St Peter's Primary School

Design and Technology

Scheme of Work:

Academic year: 2023-2024

Growing Together in Knowledge, Wisdom and Faith

A Design and Technology Education at St Peter's means that children leaving in year 6 can:

A high-quality Design and Technology education, preparing them to take part in the development of tomorrow's rapidly changing world. Children will have been encouraged to become autonomous and creative problem solvers, both as individuals and as part of a team. They will have been given opportunities to identify needs and to respond by developing ideas, and make products and systems.

Our Design and Technology curriculum helps all children to become discriminating and informed consumers and potential innovators.

What children at St Peter's say about at our school:

" I was really pleased with my playground model"

" I made the Ferris wheel actually work!"

Intent for at St Peter's CEP

At St Peter's Primary School, we aim to inspire pupils to be innovative and creative thinkers who have an appreciation for the product design cycle. We want pupils to develop the confidence to take risks, through drafting design concepts, modelling, and testing and to be reflective learners who evaluate their work and the work of others.

We follow the Kapow Primary's Design and Technology scheme of work which is written by experts in their field and designed to build an awareness of the impact of design and technology on our lives and encourage pupils to become resourceful, enterprising citizens who will have the skills to contribute to future design advancements.

Kapow Primary's Design and Technology scheme of work supports pupils in Years 1 to 6 to meet the end of key stage attainment targets in the National curriculum.

The Kapow Primary's Design and Technology scheme of work is planned and sequenced to teach skills and knowledge which are built upon each year. Teachers can adapt lessons within the units to suit the needs of their cohort. The scheme provides a clear skills progression taking pupils through the design, make and evaluate process as well as teaching the technical knowledge for each area of Design and Technology.

Implementation of our Curriculum at St Peter's

The Design and Technology National Curriculum outlines the three main stages of the design process: design, make and evaluate. Each stage of the design process is underpinned by technical knowledge which encompasses the contextual, historical, and technical understanding required for each strand. Cooking and nutrition has a separate section, with a focus on specific principles, skills and techniques in food, including where food comes from, diet and seasonality.

The National curriculum organises the Design and technology attainment targets under five subheadings or strands:

- Design
- Make
- Evaluate
- Technical knowledge
- Cooking and nutrition

Kapow Primary's Design and Technology scheme has a clear progression of skills and knowledge within these five strands across each year group. Through Kapow Primary's Design and Technology scheme, pupils respond to design briefs and scenarios that require consideration of the needs of others, developing their skills in six key areas:

- Mechanisms
- Structures
- Textiles
- Food
- Electrical systems (KS2) and
- Digital world (KS2)

Each key area follows the design process (design, make and evaluate) and has a particular theme and focus from the technical knowledge or cooking and nutrition section of the curriculum. The Kapow Primary scheme is a spiral curriculum, with key areas revisited again and again with increasing complexity, allowing pupils to revisit and build on their previous learning.

Lessons incorporate a range of teaching strategies from independent tasks, paired and group work including practical hands-on, computer-based and inventive tasks. This variety means that lessons are engaging and appeal to those with a variety of learning styles. Differentiated guidance is available for every lesson to ensure that lessons can be accessed by all pupils and opportunities to stretch pupils' learning are available when required. Knowledge organisers for each unit support pupils in building a foundation of factual knowledge by encouraging recall of key facts and vocabulary.

Strong subject knowledge is vital for our staff to be able to deliver a highly effective and robust Design and Technology curriculum. Each unit of lessons from Kapow Primary includes multiple teacher videos to develop subject knowledge and support ongoing CPD.

Impact of our Curriculum at St Peter's

Peter's

By following our Design and Technology curriculum at St Peter's Primary School, children will:

- Understand the functional and aesthetic properties of a range of materials and resources.
- Understand how to use and combine tools to carry out different processes for shaping, decorating, and manufacturing products.
- Build and apply a repertoire of skills, knowledge and understanding to produce high quality, innovative outcomes, including models, prototypes, CAD, and products to fulfil the needs of users, clients, and scenarios.
- Understand and apply the principles of healthy eating, diets, and recipes, including key processes, food groups and cooking equipment.
- Have an appreciation for key individuals, inventions, and events in history and of today that impact our world.
- Recognise where our decisions can impact the wider world in terms of community, social and environmental issues.
- Self-evaluate and reflect on learning at different stages and identify areas to improve.
- Meet the end of key stage expectations outlined in the National curriculum for Design and technology.
- Meet the end of key stage expectations outlined in the National curriculum for Computing.

Inclusion of our Curriculum at St Peter's

We recognise that design and technology should be accessible to all children. Differentiated guidance is available from Kapow for every lesson to ensure that lessons can be accessed and enjoyed by all pupils and

opportunities to stretch pupils' learning are available when required. Where necessary we take advise from our school SENCO and/or specialist teachers to ensure we are planning learning opportunities which will ensure all of our pupils can access learning and progress from their own unique starting points.
At St Peter's, we recognise and celebrate design and technology's important contribution to culture, values and society. We aim to study production and design from a range of cultures across the world and recognise the important influence of designers from a wide range of cultures and backgrounds.
We recognise that our design an technology the curriculum provided opportunities for all pupils to develop the knowledge and cultural capital they need to succeed in life and we plan enrichment activities into design curriculum including an art festival.

Design and Technology in EYFS

Mars Class

Kapow Primary Unit (In Reception, Kapow Primary Units may be taught in any order to meet the needs of the children or fit in with particular interests or topics)	Knowledge	Skills
Design and Technology Kapow Primary Unit – **Structures:** Junk Modelling Exploring and learning about various types of permanent and temporary join. Pupils are encouraged to tinker using a combination of materials and joining techniques in the junk modelling area.	• To know there are a range of different materials that can be used to make a model and that they are all slightly different. • Know how to make simple suggestions to fix their junk model.	• I can make verbal plans and material choices. • I can develop a junk model. • I can improve my fine motor/scissor skills. • I can join materials in a variety of ways (temporary and permanent). • I can join different materials together. • I can describe my junk model, and how I intend to put it together. • I can give a verbal evaluation of my own and others' junk models with adult support. • I can check to see if my model matches my plan. • I can consider what I would do differently if I was to do it again. • I can describe my favourite and least favourite part of my model.
Design and Technology Kapow Primary Unit – **Cooking and Nutrition:** Soup	• To know that soup is ingredients (usually vegetables and liquid) blended together. • To know that vegetables are grown. • To recognise and name some common vegetables. • To know that different vegetables taste different. • To know that eating vegetables is good for us. • To discuss why different packages might be used for different foods.	• I can design a soup recipe as a class. • I can design soup packaging. • I can chop plasticine safely. • I can chop vegetables with support. • I can taste the soup I have made and give my opinion. • I can describe some of the following when tasting food: look, feel, smell and taste. • I can choose my favourite packaging design and explaining why.
Design and Technology Kapow Primary Unit – **Structures:** Boats	• To know that 'waterproof' materials are those which do not absorb water. • To know that some objects float and others sink. • To know the different parts of a boat.	• I can design a junk model boat. • I can use knowledge from exploration to inform design. • I can make a boat that floats and is waterproof, considering material choices.

Exploring what is meant by 'waterproof', 'floating' and 'sinking', pupils experiment and make predictions with various materials to carry out a series of tests. They learn about the different features of boats and ships before investigating their shape and structures to build their own.		• I can make predictions about, and evaluate different materials to see if they are waterproof. • I can make predictions about, and evaluate existing boats to see which floats best. • I can test my design and reflect on what could have been done differently. • I can investigate how the shapes and structure of a boat affect the way it moves.

End point at the end of EYFS

By the end of Reception, children will be able to:

Structures

Design

- Make verbal plans and material choices.
- Develop a junk model.
- Design a junk model boat.
- Use knowledge from exploration to inform design.

Make

- Improve fine motor/scissor skills with a variety of materials.
- Join materials in a variety of ways (temporary and permanent).
- Join different materials together.
- Describe their junk model, and how they intend to put it together.
- Make a boat that floats and is waterproof, considering material choices.

Evaluate

- Give a verbal evaluation of their own and others' junk models with adult support.
- Check to see if their model matches their plan.
- Consider what they would do differently if they were to do it again.
- Describe their favourite and least favourite part of their model.
- Make predictions about, and evaluate different materials to see if they are
- waterproof.
- Make predictions about, and evaluate existing boats to see which floats best.
- Test their design and reflecting on what could have been done differently.
- Investigate how the shapes and structure of a boat affect the way it moves.

Cooking and Technology

Design

- Design a soup recipe as a class.
- Design soup packaging.

Make

- Chop plasticine safely.
- Chop vegetables with support.

Evaluate

- Taste the soup they have made and give their opinion.
- Describe some of the following when tasting food: look, feel, smell and taste.
- Choose their favourite packaging design and explaining why.

St Peter's Long Term Plan – KS1 and KS2

KS1 Long Term Plan			
	Autumn	**Spring**	**Summer**
Year 1 Pluto	**Structures:** Constructing Windmills Designing, decorating and building a windmill for their mouse client to live in, developing an understanding of different types of windmill, how they work and their key features.	**Textiles:** Puppets Exploring different ways of joining fabrics before creating their own hand puppets based upon characters from a well-known fairytale. Children work to develop their technical skills of cutting, glueing, stapling and pinning	**Food:** Fruit and Vegetables Handling and exploring fruits and vegetables and learning how to identify which category they fall into, before undertaking taste testing to establish their chosen ingredients for the smoothie they will make a design packaging for.
Year 2 Earth	**Structures:** Baby Bear's Chair Using the tale of Goldilocks and the Three Bears as inspiration, children help Baby Bear by making him a brand new chair. When designing the chair, they consider his needs and what he likes and explore ways of building it so that it is strong.	**Mechanisms:** Fairground Wheels 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	**Mechanisms:** Making a moving monster After learning the terms; pivot, lever and linkage, children design a monster which will move using a linkage mechanism. Children practise making linkages of different types and varying the materials they use to bring their monsters to life.

LKS2 Long Term Plan			
	Autumn	**Spring**	**Summer**
Year 3 Neptune	**Food:** Eating Seasonally Discovering when and where fruits and vegetables are grown. Learning about seasonality in the UK and the relationship between the colour of fruits and vegetables and their health benefits by making three dishes.	**Digital World:** Electronic Charm 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	**Structures:** Constructing a Castle Learning about the features of a castle, children design and make one of their own. Using configurations of handmade nets and recycled materials to make towers and turrets and constructing a base to secure them.
Year 4 Mercury	**Structure:** Pavilions Exploring pavilion structures, children learn 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	**Mechanical Systems:** Making a slingshot car Transforming lollipop sticks, wheels, dowels and straws into a moving car. Using a glue gun to, making a launch mechanism, designing and making the body of the vehicle using nets and assembling these to the chassis.	**Electrical Systems:** Torches Applying their scientific understanding of electrical circuits, children create a torch, designing and evaluating their product against set design criteria.

LKS2 Long Term Plan			
	Autumn	**Spring**	**Summer**
Year 5 Saturn	**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.	**Mechanical Systems:** Making a pop-up book Creating a four-page pop-up storybook design incorporating a range of mechanisms and decorative features, including: structures, levers, sliders, layers and spacers.	**Food:** What could be Healthier? Researching and modifying a traditional Bolognese sauce recipe to make it healthier. Children cook their healthier versions, making appropriate packaging and learn about farming cattle.
Year 6 Jupiter	**Textiles:** Waistcoats Selecting suitable fabrics, using templates, pinning, decorating and stitching to create a waistcoat for a person or purpose of their choice.	**Structure:** Playgrounds Designing and creating a model of a new playground featuring five apparatus, made from three different structures. Creating a footprint as the base, pupils visualise objects in plan view and get creative with their use of natural features.	**Digital World:** Navigating the World Programming a navigation tool to produce a multifunctional device for trekkers. Combining 3D objects to form a complete product in CAD 3D modelling software and presenting a pitch to 'sell' their product.

Year 1 Pluto Class

<table>
<tr><th>Term</th><th>Outcomes</th><th>vocabulary</th></tr>
<tr><td rowspan="3">Autumn
Structures:
Constructing Windmills</td><td>Pupils who are secure will be able to:
Identify some features that would appeal to the client (a mouse) and create a suitable design.
Explain how their design appeals to the mouse.
Make stable structures, which will eventually support the turbine, out of card, tape and glue.
Make functioning turbines and axles that are assembled into the main supporting structure.
Say what is good about their windmill and what they could do better.</td><td>axle
bridge
design
design criteria
model
net
packaging
structure
template
unstable
stable
strong
weak</td></tr>
<tr><td>Knowledge</td><td>Skills</td></tr>
<tr><td>To understand that the shape of materials can be changed to improve the strength and stiffness of structures.
To understand that cylinders are a strong type of structure (and, therefore, they are the main shape used for windmills and lighthouses).
To understand that axles are used in structures and mechanisms to make parts turn in a circle.
To begin to understand that different structures are used for different purposes.
To know that a structure is something that has been made and put together.</td><td>I can include individual preferences and requirements in a design.
I can make stable structures from card, tape and glue.
I can turn 2D nets into 3D structures with support.
I can follow instructions to cut and assemble a supporting structure.
I can make a functioning turbine and axle.</td></tr>
<tr><td></td><td>Outcomes</td><td>vocabulary</td></tr>
<tr><td rowspan="3">Spring
Textiles:
Puppets</td><td>Pupils who are secure will be able to:
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.</td><td>decorate
design
fabric
glue
model
hand puppet
safety pin
staple
stencil
template</td></tr>
<tr><td>Knowledge</td><td>Skills</td></tr>
<tr><td>To know that ‘joining technique’ means connecting two pieces of material together.
To know that there are various temporary methods of joining fabric by using staples, glue or pins.
To understand that different techniques for joining materials can be used for different purposes.</td><td>I can use a template to create a design for a puppet.</td></tr>
</table>

	• To understand that a template (or fabric pattern) is used to cut out the same shape multiple times. To know that drawing a design idea is useful to see how an idea will look.	• I can cut fabric neatly with scissors. • I can use joining methods to decorate a puppet. • I can reflect on a finished product, explaining likes and dislikes.
Summer **Food:** Fruit and Vegetables	**Pupils who are secure will be able to:** • 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 smoothie.	fruit vegetable seed leaf root stem smoothie healthy carton design flavour peel slice
	Knowledge	**Skills**
	• To understand the difference between fruits and vegetables. • To understand that some foods typically known as vegetables are actually fruits (e.g. cucumber). • To know that a blender is a machine which mixes ingredients together into a smooth liquid. • To know that a fruit has seeds and a vegetable does not. • To know that fruits grow on trees or vines. • To know that vegetables can grow either above or below ground. • To know that vegetables can come from different parts of the plant.	• I can chop fruit and vegetables safely. • I can identify if a food is a fruit or a vegetable. • I can describe the appearance, smell and taste of fruit and vegetables.

End point at the end of Year 1

By the end of Year 1 children will be able to:

<u>Structures</u>

Design:

- Identify the importance of a clear design criteria.
- Explain individual preferences and requirements in a design.

Make:

- Make stable structures from card, tape and glue.
- Know how to turn 2D nets into 3D structures.
- Follow instructions to cut and assemble the supporting structure of a windmill.
- Make functioning turbines and axles which are assembled into a main supporting structure.

Evaluate:

- Evaluate a windmill according to the design criteria, testing whether the structure is strong and stable and altering it if it isn't.

- Suggest points for improvements.

Textiles

Design:

- Use a template to create a design for a puppet.

Make:

- Cut fabric neatly with scissors.
- Use joining methods to decorate a puppet.
- Sequence the steps taken during construction.

Evaluate:

- Reflect on a finished product, explaining likes and dislikes.

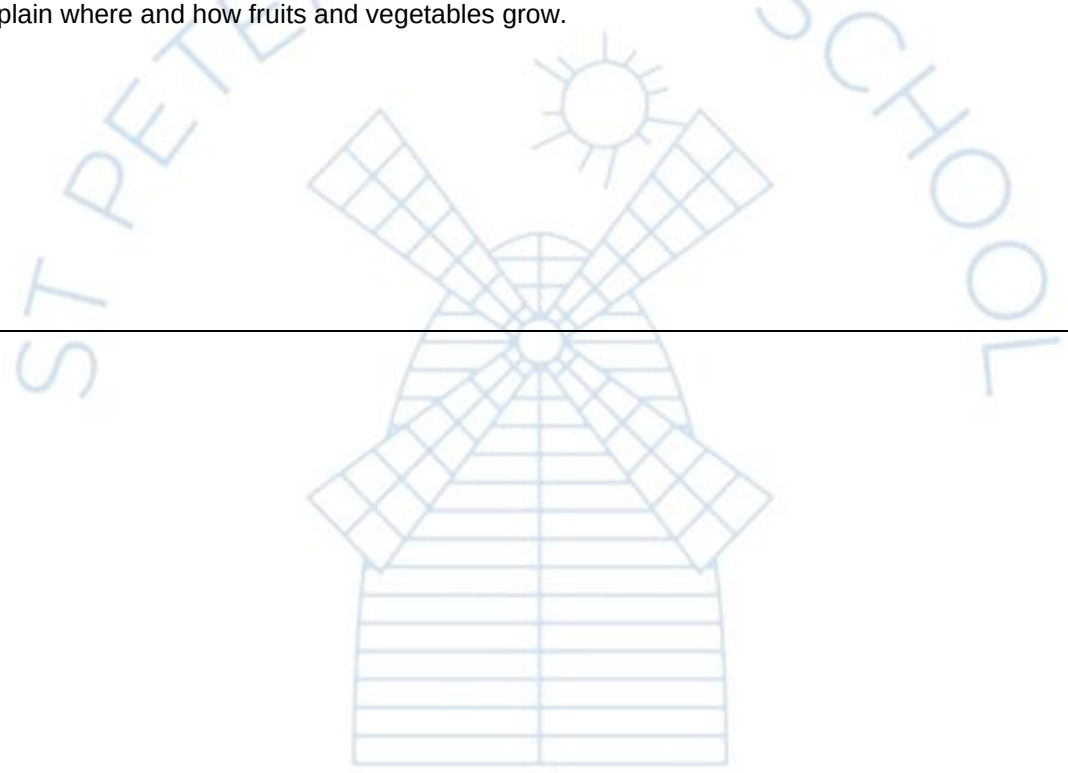
Cooking and Nutrition

Design:

- Design a smoothie carton packaging by-hand or on ICT software.

Make:

- Chop fruit and vegetables safely to make a smoothie.
- Identify if a food is a fruit or a vegetable.
- Explain where and how fruits and vegetables grow.



Year 2 Earth Class

<table>
<tr><th>Term</th><th>Outcomes</th><th>vocabulary</th></tr>
<tr><td rowspan="3">Autumn
Structures:
Baby Bear's Chair</td><td>Pupils who are secure will be able to:

• 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</td><td>design criteria
man-made
natural
properties
structure
stable
shape
model
test</td></tr>
<tr><td>Knowledge</td><td>Skills</td></tr>
<tr><td>• To know that shapes and structures with wide, flat bases or legs are the most stable.
• To understand that the shape of a structure affects its strength.
• To know that materials can be manipulated to improve strength and stiffness.
• To know that a structure is something which has been formed or made from parts.
• To know that a 'stable' structure is one which is firmly fixed and unlikely to change or move.
• To know that a 'strong' structure is one which does not break easily.
• To know that a 'stiff' structure or material is one which does not bend easily.</td><td>• I can generate and communicate ideas using sketching and modelling.
• I can make a structure according to design criteria.
• I can create joints and structures from paper/card and tape.
• I can build a strong and stiff structure by folding.
• I can compare the stability of different shapes.
• I can evaluate the strength, stiffness and stability of their own structure.</td></tr>
<tr><th>Term</th><th>Outcomes</th><th>vocabulary</th></tr>
<tr><td rowspan="3">Spring
Mechanisms:
Fairground Wheels</td><td>Pupils who are secure will be able to:

• 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.</td><td>design
design criteria
wheel
Ferris wheel
pods
axle
axle holder
frame
mechanism</td></tr>
<tr><td>• Knowledge</td><td>Skills</td></tr>
<tr><td>• To know that different materials have different properties and are therefore suitable for different uses.

• To know the features of a Ferris wheel include the wheel, frame, pods, a base, an axle and an axle holder.

• To know that it is important to test my design as I go along so that I can solve any problems that may occur.</td><td>I can select a suitable linkage system to produce a desired motion.

I can design a wheel.

I can follow a design brief.</td></tr>
</table>

		I can evaluate different designs. I can test and adapt my design.
Term	• **Outcomes**	**Vocabulary**
Summer **Mechanisms:** Making a moving monster	**Pupils who are secure will be able to:** • 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.	axle design criteria input linkage mechanical output pivot wheel
	Knowledge	**Skills**
	• To know that mechanisms are a collection of moving parts that work together as a machine to produce movement. • To know that there is always an input and an output in a mechanism. • To know that an input is the energy that is used to start something working. • To know that an output is the movement that happens as a result of the input. • To know that a lever is something that turns on a pivot. • To know that a linkage mechanism is made up of a series of levers.	• I can design a moving monster for a specific audience in accordance with a design criteria. • I can make linkages using card for levers and split pins for pivots. • I can cut and assemble components neatly. • I can evaluate own designs against design criteria.

End point at the end of Year 2

By the end of Year 2 children will be able to:

<u>Structures</u>

Design:

- Generate and communicate ideas using sketching and modelling.

Make:

- Make a structure according to design criteria.
- Create joints and structures from paper/card and tape.
- Build a strong and stiff structure by folding paper.

Evaluate:

- Evaluate the features of structures.
- Compare the stability of different shapes.
- Test the strength of own structures.
- Identify the weakest part of a structure.
- Evaluate the strength, stiffness and stability of own structure.

Mechanisms

Design:

- Select a suitable linkage system to produce the desired motion.
- Design a wheel.
- Design a moving monster for a specific audience in accordance with a design criteria.

Make:

- Select materials according to their characteristics.
- Follow a design brief.
- Make linkages using card for levers and split pins for pivots.
- Experiment with linkages adjusting the widths, lengths and thicknesses of card used.
- Cut and assemble components neatly.

Evaluate:

- Evaluate different designs.
- Test and adapt a design.
- Evaluate own designs against design criteria
- Use peer feedback to modify a final design.

Year 3 Neptune Class

<table>
<tr><th>Term</th><th>Outcomes</th><th>vocabulary</th></tr>
<tr><td rowspan="2">Autumn
Food:
Eating Seasonally</td><td>Pupils who are secure will be able to:

• Explain that fruits and vegetables grow in different countries based on their climates.
• Understand that ‘seasonal’ fruits and vegetables are those that grow in a given season and taste best then.
• Know that eating seasonal fruit and vegetables has a positive effect on the environment.
• Design their own tart recipe using seasonal ingredients.
• Understand the basic rules of food hygiene and safety.
• Follow the instructions within a recipe</td><td>Climate
Imported
Natural
Diet
Ingredients
Processed
Reared
seasonal</td></tr>
<tr><td>Knowledge
• To know that not all fruits and vegetables can be grown in the UK.
• To know that climate affects food growth.
• To know that vegetables and fruit grow in certain seasons.
• To know that cooking instructions are known as a ‘recipe’.
• To know that imported food is food that has been brought into the country.</td><td>Skills
• I can create a healthy and nutritious recipe for a savoury tart using seasonal ingredients.
• I can prepare myself and a workspace to cook safely in.
• I can follow the instructions within a recipe.
• I can test and review dishes.
• I can describe the benefits of seasonal fruits and vegetables and the impact on the environment.
• I can suggest points for improvement when making a seasonal tart.</td></tr>
<tr><th>Term</th><th>Outcomes</th><th>vocabulary</th></tr>
<tr><td>Spring
Digital World:
Electronic Charm</td><td>• Pupils who are secure will be able to:
• 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.</td><td>analogue
analyse
annotate
badge
computer-aided design (CAD)
control
design criteria
develop
digital
digital revolution
digital world
display
electronic
electronic products
fastening
feature
feedback
form
function
initiate
layers
monitor
net
opinion
point of sale
product
product design</td></tr>
</table>

		program
	Knowledge	**Skills**
	• To understand that in programming a 'loop' is code that repeats something again and again until stopped. • To know that a Micro:bit is a pocket-sized, codeable computer. • Writing a program to control (button press) and/or monitor (sense light) that will initiate a flashing LED algorithm.	• I can solve problems by suggesting potential features on a Micro:bit and justifying my ideas. • I can develop design ideas for a technology pouch. • I can draw and manipulate 2D shapes, using computer-aided design, to produce a point of sale badge. • I can use a template when cutting and assembling the pouch. • I can select and join using the appropriate tools and equipment for cutting, joining, shaping and decorating a foam pouch. • I can apply functional features such as using foam to create soft buttons. • I can Aanalyse and evaluate an existing product. • I can identify the key features of a pouch.
Term	**Outcomes**	**vocabulary**
Summer Structures: Constructing a Castle	Pupils who are **secure** will be able to: • 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.	2D 3D Castle Net Shape Stiff Structure strong
	Knowledge	**Skills**
	• 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.	• I can design a castle with key features to appeal to a specific person/purpose. • I can draw and label a castle design using 2D shapes. • I can design and/or decorate a castle tower on CAD software. • I can construct a range of 3D geometric shapes using nets. • I can make facades from a range of recycled materials.

		• I can evaluate my own work and the work of others.

End point at the end of Year 3

By the end of Year 3 children will be able to:

Cooking and Nutrition

Design:

- Create a healthy and nutritious recipe for a savoury tart using seasonal ingredients, considering the taste, texture, smell and appearance of the dish.

Make:

- Know how to prepare themselves and a work space to cook safely in, learning the basic rules to avoid food contamination.
- Follow the instructions within a recipe.

Evaluate:

- Establish and use design criteria to help test and review dishes.
- Describe the benefits of seasonal fruits and vegetables and the impact on the environments.
- Suggest points for improvement when making a seasonal tart.

Digital World

Design:

- Solve a problem by suggesting potential features on a Micro: bit and justifying my ideas.
- Develop design ideas for a technology pouch.
- Draw and manipulate 2D shapes, using computer-aided design, to produce a point of sale badge.

Make:

- Use a template when cutting and assembling the pouch.
- Follow a list of design requirements.
- Select and use the appropriate tools and equipment for cutting, joining, shaping and decorating a foam pouch.
- Apply functional features such as using foam to create soft buttons.
- Write a program to control (button press) and/or monitor (sense light) that will initiate a flashing LED algorithm.

Evaluate:

- Analyse and evaluate an existing product.
- Identify the key features of a pouch.

Structures

Design:

- Design a castle with key features to appeal to a specific person/purpose.
- Draw and label a castle design using 2D shapes, labelling: -the 3D shapes that will create the features - materials needed and colours.
- Design and/or decorate a castle tower on CAD software.

Make:

- Construct a range of 3D geometric shapes using nets.
- Create special features for individual designs.
- Make facades from a range of recycled materials.

Evaluate:

- Evaluate my own work and the work of others based on the aesthetic of the finished product, in comparison to the original design.
- Suggest points for modification of the individual designs.

Year 4 Mercury Class

<table>
<tr><th>Term</th><th>Outcomes</th><th>vocabulary</th></tr>
<tr><td rowspan="3">Autumn
Structure:
Pavilions</td><td>• Pupils who are secure will be able to:
• 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.</td><td>Cladding
Innovation
3D
Reinforce
Structure
Natural
Design
Criteria</td></tr>
<tr><td>Knowledge</td><td>Skills</td></tr>
<tr><td>• To understand what a frame structure is.
• To know that a ‘free-standing’ structure is one that can stand on its own.
• To know that a pavilion is a decorative building or structure for leisure activities.
• To know that cladding can be applied to structures for different effects.
• To know that aesthetics are how a product looks.</td><td>• I can design a stable pavilion structure that is aesthetically pleasing.
• I can build frame structures designed to support weight.
• I can create a range of different shaped frame structures.
• I can make a variety of free-standing frame structures of different shapes and sizes.
• I can select appropriate materials to build a strong structure.
• I can reinforce corners to strengthen a structure.
• I can create a design in accordance with a plan.</td></tr>
<tr><th>Term</th><th>Outcomes</th><th>vocabulary</th></tr>
<tr><td rowspan="3">Spring
Mechanical
Systems:
Making a slingshot car</td><td>• Pupils who are secure will be able to:
• 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</td><td>chassis
energy
kinetic
mechanism
air
resistance
design
structure
graphics
research
model
template</td></tr>
<tr><td>• Knowledge</td><td>Skills</td></tr>
<tr><td>• To understand that all moving things have kinetic energy.</td><td>• I can design a shape that reduces air resistance.</td></tr>
</table>

	• To understand that kinetic energy is the energy that something (object/person) has by being in motion. • To know that air resistance is the level of drag on an object as it is forced through the air. • To understand that the shape of a moving object will affect how it moves due to air resistance.	• I can draw a net to create a structure from. • I can choose shapes that increase or decrease speed as a result of air resistance. • I can measure, mark, cut and assemble with increasing accuracy. • I can make a model based on a chosen design. • I can evaluate the speed of a final product.
Term	• **Outcomes**	**vocabulary**
Summer Electrical Systems: Torches	• Pupils who are **secure** will be able to: • 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.	battery bulb buzzer conductor circuit circuit diagram electricity insulator series circuit switch component design design criteria diagram evaluation LED model shape target audience input recyclable theme aesthetics assemble equipment ingredients packaging properties
	• **Knowledge**	**Skills**
	• To understand that electrical conductors are materials which electricity can pass through. • To understand that electrical insulators are materials which electricity cannot pass through. • To know that a battery contains stored electricity that can be used to power products. • To know that an electrical circuit must be complete for electricity to flow. • To know that a switch can be used to complete and break an electrical circuit.	• I can design a torch, considering the target audience. • I can make a torch with a working electrical circuit and switch. • I can use appropriate equipment to cut and attach materials. • I can assemble a torch according to the design and success criteria.

		• I can evaluate electrical products. • I can test and evaluate the success of a final product.

End point at the end of Year 4

By the end of Year 4 children will be able to:

Structures

Design:

- Design a stable pavilion structure that is aesthetically pleasing and selecting materials to create a desired effect.
- Build a frame structures designed to support weight.

Make:

- Create a range of different shaped frame structures.
- Make a variety of free standing frame structures of different shapes and sizes.
- Select appropriate materials to build a strong structure and cladding.
- Reinforce corners to strengthen a structure.
- Create a design in accordance with a plan.
- Learn to create different textural effects with material.

Evaluate:

- Evaluate structures made by the class.
- Describe what characteristics of a design and construction made it the most effective.
- Consider effective and ineffective design.

Mechanical Systems

Design:

- Design a shape that reduces air resistance.
- Draw a net to create a structure from.
- Choose shapes that increase or decrease speed as a result of air resistance.
- Personalise a design.

Make:

- Measure, mark, cut and assemble with increasing accuracy.
- Make a model based on a chosen design.

Evaluate:

- Evaluate the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance.

Electrical systems

Design:

- Design a torch, giving consideration to the target audience.

Make:

- Make a torch with a working electrical circuit and switch.
- Use appropriate equipment to cut and attach materials.
- Assemble a torch according to the design and success criteria.

Evaluate:

- Evaluate electrical products.
- Test and evaluate the success of a final product.

Year 5 Saturn Class

<table>
<tr><th>Term</th><th>Outcomes</th><th>vocabulary</th></tr>
<tr><td rowspan="3">Autumn
Electrical systems:
Doodlers</td><td>

Pupils who are secure will be able to:
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

</td><td>circuit
component
configuration
current
develop
DIY
investigate
motor
motorised
problem
solve
product
analysis
series circuit
stable
target user</td></tr>
<tr><th>Knowledge</th><th>Skills</th></tr>
<tr><td>

To know that, in a series circuit, electricity only flows in one direction.
To know when there is a break in a series circuit, all components turn off.
To know that an electric motor converts electrical energy into rotational movement, causing the motor’s axle to spin.
To know a motorised product is one which uses a motor to function.

</td><td>

I can identify factors that could be changed on existing products and explain how these would alter the form and function of the product.
I can develop design criteria based on findings from investigating existing products.

</td></tr>
</table>

		• I can develop design criteria that clarifies the target user. • I can alter a product's form and function by tinkering with its configuration. • I can make a functional series circuit, incorporating a motor. • I can construct a product with consideration for the design criteria. • I can determin which parts of a product affect its function and which parts affect its form. • I can analyse whether changes in configuration positively or negatively affect an existing product.
Term	**Outcomes**	**vocabulary**
Spring **Mechanical Systems:** Making a pop-up book	• Pupils who are **secure** will be able to: • 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.	design input motion mechanism criteria research reinforce model
	Knowledge	**Skills**
	• To know that mechanisms control movement. • To understand that mechanisms can be used to change one kind of motion into another. • To understand how to use sliders, pivots and folds to create paper-based mechanisms. • To know that a design brief is a description of what I am going to design and make. • To know that designers often want to hide mechanisms to make a product more aesthetically pleasing.	I can design a pop-up book which uses a mixture of structures and mechanisms. I can name each mechanism, input and output accurately. I can follow a design brief to make a pop-up book, neatly and with focus on accuracy. I can make mechanisms and/or structures using sliders, pivots and folds to produce movement. I can use layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result.

<table>
<tr><th>Term</th><th>Outcomes</th><th>vocabulary</th></tr>
<tr><td rowspan="2">Summer
Food:
What could be Healthier?</td><td>

Pupils who are secure will be able to:
Understand how beef gets from the farm to our plates.
Present a subject as a poster with clear information in an easy to read format.
Contribute ideas as to what a ‘healthy meal’ means.
Notice the nutritional differences between different products and recipes.

Recognise nutritional differences between two similar recipes and give some justification as to why this is.

Work as a team to amend a bolognese recipe with healthy adaptations.

Follow a recipe to produce a healthy bolognese sauce.

Design packaging that promotes the ingredients of the bolognese.
</td><td>beef
reared
processed
ethical
diet
ingredients
supermarket
farm
balanced</td></tr>
<tr><td colspan="2">
<table>
<tr><th>Knowledge</th><th>Skills</th></tr>
<tr><td>

To understand where meat comes from – learning that beef is from cattle and how beef is reared and processed, including key welfare issues.
To know that I can adapt a recipe to make it healthier by substituting ingredients.
To know that I can use a nutritional calculator to see how healthy a food option is.
To understand that ‘cross-contamination’ means that bacteria and germs have been passed onto ready-to-eat foods and it happens when these foods mix with raw meat or unclean objects.

</td><td>

I can adapt a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients.
I can write an amended method for a recipe to incorporate the relevant changes to ingredients.
I can design appealing packaging to reflect a recipe.
I can use equipment safely, including knives, hot pans and hobs.
I can follow a step-by-step method carefully to make a recipe.
I can identify the nutritional differences between different products and recipes.

I can identify and describe healthy benefits of food groups.
</td></tr>
</table>
</td></tr>
</table>

End point at the end of Year 5

By the end of Year 5 children will be able to:

<u>Electrical circuits</u>

Design

- Identify factors that could be changed on existing products and explaining how these would alter the form and function of the product.
- Develop design criteria based on findings from investigating existing products.
- Develop design criteria that clarifies the target user.

Make

- Alter a product’s form and function by tinkering with its configuration.
- Make a functional series circuit, incorporating a motor.
- Construct a product with consideration for the design criteria.
- Break down the construction process into steps so that others can make the product.

Evaluate

- Carry out a product analysis to look at the purpose of a product along with its strengths and weaknesses.
- Determine which parts of a product affect its function and which parts affect its form.
- Analyse whether changes in configuration positively or negatively affect an existing product.
- Peer evaluate a set of instructions to build a product.

Mechanical Systems

Design

- Design a pop-up book which uses a mixture of structures and mechanisms.
- Name each mechanism, input and output accurately.
- Storyboard ideas for a book.

Make

- Follow a design brief to make a pop-up book, neatly and with focus on accuracy.
- Make mechanisms and/or structures using sliders, pivots and folds to produce movement.
- Use layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result.

Evaluate

- Evaluate the work of others and receiving feedback on own work.
- Suggest points for improvement.

Cooking and Nutrition

Design

- Adapt a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients.
- Write an amended method for a recipe to incorporate the relevant changes to ingredients.
- Design appealing packaging to reflect a recipe.

Make

- Cut and prepare vegetables safely.
- Use equipment safely, including knives, hot pans and hobs.
- Know how to avoid cross-contamination.
- Follow a step by step method carefully to make a recipe.

Evaluate

- Identify the nutritional differences between different products and recipes.
- Identify and describe healthy benefits of food groups.

Year 6 Jupiter Class

<table>
<tr><th>Term</th><th>Outcomes</th><th>vocabulary</th></tr>
<tr><td rowspan="3">Autumn
Textiles:
Waistcoats</td><td>Pupils who are secure will be able to:
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.</td><td>annotate
decorate
design criteria
fabric
target customer
waistcoat
waterproof</td></tr>
<tr><td>Knowledge</td><td>Skills</td></tr>
<tr><td>To understand that it is important to design clothing with the client/target customer in mind.
To know that using a template (or clothing pattern) helps to accurately mark out a design on fabric.
To understand the importance of consistently sized stitches.</td><td>I can design a waistcoat in accordance with a specification and design criteria to fit a specific theme.
I can use a template when pinning panels onto fabric.
I can mark and cut fabric accurately, in accordance with a design.
I can sew a strong running stitch, making small, neat stitches and following the edge.
I can tie strong knots.
I can attach objects using thread and adding a secure fastening.
I can sew accurately with even regularity of stitches.</td></tr>
<tr><th>Term</th><th>Outcomes</th><th>vocabulary</th></tr>
<tr><td rowspan="3">Spring
Structure:
Playgrounds</td><td>Pupils who are secure will be able to:
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.</td><td>apparatus
design criteria
equipment
playground
landscape features
cladding</td></tr>
<tr><td>Knowledge</td><td>Skills</td></tr>
<tr><td>To know that structures can be strengthened by manipulating materials and shapes.
To understand what a ‘footprint plan’ is.</td><td>I can design a playground featuring a variety of different structures, giving</td></tr>
</table>

	• To understand that in the real world, design can impact users in positive and negative ways. To know that a prototype is a cheap model to test a design idea.	consideration to how the structures will be used. • I can Consider effective and ineffective designs. • I can build a range of play apparatus structures drawing upon new and prior knowledge of structures. • I can measure, mark and cut wood to create a range of structures. • I can use a range of materials to reinforce and add decoration to structures. • I can improve a design plan based on peer evaluation. • I can test and adapt a design to improve it as it is developed. I can identify what makes a successful structure.
Term	**Outcomes**	**vocabulary**
Summer **Digital World:** Navigating the World	Pupils who are **secure** will be able to: • 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.	smart smartphone equipment navigation cardinal compass application (apps) pedometer GPS tracker design brief design criteria client function program duplicate replica loop variable value if statement boolean corrode moudable lightweight sustainable design environmentally friendly biodegradable recyclable product lifecycle
	Knowledge	**Skills**
	• To know that accelerometers can detect movement. • To understand that sensors can be useful in products as they mean the product can function without human input. • To know that designers write design briefs and develop design criteria to enable them to fulfil a client's request. • To know that 'multifunctional' means an object or product has more than one function.	• I can write a design brief from information submitted by a client • I can develop design

	• To know that magnetometers are devices that measure the Earth's magnetic field to determine which direction you are facing.	criteria to fulfil the client's request. • I can develop a product idea through annotated sketches. • I can place and manoeuvre 3D objects, using CAD. • I can change the properties of, or combine one or more 3D objects, using CAD. • I can consider materials and their functional properties. • I can explain material choices. • I can programme an N, E, S,W cardinal compass. • I can develop an awareness of sustainable design. • I can demonstrate a functional program as part of a product concept.

End point at the end of Year 6

By the end of Year 6 children will be able to:

<u>Textiles</u>

Design

- Design a waistcoat in accordance to a specification linked to set of design criteria.
- Annotate designs, to explain their decisions.

Make

- Use a template when cutting fabric to ensure they achieve the correct shape.
- Use pins effectively to secure a template to fabric without creases or bulges.
- Mark and cut fabric accurately, in accordance with their design.
- Sew a strong running stitch, making small, neat stitches and following the edge.
- Tie strong knots.
- Decorate a waistcoat, attaching features (such as appliqué) using thread.
- Finish the waistcoat with a secure fastening (such as buttons).

- Learn different decorative stitches.
- Sew accurately with evenly spaced, neat stitches.

Evaluate
- Reflect on their work continually throughout the design, make and evaluate process.

Structures

Design
- Design a playground featuring a variety of different structures, giving careful consideration to how the structures will be used, considering effective and ineffective designs.

Make
- Build a range of play apparatus structures drawing upon new and prior knowledge of structures.
- Measure, mark and cut wood to create a range of structures.
- Use a range of materials to reinforce and add decoration to structures.

Evaluate
- Improve a design plan based on peer evaluation.
- Test and adapt a design to improve it as it is developed.
- Identify what makes a successful structure.

Digital World

Design
- Write a design brief from information submitted by a client.
- Develop design criteria to fulfil the client's request.
- Consider and suggest additional functions for my navigation tool.
- Develop a product idea through annotated sketches.
- Place and manoeuvre 3D objects, using CAD.
- Change the properties of, or combine one or more 3D objects, using CAD.

Make
- Consider materials and their functional properties, especially those that are sustainable and recyclable (for example, cork and bamboo).
- Explain material choices and why they were chosen as part of a product concept.
- Programme an N, E, S, W cardinal compass.

Evaluate
- Explain how my program fits the design criteria and how it would be useful as part of a navigation tool.
- Develop an awareness of sustainable design.
- Identify key industries that utilise 3D CAD modelling and explaining why.
- Describe how the product concept fits the client's request and how it will benefit the customers.
- Explain the key functions in my program, including any additions.
- Explain how my program fits the design criteria and how it would be useful as part of a navigation tool.
- Explain the key functions and features of my navigation tool to the client as part of a product concept pitch.
- Demonstrate a functional program as part of a product concept pitch.