

# Design Technology Curriculum

The broad aims of our DT curriculum at Wave are in line with the aims of the National Curriculum. We value the practical education of our pupils, and want them to have the very best experience of designing and making, as well as learners, able to evaluate and improve their creations, and reflect on work of others. We run a rolling programme of 3 half termly units a year, complementing our Art curriculum. Pupils can build and develop their skills and learning throughout the year in the many opportunities teachers provide and can link to broader learning in AP. We have mixed year classes, so teach a Year A and B spiral curriculum model to ensure coverage.

		Autumn	Spring	Summer
KS1	Year A	Structures Constructing a Windmill	Textiles Puppets	Mechanisms Making a Moving Monster
	Year B	Structures Baby Bears Chair	Mechanisms Fairground Wheel	Cooking and Nutrition Smoothies
LKS2	Year A	Structures Constructing a Castle	Digital World Wearing Technology	Cooking and Nutrition Eating Seasonally
	Year B	Structures Pavilions	Mechanical Systems Making a Sling Shot Car	Electrical Systems Torches
UKS2	Year A	Electrical Systems Doodlers	Mechanical Systems Making a Pop-Up Book	Cooking and Nutrition Developing a Recipe
	Year B	Textiles Waistcoats	Structure Playgrounds	Digital World Navigating the World

## Composite:

### 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 [for example, 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 [for example, levers, sliders, wheels and axles], in their products.

# Key Stage 1

## Year A

### Unit 1A: Structures - Constructing a Windmill

Designing, decorating and building a windmill for their mouse client to live in, developing an understanding of different types of windmills, how they work and their key features.

Outcomes:

- ✓ Follow design criteria to meet the needs of a user.
- ✓ Make a stable structure.
- ✓ Make functioning sails/blades that attach to the supporting structure.
- ✓ Improve their windmill.

Learning Objectives	Learning Outcomes
To include individual preferences and requirements in my design.	<ul style="list-style-type: none"><li>• I can understand what a windmill is.</li><li>• I can describe the purpose of structures.</li><li>• I can understand the importance of clear design criteria.</li><li>• I can understand what a net is.</li><li>•</li></ul>
To make a stable structure.	<ul style="list-style-type: none"><li>• I can follow instructions to cut and assemble the supporting structure of my windmill.</li><li>• I can understand that the shape of materials can be changed to improve the strength and stiffness of structures.</li><li>• I can identify a cylinder as a strong type of structure that is often used for windmills and lighthouses.</li><li>• I can understand what stable means and can ensure my structure has this property.</li></ul>
To join parts of a structure.	<ul style="list-style-type: none"><li>• I can widen a hole.</li><li>• I can join parts together.</li><li>• I can attach a supporting structure.</li><li>• I can test a structure.</li></ul>
To evaluate a structure.	<ul style="list-style-type: none"><li>• I can test my windmill.</li><li>• I can make my design better.</li><li>• I can decorate my windmill for the user.</li></ul>

### Unit 2A: Textiles - Puppets

Pupils will explore different ways of joining fabrics before creating hand puppets based upon characters from a well-known fairy tale. Develop technical skills of cutting, gluing, stapling and pinning.

Outcomes:

- ✓ Join fabrics together using pins, staples or glue.
- ✓ Design a puppet and use a template.
- ✓ Join their two puppets' faces together as one.
- ✓ Decorate a puppet to match their design.
- ✓ Evaluate my design

The unit can be linked to whichever Story the class may currently be studying.

Learning Objectives	Learning Outcomes
To join fabrics together using different methods	<ul style="list-style-type: none"><li>• I can talk about different techniques that may be used to join fabrics for different purposes</li><li>• I know how to join fabric by pinning, stapling or gluing</li></ul>

To use a template to create my design	<ul style="list-style-type: none"> <li>• I can design a puppet</li> <li>• I can build my design on a template</li> </ul>
To join two fabrics together accurately	<ul style="list-style-type: none"> <li>• I can join fabrics together</li> <li>• I can align two pieces of fabric</li> <li>• I know how to use a template</li> <li>• I can fit my hand into my puppet</li> </ul>
To embellish my design using joining methods	<ul style="list-style-type: none"> <li>• I can use joining methods to decorate my puppet</li> <li>• I can still put my hand into the puppet after it is decorated</li> <li>• I can evaluate mine and others' work</li> </ul>

### Unit 3A Making a Moving Monster

Explore levers, linkages and pivots through existing products and experimentation, use this research to construct and assemble a moving monster.

Outcomes:

- ✓ Identify the correct terms for levers, linkages and pivots.
- ✓ Analyse popular toys with the correct terminology.
- ✓ Create functional linkages that produce the desired input and output motions.
- ✓ Design monsters suitable for children, which satisfy most of the design criteria.
- ✓ Evaluate their two designs against the design criteria, using this information and the feedback of their peers to choose their best design.
- ✓ Select and assemble materials to create their planned monster features.
- ✓ Assemble the monster to their linkages without affecting their functionality.

Learning Objectives	Learning Outcomes
To look at objects and understand how they move.	<ul style="list-style-type: none"> <li>• I can understand that mechanisms are a collection of moving parts that work together in a machine.</li> <li>• I can understand that there is always an input and output in a mechanism.</li> <li>• I can identify mechanisms in everyday objects.</li> <li>• I can understand that a lever is something that turns on a pivot.</li> <li>• I can understand that a linkage is a system of levers that are connected by pivots.</li> <li>• I can help devise whole-class design criteria for what our moving monster should do.</li> </ul>
To look at objects and understand how they move.	<ul style="list-style-type: none"> <li>• I can understand that mechanisms are a collection of moving parts that work together in a machine.</li> <li>• I can understand that there is always an input and output in a mechanism.</li> <li>• I can understand that a lever is something that turns on a pivot.</li> <li>• I can understand that a linkage is a system of levers that are connected by pivots.</li> </ul>
To explore different design options.	<ul style="list-style-type: none"> <li>• I can understand that linkages use levers and pivots to create motion.</li> <li>• I can think of two of my own points to add to the class design criteria.</li> <li>• I can draw two moving monster designs that meet all points of my design criteria.</li> <li>• I can design the linkage I will use to make my monster move.</li> </ul>
To make a moving monster.	<ul style="list-style-type: none"> <li>• I can make linkages by connecting levers and pivots.</li> <li>• I can understand that materials can be selected according to their characteristics.</li> <li>• I can design and make the features of my monster.</li> <li>• I can evaluate how functional my monster is and whether it meets the Design Criteria.</li> </ul>

## Year B

### Unit 1B Structures - Baby Bear's Chair

Using the tale of Goldilocks and the Three Bears as inspiration, pupils help Baby Bear by making him a brand-new chair, exploring different shapes and materials. When designing the chair, they consider his needs and what he likes.

Outcomes:

- ✓ Identify man-made and natural structures.
  - ✓ Identify stable and unstable structural shapes.
  - ✓ Contribute to discussions.
  - ✓ Identify features that make a chair stable.
  - ✓ Work independently to make a stable structure, following a demonstration.
  - ✓ Explain how their ideas would be suitable for Baby Bear.
  - ✓ Produce a model that supports a teddy, using the appropriate materials and construction techniques.
- Explain how they made their model strong, stiff and stable

Learning Objectives	Learning Outcomes
To explore the concept and features of structures and the stability of different shapes	<ul style="list-style-type: none"> <li>• I can identify natural and man-made structures</li> <li>• I understand what is meant by stability and can identify when a structure is more or less stable than another</li> <li>• I know that shapes and structures with wide, flat bases or legs are the most stable</li> </ul>
<p>To explore strength in different structures</p> <p>To understand that the shape of the structure affects its strength</p>	<ul style="list-style-type: none"> <li>• I know the meaning of the words strength, stiffness and stability</li> <li>• I know there are different ways paper can be folded to improve its strength and stiffness</li> <li>• I can build a strong and stiff structure by folding paper</li> <li>• I can test the strength of my structure</li> </ul>
To make a structure according to design criteria	<ul style="list-style-type: none"> <li>• I can remember that chairs are structures and need to be strong, stiff and stable</li> <li>• I know how to create joints and structures from paper/card and tape</li> </ul>
To produce a finished structure and evaluate its strength, stiffness and stability	<ul style="list-style-type: none"> <li>• I know that the chair I design for Baby Bear needs to: support Teddy; be strong, stiff and stable</li> <li>• I know how to create joints and structures</li> <li>• I can evaluate my structure according to the design criteria</li> </ul>

## Unit 2B: Mechanisms - Fairground Wheel

Designing and creating their own Ferris wheels, considering how the different components fit together so that the wheels rotate and the structures stand freely. Pupils select appropriate materials and develop their cutting and joining skills.

Outcomes:

- ✓ Design and label a wheel.
- ✓ Consider the designs of others and make comments about their practicality or appeal.
- ✓ Consider the materials, shape, construction and mechanisms of their wheel.
- ✓ Label their designs.
- ✓ Build a stable structure with a rotating wheel.
- ✓ Test and adapt their designs as necessary.
- ✓ Follow a design plan to make a completed model of the wheel.

Learning Objectives	Learning Outcomes
To explore wheel mechanisms and design a Ferris wheel.	<ul style="list-style-type: none"> <li>• I can describe how axles help wheels to move a vehicle.</li> <li>• I can evaluate different designs.</li> <li>• I can design and label a working wheel.</li> </ul>
To select appropriate materials.	<ul style="list-style-type: none"> <li>• I can understand the properties of different materials.</li> <li>• I can communicate my ideas to someone else.</li> <li>• I can select appropriate materials for my wheel.</li> </ul>
To build and test a moving wheel.	<ul style="list-style-type: none"> <li>• I can build a stable structure.</li> <li>• I can test elements of my design.</li> <li>• I can adapt my design as necessary.</li> </ul>

	<ul style="list-style-type: none"> <li>I can make the wheel rotate.</li> </ul>
To make and evaluate a structure with a rotating wheel.	<ul style="list-style-type: none"> <li>I can evaluate a wheel mechanism and adapt it as necessary.</li> <li>I can ensure that my pods stay upright when rotating around a fixed point.</li> </ul>

### Unit 3B: Cooking and Nutrition – Smoothies

Handle and explore fruits and vegetables and learn how to identify fruit, before undertaking taste testing to establish chosen ingredients for a smoothie they will make, with accompanying packaging.

Outcomes:

- ✓ Describe fruits and vegetables and explain why they are a fruit or a vegetable.
- ✓ Name a range of places that fruits and vegetables grow.
- ✓ Describe basic characteristics of fruit and vegetables.
- ✓ Prepare fruits and vegetables to make a smoothies.

Learning Objectives	Learning Outcomes
To identify fruits.	<ul style="list-style-type: none"> <li>I can name fruits and vegetables.</li> <li>I can identify seeds.</li> <li>I can sort fruits and non-fruits.</li> </ul>
To describe where fruits and vegetables grow.	<ul style="list-style-type: none"> <li>I can name places where fruits and vegetables grow.</li> <li>I can decide whether a fruit or vegetable will grow aboveground or underground.</li> <li>I can make predictions about where edible parts of plants will grow</li> </ul>
To practise food preparation skills.	<ul style="list-style-type: none"> <li>I can use a fork to hold foods I am cutting.</li> <li>I can use a table knife to cut soft foods.</li> <li>I can use a juicer to get juice from fruits.</li> <li>I can work safely and follow instructions.</li> </ul>
To select ingredients for a recipe.	<ul style="list-style-type: none"> <li>I can choose fruits and vegetables to taste.</li> <li>I can suggest fruits to put together based on taste.</li> <li>I can describe a food's taste.</li> <li>I can decide on three ingredients to create a recipe.</li> </ul>

## Lower Key Stage 2

### Year A

#### Unit 1A: Structures - Constructing a Castle

Learning about the features of a castle, pupils design and make one of their own. They will also be using configurations of handmade nets and recycled materials to make towers and turrets before constructing a stable base.

Outcomes:

- ✓ Draw and label a simple castle that includes the most common features.
- ✓ Recognise that a castle is made up of multiple 3D shapes.
- ✓ Design a castle with key features which satisfy a given purpose.
- ✓ Score or cut along lines on the net of a 2D shape.
- ✓ Use glue to securely assemble geometric shapes.
- ✓ Utilise skills to build a complex structure from simple geometric shapes.
- ✓ Evaluate their work by answering simple questions.

Learning Objectives	Learning Outcomes
To recognise how multiple shapes (2D and 3D) are combined to form a strong and stable structure.	<ul style="list-style-type: none"> <li>I can identify different features of castles.</li> <li>I can design my own castle.</li> <li>I can label the features of my castle.</li> <li>I can explain why a castle needs to be strong and stable.</li> <li></li> </ul>
To design a castle.	<ul style="list-style-type: none"> <li>I can recall the features of a castle.</li> <li>I can add two design points to the design specification to appeal to the person/purpose of my castle.</li> <li>I can draw the design of my castle using 2D shapes and labelling: <ul style="list-style-type: none"> <li>the 3D shapes that will create the features;</li> <li>the materials I need;</li> <li>the colours I will use.</li> </ul> </li> </ul>
To construct 3D nets.	<ul style="list-style-type: none"> <li>I know that a net is what a 3D shape would look like if it were opened out flat.</li> <li>I can construct a range of 3D geometric shapes using a net by <ul style="list-style-type: none"> <li>Cutting along the bold lines.</li> <li>Folding along the dotted lines.</li> <li>Keeping the tabs the correct size.</li> <li>Making crisply folded edges.</li> </ul> </li> <li>Constructing the net using glue to make a geometric shape.</li> </ul>
To construct and evaluate my final product.	<ul style="list-style-type: none"> <li>I can construct my castle to meet the requirements of my brief by: <ul style="list-style-type: none"> <li>Making neat 3D shapes using nets.</li> <li>Stacking shapes and recyclable materials to make the structures of my castle.</li> <li>Creating a castle base to secure my structures to.</li> <li>Adorning my castle with facades and other decorative features</li> </ul> </li> <li>I can evaluate my work and the work of others.</li> </ul>

### Unit 2A: Digital World: Wearable Technology

**Design, code and promote a piece of wearable technology to use in low light conditions, developing their understanding of programming to monitor and control products to solve a design scenario.**

Outcomes:

- ✓ Give a brief explanation of the digital revolution and/or remember key examples.
- ✓ Suggest a feature from the virtual micro:bit that is suitable for the product.
- ✓ Write a program that initiates a flashing LED panel, or another pattern, on the virtual micro:bit when a button is pressed.
- ✓ Identify errors, if testing is unsuccessful, by comparing their code to a correct example.
- ✓ Explain the basic functionality of their finished program.
- ✓ Suggest key features for a way to attach the product to the user, with some consideration for the overall theme and the user.
- ✓ Create annotated diagrams to help illustrate how their product is worn.
- ✓ Describe what is meant by 'point of sale display' with an example.
- ✓ Follow basic design requirements using computer-aided design, drawing at least one shape with a text box and bright colours, following a demonstration.
- ✓ Evaluate their design using a focus group.

Learning Objectives	Learning Outcomes
To research and evaluate existing products.	<ul style="list-style-type: none"> <li>I can describe a significant moment in the history of digital products.</li> <li>I can give reasons why a product is useful.</li> <li>I can suggest some people who might find a product useful.</li> </ul>
To develop design criteria.	<ul style="list-style-type: none"> <li>I can decide who will use my product.</li> <li>I can identify what my product will do.</li> <li>I can discuss how I want my product to function.</li> </ul>
To use code to program and control a product.	<ul style="list-style-type: none"> <li>I can write code to control a function on a device.</li> <li>I can check my code for errors by comparing it to the correct code.</li> <li>I can think about the user when choosing the code for my product.</li> </ul>

To develop and communicate ideas.	<ul style="list-style-type: none"> <li>• I can draw a diagram of how I would like my product to look.</li> <li>• I can annotate my diagram to explain some of its features.</li> <li>• I can make choices that help me meet the design criteria.</li> </ul>
To develop ideas through computer-aided design.	<ul style="list-style-type: none"> <li>• I can define the term point of sale display.</li> <li>• I can follow simple design requirements and use Sketchpad to complete a computer-aided design.</li> <li>• I can answer simple questions to help evaluate my work.</li> </ul>
To improve a design based on feedback.	<ul style="list-style-type: none"> <li>• I can form an opinion about a product.</li> <li>• I can participate in a discussion about a product.</li> <li>• I can use the opinions of others to suggest improvements to my design.</li> </ul>

### Unit 3A: Cooking and Nutrition - Eating Seasonally

Pupils discover when and where fruits and vegetables are grown and learn about seasonality in the UK. They respond to a design brief to design a seasonal food tart using ingredients harvested in the UK in May and June.

Outcomes:

- ✓ Explain that fruits and vegetables grow in different countries based on their climates.
- ✓ Understand that seasonal fruits and vegetables grow in a given season.
- ✓ Understand that eating seasonal fruit and vegetables positively affects the environment.
- ✓ Design a tart recipe using seasonal ingredient

Learning Objectives	Learning Outcomes
To explain why food comes from different places around the world.	<ul style="list-style-type: none"> <li>• I can identify some fruits and vegetables that cannot be grown in the UK.</li> <li>• I can label countries where different fruits and vegetables grow.</li> </ul>
To explain the benefits of seasonal foods.	<ul style="list-style-type: none"> <li>• I know that importing food has an impact on the environment.</li> <li>• I can match fruits and vegetables with the season in which they grow in the UK.</li> <li>• I can find recipes containing seasonal foods.</li> </ul>
To develop cutting and peeling skills.	<ul style="list-style-type: none"> <li>• I can identify equipment used for preparing food.</li> <li>• I can explain why food would or would not need to be prepared.</li> <li>• I can describe the safety rules for preparation techniques.</li> </ul>
To evaluate seasonal ingredients.	<ul style="list-style-type: none"> <li>• I can identify current seasonal foods.</li> <li>• I can taste various fruits and vegetables and describe their flavours.</li> <li>• I can contribute to a class taste wheel.</li> </ul>
To design a mock-up using criteria.	<ul style="list-style-type: none"> <li>• I can design a puff pastry tart using seasonal vegetables and fruits.</li> <li>• I can use colours to identify nutritional benefits.</li> <li>• I can describe my puff pastry tart and the benefits of its ingredients.</li> </ul>
To evaluate a dish.	<ul style="list-style-type: none"> <li>• I can taste tarts and provide feedback.</li> <li>• I can consider taste, texture, appearance and use of seasonal ingredients.</li> <li>• I can receive feedback on my tart and identify strengths.</li> </ul>

## Year B

### Unit 1B: Structures - Pavilions

Exploring pavilion structures, learning about what they are used for and investigate how to create strong and stable structures before designing and creating their own pavilions, complete with cladding.

Outcomes:

- ✓ Produce a range of free-standing frame structures of different shapes and sizes.
- ✓ Design a pavilion that is strong, stable and aesthetically pleasing.

- ✓ Select appropriate materials and construction techniques to create a stable, free-standing frame structure.
- ✓ Select appropriate materials and techniques to add cladding to their pavilion.

Learning Objectives	Learning Outcomes
To create a range of different shaped frame structures.	<ul style="list-style-type: none"> <li>• I can make a variety of different frame structures.</li> <li>• I know what the structure (pavilion) is used for.</li> </ul>
To design a structure.	<ul style="list-style-type: none"> <li>• I can understand that different materials can create different effects.</li> <li>• I can understand how to make a stable structure.</li> <li>• I can design a structure that is stable and aesthetically pleasing.</li> </ul>
To build a frame structure.	<ul style="list-style-type: none"> <li>• I can build a free-standing structure.</li> <li>• I can select appropriate materials to build a strong structure.</li> <li>• I can use my knowledge of how to reinforce corners to strengthen my structure.</li> <li>• I can refer to my design sheet to create my pavilion.</li> </ul>
To add cladding to a frame structure.	<ul style="list-style-type: none"> <li>• I can select appropriate materials for my cladding.</li> <li>• I can add cladding which reflects my design.</li> <li>• I can create different textural effects with my chosen material.</li> </ul>

## Unit 2B: Mechanical Systems - Making a Sling Shot Car

**Transform lollipop sticks, wheels, dowel and straws into a moving car. Pupils use a glue gun to construct, make the launch mechanism, design and create the chassis of a vehicle using nets.**

Outcomes:

- ✓ Work independently to produce an accurate, functioning car chassis.
- ✓ Design a shape that is suitable for the project.
- ✓ Attempt to reduce air resistance through the design of the shape.
- ✓ Produce panels that will fit the chassis and can be assembled effectively using the tabs they have designed.
- ✓ Construct car bodies effectively.
- ✓ Conduct a trial accurately and draw conclusions and improvements from the results.

Learning Objectives	Learning Outcomes
To build a car chassis.	<ul style="list-style-type: none"> <li>• I understand that car designs have developed over many years.</li> <li>• I know that a chassis is the frame of a car on which everything else is built.</li> <li>• I know that all moving things have kinetic energy.</li> <li>• I know that kinetic energy is the energy that something (an object or person) has by being in motion, e.g., the energy that a swing has to keep moving; any object in motion uses kinetic energy.</li> </ul>
To design a shape that reduces air resistance.	<p>I can design a suitable car body to cover my chassis by:</p> <ul style="list-style-type: none"> <li>• Drawing a net to create a structure from.</li> <li>• Choosing shapes that increase or decrease the speed of the car as a result of air resistance.</li> <li>• Adding graphics to personalise my design.</li> </ul>
To make a model based on a chosen design.	<p>I can make the body of my car by:</p> <ul style="list-style-type: none"> <li>• Remembering that nets are flat shapes that can be turned into 3D structures.</li> <li>• Measuring, marking and cutting the panels (nets) against the dimensions of my chassis.</li> <li>• Including tabs on my net so I can secure them to the panels of my chassis</li> <li>• Decorating the panels.</li> </ul>
To assemble and test my completed product.	<ul style="list-style-type: none"> <li>• I can assemble the panels of the body to the chassis correctly.</li> <li>• I can remember that smaller shapes create less air resistance and can move faster through the air.</li> <li>• I can evaluate the speed of my design based on the understanding that some cars are faster than others as a result of the following. <ul style="list-style-type: none"> <li>○ Body shapes</li> </ul> </li> </ul>



	<ul style="list-style-type: none"> <li>○ Stored energy in the elastic band.</li> <li>○ Accuracy of the angle in the chassis and axle.`</li> </ul>
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### Unit 3B: Electrical Systems - Torches

Pupils apply their scientific understanding of electrical circuits to create a torch made from recycled and reclaimed materials and objects. They design and evaluate their product against set design criteria.

Outcomes:

- ✓ Identify electrical products and explain why they are useful.
- ✓ Help to make a working switch.
- ✓ Identify the features of a torch and how it works.
- ✓ Describe what makes a torch successful.
- ✓ Create suitable designs that fit the success criteria and their own design criteria.
- ✓ Create a functioning torch with a switch according to their design criteria.

Learning Objectives	Learning Outcomes
To learn about electrical items and how they work.	<ul style="list-style-type: none"> <li>• I can identify electrical products.</li> <li>• I know what electrical conductors and insulators are.</li> <li>• I know that a battery contains stored electricity and can be used to power products.</li> </ul>
To analyse and evaluate electrical products.	<ul style="list-style-type: none"> <li>• I can identify the features of a torch.</li> <li>• I understand how a torch works.</li> <li>• I can say what is good and bad about different torches.</li> <li>• I understand what is important in torch design.</li> </ul>
To design a product to fit a set of specific user needs.	<ul style="list-style-type: none"> <li>• I can factor in who my product is for in my design criteria.</li> <li>• I can design a torch which satisfies both the design and success criteria.</li> </ul>
To make and evaluate a torch.	<ul style="list-style-type: none"> <li>• I can make a working circuit with a switch.</li> <li>• I can use appropriate equipment to cut and attach materials.</li> <li>• I can assemble a torch according to my design criteria.</li> <li>• I can assemble a torch which satisfies the success criteria.</li> <li>• I can test my torch to evaluate its success.</li> </ul>

## Upper Key Stage 2

### Year A

#### Unit 1A: Electrical Systems - Doodlers

Explore series circuits further and introduce motors. Explore how the design cycle can be approached at a different starting point, by investigating an existing product, which uses a motor, to encourage pupils to problem-solve and work out how the product has been constructed, ready to develop their own.

Outcomes:

- ✓ Identify simple circuit components (battery, bulb and switch) with a basic explanation of their function.
- ✓ Explain that a series circuit is assembled in a loop to allow the electricity to flow along one path.
- ✓ Describe a motor as a circuit component that changes electrical energy into movement.
- ✓ Provide examples of motorised products that use movement to rotate or spin different parts.
- ✓ Remove and replace different parts of a Doodler, as part of a team.
- ✓ Suggest ways to switch the configuration to amend the form or function of the Doodler.
- ✓ Explain, in an investigation report, each of the changes they made and the effect this had on the Doodler's ability to draw scribbles (function) and appearance (form).
- ✓ Develop design criteria with consideration for the target user, the purpose of their Doodler, a key function and the Doodler's form and final appearance (e.g. fun, bright, soft).
- ✓ Explain simply why their Doodler has a certain configuration based on the findings of their investigation (e.g. I used four pens because the Doodler would fall over with two).

- ✓ Create a functional Doodler that creates scribbles on paper with or without a switch.
- ✓ Identify and list each of the required materials, tools and circuit components required to build a Doodler.
- ✓ Explain simply the steps to assemble a Doodler as part of a set of instructions (or storyboard).
- ✓ Write instructions to build a functional circuit, explaining how to identify if it is functional or not.
- ✓ Provide suggestions to improve a peer's set of instructions after testing how effective they are at guiding someone.

Learning Objectives	Learning Outcomes
To understand how motors are used in electrical products.	<ul style="list-style-type: none"> <li>• I can identify simple circuit components (battery, bulb, motor and switch).</li> <li>• I can explain what a series circuit is.</li> <li>• I can give examples of motorised products and explain their primary function</li> </ul>
To investigate an existing product to determine the factors that affect the product's form and function.	<ul style="list-style-type: none"> <li>• I can take apart a product and reassemble it.</li> <li>• I can determine which parts of the product affect its function.</li> <li>• I can determine which parts of the product affect its form.</li> <li>• I can alter the way a product functions by tinkering with its configuration.</li> </ul>
To apply the findings from research to develop a unique product.	<ul style="list-style-type: none"> <li>• I can identify design criteria based on findings from an investigation.</li> <li>• I can develop my design based on key points discovered in an investigation.</li> <li>• I can incorporate a motor into an electrical system.</li> </ul>
To develop a DIY kit for another individual to assemble their product.	<ul style="list-style-type: none"> <li>• I can identify and list the materials, equipment and circuit components required to build my product.</li> <li>• I can explain the steps required to assemble my product.</li> <li>• I can explain how to build and integrate an electrical system as part of my product.</li> </ul>

## Unit 2A: Mechanical Systems - Making a Pop-Up Book

**Create a four-page pop-up story book design, incorporating a range of functional mechanisms that use levers, sliders, layers and spacers to give the illusion of movement through interaction**

Outcomes:

- ✓ Produce a suitable plan for each page of their book.
- ✓ Produce the structure of the book.
- ✓ Assemble the components necessary for all their structures/mechanisms.
- ✓ Hide the mechanical elements with more layers using spacers where needed.
- ✓ Use a range of mechanisms and structures to illustrate their story and make it interactive for the users.
- ✓ Use appropriate materials and captions to illustrate the story.

Learning Objectives	Learning Outcomes
To design a pop-up book.	<ul style="list-style-type: none"> <li>• I can remember that: <ul style="list-style-type: none"> <li>○ an input is the motion used to start a mechanism</li> <li>○ output is the motion that happens as a result of starting the input.</li> </ul> </li> <li>• I know that structures use the movement of the pages to work.</li> <li>• I know that mechanisms control movement.</li> <li>• I can design a book made up of a front cover and four pages and include a mixture of structures and mechanisms within it.</li> </ul>
To follow my design brief to make my pop-up book.	<ul style="list-style-type: none"> <li>• I can use paper, card and glue to make my book structure.</li> <li>• I can make mechanisms and/or structures as detailed in my design template by using sliders, pivots and folds to produce movement.</li> </ul>
To use layers and spacers to cover the working of mechanisms.	<ul style="list-style-type: none"> <li>• I can complete the mechanisms and structures as detailed in my design template.</li> <li>• I can make my book look neater and more attractive by using layers and spacers to hide relevant parts of my mechanisms.</li> </ul>
To create a high-quality product suitable for a target user.	<ul style="list-style-type: none"> <li>• I can complete the surface decoration of my pop-up book by adding the story through: <ul style="list-style-type: none"> <li>○ pictures;</li> <li>○ captions.</li> </ul> </li> <li>• I know that I need to consider the preferences and needs of the user.</li> </ul>

	<ul style="list-style-type: none"> <li>I know that good quality making should be neat, accurate and securely assembled.</li> </ul>
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### Unit 3A: Cooking and Nutrition – Developing a Recipe

Research and modify a traditional Bolognese sauce recipe to improve the nutritional value. Cook improved version and create packaging that fits design criteria. Learn about where beef comes from

Outcomes:

- ✓ Describe the process of beef production.
- ✓ Research a traditional recipe and make changes to it.
- ✓ Add nutritional value to a recipe by selecting ingredients.
- ✓ Prepare and cook a version of Bolognese sauce.

Learning Objectives	Learning Outcomes
To understand how ingredients are reared and processed.	<ul style="list-style-type: none"> <li>I can identify the ingredients in spaghetti Bolognese.</li> <li>I can create an informative poster.</li> <li>I can explain the journey of beef from farm to table.</li> </ul>
To make adaptations to design a recipe.	<ul style="list-style-type: none"> <li>I can compare two Bolognese sauces.</li> <li>I can research unique ingredients in different Bolognese recipes.</li> <li>I can plan an adaptation of a basic Bolognese recipe.</li> </ul>
To evaluate nutritional content.	<ul style="list-style-type: none"> <li>I can use a nutrition calculator.</li> <li>I can compare nutritional values.</li> <li>I can make ingredient choices based on nutritional values.</li> <li>I can modify a recipe to contain different ingredient choices.</li> </ul>
To practise food preparation skills.	<ul style="list-style-type: none"> <li>I can cut resistant foods like onions safely and accurately.</li> <li>I understand the safety aspects of working with hot food.</li> <li>I can explain how to avoid cross-contamination.</li> </ul>
To design a product label.	<ul style="list-style-type: none"> <li>I can measure and cut to fit specific dimensions.</li> <li>I can design a label thinking about colours, ingredients and the contents of the jar.</li> <li>I can evaluate a design against criteria.</li> </ul>
To follow and make an adapted recipe.	<ul style="list-style-type: none"> <li>I can use a recipe to gather the correct quantities of ingredients.</li> <li>I can select the right equipment for each preparation technique.</li> <li>I can make a video to explain a recipe.</li> </ul>

## Year B

### Unit 1B: Textiles – Waistcoats

Select fabrics, use templates, pin, decorate and stitch materials together to create a waistcoat for a person or purpose of their choosing. Create or use a pattern template to fit a desired person or item (e.g. teddy bear).

Outcomes:

- ✓ Consider a range of factors in their design criteria and use this to create a waistcoat design.
- ✓ Use a template to mark and cut out a design.
- ✓ Use a running stitch to join fabric to make a functional waistcoat.
- ✓ Attach a secure fastening, as well as decorative objects.
- ✓ Evaluate their final product.

Learning Objectives	Learning Outcomes
To design a waistcoat.	<ul style="list-style-type: none"> <li>I can annotate my designs.</li> <li>I can design clothing to a set of design criteria.</li> </ul>

To mark and cut fabric according to a design.	<ul style="list-style-type: none"> <li>• I can explain the differences between my design and the template.</li> <li>• I can accurately mark out the outline of the panels for my waistcoat.</li> <li>• I can cut neatly and accurately.</li> </ul>
To assemble a waistcoat.	<ul style="list-style-type: none"> <li>• I can sew a strong running stitch.</li> <li>• I can ensure my stitches are small, neat and follow the edge.</li> <li>• I can tie strong knots to secure the thread in place.</li> </ul>
To decorate your waistcoat.	<ul style="list-style-type: none"> <li>• I can secure a fastening.</li> <li>• I can attach objects for decoration using thread.</li> <li>• I can evaluate my work according to the design criteria.</li> </ul>

## Unit 2B: Structures - Playgrounds

Pupils will design and create a model for a new playground featuring five apparatus, made from three different structures. Using a footprint as the base, they will practise visualising objects in plan view and get creative including natural features.

Outcomes:

- ✓ Create five apparatus designs, applying the design criteria to their work.
- ✓ Make suitable changes to their work after peer evaluation.
- ✓ Make roughly three different structures from their plans using the materials available.
- ✓ Complete their structures, improving the quality of their rough versions and applying some cladding to a few areas.
- ✓ Secure their apparatus to a base.
- ✓ Make a range of landscape features using a variety of materials which will enhance their apparatus.

Learning Objectives	Learning Outcomes
To design a playground with a variety of structures.	<ul style="list-style-type: none"> <li>• I can identify different types of structures used in playgrounds as apparatus.</li> <li>• I can consider how the structures can be used.</li> <li>• I can design five different pieces of apparatus using three different structures.</li> <li>• I can improve my design based on peer evaluation.</li> </ul>
To build a range of structures.	<ul style="list-style-type: none"> <li>• I can build play apparatus structures using the techniques demonstrated as well as prior knowledge of structures.</li> <li>• I can explain that structures can be strengthened by manipulating materials and shapes.</li> <li>• I can measure, mark, cut and shape wood to create a range of structures.</li> </ul>
To improve and add detail to structures.	<ul style="list-style-type: none"> <li>• I can test and adapt my design to improve it.</li> <li>• I can identify what makes a successful structure.</li> <li>• I can use a range of materials to reinforce and add decoration to my structures.</li> </ul>
To create a surrounding landscape.	<ul style="list-style-type: none"> <li>• I can attach structures to a base, reinforcing the join where necessary.</li> <li>• I can consider the surrounding environment of my playground.</li> <li>• I can create landscape features using a range of materials.</li> </ul>

## Unit 3B: Digital World - Navigating the World

Program a navigation tool to produce a multifunctional device for trekkers. Combine 3D virtual objects to form a complete product concept in 3D computer-aided design modelling software.

Outcomes:

- ✓ Incorporate key information from a client's design request such as 'multifunctional' and 'compact' in their design brief.
- ✓ Write a program that displays an arrow to indicate cardinal compass directions with an 'On start' loading screen.
- ✓ Identify errors (bugs) in the code and suggest ways to fix (debug) them.
- ✓ Self and peer evaluate a product concept against a list of design criteria with basic statements.
- ✓ Identify key industries that use 3D CAD modelling and why.
- ✓ Recall and describe the name and use of key tools used in Tinkercad (CAD) software.
- ✓ Combine more than one object to develop a finished 3D CAD model in Tinkercad.

✓ Complete a product pitch plan that includes key information.

Learning Objectives	Learning Outcomes
To write a design brief and criteria based on a client request.	<ul style="list-style-type: none"><li>• I can write a design brief from information submitted by a client.</li><li>• I can develop design criteria to fulfil the client's request.</li><li>• I can consider and suggest additional functions for my navigation tool.</li></ul>
To write a program to include multiple functions as part of a navigation device.	<ul style="list-style-type: none"><li>• I can program an n, e, s and w cardinal compass.</li><li>• I can explain the key functions in my program, including any additions.</li><li>• I can explain how my program fits the design criteria and how it would be useful as part of a navigation tool.</li></ul>
To develop a sustainable product concept.	<ul style="list-style-type: none"><li>• I can consider materials and their functional properties.</li><li>• I can understand the need for sustainability in design.</li><li>• I can develop a product idea through annotated sketches.</li></ul>
To develop 3D CAD skills to produce a virtual model.	<ul style="list-style-type: none"><li>• I can identify key industries that utilise 3D CAD modelling and explain why.</li><li>• I can place and manoeuvre 3D objects using computer-aided design.</li><li>• I can change the properties of or combine one or more 3D objects using computer-aided design to produce a 3D CAD model.</li></ul>
To present a pitch to 'sell' the product to a specified client.	<ul style="list-style-type: none"><li>• I can explain the key functions and features of my navigation tool.</li><li>• I can explain my material choices and why they were chosen.</li><li>• I can describe how my product fits the client's request and how it will benefit the customers.</li></ul>