

# Design Technology: Progression of Skills

*Progression of skills and knowledge*

**Mechanisms / mechanical systems**

		Year 3	Year 4
		Option 2: <b>Pneumatic toys</b>	<b>Making a slingshot car</b>
Skills	Design	<ul style="list-style-type: none"> <li>• Designing a toy which uses a pneumatic system.</li> <li>• Developing design criteria from a design brief.</li> <li>• Generating ideas using thumbnail sketches and exploded diagrams.</li> <li>• Learning that different types of drawings are used in design to explain ideas clearly.</li> </ul>	<ul style="list-style-type: none"> <li>• Designing a shape that reduces air resistance.</li> <li>• Drawing a net to create a structure from.</li> <li>• Choosing shapes that increase or decrease speed as a result of air resistance.</li> <li>• Personalising a design.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>• Creating a pneumatic system to create a desired motion.</li> <li>• Building secure housing for a pneumatic system.</li> <li>• Using syringes and balloons to create different types of pneumatic systems to make a functional and appealing pneumatic toy.</li> <li>• Selecting materials due to their functional and aesthetic characteristics.</li> <li>• Manipulating materials to create different effects by cutting, creasing, folding and weaving.</li> </ul>	<ul style="list-style-type: none"> <li>• Measuring, marking, cutting and assembling with increasing accuracy.</li> <li>• Making a model based on a chosen design.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Using the views of others to improve designs.</li> <li>• Testing and modifying the outcome, suggesting improvements.</li> <li>• Understanding the purpose of exploded-diagrams through the eyes of a designer and their client.</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluating the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance.</li> </ul>
Knowledge	Technical	<ul style="list-style-type: none"> <li>• To understand how pneumatic systems work.</li> <li>• To understand that pneumatic systems can be used as part of a mechanism.</li> <li>• To know that pneumatic systems operate by drawing in, releasing and compressing air.</li> </ul>	<ul style="list-style-type: none"> <li>• To understand that all moving things have kinetic energy.</li> <li>• To understand that kinetic energy is the energy that something (object/person) has by being in motion.</li> <li>• To know that air resistance is the level of drag on an object as it is forced through the air.</li> <li>• To understand that the shape of a moving object will affect how it moves due to air resistance.</li> </ul>
	Additional	<ul style="list-style-type: none"> <li>• To understand how sketches, drawings and diagrams can be used to communicate design ideas.</li> <li>• To know that exploded-diagrams are used to show how different parts of a product fit together.</li> <li>• To know that thumbnail sketches are small drawings to get ideas down on paper quickly.</li> </ul>	<ul style="list-style-type: none"> <li>• To understand that products change and evolve over time.</li> <li>• To know that aesthetics means how an object or product looks in design and technology.</li> <li>• To know that a template is a stencil you can use to help you draw the same shape accurately.</li> <li>• To know that a birds-eye view means a view from a high angle (as if a bird in flight).</li> <li>• To know that graphics are images which are designed to explain or advertise something.</li> <li>• To know that it is important to assess and evaluate design ideas and models against a list of design criteria.</li> </ul>

# Design Technology: Progression of Skills

*Progression of skills and knowledge*

Mechanisms / mechanical systems

Year 5

**\*New\* Gears and pulleys**

Skills	Design	<ul style="list-style-type: none"> <li>Noticing wider-reaching problems or needs in the community.</li> <li>Identifying a wide range of needs and potential barriers through market research.</li> <li>Writing more complex problem statements that consider multiple factors and constraints.</li> <li>Creating more complex design criteria that require considering detailed user needs, environmental impact, materials and cost.</li> <li>Coming up with a broader range of ideas and deeper innovation, requiring pupils to think critically about their ideas' practicality and originality.</li> <li>Beginning to use more complex annotated sketches, such as cross-sectional and exploded diagrams and pattern pieces in design.</li> <li>Using a series of prototypes to refine and improve their designs.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>Consistently apply safety instructions.</li> <li>Select appropriate scissors to handle delicate cutting tasks and challenging materials.</li> <li>Cutting patterns and drawings accurately.</li> <li>In supervised groups, using hot glue guns safely.</li> <li>Recognising that hot glue is useful for joining materials that need a strong bond that sets quickly.</li> <li>Choosing PVA glue over hot glue for its safety when joining materials in less intensive projects.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>Reflecting on the usability, aesthetics, innovation and sustainability of products and discussing how design choices impact these aspects.</li> <li>Assessing their designs against a more complex set of design criteria that includes functionality, aesthetics, user experience, sustainability and cost.</li> <li>Considering alternative materials, tools or techniques that could enhance the product.</li> <li>Providing feedback that is helpful, specific, and encouraging.</li> <li>Incorporating feedback from peers or users improve their product further, explaining the changes they made and the impact they had.</li> </ul>
Knowledge	Technical	<ul style="list-style-type: none"> <li>That mechanical systems that use gears in everyday objects (eg bicycle, clock).</li> <li>That gears and pulleys allow us to transfer movement and force from one part of a mechanical system to another.</li> <li>That gears allow us to increase the output of a mechanism.</li> </ul>
	Additional	<ul style="list-style-type: none"> <li>That market research is a way of collecting information about problems or needs.</li> <li>That constraints are things that might stop our ideas being successful.</li> <li>That original and innovative ideas are different from what has been made before.</li> <li>That annotations are detailed labels and comments on diagrams.</li> <li>That risks are things that might happen.</li> <li>That hot glue creates a strong bond quickly.</li> <li>That is often better to choose safer equipment.</li> <li>That sustainability means thinking about the materials that were used to make a product and how the product was made.</li> <li>That their final product can still be improved by different materials or techniques.</li> <li>That evaluating their designs in detail will help them understand its successful and less successful parts.</li> <li>That feedback should be positive, helpful and specific.</li> <li>That explaining how they used feedback to improve their design can help them create better products in the future.</li> </ul>

# Design Technology: Progression of Skills

## Mechanisms / mechanical systems

### Year 6

#### Automata toys

- Noticing wider-reaching problems or needs in the community.
  - Coming up with a broader range of ideas and deeper innovation, requiring pupils to think critically about their ideas' practicality and originality.
  - Beginning to use more complex annotated sketches, such as cross-sectional and exploded diagrams and pattern pieces in design.
- Producing lists of equipment, materials and tools that they need for a task.
  - Selecting materials, components or ingredients based on research or user needs.
  - Explaining their choices, referring to their research.
  - Considering which equipment will work well together.
  - Choosing from the known range of equipment available to them with little guidance.
  - Assessing risks associated with different tools and equipment.
  - Understanding and explaining the importance of each safety rule.
  - Consistently apply safety instructions.
  - Cutting jelutong or other harder wood with a coping saw or a tenon saw in small groups.
  - Cutting in a back-and-forth sawing motion where appropriate.
  - In supervised groups, using hot glue guns safely.
  - Recognising that hot glue is useful for joining materials that need a strong bond that sets quickly.
- Assessing their designs against a more complex set of design criteria that includes functionality, aesthetics, user experience, sustainability and cost.
  - Providing feedback that is helpful, specific and encouraging.
  - Incorporating feedback from peers or users to improve their product further, explaining the changes they made and the impact they had.
- To know that the mechanism in an automata uses a system of cams, axles and followers.
  - To know that different shaped cams produce different outputs.
  - To know which mechanisms are working together to make a mechanical system.
  - To know that there are different directions of movement.
  - To know that mechanisms can change one type of movement to another.
- To know that an automata is a hand powered mechanical toy.
  - To know that a cross-sectional diagram shows the inner workings of a product.

# Design Technology: Progression of Skills

## Progression of skills and knowledge

## Cooking and nutrition

		Year 3	Year 4
		<u>Eating seasonally</u>	<u>Adapting a recipe</u>
Skills	Design	<ul style="list-style-type: none"> <li>• Describing how climate affects where foods grow.</li> </ul>	<ul style="list-style-type: none"> <li>• Designing a biscuit within a given budget.</li> <li>• Conducting market research.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>• Identifying seasonal ingredients from the UK.</li> <li>• Following the instructions within a recipe.</li> <li>• Tasting seasonal ingredients.</li> <li>• Peeling foods by hand or with a peeler.</li> <li>• Cutting ingredients safely.</li> <li>• Choosing ingredients based on a design brief.</li> </ul>	<ul style="list-style-type: none"> <li>• Following a baking recipe.</li> <li>• Understanding safety and hygiene rules.</li> <li>• Adapting a recipe.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Describing the texture and flavour of ingredients.</li> <li>• Describing the benefits of seasonal fruits and vegetables and the impact on the environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluating an adapted recipe.</li> <li>• Evaluating and comparing a range of products.</li> <li>• Suggesting modifications.</li> </ul>
Knowledge		<ul style="list-style-type: none"> <li>• To know that seasonal means foods that grow in a given season in a given country.</li> <li>• To know some seasonal foods that grow in the UK and what season they grow in.</li> <li>• To know that eating seasonal foods can have a positive impact on the environment.</li> <li>• To know how to describe the flavour and texture of foods.</li> <li>• To know how to cut a peel safely.</li> <li>• To know that the appearance of food is as important as taste.</li> <li>• To know that similar coloured fruits and vegetables often have similar nutritional benefits.</li> </ul>	<ul style="list-style-type: none"> <li>• To know that the amount of an ingredient in a recipe is known as the 'quantity'.</li> <li>• To know that safety and hygiene are important when cooking.</li> <li>• To know the following cooking techniques: sieving, measuring, stirring, cutting out and shaping.</li> <li>• To know the importance of budgeting while planning ingredients for a recipe.</li> <li>• To know that products often have a target audience.</li> </ul>

# Design Technology: Progression of Skills

*Progression of skills and knowledge*

**Cooking and nutrition**

		Year 5	Year 6
		<u>Developing a recipe</u>	<u>Come dine with me</u>
Skills	Design	<ul style="list-style-type: none"> <li>• Researching existing recipes.</li> <li>• Suggesting alternative ingredients.</li> <li>• Designing a jar label.</li> </ul>	<ul style="list-style-type: none"> <li>• Writing a recipe, explaining the key steps, method and ingredients.</li> <li>• Including facts and drawings from research undertaken.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>• Writing an alternative recipe.</li> <li>• Understanding cross-contamination.</li> <li>• Using preparation skills.</li> <li>• Making a developed recipe.</li> </ul>	<ul style="list-style-type: none"> <li>• Following a recipe, including using the correct quantities of each ingredient.</li> <li>• Adapting a recipe based on research.</li> <li>• Working to a given timescale.</li> <li>• Working safely and hygienically with independence.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Explaining the farm to fork process.</li> <li>• Analysing nutritional content.</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluating a recipe, considering: taste, smell, texture and origin of the food group.</li> <li>• Taste testing and scoring final products.</li> <li>• Suggesting and writing up points of improvements in productions.</li> <li>• Evaluating health and safety in production to minimise cross contamination.</li> </ul>
Knowledge		<ul style="list-style-type: none"> <li>• To know that beef comes from cows reared on farms.</li> <li>• To know that recipes can be adapted to suit nutritional needs and dietary requirements.</li> <li>• To know that nutritional information is found on food packaging.</li> <li>• To know that coloured chopping boards can prevent cross-contamination.</li> <li>• To know that food packaging serves many purposes.</li> </ul>	<ul style="list-style-type: none"> <li>• To know that 'flavour' is how a food or drink tastes.</li> <li>• To know that many countries have 'national dishes' which are recipes associated with that country.</li> <li>• To know that 'processed food' means food that has been put through multiple changes in a factory.</li> <li>• To understand that it is important to wash fruit and vegetables before eating to remove any dirt and insecticides.</li> <li>• To understand what happens to a certain food before it appears on the supermarket shelf (Farm to Fork).</li> </ul>

# Design Technology: Progression of Skills

## Progression of skills and knowledge

## Textiles

		Year 3	Year 4
		Cross-stitch and appliqué <u>Cushions</u> or <u>Egyptian collars</u>	<u>Fastenings</u>
Skills	Design	<ul style="list-style-type: none"> <li>• Designing and making a template from an existing cushion and applying individual design criteria.</li> </ul>	<ul style="list-style-type: none"> <li>• Writing design criteria for a product, articulating decisions made.</li> <li>• Designing a personalised book sleeve.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>• Following design criteria to create a cushion or Egyptian collar.</li> <li>• Selecting and cutting fabrics with ease using fabric scissors.</li> <li>• Threading needles with greater independence.</li> <li>• Tying knots with greater independence.</li> <li>• Sewing cross stitch to join fabric.</li> <li>• Decorating fabric using appliqué.</li> <li>• Completing design ideas with stuffing and sewing the edges (Cushions) or embellishing the collars based on design ideas (Egyptian collars).</li> </ul>	<ul style="list-style-type: none"> <li>• Making and testing a paper template with accuracy and in keeping with the design criteria.</li> <li>• Measuring, marking and cutting fabric using a paper template.</li> <li>• Selecting a stitch style to join fabric.</li> <li>• Working neatly by sewing small, straight stitches.</li> <li>• Incorporating a fastening to a design.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Evaluating an end product and thinking of other ways in which to create similar items.</li> </ul>	<ul style="list-style-type: none"> <li>• Testing and evaluating an end product against the original design criteria.</li> <li>• Deciding how many of the criteria should be met for the product to be considered successful.</li> <li>• Suggesting modifications for improvement.</li> <li>• Articulating the advantages and disadvantages of different fastening types.</li> </ul>
Knowledge		<ul style="list-style-type: none"> <li>• To know that applique is a way of mending or decorating a textile by applying smaller pieces of fabric to larger pieces.</li> <li>• To know that when two edges of fabric have been joined together it is called a seam.</li> <li>• To know that it is important to leave space on the fabric for the seam.</li> <li>• To understand that some products are turned inside out after sewing so the stitching is hidden.</li> </ul>	<ul style="list-style-type: none"> <li>• To know that a fastening is something which holds two pieces of material together for example a zipper, toggle, button, press stud and velcro.</li> <li>• To know that different fastening types are useful for different purposes.</li> <li>• To know that creating a mock up (prototype) of their design is useful for checking ideas and proportions.</li> </ul>

# Design Technology: Progression of Skills

*Progression of skills and knowledge*

**Textiles**

**Year 5**

**Stuffed toys**

**Skills**

**Design**

- Designing a stuffed toy, considering the main component shapes required and creating an appropriate template.
- Considering the proportions of individual components.

**Make**

- Creating a 3D stuffed toy from a 2D design.
- Measuring, marking and cutting fabric accurately and independently .
- Creating strong and secure blanket stitches when joining fabric.
- Threading needles independently.
- Using appliqué to attach pieces of fabric decoration.
- Sewing blanket stitch to join fabric.
- Applying blanket stitch so the spaces between the stitches are even and regular.

**Evaluate**

- Testing and evaluating an end product and giving point for further improvements.

**Knowledge**

- To know that blanket stitch is useful to reinforce the edges of a fabric material or join two pieces of fabric.
- To understand that it is easier to finish simpler designs to a high standard.
- To know that soft toys are often made by creating appendages separately and then attaching them to the main body.
- To know that small, neat stitches which are pulled taut are important to ensure that the soft toy is strong and holds the stuffing securely.

# Design Technology: Progression of Skills

*Progression of skills and knowledge*

**Textiles**

		Year 6	
		Option 1: <b>Bags</b>	Option 2: <b>Waistcoats</b>
Skills	Design	<ul style="list-style-type: none"> <li>Developing annotated sketches to communicate design ideas.</li> <li>Creating pattern pieces to use in design.</li> </ul>	<ul style="list-style-type: none"> <li>Designing a waistcoat in accordance to a specification linked to set of design criteria.</li> <li>Annotating designs, to explain their decisions.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>Using a ruler to accurately measure and draw lines and marks.</li> <li>Using nets to create 3D objects.</li> </ul>	<ul style="list-style-type: none"> <li>Using a template when cutting fabric to ensure they achieve the correct shape.</li> <li>Using pins effectively to secure a template to fabric without creases or bulges.</li> <li>Marking and cutting fabric accurately, in accordance with their design.</li> <li>Sewing a strong running stitch, making small, neat stitches and following the edge.</li> <li>Tying strong knots.</li> <li>Decorating a waistcoat, attaching features (such as appliqué) using thread.</li> <li>Finishing the waistcoat with a secure fastening (such as buttons).</li> <li>Learning different decorative stitches.</li> <li>Sewing accurately with evenly spaced, neat stitches.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>Reflecting on the functionality and aesthetics of products.</li> <li>Discussing reasons for design choices.</li> </ul>	<ul style="list-style-type: none"> <li>Reflecting on their work continually throughout the design, make and evaluate process.</li> </ul>
	Technical	<ul style="list-style-type: none"> <li>Using pins effectively to secure a template to fabric without creases or bulges.</li> <li>Threading needles independently.</li> <li>Tying knots at the end of thread to secure it.</li> <li>Selecting textiles and buttons to improve aesthetics and function.</li> <li>Attaching objects like buttons using thread.</li> </ul>	
Knowledge		<ul style="list-style-type: none"> <li>To know that nets can be folded to create 3D shapes.</li> <li>To know that pattern pieces are like nets/templates.</li> <li>To know how designers use pattern pieces when creating textiles products.</li> <li>To know that products are sometimes made in parts that are sewn together.</li> <li>To know that safety pins can hold fabric in place before sewing.</li> <li>To know that there are different types of stitches.</li> <li>To know what a running stitch is.</li> <li>To know that aesthetics is how something looks.</li> <li>To know that consistently sized stitches improve the aesthetic of a product.</li> <li>To know that the shape of an object can affect both its aesthetics and function.</li> </ul>	<ul style="list-style-type: none"> <li>To understand that it is important to design clothing with the client/ target customer in mind.</li> <li>To know that using a template (or clothing pattern) helps to accurately mark out a design on fabric.</li> <li>To understand the importance of consistently sized stitches.</li> </ul>

# Design Technology: Progression of Skills

## Structures

### Year 3

#### Constructing a castle

- Designing a castle with key features to appeal to a specific person/purpose.
  - Drawing and labelling a castle design using 2D shapes, labelling: -the 3D shapes that will create the features - materials needed and colours.
  - Designing and/or decorating a castle tower on CAD software.
- Constructing a range of 3D geometric shapes using nets.
  - Creating special features for individual designs.
  - Making facades from a range of recycled materials.
- Evaluating own work and the work of others based on the aesthetic of the finished product and in comparison to the original design.
  - Suggesting points for modification of the individual designs.
- To understand that wide and flat based objects are more stable.
  - To understand the importance of strength and stiffness in structures.
- To know the following features of a castle: flags, towers, battlements, turrets, curtain walls, moat, drawbridge and gatehouse - and their purpose.
  - To know that a façade is the front of a structure.
  - To understand that a castle needed to be strong and stable to withstand enemy attack.
  - To know that a paper net is a flat 2D shape that can become a 3D shape once

# Design Technology: Progression of Skills

		Option 1: <u>Helmets</u>
Skills	Design	<ul style="list-style-type: none"> <li>• Creating simple design criteria that outline basic functionality and appeal to individual users or target audiences.</li> <li>• Noticing simple problems or needs in everyday life.</li> <li>• Developing drawing and sketching skills with a focus on clarity and simplicity.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>• Selecting materials, components or ingredients based on their form as well as their functional properties.</li> <li>• Explaining choices with regard to function and form.</li> <li>• Choosing shapes to suit the function of a product.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Evaluating designs by comparing them against design criteria.</li> <li>• Considering feedback from peers to suggest improvements.</li> <li>• Evaluating how effective the chosen materials were in fulfilling the design brief.</li> </ul>
Knowledge	Technical	<ul style="list-style-type: none"> <li>• Strengthening structures by layering materials (lamination).</li> <li>• Strengthening structures by ribbing.</li> <li>• To know how some different structures are built.</li> <li>• To know that structures can be strengthened by manipulating materials and shapes.</li> <li>• To know a shell structure is a hollow shape with a thin outer layer.</li> </ul>
	Additional	<ul style="list-style-type: none"> <li>• To know form is the look and shape of something.</li> <li>• To know function is what something does and how it works.</li> <li>• To know that creating accurate shapes improves how they look and sometimes their function.</li> <li>• To know choices of materials and equipment can affect the final product.</li> </ul>

# Design Technology: Progression of Skills

		Year 5	Year 6
		<u>Bridges</u>	<u>Playgrounds</u>
Skills	Design	<ul style="list-style-type: none"> <li>• Designing a stable structure that is able to support weight.</li> <li>• Creating a frame structure with a focus on triangulation.</li> </ul>	<ul style="list-style-type: none"> <li>• Designing a playground featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs.</li> </ul>
	Make	<ul style="list-style-type: none"> <li>• Making a range of different shaped beam bridges.</li> <li>• Using triangles to create truss bridges that span a given distance and support a load.</li> <li>• Building a wooden bridge structure.</li> <li>• Independently measuring and marking wood accurately.</li> <li>• Selecting appropriate tools and equipment for particular tasks.</li> <li>• Using the correct techniques to saws safely.</li> <li>• Identifying where a structure needs reinforcement and using card corners for support.</li> <li>• Explaining why selecting appropriating materials is an important part of the design process.</li> <li>• Understanding basic wood functional properties.</li> </ul>	<ul style="list-style-type: none"> <li>• Building a range of play apparatus structures drawing upon new and prior knowledge of structures.</li> <li>• Measuring, marking and cutting wood to create a range of structures.</li> <li>• Using a range of materials to reinforce and add decoration to structures.</li> </ul>
	Evaluate	<ul style="list-style-type: none"> <li>• Adapting and improving own bridge structure by identifying points of weakness and reinforcing them as necessary.</li> <li>• Suggesting points for improvements for own bridges and those designed by others.</li> </ul>	<ul style="list-style-type: none"> <li>• Improving a design plan based on peer evaluation.</li> <li>• Testing and adapting a design to improve it as it is developed.</li> <li>• Identifying what makes a successful structure.</li> </ul>
Knowledge	Technical	<ul style="list-style-type: none"> <li>• To understand some different ways to reinforce structures.</li> <li>• To understand how triangles can be used to reinforce bridges.</li> <li>• To know that properties are words that describe the form and function of materials.</li> <li>• To understand why material selection is important based on properties.</li> <li>• To understand the material (functional and aesthetic) properties of wood.</li> </ul>	<ul style="list-style-type: none"> <li>• To know that structures can be strengthened by manipulating materials and shapes.</li> </ul>
	Additional	<ul style="list-style-type: none"> <li>• To understand the difference between arch, beam, truss and suspension bridges.</li> <li>• To understand how to carry and use a saw safely.</li> </ul>	<ul style="list-style-type: none"> <li>• To understand what a 'footprint plan' is.</li> <li>• To understand that in the real world, design, can impact users in positive and negative ways.</li> <li>• To know that a prototype is a cheap model to test a design idea.</li> </ul>



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