Purpose of study

Design and technology is an inspiring, rigorous and practical subject. Using creativity and imagination, pupils design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, they develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation.

Aims

Our curriculum for design and technology aims to ensure that all pupils:

- develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
- build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
- critique, evaluate and test their ideas and products and the work of others
- understand and apply the principles of nutrition and learn how to cook.

The study of design and technology will help our children to express their ideas in a creative way. They will gain a comprehensive range of techniques which are sequentially built upon to enable them to show their ideas using a wide range of materials and styles. Research suggests DT is one of primary-aged children's favourite subjects. Projects on a Page maximises their enjoyment by providing scope for teachers to meet children's needs and interests through creative and motivating projects within a range of contexts Children will develop and build their knowledge in five key areas:

Food
Mechanisms & Mechanical Structures
Structures
Textiles
Electrical Systems

Projects on a Page is based on the six essentials of good practice in D&T. They are consistent with the National Curriculum requirements and should be applied whenever children are designing and making products:

- **User** – children should have a clear idea of who they are designing and making products for, considering their needs, wants, interests or preferences. The user could be themselves, an imaginary character, another person, client, consumer or a specific target audience.
- **Purpose** – children should know what the products they design and make are for. Each product should perform a clearly defined task that can be evaluated in use.
- **Functionality** – children should design and make products that function in some way to be successful. Products often combine aesthetic qualities with functional characteristics. In D&T, it is insufficient for children to design and make products which are purely aesthetic.
- **Design Decisions** – when designing and making, children need opportunities to make informed decisions such as selecting materials, components and techniques and deciding what form the products will take, how they will work, what task they will perform and who they are for.
- **Innovation** – when designing and making, children need some scope to be original with their thinking. Projects that encourage innovation lead to a range of design ideas and products being developed, characterised by engaging, open-ended starting points for children's learning.
- **Authenticity** – children should design and make products that are believable, real and meaningful to themselves i.e. not replicas or reproductions or models which do not provide opportunities for children to make design decisions with clear users and purposes in mind.

Knowledge in Design Technology:

Substantive knowledge concerns the key facts, concepts, principles and explanatory frameworks in a subject. Disciplinary knowledge is needed in order to think, process and understand with the subject.

Breadth of Study – Example

Electrical Systems is not covered in this example as it has been covered in the Science curriculum:

Year Group	Unit 1	Unit 2
Year 1	Structures – Freestanding structures	Textiles – Templates and Joining Techniques
Year 2	Mechanics - sliders & Levers	Food – Preparing food & Vegetables
Year 3	Structures – Shell structures	Textiles – 2D shape & 3D project
Year 4	Mechanics – Levers & Linkages	Food – Healthy & Varied Diet
Year 5	Structures - Frame structures	Textiles – Combining different fabric shapes
Year 6	Mechanics – Pulleys & gears	Food – Celebrating Culture & Seasonality

Year 1: Unit 1 - Freestanding structures - Structures		
Sequence of Lessons	**Prior Learning**	**Vocabulary**
Lesson 1 – Explore our local park – analyse what is there. How good are the facilities? Compare to pictures of other local parks. What do you like? What is missing? How important is colour in the park? Should we use natural or manmade materials? **Lesson 2 – Identify the components, materials and features of playground equipment.** Children to discuss the individual pieces of different playground equipment and the materials used to make it. Choose two different pieces of equipment to draw, label and describe. **Lesson 3 - Identify different ways of joining and strengthening materials to create pieces of playground equipment**. Explore how different playground equipment is made and the safety aspects involved with them. Experiment with different materials to make different models of playground equipment, checking the strength and sturdiness of them. **Lesson 4 – Design a new piece of playground equipment for the park**. Think about the materials needed to build it. **Lesson 5 - Follow designs to make designed piece of playground equipment.** Think about how to work safely and carefully within the classroom. **Lesson 6 - Share and demonstrate how piece of playground equipment works**. Evaluate model against design criteria.	Experience of using construction kits to build walls, towers and frameworks. Experience of using basic tools e.g. scissors or hole punches with construction materials e.g. plastic, card. Experience of different methods of joining card and paper.	**Freestanding structure** – a structure that stands on its own foundation or base without attachment to anything else. **Frame structure -** a structure made from thin components E.g. Tent frame. **Shell structure** – a hollow structure with a thin outer covering. **Stability -** in relation to a freestanding structure, the extent to which it is likely to fall over if a force is applied. **Buttress** – a structure added to a wall, tower or framework to make it more stable and/or reinforce it. **Brick bonding** – arranging bricks in a wall to improve the performance of the structure or improve its appearance. **Mock-up** – 3-D representation of a product.

Knowledge			
Design	**Make**	**Evaluate**	**Technical Knowledge**
• Knows the importance of clear design criteria • Knows how to include individual preferences and requirements in a design • Knows how to show ideas using sketching and modelling • Knows about different structures found in the natural and manmade world	• Knows how to make stable structures from card, tape and glue • Knows how to follow instructions to cut and assemble the supporting structure of a piece of playground equipment • Knows how to make a structure according to design criteria • Knows how to create joints and structures from paper/card and tape	• Know how to evaluate a design according to the design criteria, testing whether the structure is strong and stable and altering it if it isn't • Know how to suggest points for improvements • Know the features of structures • Know how to compare the stability of different shapes • Know how to test the strength of structures • Know how to identify the weakest part of a structure • Know how to evaluate the strength, stiffness and stability of own structure	• Know how to describe the purpose of structures • Know that the shape of materials can be changed to improve the strength and stiffness of structures • Know that that axles are used in structures and mechanisms to make parts turn in a circle • Know that shapes and structures with wide, flat bases or legs are the most stable • Know that the shape of a structure affects its strength • Know the vocabulary: strength, stiffness and stability • Know that materials can be manipulated to improve strength and stiffness

Years 1/2

Structures
Freestanding structures

Instant CPD

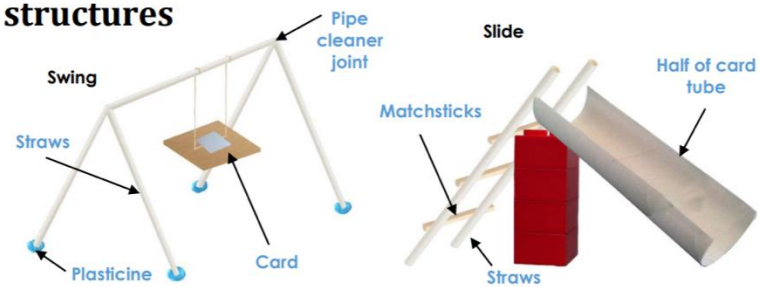
Tips for teachers

- ✓ Create a PowerPoint or range of pictures showing a variety of freestanding structures relevant to the product the children are designing and making.
- ✓ Exploring structures in the local area provides a good opportunity to develop children's observational drawing.
- ✓ Create and display a word bank of relevant technical vocabulary in the classroom.
- ✓ Ensure that work with construction kits and materials builds on children's prior experience in the Early Years Foundation Stage (EYFS).
- ✓ Ensure that different types of construction kits are available for children to explore through focused tasks.
- ✓ It is perfectly acceptable for children's final products to include both construction kits and consumable materials.
- ✓ Demonstrate measuring, marking out, cutting, joining and strengthening techniques and provide help sheets showing instructions for the children to practise independently.
- ✓ Prior to producing their designs, have a range of materials available for children to access and create models.

Useful resources at www.data.org.uk

- Door hinges helpsheet
- Let's Get Building and Using Construction Kits Effectively
- Chairs for Three Bears
- Hinges and Catches
- Picture Frames and holders
- Working with Plastics
- Bird Hides Dragons' Den Challenge (Yrs 5-6)
- Working with paper straws (Yrs 3-4)

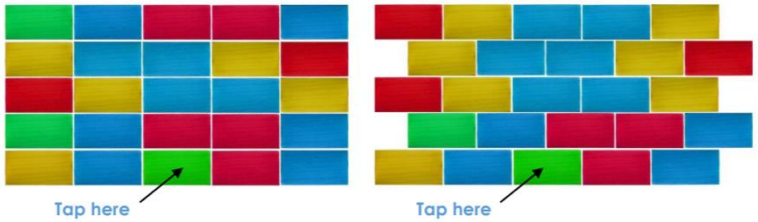
Techniques for assembling freestanding structures

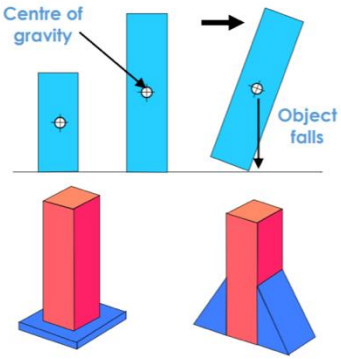


Show children how to join sheet materials and reclaimed boxes together using different tapes and glues.

Technical knowledge and understanding

Build walls with these different patterns. Tap away the centre brick in the bottom row of each wall in turn. What happens? Which wall is the strongest?





As a freestanding structure becomes taller its centre of gravity rises. Stability in a structure can generally be increased by making the base wider, making the base heavier or adding buttresses.

Ask the children to build and explore a variety of freestanding structures through focused tasks. Use a range of construction kits.

Designing, making and evaluating a strong chair for Baby Bear

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:

THOUGHT	ACTION
What sort of chair shall I make? Who is it for and what is it for?	Choose an appropriate soft toy Generating ideas through talking and drawing based on own experiences.
How can I make sure it is strong, stiff and stable?	Developing ideas using construction kits to create mock-ups.
Which joining techniques will work best for the chair?	Exploring and evaluating joining techniques.
What media, materials and kits will I use?	Exploring and evaluating construction kits, new and reclaimed materials.
What shall I do first? What tools and techniques will I use? What materials shall I use?	Selecting from a range of tools, techniques and materials Explaining choices.
More thoughts… judging, planning, generating new ideas.	More actions… making, testing, modifying.
Will the chair meet the needs of the user and achieve its purpose?	Evaluating the chair with a soft toy and against design criteria.

Glossary

- **Freestanding structure** – a structure that stands on its own foundation or base without attachment to anything else.
- **Frame structure** – a structure made from thin components e.g. tent frame.
- **Shell structure** – a hollow structure with a thin outer covering.
- **Stability** – in relation to a freestanding structure, the extent to which it is likely to fall over if a force is applied.
- **Buttress** – a structure added to a wall, tower or framework to make it more stable and/or reinforce it.
- **Brick bonding** – arranging bricks in a wall to improve the performance of the structure or improve its appearance.
- **Mock-up** – 3-D representation of a product.

Year 1: Unit 2 - Templates and Joining Techniques - Textiles		
	Prior Learning	Vocabulary
Lesson 1 – Investigate different existing bags, draw, identify and label materials, joining and finishing techniques. Discuss suitability for different purposes. Look at famous handbag designers. What makes them popular? Useful? Durable? **Lesson 2 and 3 – Demonstrate how to use a template to mark out, tape and cut out a shape to create 2 identical pieces**. Ch to practice. Demonstrate how to join fabric in different ways: running stitch, stapling and gluing. Ch to practice different techniques. Investigate different ways of finishing product to ensure it is appealing. **Lesson 4 –Introduce design criteria. Children to plan, draw and label their bag design**. Identify the steps they need to make their final design. **Lesson 5 - Follow designs to make their bag**. Think about how to work safely and carefully within the classroom. **Lesson 6 - Share their final design with each other**. Evaluate their bag against the design criteria.	• Thought about the user and purpose of products. • Explored and used different fabrics. • Cut and joined fabrics with simple techniques.	**Applique -** to attach a decorative fabric item onto another piece of fabric by gluing and/or sewing. **Design -** to generate, develop and communicate ideas for a product. **Embroider –** to decorate fabric with stitches. **Evaluate -** to judge how a product meets chosen criteria. **Fray -** to unravel or become worn at the edge. **Glove puppet –** a glove puppet fits over the hand, and the fingers operate its head and arms. **Mock-up –** a model which allows children to try out ideas using cheaper materials and temporary joints. **Seam -** a row of stitches joining two pieces of fabric. **Sew -** to join pieces of fabric with stitches. **Template –** a shape drawn to assist in cutting out shapes.

Knowledge			
Design	Make	Evaluate	Technical Knowledge
• Knows how to use a template to design a bag • Knows how to design a simple pouch	• Knows how to cut fabric neatly with scissors • Knows joining methods to decorate a bag • Knows how to decorate a pouch using fabric glue or running stitch	• Know how to reflect on a finished product, explaining likes and dislikes • Know how to evaluate the quality of the stitching on others' work • Know how to identify aspects of their peers' work that they particularly like and explain why	• Know different ways in which to join fabrics together: pinning, stapling, gluing • Know benefits of techniques • Know how to thread a needle • Know running stitch, is evenly spaced, neat, even stitches to join fabric

Years 1/2

Textiles
Templates and joining

Instant CPD



Tips for teachers

- ✓ It is helpful if each child has a named plastic envelope, zip wallet or folder in which to keep their work safe.
- ✓ Give children the opportunity to join fabrics in a variety of ways through focused tasks and compare the outcomes.
- ✓ In order for children to thread their own needle start by using a needle with a large eye and a sharp point.
- ✓ Children's stitching skills may be in their infancy and fabrics need to be chosen with this in mind. Start with felt as it doesn't fray and progress to other fabrics.
- ✓ Fabrics used for children's products could be reclaimed.
- ✓ Children should be taught to place their templates and pattern pieces economically on the fabric.
- ✓ Children could be reminded of sustainability issues, and of the need to reduce, reuse and recycle.
- ✓ Demonstrate sewing techniques, joining two pieces of fabric e.g. running stitch.
- ✓ Demonstrate other ways of joining, not sewing, to the class e.g. sticking, stapling, lacing.
- ✓ Encourage the children to make a mock-up from dipryl (disposable cloth fabric).
- ✓ Put technical vocabulary onto flash cards.

Useful resources at www.data.org.uk

- Teddy's Safety Jacket
- Joining and Fastening Fabrics
- Special Sun Hat for Barnaby Bear
- Designing with textiles (7-11 years)

EYFS Resources

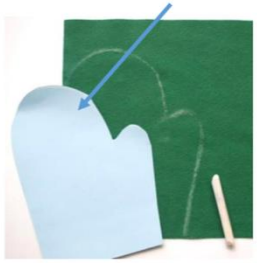
- Three Bears Picnic Blanket
- Let's Look at Hats

Three alternative ways of using templates and simple pattern pieces

Thin card

Use clear sticky tape to position pattern on fabric. Cut around the pattern.

Thin card



Use soft chalk pastel or soft white crayon to draw around the pattern prior to cutting out.

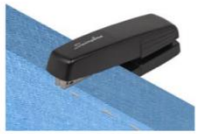
Paper

Use pins to secure the pattern on the fabric. Cut around the pattern.

Exploring and evaluating joining techniques

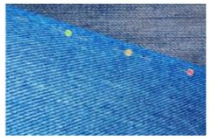
Joining fabric

Gluing

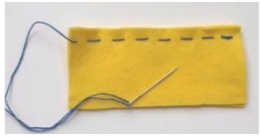


Stapling

Safety pin



Pinning



Sewing

Finishing techniques

Textile paints – glitter

Adding sequins and shiny fabrics

Textile paints – raised

Fabric crayons

Explore different techniques, including information and communication technology, for creating fabric designs and finishing techniques.

Designing, making and evaluating a puppet to perform a play

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:

THOUGHT	ACTION
What sort of puppet shall I make? Who is it for and what is it for?	Generating ideas through talking and drawing based on own experiences.
How can I make sure it fits my hand or finger?	Developing ideas using templates or pattern pieces to create mock-ups.
Which joining technique will work best for my puppet?	Exploring and evaluating joining techniques.
What media and materials will I use? How will I add the features?	Exploring and evaluating media and materials.
What shall I do first? What tools and techniques will I use? What fabrics shall I use?	Selecting from a range of tools, techniques and materials. Explaining choices.
More thoughts... judging, planning, generating new ideas.	More actions... making, testing, modifying.
Will the puppet meet the needs of the user and achieve its purpose?	Evaluating the puppet with the intended user and against original design criteria.

Glossary

- **Appliqué** – to attach a decorative fabric item onto another piece of fabric by gluing and/or sewing.
- **Design** – to generate, develop and communicate ideas for a product.
- **Embroider** – to decorate fabric with stitches.
- **Evaluate** – to judge how a product meets chosen criteria.
- **Fray** – to unravel or become worn at the edge.
- **Glove puppet** – a glove puppet fits over the hand, and the fingers operate its head and arms.
- **Mock-up** – a model which allows children to try out ideas using cheaper materials and temporary joints.
- **Seam** – a row of stitches joining two pieces of fabric.
- **Sew** – to join pieces of fabric with stitches.
- **Template** – a shape drawn to assist in cutting out shapes.

Year 2 - Unit 1 – Sliders and levers - Mechanics		
Lesson Sequence	**Prior Learning**	**Vocabulary**
Lesson 1 – Investigate wheels by walking around the school building and grounds, recording how wheels and axles are used in daily life. Explore and evaluate a range of wheeled products such as toys and everyday objects. Discuss suitability for different purposes. What makes them popular? Useful? Durable? **Lesson 2 – Draw an example of a wheeled product**, stating the user and purpose, and labelling the main parts e.g. body, chassis, wheels, axles and axle holders **Lesson 3 – Demonstrate to children how wheels and axles may be assembled as either fixed axles or free axles.** Children need to practice making prototypes of axels and wheels **Lesson 4 –Introduce design criteria relating to a book character.** Children to plan, draw and label their vehicle design. Identify the steps they need to make their final design. **Lesson 5 - Follow designs to make their vehicle.** Think about how to work safely and carefully within the classroom. **Lesson 6 - Share their final design with each other.** Evaluate their vehicle against the design criteria.	Gained some experience of designing, making and evaluating products for a specified user and purpose. Developed some cutting, joining and finishing skills with card. Assembled vehicles with moving wheels using construction kits. Explored moving vehicles through play.	**Axle-** a rod on which one or more wheels can rotate, either freely or be fixed to and turn with the axle. **Axleholder –** the component through which an axle fits and rotates. **Chassis –** the frame or base on which a vehicle is built. **Friction -** resistance which is encountered when two things rub together. **Dowel –** wooden rods used for making axles to hold wheels.

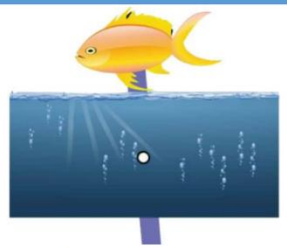
Knowledge

Design	Make	Evaluate	Technical Knowledge
• Knows how to adapt mechanisms, using guides to control the movement • Knows how to design a moving story book for a given audience • Knows how to design a vehicle that includes wheels, axles and axle holders, which will allow the wheels to move • Knows how to create clearly labelled drawings which illustrate movement • Knows how to create design criteria for a project/task • Knows how to select appropriate materials based on their properties	• Know how to follow a design to create a moving model using leavers and sliders • Know how to simply adapt mechanisms • Know how to use linkages using card for levers and split pins for pivots • Know how to follow a design plan • Know how to select materials according to their characteristics	• Know how to test a finished product seeing if it moves as planned • Know how to explain how to fix a product that is not working • Know how to review the success of a product • Know how to test mechanisms • Know how to give and receive per feedback and act on it adapting product	• Know that levers and sliders are mechanisms and can make things move • Know the vocabulary up, down, left, right, vertical and horizontal to describe movement • Know what mechanisms makes a toy move forward • Know that a wheel needs an axel to move • Know a mechanism is a collection of moving parts that work together and have input and output • Know a lever turns on a pivot • Know a linkage is a system of levers that are connected by pivots

Years 1/2

Mechanisms
Sliders and levers

Instant CPD



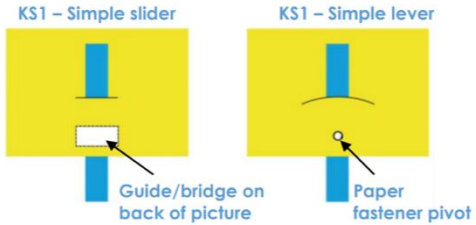
Tips for teachers

- ✓ Using books and prepared examples of simple mechanisms, ask children to explain how the sliders and levers work.
- ✓ Prepare plenty of pre-cut strips of card for making the levers and sliders.
- ✓ To make a small hole for the pivot, a pencil can be used by placing the thin card over a piece of Plasticine or Blu Tack and pressing the pencil through.
- ✓ Guides/bridges can be made using strips of card fixed with masking tape.
- ✓ Display technical vocabulary and encourage the children to use it when discussing mechanisms and when designing and making.
- ✓ Make sure the existing books children investigate include moving pictures that are similar to the teaching aids.
- ✓ Mechanisms are operated directly by the children e.g. the slider is pushed and a snail appears from behind a stone.
- ✓ The mechanisms that children use are found in everyday products in the classroom or the school grounds. For example, levers are used to make door handles and sliders are used to make children's trays.
- ✓ Think about directional language e.g. sliders move in a straight line and levers move in a curve.
- ✓ Children may need extra support when they are attaching paper fasteners to levers.

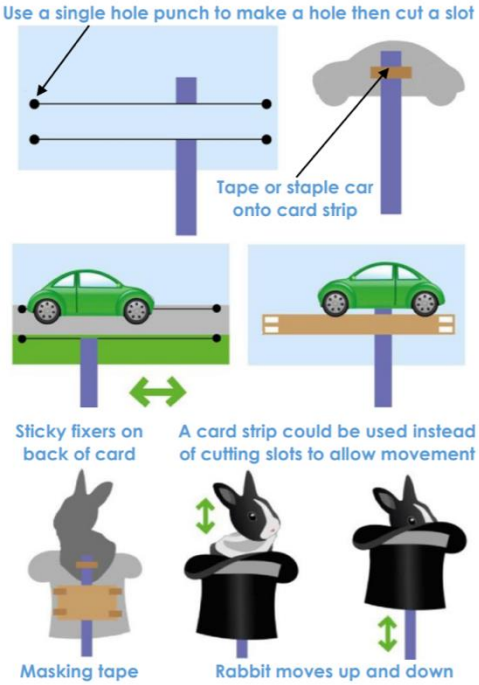
Useful resources at www.data.org.uk

- **Moving Pictures** (links to literacy)
- **Moving history book** (Yrs 3/4)
- **Working with sliders and levers**
- **Levers and linkages - Poster and Support Pack**
- **Mechanisms with a message** (Yrs 5/6)
- **D&T Primary issue 17** Focus on Mechanisms

Teaching aids to demonstrate sliders and levers



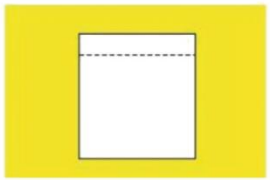
Sliders move from side to side and up and down



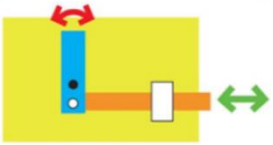
Levers can be used with or without a slot

A card strip is used as a lever. The fish and boat are glued to the lever which is used as a handle.

As an enhancement to this project children could add flaps to their moving pictures. Some children may find flaps, which can be used to make a picture appear and disappear, easier to make than levers or sliders.

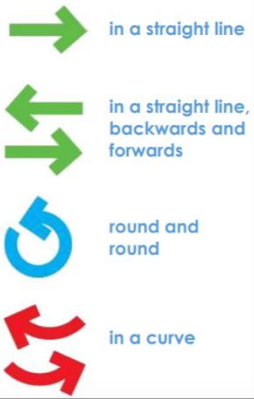


Where children have a particularly good understanding of levers and sliders in Key Stage 1, they could be introduced to the simplest lever and linkage mechanism used in Key Stage 2. This will introduce them to the idea of loose and fixed pivots.



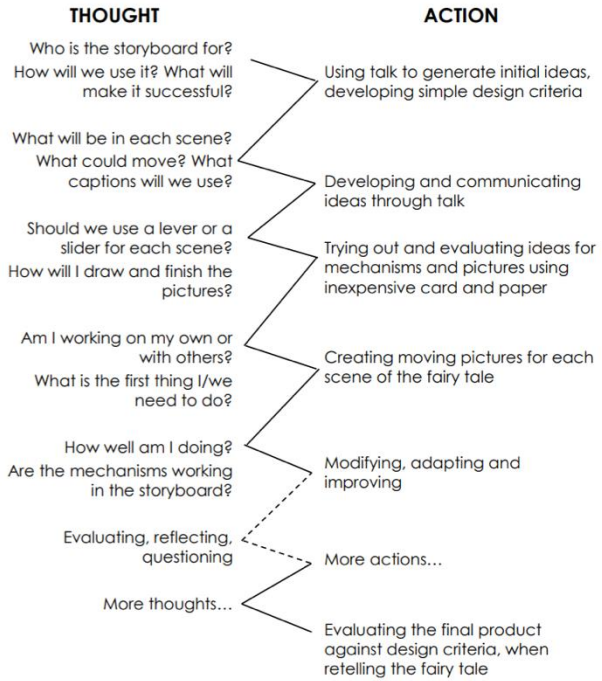
● Fixed pivot
○ Loose pivot

Simple mechanisms move...



Designing, making and evaluating a moving storyboard to retell a fairy tale to the class

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:



Glossary

- **Mechanism** – a device used to create movement in a product.
- **Lever** – a rigid bar which moves around a pivot. Levers are used in many everyday products. In this project children will use card strips for levers and paper fasteners for pivots.
- **Slider** – a rigid bar which moves backwards and forwards along a straight line. Unlike a lever, a slider does not have a pivot point.
- **Slot** – the hole through which a lever or slider is placed to enable part of a picture to move.
- **Guide or bridge** – a short card strip used to keep sliders in place and control movement.

Year 2 - Unit 2 - Preparing food and vegetables – Food and Nutrition		
Sequence of Lessons	**Prior Learning**	**Vocabulary**
Lesson 1 – Evaluate existing products. Children to handle, smell and taste fruit and vegetables in order to describe them through talking and drawing. evaluate existing products to determine what the children like best; provide opportunities for the children to investigate preferences of their intended users/suitability for intended purposes **Lesson 2 – 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? Discuss healthy eating advice, including eating more fruit and vegetables; using The eat well plate model talk about the importance of fruit and vegetables in our balanced diet **Lesson 3 –Demonstrate how to use simple utensils and provide opportunities for the children to practise food-processing skills** such as washing, grating, peeling, slicing, squeezing e.g. Do we eat the whole fruit? Why or why not? Which parts do we eat? What might we have to do before eating this? Why do we cut, grate, peel and slice in this way? Discuss different effects achieved by different processes. **Lesson 4 – Set a context for designing and making which is authentic and meaningful** – maybe creating kebabs for parents to enjoy? Introduce a design criterion that can be used to guide the development and evaluation of children's products **Lesson 5 – Children to then draw and label products e.g.** planned kebabs; ask the children to think about what they will need and make a list **Lesson 6 – Children create their fruit kebabs and then will evaluate their work.**	• Experience of common fruit and vegetables, undertaking sensory activities i.e. appearance taste and smell. • Experience of cutting soft fruit and vegetables using appropriate utensils.	**Fruit -** plant or tree's edible seed with envelope. **Vegetable –** plant used for food. **Nutrients -** all the things in food that the body needs to remain healthy. **Pith –** the soft white lining inside fruit such as oranges. **Salad -** a cold dish of fresh and/or cooked vegetables or fruit. **Sensory Evaluation -** subjective testing of foods where senses are used to evaluate qualities such as appearance, smell, taste, texture (mouth feel). **Kebab –** cooked and/or fresh ingredients on a skewer.

Knowledge			
Design	**Make**	**Evaluate**	**Technical Knowledge**
• Know which healthy food combinations which work well together	• Identifying if a food is a fruit or a vegetable • Know where and how some fruits and vegetables grow • Know how to peel, chop and slice fruit and vegetables safely using the bridge or claw grip	• Know how to describe appearance, smell and taste of some fruits and vegetables • Know what information might be included on packaging for a smoothie • Know the taste of common fruits and vegetables • Know which grip was most effective when peeling, chopping and slicing	• Know the difference between fruits and vegetables • Know how to describe and group fruits and vegetables by texture and taste • Know what makes a balanced diet • Know where to find the nutritional information on packaging • Know the five food groups

Years 1/2

Food

Preparing fruit and vegetables

Instant CPD


Tips for teachers

- ✓ Display fruit, including photographs and associated technical vocabulary, to encourage the children to use it when discussing, designing and making a food product.
- ✓ Ask the children to sort a selection of fruit and vegetables – which is which? Photo cards could be used for this.
- ✓ Include fruit that is less likely to be known to the children.
- ✓ Stories and poems about food could be used for inspiration and as an introduction to the project.
- ✓ Visit a local shop or food market to give your project a real-life context.
- ✓ Carrots can provide a relatively cheap food for examining the effects of using different equipment such as grating, slicing into thin rings, slicing into sticks.
- ✓ Serrated knives with rounded ends are the best.
- ✓ Foods for chopping/slicing could be cut in half lengthways to provide a flat base and held still with, for example, a fork so that children cut safely.
- ✓ Before you organise any food tasting in your class, you need to check your school and local authority health and safety policy. Seek parental consent.
- ✓ As homework ask children to keep a weekly fruit and vegetable diary and ask them to record their results in a chart/table. If more appropriate, focus on fruit and vegetables served in school.

Useful resources at www.data.org.uk

- Caribbean fruit cocktails (7-9 years but contains useful information)
- Are you teaching food in Primary D&T?
- Super salads (7-9 years but contains useful information)
- Chilled Food Association resources
- Fantastic fruit

Other useful web-based resources:

- www.foodafactoflife.org.uk
- http://www.nhs.uk/livewell/5aday/pages/5adayhome.aspx
- www.eatwell.gov.uk

Teaching aids to demonstrate food processing skills


Peeling


Cutting


Slicing


Grating


Squeezing

Food Processing Equipment

Utensil	Food	Effect	Mouth feel
Juicer 	Orange	Makes juice	Liquid
Peeler 	Apple	Unpeeled apple	Crunchy
Knife 	Carrot	Thin rings	Crispy hard

Hygiene – some key pointers

- Jewellery is removed
- Hair is tied back
- Sleeves are rolled up
- Aprons are on
- Hands are washed
- Cuts are covered with blue waterproof dressing

Further information from www.foodafactoflife.org.uk

Designing, making and evaluating a fruit snack for a class picnic

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:

THOUGHT	ACTION
What sort of fruit product shall I make? Who will it be for? Which fruit will I put into my salad? Will my product appeal to my intended user?	Talking, drawing, writing lists, generating design criteria.
How will I process my fruit?	Using different tools and practising using different food-processing skills, e.g. cutting, slicing, grating.
How will different food processes create different effects?	Discussing and comparing different effects. Trying them out and evaluating.
What tools and food processing skills will I use? What order will I work in? How will I present my fruit snack?	Negotiating, developing and agreeing a plan of action, evaluating actions.
Do I need to adjust or change anything? Refining and reflecting.	Discussing, trying out and modifying the design.
Will my fruit salad meet the needs of the user and achieve its purpose?	Evaluating the product with the intended user and against the design criteria.

Glossary

- **Fruit** – plant or tree's edible seed with envelope.
- **Vegetable** – plant used for food.
- **Nutrients** – all the things in food that the body needs to remain healthy.
- **Pith** – the soft white lining inside fruit such as oranges.
- **Salad** – a cold dish of fresh and/or cooked vegetables or fruit.
- **Sensory evaluation** – subjective testing of foods where senses are used to evaluate qualities such as appearance, smell, taste, texture (mouth feel).
- **Kebab** – cooked and/or fresh ingredients on a skewer.

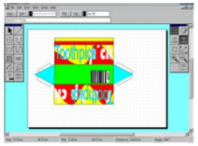
Year 3 - Unit 1 – Shell structures – Freestanding structures		
Sequence of Lessons	**Prior Learning**	**Vocabulary**
Lesson 1 - What is packaging? To understand the different types of packaging. Children to look at a range of different products and how those products have different packaging. **Lesson 2 - Evaluate different products packaging.** Is it safe? Beautiful? Strong? **Lesson 3 - Introduce the design** brief – To design a new package for Christmas Chocolates. Look at Chocolate packaging specifically. Explain the importance of packaging for food items **Lesson 4 - Designing different packaging ideas and testing prototypes.** Discuss and evaluate their effectiveness. **Lesson 5 - Draw a final design and label**. What materials and tools will you need to create your package? **Lesson 6 - Finish creating final product and evaluate it.**	• Experience of using different joining, cutting and finishing techniques with paper and card. • A basic understanding of 2-D and 3-D shapes in mathematics and the physical properties and everyday uses of materials in science.	**Cuboid** - a solid body with rectangular sides. **Edge -** where two surfaces meet at an angle. **Face -** a surface of a geometric shape. **Font-** a printer's term meaning the style of lettering being used. **Net** - the flat or opened - out shape of an object such as a box. **Prism** - a solid geometric shape with ends that are similar, equal and parallel **Scoring** - cutting a line or mark into sheet material to make it easier to fold. **Shell Structure –** a hollow structure with a thin outer covering. **Vertex** – used to refer to the corners of a solid geometric shape, where edges meet.

Knowledge			
Design	**Make**	**Evaluate**	**Technical Knowledge**
• Knows how to design suitable packaging for products with key features to appeal to a specific person/ purpose • Knows how to draw and label a design using 2D shapes • Knows the 3D shapes that will create the features • Knows how to design a frame structure designed to support weight	• Know how to construct a range of 3D geometric shapes using nets • Know there are special features for individual designs • Know how to create a range of different shaped frame structures • Know how to make a variety of free-standing frame structures of different shapes • Know how to select appropriate materials to build a strong structure and for the cladding • Know how to reinforce corners to strengthen a structure • Know how to create a design in accordance with a plan	• Know how to evaluate own work and the work of others based on the aesthetic of the finished product and in comparison to the original design • Know how to suggest points for modification of the individual designs • Know how to evaluate structures made by the class • Know what characteristics of a design and construction make it the most effective • Know how to identify effective and ineffective designs	• Know suitable materials to be selected and used for food packaging considering weight, compression, tension • Know wide and flat based objects are more stable • Know the terminology of strut, tie, span, beam • Know the difference between frame and shell structure • Know how to identify effective and ineffective designs

Years 3/4

Structures
Shell structures

Instant CPD



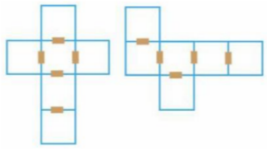
Tips for teachers

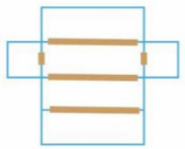
- ✓ Make a collection of boxes of various shapes and flatten them for storage.
- ✓ Discuss environmental issues relating to the wastage of materials when packaging items including the three R's – reducing, recycling and reusing.
- ✓ Visit a local shop or supermarket to investigate different types of card packaging.
- ✓ The use of an empty ball point pen together with a safety rule is ideal for scoring.
- ✓ The use of standard shapes as templates will help children design their own nets.
- ✓ Ensure that the children have sufficient tabs for assembling their nets.
- ✓ Consider the use of enlarge and reduce facilities on the photocopier when copying 2-D nets for the children as examples.
- ✓ Display technical vocabulary to encourage the children to use it when discussing, designing and making their product.
- ✓ Divide your class into teams and assign children to specific jobs within their teams e.g. Resources Manager, Sustainability Officer, Design Director, Tools Manager, Process Controller, Graphics Director.
- ✓ The use of computer-aided design to draw nets and graphics for the children's products could be practised in computing lessons.
- ✓ Ensure that the children have a good understanding of 2-D and 3-D shapes in maths before carrying out this project.

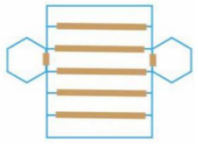
Useful resources at www.data.org.uk

- Primary Subject Leaders' File Section 5.9
- Banish broken biscuits! Box them brilliantly
- Desk Tidy
- Working with Materials
- Packaging – with links to Maths
- Nets for packaging helpsheet
- Door hinges helpsheet

Assemble and evaluate 3-D shapes using standard sized card squares, rectangles, equilateral triangles, isosceles triangles and hexagons, joined with masking tape.


Nets for cubes

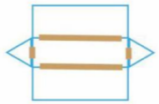

Cuboid net


Hexagonal prism net

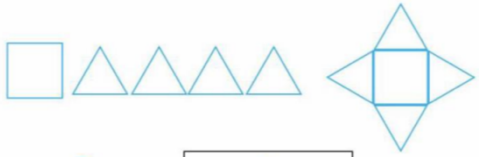

Tetrahedron net

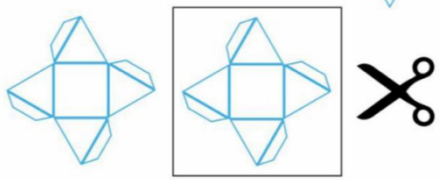

Hexagonal based pyramid net


Square based pyramid net

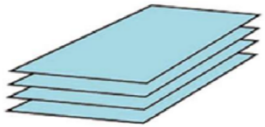

Triangular prism net

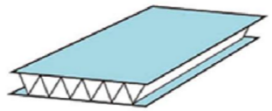
Creating the net for the product you are designing and making without using computer aided design:

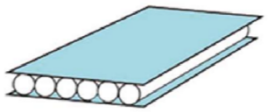

Draw the faces and stick them together

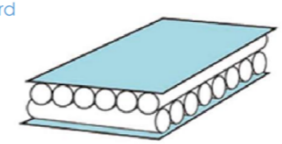

Add tabs, glue your paper net onto card and cut out

Stiffening and strengthening sheet materials:


Laminating – glue together several layers of card


Corrugating – zig-zag a piece of paper or card and glue in between two layers of card


Ribbing – glue layers of straws between layers of card



Designing, making and evaluating packaging for a gift for a family member

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:

THOUGHT	ACTION
What type of shell structure shall I make? What will be the purpose of my product? How will my product appeal to my intended user?	Discussing ideas, drawing annotated sketches, generating design criteria.
Which materials will I use to make it?	Investigating and evaluating possible materials.
Which shape will be the best for my structure? How will I stiffen and strengthen my structure?	Discussing, constructing and comparing different nets. Exploring strengthening techniques. Evaluating prototypes against success criteria.
What graphics techniques will I use to achieve a desired visual effect and purpose?	
Will I work with someone else? How long will it take? What order will I work in? What tools, techniques and skills will I use?	Discussing, exploring, trialling and evaluating different graphics effects. Negotiating, developing and agreeing a plan of action, evaluating actions.
Do I need to adjust or change anything?	Discussing, trying out and modifying the design.
Will my product meet the needs of the user?	Evaluating the product with the intended user and against the success criteria.

Glossary

- **Cuboid** – a solid body with rectangular sides.
- **Edge** – where two surfaces meet at an angle.
- **Face** – a surface of a geometric shape.
- **Font** – a printer's term meaning the style of lettering being used.
- **Net** – the flat or opened-out shape of an object such as a box.
- **Prism** – a solid geometric shape with ends that are similar, equal and parallel.
- **Scoring** – cutting a line or mark into sheet material to make it easier to fold.
- **Shell structure** – a hollow structure with a thin outer covering.
- **Vertex** – used to refer to the corners of a solid geometric shape, where edges meet.

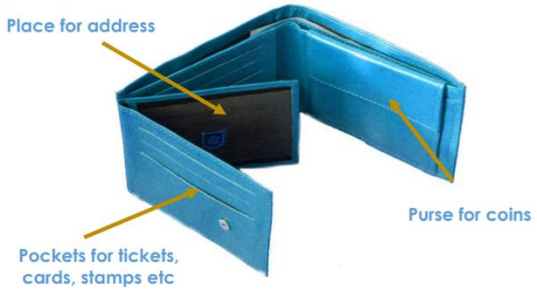
Year 3 - Unit 2 - 2D shape to a 3D project – Textiles		
Sequence of Lessons	**Prior Learning**	**Vocabulary**
Lesson 1 – Investigate a range of textile products that have a selection of stitches, joins, fabrics, finishing techniques, fastenings, and purposes. Think about products from the past and what changes have been made in textile production and products e.g., the invention of zips and Velcro. **Lesson 2 – 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. Introduce patterns in textiles and how to cut out a pattern template to use. **Lesson 3 – Children to create a design brief,** supported by the teacher, set within a context which is authentic and meaningful. 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. **Lesson 4 –Plan the main stages of making** e.g., using a flowchart or storyboard. Look at different fabrics and plan their final design. Label and annotate the design with useful information. **Lesson 5 - Follow designs to make their purse.** Think about how to work safely and carefully within the classroom. **Lesson 6 - Share their final design with each other**. Evaluate their purse against the design criteria.	• Have evaluated a range of textile products. • Have joined fabric in simple ways by gluing and stitching. • Have used simple patterns and templates for marking out.	**Appliqué** – means 'applied' - describes method of stitching/gluing patches onto fabric (originally to mend holes in worn clothes) to provide decoration. **Pattern/Template -** a shape drawn to exact shape and size and used to assist cutting out. **Seam -** a line of stitching that joins pieces of fabrics together. **Seam Allowance-** extra fabric allowed for joining together - usually 1.5cm. **Prototype –** a model that is made to test whether a design will work. **Aesthetics -** the way in which the product looks with the nature and expression of beauty.

Knowledge			
Design	**Make**	**Evaluate**	**Technical Knowledge**
• Knows how to design and make a template from an existing product and applying individual design criteria • Knows how to write design criteria for a product, articulating decisions made	• Know how to follow design criteria • Know how to select and cut fabrics using fabric scissors • Know hot to cross stitch to join fabric • Know how to make and test a paper template • Know how to measure, mark, and cut fabric • Know stitch styles to join fabric, working neatly sewing small, neat stitches • Know how to incorporate fastening to a design	• Know how to evaluate an end product and think of other ways in which to create similar items • Know how to test and evaluate an end product against the original design criteria • Know how many of the criteria should be met for the product to be considered successful • Know how to suggest modifications for improvement	• Know how to thread needles with greater independence • Know how to tie knots with greater independence • Know how to cross stitch and appliqué • Know the need to count the thread on a piece of even weave fabric in each direction to create uniform size and appearance • Know that fabrics can be layered for affect • Know that there are different types of fastenings and what they are and the benefits and disadvantages of different fastening types

Years 3/4

Textiles
2-D shape to 3-D product

Instant CPD



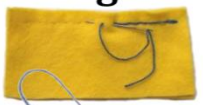
Tips for teachers

- ✓ Have simple patterns available for children who may find it difficult to create their own.
- ✓ Demonstrate stitching techniques and have help sheets showing stitch instructions for the children to practise independently.
- ✓ Complete sewing practice in small groups. Use adult helpers to provide additional support. Possibly set up a rotation of activities.
- ✓ Demonstrate finishing techniques; let the children practise on small pieces of fabric.
- ✓ Have a limited range of fasteners.
- ✓ Use recycled fabrics e.g. old clothing, ensuring they are easy to work with.
- ✓ Use dipryl or J-cloth type fabric for prototypes.
- ✓ Have a range of products and pictures for children to investigate. Try to use at least one product that can be disassembled so children can see all the parts.
- ✓ Games could be made with technical vocabulary cards e.g. pairs.

Useful resources at www.data.org.uk

- Aprons
- Fancy a bag?
- Designing with textiles
- Bendy bags (Years 1/2)
- A to Z of D&T
- Working with Materials

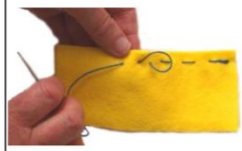
Teaching aids – joining techniques


Back stitch


Backwards running stitch


Over sew stitch


Blanket stitch


Running stitch

Cutting out techniques


Ensure template is secured to fabric to allow for accuracy. Double sided tape can be used instead of pins to do this.


Place pattern pieces carefully to avoid wastage.

To move children's learning on, as enhancement activities, children could research into different types of fabrics and how they are constructed. They could carry out tests to check e.g. strength, waterproofness or flexibility to ensure their chosen fabric can be used to create a product that meets the needs of user and is fit for purpose.


Bonded

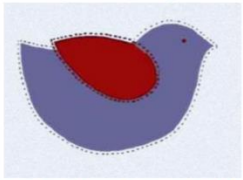

Woven


Knitted


Felted

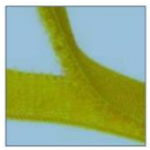
Decorative Techniques


Embroidery stitches e.g. cross-stitch


Appliqué by gluing or stitching

Possible fastenings


Buttons


Velcro

Designing, making and evaluating a holder/purse/wallet for a friend or relative

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:

THOUGHT	ACTION
Who is it for? What will it hold? e.g. phone, money, plastic cards, pencils.	Discuss ideas; create a list of likes and dislikes of the user Generate design criteria
What shape will the holder be? How will it fasten?	Investigate a range of templates/patterns and choose the most appropriate one for purpose Create initial design ideas
What fabric should I use?	Discuss and explore different fabrics suitable for purpose Possibly test fabrics for strength/waterproofness
Which joining techniques would be the best for the fabric and pattern?	Discuss and test out different joining techniques on mock ups Evaluate these against the design criteria
How can I make my holder aesthetically pleasing for the user?	Test out a range of decorative techniques and decide on the one/s which are appropriate
How long will it take to make? What tools will I need? What order should I do it in?	Create the holder following the design
Reflection and refining What isn't working very well? What could I improve on?	Make suitable adjustment during the making process Develop the plan during the making
Will my holder/purse/wallet fulfill its function? Is it suitable for the user?	Test out the product Make an evaluation with the user against the initial design criteria and design ideas

Glossary

- **Appliqué** – means 'applied' - describes method of stitching/gluing patches onto fabric (originally to mend holes in worn clothes) to provide decoration.
- **Pattern/Template** – a shape drawn to exact shape and size and used to assist cutting out.
- **Seam** – a line of stitching that joins pieces of fabrics together.
- **Seam Allowance** – extra fabric allowed for joining together - usually 1.5cm.
- **Prototype** – a model that is made to test whether a design will work.
- **Aesthetics** – the way in which the product looks with the nature and expression of beauty.

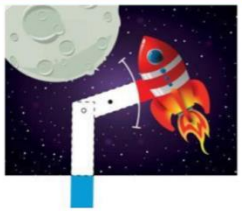
Year 4 - Unit 1 – Levers and linkages - Mechanics		
Sequence of Lessons	**Prior Learning**	**Vocabulary**
Lesson 1 - To look at levers in different settings like pop up books, cards etc. Children investigate, analyse and evaluate books and, where available, other products which have a range of lever and linkage mechanisms. **Lesson 2 – Introduce a design a design brief** with the children for a toy. Discuss with children the purpose of the product and who the products will be for. Children to generate a range of ideas using their ideas from research of existing products **Lesson 3 - Draw a final design and label.** What materials and tools will you need to create your package? **Lesson 4 - Create a prototype using different lever and linkage mechanisms.** Allow the children a chance to make a prototype of their designs **Lesson 5 - Practical session continuing prototype making of levers and linkages.** Focus on the correct and accurate use of measuring, marking out, cutting, joining and finishing skills and techniques. **Lesson 6- Finish creating final product and evaluate it.**	• Explored and used mechanisms such as flaps, sliders and simple levers. • Gained experience of basic cutting, joining and finishing techniques with paper and card.	**Mechanism -**a device used to create movement in a product. **Lever-**a rigid bar which moves around a pivot. Levers are used in many everyday products. **Linkage –** the card strips joining one or more levers to produce the type of movement required. The term 'linkage' is also used to describe the lever and linkage mechanism. **Slot –** the hole through which a lever is placed to enable part of a picture to move. **Guide or bridge -** a short card strip used to keep lever and linkage mechanisms in place and control movement. **Loose pivot –** a paper fastener that joins card strips together. **Fixed pivot –** a paper fastener that joins card strips to the backing card. **System –** a set of related parts or components used to create an outcome. Systems have an input, process and an output. In a lever and linkage mechanism, the 'input movement' is where the user pushes or pulls a card strip. The 'output movement' is where one or more parts of the picture move.

Knowledge			
Design	**Make**	**Evaluate**	**Technical Knowledge**
• Know how to design a toy which uses a pneumatic system • Know how to develop design criteria from a design brief • Knows how to generate ideas using sketches and diagrams • Know that different types of drawings are used in design to explain ideas clearly • Know how to design a shape that reduces air resistance	• Know how to use a pneumatic system to create a desired motion • Know how to build secure housing for a pneumatic system • Know how to use syringes and balloons to create different types of pneumatic systems to make a functional and appealing pneumatic toy • Know how to select materials due to their functional and aesthetic characteristics • Know how to manipulate materials to create different effects by cutting, creasing, folding, weaving • Know how to measure, marking, cutting and assembling with increasing accuracy	• Know how to use the views of others to improve designs • Know how to use testing to modify the outcome, suggesting improvements • Know how to evaluate the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance	• Know how pneumatic systems work • Know that mechanisms are a system of parts that work together to create motion • Know that pneumatic systems can be used as part of a mechanism • Know that pneumatic systems force air over a distance to create movement • Know that products change and evolve over time • Know that all moving things have kinetic energy • Know that kinetic energy is the energy that something (object person) has by being in motion

Years 3/4

Mechanisms
Levers and linkages

Instant CPD



Tips for teachers

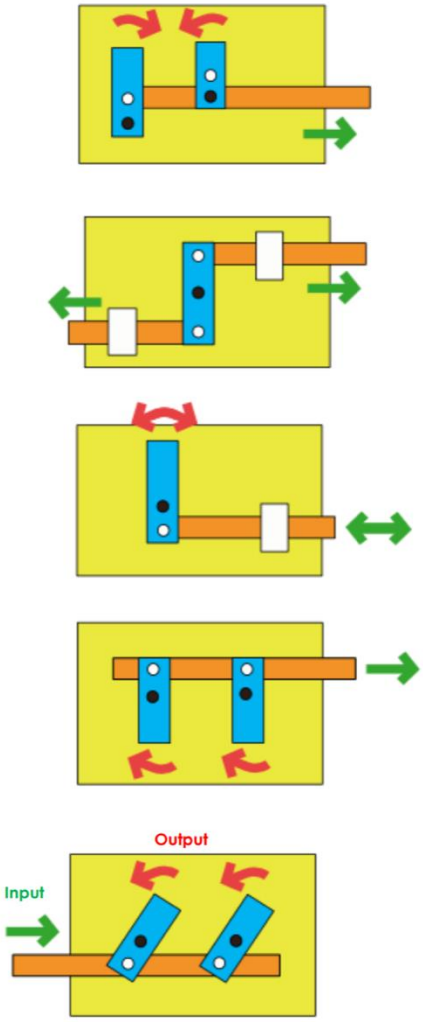
- ✓ Give children the opportunity to make examples of lever and linkage mechanisms though focused tasks.
- ✓ Preparing a plentiful supply of card strips can be useful to speed up the process.
- ✓ Card from recycled packaging is a cost-efficient way of providing enough material for children to experiment with different arrangements and to make mock-ups and prototypes.
- ✓ When working with thin card, a hole can be made for the paper fastener pivot by pressing a pencil through the card on to a piece of Plasticine or Blu Tack.
- ✓ A picture can be drawn on and cut out from another piece of card and glued on to the output levers.
- ✓ Windows can be cut out of the backing sheet or extra pieces added so that the picture on the output lever is hidden and then revealed.
- ✓ The backing sheet can be shaped to suit the picture.
- ✓ Guides/bridges can be made using strips of card fixed with masking tape e.g. white card on diagrams.
- ✓ Display technical vocabulary and encourage the children to use it when discussing mechanisms and when designing and making.
- ✓ Make sure the existing books children investigate include moving pictures that are similar to the teaching aids.

Useful resources at www.data.org.uk

- Levers and linkages - Poster and Support Pack
- Mechanisms with a message
- Moving history book

Teaching aids to demonstrate levers and linkages

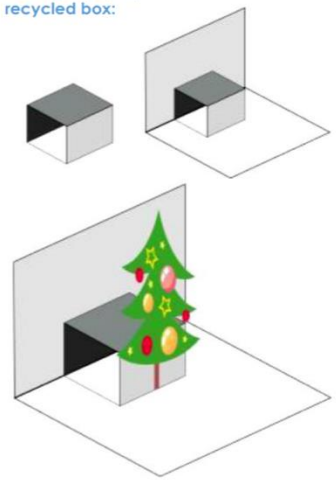
● Fixed pivot
○ Loose pivot



When you push the card strip (input movement), the two levers move (output movement).

Pop-up mechanisms can be added to children's moving pictures as an enhancement. However, to build on work with simple levers and sliders in KS1, it is important to focus children's learning during this project on levers and

Making a pop-up from a small section of a recycled box:



1. Cut a slice off a small box.
2. Glue two sides to the paper.
3. Stick a picture to pop up on the front.

Lever and linkage mechanisms usually produce oscillating or reciprocating movement:

- Linear – in a straight line
- Reciprocating – backwards and forwards in a straight line e.g. a slider
- Rotary – round and round e.g. a wheel, cam, pulley, gear wheel
- Oscillating – backwards and forwards in an arc e.g. a lever

Designing, making and evaluating a greetings card with moving parts for family or friends

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:

THOUGHT	ACTION
What sort of greetings card shall I make and who will it be for? What part will move? How will it appeal to the user?	Discussing ideas, drawing annotated sketches, generating design crite
How will it move?	Discussing ideas, model possible lever and linka mechanisms.
Which lever and linkage mechanism will work best for my greetings card?	Discussing and evaluati mock-ups and prototyp against design criteria.
What media and materials will I use?	Discussing, exploring and trialling media and materials.
Who will I work with? How long will it take? What order will I work in? What tools and techniques will I use?	Negotiating, developing and agreeing a plan of action.
More thoughts ... appraising, reflecting, refining.	More actions ... building, testing, modifying.
Will the greetings card meet the needs of the user and achieve its purpose?	Evaluating the greetings card with the intended user and against design criteria.

Glossary

- **Mechanism** – a device used to create movement in a product.
- **Lever** – a rigid bar which moves around a pivot. Levers are used in many everyday products. In this project children will use card strips for levers and paper fasteners for pivots.
- **Linkage** – the card strips joining one or more levers to produce the type of movement required. The term 'linkage' is also used to describe the lever and linkage mechanism as a whole.
- **Slot** – the hole through which a lever is placed to enable part of a picture to move.
- **Guide or bridge** – a short card strip used to keep lever and linkage mechanisms in place and control movement.
- **Loose pivot** – a paper fastener that joins card strips together.
- **Fixed pivot** – a paper fastener that joins card strips to the backing card.
- **System** – a set of related parts or components used to create an outcome. Systems have an input, process and an output. In a lever and linkage mechanism, the 'input movement' is where the user pushes or pulls a card strip. The 'output movement' is where one or more parts of the picture move.

Year 4 - Unit 2 - Healthy and varied diet – Food and Nutrition		
Sequence of Lessons	**Prior Learning**	**Vocabulary**
Lesson 1 Investigating food products for taste, smell, appearance and texture. **Lesson 2** Research food from farm to fork. What is food hygiene and why is it important? **Lesson 3** Introduce the design brief **Lesson 4** Food preparation techniques **Lesson 5** Draw a final design and label. Decide on final design. **Lesson 6** – Make their final design. Present it and eat it. Share their final design with each other. Evaluate their food against the design criteria.	• Know some ways to prepare ingredients safely and hygienically. • Have some basic knowledge and understanding about healthy eating and *The eatwell plate.* Have used some equipment and utensils and prepared and combined ingredients to make a product.	**Appearance -** how the food looks to the eye. **Texture -** how the product feels in the mouth. **Sensory evaluation** - evaluating food products in terms of the taste, smell, texture and appearance. **Preference test -** trying different foods and deciding which you like best. **Strawberry huller -** tool to remove the stalk and leaves from a strawberry. **Processed food** - ingredients that have been changed in some way to enable them to be eaten or used in food preparation and cooking.

Knowledge			
Design	**Make**	**Evaluate**	**Technical Knowledge**
• Knows how to design a biscuit within a given budget, drawing upon previous taste testing and considering the taste, texture, smell and appearance	• Know how to prepare themselves and a workspace to cook safely in • Know the basic rules to avoid food contamination • Knowhow to follow the instructions within a recipe • Know how to follow basic hygiene rules • Know simple ways to adapt a recipe	• Know simple design criteria to help test and review • Know how to evaluate a recipe, considering: taste, smell, texture and appearance • Know the impact of the budget on the selection of ingredients	• Know how to work with cooking equipment safely and hygienically • Know how to use, store and clean a knife safely • Know the impact of the cost and importance of budgeting while planning ingredients for biscuits

Years 3/4

Food
Healthy and varied diet

Instant CPD

Tips for teachers

- ✓ When choosing bought products to evaluate, choose some with simple fillings (such as cheese) and others with more variety (such as bacon, lettuce and tomato). Include some with fillings from a variety of cultures.
- ✓ Children may need help to develop design criteria for their product. You can model this by discussing what the design criteria may have been for an existing product that the children have previously evaluated before encouraging them to create their own.
- ✓ If you grow edible plants in the school grounds such as herbs, lettuce or tomatoes, encourage the children to use these in their food product. When possible, use some ingredients which are seasonal and locally sourced.
- ✓ It is advisable to have additional adult support when children are learning to prepare ingredients.
- ✓ Use a range of fresh and processed ingredients.
- ✓ Some ingredients can be cooked using a heat source with adult supervision to introduce children to techniques such as boiling an egg or roasting a pepper.
- ✓ Hygiene: tie long hair back, wear aprons, cover cuts with blue plasters and wash hands thoroughly with soap and dry with a paper towel. More details on www.foodafactoflife.org.uk.
- ✓ Homework idea 1: Ask children to collect pictures of related food products from magazines etc. Research which similar products are used around the world.
- ✓ Homework idea 2: Ask members of the children's family which is their favourite lunch snack and why.

Useful resources at www.data.org.uk

- Dips and Dippers
- Super Salads
- Sandwich Snacks adapted for SEN
- Soups - Celebrating culture and seasonality

Other useful web-based resources:

- www.foodafactoflife.org.uk
- http://www.nhs.uk/livewell/5aday/pages/5adayhome.aspx
- www.eatwell.gov.uk

Wraps

Pitta bread sandwich

Sandwich

Skills and techniques

Grating cheese

Spreading butter on bread

Cutting using the bridge technique

Cutting using the claw technique

Investigating and Evaluating Activities

Children can analyse existing products related to their project using sensory evaluations and record their results in a table. Explain that tasting is not the same as eating. Provide kitchen towel so children can spit out food they do not like. Provide water to cleanse palette between tasting products.

Analysing existing products

Filling	Appearance	Smell	Flavour/ Taste	Texture	Dislike	Neither	Like
1							
2							
3							
4							
Word bank	Colourful Dark/pale Greasy Moist	Fruity Meaty Smoky Oniony Garlicky Fishy	Salty Herby Spicy Fishy Smoky	Crispy Crunchy Soft Chewy Sticky Smooth Hard			

Designing, making and evaluating a bread-based product with a filling for lunch, such as a wrap, a sandwich, a roll, a blini or a toastie

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:

THOUGHT	ACTION
Who am I making the food product for? How can I make it appealing for the range of users?	Discussing and communicating ideas, researching existing products, drawing annotated sketches, generating design criteria.
What kind of food product shall I make that can be carried easily? What ingredients could it contain?	Referring back to sensory evaluations carried out in IEAs.
How will I make sure it looks appealing as well as tastes and smells good?	Discussing ideas and how the type of food product and way it is eaten will affect the design.
What techniques will I use to prepare the ingredients and what equipment do I need?	Peeling, chopping, slicing, grating, spreading. Using tools such as round ended knives, vegetable peelers, apple corers, strawberry hullers and graters. Listing the equipment required.
How long will it take? What order will I work in?	Planning the order of the activity and timescale.
More thoughts... appraising, reflecting and refining.	Acting on ongoing evaluation to make appropriate changes.
Has the snack met the needs of the user and achieved its purpose?	Evaluating the food product against the design criteria including the user and purpose. Recording final product through an annotated sketch.

Glossary

- **Appearance** – how the food looks to the eye.
- **Texture** – how the product feels in the mouth.
- **Sensory evaluation** – evaluating food products in terms of the taste, smell, texture and appearance.
- **Preference test** – trying different foods and deciding which you like best.
- **Strawberry huller** – tool to remove the stalk and leaves from a strawberry.
- **Processed food** – ingredients that have been changed in some way to enable them to be eaten or used in food preparation and cooking.

Year 5 - Unit 1 –Frame structures – Freestanding structures

Sequence of Lessons	Prior Learning	Vocabulary
Lesson 1 - Investigate and make annotated drawings of a range of portable and permanent frame structures, e.g. tents, bus shelters, umbrellas. Children research key events and individuals related to their study of frame structures - Stephen Sauvestre – a designer of the Eiffel Tower and Thomas Farnolls Pritchard – designer of the Iron Bridge. **Lesson 2 - Construct 2-D frameworks prototypes** out of straws/paper etc. Compare the strength of square frameworks with triangular frameworks. Ask the children to reinforce square frameworks using diagonals to help develop an understanding of using triangulation to add strength to a structure. **Lesson 3 - Investigate how paper tubes can be made** from rolling sheets of newspaper diagonally around pieces of wood e.g. dowel. Children to then use these tubes and masking tape or paper straws with pipe cleaners to build 3-D frameworks such as cubes, cuboids and pyramids. How could each of the frameworks be reinforced and strengthened? Evaluate against last week. **Lesson 4- Practical woodwork session.** Demonstrate the accurate use of tools and equipment. Develop skills and techniques using junior hacksaws, G-clamps, bench hooks, square section wood, card triangles and hand drills to construct wooden frames, as appropriate. **Lesson 5 – Planning session** - Discuss the brief of designing and making a small-scale frame structure. Generate ideas and drawings from previous weeks experience. Children should then produce a detailed, step-by-step plan, listing tools and materials **Lesson 6 - Create final product and evaluate it.**	• Experience of using measuring, marking out, cutting, joining, shaping and finishing techniques with construction materials. • Basic understanding of what structures are and how they can be made stronger, stiffer and more stable.	**Modelling-** the process of making a 3-D representation of a structure or product. **Compression –**the application of pressure to squeeze an object. **Strut -** a part of a structure under compression. **Tension-**a force pulling on a material or structure. **Tie -** a part of a structure under tension. **Diagonal-** a straight line that goes from one corner to another inside a shape. **Horizontal –** a line that is parallel to the ground. **Vertical-** a line that is at right angles to the ground. **Triangulation-** the use of triangular shapes to strengthen a structure. **Frame Structure –** a structure made from thin components e.g. Tent frame.

Knowledge

Design	Make	Evaluate	Technical Knowledge
• Knows how to design a stable structure that is able to support weight • Knows how to design a frame structure with focus on triangulation • Knows how to design a variety of different structures, considering how the structures will be used	• Know how to use triangles to create truss bridges that span a given distance and supports a load • Know how to independently measure and mark accurately • Know how to select appropriate tools and equipment for particular tasks • Know the correct techniques to saw safely • Know where a structure needs reinforcement	• Know how to adapt and improve own structures by identifying points of weakness and reinforcing them as necessary • Know how to suggest points for improvements for own structures and those designed by others • Know how to improve a design plan based on peer evaluation • Know how to test and adapt a design can improve it	• Know what makes a stronger and weaker structure • Know different ways to reinforce structures • Know how triangles can be used to reinforce bridges • Know that structures can be strengthened by manipulating materials and shapes • Know the difference between man made and natural structures

Years 5/6

Structures
Frame structures

Instant CPD



Tips for teachers

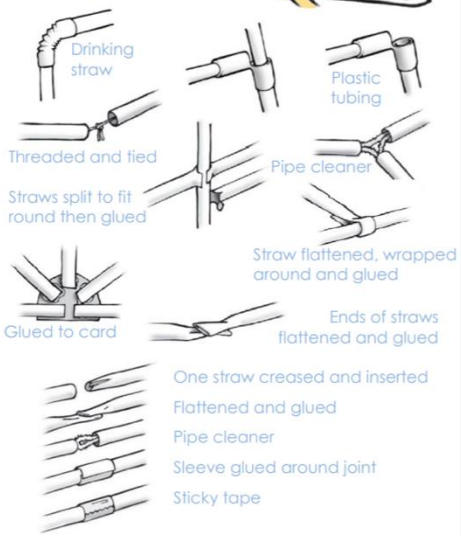
- ✓ Collect a range of photographs of different frame structures, both portable and permanent e.g. tents, bus shelters, bird hides.
- ✓ Include examples constructed with external and internal frameworks.
- ✓ Record the process of investigating frame structures using photographs and annotated drawings.
- ✓ Take children on a local 'frame structures' trail to help them get ideas for their own products and understand construction techniques.
- ✓ Frame structures for large scale shelters can be made from broom sticks, garden canes or rolls of newspaper.
- ✓ Ensure children are familiar with all the materials they are likely to use and that these are made easily available and accessible.
- ✓ Discuss constraints such as time, resources and cost.
- ✓ Display technical vocabulary and encourage children to use it when discussing, designing and making their product.
- ✓ Ensure children use simple tests to evaluate the functionality and strength of their products.
- ✓ Encourage the children to evaluate each other's work positively.

Useful resources at www.data.org.uk

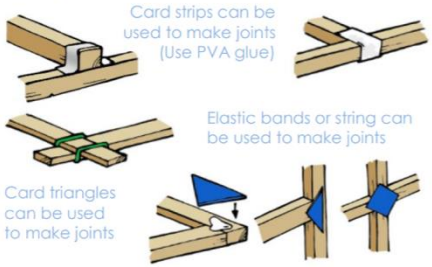
- Primary Subject Leaders' File Section 5.9
- Bird Hides Dragons' Den Challenge
- Working with paper straws

Techniques for building frame structures

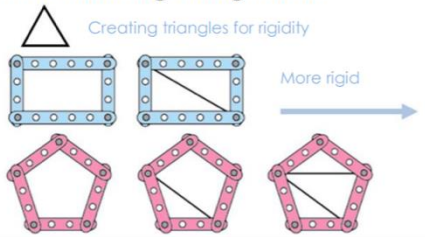
Joining straws



Joining thin sectioned pieces of wood

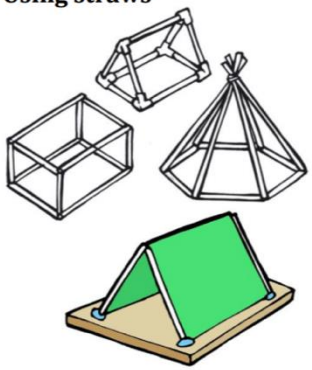


Understanding triangulation

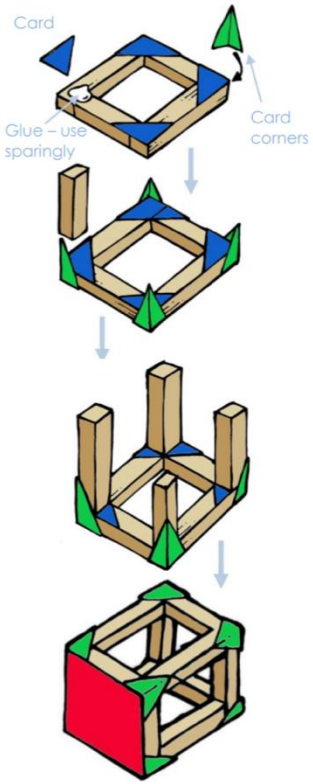


Making small-scale frame structures

Using straws



Using square section wood



Designing and making a small-scale bird hide for children to use in the school wildlife area

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:

THOUGHT	ACTION
What type of structure shall I make? What will be its purpose? Who will use it?	Discussing ideas, drawing annotated sketches. Generating a simple design specification.
Which will be the best shape for my bird hide? What features will it have?	Discussing, modelling and evaluating different options.
Which materials will I use to make it? How will I make it strong and waterproof?	Investigating and testing possible materials. Discussing, exploring and evaluating prototypes.
What will I use to cover the structure of my shelter?	Discussing, exploring and evaluating different fabric and rigid covering options.
What tools and materials will I need? What order will I work in? Will I work with someone? What constraints I am working to?	Negotiating, developing and agreeing a step-by-step-plan.
Do I need to change anything?	Discussing, testing and modifying the design.
Will my product meet the needs of the user?	Evaluating the product with the intended user and against the original design specification.

Glossary

- **Modelling** – the process of making a 3-D representation of a structure or product.
- **Compression** – the application of pressure to squeeze an object.
- **Strut** – a part of a structure under compression.
- **Tension** – a force pulling on a material or structure.
- **Tie** – a part of a structure under tension.
- **Diagonal** – a straight line that goes from one corner to another inside a shape.
- **Horizontal** – a line that is parallel to the ground.
- **Vertical** – a line that is at right angles to the ground.
- **Triangulation** – the use of triangular shapes to strengthen a structure.
- **Frame structure** – a structure made from thin components e.g. tent frame.

Year 5 - Unit 2 - Combining different fabric shapes – Textiles		
Sequence of Lessons	**Prior Learning**	**Vocabulary**
Lesson 1 – Investigate, analyse and evaluate a range of existing products which have been produced by combining fabric shapes. Investigate work by designers and their impact on fabrics and products. Explore prominent designers. **Lesson 2 – 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 strengthen and stiffened, what fastenings have been used and why. Children investigate properties of textiles through investigation e.g. exploring insulating properties, water resistance, wear and strength of textiles. **Lesson 3 – 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 to join fabric 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, how to tack or attach wadding or stiffening and learn how to start and finish off a row of stitches. **Lesson 4 – Develop skills of 2-D paper pattern** making using grid or tracing paper to create a 3-D mock-up of a chosen product. Remind/teach how to pin a pattern on to fabric ensuring limited wastage, how to leave a seam allowance and different cutting techniques. Planning session - Discuss the brief of designing and making a small-scale frame structure for a new glamping site. Generate ideas and drawings from previous weeks experience. Children should then produce a detailed, step-by-step plan, listing tools and materials. Think about tie dye fabric, applique and embroidery techniques for design. **Lesson 5 - Follow designs to make their bag**. Think about how to work safely and carefully within the classroom. **Lesson 6 - Evaluate their purse against the design criteria.**	• Experience of basic stitching, joining textiles and finishing techniques. • Experience of making and using simple pattern pieces.	**Mock up** - quick 3-D modelling using easy to work and cheaper materials and temporary joints. Useful for checking proportions and scale. **Pattern or template –** a shape drawn to exact shape and size, used to assist in cutting out. **Seam allowance –** extra fabric allowed for joining together -15mm for domestic patterns. **Specification** - describes what a product has to do. **Tacking –** large running stitches to hold pieces of fabric together temporarily. **Working drawing –** detailed drawing contains all information needed to make a product but is updated as changes are made.

Knowledge			
Design	**Make**	**Evaluate**	**Technical Knowledge**
• Knows to consider proportions of individual components • Knows how to design a product in accordance to specification linked to set of design criteria • Knows how to annotate designs	• Know how to measure, mark and cut fabric accurately and independently • Know how to create strong and secure blanket stitches when joining fabric • Know how to use template pinning panels onto fabric • Know how to use strong running stitch, making small, neat stitches and following the edge • Know how to tie strong knots • Know how to attach objects using thread and adding a secure fastening	• Know how to test and evaluate an end product and give a point for further improvements • Know how to evaluate work continually as it is created help improve it	• Know a blanket stitch joins fabric • Know that the space between the stitches are even and regular • Know how to thread needles independently • Know different decorative stitches

Years 5/6

Textiles

Combining different fabric shapes

Instant CPD

Tips for teachers

- ✓ Choose fabrics carefully. Shiny, heavyweight or fabrics that fray easily are often difficult to work with and can be frustrating. Have fabric cut into manageable sizes.
- ✓ Investigate using materials other than fabrics e.g. for handles. Plastic bags can be cut into strips and plaited.
- ✓ To make the activity more manageable limit the choice of decorating techniques.
- ✓ Keep scissors for fabric only.
- ✓ Make sure that you have plenty of pins and needles for children to use.
- ✓ Arrange zones in the class where children will find materials and resources.
- ✓ Ensure children have a basic understanding of stitching techniques, threading needles, starting and finishing off.
- ✓ Make mock-ups, then alter and refine and go back to initial design ideas to amend as necessary e.g. change measurements. Ensure the children keep all their modifications as part of the ongoing evaluation and for their final evaluation.
- ✓ Enlist the help of a local textile designer if available.
- ✓ Children can make their own demonstration videos to show e.g. how to join in different ways or how to complete a range of stitches. Different groups could show how to do different tasks and then share them.
- ✓ If using sewing machines, either hand or electric, make sure that their use is very closely supervised, using, for example, trained adult volunteers. If this cannot be achieved, children can tack the fabric together and an adult can use the machine.

Useful resources at www.data.org.uk

- Designing with textiles
- Designer bags
- A to Z of D&T
- Working with Materials
- Recycling to sell
- Butterflies in My Tummy

Teaching aids – fasteners

Children may want to use a fastener which should be appropriate for the purpose for the product.

Zip

Velcro

Clasp

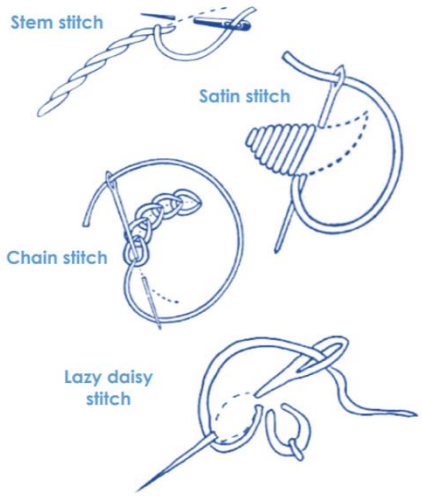
Toggles

Ties

Buttons

Press studs

Stitches



Using stitches as a finish for the product.

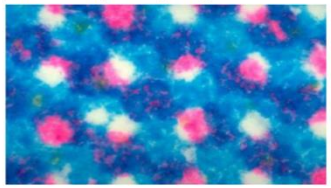
The children could design their finish for their product using a variety of appropriate stitches. They could draw enlarged examples of e.g. insects, flowers, animals and then decide which stitch would be best for each part. Use square paper for a grid to ensure the stitches are in the right place and are the right size.

Appliqué

Embroidery

Tie Dye

Children could decorate their fabric before they make up their product by tie dyeing.



The key to success is to tie the fabric very tightly with e.g. rubber bands or string so that the dye is prevented from reaching that part of the fabric.

Designing, making and evaluating a belt for garden tools

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:

THOUGHT	ACTION
What are the features of a successful product? What features do I need to include in a functional, innovative and authentic product?	Researching, investigating, disassembling and evaluating existing products and consulting 'real life' designers.
What knowledge and skills do I need to be able to design and make a good quality product?	Investigating and practising using a range of methods to join fabrics together and making judgments about the strength and appropriateness of each technique. Practising finishing techniques and, if possible, learning to use a sewing machine.
How do I make a paper pattern for the product I want to produce?	Creating a 2-D paper pattern with a seam allowance.
What design decisions do I need to make? How can I communicate my ideas for my product in an effective way?	Developing ideas through research, working drawings, computer-aided design, discussion, paper mock-ups and modelling.
How will I show innovation? Who will be the user of my product and what are their needs, wants and values? What will be the purpose of my product?	Thinking about the user and purpose and developing specifications for products. Formulating a clear plan of work and allocating tasks if appropriate.
More thoughts... appraising, reflecting, refining.	Constantly self-evaluating and making changes if the product is not fulfilling the specification.
Does my product meet the needs and wants of the user? Is it appealing and does it fulfill a purpose? Is it innovative?	Testing final products with the intended user and making an evaluation of how successful they are.

Glossary

- **Mock up** – quick 3-D modelling using easy to work and cheaper materials and temporary joints. Useful for checking proportions and scale.
- **Pattern or template** – a shape drawn to exact shape and size, used to assist in cutting out.
- **Seam allowance** – extra fabric allowed for joining together - 15mm for domestic patterns.
- **Specification** – describes what a product has to do.
- **Tacking** – large running stitches to hold pieces of fabric together temporarily.
- **Working drawing** – detailed drawing contains all information needed to make a product but is updated as changes are made.

Year 6 - Unit 1 – Pulleys and gears - Mechanics

Sequence of Lessons

Lesson 1 - Investigate, analyse and evaluate existing everyday products and existing or pre-made toys that incorporate gear or pulley systems. Use observational drawings and questions to develop understanding of each product in the collection

Lesson 2 - Investigate combinations of two different sized pulleys to learn about direction and speed of rotation e.g. How many times does the smaller pulley turn each time the larger pulley turns once? Do the pulleys move in the same direction? How can you reverse the direction of rotation?

Using a construction kit, explore combinations of two different size gears meshed together. Investigate the direction and speed of rotation focusing on how the size of the driver gear affects the speed of the follower gear. Ask the children to use the number of teeth on each gear to decide upon the gear ratios e.g. 10 tooth driver gear meshed with a 20 tooth follower gear produces a ratio of 2:1

Lesson 3 - Build a working circuit that incorporates a battery, a motor and a handmade switch, such as a reversing switch. Demonstrate the accurate use of tools and equipment including cutting and stripping wire, and making secure electrical connections. Remind children about the dangers of mains electricity. Draw a pictorial representation of the circuit or draw a circuit diagram using correct symbols.

Lesson 4 - Practical woodwork session. Demonstrate the accurate use of tools and equipment. Develop skills and techniques using junior hacksaws, G-clamps, bench hooks, square section wood, card triangles and hand drills to construct wooden frames, as appropriate.

Lesson 5 – Planning session - Discuss the brief of designing and making a small-scale vehicle suitable for surveying the ocean floor. Generate ideas and drawings from previous weeks experience. Children should then produce a detailed, step-by-step plan, listing tools and materials

Lesson 6 Create final product and evaluate it.

Prior Learning

- Basic understanding of electrical circuits, simple switches and components.
- Experience of cutting and joining techniques with a range of materials including card, plastic and wood. An understanding of how to strengthen and stiffen structures.

Vocabulary

Mechanism -a device used to create movement in a product.
Lever -a rigid bar which moves around a pivot. Levers are used in many everyday products.
Linkage the card strips joining one or more levers to produce the type of movement required. The term 'linkage' is also used to describe the lever and linkage mechanism
Slot - the hole through which a lever is placed to enable part of a picture to move.
Guide or bridge - a short card strip used to keep lever and linkage mechanisms in place and control movement.
Loose pivot -a paper fastener that joins card strips together.
Fixed pivot -a paper fastener that joins card strips to the backing card.
System – a set of related parts or components used to create an outcome. Systems have an input, process and an output. In a lever and linkage mechanism, the 'input movement' is where the user pushes or pulls a card strip. The 'output movement' is where one or more parts of the picture move.

Knowledge

Design

- Knows how to design a stable structure that is able to support weight
- Knows how to design a frame structure with focus on triangulation
- Knows how to design a variety of different structures, considering how the structures will be used

Make

- Know how to use triangles to create truss bridges that span a given distance and supports a load
- Know how to independently measure and mark accurately
- Know how to select appropriate tools and equipment for particular tasks
- Know the correct techniques to saw safely
- Know where a structure needs reinforcement

Evaluate

- Know how to adapt and improve own structures by identifying points of weakness and reinforcing them as necessary
- Know how to suggest points for improvements for own structures and those designed by others
- Know how to improve a design plan based on peer evaluation
- Know how to test and adapt a design can improve it

Technical Knowledge

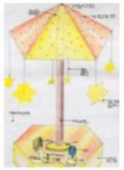
- Know what makes a stronger and weaker structure
- Know different ways to reinforce structures
- Know how triangles can be used to reinforce bridges
- Know that structures can be strengthened by manipulating materials and shapes
- Know the difference between man made and natural structures

Years 5/6

Mechanical systems Pulleys or Gears

Instant CPD





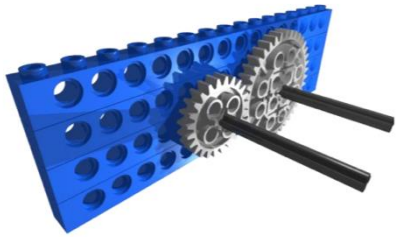
Tips for teachers

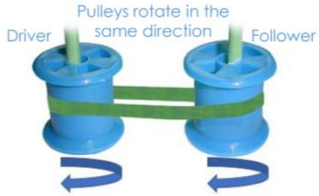
- ✓ Sourcing existing products with gears or pulleys can sometimes be difficult. Example products using construction kits or consumable materials can be premade for children to investigate.
- ✓ When beginning designing and making, ensure children are focused on making the mechanical system work, rather than the decoration.
- ✓ Focused tasks should concentrate on exploring combinations gears or pulleys using construction kits. If you do not have construction kits, attach bought pulleys and gears to cardboard using paper fasteners.
- ✓ Gears require more accuracy than pulleys at the making stage but make it easier for children to understand the concept of ratio by counting the number of teeth on each gear.
- ✓ The key to success in these units is to use components that are compatible with each other e.g. components purchased should have the same diameter holes.
- ✓ When children are making, zone areas of the classroom so resources can be easily found and replaced independently.
- ✓ Investigate alternative methods of evaluating. Try making video or photographic diaries that help develop ongoing evaluation.
- ✓ Don't be afraid of incorporating any failed designs into display of final products. Include evaluations of why designs didn't work and how children would make them work. This links to design in the real world and the concept that designs don't always work first time around.
- ✓ Do not use rechargeable, lithium or alkaline batteries as these can overheat if short circuited.

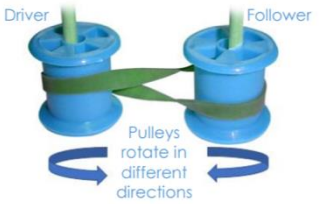
Useful resources at www.data.org.uk

- Levers and Linkages
- Developing Handmade Switches
- Handmade Switches Helpsheet
- Gears and Pulleys
- Fairgrounds

Developing understanding of gears and pulleys

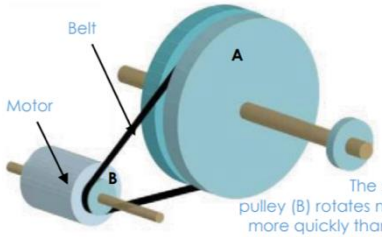






Using construction kits, ask children to explore gear ratio using combinations of two gears e.g.

No. teeth	Ratio
8, 16	2:1
8, 40	5:1
8, 24	3:1
40, 40	1:1

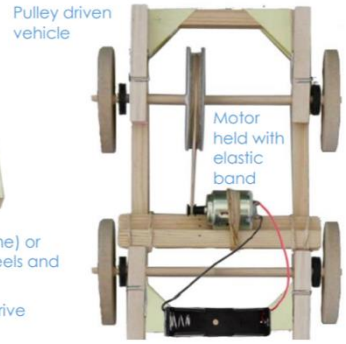


The small pulley (B) rotates much more quickly than the large pulley (A)

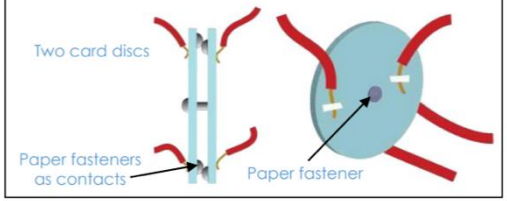
Building gears or pulleys into children's products

Construct a chassis using wooden strips (frame) or corrugated plastic. Add a pulley and/or wheels and an electric motor with battery housing.

The chassis can be used for a vehicle or to drive machines such as fairground rides.



An example of a handmade reversing switch



Designing, making and evaluating a new toy vehicle for children in a particular age range

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:

THOUGHT	ACTION
What type of toy vehicle shall I make? What will be its purpose? Who will use it?	Discussing ideas, drawing annotated sketches or exploded diagrams. Generating a simple design specification.
What electrical and mechanical components shall I use?	Discussing, modelling and evaluating different systems using mechanical and electrical components.
Which materials will I use to make it? How will I make fit for purpose?	Investigating and trialling possible materials and components.
How will I make the body shell for my toy vehicle?	Discussing, exploring and evaluating prototypes.
What tools and materials will I need? What order will I work in? What constraints am I working to?	Negotiating, developing and agreeing a step-by-step-plan.
Do I need to change anything?	Discussing, testing and modifying the design.
Will my product meet the needs, wants and interests of the user group?	Evaluating the product with the intended user group and against the original design specification.

Glossary

- **Pulley** – a grooved wheel over which a drive belt can run.
- **Gear** – a wheel with teeth around its circumference.
- **Drive belt** – the belt which connects and transfers movement between two pulleys.
- **Gearing up or down** – changing the rotational speed of a product by the use of pulleys or gears. When a small pulley or gear is used to drive a larger one the rotational speed is reduced and the product has been geared down.
- **Mechanical system** – a set of related parts or components used to create movement.
- **Driver** – the gear or pulley that provides the input movement to the system.
- **Follower** – the gear or pulley that provides the output movement to the system.
- **Mesh** – the point where two gears join together and transfer movement.
- **Motor spindle** – the rod on the end of the motor onto which a gear or pulley is attached.

Year 6 - Unit 2 - Celebrating culture and seasonality – Food and Nutrition		
Sequence of Lessons	**Prior Learning**	**Vocabulary**
Lesson 1 –Investigate, identify, and describe safe practices when handling, preparing, cooking and storing food. Healthy eating – link to eatwell plate. **Lesson 2 – Investigate, research, and evaluate existing products.** Discuss importance of seasonality and evaluate a range of products/ingredients. **Lesson 3 – Create a design criterion.** Use key vocabulary and sketches to communicate ideas. Use research skills to develop brief and help make decisions to develop final product. **Lesson 4 – Practical session** - follow a recipe. Children to follow a step-by-step guide showing they can apply skills safely to make and decorate food product. **Lesson 5 – Planning session** - Discuss the brief of designing and making a traditional recipe/menu **Lesson 6 - Share their final design with each other. Evaluate their purse against the design criteria.**	• Have knowledge and understanding about food hygiene, nutrition, healthy eating and a varied diet. • Be able to use appropriate equipment and utensils, and apply a range of techniques for measuring out, preparing and combining ingredients.	**Finishing -** related to the appearance of the product – shape, decoration and colour. **Rubbing in** - rubbing the dry ingredients together with the fat, lifting to put air into the mixture, so that it resembles fine breadcrumbs. **Knead –** pulling and squeezing dough to make it smooth. **Bran -** the hard, protective shell of a grain of wheat. **Dough –** a mixture of flour, yeast and water before it is cooked. **Endosperm** - the store of food inside a seed. **Germ –** part of the seed where the root and shoots grow from. **Yeast –** a tiny plant which makes bubbles of carbon dioxide when mixed with flour and warm water. **Unleavened bread -** flatbread where yeast has not been added.

Objectives and knowledge			
Design	**Make**	**Evaluate**	**Technical Knowledge**
• Knows how to adapt a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute, or add additional ingredients • Knows how to write an amended method for a recipe to incorporate the relevant changes to ingredients • Knows how to design appealing packaging to reflect a recipe • Knows how to write a recipe, explaining the key steps, method and ingredients	• Know how to use equipment safely, including knives, hot pans and hobs • Knowing how to avoid cross contamination • Know how to follow a step-by-step method carefully to make a recipe • Know how to follow a recipe, including using the correct quantities of each ingredient • Know how to adapt a recipe based on research • Know how to work safely and hygienically with independence	• Know how to Identify the nutritional differences between different products and recipes • Know how to describe healthy benefits of food groups • Know how to evaluate a recipe, considering: taste, smell, texture and food group • Know how to taste test and score final products • Know how to suggest points of improvements in productions • Know how to evaluate health and safety in production to minimise cross contamination	• Know where food comes from – e.g. learning that beef is from cattle and how beef is reared and processed • Know what constitutes a balanced diet • Know how to adapt a recipe to make it healthier • Know the relevant ingredients and equipment needed for a recipe • Know the combinations of food that will complement one another

Years 5/6

Food

Celebrating culture and seasonality

Instant CPD

Tips for teachers

- ✓ When rubbing in flour and fat, keep ingredients and hands cool.
- ✓ The purpose of kneading bread is to strengthen the gluten (the protein in grain such as wheat). It normally takes about 10-12 minutes by hand. When ready the dough will be smooth, elastic and hold its shape.
- ✓ When developing a product e.g. soup, that requires chopping and slicing of ingredients refer to the Y3/4 Food Project Planner.
- ✓ Limit the number of ingredients added to the basic recipe and discuss when is the best time to add the new or changed ingredient(s).
- ✓ Emphasise the importance of accurate weighing and measuring.
- ✓ Some supermarkets and bakeries will allow children to visit. This could be linked to an enterprise project with a class-based food company.
- ✓ Children could design packaging for their food products as part of work on structures linked to mathematics.
- ✓ Carry out a survey to find out which cultural/seasonal food products are preferred by family and friends.
- ✓ For homework, encourage children to grow edible plants such as herbs.

Useful resources at www.data.org.uk

- Christmas Ginger Biscuits
- Willy Wonka's Fair Trade Cookies
- Making Bread using the Six Essentials
- Are you Teaching Food in Primary D&T?
- A to Z of D&T
- Make it Safe!

Other useful web-based resources:

- www.foodafactoflife.org.uk

Possible products

Biscuits

Savoury scones

Savoury muffins

Possible techniques that children could use

Mixing to combine ingredients if making savoury muffins or scones

Rubbing in to mix fat and flour if making a yeast-based product

Kneading a bread dough

Sensory evaluation

When carrying out sensory evaluations of products and/or separate ingredients, begin with a whole class activity then use group work to develop ideas.

Example of a recording table:

Type of cultural/seasonal food product	Appearance	Smell	Texture	Taste
Savoury scone	Golden/rough	Fresh/baked	Crumbly	Cheesy

Children can also use simple ranking and rating tables as well as star diagrams.
Use packaging and/or the internet to find out about the nutritional content of the food products and the ingredients. Link this to the principles of a healthy and varied diet.
Edible plants grown in the school grounds can also be evaluated and considered as potential ingredients for products the children will later design, make and evaluate. The benefits/difficulties of selecting seasonal, organic and/or locally sourced ingredients can be discussed here.

Designing, making and evaluating a yeast-based snack for parents and children participating in the school sports day

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process *might* be experienced by an individual pupil during this project:

THOUGHT	ACTION
Who am I making the snack for? What is it for?	
How can I make it appealing for the range of users?	Discussing ideas, researching existing products, drawing annotated sketches, generating a simple design specification.
What kind of snack shall I make?	
What ingredients could it contain?	
How could it be innovative?	
Where will the snack be served/eaten?	Discussing ideas and how the type of snack and way it is eaten will affect the design.
What techniques will I use and what equipment do I need?	Listing the ingredients and equipment required.
What order will I work in? How long will it take?	Planning the order of the activity and timescale.
More thoughts... appraising, reflecting and refining.	Preparing, cooking and finishing Make changes throughout as appropriate.
Has the snack met the needs of the user and achieved its purpose?	Evaluating the snack against the original design specification.

Glossary

- **Finishing** – related to the appearance of the product – shape, decoration and colour.
- **Rubbing in** – rubbing the dry ingredients together with the fat, lifting to put air into the mixture, so that it resembles fine breadcrumbs.
- **Knead** – pulling and squeezing dough to make it smooth.
- **Bran** – the hard, protective shell of a grain of wheat.
- **Dough** – a mixture of flour, yeast and water before it is cooked.
- **Endosperm** – the store of food inside a seed.
- **Germ** – part of the seed where the root and shoots grow from.
- **Yeast** – a tiny plant which makes bubbles of carbon dioxide when mixed with flour and warm water.
- **Unleavened bread** – flat bread where yeast has not been added.

Progression:

Year 1 & 2				
Area	Designing	Making	Evaluating	Technical Knowledge
Food	• Know which healthy food combinations which work well together	• Identifying if a food is a fruit or a vegetable • Know where and how some fruits and vegetables grow • Know how to peel, chop and slice fruit and vegetables safely using the bridge or claw grip	• Know how to describe appearance, smell and taste of some fruits and vegetables • Know what information might be included on packaging for a smoothie • Know the taste of common fruits and vegetables • Know which grip was most effective when peeling, chopping and slicing	• Know the difference between fruits and vegetables • Know how to describe and group fruits and vegetables by texture and taste • Know what makes a balanced diet • Know where to find the nutritional information on packaging • Know the five food groups
Mechanisms & Mechanical Structures	• Knows how to adapt mechanisms, using guides to control the movement • Knows how to design a moving story book for a given audience • Knows how to design a vehicle that includes wheels, axles and axle holders, which will allow the wheels to move • Knows how to create clearly labelled drawings which illustrate movement • Knows how to create design criteria for a project/task • Knows how to select appropriate materials based on their properties	• Know how to follow a design to create a moving model using leavers and sliders • Know how to simply adapt mechanisms • Know how to use linkages using card for levers and split pins for pivots • Know how to follow a design plan • Know how to select materials according to their characteristics	• Know how to test a finished product seeing if it moves as planned • Know how to explain how to fix a product that is not working • Know how to review the success of a product • Know how to test mechanisms • Know how to give and receive per feedback and act on it adapting product	• Know that levers and sliders are mechanisms and can make things move • Know the vocabulary up, down, left, right, vertical and horizontal to describe movement • Know what mechanisms makes a toy move forward • Know that a wheel needs an axel to move • Know a mechanism is a collection of moving parts that work together and have input and output • Know a lever turns on a pivot • Know a linkage is a system of levers that are connected by pivots
Structures	• Knows the importance of clear design criteria • Knows how to include individual preferences and requirements in a design • Knows how to show ideas using sketching and modelling • Knows about different structures found in the natural and manmade world	• Knows how to make stable structures from card, tape and glue • Knows how to follow instructions to cut and assemble the supporting structure of a piece of playground equipment • Knows how to make a structure according to design criteria • Knows how to create joints and structures from paper/card and tape	• Know how to evaluate a design according to the design criteria, testing whether the structure is strong and stable and altering it if it isn't • Know how to suggest points for improvements • Know the features of structures • Know how to compare the stability of different shapes • Know how to test the strength of structures • Know how to identify the weakest part of a structure • Know how to evaluate the strength, stiffness and stability of own structure	• Know how to describe the purpose of structures • Know that the shape of materials can be changed to improve the strength and stiffness of structures • Know that that axles are used in structures and mechanisms to make parts turn in a circle • Know that shapes and structures with wide, flat bases or legs are the most stable • Know that the shape of a structure affects its strength • Know the vocabulary: strength, stiffness and stability • Know that materials can be manipulated to improve strength and stiffness

Textiles	• Knows how to use a template to design a bag • Knows how to design a simple pouch	• Knows how to cut fabric neatly with scissors • Knows joining methods to decorate a bag • Knows how to decorate a pouch using fabric glue or running stitch	• Know how to reflect on a finished product, explaining likes and dislikes • Know how to evaluate the quality of the stitching on others' work • Know how to identify aspects of their peers' work that they particularly like and explain why	• Know different ways in which to join fabrics together: pinning, stapling, gluing • Know benefits of techniques • Know how to thread a needle • Know running stitch, is evenly spaced, neat, even stitches to join fabric

Years 3 & 4				
Area	Designing	Making	Evaluating	Technical Knowledge
Food	• Knows how to design a biscuit within a given budget, drawing upon previous taste testing and considering the taste, texture, smell and appearance	• Know how to prepare themselves and a workspace to cook safely in • Know the basic rules to avoid food contamination • Knowhow to follow the instructions within a recipe • Know how to follow basic hygiene rules • Know simple ways to adapt a recipe	• Know simple design criteria to help test and review • Know how to evaluate a recipe, considering: taste, smell, texture and appearance • Know the impact of the budget on the selection of ingredients	• Know how to work with cooking equipment safely and hygienically • Know how to use, store and clean a knife safely • Know the impact of the cost and importance of budgeting while planning ingredients for biscuits
Mechanisms & Mechanical Structures	• Know how to design a toy which uses a pneumatic system • Know how to develop design criteria from a design brief • Knows how to generate ideas using sketches and diagrams • Know that different types of drawings are used in design to explain ideas clearly • Know how to design a shape that reduces air resistance •	• Know how to use a pneumatic system to create a desired motion • Know how to build secure housing for a pneumatic system • Know how to use syringes and balloons to create different types of pneumatic systems to make a functional and appealing pneumatic toy • Know how to select materials due to their functional and aesthetic characteristics • Know how to manipulate materials to create different effects by cutting, creasing, folding, weaving • Know how to measure, marking, cutting and assembling with increasing accuracy	• Know how to use the views of others to improve designs • Know how to use testing to modify the outcome, suggesting improvements • Know how to evaluate the speed of a final product based on: the effect of shape on speed and the accuracy of workmanship on performance	• Know how pneumatic systems work • Know that mechanisms are a system of parts that work together to create motion • Know that pneumatic systems can be used as part of a mechanism • Know that pneumatic systems force air over a distance to create movement • Know that products change and evolve over time • Know that all moving things have kinetic energy • Know that kinetic energy is the energy that something (object person) has by being in motion
Structures	• Knows how to design suitable packaging for products with key features to appeal to a specific person/ purpose	• Know how to construct a range of 3D geometric shapes using nets • Know there are special features for individual designs	• Know how to evaluate own work and the work of others based on the aesthetic of the finished product and in comparison to the original design	• Know suitable materials to be selected and used for food packaging considering weight, compression, tension

	• Knows how to draw and label a design using 2D shapes • Knows the 3D shapes that will create the features • Knows how to design a frame structure designed to support weight	• Know how to create a range of different shaped frame structures • Know how to make a variety of free-standing frame structures of different shapes • Know how to select appropriate materials to build a strong structure and for the cladding • Know how to reinforce corners to strengthen a structure • Know how to create a design in accordance with a plan	• Know how to suggest points for modification of the individual designs • Know how to evaluate structures made by the class • Know what characteristics of a design and construction make it the most effective • Know how to identify effective and ineffective designs	• Know wide and flat based objects are more stable • Know the terminology of strut, tie, span, beam • Know the difference between frame and shell structure • Know how to identify effective and ineffective designs
Textiles	• Knows how to design and make a template from an existing cushion and applying individual design criteria • Knows how to write design criteria for a product, articulating decisions made	• Know how to follow design criteria • Know how to select and cut fabrics using fabric scissors • Know hot to cross stitch to join fabric • Know how to make and test a paper template • Know how to measure, mark, and cut fabric • Know stitch styles to join fabric, working neatly sewing small, neat stitches • Know how to incorporate fastening to a design	• Know how to evaluate an end product and think of other ways in which to create similar items • Know how to test and evaluate an end product against the original design criteria • Know how many of the criteria should be met for the product to be considered successful • Know how to suggest modifications for improvement	• Know how to thread needles with greater independence • Know how to tie knots with greater independence • Know how to cross stitch and appliqué • Know the need to count the thread on a piece of even weave fabric in each direction to create uniform size and appearance • Know that fabrics can be layered for affect • Know that there are different types of fastenings and what they are and the benefits and disadvantages of different fastening types
Electrical Systems	• Knows how to design a torch, considering the target audience and creating both design and success criteria focusing on features of individual design ideas	• Know how to make a torch with a working electrical circuit and switch • Know how to use appropriate equipment to cut and attach materials • Know how to assemble a torch according to the design and success criteria	• Know how to give constructive criticism on own work and the work of others • Know how to test the success of a product against the original design criteria and justifying opinions help improve	• Know how simple electrical items work • Know what electrical conductors and insulators are • Know that a battery contains stored electricity and can be used to power products • Know the features of a torch • Know how a torch works • Know the positives and negatives about different torches

Monksmoor Park Design & Technology Curriculum

Years 5 & 6				
Area	Designing	Making	Evaluating	Technical Knowledge
Food	• Knows how to adapt a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute, or add additional ingredients • Knows how to write an amended method for a recipe to incorporate the relevant changes to ingredients • Knows how to design appealing packaging to reflect a recipe • Knows how to write a recipe, explaining the key steps, method and ingredients	• Know how to use equipment safely, including knives, hot pans and hobs • Knowing how to avoid cross contamination • Know how to follow a step-by-step method carefully to make a recipe • Know how to follow a recipe, including using the correct quantities of each ingredient • Know how to adapt a recipe based on research • Know how to work safely and hygienically with independence	• Know how to Identify the nutritional differences between different products and recipes • Know how to describe healthy benefits of food groups • Know how to evaluate a recipe, considering: taste, smell, texture and food group • Know how to taste test and score final products • Know how to suggest points of improvements in productions • Know how to evaluate health and safety in production to minimise cross contamination	• Know where food comes from – e.g. learning that beef is from cattle and how beef is reared and processed • Know what constitutes a balanced diet • Know how to adapt a recipe to make it healthier • Know the relevant ingredients and equipment needed for a recipe • Know the combinations of food that will complement one another
Mechanisms & Mechanical Structures	• Knows how to design a pop-up book which uses a mixture of structures and mechanisms • Knows the name of each mechanism, input and output accurately • Knows how to Storyboard ideas for a book • Knows how to experiment with a range of cams, creating a design for an automata toy based on a choice of cam to create a desired movement • Understand how linkages change the direction of a force • Know how to Make things move at the same time	• Know how to follow a design brief to make an automated toy • Know how to make/use mechanisms and/ or structures using sliders, pivots and folds to produce movement • Know how to use layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result • Know how to measure, mark and check the accuracy • Know how to cut components accurately using a ruler and scissors • Know how to assemble components accurately to make a stable frame • Know that for a frame to function effectively the components must be cut accurately and the joints of the frame secured at right angles • Know how to select appropriate materials based on the materials being joined and the speed at which the glue needs to dry/set	• Know how to evaluate the work of others and receive feedback on own work • Know how to act on points of improvements • Know how to describe changes they would make/ do if they were to do the project again	• Know that an input is the motion used to start a mechanism • Know that output is the motion that happens as a result of starting the input • Know that mechanisms control movement • Know mechanisms that can be used to change one kind of motion into another • Know that different shaped cams produce different follower movements
Structures	• Knows how to design a stable structure that is able to support weight • Knows how to design a frame structure with focus on triangulation • Knows how to design a playground featuring a variety of different structures, considering how the structures will be used	• Know how to use triangles to create truss bridges that span a given distance and supports a load • Know how to independently measure and mark accurately • Know how to select appropriate tools and equipment for particular tasks	• Know how to adapt and improve own structures by identifying points of weakness and reinforcing them as necessary • Know how to suggest points for improvements for own structures and those designed by others	• Know what makes a stronger and weaker structure • Know different ways to reinforce structures • Know how triangles can be used to reinforce bridges

		• Know the correct techniques to saw safely • Know where a structure needs reinforcement	• Know how to improve a design plan based on peer evaluation • Know how to test and adapt a design can improve it	• Know that structures can be strengthened by manipulating materials and shapes • Know the difference between man made and natural structures
Textiles	• Knows to consider proportions of individual components • Knows how to design a waistcoat in accordance to specification linked to set of design criteria • Knows how to annotate designs	• Know how to measure, mark and cut fabric accurately and independently • Know how to create strong and secure blanket stitches when joining fabric • Know how to use template pinning panels onto fabric • Know how to use strong running stitch, making small, neat stitches and following the edge • Know how to tie strong knots • Know how to attach objects using thread and adding a secure fastening	• Know how to test and evaluate an end product and give a point for further improvements • Know how to evaluate work continually as it is created help improve it	• Know a blanket stitch joins fabric • Know that the space between the stitches are even and regular • Know how to thread needles independently • Know different decorative stitches
Electrical Systems	• Knows how to design a steady hand game with a simple electrical circuit identifying and naming the components required • Knows how to draw a design from three different perspectives	• Know how to make a working circuit • Know how to construct a stable base for an electromagnetic game • Know how to decorate the base of the game to a high-quality finish • Know how to test a circuit	• Know how to evaluate a completed product against the original design sheet and look at modifications that could be made to improve the reliability or aesthetics of it or to incorporate another type of electronic device, eg: buzzer • Know how to test own and others finished games, identifying what went well and make suggestions for improvement	• Know the key components used to create a functioning circuit • Know that breaks in a circuit will stop it from working • Know that batteries contain acid, which can be dangerous if they leak