

Cantrell Primary School Design and Technology Curriculum

Year 1: Christmas cards

Mechanisms – sliders and levers

Objectives:

- Be able to investigate existing slider and lever products and discuss and understand how they work
- Be able to create a slider mechanism
- Be able to create a lever mechanism
- Be able to design and create their own mechanism for a user and purpose

Key Factual Learning:

- ✓ When we push or pull a slider, it causes something to move in a straight line.
- ✓ The object which moves might go up and down or forwards and backwards.
- ✓ Masking tape is one way in which we can fix a slider.
- ✓ When we turn a lever, it causes something to move around a fixed point (pivot).
- ✓ The object can move round and round or in a curve.
- ✓ Sliders and levers can be made with card.
- ✓ We can find sliders and levers in things with moving parts, including in books, greeting cards and puppets.
- ✓ Sliders and levers are mechanisms, which means they create movement.
- ✓ A guide/bridge is used to keep a slider in place to control where it moves.

Practical Tasks:

Investigative and Evaluative Activities:

- Look at and investigate existing sliders and levers around the classroom such as door handles and trays.
- Provide books and greetings cards with examples of sliders and levers in for the children to investigate.
- Discuss the movements, e.g. slider move in a straight line and levers move in curves.

Focused Tasks:

- Teach the children how to cut in the middle of a piece of paper/card, e.g. use a hole punch to create a hole ready for cutting or fold and cut along the fold to create a slot.
- The children learn and practise how to create a slider using card, tape and scissors.
- The children learn and practise how to create a lever using a hole punch, card and split pins.

Design, Make and Evaluate Assignment:

- Children will be told that they will be designing and making a moving Christmas card to give to someone at Christmas to say "Merry Christmas".
- Children will design their slider puppet and/or their lever puppet. E.g. they could create a slider card with Santa moving up and down a chimney and then a lever of Santa and his sleigh flying through the sky.
- Create their slider and levers. (Children will only create a slider or a lever on their card)
- Create their setting/background in order for it to be fit for purpose (be an appealing greeting card).
- Evaluate by using their slider or lever on their card and discuss with a partner. Did the slider move in a straight line? Did the lever move in a curve?

Key Vocabulary:

Mechanism, slider, lever, pivot, slot, card, masking tape, paper fastener, join, pull, push, up, down, forwards, backwards, straight, curve, design, make, evaluate, user, purpose, ideas, product, guide/bridge.

Cross-Curricular Links:

Art – drawing (people), painting, colouring.
Maths – measuring.

Year 1: Fruit salad

Food – preparing fruit and vegetables

Objectives:

- Understand that there are five different food groups.
- Understand that we should eat at least five portions of fruits and vegetables each day.
- Be able to name and talk about a range of fruits.
- Be able to design a fruit dish for a purpose.
- Be able to prepare fruit to create a fruit dish.
- Be able to evaluate my product.

Key Factual Learning:

- ✓ Food comes from plants or animals.
- ✓ Fruit and vegetables can be grown on farms or at home.
- ✓ The Eatwell guide helps us to have a healthy diet. There are five groups of food on the Eatwell guide.



Common foods, such as bread, apples, milk, chicken, can be sorted into the different groups.

- ✓ We should eat at least five portions of fruit and vegetables each day.
- ✓ Before we prepare food, we should wash and dry our hands, tie back long hair, and put on an apron.
- ✓ Fruit can be prepared for being eaten in different ways (e.g. washing, peeling using fingers, chopping).
- ✓ Soft fruit can be cut with simple cutting tools, such as a table knife. A fork can be used to hold soft foods when chopping.



Practical Tasks:

Investigative and Evaluative Activities:

- Investigate and explore a range of fruit through sensory analysis – feel, smell, look at and taste different fruits. Draw fruits that they know.
- Taste and evaluate existing fruit dishes to see which one they like best and which might be suitable for their user and purpose.

Focused Tasks:

- Children learn how to prepare different fruits using simple utensils safely and food processing techniques, such as washing, peeling and chopping.
- Children learn basic food hygiene practices, including the importance of following instructions.
- Introduce the children to the healthy guide. Give pictures of food to sort into the different food groups.
- Discuss the fact that we should eat at least five portions of fruit and vegetables a day. Explain that roughly a handful is a portion.

Design, Make and Evaluate Assignment:

- Children will design their own fruit dish for a superhero! They must create for a purpose so is it for breakfast, snack or dessert? What might we include for these things? E.g. breakfast may have fruit, yoghurt, cereal.
- Talk about and make drawings to help develop and communicate their ideas.
- Create their fruit dish using the utensils and techniques learnt in IEAs and FTs.
- Evaluate by answering the following questions:
Do you like the way it looks? Why? How does it taste? Do you think your friend would like it? What food skills did you use to make it? Would you change anything if you could?

Key Vocabulary:

Healthy diet, Fruit names - apples, bananas, pears, oranges, grapes, strawberries, blueberries, pineapples, names of equipment and utensils – knife, chopping board, bowl, spoon, sensory vocabulary e.g. soft, juicy, crunchy, sweet, sticky, smooth, sharp, crisp, sour, hard, fruit vocabulary - flesh, skin, seed, pip, core, chopping, peeling

Cross-Curricular Links:

Link to Superhero topic – Super foods!

Year 1: Superhero capes

Textiles – templates and joining techniques

Objectives:

- Be able to investigate and understand existing joining techniques used for fabric products
- Be able to design and create their own fabric product for a user and purpose
- Be able to evaluate their own product based on the product brief/purpose

Key Factual Learning:

- ✓ Fabric is used to make a range of products, including clothing, cushions, blankets and toys.
- ✓ Fabrics have properties which can make them suitable for different products.
- ✓ A template (or pattern) is a shape which we can use to draw around on fabric and then cut out.
- ✓ Two pieces of fabric can be joined using different joining techniques, such as gluing, sewing, masking tape and stapling.
- ✓ We can use finishing techniques to decorate our product and make it attractive to the user.
- ✓ There are a range of finishing techniques, including textile paints or crayons, and sticking buttons, sequins or other decorations.
- ✓ Fabric can be fastened in a simple way with treasury tags, Velcro, ties and safety pins. Buttons and zips are commonly used as fastenings.

Practical Tasks:

Investigative and Evaluative Activities:

- Investigate products with a range of joins, e.g. zips, buttons, sewing, glue, Velcro.
- Investigate fabrics to find out which is the best for the purpose of the product they will make.

Focused Tasks:

- Learn and practise joining techniques on material such as Velcro, glue, treasury tags (use tape to make material stronger for hole punching). They could cut a hole in the fabric and use ribbon or string to join.
- Practise cutting material and drawing around a template to create the desired shape.

Design, Make and Evaluate Assignment:

- Tell the children that they will be designing and making a superhero cape for Super Bear to make him stand out as a superhero. He must be able to take it on and off easily.
- Draw and label design of cape – what materials will you use? What joining techniques will you use? He needs to be able to put his cape on and off for when he isn't out being a superhero!
- Create the superhero cape using joining techniques.
- Use simple applique to finish product (attach small fabric shapes using glue).
- Evaluate their product - does it stand out? Does it come on and off? Does it look like a superhero cape for Super Bear? Does it attach securely for when he is out fighting crime?

Key Vocabulary:

Names of products, joining and finishing techniques (see factual learning), tools, fabrics and components, template, mark out, join, decorate, finish, features, suitable, design brief, design criteria, make, evaluate, user, purpose, function

Cross-Curricular Links:

Link to Superhero topic.

Art – drawing, joining fabrics, colour.

Maths – shapes.

Year 1: Castles

Structures – freestanding structures

Objectives:

- Be able to observe existing buildings and discuss what makes them strong and stable structures.
- Be able to join materials together
- Be able to investigate different techniques to make a structure strong and stable.
- Be able to create own freestanding structure for a purpose.
- Be able to evaluate own freestanding structure against the product brief.

Key Factual Learning:

- ✓ A structure is something which is built, like a house, castle, wall or playground equipment.
- ✓ Structures in the environment can be made from different materials, such as metal, wood, plastic, bricks and concrete.
- ✓ Buildings and structures have different purposes and therefore different designs.
- ✓ A freestanding structure can stand on its own without being attached to a base or foundation.
- ✓ We can use various materials such as construction bricks, wooden blocks, box modelling and paper straws to make our model freestanding structures,
- ✓ A freestanding structure can be made stronger, stiffer and more stable, by using techniques such as the brick pattern, a wide base, a buttress and by folding materials.
- ✓ There are ways to join materials in our freestanding structures, such as masking tape, glue, and staples.

Practical Tasks:

Investigative and Evaluative Activities:

- Provide the children with images of different buildings including castles. Discuss how these buildings stand up on their own and what might make them strong and more stable structures. Discuss what the buildings may be used for and what features may tell them that. What materials were used to make them?

Focused Tasks:

- Practise building walls with blocks – investigate how we could make the wall stronger.
- The children will learn how to join sheet materials (cardboard and paper) using glue and tape.
- We will practise measuring and marking ready for cutting.
- Children will be given materials such as paper and straws to create a structure to investigate how folding and joining can make their structure more stable and stronger.

Design, Make and Evaluate Assignment:

- Tell children that they will be designing and making a freestanding castle for a king or queen that is strong enough to keep invaders out. Discuss and link back to previous tasks and structures investigated.
- Draw and label their castle design.
- Children will create their castle structure, choosing their own materials and techniques – support children in doing this and provide suggestions where needed.
- Children will use appropriate finishing techniques such as paint and collage to complete their product.
- Encourage children to verbally evaluate their product as they create.
- Evaluate product in their books – does it stand up on its own? Is it fit for purpose (e.g. is it strong and stable).

Key Vocabulary:

Cut, fold, join, fix, freestanding, structure, wall, tower, framework, metal, wood, plastic, weak, strong, base, top, underneath, side, edge, surface, thinner, thicker, corner point, straight, curved, circle, triangle, square, rectangle, cuboid, cube, cylinder, design, make, evaluate, user, purpose, ideas, design criteria, product, function

Cross-Curricular Links:

Links to castle topic – English and History.
Maths – measuring and shapes.
Science – structures and material properties.

Year 2: Sewing puppets

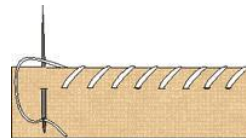
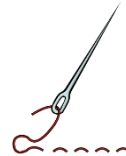
Textiles – templates and joining techniques

Objectives:

- Be able to explore and use different fabrics
- Be able to cut and join fabrics with simple techniques
- Be able to design a product for a chosen user and purpose
- Be able to select from and use a range of tools and equipment to perform practical tasks.
- Be able to select from and use textiles according to their characteristics
- Be able to evaluate their ideas and their final products against the design criteria
- Understand how to join fabrics using different techniques
- Be able to explore a variety of finishing techniques

Key Factual Learning:

- ✓ Fabric is used to make a range of products, including clothing, cushions, blankets and toys.
- ✓ Different fabrics are suitable for different products.
- ✓ A template (or pattern) is a shape made from card which we can use to draw around on fabric and cut out. We can also pin it on the fabric then cut it out.
- ✓ Two pieces of fabric can be joined using different joining techniques, such as gluing, sewing, pinning and stapling.
- ✓ A needle is threaded by twisting the end of the thread and pushing it through the eye. A needle threader can also be used.
- ✓ Running stitch (top) and over sew stitch (bottom) can be used to sew fabric together.
- ✓ Finishing techniques can be used to decorate our product and make it attractive to the user.
- ✓ There is a range of finishing techniques e.g. fabric paints or crayons, and sticking buttons, sequins or other decorations, such as appliqué.
- ✓ Fabric can be fastened in a simple way with treasury tags, Velcro, ties and safety pins.
- ✓ A 3D textiles product can be made using two identical fabric shapes.



Practical Tasks:

Investigative and Evaluative Activities:

- Investigate and evaluate a range of puppets.
- Sort a range of existing products according to user and purpose.
- Label fastenings and techniques used on existing products.
- Investigate fabrics to determine which is best for the product.

Focused Tasks:

- Create a paper template for their puppet.
- Cut out the fabric pieces.
- Practise different joining techniques e.g. running stitch and over sew stitch.
- Practise different finishing techniques.

Design, Make and Evaluate Assignment:

- Generate a range of ideas when designing their product.
- Communicate and develop ideas through talk, drawings and mock-ups, including their steps for making.
- Design product with purpose and user in mind.
- Evaluate ongoing work and final products against the intended purpose and user.

Key Vocabulary:

Names of products, fabrics (eg felt, fleece, recycled fabric) joining and finishing techniques (see factual learning), tools, fabrics and components, template, pattern pieces, mark out, join, decorate, finish, features, suitable, quality mock-up, design brief, design criteria, make, evaluate, user, purpose, function

Cross-Curricular Links:

English – Twisted tales

Year 2: Fire engines and emergency vehicles

Mechanisms – wheels and axles

Objectives:

- Be able to assemble a vehicle with moving wheels using construction kits
- Be able to explore moving vehicles through play
- Be able to develop cutting, joining, and finishing skills
- Be able to develop and communicate ideas through drawings and mock-ups
- Be able to select from and use a range of tools and equipment to perform practical tasks.
- Be able to select from and use a range of components
- Be able to evaluate wheeled products

Key Factual Learning:

- ✓ A wheel can make a vehicle move when it turns.
- ✓ An axle is a rod onto which we can attach one or more wheels. Axles keep wheels in place and allow them to turn. Axles can be fixed or free moving.
- ✓ Free moving axles can be fixed onto a vehicle using an axle holder, (eg clothes pegs, card triangles and paper straws). It is important that the axle moves freely in the axle holder.
- ✓ Fixed axles can be attached on with tape. Moving wheels must be used with a fixed axle for the vehicle to move.
- ✓ The chassis is the frame or base onto which the vehicle is built.

Practical Tasks:

Investigative and Evaluative Activities:

- Explore and evaluate wheeled products.
- Draw and label an example of a wheeled product.
- Read a story that includes a wheeled product. (Fiction or Non-fiction).

Focused Tasks:

- Use construction kits with wheels and axels – make a product that moves.
- Demonstrate to children how wheels and axels may be assembled as either free or fixed axles.
- Using construction kits with wheels and axles.
- Using samples of materials and components they will use when designing and making.

Design, Make and Evaluate Assignment:

- Identify user and purpose for the product and generate a simple criteria.
- Use their guide to create a wheel and axel product.
- Evaluate their finished product.

Key Vocabulary:

vehicle, wheel, axle, axle holder, chassis, body, cab, assembling, cutting, joining, shaping, finishing, fixed, free, moving, mechanism, names of tools, equipment and materials used, design, make, evaluate, purpose, user, criteria, function

Cross-Curricular Links:

Science – working scientifically

Mathematics – number of wheels, more than, less than, equal, measuring length.

Spoken language – use of technical terminology

Art – Use a range of media

Year 2: Salad

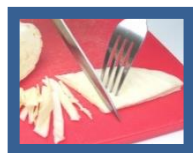
Food – preparing fruit and vegetables

Objectives:

- Understand that there are five different food groups
- Understand that we should eat at least five portions of fruits and vegetables each day
- Be able to name and talk about a range of vegetables
- Be able to design a vegetable/salad dish for a purpose
- Be able to prepare vegetables to create a salad
- Be able to evaluate my product

Key Factual Learning:

- ✓ All food comes from plants or animals.
- ✓ Food has to be farmed, grown, or caught.
- ✓ The Eatwell guide helps us to have a healthy, balanced diet. It shows the five food groups (fruit and vegetables; potatoes, bread and pasta; foods high in sugar and fats; dairy and alternative; meat, fish and other proteins). Foods can be named and sorted into the different groups.
- ✓ We should eat at least five portions of fruit and vegetables each day.
- ✓ Before we prepare food, we should wash and dry our hands, tie back long hair, and put on an apron.
- ✓ Fruit and vegetables can be prepared for being eaten in different ways (eg washing, peeling, separating, chopping, grating, cutting, squeezing).
- ✓ Fruit and vegetables can be prepared with simple tools, such as scissors, a grater or a table knife. A fork can be used to hold soft foods when chopping.



Practical Tasks:

Investigative and Evaluative Activities:

- Investigate, examine and explore a range of vegetables by feeling, smelling, looking at and tasting different vegetables. Draw and label vegetables.
- Taste and evaluate a variety of vegetables to see which ones they like best and which might be suitable for their user and purpose.

Focused Tasks:

- Children learn how to prepare different vegetables using a variety of utensils safely and food processing techniques, such as washing, peeling and chopping.
- Children learn basic food hygiene practices, including the importance of following instructions.
- Introduce the children to the healthy guide. Draw a healthy food plate and create a meal plan for a well-balanced diet.

Design, Make and Evaluate Assignment:

- Children will design their own salad dish for their family to accompany a meal. What might we include for these things? E.g. celery, cucumber, leaves, tomatoes, peppers, onion, sweetcorn, radish, carrot, cabbage, avocado, potatoes, beetroot, eggs, mushrooms.
- Draw and label their product deciding which vegetables to include.
- Discuss using appropriate utensils and tools.
- Create their salad using the utensils and techniques learnt in IEAs and FTs.
- Evaluate the product against the intended purpose and design.

Key Vocabulary:

Vegetable names -celery, cucumber, leaves, tomatoes, peppers, onion, sweetcorn, radish, carrot, cabbage, avocado, potatoes, beetroot, eggs, mushrooms.
 Names of equipment and utensils – knife, peeler, grater, chopping board.
 Vegetable vocabulary - flesh, skin, seed, pip, core, slicing, chopping, peeling, cutting, squeezing, healthy diet
 Task related vocabulary - choosing, ingredients, planning, investigating tasting, arranging, popular, design, evaluate, criteria

Cross-Curricular Links:

Science – Humans and Animals

Cantrell Primary School Design and Technology Curriculum

Year 3: Pop-up story book

Mechanical systems – levers and linkages

Objectives:

- Be able to investigate existing products with levers and linkages and understand how they work
- Have knowledge and understanding of lever and linkage mechanisms and the movement they create
- Be able to create lever and linkage mechanisms
- Understand the difference between an input and output
- Be able to design and create their own product for a user and purpose using a lever and linkage mechanism
- Generate, develop, model and communicate their ideas through discussion, storyboards, annotated sketches and prototypes.
- Be able to evaluate their products against their design specification, intended user and purpose, identifying strengths and areas for development

Key Factual Learning:

- ✓ Jan Pienkowski was born in Poland and has illustrated and written over 140 books. He is a much-loved children's author of Meg and Mog books, a paper engineer.
- ✓ A mechanism is a device used to create movement in a product. Levers and linkages are types of mechanism.
- ✓ A lever is a rigid bar which moves around a pivot.
 - Levers are used in many everyday products, such as scissors, staplers and pliers. A lever can be used to carry a heavy weight or crack a nut.
 - Levers can be joined together to produce linkages, such as on the arm of a big digger or an angle poise lamp.
- ✓ Levers and linkages can be made using card strips and paper fasteners for pivots.
- ✓ A pivot can be loose or fixed.
 - A fixed pivot is where the paper fastener joins the card strip to the backing card (shown as black dots on the diagrams below).
 - A loose pivot is where the paper fastener joins the strips together (yellow on diagram below).
- ✓ A linkage is the card strips joining one or more levers to produce the required movement.
- ✓ A lever and linkage mechanism can produce different sorts of movement:
 - linear (in a straight line)
 - reciprocating (backwards and forwards in a straight line)
 - rotary (going round and round)
 - oscillating (backwards and forwards in an arc)
- ✓ A lever and linkage mechanism can be operated by pushing or pulling a card strip. This is called the input. The output is the resulting movement on the picture.



Practical Tasks:

Investigative and Evaluative Activities:

- Children investigate, analyse and evaluate books and, where available, other products which have a range of lever and linkage mechanisms.
- Use questions to develop children's understanding e.g. Who might it be for? What is its purpose? What do you think will move? How will you make it move? What part moved and how did it move? How do you think the mechanism works? What materials have been used? How effective do you think it is and why? What else could move?

Focused Tasks:

- Demonstrate a range of lever and linkage mechanisms using prepared teaching aids.
- Use questions to develop understanding e.g. Which card strip is the lever? Which card strip is acting as the linkage? Which part of the system is the input and which part the output? What does the type of movement remind you of? Which are the fixed pivots and which are the loose pivots?
- Demonstrate the correct and accurate use of measuring, marking out, cutting, joining and finishing skills and techniques.
- Children develop their knowledge and skills by replicating one or more of the teaching aids.

Design, Make and Evaluate Assignment:

- Develop a design brief with the children within a context which is authentic and meaningful (designing a Little Hippo Book aimed at KS1 children for a museum's learning resource).
- Discuss with children the purpose of the products they will be designing and making and who the products will be for. Ask the children to generate a range of ideas, encouraging creative responses. Agree on design criteria that can be used to guide the development and evaluation of the children's products.
- Using annotated sketches and prototypes, children develop, model and communicate their ideas.
- Ask the children to consider the main stages in making before assembling high quality products, drawing on the knowledge, understanding and skills learnt through IEAs and FTs.
- Evaluate the final products against the intended purpose and with the intended user, drawing on the design criteria previously agreed.

Key Vocabulary:

mechanism, lever, linkage, pivot, slot, bridge, guide, system, input, process, output, linear, rotary, oscillating, reciprocating, user, purpose, function prototype, design criteria, innovative, appealing, design brief

Cross-Curricular Links:

Mathematics – use the vocabulary of position, direction and movement. Use a ruler to measure to the nearest cm, half cm or mm.
 Art and design – use colour, pattern, line, shape. – use and develop drawing techniques. Use colour, pattern, line, shape.
 Computing – digital graphics and text could be incorporated into final products as the background or moving parts.

Year 3: Soft toy sea creature

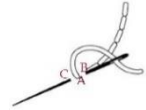
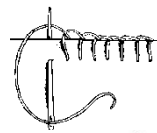
Textiles – 2D shape to 3D product

Objectives:

- Be able to create their own stuffed toy for a particular user and purpose (for children to buy from the Sea Life Centre Gift shop)
- Have knowledge and understanding of different fabrics and be able to select from and use them according to their properties
- Be able to select and use different stitches to join different fabric shapes
- Know that there are different joining and finishing techniques and be able to select from and use them for a variety of purposes
- Be able to follow a process of designing and making a sea creature.
- Be able to use relevant tools and techniques accurately and safely
- Know how to make and use a template and understand how it can be used to turn a 2d shape to a 3d product
- Be able to generate, develop, model and communicate ideas through discussion, storyboards, annotated sketches and prototypes
- Be able to evaluate their products against their design specification, intended user and purpose, identifying strengths and areas for development

Key Factual Learning:

- ✓ Different types of fabrics are constructed in various ways (eg bonded, woven, knitted, felted)
- ✓ Different types of fabrics have properties (such as strength, waterproofness and flexibility) which can make them suitable for different users and purposes.
- ✓ Two pieces of fabric can be securely joined together using a range of stitches.
- ✓ Running stitch can be used for tacking seams and hems before sewing and joining two pieces of fabric together. Over sew stitch can be used to neaten edges to prevent fabrics from fraying or to join two edges together (taught in yr2 but give more detail on use)
- ✓ Blanket stitch (top) can be used to hold two edges together, to neaten edges or to produce a decorative effect.
- ✓ Back stitch (bottom) is a secure stitch for hand sewing seams. The smaller the stitches, the more secure it will be.
- ✓ A line of stitches joining fabric pieces together is called a seam. A seam allowance is extra fabric allowed for joining together (usually 1.5 cm) so the stitches aren't too close to the edge and less likely to come undone.
- ✓ A template (or pattern) is a shape drawn to an exact shape and size which is then pinned/taped to the fabric and cut out and assembled. A template helps with cutting out accurately, creating a more professional finished product.
- ✓ A single fabric shape can be used to make a 3D textiles product.
- ✓ We can use finishing techniques to decorate our product and make it attractive to the user. Different decorative techniques can be used to achieve a required effect.
- ✓ Some common techniques include appliqué (stitching or gluing a shape or patch onto fabric); embroidery (such as cross-stitch); tie dye; batik; printing; and fabric pens and paints.
- ✓ Fabric can be fastened with Velcro, buttons, cord and ribbon.
- ✓ The stuffed toy originated from the Steiff company in Germany. Richard Steiff designed a bear of the same name in 1902, following the popularity of the 'Teddy' bear in the US.



Practical Tasks:

Investigative and Evaluative Activities:

- Children investigate a range of textile products that have a selection of stitches, joins, fabrics, finishing techniques, fastenings and purposes, linked to the product they will design, make and evaluate. Think about products from the past and what changes have been made in textile production and products e.g. the invention of zips and Velcro.
- Give children the opportunity to disassemble appropriate textiles products to gain an understanding of 3-D shape, patterns and seam allowances.
- Use questioning to develop understanding e.g. What is its purpose? Which one is most suited to its purpose? What properties does the fabric have? Why has this fabric been chosen? How has the fabric been joined together? How effective are its fastenings? How has it been decorated? Does its decoration have a purpose? What would the 2-D pattern piece look like? What are its measurements? How might you change the product?

Focused Tasks:

- Demonstrate a range of stitching techniques and allow children to practise sewing two small pieces of fabric together, demonstrating the use of, and need for, seam allowances.
- Allow children to use a textile product they have taken apart to create a paper pattern using 2-D shapes.
- Provide a range of fabrics – children to consider whether fabrics are suitable for the chosen purpose and user. The fabrics also can be used for demonstrating and testing out a range of decorative finishing techniques e.g. appliqué, embroidery, fabric pens/paints, printing.
- Use questioning to develop understanding e.g. Which joining technique makes the strongest seam? Why? Which stitch is appropriate for the purpose? Which joining techniques are suitable for the fabric and purpose? How can you stiffen your fabric? What is the purpose of the fastenings? Which one is most suited to the purpose and user? What decorative techniques have been used? What effect do they have?

Design, Make and Evaluate Assignment:

- Children to create a design brief, supported by the teacher, set within a context which is authentic and meaningful (making a stuffed toy sea creature for the Sea Life Centre gift shop). Discuss the intended user, purpose and appeal of their product. Create a set of design criteria.
- Ask children to sketch and annotate a range of possible ideas, constantly encouraging creative thinking. Produce mock-ups and prototypes of their chosen product.
- Plan the main stages of making e.g. using a flowchart or storyboard.
- Children to assemble their product using their existing knowledge, skills and understanding from IEs and FtS. Encourage children to think about the aesthetics and quality finish of their product.
- Evaluate as the process is undertaken and the final product in relation to the design brief and criteria. The product should be tested by the intended user and for its purpose and others' views sought to help with identifying possible improvements.

Key Vocabulary:

Fabric, names of fabrics (e.g. felt, fleece, cotton, calico, recycled fabric), fastening, compartment, zip, button, structure, finishing technique, strength, weakness, stiffening, templates, stitch, seam, seam allowance, user, purpose, design, model, evaluate, prototype, annotated sketch, functional, innovative, investigate, label, drawing, aesthetics, function, pattern pieces

Cross-Curricular Links:

Science – physical properties of fabrics. Identify and compare the suitability of a variety of fabrics for particular uses.

Computing – opportunity to create pattern pieces using a computer program. Using software to produce pattern pieces and possible use for decorative techniques.

Cantrell Primary School Design and Technology Curriculum

Year 3: Sandwich and salad

Food– healthy and varied diet

Objectives:

- Be able to investigate and evaluate existing food products using their senses
- Understand that a healthy diet should be made up of a balance of different food groups
- Understand that living things need nutrients to gain energy and remain healthy
- Be able to use a range of utensils and techniques for food preparation
- Understand basic food hygiene practices
- Be able to design a healthy sandwich and side salad for a school lunch menu
- Be able to develop and communicate ideas using discussion, annotated sketches and ICT
- Be able to evaluate the final product

Key Factual Learning:

- ✓ A healthy plate is made up from a variety and balance of different foods and drinks, as shown in the Eatwell guide.
- ✓ To be active and healthy, food and drink are needed to provide energy for the body.
- ✓ Foods can be grown (eg wheat), reared (eg chickens) and caught (eg fish) in the UK, Europe and wider world.
- ✓ Sandwiches were invented in the Edwardian era by the Earl of Sandwich. They were originally designed as an afternoon snack. The sandwich industry is worth £5.6 billion a year in the UK, and around 12 billion sandwiches are eaten every year.
- ✓ Salads are a great way to add nutrients and fibre to a diet. They can be used as a side dish but also as a main meal.
- ✓ Food and ingredients can be analysed using sensory evaluations, such as appearance and smell.
- ✓ Foods and ingredients can be prepared for eating using technique such as peeling, chopping (using a vegetable knife in a claw grip), grating, mixing, kneading.
- ✓ Food must be prepared safely and hygienically. Work surfaces being used to prepare food must be clean. Oven gloves must be worn when using heat sources and handling cooking trays.



Practical Tasks:

Investigative and Evaluative Activities:

- Children investigate a range of food products e.g. a selection of foods provided for them or each day the children will record what they have in their lunchboxes or for their school meal. They can keep a food diary. Link to the principles of a varied and healthy diet using the Eatwell guide e.g. What ingredients have been used? Which food groups do they belong to? What substances are in the products e.g. nutrients, water and fibre?
- Carry out sensory evaluations on the contents of some examples of food that has been brought in (check for dietary needs). Record results using a table. Use appropriate words to describe the taste/smell/texture/appearance. How do the sensory characteristics affect your liking for the food?
- Gather information about existing products available relating to your product. Visit a supermarket and/or use the internet.
- Find out how a variety of ingredients in products are grown and harvested, reared, caught and processed. Use 2 ingredients that we will be using to create the salads. Where/when are the ingredients grown? Where do different meats/fish/cheese/eggs come from? How/why are they processed?

Focused Tasks:

- Learn to select and use a range of utensils and use a range of techniques as appropriate to prepare ingredients hygienically including the bridge and claw technique, grating, peeling, chopping, slicing, mixing, spreading, kneading and baking. Have a range of foods to practise on.
- Food preparation and cooking techniques could be practised by making a food product using an existing recipe. This will be a simple recipe to follow and will show the children the importance of following instructions step by step and in order.
- Discuss basic food hygiene practices when handling food including the importance of following instructions to control risk. What should we do before we work with food? Why is following instructions important?

Design, Make and Evaluate Assignment:

- Discuss the purpose of the products that the children will be designing, making and evaluating and who the products will be for. The school cook has written to Year 3 asking for some guidance. They want to expand the sandwich options available at lunchtime. She would like our help in designing a new sandwich and side salad for the school menu. Have a letter written by her that has been posted to school.
- Develop and agree on design criteria with the children e.g. What do you need to consider to make it part of a balanced diet? How do we select the ingredients? How could we make it appealing to eat? Ask children to generate a range of ideas encouraging realistic responses.
- Using discussion, annotated sketches and ICT, ask the children to develop and communicate their ideas.
- Ask children to consider the main stages in making the food product, before preparing/cooking the product including ingredients and utensils.
- Evaluate as the assignment proceeds and the final product against the intended purpose and user, reflecting on the agreed design criteria.

Key Vocabulary:

name of food products, names of equipment, utensils, techniques and ingredients, texture, taste, sweet, sour, hot, spicy, appearance, smell, preference, moist, cook, fresh, savoury, hygienic, edible, grown, reared, caught, frozen, tinned, processed, seasonal, harvested, healthy/varied diet, planning, design criteria, purpose, user, annotated sketch, sensory evaluations

Cross-Curricular Links:

Mathematics – mass kg/g weighing out ingredients using scales

Cantrell Primary School Design and Technology Curriculum

Year 4: Torches

Electrical systems – simple circuits and switches / simple programming and control

Objectives:

- Be able to investigate a range of relevant products (battery powered lights and switches)
- Understand how a simple electrical circuit works
- Understand how a switch works
- Understand the difference between a conductor and insulator
- Know how to make a simple circuit with switches
- Be able to identify a purpose and develop design criteria for an electrical product
- Be able to select materials and components and order the main stages of making
- Be able to design and make an electrical product for the intended user and purpose
- Be able to evaluate the final product, using their design criteria and the views of intended users

Key Factual Learning:

- ✓ Electricity is a live electrical current that if misused can be dangerous. You should never put electrical equipment near water. You should not enter electrical sub stations or climb electrical cables.
- ✓ An electrical circuit is a complete path of components through which an electric current can travel.
- ✓ An electrical circuit always needs a power source, such as a battery in a battery holder, with wires connected to both the positive and negative ends.
- ✓ Other components of a simple electrical circuit include a bulb (to light up), buzzer (to make a noise) or switch (to turn the electricity on and off).
- ✓ There are several types of switch, including a toggle switch which turns a product on so that it stays on; a push-to-make switch which turns on by pressing it; and a push-to-break which turns off by pressing.
- ✓ Handmade switches can be made with paper clips, paper fasteners, and wires.
- ✓ Simple secure connections for wires in a circuit can be made in a range of ways: by twisting strands of wire together; wrapping ends; taping over with insulating tape; and with a connecting block.
- ✓ Output devices are components that produce an outcome eg bulbs and buzzers.
- ✓ Input devices are components used to control an electrical circuit eg switches.
- ✓ A conductor is a material which allows an electric current to pass through it. Metals such as copper, iron and steel are good conductors.
- ✓ An insulator is a material which does not easily allow an electric current to pass through it. Plastic, wood, glass and rubber are good electrical insulators.
- ✓ Electrical systems can be used in a range of places, such as lamps in a house, display signs, traffic lights, and torches.
- ✓ A torch or lamp has a reflector to gather the light from the light source and form it into a beam.
- ✓ A microcontroller (such as a Crumble) can be used to control an electrical product.

Practical Tasks:

Investigative and Evaluative Activities:

- Discuss, investigate different examples of battery powered lights. Where and why they are used? How does the product work? What are its key features and components? How does the switch work? Is the product manually controlled or controlled by a computer? What materials have been used and why? How is it suited to its intended user and purpose?
- Children to investigate examples of switches, including those which are commercially available, which work in different ways e.g. push-to-make, push-to-break, toggle switch. Children to use them in simple circuits e.g. How might different types of switches be useful in different types of products?

Focused Tasks:

- Explore how to make simple circuits with batteries, switches and bulbs
- Make a variety of switches using everyday classroom equipment, how they can be operated in different ways eg, using paper fasteners, foil and card.
- Demonstrate and practise using a microcontroller such as a Crumble to control an output device.

Design, Make and Evaluate Assignment:

- Develop a design brief with the children within a context which is authentic and meaningful.
- Discuss with children the purpose of the battery-powered products that they will be designing and making and who they will be for (a night light for themselves or a family member to help them fall sleep at bedtime).
- Children generate a range of ideas, encouraging realistic responses. Agree on design criteria that can be used to guide the development and evaluation of the children's products, including safety features.
- Using annotated sketches, cross-sectional and exploded diagrams, as appropriate, ask the children to develop, model and communicate their ideas.
- Ask the children to consider the main stages in making and testing before assembling high quality products, drawing on the knowledge, understanding and skills learnt through IEAs and FTs.
- Evaluate throughout and the final products against the intended purpose and with the intended user, drawing on the design criteria previously agreed.

Key Vocabulary:

Series circuit, fault, connection, toggle switch, push-to-make switch, push-to-break switch, battery, battery holder, bulb, bulb holder, wire, insulator, conductor, crocodile clip, control, program, system, input device, output device, user, purpose, function, prototype, design criteria, innovative, appealing, design brief

Cross-Curricular Links:

Computing – Coding (CPD needed and extra equipment) Science – Electricity

Year 4: Easter treat box

Structures – shell structures and using computer-aided design (CAD)

Objectives:

- Understand what the net of a 3D shape is
- Be able to construct a 3D shape using the net shape
- Be able to evaluate the effectiveness of existing products and use that evaluation to inform the design of their own product
- Be able to design and make an Easter themed box for themselves to protect an Easter treat
- Be able to use Microsoft word to draw shapes (I - pads or computers)
- Be able to draw shapes, colour and different fonts
- Be able to evaluate their product against their design brief

Key Factual Learning:

- ✓ Structures are things built for a purpose, for example, to support or hold something.
- ✓ A shell structure is a hollow 3-D shape with a thin outer covering, which may be flat or curved.
- ✓ Shell structures can be used to present, protect or contain another product. Examples of shell structures include cereal boxes, party boxes, drinks cans, pizza boxes.
- ✓ The Sydney Opera House and the Taj Mahal domes are examples of shell structures in the world. The designer of the Opera House is a Danish man called Jørn Utzon..The Opera house took 14 years to build-10 years longer than expected.
- ✓ Curved shell structures are particularly strong as they spread the forces throughout the whole structure.
- ✓ A net is the flat or opened out shape of an object such as a box. Nets of 3-D shapes can be made using a computer or by hand by joining standard-sized card squares, rectangles, triangles and hexagons with masking tape. Tabs can be added to the net to join the vertices together.
- ✓ The sheet materials which are used to construct shell structures can be strengthened or stiffened through ribbing (gluing layers of straw between layers of card); corrugating (zig-zagging a piece of paper or card and gluing it between two layers of card); and laminating (gluing together several layers of card).
- ✓ Sheet materials can be made easier to fold by scoring (cutting a line or mark into the material).
- ✓ Shell structures are designed to be appropriate for their purpose and attractive to their audience. Design techniques such as colour, logos, lettering, pictures can be added to make the product appealing.

Practical Tasks:

Investigative and Evaluative Activities:

- Children investigate a collection of different shell structures including packaging. What is the purpose of the shell structure – protecting, containing, presenting? What material is it made from? How has it been constructed? Are the materials recyclable or reusable? How has it been stiffened i.e. folded, corrugated, ribbed, laminated? What size/shape/colour is it? What information does it show and why? How attractive is the design?
- Children take a small package apart identifying and discussing parts of a net including the tabs e.g. How are different faces of the package arranged? How are the tabs used to join the 'free' edges of the net?
- Evaluate existing products to determine which designs children think are the most effective. Provide opportunities for the children to judge the suitability of the shell structures for their intended users and purposes. Discuss graphics including colours/impact of style/logo/size of font e.g. What do you prefer and why? What style of graphics and lettering might we want to include in our product to meet users' preferences and its intended purpose? Which packaging might be the best for...?

Focused Tasks:

- Demonstrate simple drawing software (using Microsoft Word). Children to explore the interface and drawing tools to practise drawing and manipulating shapes such as rectangles, squares, ellipses, trapezoids and triangles.
- Children to use the software to open existing drawings including nets and to draw nets of their own, using gridlines, pre-shaped tools.
- Children explore and be guided to try out different fill and font tools to become familiar with the graphic design aspects of the available software to achieve the desired appearance of their products.
- Practise making nets out of card, joining flat faces with masking tape to create 3-D shapes. Experiment with assembling pre-drawn nets in numerous ways using scoring, cutting and assembling techniques. Children make a simple box, cut out a window and add an acetate sheet.

Design, Make and Evaluate Assignment:

- Design a product made from recyclable material that could be used to hold a small Easter treat (e.g. little egg, shaped chocolate treat)
- Develop and agree design criteria: what does the product need to do? Who is it aimed at? How will we know we have developed and designed a successful product?
- Children develop a design using CAD software to create nets, addressing the needs of the user and the purpose. Children print out their nets to develop prototypes in order to evaluate and refine their ideas e.g. What will you need to include in your design? How can you improve it? What materials will you use? How will you make sure your product works well and has the right appearance?
- Children to identify the main stages of making and the appropriate tools and skills they learnt through focused tasks. Children to work with accuracy, using their computer-aided design (CAD) skills as appropriate.
- Evaluate throughout and the final products against the intended purpose and with the intended user, where safe and practical, drawing on the design criteria previously agreed

Key Vocabulary:

shell structure, three-dimensional (3-D) shape, net, cube, cuboid, prism, vertex, edge, face, length, width, breadth, capacity, marking out, scoring, shaping, tabs, adhesives, joining, assemble, accuracy, material, stiff, strong, reduce, reuse, recycle, corrugating, ribbing, laminating, font, lettering, text, graphics, decision, evaluating, design brief design criteria, innovative, prototype

Cross-Curricular Links:

Computing – CAD History – the Maya and chocolate Maths – Shapes and nets

Cantrell Primary School Design and Technology Curriculum

Year 4: Picnic food

Food – healthy and varied diet

Objectives:

- Be able to investigate and evaluate existing food products using their senses
- Understand the different food groups and how they contribute to a balanced diet
- Be able to use a range of utensils for food preparation
- Understand basic food hygiene practices
- Be able to design an item of food for a healthy picnic
- Be able to independently make their healthy food
- Be able to evaluate their final product by using their senses

Key Factual Learning:

- ✓ A healthy diet is made up from a variety and balance of different foods and drinks, as shown in the Eatwell guide.
- ✓ To be active and healthy, food and drink are needed to provide energy for the body.
- ✓ Foods can be grown (such as tomatoes, wheat and potatoes), reared (such as pigs, chickens and cattle) and caught (such as fish) in the UK, Europe and wider world.
- ✓ Jamie Oliver is a British chef and restaurateur. In 2005, he started a campaign called 'Feed Me Better' to improve the standard of food in schools. As a result of this, tighter nutritional guidelines were brought in for school canteens, including the banning of junk and processed food.
- ✓ Sat Bains is a local chef who has Nottingham's first Michelin starred restaurant Restaurant Sat Bains in Lenton.
- ✓ Food and ingredients can be analysed using sensory evaluations, such as appearance, smell, flavour and texture.
- ✓ Foods and ingredients can be prepared for eating using a variety of techniques, such as peeling, chopping (with a vegetable knife using a claw grip), slicing, grating, mixing, spreading, kneading and baking.
- ✓ Food must be prepared safely and hygienically. Work surfaces being used to prepare food must be clean. Oven gloves must be worn when using heat sources and handling cooking trays.
- ✓ Sandwiches were invented in the Edwardian period by the Earl of Sandwich. They were originally designed as an afternoon snack. Tortilla wraps are originally Mexican flat breads that don't contain yeast. Pitta breads are a middle eastern/ Greek type of bread. When it is heated, the bread puffs up.

Practical Tasks:

Investigative and Evaluative Activities:

- Investigate a range of food products e.g. the content of their lunchboxes over a week, a selection of foods provided for them, food from a visit to a local shop. Link to the principles of a varied and healthy diet using the eat well guide e.g. What ingredients have been used? Which food groups do they belong to? What substances are used in the products e.g. nutrients, water and fibre?
- Carry out sensory evaluations on the contents of the food from e.g. a variety of bought food products such as a range of wraps or sandwiches. Record results, for example using a table. Use appropriate words to describe the taste/smell/texture/appearance e.g. How do the sensory characteristics affect your liking for the food?
- Find out information about local Michelin star chef Sat Bains and Jamie Oliver and his campaign for better school dinners.

Focused Tasks:

- Learn to select and use a range of utensils and use a range of techniques as appropriate to prepare ingredients hygienically including the bridge and claw technique, grating, peeling, chopping, slicing, mixing, spreading, kneading and baking.
- Food preparation and cooking techniques could be practised by making a food product using an existing recipe.
- Discuss basic food hygiene practices when handling food including the importance of following instructions to control risk e.g. What should we do before we work with food? Why is following instructions important?

Design, Make and Evaluate Assignment:

- Design an individual sandwich/ wrap or pitta that can be eaten at a picnic and as a group, create a dip.
- Using discussion, annotated sketches and ICT, ask the children to develop and communicate their ideas.
- Ask children to consider the main stages in making the food product, before preparing/cooking the product including the ingredients and utensils they will need.
- Using appropriate utensils and preparation techniques children make their food product.
- Evaluate as the assignment proceeds and the final product against the intended purpose and user, reflecting on the agreed design criteria. Consider what others think of the product when considering how the work might be improved.

Key Vocabulary:

name of products, names of equipment, utensils, techniques and ingredients, texture, taste, sweet, sour, hot, spicy, appearance, smell, preference, greasy, moist, cook, fresh, savoury, hygienic, edible, grown, reared, caught, frozen, tinned, processed, seasonal, harvested healthy/varied diet, planning, design criteria, purpose, user, sensory evaluations

Cross-Curricular Links:

Science – Digestion and teeth English – instructional texts Maths – non-standard measurements Computing – researching chefs

Year 5: Healthy Biscuits

Food – celebrating culture and seasonality

Objectives:

- Know key facts about the life, work and cultural impact of Nadiya Hussain.
- Have knowledge and understanding about food hygiene, nutrition, healthy eating and a varied diet.
- Have knowledge and understanding of seasonality, where food comes from and how it is processed into ingredients.
- Be able to carry out sensory evaluations of a range of food products, by describing their characteristics with relevant vocabulary. Know and use other technical vocabulary relevant to the project.
- Understand the processes involved in making biscuits and be able to write a step-by-step recipe, including a list of ingredients, equipment and utensils.
- Understand that basic recipes can be adapted to change the appearance, taste or texture by adding or substituting ingredients.
- Be able to use a variety of food skills to prepare food. Be able to select and use utensils and equipment accurately and safely to prepare and cook food.
- Be able to generate innovative ideas through research and discussion with peers and adults to develop a design brief and criteria for a design specification.
- Explore a range of initial ideas, and make design decisions to develop a final product linked to user and purpose.
- Be able to make, decorate and present the food product appropriately for the intended user and purpose.
- Be able to evaluate the final product against the intended user and purpose, with reference to the design specification.

Key Factual Learning:

- ✓ To be active and healthy, food and drink are needed to provide energy for the body. Different food and drink contain different substances - nutrients, water and fibre – that are needed for health.
- ✓ Foods can be grown (eg wheat), reared (eg chickens) and caught (eg fish) in the UK and wider world.
- ✓ Food is processed into ingredients that can be eaten or used in cooking, for example grain is milled to produce flour, and butter is made from milk.
- ✓ Seasons, climate and condition affect the production and availability of some food.
- ✓ Some people can have allergic reactions to ingredients or they could go against their cultural dietary requirements or religions eg nuts, animal fat, eggs.
- ✓ A biscuit is a small baked product and can be savoury or sweet. The word comes from the Old French (*bescuit*) and means 'twice cooked.' Biscuits are eaten worldwide and have different names - *Lebkuchen*, *Viennese biscuits*, *cookies*, *oatcakes*, *flapjacks*, *matzo biscuits*, *Chinese fortune cookies*.
- ✓ Biscuits have different textures, flavours, appearances. Many different ingredients need to be mixed together and baked to make a biscuit. Some ingredients would have been rationed or unavailable in the war so recipes were often adapted by substituting one or more ingredients.
- ✓ A basic biscuit dough can be made by combining the following ingredients:

Ingredient	What I do	Where I come from
Flour	Give the biscuit structure, make it thick	Wheat grain
Bicarbonate of soda	Produce carbon dioxide, make the biscuits rise	A white chemical powder
Ground ginger	Give a hot flavour	Ginger root
Butter	Give colour, flavour and make the biscuit crumbly	Cream from milk
Brown sugar	Give the biscuit colour, a sweet taste and make the biscuit crisp	Sugar beet or cane
Golden syrup	Give a sweet taste and help to make a soft texture	Sugar beet or cane
Egg	Helps to give structure with the flour and set the mixture when cooked.	Chicken

- ✓ Nadiya Hussain MBE is a chef, author and TV presenter who rose to fame after winning 'The Great British Bake Off' in 2015. She was born in Luton on 25 December 1984 and is a second generation British-Bangladeshi. Since winning 'Bake off' (the episode where she was announced as the winner was the most watched TV show of 2015), she has presented many shows and written several books, many with a focus on baking. She has recently fronted a campaign to cut household food waste.
- ✓ Recipes can be adapted to change the appearance, taste, texture and aroma of a food product.
- ✓ Food can be prepared using a range of food skills, such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking. Food must be prepared safely and hygienically.

Practical Tasks:

Investigative and Evaluative Activities:

- Introduction to biscuits and their history (<https://www.english-heritage.org.uk/visit/inspire-me/the-history-of-the-biscuit/>). Look at different types of biscuits and cookies, discussing personal/cultural preferences (that people have different preferences and designers need to consider this when designing); the availability of locally sourced/seasonal key ingredients (comparing WWII to the present day); how ingredients have been processed, nutritional value as part of a healthy diet etc
- Carry out sensory evaluations of a range of biscuits, comparing them in terms of appearance, flavour, texture and cost. Present results in eg a table/chart and by using evaluative writing.
- Explore ideas for ingredients which could be substituted/added to a basic recipe
- Research Nadiya Hussain, her cultural impact and how she has raised awareness of food waste.

Focused Tasks:

- Demonstrate how to use food skills to weigh out and measure, combine, mix, knead and shape ingredients to make biscuits and how to use utensils/equipment safely.
- Demonstrate the rules of basic food hygiene, with specific reference to raw egg and its handling.
- Children practise techniques by following a basic recipe. Discuss what happens when ingredients are added or changed. Evaluate different outcomes (by taste, appearance, texture, smell) and draw conclusions about the impact of added ingredients, different finishes/shape on end product.

Design, Make and Evaluate Assignment:

- Apply what they have learnt through IEAs/FTs in their designing and making.
- Develop a design brief and specification with the children, discussing the purpose of the products and who they will be for (making biscuits for a VE day celebration).
- Children to generate a range of ideas and use annotated sketches, discussion and ICT to develop and communicate ideas.
- Children to record the steps, equipment, utensils and ingredients to make their biscuits.
- Make accurately & safely with regard to the quality of the end product, evaluating as it progresses
- Evaluate the final product against the intended purpose and user and reflecting on the design specification previously agreed.

Key Vocabulary:

Designing eg investigate, research, evaluate, brainstorm, consumer, quality, specification; Making eg melting, combining, mixing, rolling, shaping, moulding, finishing, hygiene, antibacterial; Knowledge and understanding eg names of equipment and ingredients, names of products, quality control, texture, flavour, crisp, crunchy, sticky, soft dough, elastic dough, raising agents

Cross-Curricular Links: World War I and World War II, Materials and their properties, Weight and volume.

Year 5: Life cycle

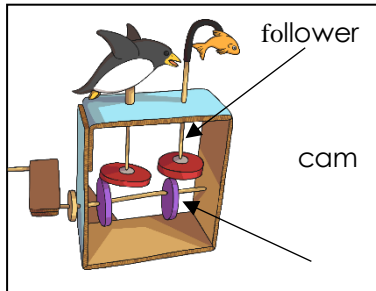
Mechanical systems – cams

Objectives:

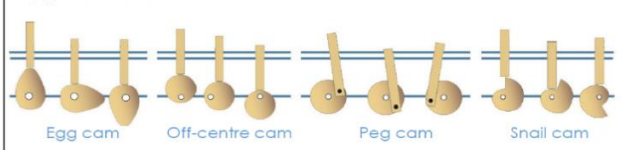
- Recognise different types of movement within simple moving objects
- Be able to investigate existing products with cam mechanisms and understand how they work
- Understand that a cam will change one sort of movement to another
- Understand that mechanical systems have an input, process and an output
- Be able to explore how different shaped cams produce different movements
- Understand the relationship between a cam and a follower and be able to make cam mechanisms with a lever follower and a slider follower
- Explore and test out design ideas to develop a design brief and criteria for a design specification.
- Be able to design and create their own product for a user and purpose using a cam mechanism
- Be able to measure and mark out accurately and use tools and equipment safely
- Be able to cut and join with accuracy to ensure a quality finish to the product, making adjustments where necessary
- Be able to evaluate the final product against the intended user and purpose, with reference to the design specification
- Know and use technical vocabulary relevant to the project.

Key Factual Learning:

- ✓ There are 3 types of movement (or motion): rotary, oscillating and reciprocating. Rotary motion goes around. Oscillating motion moves to and fro around a pivot point, as in a lever. Reciprocating motion is a backwards and forwards movement in a straight line, as in a slider.
- ✓ A cam is a mechanism that changes one sort of movement into oscillating or reciprocating motion). In simple terms, using a handle (the input) to turn or slide a cam in a mechanical object will make other pieces (eg the penguin and fish) move (the output).
- ✓ The main components of a cam mechanism are the cam and a follower. The follower is the device that follows the movement of the cam: a slider or a lever.
- ✓ There are many types of cams. The shape of the cam controls the movement of the follower. Cams can be combined to produce different motions (eg rotary and reciprocating at the same time)



Types of cams



Practical Tasks:

Investigative and Evaluative Activities:

- <https://www.bbc.co.uk/teach/class-clips-video/art-and-design-ks2-how-to-design-a-moving-shop-window-display/z7ytsqw>
- <https://www.edumedia-sciences.com/en/media/830-motion-transformation-systems> <https://www.explainthatstuff.com/cranks-and-cams.html>
- Discuss with the children different types of movement: rotary, oscillating and reciprocating. Encourage children to look for different types of movement in the home and in school. Make simple models of different types of cams or have toys in which the cam mechanisms can be seen. Use videos, photographs and computer animations of products that cannot be explored through first-hand experience (using sources above)
- Use observational drawings and questions to develop understanding of the actual products and those that children have researched e.g. What type of movement can be seen? What types of mechanical components are used and where are they positioned? What are the input movement, process and output movement of the system?
- Children could research and, if possible, visit engineering and manufacturing companies that are relevant to the product they are designing and making.

Focused Tasks:

- Z:\Teaching\Curriculum\2020-2021 Cantrell Curriculum Documents\D&T\Year 5\Life cycles (Mech systems - Cams) (Twinkl / D&T Assn units)
- Give children pre-cut cams made from MDF or wooden wheels to mount on a piece of board and observe their movement with a follower.
- Demonstrate how to use a hand drill safely to make an off-centre cam and position it accurately in a housing. Ensure children secure the wheel with a G-clamp and use a piece of scrap wood under the wheel to avoid drilling through the bench hook or table. Stress the importance of measuring accurately and checking before cutting any holes or gluing. It is important to line up the cam and follower otherwise the mechanism may not work smoothly. How high will the cam lift the follower?
- Develop measuring, marking, cutting, shaping and joining skills using junior hacksaws, G-clamps, bench hooks, square section wood, card triangles and hand drills to make cam mechanisms. Construct wooden frames or card housings, as appropriate. Demonstrate accurate, safe use of tools / equipment

Design, Make and Evaluate Assignment:

- Develop an authentic and meaningful design brief with the children (Using a cam mechanism to show a life cycle for pupils in FS/KS1)
- Children generate innovative ideas by carrying out research including surveys, interviews and questionnaires and develop a design specification for their product, carefully considering the purpose and intended user for their product.
- Communicate ideas through detailed, annotated sketches from different views and/or exploded diagrams. The drawings should indicate the design decisions made, including the location of the components, how they work as a system and the appearance and finishing techniques for the product.
- Produce detailed step-by-step plans and lists of tools, equipment and materials needed. If appropriate, allocate tasks within a team.
- Make high quality products, applying knowledge, understanding and skills from IEs and Fts. Children should use a range of decorative finishing techniques to ensure a well finished final product that matches the intended user and purpose.
- Evaluate throughout and the final product in use, comparing it to the original design specification. Critically evaluate the quality of the design, the manufacture, functionality, innovation shown and fitness for the intended user and purpose

Key Vocabulary:

Cam, snail cam, off-centre cam, peg cam, pear shaped cam follower, axle, shaft, crank, handle, housing, framework rotation, rotary motion, oscillating motion, reciprocating motion annotated sketches, exploded diagrams mechanical system, input movement, process, output movement design decisions, functionality, innovation, authentic, user, purpose, design specification, design brief

Cross-Curricular Links:

Science – identify and compare the suitability of a variety of everyday materials for particular uses. Explore the effects of simple machines on movement.

Mathematics – use mathematical vocabulary to describe position, direction and movement. Choose and use appropriate standard units (i.e. cm/mm) to estimate and accurately measure length/height

Year 5: Utility bag

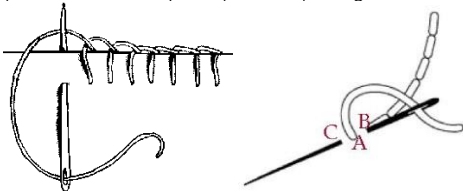
Textiles – combining different fabric shapes with CAD

Objectives:

- Be able to develop skills in evaluating and describing characteristics of bags and their uses.
- Know how to strengthen and reinforce fabric for different purposes.
- Be able to use different stitches to join different fabric shapes and know which stitch is suitable for which purpose
- Be able to create their own bag for a particular user and purpose
- Know how to generate pattern pieces, using CAD/2d paper patterns to create a 3d mock-up
- Be able to use relevant tools and techniques accurately and safely
- Know that there is a range of finishing techniques and be able to select and use them for aesthetic and practical purposes
- Know that there are different fasteners and be able to select and use them for the purpose of a product
- Be able to evaluate their work against the product brief
- Be able to critically evaluate their products against their design specification, intended user and purpose, identifying strengths and areas for development
- Know and use technical vocabulary relevant to the project

Key Factual Learning:

- ✓ A 3-D textile product can be made from a combination of accurately made pattern pieces, fabric shapes and different fabrics.
- ✓ A template (or pattern) is a shape drawn to an exact shape and size, used to assist in cutting out. Using a template helps with cutting out accurately, creating a more professional finished product.
- ✓ Fabrics can be strengthened, stiffened and reinforced by hemming/ folding or adding another material e.g. card to support.
- ✓ Running, oversew, back and blanket stitches can be used to join fabric together (NB running and oversew previously taught).
- ✓ Blanket stitch (left) can be used to hold two edges together, to neaten edges or to produce a decorative effect.
- ✓ Back stitch(right) is a secure stitch for hand sewing seams. The smaller the stitches, the more secure it will be.
- ✓ Tacking (large running stitches) can be used to hold pieces of fabric together temporarily.
- ✓ The thread colour choice can be selected to either blend with the fabric or contrast, becoming an additional, aesthetic feature.
- ✓ Fabric can be fastened for closure and security with zips, Velcro, toggles, ties, buttons and press studs.
- ✓ Finishing techniques can decorate our product and make it attractive to the user. Different decorative techniques can be used to achieve a required effect or for a particular purpose. Common techniques include appliqué (stitching or gluing a shape or patch onto fabric); embroidery (such as cross-stitch); tie dye; batik; printing; and fabric pens and paints.



Practical Tasks:

Investigative and Evaluative Activities:

- Children investigate, analyse and evaluate a range of bags which have been produced by combining fabric shapes. Investigate work by designers and their impact on fabrics and products. Is the product functional or decorative? Who would use this product? What is its purpose? What design decisions have been made? Do the textiles used match the intended purpose? How has the appearance been enhanced?
- Investigate and analyse how existing products have been constructed. Children disassemble a product and evaluate what the fabric shapes look like, how the parts have been joined, how the product has been strengthened and stiffened, what fastenings have been used and why.
- Investigate properties of textiles e.g. exploring insulating properties, water resistance, wear and strength of textiles.

Focused Tasks:

- Develop skills of threading needles and joining textiles using a range of stitches. This activity must build upon children's earlier experiences of stitches e.g. improving appearance and consistency of stitches and introducing new stitches. If available, demonstrate and allow children to use sewing machines with close adult supervision.
- Develop skills of sewing textiles by joining right side together and making seams. Children should investigate how to sew and shape curved edges by snipping seams and learn how to start and finish off a row of stitches.
- Develop skills of 2-D paper pattern making using grid or tracing paper to create a 3-D diptyl mock-up of a chosen product. Remind/teach how to pin a pattern onto fabric with limited wastage, how to leave a seam allowance, and cutting techniques.
- Develop skills of CAD by using online pattern making software to generate pattern pieces and art packages to design prints/motifs to apply.

Design, Make and Evaluate Assignment:

- Set an authentic and meaningful design brief (making a utility bag for a refugee). Children generate ideas by carrying out research using e.g. surveys, interviews, questionnaires and the web. Children develop a simple design specification for their product.
- Communicate ideas through detailed, annotated drawings from different perspectives and/or CAD. Drawings should indicate design decisions made, the methods of strengthening, the type of fabrics to be used and the types of stitching that will be incorporated.
- Produce step-by-step plans, lists of tools equipment, fabrics and components needed. Allocate tasks within a team if appropriate.
- Make high quality products applying knowledge, understanding and skills from IEAs and FTs. Incorporate simple computer-aided manufacture (CAM) if appropriate e.g. printing on fabric. Children use a range of decorating techniques to ensure a well-finished final product that matches the intended user and purpose.
- Evaluate both as the children proceed with their work and the final product in use, comparing the final product to the original design specification. Critically evaluate the quality of the design, the manufacture, functionality, innovation shown and fitness for intended user and purpose, considering others' opinions. Communicate the evaluation in various forms e.g. writing for a particular purpose, giving a well-structured oral evaluation, speaking clearly and fluently.

Key Vocabulary:

Seam, seam allowance, reinforce, right side, wrong side, hem, template, pattern pieces, selvedge, name of textiles and fastenings used, pins, needles, thread, pinking shears, fastenings, iron transfer paper, design criteria, annotate, design decisions, functionality, innovation, authentic, user, purpose, evaluate, mock-up, prototype

Cross-Curricular Links: Mathematics – apply knowledge of how 2-D nets can be formed into 3-D shapes; apply skills of accurate measuring using standard units i.e. cm/mm.

Art and design – investigate methods of adding colour, pattern and texture on to textiles and how to make their own textiles through weaving or felt making

Year 6: Animal Hides

Structures – frame structures

Objectives:

- Know who Isambard Kingdom Brunel was and why he is a famous engineer.
- Know what the four basic structure types are.
- Understand how to strengthen, stiffen and reinforce 3-D frameworks.
- Be able to carry out research into user needs and existing products .
- Be able to develop and generate a simple design, taking account of constraints including time and available resources, producing annotated sketches and including a step-by-step list of what needs to be done and lists of resources to be used.
- **Be able to use equipment safely**
- Be able to competently select from and use appropriate tools to accurately measure, mark out, cut, shape and join construction materials to make frameworks.
- Be able to use finishing and decorative techniques suitable for the product they are designing and making.
- Be able to critically evaluate their products against their design specification, intended user and purpose, identifying strengths and areas for development, and carrying out appropriate tests.
- Know and use technical vocabulary relevant to the project.

Key Factual Learning:

- ✓ Isambard Kingdom Brunel was a famous engineer who was born in 1806 during the British Industrial Revolution. He designed and built bridges, tunnels and railways. He designed and engineered the Clifton Suspension Bridge in Bristol. However, the bridge was not completed before his death in 1864.
- ✓ A structure is something which is built for a purpose, such as holding or supporting something.
- ✓ Frame structures are rigid support structures that use beams and columns to hold large forces of weight and gravity. Unlike shell structures, frame structures have joints.
- ✓ Examples of frame structures include skyscrapers, bridges, roller coasters, bus shelters and tents.
- ✓ The Clifton Suspension Bridge is an example of a frame structure. It uses ropes, chains or cables to hold the bridge. Suspension bridges can cover large distances up to around 2000 metres. Large pillars at either end of the waterways are connected with these cables, and the cables are secured, usually to the ground.
- ✓ Model frame structures can be built using construction kits, rolled up newspaper, straws and thin sectioned pieces of wood.
- ✓ 3D frame structures can be strengthened using triangulation, which involves adding in triangular shapes to the frame. Other strengthening techniques include a wide base, rigid joints in the frame, and layering/reinforcing materials.
- ✓ When joining pieces of wood, rigid joints can be made with elastic bands or by gluing card triangles or card strips. Straws may be joined in a range of ways, including with pipe cleaners, thread, and glue.
- ✓ To be safe, we need to follow certain health and safety rules (eg tying back hair, wearing aprons, keeping work area clear, goggles, following teachers' instructions etc)
- ✓ Bird feeders are made in a wide variety of shapes and sizes. They need to have a ledge for the birds to stand on and an area to feed from. It needs not to collect water so the food doesn't get wet and then go mouldy. It can be on a stand but tall enough to be safe from predators or hung/ attached from a branch/fence/shed.

Practical Tasks:

Investigative and Evaluative Activities:

- Children research and complete a fact file for Isambard Kingdom Brunel, looking in detail at his structural creations, for example the Clifton Suspension Bridge.
- Introduction to structures and frame structures. Starter (for example) – make strongest structure possible using spaghetti and marshmallows. Make annotated drawings
- Conduct research into existing animal hides and identify key design features. Design an initial sketch of their own preliminary ideas in line with the design brief.

Focused tasks:

- <https://www.bbc.co.uk/teach/class-clips-video/design-and-technology-ks2-making-structures-stronger/z626hbk>
- Build 2D frameworks with plastic/card strips and paper fasteners. Compare strength of square v triangular shape. Use diagonals to develop understanding of triangulation adding strength to a structure.
- Demonstrate use of tools and equipment to develop skills and techniques (eg hacksaw, G clamps, bench hooks, square section wood etc).
- Demonstrate skills and techniques for accurately joining framework materials together eg paper straws, sectioned wood. Children to practise.

Design, Make and Evaluate Assignment:

- Develop design specification, identifying the user and purpose of the product. Bring in ideas from previous lessons about making a structure strong and stable.
- Generate and develop innovative ideas through discussion, prototypes and annotated sketches
- Produce step by step plan, with tools and materials
- Make mock-up with paper or straws – looking at how making it strong and stable.
- Then make frame with wood. Evaluate at end. Did it meet design brief?

Key Vocabulary:

Isambard Kingdom Brunel, engineer, architect, suspension bridge, arch bridge, cantilever bridge, beam bridge, frame structure, stiffen, strengthen, reinforce, triangulation, stability, shape, join, temporary, permanent design brief, design specification, prototype, annotated sketch, purpose, user, innovation, research, functional

Cross-Curricular Links:

History – The Victorians (Brunel)
English – Skellig
Art – Observational drawing of birds

Cantrell Primary School Design and Technology Curriculum

Year 6: Bread making

Food – celebrating culture and seasonality

Objectives:

- Know key facts about the life and work of Paul Hollywood
- Have knowledge and understanding about food hygiene, nutrition, healthy eating and a varied diet
- Be able to generate innovative ideas through research and discussion with peers and adults to develop a design brief and criteria for a design specification
- Explore a range of initial ideas, and make design decisions to develop a final product linked to user and purpose.
- Be able to write a step-by-step recipe, including a list of ingredients, equipment and utensils
- Be able to select and use appropriate utensils and equipment accurately to measure and combine appropriate ingredients.
- Be able to make, decorate and present the food product appropriately for the intended user and purpose.
- Be able to carry out sensory evaluations of a range of relevant products and ingredients. Record the evaluations using e.g. tables/graphs/charts such as star diagrams.
- Be able to evaluate the final product with reference back to the design brief and design specification, taking into account the views of others when identifying improvements.
- Understand how key chefs have influenced eating habits to promote varied and healthy diets.
- Know how to use utensils and equipment including heat sources to prepare and cook food.
- Understand about seasonality in relation to food products and the source of different food products.
- Know and use relevant technical and sensory vocabulary

Key Factual Learning:

- ✓ Paul Hollywood is a celebrity baker and TV presenter. He was born 1st March 1966 in Wallasey Cheshire. He started baking at 10 years old in his father's bakery. He was a head baker at a number of hotels around Britain, he moved to Cyprus and became a head baker of a five-star hotel. On his return to England, he began his tv career. Probably most famous for The Great British Bake Off. He is now involved with numerous Tv shows and written a selection of books. In 2005 he won the Gourmand World cook book award for his book entitled 100 Great Breads. He created the most expensive bread – almond and Roquefort sour dough. It was £15 a loaf.
- ✓ To be active and healthy, food and drink are needed to provide energy for the body. Different food and drink contain different substances - nutrients, water and fibre – that are needed for health.
- ✓ Foods can be grown (such as tomatoes, wheat and potatoes), reared (such as pigs, chickens and cattle) and caught (such as fish) in the UK, Europe and wider world.
- ✓ Food is processed into ingredients that can be eaten or used in cooking, for example grain is milled to produce flour, oil is pressed from olives, and butter is made from milk.
- ✓ Bread is a carbohydrate.
- ✓ About 60% of flour grown from wheat in the UK is used in the manufacture of bread products. The remaining 40% is used in a huge diversity of food products.
- ✓ Seasons, climate and condition affect the production and availability of some food.
- ✓ Recipes can be adapted to change the appearance, taste, texture and aroma of a food product.
- ✓ Food can be prepared using a range of techniques, peeling, chopping, slicing, grating, mixing, spreading, kneading and baking. Food must be prepared safely and hygienically.
- ✓ A basic bread dough can be made using strong flour, salt, yeast, oil and water. Ingredients such as types of flour, seeds, garlic, vegetables can also be added.
- ✓ Once we have prepared our bread dough, we knead it for around 10-12 minutes before shaping and baking it. The dough is ready when it becomes smooth, elastic and holds its shape.

Practical Tasks:

Investigative and Evaluative Activities:

- Introduction to bread using (virtual) visit to bakery, supermarket and <https://www.foodafactoflife.org.uk/> Learn about existing bread products, ingredients used; where ingredients are sourced (locally, in UK or overseas); how they are processed; nutritional value.
- Introduce Paul Hollywood and discuss how he has promoted seasonality, local produce, healthy eating.
- Children carry out sensory evaluations of existing bread products and ingredients (which could be added to a basic recipe such as herbs, spices, vegetables or cheese). Present results in a table/chart.

Focused Tasks:

- Demonstrate how to weigh and measure out, combine, mix, knead and shape ingredients and how to use utensils/equipment safely.
- Look at how ingredients could be changed/added to a recipe (eg types of flour, seeds, garlic, vegetables, fruit).
- Explore different ways of shaping the dough. Which shape is most appealing and why?
- Practise techniques by making a basic recipe. Evaluate them by taste, appearance, texture, smell.

Design, Make and Evaluate Assignment:

- Develop design brief and specification with the children.
- Discuss the purpose of the products and who they will be for. The Great Cantrell Bake Off!
- Children to generate a range of ideas and use annotated sketches, discussion and ICT to develop and communicate ideas
- Children to record steps, equipment, utensils, ingredients to make their bread
- Make bread, evaluating it as it progresses. Evaluate final product against the intended purpose and user and reflecting on the design specification previously agreed.

Key Vocabulary:

Ingredients for bread rolls (yeast, dough, bran, flour, wholemeal, unleavened, baking soda, spice, herbs), cheese, vegetables, fat, sugar, carbohydrate, protein, vitamins, nutrients, nutrition, healthy, varied, gluten, dairy, allergy, intolerance, savoury, source, seasonality, utensils, combine, fold, knead, stir, pour, mix, rubbing in, whisk, beat, roll out, shape, sprinkle, crumble, design specification, innovative, research, evaluate, design brief

Cross-Curricular Links:

Maths – weighing and measuring ingredients – understanding and using scales, recording information in a table
Science – observing, questioning and changing state of ingredients.

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Year 6: Travel games

Electrical systems – more complex switches and circuits (including programming, monitoring and control)

Objectives:

- Investigate famous inventors who developed ground-breaking electrical systems and components.
- Use research to develop a design specification for a functional product that responds to a break/connection in an electrical circuit.
- Understand and use electrical systems in their products.
- Generate and develop innovative ideas and share and clarify these through discussion.
- Communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams.
- Formulate a step-by-step plan to guide making, listing tools, equipment, materials and components.
- Competently select and accurately assemble materials, and securely connect electrical components to produce a reliable, functional product.
- Continually evaluate and modify the working features of the product to match the initial design specification.
- Test the system to demonstrate its effectiveness for the intended user and purpose.
- Know and use technical vocabulary relevant to the project.

Key Factual Learning:

- ✓ Open switch – when a switch is positioned such that electricity cannot flow through it.
- ✓ Closed switch – when a switch is positioned such that electricity can flow through it.
- ✓ Normally open – the term used to describe when a switch is in the off position, i.e. the switch is open and no electricity can flow when the button is not pressed.
- ✓ Normally closed – the term used to describe when a switch is in the on position i.e. the switch is closed and electricity can flow when the button is not pressed
- ✓ Computer control input – when a switch, such as a micro switch, sends a signal to a computer control box to activate a sequence of events such as a buzzer or light being used to attract attention or alert people.
- ✓ Output devices – components that produce an outcome e.g. bulbs and buzzers.
- ✓ Input devices – components that are used to control an electrical circuit e.g. switches or sensors.
- ✓ Types of switches: Micro-switch – a switch that can operate as push-to-break switch or a push-to-make switch. Push-to-break switch – a switch turned off by pressing it. Push-to-make switch – a switch turned on by pressing it. Reed switch – a switch operated by a magnet. Tilt switch – a switch that works when tilted at an angle. Toggle switch – a switch operated when a lever is pressed. Light dependent resistor (LDR) – a sensor that operates when light is shined on it.

Practical Tasks:

Investigative and Evaluative Activities:

- Using research, discuss a range of relevant products that respond to changes in the environment using a computer control program such as automatic nightlights, alarm systems, security lighting e.g. Who have the products been designed for and for what purpose? How and why is a computer control program used to operate the products? What input devices, e.g. switches, and output devices, e.g. bulbs, have been used?
- Investigate electrical circuits and a range of switches such as push-to-make switches, push-to-break switches, toggle switches, micro switches and reed switches. To gain an understanding of how they are operated by the user and how they work, ask the children to use each component to control a bulb in a simple circuit. Remind children about the dangers of mains electricity.
- Children could research famous inventors related to the project e.g. Thomas Edison – light bulb.

Focused Tasks:

- Through teacher demonstration and explanation, recap measuring, marking out, cutting and joining skills with construction materials that children will need to create their electrical products.
- Demonstrate and enable children to practise methods for making secure electrical connections e.g. using automatic wire strippers, twist and tape electrical connections, screw connections and connecting blocks.
- Drawing on science understanding, ask the children to explore a range of electrical systems that could be used to control their products, including a simple series circuit where a single output device is controlled, a series circuit where two output devices are controlled by one switch and, where appropriate, parallel circuits where two output devices are controlled independently by two separate switches.

Design, Make and Evaluate Assignment:

- Develop an authentic and meaningful design brief with the children. Think about a travel game that they could take in the car or on the train.
- Ask the children generate innovative ideas by drawing on research and develop a design specification for their product, carefully considering the purpose and needs of the intended user.
- Communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams. Drawings should indicate the design decisions made, including the location of the electrical components and how they work as a system with an input, process and output.
- Produce detailed step-by-step plans and lists of tools, equipment and materials needed. If appropriate, allocate tasks within a team.
- Make high quality products, applying knowledge, understanding and skills
- Critically evaluate throughout and the final product, comparing it to the original design specification. Test the system to demonstrate its effectiveness for the intended user and purpose.

Key Vocabulary:

Cut, fold, series circuit, parallel circuit, names of switches and components, input device, output device, system, monitor, control, program, innovative, design specification, design brief, user, purpose

Cross-Curricular Links:

Science – links to electrical circuits, conductors and insulators.