> </ul>	<p>your product (make) 4. diagrams or pictures of how you tested your product (break) 5. diagrams or pictures of how you re-thought your design (think) 6. diagrams or pictures of your improved design (make). Here are some examples of products you may make: • a house or shelter • a picture frame • a box • a bridge.</p> <p><u>Learning Objectives</u></p> <p><u>Materials</u></p> <ul style="list-style-type: none"> <li>• Cut materials accurately and safely by selecting appropriate tools.</li> <li>• Measure and mark out to the nearest millimetre.</li> <li>• Apply appropriate cutting and shaping techniques that include cuts within the perimeter of the material (such as slots or cut outs).</li> <li>• Select appropriate joining techniques.</li> </ul> <p><u>Construction</u></p> <ul style="list-style-type: none"> <li>• Choose suitable techniques to construct products or to repair items.</li> <li>• Strengthen materials using suitable techniques.</li> </ul> <p><u>Design, Make, Evaluate and Improve</u></p> <ul style="list-style-type: none"> <li>• Design with purpose by identifying opportunities to design.</li> <li>• Make products by working efficiently (such as by carefully selecting materials).</li> <li>• Refine work and techniques as work progresses, continually evaluating the product design.</li> </ul>	<p><u>The Design Process – Idea generation and manufacture</u></p> <p><b>Children to work in groups to prepare and cook their bolognese dish</b></p> <p><b>Apply your knowledge of cooking techniques and nutrition to:</b></p> <ul style="list-style-type: none"> <li>• <b>make the first prototype of your bolognese</b></li> <li>• <b>list possible additions to the bolognese (Y6)</b></li> <li>• <b>investigate what type of pasta you might serve with your bolognese. (Y6)</b></li> </ul> <p><b>Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>• Demonstrate a range of baking and cooking techniques.</li> <li>• Create and refine recipes, including ingredients, methods, cooking times and temperatures.</li> <li>• Create innovative designs that improve upon existing products.</li> </ul> <p><b>Lesson 5</b></p> <p><u>The Design Process – Evaluation</u></p> <p><b>Provide children will the problem – that a family member has become vegetarian. Children need to modify their recipes and explain their decisions.</b></p> <p><u>Learning Objectives</u></p>
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		<ul style="list-style-type: none"> <li>• Use software to design and represent product designs. <u>Take Inspiration from the Greats</u></li> <li>• Identify some of the great designers in all of the areas of study (including pioneers in horticultural techniques) to generate ideas for designs.</li> <li>• Improve upon existing designs, giving reasons for choices.</li> </ul>	<ul style="list-style-type: none"> <li>• Create innovative designs that improve upon existing products.</li> <li>• Evaluate the design of products so as to suggest improvements to the user experience.</li> </ul>
<p><b><u>Slider Mechanisms (1.5) – Design an Easter card with a moving slider mechanism</u></b> <b><u>Knowledge Category – Technical knowledge; Practical knowledge; Design inspiration; Design process</u></b></p> <p><i>Pop Tasks</i> <u>The Design Process – Problem/Research and Analysis</u> Explore a range of Easter themed pre-made pop up cards e.g. chick out of egg, bunny from behind a hill, Jesus out of the tomb.</p> <p>SHOW PROBLEMATIC CARDS – What is the problem? Describe what happens to the slider rod without a guide bridge. Describe what happens when a guide bridge is added. Draw annotated diagrams of what happened before and after the guide bridge was added.</p>	<p><b><u>Lever Mechanisms (1.6) – Design a product/picture with a lever mechanism (SHORT UNIT)</u></b> <b><u>Knowledge Category – Technical knowledge; Design inspiration; Design process</u></b></p> <p><i>Pop Tasks</i> <u>The Design Process – Problem/Research and Analysis</u> Look at the Crocodile WAGOLL, and identify the different parts and how it works. Where is the fulcrum and why is it important that it is there?</p> <ul style="list-style-type: none"> <li>• What is a lever?</li> <li>• Define the word ‘rigid’.</li> <li>• Define the word ‘pivot’.</li> <li>• Define the word ‘fulcrum’.</li> <li>• Define the word ‘force’.</li> <li>• Define the word ‘input’.</li> <li>• Define the word ‘output’.</li> <li>• Draw annotated diagrams to show what happens to the input and output of a lever if the fulcrum is moved.</li> </ul>	<p><b><u>Vegetable Soup (2.8) – Making Vegetable Soup</u></b> <b><u>Knowledge Category – Design inspiration; Design process</u></b></p> <p><i>Pop Tasks</i> <u>The Design Process – Research and Analysis</u> • Label and annotate pictures of the following vegetable soups, showing their design features: • minestrone soup • vegetable and lentil soup • summer vegetable soup. • Describe the safety features to be taken into account when preparing one of these dishes. • List the ingredients that one of the soups is made from.</p> <p>Do a lesson about seasonality and the health benefits of different vegetables and carbohydrates e.g. pasta, bread and pulses.</p> <p><u>The Design Process – Idea generation and manufacture.</u></p> <p><i>Finger fluency carousel: Teach the</i></p>	<p><b><u>Structures</u></b> <b><u>Frame Structure ( 3.5)</u></b> <b><u>Kite</u></b> <b><u>Knowledge Category – Design Inspiration, Technical Knowledge, Design process,</u></b></p> <p><i>Pop Tasks</i> <u>The Design Process – Research and Analysis- Technical Knowledge</u> Demonstrate ways in which straws can be joined Draw annotated diagrams Describe how the joins give strength to a frame structure.</p> <p><b><u>Practical Knowledge</u></b> Finger Fluency</p> <ul style="list-style-type: none"> <li>• Glue joints together to make strong structures e.g tetrahedron.</li> <li>• Thread straws together.</li> <li>• (see page 371)</li> </ul> <p><u>Lesson Objectives</u></p> <ul style="list-style-type: none"> <li>• Develop a range of practical skills to create products (such as cutting, drilling and screwing, nailing, gluing, filing and sanding).</li> </ul>

<p><u>The Design Process – Idea generation and manufacture.</u></p> <ul style="list-style-type: none"> <li>• Make a slider mechanism with a curved slot and another with a wavy slot.</li> <li>• For each one, describe what happens to the slider rod and the object attached to it.</li> <li>• Decorate both your sliding mechanisms so that they have a purpose (e.g. helping to tell a story).</li> <li>• Draw annotated diagrams of your products.</li> </ul> <p><u>The Design Process – Evaluation</u> Test your design techniques and see if they work. • Re-think your design decisions by applying your technical and practical knowledge of slider mechanisms.</p> <p><b>Learning objectives covered</b></p> <ul style="list-style-type: none"> <li>• Design products that have a clear purpose and an intended user.</li> <li>• Make products, refining the design as work progresses.</li> <li>• Cut materials safely using tools provided.</li> <li>• Measure and mark out to the nearest centimeter</li> <li>• Demonstrate a range of cutting and shaping techniques</li> </ul>	<p><b>SHOW PROBLEMATIC EXAMPLES</b> – What is the problem? (Fulcrum in wrong place, badly decorated,</p> <p><u>The Design Process – Idea generation and manufacture.</u></p> <p>Apply your knowledge of lever mechanisms to make products.</p> <ul style="list-style-type: none"> <li>• Explain how the lever mechanisms are made, using annotated diagrams.</li> </ul> <p><b>EXTENSION</b></p> <ul style="list-style-type: none"> <li>• Experiment with a variety of different lever mechanisms in your products.</li> </ul> <p><u>The Design Process – Evaluation</u> Test your design ideas to see if they work. • Re-think your design decisions by applying your technical and practical knowledge of lever mechanisms. • Modify your design. • Explain your decisions</p> <p><b>Learning objectives covered</b></p> <ul style="list-style-type: none"> <li>• Design products that have a clear purpose and an intended user.</li> <li>• Make products, refining the design as work progresses.</li> <li>• Cut materials safely using tools provided.</li> </ul>	<p><i>Claw grip, bridge hold, crushing and blending to be practiced.</i></p> <p><b>Station 1</b> Using the claw hold, experiment with chopping different foods such as cucumbers and courgettes. Ask an adult for help if you are unsure.</p> <ul style="list-style-type: none"> <li>• List foods that are best cut with a bridge hold or claw grip. • Draw and annotate diagrams of your sliced and chopped foods, explaining the methods you have used to produce the best consistency for each type of food.</li> <li>• Compare and contrast your first and most recent attempts at chopping.</li> </ul> <p><b>Station 2</b> Crushing garlic and blending</p> <p><u>The Design Process – Idea generation and manufacture.</u> Practise step 1 of the design process (thinking) by completing your own product outline for vegetable soup. • For the inspiration section, make sure children can see a variety of soups with their ingredients listed. • Apply your knowledge of techniques to decide which will be most appropriate for this task. • Decide which ingredients you will need to include.</p> <p>Introduce the brief: Variety of ingredients Seasonal vegetables Nutritious Low cost</p>	<ul style="list-style-type: none"> <li>• Combine elements of design from a range of inspirational designers throughout history, giving reasons for choices.</li> </ul> <p><b>Lesson 2</b> <u>Design Inspiration</u> Label and annotate a picture of a box kite and a tetrahedral kite, compare designs.</p> <p><b>Lesson Objectives</b></p> <ul style="list-style-type: none"> <li>• Evaluate the design of products so as to suggest improvements to the user experience</li> </ul> <p><b>Lesson 3</b> Design Process – Idea generation and manufacture. Introduce brief: To design a 3D kite for their friend to take to the park Children to apply their knowledge of techniques to decide which type of kite they would like to design. Decide which materials they will need. Create a design diagram.</p> <p><b>Lesson Objectives</b></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• 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).</li> </ul>
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<p>(such as tearing, cutting, folding and curling).</p> <ul style="list-style-type: none"> <li>• Demonstrate a range of joining techniques (such as gluing, hinges or combining materials to strengthen).</li> </ul>	<ul style="list-style-type: none"> <li>• Measure and mark out to the nearest centimeter.</li> <li>• Demonstrate a range of joining techniques.</li> <li>• Create products using levers.</li> <li>• Suggest improvements to existing designs.</li> </ul> <hr/> <p><b><u>Textiles: Puppets (Not CQ)</u></b></p> <p><i>Pop Tasks</i></p> <p><u>The Design Process – Problem/Research and Analysis</u></p> <p>What is a puppet? What are they used for?</p> <ul style="list-style-type: none"> <li>• Go through the pictures of some different puppets on the slides. What kind of puppet is this? What do you think it is made from? Do you like this puppet? Discuss questions as a class. • Tell children that today they will be exploring some different puppets and looking at their features. What questions do you think we need to ask when we are exploring different puppets? List children’s ideas on the slides, e.g. How does it move? Who was it designed for? Who would play with it? What materials is it made from? etc.</li> </ul> <p>Provide children with a variety of different puppets that they can look at, touch and explore, such as finger puppets, glove puppets,</p>	<ul style="list-style-type: none"> <li>• Adapt the design diagram on the previous page to make your own design diagram for a vegetable soup. • Organise your diagram so that it is clear and gives enough detail for someone else to understand. • Arrange your diagram to include annotations where they are helpful. • Apply your knowledge of cooking techniques and nutrition to: 1. draw sketches of how the vegetable soup will be constructed 2. list possible ingredients for your vegetable soup 3. make the first prototype of your vegetable soup 4. use seasonal ingredients.</li> </ul> <p><b><u>Extension – Problem: The soup isn’t very filling!</u></b></p> <p>Children to look at the suggestions on p289</p> <p><u>The Design Process – Evaluation</u></p> <ul style="list-style-type: none"> <li>• Test your soup and decide what you could add to make the soup more substantial. • Re-think your design decisions by applying your technical and practical knowledge of cooking and nutrition. • Modify your recipe. • Explain your decisions.</li> </ul> <p><b><u>Learning Objectives</u></b></p> <p><b><u>Food Seasonality</u></b></p> <p><b><i>Master Practical Skills</i></b></p> <ul style="list-style-type: none"> <li>• Prepare ingredients hygienically using appropriate utensils.</li> <li>• Measure ingredients to the nearest gram accurately.</li> <li>• Follow a recipe.</li> </ul>	<p>Design with the user in mind, motivated by the service a product will offer (rather than simply for profit).</p> <p><u>Lesson 4</u></p> <p><u>Design Process – Manufacture</u></p> <p>Children to make their first prototype of their kite.</p> <p><u>Learning Objectives</u></p> <ul style="list-style-type: none"> <li>• Make products through stages of prototypes, making continual refinements.</li> </ul> <p><u>Lesson 5</u></p> <p><u>Design Process – Evaluation</u></p> <p>Children to test their designs to see if they work.</p> <p>Challenge children to modify their design and explain their decisions for their choices.</p> <p><b><u>Learning Objectives</u></b></p> <ul style="list-style-type: none"> <li>• Combine elements of design from a range of inspirational designers throughout history, giving reasons for choices.</li> <li>• Create innovative designs that improve upon existing products.</li> <li>• Evaluate the design of products so as to suggest improvements to the user experience.</li> </ul>
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marionettes, etc. Ideally there should be enough puppets so children can have one each. Give children some time to explore these in small groups. • Ask children to choose one of the puppets to explore in more detail. Children to draw and annotate their chosen puppet and describe how it works/what it is made of/how it might be made.

Lesson 2: Practical Knowledge  
Making finger puppets

Show children the picture of finger puppets on the slides. What are these puppets called and who do you think would enjoy playing with them? Children to discuss ideas as a class. • Tell children that today they are going to learn how to make finger puppets. How do you think we could make a puppet like this? Children to think, pair, share their ideas. • Go through the step-by-step photos on the slides explaining how to make a finger puppet by drawing around a template, gluing felt together and decorating. • How could you make a bear finger puppet? How could you make a ladybird finger puppet? How could you make a pirate finger puppet? As a class, discuss different ways of decorating the basic finger puppet template to make different characters, then go

• Assemble or cook ingredients (controlling the temperature of the oven or hob, if cooking).

***Design, Make, Evaluate Improve***

- 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.

***Take inspiration from the greats***

- Improve upon existing designs, giving reasons for choices.

through the examples on the slides.

Extension – Making own template.

Lesson 3: Practical Knowledge – Sewing

We found out last lesson that we are able to make puppets by gluing pieces of fabric together but is there another way we could join pieces of fabric together?

Invite children to share ideas. •

Tell children that today they are going to be learning some sewing skills so that they can sew their own puppets. Go through the explanations for how to do running stitch and over stitch on the slides. • Explain that sewing is a much more secure way to add features onto a puppet too. Go through the photos showing how to add buttons and other pieces of fabric to the main piece of material to add decoration. • Tell children that today they are just practising so it doesn't matter if they make mistakes but that we will be working with needles which are very sharp. How can we make sure we stay safe when we are sewing? Discuss ideas as a class, e.g. not moving around with a needle or scissors in your hand, being careful where you put your fingers, etc.

Help children to thread their needle and tie a knot in the end.

Provide children with 2 squares of



felt and challenge them to sew them together around 3 of the edges using either running stitch or over stitch (whichever they feel more comfortable with).

Lessons 4 and 5: The Design Process – Idea generation and manufacture.

Tell children that over the next few lessons they will be using what they have learnt about working with fabric to design, make and evaluate a glove puppet. Show children some different glove puppets on the slides. How do you think you could make a glove puppet? • Go through the step-by-step photos on the slides for how to make a basic glove puppet, including making a template and adding features, such as ears. • What kind of glove puppet do you think you would like to make and why? Children to discuss their ideas with a partner. What else could you add to your glove puppet? • Explain to the children that today they will be designing their glove puppet so that they can make them next lesson. What do we need to think about when we are designing a product? Write a list of questions on the board based on the children's feedback, e.g. What materials and tools will I need? Who am I designing my



product for? How will I join the different parts together? etc.  
EXTENSION – Making own template

The Design Process – Evaluation

Test your design ideas to see if they work. • Re-think your design decisions by applying your technical and practical knowledge of lever mechanisms. • Modify your design. • Explain your decisions

**Learning objectives covered**

***Master Practical Skills***

- 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).

***Design, Make, Evaluate Improve***

- Design products that have a clear purpose and an intended user.
- Make products, refining the design as work progresses.

***Take Inspiration from the Greats***

- Explore objects and designs to identify likes and dislikes of the designs.
- Explore how products have been created.
- Suggest improvements to existing design.

<p><b><u>Portable Snacks – 1.8 - To produce a tasty and nutritious snack for a picnic</u></b>  <b><u>Knowledge Category – Technical knowledge; Practical knowledge; Design inspiration; Design process</u></b></p> <p>Brief: Must be small, easy to hold, easy to transport, can eat without plates, knives and forks, filling inside pasty or bread. Show the children the brief and then a range of different meals or snacks. Sort into which fit the brief and which do not. Children are to describe what makes the snacks or non-portable.</p> <p>Label and annotate pictures of the following portable snacks showing their design features: • a sandwich • a wrap • a sausage roll • a pie • a samosa</p> <p>List the ingredients that one of the snacks is made from.</p> <hr/> <p><b><u>The Design Process – Research and analysis</u></b>  <b><u>Food preparation 1: Finger fluency</u></b>  Carousel of food prep activities Using a grater with four different sides, experiment with grating different foods on each side. Remember you do not have to</p>	<p><b><u>Couscous Dish – 1.9 - To produce a tasty and nutritious snack for a picnic</u></b>  <b><u>Knowledge Category – Technical knowledge; Practical knowledge; Design inspiration; Design process</u></b></p> <p><b><u>The Design Process – Research and analysis</u></b></p> <p>Explore the pictures and labels to show the features of a couscous dish.</p> <p>Do a cookery demonstration and tasting session and link it to the brief: Variety of ingredients, Seasonal vegetables, Nutritious Low cost</p> <p>During the demo recap on Safety and Hygiene rules on P165</p> <ul style="list-style-type: none"> <li>• Children to spot which rules are adhered to throughout the lesson, which are missing?</li> </ul> <p>Do the lesson on p163 about seasonal food.</p> <p>Match fruits and vegetables to their seasons.</p> <hr/> <p>– To extend children who could be ‘Deep’ – they could have a</p>	<p><b><u>Pencil Cases - To produce a pencil case that opens and closes</u></b>  <b><u>Knowledge Category – Technical knowledge; Practical knowledge; Design inspiration; Design process</u></b></p> <p><b><u>The Design Process – Research and analysis</u></b>  <b><u>Lesson 1</u></b>  Provide children with a range of pencil cases they can look at closely. Children to choose two to draw and label. Work on a design brief together – it must be the right size to hold the largest item that would need to be in there and it must open and close.</p> <p><b><u>Lesson 2 – Finger Fluency</u></b>  Remind children that over the next few lessons they will be designing and making their own pencil cases. To do this, they are going to have to do some sewing. Revisit of sewing unit from Y2.</p> <ul style="list-style-type: none"> <li>• Explain that there are lots of different sewing stitches we can do and that today we will be practising some of them and seeing which ones would be best for joining felt together to make a pencil case. Go through the information on the slides about the different stitches and how they are done.</li> <li>• Which of these stitches do you think would make the most secure join? Why? Which do you think looks the best? Why? Children to share their ideas, giving reasons for their choices.</li> <li>• Remind children about how to work safely with needles, pins and scissors. Provide children with Challenge Cards 2A and 2B. Children to practise joining two strips of felt together using running stitch and backstitch. Provide</li> </ul>	<p><b><u>Electronic Motors (3.3) - To produce a motorised car that is battery powered with a secure chasis</u></b>  <b><u>Knowledge Category – Technical knowledge; Practical knowledge; Design inspiration; Design process</u></b></p> <p><b><u>The Design Process – Research and analysis</u></b>  Make the prototypes of p337 for the children to examine during the lesson – windmill, motor and propeller driven cars.</p> <ul style="list-style-type: none"> <li>• What sort of motion is created by a motor? • Draw annotated diagrams to show the effect of attaching a motor to: • a pulley • a propeller • a fan • gears, axles and wheels.</li> </ul> <p><b><u>Lesson 2 – Finger Fluency</u></b>  Apply your knowledge of motors to make products. • Explain how the products are made, using annotated diagrams. • Experiment with a variety of motor components, such as fans, propellers, pulleys and gears in your products.  See p339 and 340</p> <p><b><u>The Design Process – Research and analysis and Idea generation</u></b>  • Label and annotate this picture of a motorised vehicle, showing its design features. • List the materials that the product is made from.</p> <p><b><u>The Design Process – Idea generation and manufacture.</u></b></p>
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<p>grate all the food. It is best to leave a little bit to hold on to.</p> <ul style="list-style-type: none"> <li>• Using a swivel peeler, experiment with peeling different foods. Remember to peel away from yourself.</li> <li>• Spread a soft food such as hummus or mashed banana onto bread or a wrap.</li> <li>• Using the bridge hold, experiment with slicing some soft food such as tomatoes, strawberries and apples.</li> <li>• Using the fork secure hold, experiment with slicing some soft food with a flat surface such as a halved cucumber.</li> <li>• Compare different ways of folding a wrap</li> </ul> <p><u>The Design Process – Idea generation and manufacture.</u> Apply your knowledge of cooking techniques and nutrition to:</p> <ol style="list-style-type: none"> <li>1. draw sketches of how the snack will be constructed</li> <li>2. list possible ingredients for your snack</li> <li>3. make the first prototype of your snack</li> <li>4. use seasonal ingredients</li> <li>5. wrap the snack securely</li> </ol> <p><u>The Design Process – Evaluation</u> Taste your snack to see if it has any weaknesses. • Re-think your design decisions by applying your technical and practical knowledge of cooking and</p>	<p>specific intended user or purpose in mind:</p> <ul style="list-style-type: none"> <li>• a couscous dish using seasonal ingredients</li> <li>• a couscous dish for a vegetarian</li> <li>• a couscous dish containing pulses</li> <li>• the cheapest couscous dish you can make while maintaining taste.</li> </ul> <hr/> <p><u>The Design Process – Research and analysis and Idea generation</u> Practise step 1 of the design process (thinking) by completing your own product outline for a couscous dish.</p> <ul style="list-style-type: none"> <li>• For the inspiration section, arrange an annotated mood board to show more details.</li> <li>• Apply your knowledge of techniques to decide which will be most appropriate for this task.</li> <li>• Decide which ingredients you will need to include.</li> <li>• Adapt the design diagram on the previous page to make your own design diagram for a couscous dish.</li> <li>• Organise your diagram so that it is clear and gives enough detail for someone else to understand.</li> <li>• Arrange your diagram to include annotations where they are helpful.</li> <li>• Experiment with different ways to present your diagram.</li> </ul> <p><u>The Design Process – Idea generation and manufacture.</u> Apply your knowledge of cooking techniques and nutrition to:</p>	<p>pins so children can hold the two pieces of felt in place while they work. Extension: Also card 2C including whip stitches.</p> <p><u>The Design Process – Research and analysis</u> <u>Lesson 3</u> Can you remember the names of the three types of stitches we looked at in the last lesson? Invite children to share their ideas, then check on the slides. • Explain that to make our pencil cases we will need a way to open and close them. Can you think of some different ways of opening and closing a pencil case? Invite children to share their ideas. • Explain that a lot of the pencil cases you buy in the shops have zips which are difficult to sew on securely without a sewing machine. Today we will be looking at how to use buttons and poppers to open and close a pencil case. Go through the step-by-step photos of how to do this on the slides. Provide children with Instruction Card 3B. Children to work independently to attach a button to a piece of felt and cut a button hole. Encourage children to sew a whip stitch around their button hole to stop the hole from getting too big. Extension: Provide children with Instruction Card 3C. Children to work independently to sew poppers onto a piece of felt. Encourage children to measure and check the placement of their poppers so that they line up correctly.</p> <p><u>The Design Process – Idea generation and manufacture.</u> <u>Lesson 4</u></p>	<ul style="list-style-type: none"> <li>• Adapt the design diagram on the previous page to make your own design diagram for a motorised car.</li> <li>• Organise your diagram so that it is clear and gives enough detail for someone else to understand. • Arrange your diagram to include annotations where they are helpful.</li> <li>• Experiment with different ways to present your diagram.</li> </ul> <p><b><u>Learning objectives covered</u></b></p> <ul style="list-style-type: none"> <li>• Use scientific knowledge of the transference of forces to choose appropriate mechanisms for a product (such as levers, winding mechanisms, pulleys and gears).</li> <li>• Design with the user in mind, motivated by the service a product will offer (rather than simply for profit).</li> <li>• Make products through stages of prototypes, making continual refinements.</li> <li>• Ensure products have a high quality finish, using art skills where appropriate.</li> <li>• Use prototypes, cross-sectional diagrams and computer aided designs to represent designs.</li> <li>• Create circuits using electronics kits that employ a number of components (such as LEDs, resistors, transistors and chips).</li> </ul>
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<p>nutrition. • <b>Modify your recipe.</b> • <b>Explain your decisions.</b></p> <hr/> <p><b>Learning Objectives</b> <b>Master Practical Skills</b></p> <ul style="list-style-type: none"> <li>• Cut, peel or grate ingredients safely and hygienically.</li> <li>• Assemble or cook ingredients.</li> </ul> <p><b>Design, Make, Evaluate Improve</b></p> <ul style="list-style-type: none"> <li>• Design products that have a clear purpose and an intended user.</li> <li>• Make products, refining the design as work progresses.</li> </ul> <p><b>Take inspiration from the greats</b></p> <ul style="list-style-type: none"> <li>• Explore objects and designs to identify likes and dislikes of the designs.</li> </ul>	<ol style="list-style-type: none"> <li>1. draw sketches of how the couscous dish will be constructed</li> <li>2. list possible ingredients for your couscous dish</li> <li>3. make the first prototype of your couscous dish</li> <li>4. use seasonal ingredients</li> <li>5. cost out your couscous dish</li> <li>6. decide how long the recipe will take.</li> </ol> <p><u>PRESENT A PROBLEM: YOUR DISH NEEDS TO BE MORE COLOURFUL – HOW WILL YOU ADAPT IT?</u></p> <p><u>The Design Process – Evaluation</u></p> <ul style="list-style-type: none"> <li>• Evaluate the look of your couscous dish and see if it has any weaknesses.</li> <li>• Re-think your design decisions by applying your technical and practical knowledge of cooking and nutrition.</li> <li>• Modify your recipe.</li> <li>• Explain your decisions.</li> </ul> <hr/> <p><b>Learning Objectives</b> <b>Master Practical Skills</b></p> <ul style="list-style-type: none"> <li>• Cut, peel or grate ingredients safely and hygienically.</li> <li>• Assemble or cook ingredients.</li> </ul> <p><b>Design, Make, Evaluate Improve</b></p> <ul style="list-style-type: none"> <li>• Design products that have a clear purpose and an intended user.</li> <li>• Make products, refining the design as work progresses.</li> </ul> <p><b>Take inspiration from the greats</b></p>	<p>Remind children that soon they will be designing and making their own pencil cases. Tell children that today they will be looking at different ways they can add embellishments to their designs to make their pencil cases attractive to look at, as well as being functional. Can you think of some different ways you could add patterns, colours and designs to a piece of felt? Invite children to share their ideas.</p> <ul style="list-style-type: none"> <li>• Go through the suggestions on the slides of different ways of adding decorations, including buttons, sequins, appliqué, beads and ribbons. Show some different ways of joining these to the main piece of fabric. Which joining method do you think will be the most secure? Why? Invite children to share their ideas, then explain that fabric glue doesn't always work well on felt because it is fluffy. Sewing is a much more secure way of adding embellishments. Provide children with a square of felt and a variety of embellishments, including sequins, ribbons, beads, buttons and other off-cuts of fabric to appliqué onto the felt. Children work independently to sew the embellishments onto the felt.</li> </ul> <p><b>Extension</b></p> <p>Provide children with a square of felt and a variety of embellishments, including sequins, ribbons, beads, buttons and other off-cuts of fabric to appliqué onto the felt. Children work independently to sew the embellishments onto the felt. Children to make sure that their stitches are neat, even and well-secured.</p>	
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- Explore objects and designs to identify likes and dislikes of the designs.

### The Design Process – Idea generation and manufacture.

#### Lesson 5

Children to design their pencil case on worksheet 5B. When they have done that, they complete the flow diagram on worksheet 5C explaining which steps they will need to take to complete their pencil case.

#### Lesson 6O

Children to work independently to follow their design to create their pencil case. Make sure children are working with particular attention to detail to ensure that their finished product is of a high quality.

### The Design Process – Evaluation

#### Lesson 7

Evaluate and suggest improvements#

#### Lesson Objectives

##### Textiles

- Understand the need for a seam allowance.
- Join textiles with appropriate stitching.
- Select the most appropriate techniques to decorate textiles.

##### Design, Make, Evaluate and Improve

- 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.

##### Materials

		<ul style="list-style-type: none"> <li>• Cut materials accurately and safely by selecting appropriate tools.</li> <li>• Measure and mark out to the nearest millimetre.</li> <li>• Apply appropriate cutting and shaping techniques that include cuts within the perimeter of the material (such as slots or cut outs).</li> <li>• Select appropriate joining techniques.</li> </ul> <p><u>Construction</u></p> <ul style="list-style-type: none"> <li>• Choose suitable techniques to construct products or to repair items.</li> <li>• Strengthen materials using suitable techniques.</li> </ul> <p><u>Design, Make, Evaluate and Improve</u></p> <ul style="list-style-type: none"> <li>• Design with purpose by identifying opportunities to design.</li> <li>• Make products by working efficiently (such as by carefully selecting materials).</li> <li>• Refine work and techniques as work progresses, continually evaluating the product design.</li> <li>• Use software to design and represent product designs.</li> </ul>	
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## STEM WEEK PROJECT

<p><b>Solid Structures 1.4 – <u>Where does Grandma live?</u></b> <u>Knowledge Category – Technical Knowledge, Practical Knowledge, Design Inspiration, Design Process</u></p> <p><i>Pop Tasks</i></p>	<p><b>Wheel and Axle Mechanisms (1.7) – <u>Design a wind powered vehicle</u></b> <u>Knowledge Category – Technical knowledge; Practical knowledge; Design inspiration; Design process</u></p> <p>Brief: Transport people without using any fuel. Intended users will be</p>	<p><b>CYCLE A</b></p> <p><u>Linked Levers (2.4) – Design a fold away safety barrier to help with parking.</u></p>	<p><b>CYCLE A</b></p> <p><u>Electronic Motors (3.3) - To produce a motorised car that is battery powered with a secure chasis</u></p>
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<p>Explore different houses and materials in terms of strength – Link to the 3 little pigs. Describe which house was strongest and why?</p> <p><u>The Design Process - Researching</u> How were the house materials joined together, focusing on the strongest and weakest structures (Straw house and brick house) Straw house – Bundles tied together Bricks – Mortar, pattern of bricks.</p> <p>List the benefits and drawbacks of each type of structure.</p> <p><u>The Design Process – Research and analysis</u></p> <p>Design a strong wall using a range of materials: brick set from FS2, sugar cubes, Lego, small cardboard boxes for junk modelling, joining with glue and without. Think about waterproofing, stability and strength.</p> <p>Problem – If you take a brick out is it still stable?</p> <p><u>The Design Process – Idea generation and manufacture.</u> Design a house for grandma to keep wolves out, choosing the strongest materials and how you will join them to make it stable.</p>	<p>people who want to cut down on harmful gases. Features include – a sail to catch the wind, dowel for the sail, cardboard chassis, wheels and axles.</p> <p><i>Pop Tasks</i> <u>The Design Process – What is a mechanism?</u></p> <ul style="list-style-type: none"> <li>• Define the word ‘rotate’.</li> <li>• Define the word ‘force’.</li> <li>• Draw annotated diagrams to show what happens to the speed and force of a wheel and axle when one or the other is turned.</li> </ul> <p><u>The Design Process – Research and analysis of how to attach wheels and axles</u></p> <p>Apply your knowledge of wheels and axles to make products.</p> <ul style="list-style-type: none"> <li>• Explain how the wheel and axle mechanisms are made and attached, using annotated diagrams.</li> <li>• Experiment with a variety of different ways to attach wheels and axles in your products.</li> </ul> <p>Practice using cardboard tubes, sheet materials and clothes pegs as the chassis.</p> <p><u>The Design Process – Design Inspiration (Showing WAGOLLS)</u> Label and annotate this picture of a wheel and axle mechanism, showing its design features. List the materials that the product is made from.</p>	<p><u>Knowledge Category – Technical knowledge; Practical knowledge; Design inspiration; Design process</u></p> <p>Revisit the work on levers in Y2 and the work around fulcrums.</p> <p><i>Pop Tasks</i> <u>The Design Process – What is a linked lever?</u> Introduce linked levers by showing a range of prototypes as described on p211.</p> <p>Describe the purpose of linked levers.</p> <ul style="list-style-type: none"> <li>• What does pivot mean?</li> <li>• Define the word ‘fulcrum’.</li> <li>• Describe the following types of movement: 1. linear 2. rotary 3. reciprocating 4. oscillating.</li> <li>• Draw a range of annotated diagrams to show which outputs you would see with different arrangements of linked levers.</li> </ul> <p><u>The Design Process – Research and Analysis - Finger fluency</u> Children to have a go at making one of the prototype items. Apply your knowledge of linked levers to make products. • Explain how the linked levers are made and attached, using annotated diagrams. • Experiment with a variety of fixed and moving pivots in your products.</p> <p>P214 – Show examples of linked lever mechanisms</p> <ul style="list-style-type: none"> <li>• Label and annotate a picture of a linked lever mechanism, showing its design features.</li> <li>• List the materials that the product is made from.</li> <li>• Apply your knowledge of linked lever</li> </ul>	<p><u>Knowledge Category – Technical knowledge; Practical knowledge; Design inspiration; Design process</u></p> <p>Continued from the plan above</p> <p><u>The Design Process – Idea generation and manufacture.</u> Apply your knowledge of wheel mechanisms to: 1. draw sketches of your car 2. show how the car will be constructed 3. make the first prototype of your car.</p> <p>PROBLEM – THE WHEELS START TURNING AS SOON AS THE BATTERY IS CONNECTED WHICH MAKES IT DIFFICULTY TO CONTROL! How can you modify the design? P349 USE A SWITCH!</p> <p><u>The Design Process – Evaluation</u></p> <ul style="list-style-type: none"> <li>• Test your design ideas to see if they work.</li> <li>• Re-think your design decisions by applying your technical and practical knowledge of motors, electrical circuits, pulleys, and wheels and axles.</li> <li>• Modify your design.</li> <li>• Explain your decisions.</li> </ul> <p>If you wish to extend the task:</p> <ul style="list-style-type: none"> <li>• Design and make a motorised product of your choice, remembering to include: 1. a product overview sheet (think) 2. a mood board to give more detail about your inspiration (think) 3. a design sheet (think) 4. pictures of your product (make) 5. diagrams or pictures of how you tested your product (break) 6. diagrams or pictures of how you re-thought your</li> </ul>
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<p><u>The Design Process – Evaluation</u> Test out their designs for strength, stability and whether they are waterproof.</p> <p>Complete the evaluation</p> <p><b><u>Learning objectives covered</u></b></p> <ul style="list-style-type: none"> <li>• Design products that have a clear purpose and an intended user.</li> <li>• Make products, refining the design as work progresses.</li> <li>• Cut materials safely using tools provided.</li> <li>• Demonstrate a range of joining techniques (such as gluing, hinges or combining materials to strengthen).</li> <li>• Use materials to practise drilling, screwing, gluing and nailing materials to make and strengthen products.</li> </ul>	<ul style="list-style-type: none"> <li>• Apply your knowledge of wheel and axle mechanisms to make a product based on the picture above.</li> </ul> <p><u>The Design Process – Idea generation and manufacture.</u> <u>ADD IN THE PROBLEM THAT IT MUST BE WINDPOWERED</u></p> <p>Adapt the design diagram on the previous page to make your own design diagram for a wind-powered car. • Organise your diagram so that it is clear and gives enough detail for someone else to understand. • Arrange your diagram to include annotations where they are helpful. • Experiment with different ways to present your diagram. • Apply your knowledge of wheel mechanisms to: 1. draw sketches of your car 2. show how the car will be constructed 3. make the first prototype of your car.</p> <p><u>The Design Process – Evaluation</u> Test your design ideas to see if they work. • Re-think your design decisions by applying your technical and practical knowledge of wheel and axle mechanisms. • Modify your design. • Explain your decisions</p> <p><b><u>Learning objectives covered</u></b></p> <ul style="list-style-type: none"> <li>• Design products that have a clear purpose and an intended user.</li> <li>• Make products, refining the design as work progresses.</li> <li>• Cut materials safely using tools provided.</li> </ul>	<p>mechanisms to make a product based on the picture above.</p> <p><u>Introduce the brief</u> A safety barrier that is tall enough to be seen by a car when reversing and that can be folded away when not needed. It needs to be stable in the wind.</p> <p><u>The Design Process – Idea generation and manufacture.</u> Practise step 1 of the design process (thinking) by completing your own product outline for a fold-away safety barrier. • For the inspiration section, arrange an annotated mood board to show more details. • Apply your knowledge of techniques to decide which will be most appropriate for this task. • Decide which materials you will need to include.</p> <ul style="list-style-type: none"> <li>• Adapt the design diagram on the previous page to make your own design diagram for a linked lever mechanism safety barrier. • Organise your diagram so that it is clear and gives enough detail for someone else to understand. • Arrange your diagram to include annotations where they are helpful. • Experiment with different ways to present your diagram.</li> <li>• Apply your knowledge of linked lever mechanisms to: 1. draw sketches of your barrier 2. show how the barrier will be constructed 3. make the first prototype of your barrier.</li> </ul> <p><u>The Design Process – Evaluation</u> Test your design ideas to see if they work. • Re-think your design decisions</p>	<p>design (think) 7. diagrams or pictures of your improved design (make). Here are some examples of products you may make: • a vehicle • a fan • a motorised pulley system • a motorised geared system. Remember: if your product design does not have a purpose and users in mind you are creating an artwork, not a product. Make sure you design a product.</p> <p><b><u>Learning objectives covered</u></b></p> <ul style="list-style-type: none"> <li>• Use scientific knowledge of the transference of forces to choose appropriate mechanisms for a product (such as levers, winding mechanisms, pulleys and gears).</li> <li>• Design with the user in mind, motivated by the service a product will offer (rather than simply for profit).</li> <li>• Make products through stages of prototypes, making continual refinements.</li> <li>• Ensure products have a high quality finish, using art skills where appropriate.</li> <li>• Use prototypes, cross-sectional diagrams and computer aided designs to represent designs.</li> <li>• Create circuits using electronics kits that employ a number of components (such as LEDs, resistors, transistors and chips).</li> </ul> <p><b>CYCLE B</b></p>
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	<ul style="list-style-type: none"> <li>• Measure and mark out to the nearest centimeter</li> <li>• Demonstrate a range of cutting and shaping techniques (such as tearing, cutting, folding and curling).</li> <li>• Demonstrate a range of joining techniques (such as gluing, hinges or combining materials to strengthen).</li> <li>• Explore objects and designs to identify likes and dislikes of the designs.</li> <li>• Suggest improvements to existing designs.</li> <li>• Explore how products have been created.</li> <li>• Create products using levers, sliders, wheels and winding mechanisms.</li> </ul>	<p>by applying your technical and practical knowledge of linked lever mechanisms. • Modify your design. • Explain your decisions.</p> <p><b><u>Learning objectives covered</u></b></p> <ul style="list-style-type: none"> <li>• Use scientific knowledge of the transference of forces to choose appropriate mechanisms for a product (such as levers, winding mechanisms, pulleys and gears).</li> </ul> <p><b>CYCLE B</b></p> <p><b><u>Mechanical systems</u></b>  <b><u>Pneumatics (Stem Week)</u></b>  <b><u>Moving Monsters</u></b>  <b><i>Master Practical Skills</i></b></p> <ul style="list-style-type: none"> <li>• Use scientific knowledge of the transference of forces to choose appropriate mechanisms for a product (such as levers, winding mechanisms, pulleys and gears).</li> </ul> <p><b><i>Design, Make, Evaluate Improve</i></b></p> <ul style="list-style-type: none"> <li>• Design with purpose by identifying opportunities to design.</li> <li>• Make products by working efficiently (such as by carefully selecting materials).</li> <li>• Refine work and techniques as work progresses, continually evaluating the product design.</li> </ul>	<p><b><u>Pulleys and Gears (3.6) - To produce a motorised car that is battery powered with a secure chassis</u></b></p> <p><b><u>Knowledge Category – Technical knowledge; Practical knowledge; Design inspiration; Design process</u></b></p> <p><b><u>The Design Process – Research and analysis</u></b></p> <ul style="list-style-type: none"> <li>• What is mechanical advantage? • Draw annotated diagrams showing how the following pulleys work: • a simple pulley • a moving pulley • a combined block-and-tackle pulley. • Draw annotated diagrams of how the following gear trains work: • gearing up • mitre gear • gearing down.</li> </ul> <p><b><u>The Design Process – Finger Fluency – Research and Analysis</u></b></p> <ul style="list-style-type: none"> <li>• Label and annotate this picture of a pulley system, showing its design features. • List the materials that the product is likely to be made from. • Apply your knowledge of pulley systems to make a product based on the picture above.</li> </ul> <p><b><u>The Design Process – Idea generation and manufacture.</u></b></p> <ul style="list-style-type: none"> <li>• Practise step 1 of the design process (thinking) by completing your own product outline for an aerial tramway. • For the inspiration section, arrange an annotated mood board to show more details. • Apply</li> </ul>
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***Take inspiration from the greats***

- Identify some of the great designers in all of the areas of study (including pioneers in horticultural techniques) to generate ideas for designs.
- Improve upon existing designs, giving reasons for choices.
- Disassemble products to understand how they work

your knowledge of techniques to decide which will be most appropriate for this task. • Decide which materials you will need to include.

- Adapt the design diagram on the previous page to make your own design diagram for an aerial tramway (cable car).
- Organise your diagram so that it is clear and gives enough detail for someone else to understand.
- Arrange your diagram to include annotations where they are helpful.
- Experiment with different ways to present your diagram.
- Apply your knowledge of pulleys to: 1. draw sketches of your cable car 2. show how the cable car will be constructed 3. make the first prototype of your cable car.
- Combine your knowledge of electrical circuits, and frame and shell structures with your knowledge of pulleys in designing your cable car.

**The Design Process – Mid Point Evaluation**

- Test your design ideas to see if they work.
- Re-think your design decisions by applying your technical and practical knowledge of pulleys.
- Modify your design.
- Explain your decisions

If you wish to extend the task:

- Design and make a pulley system of your choice, remembering to include: 1. a product overview sheet (think) 2. a mood board to give more detail about your inspiration

			<p>(think) 3. a design sheet (think) 4. pictures of your product (make) 5. diagrams or pictures of how you tested your product (break) 6. diagrams or pictures of how you re-thought your design (think) 7. diagrams or pictures of your improved design (make). Here are some examples of products you may make: • a crane • a vehicle with a drive pulley • a heavy lifting device (combining pulleys for maximum mechanical advantage)</p> <p><u>The Design Process – Evaluation</u></p> <ul style="list-style-type: none"> <li>• Test your design ideas to see if they work.</li> <li>• Re-think your design decisions by applying your technical and practical knowledge of motors, electrical circuits, pulleys, and wheels and axles.</li> <li>• Modify your design.</li> <li>• Explain your decisions.</li> </ul> <p><b><u>Learning objectives covered</u></b></p> <ul style="list-style-type: none"> <li>• Use innovative combinations of electronics (or computing) and mechanics in product designs.</li> <li>• 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).</li> <li>• 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).</li> </ul>
<b>Electronics</b>			<b>Food – Bread – 3.9</b>

## **Paper circuits Unit 2.3**

### **Design a paper circuit Christmas/greetings card to sell at a Christmas Fair**

#### **Knowledge Categories:**

**Technical Knowledge, Practical  
Knowledge, Design Inspiration,  
Design Process**

#### **Lesson 1**

##### **Technical Knowledge: Research and Analysis**

Provide children with activities to explore push and close page switches. Children need to know what does conductive mean/copper tape/ What an LED is.

Children to draw an exploded diagram to show how switches can be made with copper tape.

##### **Lesson Objectives:**

- Create series and parallel circuits
- Disassemble products to understand how they work.

#### **Lesson 2**

##### **Practical Knowledge**

##### **Research and Analysis**

##### **Finger Fluency**

Children look at some paper circuits, they then draw and/or annotate a diagram of the circuit to explain how it works.

Y4 Can experiment with a variety of different paper circuits. Pg 194/195

##### **Learning Objectives**

**To make bread rolls that use a variety of ingredients, are well risen, shapes in different ways, have a golden crust and some seeds for interest.**

**Knowledge Category – Technical  
knowledge; Practical  
knowledge; Design inspiration;  
Design process**

##### **The Design Process – Research and analysis**

- Label and annotate pictures of the following breads showing their design features: • bread rolls • pizza • sourdough loaf • sandwich loaf • tea cake. • Describe the safety features to be taken into account when preparing one of these dishes. • List the ingredients that one of the breads is made from.

##### **Finger Fluency**

- Experiment with kneading different types of dough. • Draw and annotate diagrams of your dough. • Analyse how the dough changes as you knead it. • Investigate recipes which involve kneading.

##### **The Design Process – Idea generation and manufacture**

Practise step 1 of the design process (thinking) by completing your own product outline for a type of bread. • For the inspiration section, arrange an

Disassemble products to see how they work.

### **Lesson 3**

#### **Design Inspiration**

#### **Research and Analysis**

**Look at different greetings cards with light up functions.**

**Children list the components that the product is made from.**

**Lesson Objectives as previous lesson.**

### **Lesson 4**

#### **Design Process**

#### **Idea Generation**

Children to design a greetings card that meets their brief.

Children should think about how they will make their design and decide which materials and apply their knowledge of techniques they will be using.

#### **Lesson Objectives:**

- Design with purpose by identifying opportunities to design.

### **Lesson 5**

#### **Design Process**

#### **Making**

Children to apply their knowledge to make a prototype of their design.

- Challenge for Y4 – The lights are very faint on

annotated mood board to show more details. • Apply your knowledge of techniques to decide which will be most appropriate for this task. • Decide which ingredients you will need to include.

#### **Guided Design**

- Adapt the design diagram on the previous page to make your own design diagram for bread rolls.
- Organise your diagram so that it is clear and gives enough detail for someone else to understand.
- Arrange your diagram to include annotations where they are helpful.
- Experiment with different ways to present your diagram.

Apply your knowledge of cooking techniques and nutrition to:

1. draw sketches of how the bread rolls will be constructed
2. list possible ingredients for your bread rolls
3. make the first prototype of your bread rolls
4. list possible additions to the bread dough.

**PROBLEM – THE BREAD DOESN'T RISE ENOUGH. INVESTIGATE WHY NOT.**

#### **The Design Process – Evaluation**

- Investigate how bread proves at different temperatures.
- Test out different water temperatures.
- Analyse any

the card – there are too many LEDs for one cell – they need to solve this problem.

Lesson Objectives:

- Create series and parallel circuits.
- Make products by working efficiently (such as by carefully selecting materials).
- Refine work and techniques as work progresses, continually evaluating the product design.

factors that might stop the bread from rising • Re-think your design decisions by applying your technical and practical knowledge of cooking and nutrition. • When making bread, the normal ratio of yeast to flour is 7 g : 500 g. What will you need to change if you follow this ratio and why? • Modify your recipe. • Explain your decisions.

Remake your bread and improve it.

**Food – Bread**

**Master Practical Skills**

- 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.

**Design, Make Evaluate Improve**

- 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.

		<ul style="list-style-type: none"> <li>• Ensure products have a high quality finish, using art skills where appropriate.</li> </ul> <p><b><i>Take Inspiration from the greats</i></b></p> <ul style="list-style-type: none"> <li>• Combine elements of design from a range of inspirational designers throughout history, giving reasons for choices.</li> <li>• Create innovative designs that improve upon existing products.</li> <li>• Evaluate the design of products so as to suggest improvements to the user experience.</li> </ul>	
		<p><b><u>Shell Structures 2.7</u></b>  <b><u>To create a cardboard chair for a dollhouse</u></b>  <b><u>Knowledge Category- Technical knowledge, Practical Knowledge, Design Inspiration, Design Process</u></b></p> <p><u>The Design Process - Research and analysis (Practical/Technical Knowledge)</u>  Explore the difference between natural and manufactured shell structures. Can children list a variety of shell structures? Describe the construction and purposes of the structures you have listed.</p> <p><u>Finger Fluency</u>  Shaping- score and bend card to make a corner, score and bend to make a curve, bend to make a curve.</p>	<p><b><u>Arch Structures – 3.4</u></b>  <b><u>To create a model school of the future using arch structures</u></b>  <b><u>Knowledge Category – Technical knowledge; Practical knowledge; Design inspiration; Design process</u></b></p> <p><u>The Design Process – Research and analysis</u>  Explore a range of arch structures including ancient Roman ones.</p> <ul style="list-style-type: none"> <li>• What is a keystone? • What is a voussoir? • What is an impost? • What is a pier? • Draw and describe elliptical, parabolic and catenary arch shapes. • Draw an annotated 3-D diagram showing how an arch structure gains its strength.</li> </ul> <p><u>Finger Fluency</u>  Making arches out of paper cups and folded card between 2 solid objects</p>

		<p>Joining -Flange, slots, tab, single foot fold, double foot fold.</p> <p>Experiment with a variety of 3-D shapes, explaining how the shells are made.</p> <p><u>Design Inspiration</u> Explore the cardboard shell structure pg 265/266 Label and annotate the picture of the cardboard igloo showing its design features. List the materials that the product is made from. Apply your knowledge of frame structures to make a product based on the picture above.</p> <p><u>Design Process – Idea generation and manufacture</u> Children to complete a product outline for a cardboard chair. Children to apply their knowledge of techniques to decide which will be the most appropriate for the task. Decide which materials they will need to include.</p> <p><u>Design Process – Evaluation</u> Children to test their design ideas to see if they work. Rethink their design decisions by applying their technical knowledge of shell structures. Modify their design. Explain their decisions. Challenge/Rethink: The sides of the chair are tearing due to pressure</p>	<p>Apply your knowledge of solid structures to make products that have an arch. • Explain how the arches are made, using annotated diagrams. • Experiment with a variety of arches in your products.</p> <p><b><u>The Design Process – Idea generation and manufacture</u></b> Designers take inspiration from existing products. They think about a product’s purpose, its users and how it is designed. Below is a labelled image that shows the curved structure of an office in China that was designed by Zaha Hadid Architects, a British firm that is based in London. It uses steel parabolic curves for the framework and glass for the outer shell.</p> <ul style="list-style-type: none"> <li>• Label and annotate this picture of a house, showing its design features.</li> <li>• List the materials that the product is likely to be made from. • Apply your knowledge of frame structures to make a product based on the picture above.</li> </ul> <p><u>Guided Design</u></p> <ul style="list-style-type: none"> <li>• Practise step 1 of the design process (thinking) by completing your own product outline for a model school. • For the inspiration section, arrange an annotated mood board to show more details. • Apply your knowledge of techniques to decide which will be most appropriate for this task. • Decide</li> </ul>
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		<p>caused by the prisms when someone sits on the chair – Children to re-think the design and attempt to solve the problem.</p> <p><u>Learning Objectives:</u> Materials:</p> <ul style="list-style-type: none"> <li>• Cut materials accurately and safely by selecting appropriate tools.</li> <li>• Measure and mark out to the nearest millimetre.</li> <li>• Apply appropriate cutting and shaping techniques that include cuts within the perimeter of the material (such as slots or cut outs).</li> <li>• Select appropriate joining techniques.</li> </ul> <p>Construction:</p> <ul style="list-style-type: none"> <li>• Choose suitable techniques to construct products or to repair items.</li> <li>• Strengthen materials using suitable techniques</li> </ul> <p>Design/Make/Evaluate</p> <ul style="list-style-type: none"> <li>• Design with purpose by identifying opportunities to design.</li> <li>• Make products by working efficiently (such as by carefully selecting materials).</li> <li>• Refine work and techniques as work progresses, continually evaluating the product design.</li> </ul>	<p>which materials you will need to include.</p> <p>Adapt the design diagram on the previous page to make your own design diagram for a model school. • Organise your diagram so that it is clear and gives enough detail for someone else to understand. • Arrange your diagram to include annotations where they are helpful. • Experiment with different ways to present your diagram.</p> <p>Apply your knowledge of arch structures to: 1. draw sketches of your model school 2. show how the school will be constructed 3. make the first prototype of your school.</p> <p>PROBLEM: The original design has more overhang at the top half of the arch. The way it has been made has the same overhang all the way down, making the classroom too dark. Solution? Design a template in the shape of the roof shell. See p366</p> <p><u>The Design Process – Evaluation</u></p> <ul style="list-style-type: none"> <li>• Test your design ideas to see if they work. • Re-think your design decisions by applying your technical and practical knowledge of arch structures. • Modify your design. • Explain your decisions.</li> </ul> <p><u>Learning Objectives</u></p> <ul style="list-style-type: none"> <li>• Cut materials with precision and refine the finish with appropriate tools (such as sanding wood after</li> </ul>
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			<p>cutting or a more precise scissor cut after roughly cutting out a shape).</p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• Develop a range of practical skills to create products (such as cutting, drilling and screwing, nailing, gluing, filing and sanding).</li> <li>• Design with the user in mind, motivated by the service a product will offer (rather than simply for profit).</li> <li>• Make products through stages of prototypes, making continual refinements.</li> <li>• Ensure products have a high quality finish, using art skills where appropriate.</li> <li>• Use prototypes, cross-sectional diagrams and computer aided designs to represent designs.</li> <li>• Combine elements of design from a range of inspirational designers throughout history, giving reasons for choices.</li> <li>• Evaluate the design of products so as to suggest improvements to the user experience</li> </ul>
		<p><b>Food</b>  <b>Dips Unit 2.9</b>  <a href="#">To make a dip for a friend</a>  <u>Knowledge Category Design Inspiration, Design Process,</u>  <b>Lesson 1</b></p>	<p><b>Cushions- <a href="#">To produce a cushion with a fastening that allows it to be a washable product.</a></b>  <u>Knowledge Category – Technical knowledge; Practical knowledge; Design inspiration; Design process</u></p>

		<p><b>Research and Analysis</b>  Show a Mood Board for a particular dip – ask children to decide what ingredients they think have been used. Ask children to apply their knowledge of cooking techniques to decide which will be the most appropriate for this task.  Children annotate their dip product mood board  Learning Objectives:</p> <p><b>Lesson 2</b>  <b>Design Process</b>  Share design brief.  Children to apply their knowledge of techniques to decide which will be most appropriate to make this product. Children should decide which ingredients they will need to include – give time for children to collect data from their ‘friend’ that they are designing for, so that they select suitable ingredients.  Learning Objectives:</p> <p>Lesson 3  Design Process – Making  Children to make their dips applying their knowledge of cooking techniques and nutrition.  Learning Objectives:</p> <p>Lesson 4  Design Process – Evaluate  Provide children with the problem: Your friend doesn’t like the texture of the dip.</p>	<p><u>The Design Process – Research and analysis</u>  Introduce the unit by telling children that they are going to develop their knowledge of, and skills in, different sewing techniques. Explain that they will be using these skills to design and create their own cushion cover.</p> <ul style="list-style-type: none"> <li>• Tell the children that first they are going to learn more about the product that they will be making.</li> <li>• Use the slides to show the children different types of cushions from different time periods around the world, leading up to the present day and the wide and varied range we have now.</li> <li>• Explain that cushions can be designed to have both ‘functional’ and ‘aesthetic’ features. Do you know what these terms mean? Think, pair, then share your ideas.</li> <li>• Explain that ‘functional’ means it is practical, whilst ‘aesthetic’ refers to how appealing it is visually.</li> <li>• Using the slides, display a range of different cushions. Ask children to discuss the functional and aesthetic features of each one with a partner.</li> <li>• Tell the children that they are now going to analyse some different cushions themselves. Children choose two of the Cushion Picture Cards (encourage them to choose pictures that are markedly different). They sketch and annotate their chosen cards in the boxes at the top of worksheet 1C They compare and contrast them with the guidance of the questions on the sheet.</li> </ul>
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		<p>Ask children to modify the techniques that they used.</p> <p>.</p> <p>.</p>	<p><u>Lesson 2 – Finger Fluency</u> Children investigate which stitch (running stitch, backstitch or overstitch) is best for joining two pieces of fabric together. They can use Sewing Stitches Instruction Sheets A, B and C if needed</p> <p><u>The Design Process – Research and analysis and Idea generation</u> Tell the children that today we are going to focus on the aesthetic features of a cushion cover. Can you remember what this word means? Think, pair, then share your ideas. • Explain that the aesthetics of a design refers to how appealing it is to look at. In what ways can a cushion be made more visually appealing? • Use the slides to discuss how the choice of fabric, use of adornments (such as buttons, beads, ribbons, bows, tassels and frills) and skill of appliqué can be used to make a cushion cover visually attractive. • Explain that today children are going to be exploring how to decorate fabric using their sewing skills.</p> <p>For this activity, the children need to be organised into three mixed ability groups. They will practise three different decorative sewing techniques, spending an allotted amount of time on each activity. Children use the squares of fabric and the Decorative Skills Instructions Cards (which have sections entitled ‘to begin..’, try this next...’, and</p>
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'challenge yourself to...') to practise following techniques: • sewing a button or bead onto fabric • embroidering a shape onto fabric • appliqué (attaching smaller pieces of fabric to the larger piece).

The Design Process – Idea generation and manufacture.

- Adapt the design diagram on the previous page to make your own design diagram for a motorised car.
- Organise your diagram so that it is clear and gives enough detail for someone else to understand.
- Arrange your diagram to include annotations where they are helpful.
- Experiment with different ways to present your diagram.

Tell the children that today we are going to explore different fastenings that could be used for cushions. Explain that most cushions have a resealable opening on one side, where a filling can be added or removed. Why would this be useful? Think, pair, then share your ideas. • What should the success criteria be for a cushion cover fastening? Think, pair, then share your ideas. Explain that it needs to be secure, durable, and, if it is part of the visible design, aesthetically pleasing. • What fastening methods can you think of? Think, pair, then share your ideas. • Show the children pictures of some types of fastenings they could use. What advantages and disadvantages would each method have? Think,

			<p>pair, then share your ideas. • Tell the children that we are going to look at three methods for creating a fastening for our cushion covers: the envelope fold, snap fasteners and buttons with button holes. • Use the slides to show children how to create each type of fastening.</p> <p>Children will follow Instructions Sheet B to practise using snap fasteners as a fastening method for a cushion cover. Extension: Children will follow Instructions Sheet C to practise using buttons and creating button holes as a fastening method for a cushion cover.</p> <p>They need to complete an annotated sketch of their design, record the user and purpose of the cushion cover, and explain their chosen stitches, fastenings, and measurements. They will need to record their order of work for the making process, and explain how they will know if their design has been successful.</p> <p>Children work independently to follow their design to make their cushion cover.</p> <p><u>The Design Process – Evaluation</u></p> <ul style="list-style-type: none"><li>• Test your design ideas to see if they work.</li><li>• Re-think your design decisions by applying your technical and practical knowledge</li><li>• Modify</li></ul>
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your design. • Explain your decisions.

Learning Objectives

***Master Practical Skills***

- 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).

***Design, Make Evaluate Improve***

- 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.

***Take Inspiration from the greats***

- Combine elements of design from a range of inspirational designers throughout history, giving reasons for choices.
- Create innovative designs that improve upon existing products.
- Evaluate the design of products so as to suggest improvements to the user experience.

**Vocabulary Progression Chart for Design and Technology – Key Stage 1**

Milestone 1 - Year 1			Milestone 1 – Year 2		
Topic	Tier 2	Tier 3	Topic	Tier 2	Tier 3
<b><u>What is design and technology? (1.1)</u></b>	<p>Purpose: A product's purpose is what it will be used for</p> <p>Product: A product is something that is made (manufactured), e.g. a table, a chair.</p> <p>Intended user(s): The intended user of a product is who you make it for.</p> <p>Inspiration: If something is the inspiration for your work it is where you got your ideas from.</p> <p>Features: The features of a product are the things that make it recognisable, e.g. a feature of a cup is that it has a handle.</p> <p>Materials: The materials of a product are what it is made from, e.g. a desk may be made from wood and metal.</p> <p>Techniques: The techniques used to make a product are the methods used, e.g. making a frame uses the techniques of cutting and joining.</p>		<b><u>Frame Structures 1.3</u></b>	<p>List: Names, numbers or things one after the other but written down.</p> <p>Draw: To make a picture with a writing tool.</p> <p>Automatically: An automatic action is one that you do without thinking about it.</p> <p>Fluency: If you are fluent in something you do it effortlessly.</p> <p>Accurate: Without making mistakes.</p> <p>Inspiration: Something that inspires you is where you get your ideas from.</p> <p>Purpose: The reason for which something is made.</p> <p>User: The person for whom the product is designed.</p>	<p>Beam: A bar of wood, metal or concrete to support a structure.</p> <p>Column: A tall cylinder that forms part of a structure.</p> <p>Slab: A broad, flat thick piece of wood or stone or other material.</p>



<p><b><u>Structures Introduction (1.2)</u></b></p>	<p>Collect: Gather, pick up Describe: To tell or write about something. List: Names, numbers or things places one after the other but written down. Define: To explain the meaning of something Combined: Put together Connected: Joined or linked together Protect: To keep something or someone safe.</p>	<p>Structure: Something made either in nature or by people. Nature: All things not made by people Manufactured: Made by people Span: To stretch across a space</p>	<p><b>Lever Mechanisms 1.6</b></p>	<p>Force: A pushing or pulling effect.</p>	<p>Rigid: Stiff and does not bend easily. Pivot: If something pivots it balances or turns around a point. Fulcrum: Another word for pivot. Input: Something that goes in. Output: Something that goes out. Lever: A handle used to control or set the position of part in a machine/device.</p>
<p><b><u>Slider Mechanisms - (1.5)</u></b></p>	<p>Rear: if something is at the rear, it is at the back. Rotating: if something is rotating, it is turning Horizontal: flat and level with the ground, rather than at an angle to it Vertical: standing or pointing straight up Diagonal: in a sloping direction. Decorate: to make more beautiful by adding decorations or designs. Attach: If you attach something to an object, you join it or fasten it to the object</p>	<p>Guide bridge: a piece of material that makes something go in the right direction</p>	<p><b><u>Wheel and Axle Mechanisms 1.7</u></b></p>	<p>Force: A pushing or pulling effect. Dowel: A peg or pin that is placed into corresponding holes to join two pieces of wood/materials together. Flange: A collar or rim that projects from a pipe or similar to provide strength and stability or attach different parts. Adapt: Make changes. Prototype: A first model of a design to test out your ideas. Rotating: If something is rotating it is turning. Attach: If you attach something you fasten</p>	<p>Mechanisms: Something that changes the direction or size of a push or a pull. Chassis: The frame on which a vehicle is built. Axle: A bar on which wheels turn.</p>

	<p>Automatically: an automatic action is one that you do without thinking about it</p> <p>Fluency: if you are fluent in something you do it effortlessly</p> <p>Practise: he doing of some activity many times to become skilled at it.</p> <p>Apply: to put on</p> <p>Decide: To choose</p> <p>Test: To try out.</p> <p>Modify: To change</p> <p>Explain: To say how something works or why something is that way.</p>			or join it to another object.	
<b><u>Portable Snacks – 1.8</u></b>	<p>inspiration: where you got your ideas from</p> <p>purpose: the reason for which something is made</p> <p>user: the person for whom the product is designed</p> <p>Annotate: To explain my drawing in writing.</p> <p>Organise: To decide how something should look or be done.</p> <p>Experiment: try different ways of doing something.</p>		<b><u>Couscous Dish 1.9</u></b>	<p>Nutritious: Containing a large amount of vitamins and minerals.</p> <p>Experiment: Try different ways of doing something.</p> <p>Unappealing: Unattractive.</p> <p>Colourful: Made up of different colours.</p> <p>Evaluate: To reflect on an item's effectiveness.</p>	<p>Couscous: Crushed grains originating from Africa.</p> <p>Snip: Cut at an angle</p> <p>Slice: To take form a larger portion by cutting.</p> <p>Chop: To cut by hitting many times.</p>
<b><u>Solid Structures – 1.4</u></b>	<p>solid: made of objects that have little or no space inside them</p>	<p>mortar: cement used to join bricks or stones together</p>	<b><u>Textiles Puppets</u></b>	<p>Template: A pattern used as a guide for drawing or cutting.</p>	<p>Needle: A thin instrument made of steel used for sewing.</p>

	Hollow: something that has space inside it arranged: how objects are placed remove: take something away balanced: if an object is balanced, it stays steady and does not fall	dam: a wall used to block a river bond: how bricks are arranged architects: people who design buildings foundations: the underground bases of structures		Attach: Join different parts together.	Running stitch: Needlework stitch consisting of a small line or series of lines. Textiles: Cloth made by weaving or knitting. Over stitch -
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### Vocabulary Progression Chart for LKS2

#### Milestone 2

Topic	Tier 2	Tier 3
<b>Frame Structures</b>	<b>Triangular</b> <b>Rigid</b> <b>Distribute</b> <b>Pioneer</b> <b>Interlocking</b> <b>Stability</b>	<b>Truss</b> <b>Strut</b> <b>Theory of Triangulation</b> <b>Joining Plate</b> <b>Chord – the top of bottom of a truss structure</b> <b>Pier – a solid structure supporting a bridge</b> <b>Girders</b> <b>Braces</b> <b>Cross beams</b>
<b>Vegetable Soup</b>	<b>Blended</b> <b>Smooth</b> <b>Diced</b> <b>Juicing</b> <b>Crushing</b>	<b>Claw grip</b> <b>Simmering</b> <b>Nutritious</b> <b>Season – add salt and pepper</b> <b>Prototype.</b>
<b>Pencil Cases</b>	<b>Secure</b>	<b>Applique</b> <b>Poppers/press studs</b> <b>Velcro</b> <b>Back stitch</b> <b>Whip Stitch</b> <b>Button hole</b> <b>Embellishments</b>

<b>Linked Levers (Mechanisms)</b>	<b>Operate</b> <b>Paper fasteners/split pins</b> <b>Expand</b> <b>Contract</b> <b>Portable Barrier</b> <b>Uprights</b> <b>Base</b>	<b>Pivot – the point around which a lever turns</b> <b>Fulcrum: The point at which a lever balances or turns</b> <b>Linear - in a straight line</b> <b>Rotary – turning around a fixed point</b> <b>Reciprocating – moving back and forth in a straight line</b> <b>Oscillating: moving back and forth in an arc</b> <b>Arc</b>
<b>Pneumatics (Mechanisms)</b>	<b>Compressed – squashed</b> <b>Pressure – the force that you produce when you press hard on something.</b> <b>Input</b> <b>Output</b> <b>Transferred</b> <b>Platform</b>	<b>Pneumatic – filled with air</b> <b>Hydraulic – filled with water</b> <b>Piston – a disc that slides to and fro in a hollow cylinder</b> <b>Hollow cylinder – a cylinder that is not solid</b> <b>Lever arm</b>
<b>Electronics</b>	<b>Adhesive – able to stick to a surface</b> <b>Exploded diagram – a diagram that is enlarged to show more detail.</b> <b>Illuminate – to light up</b> <b>Circuit</b> <b>Components</b>	<b>LED – light emitting diode – a type of lightbulb</b> <b>Conductive – a material that is conductive allows electricity to pass through it.</b> <b>Cell</b> <b>Battery</b> <b>Insulators</b> <b>Push switch</b> <b>Close page switch</b> <b>Crocodile clips</b> <b>Copper tape</b>
<b>Shell Structures</b>	<b>Internal</b> <b>External</b> <b>Conjunction</b> <b>Contain</b> <b>Cross section</b> <b>Aspects</b> <b>Coordinates</b> <b>Component parts</b> <b>Assemble</b> <b>Net</b>	

	<b>Interlocking Shell</b>	
<b>Dips</b>	<b>Intolerance Balanced diet Bacteria Preserve Refrigerated</b>	<b>Hummus Guacamole Salsa Garnish Consistency Pulses Wholegrain Nutrients</b>
<b>Vocabulary Progression Upper KS2</b>		
<b>Milestone 3</b>		
<b>Food - Bolognese</b>	<b>Traditional Classic Infectious</b>	<b>Sauteing Meat substitute Perishable – perishable foods go bad after a short length of time.</b>
<b>Frame Structures</b>	<b>Arches Lightweight</b>	<b>Tetrahedral (kite)</b>
<b>Electronic motors</b>	<b>Cable tie</b>	<b>Rotary – turning around a fixed point Propeller – A curved spinning blade that causes movement. Transistor Resistors Chips Motor LDR Light dependent resistor</b>
<b>Pulleys and Gears</b>	<b>Circumference – the distance around the edge of a circle Physicist – a person who studies forces such as heat, light, sound gravity and electricity Interlock Ratio</b>	<b>Mechanical Advantage – how much force is increased by using a tool or machine. Archimedes Gear train - a system of gears that transmits power Mitre gear – a gear train with equal sized driver and follower gears. Spindle</b>
<b>Bread</b>	<b>Bake</b>	<b>Yeast</b>

		<b>Sourdough</b> <b>Unleavened</b> <b>Kneading</b> <b>Gluten</b> <b>Prove</b> <b>Microorganisms</b>
<b>Arch Structures</b>	<b>Perfected</b>	<b>Keystone</b> <b>Voussoir</b> <b>Impost</b> <b>Ellipse</b> <b>Parabola – a curve like the path of something that is thrown up into the air.</b> <b>Abutments</b> <b>Foundations</b>
<b>Textiles</b>	<b>Affordable</b> <b>Aesthetic</b> <b>Functionality</b> <b>Resealable</b> <b>Durable</b> <b>Secure</b>	<b>Facing</b> <b>Tassels</b> <b>Envelope fold</b>
<b>Cams</b>	<b>Clockwise</b> <b>Anti-clockwise</b>	<b>Dwell- To stay in one position</b> <b>Eccentric circle – a circle that has an off-centre pivot point.</b> <b>Pear shaped (cam)</b> <b>Snail Shaped (cam)</b> <b>Fall/dwell/rising (relating to the movement)</b> <b>Vice versa: A latin phrase that means the other way around</b> <b>Automaton/automata</b> <b>Crank handle</b>