

Design and Technology at Furzefield Primary School



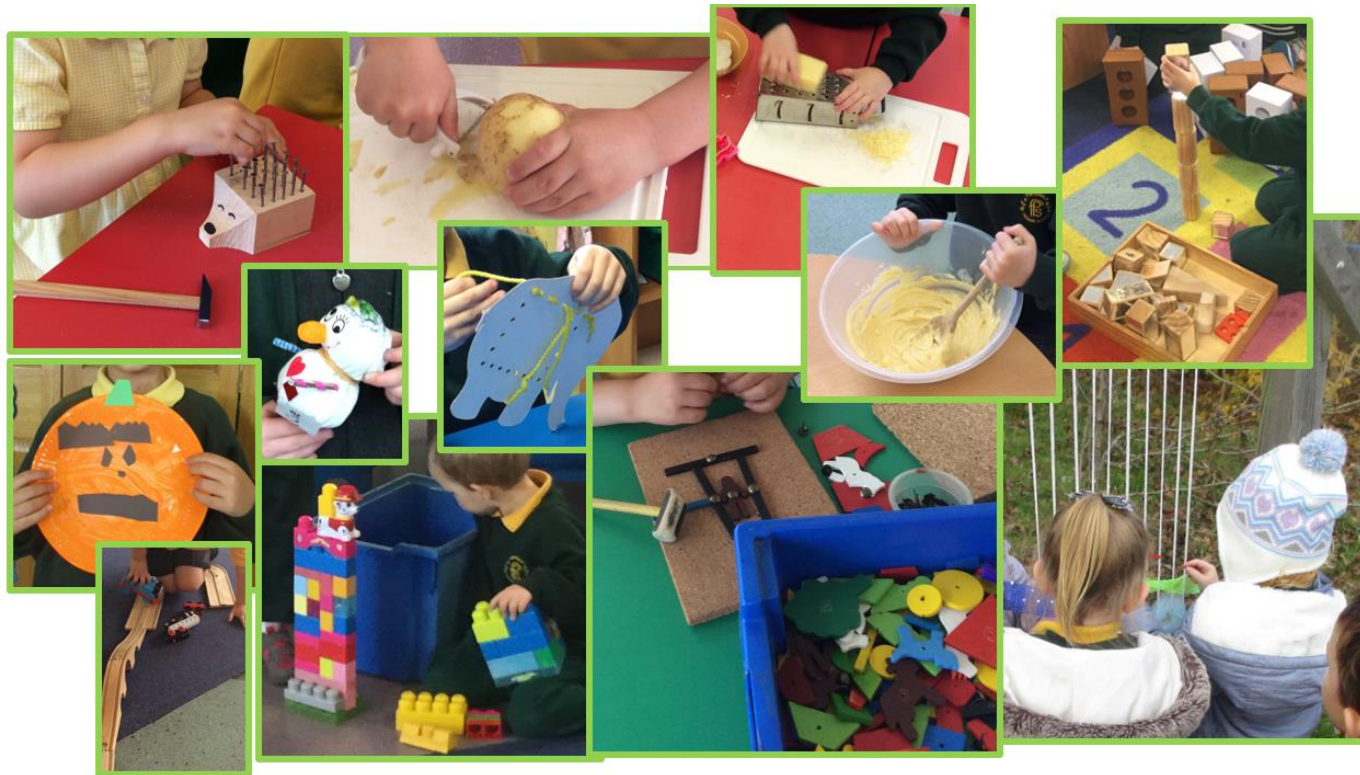
At Furzefield, we develop skills and knowledge in design and technology (D&T), including cooking and textiles, through taking opportunities to design, make and evaluate across other curriculum areas. Each summer term, we have an 'enterprise' week' in which each class has a small budget with which to create items that are sold at the 'maths market'.

In addition to this, each year group completes two 'projects on a Page' from the Design and Technology association.

The following pages set out our Design and Technology curriculum by year group.

# EYFS

In our Nursery and reception classes, children develop curiosity, relevant vocabulary, knowledge and skills through a mixture of adult led activities and continuous provision. Children have access to a wide variety of construction toys both large and small scale and to resources for junk modelling and other 'making' in the 'art gallery'. Children regularly cook in the nursery and the reception class kitchen and around a campfire in our Forest School area.





## Year 1

### Examples of D&T taught in other subject areas

Geography: Cooking and eating food from class country. Making 3D models of where we live.  
Science: At Forest School, use fruits and vegetables grown on school site to create healthy recipes.  
English: Making houses for the 'Three Little Pigs'.

### Projects on a Page from the Design and Technology Association:

#### Focus Freestanding structures

##### 3. Key learning in design and technology

- Prior learning**
- 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.

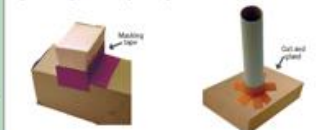
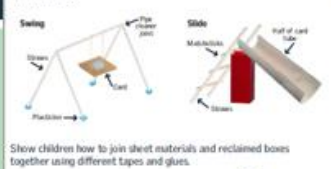
- Designing**
- Generate ideas based on simple design criteria and their own experiences, explaining what they could make.
  - Develop, model and communicate their ideas through talking, mock-ups and drawings.

- Making**
- Plan by suggesting what to do next.
  - Select and use tools, skills and techniques, explaining their choices.
  - Select new and reclaimed materials and construction kits to build their structures.
  - Use simple finishing techniques suitable for the structure they are creating.

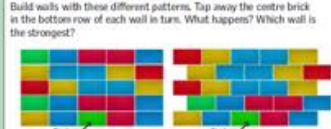
- Evaluating**
- Explore a range of existing freestanding structures in the school and local environment e.g. everyday products and buildings.
  - Evaluate their product by discussing how well it works in relation to the purpose, the user and whether it meets the original design criteria.

- Technical knowledge and understanding**
- Know how to make freestanding structures stronger, stiffer and more stable.
  - Know and use technical vocabulary relevant to the project.

#### Techniques for assembling freestanding structures



#### Technical knowledge and understanding



#### 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. beam 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 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.

#### Focus Sliders and Levers

##### 3. Key learning in design and technology

- Prior learning**
- Early experiences of working with paper and card to make simple flaps and hinges.
  - Experience of simple cutting, shaping and joining skills using scissors, glue, paper fasteners and masking tape.

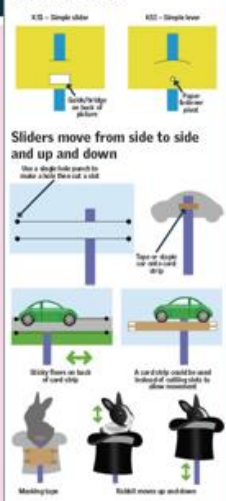
- Designing**
- Generate ideas based on simple design criteria and their own experiences, explaining what they could make.
  - Develop, model and communicate their ideas through drawings and mock-ups with card and paper.

- Making**
- Plan by suggesting what to do next.
  - Select and use tools, explaining their choices, to cut, shape and join paper and card.
  - Use simple finishing techniques suitable for the product they are creating.

- Evaluating**
- Explore a range of existing books and everyday products that use simple sliders and levers.
  - Evaluate their product by discussing how well it works in relation to the purpose and the user and whether it meets design criteria.

- Technical knowledge and understanding**
- Explore and use sliders and levers.
  - Understand that different mechanisms produce different types of movement.
  - Know and use technical vocabulary relevant to the project.

#### Teaching aids to demonstrate sliders and levers



#### 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.

THOUGHT	ACTION
Who is the storyboard for? How will we use it? What will make it successful?	Using talk to generate initial ideas, developing simple design criteria.
What will be in each scene? What could move? What captions will we use?	Developing and communicating ideas through talk.
Should we use a lever or a slider for each scene? How will I draw and finish the pictures?	Trying out and evaluating ideas for mechanisms and pictures using inexpensive card and paper.
Am I working on my own or with others? What is the first thing I/we need to do?	Creating moving pictures for each scene of the fairy tale.
How well am I doing? Are the mechanisms working in the storyboard?	Modifying, adapting and improving.
Evaluating, reflecting, questioning.	More actions...
More thoughts...	Evaluating the final product against design criteria, when retelling the fairy tale.

- 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

### Examples of D&T taught in other subject areas

Geography: Cooking and eating food from class country.

English: At Forest School, making dragons out of clay, edible 'dragon tails' using dough wrapped around a stick and cooked on a campfire.

Science: Making scarecrows to explore waterproof materials.

History: Junk modelling Tudor houses to recreate Pudding Lane and the Great Fire. Baking Tudor bread.

### Projects on a Page from the Design and Technology Association:

#### Focus Templates and joining

##### 3. Key learning in design and technology

###### Prior learning

- Explored and used different fabrics.
- Cut and joined fabrics with simple techniques.
- Thought about the user and purpose of products.

###### Designing

- Design a functional and appealing product for a chosen user and purpose based on simple design criteria.
- Generate, develop, model and communicate their ideas as appropriate through talking, drawing, templates, mock-ups and information and communication technology.

###### Making

- Select from and use a range of tools and equipment to perform practical tasks such as marking out, cutting, joining and finishing.
- Select from and use textiles according to their characteristics.

###### Evaluating

- Explore and evaluate a range of existing textile products relevant to the project being undertaken.
- Evaluate their ideas throughout and their final products against original design criteria.

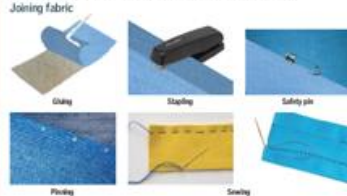
###### Technical knowledge and understanding

- Understand how simple 3-D textile products are made, using a template to create two identical shapes.
- Understand how to join fabrics using different techniques e.g. running stitch, glue, over stitch, stapling.
- Explore different finishing techniques e.g. using painting, fabric crayons, stitching sequins, buttons and ribbons.
- Know and use technical vocabulary relevant to the project.

#### Three alternative ways of using templates and simple pattern pieces



#### Exploring and evaluating joining techniques



#### Finishing techniques



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?	Exploring and evaluating media and materials.
How will I add the features?	Selecting from a range of tools, techniques and materials. Explaining choices.
What shall I do first? What tools and techniques will I use? What fabrics shall I use?	More actions... making, testing, modifying.
More thoughts... judging, planning, generating new ideas.	Evaluating the puppet with the intended user and against original design criteria.
Will the puppet meet the needs of the user and achieve its purpose?	

#### Glossary

- Puppet** - 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.
- Embellish** - 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.

#### Focus Wheels and axles

##### 3. Key learning in design and technology

###### Prior learning

- Assembled vehicles with moving wheels using construction kits.
- Explored moving vehicles through play.
- Gained some experience of designing, making and evaluating products for a specified user and purpose.
- Developed some cutting, joining and finishing skills with card.

###### Designing

- Generate initial ideas and simple design criteria through talking and using own experiences.
- Develop and communicate ideas through drawings and mock-ups.

###### Making

- Select from and use a range of tools and equipment to perform practical tasks such as cutting and joining to allow movement and finishing.
- Select from and use a range of materials and components such as paper, card, plastic and wood according to their characteristics.

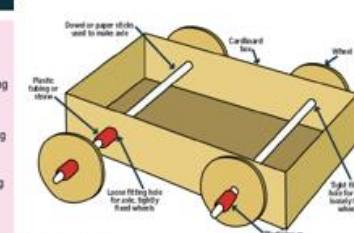
###### Evaluating

- Explore and evaluate a range of products with wheels and axles.
- Evaluate their ideas throughout and their products against original criteria.

###### Technical knowledge and understanding

- Explore and use wheels, axles and axle holders.
- Distinguish between fixed and freely moving axles.
- Know and use technical vocabulary relevant to the project.

#### Two different ways to fix wheels



#### Types of wheels



#### Ways to hold moving axles

Use **pairs of clothes pegs** glued with PVA to the underside of a box. Check the peg holes are large enough to allow axles to move freely.

Make sure they are aligned carefully so the vehicle moves in a straight line when the wheel and axle mechanism is added.

Use **card triangles** with holes for the axle. Check the holes are large enough to allow the axle to move freely.

Make sure opposite triangles are aligned carefully so the vehicle moves in a straight line when the wheel and axle mechanism is added.

Use **large paper/plastic straws** fixed with masking tape to the underside of a box.

Check straws are positioned carefully so the vehicle will move in a straight line when the wheel and axle mechanisms are added.

Make sure the straw hole is large enough to allow the axle to move freely. The wheels must be fixed tightly to the axle.

#### Designing, making and evaluating a small wheeled trolley that will carry tools to use in the school garden or for a character in a story

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 trolley for?	Talk about and explore a range of existing wheeled products.
How many wheels will it need? What type of wheels will be best?	Discuss and consider the best size and material from the wheels available. Talk about the surfaces the trolley might have to travel over.
What does it need to carry?	Discuss and list the things that need to be carried.
Should there be sections for different items? How big does each section need to be?	Use drawings and collect different sized and shaped boxes. Clarify and model ideas using the boxes.
Do we want to pull or push it? Which way moves best?	Try out existing trolleys and test out ideas including different types of handles.
How could it be appealing as well as functional?	Talk about and combine ideas to create designs.
What tools, resources and materials will we need?	Think about and collect resources. Select appropriate tools.
What will I do if something does not work as planned?	Reflect on and refine ideas and designs as the process develops.
How will I check the trolley is fit for the user and for its purpose as I make it?	Frequently test the movement and design of the trolley with and without contents.
What do I think about my final product.	Reflect and evaluate against the original design criteria.

#### Glossary

- Axle** - a rod on which one or more wheels can rotate, either freely or be fixed to and turn with the axle.
- Axle holder** - 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.



## Year 3

### Examples of D&T taught in other subject areas

History: Making models of Stonehenge using various materials. Making replica 'stone age' jewellery using malleable materials. At Forest School, try flint knapping to create simple scraping tools and arrow heads.

Geography: Making a 'rainforest in a box' showing the different levels of vegetation linked to geography.

Science: cooking healthy savoury recipes as part of staying healthy.

### Projects on a Page from the Design and Technology Association:

<p><b>Focus</b> <b>Levers and linkages</b></p> <p><b>3. Key learning in design and technology</b></p> <p><b>Prior learning</b></p> <ul style="list-style-type: none"> <li>Explored and used mechanisms such as flaps, sliders and levers.</li> <li>Gained experience of basic: cutting, joining and finishing techniques with paper and card.</li> </ul> <p><b>Designing</b></p> <ul style="list-style-type: none"> <li>Generate realistic ideas and their own design criteria through discussion, focusing on the needs of the user.</li> <li>Use annotated sketches and prototypes to develop, model and communicate ideas.</li> </ul> <p><b>Making</b></p> <ul style="list-style-type: none"> <li>Order the main stages of making.</li> <li>Select from and use appropriate tools with some accuracy to cut, shape and join paper and card.</li> <li>Select from and use finishing techniques suitable for the product they are creating.</li> </ul> <p><b>Evaluating</b></p> <ul style="list-style-type: none"> <li>Investigate and analyse books and, where available, other products with lever and linkage mechanisms.</li> <li>Evaluate their own products and ideas against criteria and user needs, as they design and make.</li> </ul> <p><b>Technical knowledge and understanding</b></p> <ul style="list-style-type: none"> <li>Understand and use lever and linkage mechanisms.</li> <li>Distinguish between fixed and loose pivots.</li> <li>Know and use technical vocabulary relevant to the project.</li> </ul>	<p><b>Teaching aids to demonstrate levers and linkages</b></p> <p>● Fixed pivot ○ Loose pivot</p>	<p>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 linkages.</p> <p><b>Making a pop-up from a small section of a recycled box:</b></p> <ol style="list-style-type: none"> <li>Cut a slice off a small box.</li> <li>Glue two sides to the paper.</li> <li>Stick a picture to pop up on the front.</li> </ol>	<p><b>Designing, making and evaluating a greetings card with moving parts for family or friends</b></p> <p>An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. 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In this project children will use card strips for levers and paper fasteners for pivots.</li> <li><b>Linkage</b> - 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 mechanisms in a whole.</li> <li><b>Slot</b> - the hole through which a lever is placed to enable part of a picture to move.</li> <li><b>Guide or bridge</b> - a short card strip used to keep lever and linkage mechanisms in place and control movement.</li> <li><b>Loose pivot</b> - a paper fastener that joins card strips together.</li> <li><b>Fixed pivot</b> - a paper fastener that joins card strips to the backing card.</li> <li><b>System</b> - 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 moves.</li> </ul>	THOUGHT	ACTION	What sort of greetings card shall I make and who will it be for?	Discussing ideas, drawing annotated sketches, generating design criteria.	What part will move? How will it appeal to the user?	Discussing ideas, modelling possible lever and linkage mechanisms.	How will it move? Which lever and linkage mechanism will work best for my greetings card?	Discussing and evaluating mock-ups and prototypes 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?	Negotiating, developing and agreeing a plan of action.	What order will I work in? What tools and techniques will I use?	More actions... building, testing, modifying.	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.	<p><b>Focus</b> <b>2D shape to 3D product</b></p> <p><b>3. Key learning in design and technology</b></p> <p><b>Prior learning</b></p> <ul style="list-style-type: none"> <li>Have joined fabric in simple ways by gluing and stitching.</li> <li>Have used simple patterns and templates for marking out.</li> <li>Have evaluated a range of textile products.</li> </ul> <p><b>Designing</b></p> <ul style="list-style-type: none"> <li>Generate realistic ideas through discussion and design criteria for an appealing, functional product fit for purpose and specific users.</li> <li>Produce annotated sketches, prototypes, final product sketches and pattern pieces.</li> </ul> <p><b>Making</b></p> <ul style="list-style-type: none"> <li>Plan the main stages of making.</li> <li>Select and use a range of appropriate tools with some accuracy e.g. cutting, joining and finishing.</li> <li>Select fabrics and fasteners according to their functional characteristics e.g. strength and aesthetic qualities e.g. pattern.</li> </ul> <p><b>Evaluating</b></p> <ul style="list-style-type: none"> <li>Evaluate a range of 3-D textile products relevant to the project.</li> <li>Test their product against the original design criteria and with the intended user.</li> <li>Take into account others' views.</li> <li>Understand how a key event/individual has influenced the development of the chosen product and/or fabric.</li> </ul> <p><b>Technical knowledge and understanding</b></p> <ul style="list-style-type: none"> <li>Know how to strengthen, stiffen and reinforce existing fabrics.</li> <li>Understand how to securely join two pieces of fabric together.</li> <li>Understand the need for patterns and seam allowances.</li> <li>Know and use technical vocabulary relevant to the project.</li> </ul>	<p><b>Teaching aids - joining techniques</b></p> <p>To move children's learning on, an enhancement activity, 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.</p> <p><b>Cutting out techniques</b></p> <p>Decorative Techniques</p> <p><b>Glossary</b></p> <ul style="list-style-type: none"> <li><b>Applique</b> - means 'applied' - describes method of stitching/design patches onto fabric (originally to mend holes in worn clothes) to provide decoration.</li> <li><b>Pattern/Template</b> - a shape drawn to exact shape and size and used to assist cutting out.</li> <li><b>Seams</b> - a line of stitching that joins pieces of fabric together.</li> <li><b>Seam Allowance</b> - extra fabric allowed for joining together - usually 1.5cm.</li> <li><b>Prototype</b> - a model that is made to test whether a design will work.</li> <li><b>Aesthetic</b> - the way in which the product looks with the nature and expression of beauty.</li> </ul>	<p><b>Designing, making and evaluating a holder/purse/wallet for a friend or relative</b></p> <p>An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. 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Evaluate these against the design criteria.</td> </tr> <tr> <td>How can I make my holder aesthetically pleasing for the user?</td> <td>Test out a range of decorative techniques and decide on the one/s which are appropriate.</td> </tr> <tr> <td>How long will it take to make? What tools will I need? What order should I do it in?</td> <td>Create the holder following the design.</td> </tr> <tr> <td>Reflection and refining. What isn't working very well? What could I improve on? Will my holder/purse/wallet fulfil its function? Is it suitable for the user?</td> <td>Make suitable adjustment during the making process. Develop the plan during the making. Test out the product. Make an evaluation with the user against the initial design criteria and design ideas.</td> </tr> </tbody> </table>	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.	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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? Will my holder/purse/wallet fulfil its function? Is it suitable for the user?	Make suitable adjustment during the making process. Develop the plan during the making. Test out the product. Make an evaluation with the user against the initial design criteria and design ideas.																																							

## Year 4

### Examples of D&T taught in other subject areas

**History:** At Forest School, exploring the various methods of farming of the ancient Maya by creating miniature systems of terraced and raised fields; making Maya style feather headdresses; making artists charcoal to recreate Maya style 'tattoos'

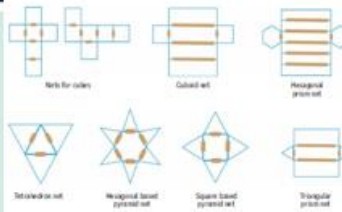
**Geography:** making 'working' models of volcanos.

**Science:** making models of human teeth using malleable materials.

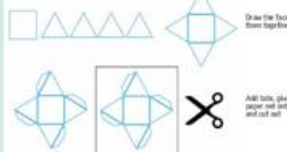
### Projects on a Page from the Design and Technology Association:

#### Focus Shell structures

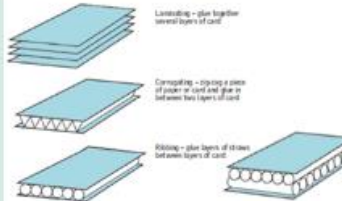
Assemble and evaluate 3-D shapes using standard sized card squares, rectangles, equilateral triangles, isosceles triangles and hexagons, joined with masking tape.



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



Stiffening and strengthening sheet materials:



#### 3. Key learning in design and technology

##### Prior learning

- Experience of using different joining, cutting and finishing techniques with paper and card.
- A basic understanding of 2D and 3D shapes in mathematics and the physical properties and everyday uses of materials in science.

##### Designing

- Generate realistic ideas and design criteria collaboratively through discussion, focusing on the needs of the user and purpose of the product.
- Develop ideas through the analysis of existing products and use annotated sketches and prototypes to model and communicate ideas.

##### Making

- Order the main stages of making.
- Select and use appropriate tools to measure, mark out, cut, score, shape and assemble with some accuracy.
- Explain their choice of materials according to functional properties and aesthetic qualities.
- Use finishing techniques suitable for the product they are creating.

##### Evaluating

- Investigate and evaluate a range of existing shell structures including the materials, components and techniques that have been used.
- Test and evaluate their own products against design criteria and the intended user and purpose.

##### Technical knowledge and understanding

- Develop and use knowledge of how to construct strong, stiff shell structures.
- Develop and use knowledge of nets of cubes and cuboids and, where appropriate, more complex 3D shapes.
- Know and use technical vocabulary relevant to the project.

#### 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:



#### Glossary

- **Cuboid** - a solid body with rectangular sides.
- **Edge** - where two surfaces meet at an angle.
- **Face** - a surface of a geometric shape.
- **Fold** - a printer's term meaning the shape of lettering being used.
- **Net** - the flat or spread-out shape of an object such as a box.
- **Pivots** - 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.

#### Focus Simple circuits and switches

##### 3. Key learning in design and technology

##### Prior learning

- Constructed a simple series electrical circuit in science, using bulbs, switches and buzzers.
- Cut and joined a variety of construction materials, such as wood, card, plastic, reclaimed materials and glue.

##### Designing

- Gather information about needs and wants, and develop design criteria to inform the design of products that are fit for purpose, aimed at particular individuals or groups.
- Generate, develop, model and communicate realistic ideas through discussion and, as appropriate, annotated sketches, cross-sectional and exploded diagrams.

##### Making

- Order the main stages of making.
- Select from and use tools and equipment to cut, shape, join and finish with some accuracy.
- Select from and use materials and components, including construction materials and electrical components according to their functional properties and aesthetic qualities.

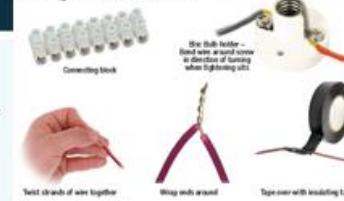
##### Evaluating

- Investigate and analyse a range of existing battery-powered products.
- Evaluate their ideas and products against their own design criteria and identify the strengths and areas for improvement in their work.

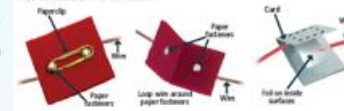
##### Technical knowledge and understanding

- Understand and use electrical systems in their products, such as series circuits incorporating switches, bulbs and buzzers.
- Apply their understanding of computing to program and control their products.
- Know and use technical vocabulary relevant to the project.

#### Making secure connections



#### Handmade switches



#### Commercial switches



#### Microcontrollers



#### Designing, making and evaluating a night light for a brother, sister or friend

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

- **Circuit** - path through which electricity passes.
- **Conductor** - a material which allows an electric current to pass through it.
- **Insulator** - a material which does not easily allow electric current to pass through it.
- **Prototype** - a model made to test whether a design will work.
- **Push-to-break switch** - a switch turned off by pressing it.
- **Push-to-make switch** - a switch turned on by pressing it.
- **Reed switch** - a switch operated by a magnet.
- **Toggle switch** - a switch operated when a lever is pressed.
- **System** - a set of related parts or components that together achieve a desired outcome.
- **Output devices** - components that produce an outcome e.g. bulbs and buzzers.
- **Input devices** - components that are used to control an electrical circuit e.g. switches.



## Year 5

### Examples of D&T taught in other subject areas

Geography: At Forest School, making 'bull roarers'. Making models of didgeridoos.

History: Recreating recipes from Victorian Britain.

English: Creating props for a production of MacBeth.

### Projects on a Page from the Design and Technology Association:

#### Focus Pulleys or Gears

##### 3. Key learning in design and technology

###### Prior learning

- Experience of axles, axle holders and wheels that are fixed or free moving.
- 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.

###### Designing

- Generate innovative ideas by carrying out research using surveys, interviews, questionnaires and web-based resources.
- Develop a simple design specification to guide their thinking.
- Develop and communicate ideas through discussion, annotated drawings, exploded drawings and drawings from different views.

###### Making

- Produce detailed lists of tools, equipment and materials. Formulate step-by-step plans and, if appropriate, allocate tasks within a team.
- Select from and use a range of tools and equipment to make products that are accurately assembled and well finished. Work within the constraints of time, resources and cost.

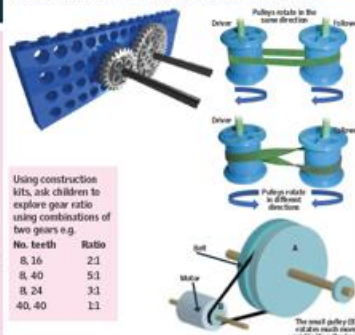
###### Evaluating

- Compare the final product to the original design specification.
- Test products with intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose.
- Consider the views of others to improve their work.
- Investigate famous manufacturing and engineering companies relevant to the project.

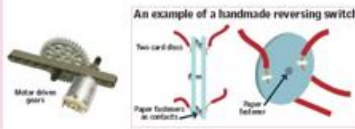
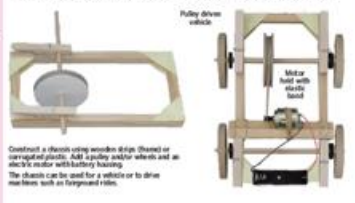
###### Technical knowledge and understanding

- Understand that mechanical and electrical systems have an input, process and an output.
- Understand how gears and pulleys can be used to speed up, slow down or change the direction of movement.
- Know and use technical vocabulary relevant to the project.

#### Developing understanding of gears and pulleys



#### Building gears or pulleys into children's products



#### 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:



#### 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.
- Followee** - 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 at the end of the motor onto which a gear or pulley is attached.

#### Focus Celebrating culture and seasonality

##### 3. Key learning in design and technology

###### Prior learning

- 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.

###### Designing

- Generate innovative ideas through research and discussion with peers and adults to develop a design brief and criteria for a design specification.
- Explore a range of initial ideas, and make design decisions to develop a final product linked to user and purpose.
- Use words, annotated sketches and information and communication technology as appropriate to develop and communicate ideas.

###### Making

- Write a step-by-step recipe, including a list of ingredients, equipment and utensils.
- Select and use appropriate utensils and equipment accurately to measure and combine appropriate ingredients.
- Make, decorate and present the food product appropriately for the intended user and purpose.

###### Evaluating

- Carry out sensory evaluations of a range of relevant products and ingredients. Record the evaluations using e.g. tables/graphs/charts such as star diagrams.
- Evaluate the final product with reference back to the design brief and design specification, taking into account the views of others when identifying improvements.
- Understand how key chefs have influenced eating habits to promote varied and healthy diets.

###### Technical knowledge and understanding

- Know how to use utensils and equipment including heat sources to prepare and cook food.
- Understand about seasonality in relation to food products and the source of different food products.
- Know and use relevant technical and sensory vocabulary.

#### Possible products



#### Possible techniques that children could use



#### 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	Swell	Flavour/Taste	Texture
Savoury Scone	Golden/brown	Fresh/baked	Crumbley	Chewy

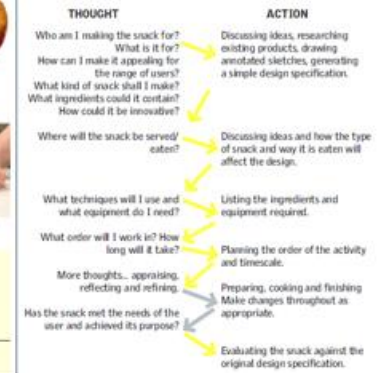
Children can also use simple ranking and rating tables as well as star diagrams.

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:



#### Glossary

- Finishing** - related to the appearance of the product - shape, decoration and colour.
- Rolling 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.
- Germs** - 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.

### Year 6

#### Examples of D&T taught in other subject areas

History: At Forest School, making hawthorn fruit leather or jellies, making 'rationing' recipes. Using tools for making 'trollen wheels' to create Viking style braids.

Making models of Viking Longboats.

English and drama: making props for a summer term production.

### Projects on a Page from the Design and Technology Association:

#### Focus Frame structures

**3. Key learning in design and technology**

**Prior learning**

- 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.

**Designing**

- Carry out research into user needs and existing products, using surveys, interviews, questionnaires and web-based resources.
- Develop a simple design specification to guide the development of their ideas and products, taking account of constraints including time, resources and cost.
- Generate, develop and model innovative ideas, through discussion, prototypes and annotated sketches.

**Making**

- Formulate a clear plan, including a step-by-step list of what needs to be done and lists of resources to be used.
- Competently select from and use appropriate tools to accurately measure, mark out, cut, shape and join construction materials to make frameworks.
- Use finishing and decorative techniques suitable for the product they are designing and making.

**Evaluating**

- Investigate and evaluate a range of existing frame structures.
- Critically evaluate their products against their design specification, intended user and purpose, identifying strengths and areas for development, and carrying out appropriate tests.
- Research key events and individuals relevant to frame structures.

**Technical knowledge and understanding**

- Understand how to strengthen, stiffen and reinforce 3D frameworks.
- Know and use technical voca

#### Techniques for building frame structures

#### 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 in a 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 structures** - a structure made from thin components e.g. tent frame.

#### Focus More complex switches and circuits

**Prior learning**

- Understanding of the essential characteristics of a series circuit and experience of creating a battery-powered, functional, electrical product.
- Initial experience of using computer control software and an interface box or a standalone box, e.g. writing and modifying a program to make a light flash on and off.

**Designing**

- Use research to develop a design specification for a functional product that responds automatically to changes in the environment. Take account of constraints including time, resources and cost.
- Generate and develop innovative ideas and share and clarify these through discussion.
- Communicate ideas through annotated sketches, pictorial representations of electrical circuits or circuit diagrams.

**Making**

- Formulate a step-by-step plan to guide making, listing tools, equipment, materials and components.
- Competently select and accurately assemble materials, and securely connect electrical components to produce a reliable, functional product.
- Create and modify a computer control program to enable an electrical product to work automatically in response to changes in the environment.

**Evaluating**

- Continually evaluate and modify the working features of the product to match the initial design specification.
- Test the system to demonstrate its effectiveness for the intended user and purpose.
- Investigate famous inventors who developed ground-breaking electrical systems and components.

**Technical knowledge and understanding**

- Understand and use electrical systems in their products.
- Apply their understanding of computing to program, monitor and control their products.
- Know and use technical vocabulary relevant to the project.

#### Switches and sensors

- Micro-switch** - a switch that can operate as push-to-break switch or a push-to-make switch.
- Push-to-break switch** - a switch turned off by pressing it.
- Push-to-make switch** - a switch turned on by pressing it.
- Reed switch** - a switch operated by a magnet.
- Tilt switch** - a switch that works when tilted at an angle.
- Toggle switch** - a switch operated when a lever is pressed.
- Light dependent resistor (LDR)** - a sensor that operates when light is shined on it.

**Beal switch**  
Activated by a magnet which closes the contacts.

**Tilt switch**  
When tilted at a set angle the contacts make, completing the circuit.

**Circuit diagram:**

```

graph TD
    Start --> Input{Input 1 on}
    Input -- Yes --> Turn[Turn]
    Input -- No --> Delay[Delay 8]
    Turn --> Output1[Output 1 on]
    Delay --> Output2[Output 1 off]
    
```

#### Designing, making and evaluating an alarm to protect a valuable artefact

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 will my alarm be for? What will it protect? Who will control it? What components will it need?	Developing innovative ideas through discussion and annotated sketches, generating a design specification.
Which switches or sensors should I use? What output devices should I use?	Discussing ideas, modelling possible electrical circuits. Recording design ideas pictorially or using circuit diagrams.
What tools and components will I need? What sequence of steps will I use?	Developing a step-by-step plan.
How can computer control improve my alarm system?	Writing and testing programs and connecting to a control box.
More thoughts... appraising, refining.	More actions... assembling, testing, modifying.
Will the alarm achieve its purpose?	Evaluating the alarm against the original design specification.

**Glossary**

- Modelling** - to realise and manipulate ideas in a tangible form.
- Open switch** - when a switch is positioned such that electricity cannot flow through it.
- Closed switch** - when a switch is positioned such that electricity can flow through it.
- Normally open** - the term used to describe when a switch is in the off position, i.e. the switch is open and no electricity can flow when the button is not pressed.
- Normally closed** - the term used to describe when a switch is in the on position, i.e. the switch is closed and electricity can flow when the button is not pressed.
- Computer control input** - when a switch, such as a micro switch, sends a signal to a computer control box to activate a sequence of events such as a buzzer or light being used to attract attention or alert people.
- Output devices** - components that produce an outcome e.g. bulbs and buzzers.
- Input devices** - components that are used to control an electrical circuit e.g. switches or sensors.





**Progression in skills**

Through the curriculum described in the previous pages, children should progress through these skills towards the end of KS2 expectations.

	EYFS	KS1	KS2
<b>Design</b>	<ul style="list-style-type: none"> <li>*Select appropriate resources.</li> <li>*Use gestures, talking and arrangements of materials and components to show design.</li> <li>* Use contexts set by the teacher and myself. *Use language of designing and making (join, build, shape, longer, shorter, heavier etc.)</li> </ul>	<ul style="list-style-type: none"> <li>*Design purposeful, functional, appealing products for themselves and other users based on design criteria.</li> <li>*Generate, develop, model and communicate their ideas through talking, drawing, templates, mock ups and, where appropriate, information and communication technology.</li> </ul>	<ul style="list-style-type: none"> <li>*Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups.</li> <li>*Generate, develop, model and communicate their ideas through discussion, annotated sketches, prototypes, pattern pieces and computer aided design.</li> </ul>
<b>Make</b>	<ul style="list-style-type: none"> <li>*Construct with a purpose, using a variety of resources.</li> <li>*Select and use tools &amp; techniques to shape, assemble and join.</li> <li>*Replicate structures</li> <li>*Understand different media can be combined for a purpose.</li> </ul>	<ul style="list-style-type: none"> <li>*Select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]</li> <li>*Select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics.</li> </ul>	<ul style="list-style-type: none"> <li>*Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately. *Select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities.</li> </ul>
<b>Evaluate</b>	<ul style="list-style-type: none"> <li>*Discuss how to make an activity safe and hygienic.</li> <li>*Record experiences by drawing, writing, talking.</li> </ul>	<ul style="list-style-type: none"> <li>*explain what I am making and why it fits the Purpose.</li> <li>*make suggestions as to what I need to do next.</li> </ul>	<ul style="list-style-type: none"> <li>*Investigate and analyse a range of existing products.</li> <li>*Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work. *Understand how key events and individuals in design and technology have helped shape the world.</li> </ul>