Art and DT Programme of Study

Last updated: Amber Fowkes, June 2024

Purpose of Study

Both Art and DT have links to other areas of the curriculum. Where there are overlaps, or very clear links, these have been made clear. It is intended that these units are taught alongside at the same time.

Aims

The national 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 teaching of Design Technology across the school follows the National Curriculum. Children design products with a purpose in mind and an intended user of the products. Food technology is implemented across the school with children developing an understanding of where food comes from, the importance of a varied and healthy diet and how to prepare this.

Design and Technology embeds our Somerdale Values. It is an inspiring, rigorous and practical subject, requiring creativity, resourcefulness, and imagination. Pupils design and make products that solve real and relevant problems within a variety of contexts. It is very cross - curricular and draws upon subject knowledge and skills within Mathematics, Science, History, Computing and Art. Children learn to take risks, be reflective, innovative, enterprising and resilient. Through the evaluation of past and present technology they can reflect upon the impact of Design Technology on everyday life and the wider world.

Yellow- Print, Colour, Collage Blue- Working in Three Dimensions Green- Paint, Surface, Texture Pink- Collaboration & Community Navy = DT Unit

Somerdale AccessArt and DT Curriculum units

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Year 1	Spirals Using drawing, collage and mark-making to explore spirals. Introducing sketchbooks. (Science links to natural spirals)	Simple Printmaking Explore simple ways to make a print. Use line, shape, colour and texture to explore pattern, sequencing and symmetry. (Maths link- shapes/pattern)	Mechanisms Sliders and levers	Exploring Watercolour Exploring watercolour and discovering we can use accidental marks to help us make art. (Learn Together link)	Structures Freestanding structures (Link with Art & Design Playful Making from AccessArt)	Inspired by Flora & Fauna Explore how artists make art inspired by flora and fauna. Make collages of MiniBeasts and display as a shared artwork. (Science, Outdoor Learning and Learn Together link)
	Food- Preparing fruit and vegetables (including cooking and nutrition requirements for KS1) Make fruit and vegetable kebabs. Playful Making Exploring materials and intention through a playful approach (Science- materials) Making Birds Sculptural project beginning with making drawings from observation, exploring media, and transforming the drawings from 2d to 3d to make a bird. (DT- link to materials learning from Spring 1)					

Year 2	Explore & Draw Introducing the idea that artists can be collectors & explorers as they develop drawing and composition skills.	Textiles Templates and joining techniques Exploring the World Through Mono Print Using a simple mono print technique to develop drawing skills, encourage experimentation and ownership Combination of Art and DT- printing onto fabric (Art) before using joining techniques (DT).	Be An Architect Exploring architecture and creating architectural models. (DT)	Expressive Painting Explore how painters sometimes use paint in an expressive and gestural way. Explore colour mixing and experimental mark making to create abstract still lifes.	Food Preparing fruit and vegetables (including cooking and nutrition requirements for KS1)	Music & Art Explore how we can make art inspired by the sounds we hear.
	Mechanisms (wheels and axles) Stick Transformation Project Explore how you can transform a familiar object into new and fun forms. (Outdoor Learning).					
Year 3	Working with Shape and Colour "Painting with Scissors": Collage and stencil in response to looking at artwork.	Structures Shell structures using computer-aided design.	Telling Stories Through Making Explore how artists are inspired by other art forms – in this case how we make sculpture inspired by literature and film.	Cloth, Thread, Paint Explore how artists combine media to create work in response to landscape. Use acrylic and thread to make a painted and stitched piece.	Mechanical Systems Levers and linkages	Using Natural Materials to Make Images Using natural pigments and dyes from the local environment to make art. Exploring Cyanotype and Anthotyp
	Food- Healthy and varied diet including cooking and nutrition Gestural Drawing with Charcoal Making loose, gestural drawings with charcoal, and exploring drama and performance. Making Animated Drawings Explore how to create simple moving drawings by making paper "puppets" and animate them using tablets. (Computing).					
Year 4	Storytelling Through Drawing Explore how artists create sequenced drawings to share and tell stories. Create concertinas or comic strips to retell poetry or prose through drawing.	Exploring Pattern Exploring how we can use colour, line and shape to create patterns, including repeating patterns	Electrical Systems Simple circuits and switches (including programming and control)	Exploring Still Life Explore artists working with the genre of still life, contemporary and more traditional. Create your own still life inspired art work.	Sculpture, Structure, Inventiveness & Determination What can artists learn from nature?	Food Healthy and varied diet (including cooking and nutrition requirements for KS2) Link to- Festival Feasts How might we use food and art to bring us together?
	Textiles 2-D shape to 3-D product					
Year 5	Typography & Maps Exploring how we can create	Making Monotypes Combine the monotype process with	Food Celebrating culture and seasonality (including cooking and nutrition	Structures	Architecture: Dream Big or Small? Explore the responsibilities architects	Fashion Design Explore contemporary fashion

	typography through drawing and design, and use our skills to create personal and highly visual maps.	painting and collage to make visual poetry zines.	requirements for KS2)	Frame structures	have to design us a better world. Make your own architectural model.	designers and create your own 2d or 3d fashion design working to a brief. Textiles Combining different fabric shapes
	Mixed Media Land & City Scapes Explore how artists use a variety of media to capture spirit of the place. Set Design Explore creating a model set for theatre or animation inspired by poetry, prose, film or music. (DT)					
Year 6	2D Drawing to 3D Making Explore how 2D drawings can be transformed to 3D objects. Work towards a sculptural outcome or a graphic design outcome.	Activism Explore how artists use their skills to speak on behalf of communities. Make art about things you care about.	Mechanical Systems Pulleys or gears	Exploring Identity Discover how artists use layers and juxtaposition to create artwork which explores identity. Make your own layered portrait.	Electrical Systems More complex switches and circuits (including programming, monitoring and control)	Shadow Puppets Explore how traditional and contemporary artists use cutouts and shadow puppets.
	Brave Colour Exploring how artists use light, form and colour to create immersive environments.					

By the end of the Early Years Foundation Stage, children will have the opportunities to:

- Use different media and materials to express their own ideas
- Use what they have learnt about media and materials in original ways, thinking about form, function and purpose
- Make plans and construct with a purpose in mind using a variety of resources
- Develop skills to use simple tools and techniques appropriately, effectively and safely
- Select appropriate resources for a product and adapt their work where necessary
- Cook and prepare food adhering to good health and hygiene routines

(Teaching and learning is based on Development Matters progression. Pupils use a variety of media and materials through a combination of child initiated and adult directed activities.)

Pre-School	Children will be learning to…	Key experiences children will be exposed to:	Key vocabulary
	•	•	•

Reception	Children will be learning to…	Key experiences children will be exposed to	Key vocabulary
	•	•	•
Prior Knowledge: See Pre-School			
Future Learning: Y1 – skills using scissors, glue, paper fasteners and masking tape.			

Year 1

<table>
<tr><td>Year 1</td><td>Possible Outcomes</td><td>Investigative and Evaluative Activities (IEAs)</td><td>Related Learning</td><td>Key Vocabulary</td></tr>
<tr><td>Mechanisms

Sliders and Levers

Design, make and evaluate a _____ (product) for _____ (user) for _____ (purpose).</td><td><u>What could children design, make and evaluate?</u>
A class/group, storybook poster display, greetings card, class/group information book, storyboard

<u>Intended users</u>
Themselves, younger children, parents, grandparents, friends, visitor to school

<u>Purpose of products</u>
Celebration, event, information, pleasure, interests/hobbies, educational

<u>Links to curriculum/enquiry</u>
Festivals and Celebrations, Traditional Tales, Nursery Rhymes, history/geography/science enquiry

<u>Possible contexts</u>
Imaginary, story-based, toys/games, people who help us, home, school, garden, playground, local community, environment</td><td>1. Children explore and evaluate a collection of books and everyday products that have moving parts, including those with levers and sliders. e.g. What is it? Who is it for? What is it for?
2. Use questions to develop children’s understanding e.g. What do you think will move? How will you make it move? What part of the product moved and how did it move? How do you think the mechanism works? What else could move in the product? How well does it work?
3. Introduce and develop vocabulary e.g. lever, pivot, slider, left, right, push, pull, up, down, forwards, backwards, in, out.

Focused Tasks (FTs)
4. Demonstrate simple levers and sliders to the children using prepared teaching aids. It is helpful if these are also used in context e.g. the slider is used to show a snail appearing from behind a stone, the lever is used to show a butterfly flying to a flower.
5. Use questions to develop children’s understanding e.g. How does the slider move? How does the lever move? Which part of the mechanism is the pivot? What does the movement of the slider and lever remind you of?
6. Following teacher demonstration of the correct use of tools and materials, children should develop their knowledge and skills by replicating the slider and lever teaching aids. Encourage children to add pictures to their mechanisms.</td><td>Spoken language – participate in discussion about books and other products with moving parts, taking turns and listening to what others say. Ask relevant questions to extend their knowledge and understanding. Build technical and directional vocabulary.

Related Learning
• Spoken language – children listen and respond appropriately to adults. Ask relevant questions to extend their knowledge and understanding. Build technical and directional vocabulary.
• Mathematics – describe position, direction and movement. Use appropriate standard and non- standard measures.</td><td>slider, lever, pivot, slot, bridge/guide card, masking tape, paper fastener, join pull, push, up, down, straight, curve, forwards, backwards, design, make, evaluate, user, purpose, ideas, design criteria, product, function</td></tr>
<tr><td>Prior Knowledge
• 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.

Future Learning:</td><td>Key Learning in Design and Technology
<u>Designing</u>
• 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.

<u>Making</u>
• 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.

<u>Evaluating</u>
• 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.

<u>Technical knowledge and understanding</u>
• Explore and use sliders and levers.
• Understand that different mechanisms produce different types of movement.
• Know and use technical vocabulary relevant to the project.</td><td>Design, Make and Evaluate Assignment (DMEA)
7. Discuss with the children what they will be designing, making and evaluating e.g. Who will your product be for? What will be its purpose? How do you want it to move? Will you use a lever or a slider?
8. Generate simple design criteria with the children e.g. the mechanism should work smoothly, it should make the right type of movement.
9. Encourage the children to develop their ideas through talking, drawing and making mock-ups of their ideas with paper and card.
10. Discuss the finishing techniques the children might use e.g. using digital text and graphics, paint, felt tipped pens or collage.
11. As a whole class, talk about the order in which the mechanisms will be made.
12. Ask children to evaluate their developing ideas and final products against the original design criteria.</td><td>Related Learning
• Spoken language – ask relevant questions to extend their knowledge and understanding.
Build technical and directional vocabulary.
Use spoken language to develop understanding through imagining and exploring ideas.
• Art and design – use colour, pattern, line, shape.
• Computing – digital graphics and text could be incorporated into final products as the background or moving parts.</td><td>Resources
books and everyday products with levers and slider mechanisms slider and lever teaching aids
card strips, card rectangles, paper, masking tape, paper fasteners, paper binders, stick glue, PVA glue, finishing materials and media
left/right handed scissors, cutting mats, card drills</td></tr>
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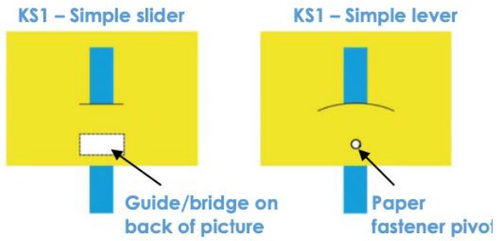
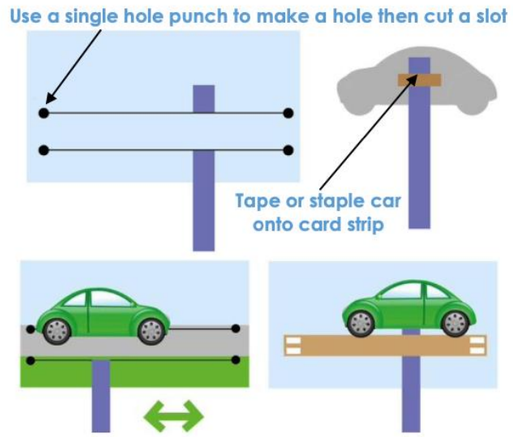
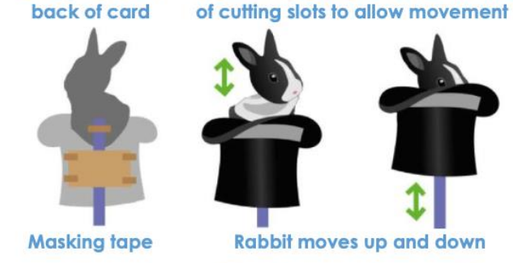
Year One
Sliders and Levers

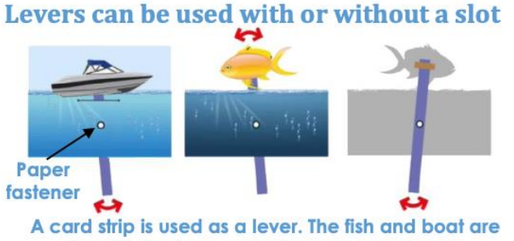


Sliders move from side to side and up and down

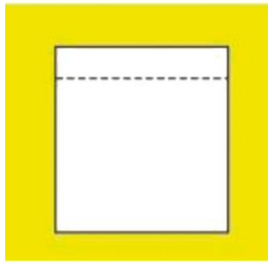




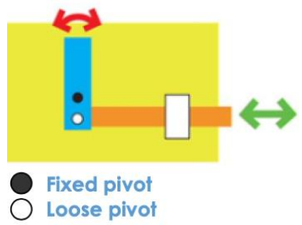
Levers can be used with or without a slot



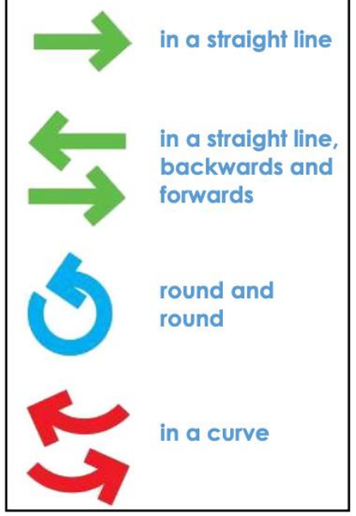
As an enhancement to this project children could add flaps to their moving pictures. Some children may find flaps, which can be used to make a picture appear and disappear, easier to make than levers or sliders.



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.



Simple mechanisms move...



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 car 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 toys.
- 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

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.

<table>
<tr><th>Year 1</th><th>Possible Outcomes</th><th>Investigative and Evaluative Activities (IEAs)</th><th>Related Learning</th><th>Key Vocabulary</th></tr>
<tr><td rowspan="2">Structures

Freestanding Structures

Design, make and evaluate a _____ (product) for _____ (user) for _____ (purpose).</td><td rowspan="2"><u>What could children design, make and evaluate?</u>
enclosures for farm or zoo animals, playground/park/garden furniture, bridge, playground equipment, furniture for the Three Bears

<u>Intended users</u>
Themselves, school community, friends, children of different ages, general public, older people, story characters, teddy, animal

<u>Purpose of products</u>
imaginary role-play, pleasure, rest, recreation, health leisure

<u>Links to curriculum/enquiry</u>
Traditional Tales, Nursery Rhymes, Buildings, Healthy living, Farming, Our School, Myself, Animals, Parks and Playgrounds

<u>Possible contexts</u>
Imaginary, story-based, classroom, school, grounds, gardens, local community, leisure, health, environment</td><td>1. Go on a walk and/or look at photographs of the local area to explore structures such as playground equipment, street furniture, walls, towers and bridges e.g. What are the structures called and what is their purpose? Who might use them? What materials have been used? Why have these been chosen? How have the parts been joined together? How have the structures been made strong enough? How have they been made stable?
2. Where possible, ask the children to draw or photograph the structures they have been exploring and label with the correct technical vocabulary in relation to the structure, materials used and shapes e.g. wall, tower, framework, base, joint, metal, wood, plastic, brick, triangle, square, rectangle, cuboid, cube.</td><td>Geography – use simple fieldwork and observational skills to study the geography of their school and its grounds and the key physical features of its surrounding environment.

Spoken language – participate in discussion about various structures, taking turns and listening to what others say. Ask relevant questions to extend their knowledge and understanding. Build technical vocabulary.</td><td rowspan="2">slider, lever, pivot, slot, bridge/guide card, masking tape, paper fastener, join pull, push, up, down, straight, curve, forwards, backwards, design, make, evaluate, user, purpose, ideas, design criteria, product, function</td></tr>
<tr><td>Focused Tasks (FTs)
3. Demonstrate measuring, marking out, cutting, shaping, joining and finishing techniques with a range of tools and new and reclaimed materials that children are likely to use to make their structures. Discuss the suitability of materials for their products according to their characteristics.
4. Ask the children to build and explore a variety of freestanding structures using construction kits, such as wooden blocks, interconnecting plastic bricks and those that make frameworks e.g. How can you stop your structures from falling over? How they can be made stronger and stiffer in order to carry a load? Children could make models of the structures they have seen in school and the local area.
5. Ask children to fold paper or card in different ways to make freestanding structures, using masking tape where necessary to make joins. Encourage them to think about how folding materials can make them stronger, stiffer, stand up and be more stable e.g. Can they support an object on top of their structures without it falling over or breaking?</td><td>Related Learning
Spoken language – children listen and respond appropriately to adults. Ask relevant questions to extend their knowledge and understanding. Build technical and directional vocabulary.

Mathematics – describe position, direction and movement. Use appropriate standard and non- standard measures.</td></tr>
<tr><td>Prior Knowledge</td><td>Key Learning in Design and Technology</td><td>Design, Make and Evaluate Assignment (DMEA)</td><td>Related Learning</td><td>Resources</td></tr>
<tr><td>• Experience of using construction kits to build walls, towers and frameworks.
• Experience of using of basic tools e.g. scissors or hole punches with construction materials e.g. plastic, card.
• Experience of different methods of joining card and paper.</td><td>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.</td><td>6. Discuss with the children what structure they will be designing, making and evaluating e.g. Who will your product be for? What will be its purpose? What materials will you use? How will you make it strong and stable?
7. Generate some simple design criteria with the children e.g. the structure should stand up on its own, it should be strong enough to carry Teddy.
8. Encourage the children to develop their ideas through talking, drawing and making mock-ups of their ideas with construction kits and other materials.
9. As a whole class, plan the order in which the structures will be made. Children could make their final products from construction kits, new and reclaimed materials or any combination of these, according to their characteristics.
10. Ask children to evaluate their developing ideas and final products against original design criteria.</td><td>Spoken language – ask relevant questions to extend their knowledge and understanding.
Build technical and directional vocabulary. Use spoken language to develop understanding through imagining and exploring ideas.

Art and design – use colour, pattern, line, shape.

Computing – digital graphics and text could be incorporated into final products as the background or moving parts.</td><td>books and everyday products with levers and
slider mechanisms
slider and lever teaching
aids
card strips, card rectangles, paper, masking tape, paper fasteners, paper binders,
stick glue, PVA glue, finishing materials and
media
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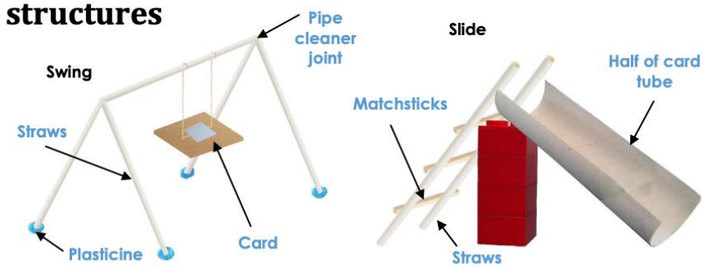
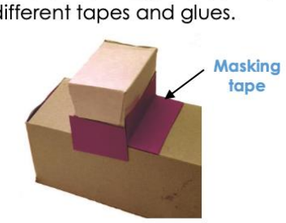
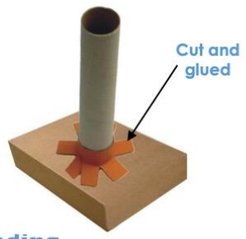
Year One
Freestanding Structures

Techniques for assembling freestanding structures



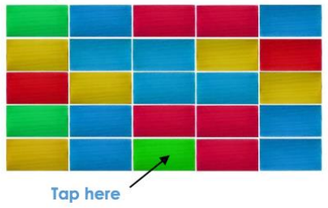
Show children how to join sheet materials and reclaimed boxes together using different tapes and glues.

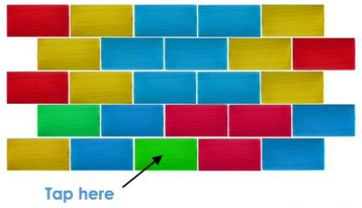


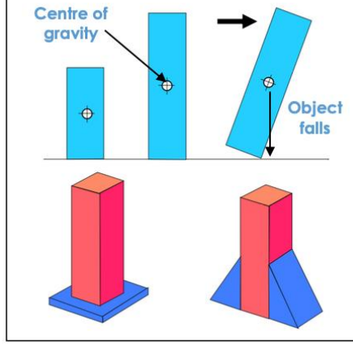


Technical knowledge and understanding

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.

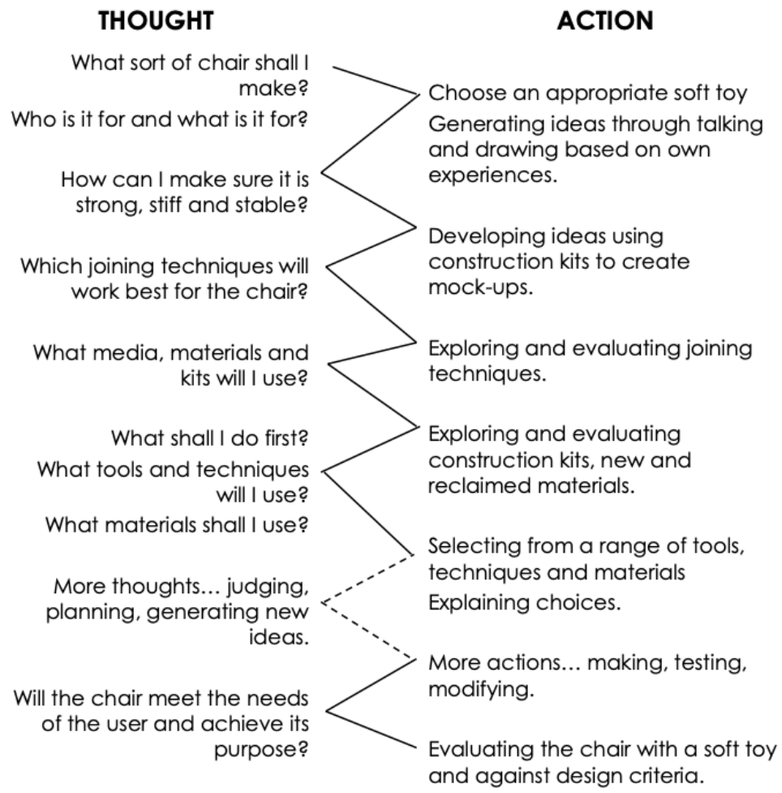
Ask the children to build and explore a variety of freestanding structures through focused tasks. Use a range of construction kits.

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.

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

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 3

<table>
<tr><td>Year 3</td><td>Possible Outcomes</td><td>Investigative and Evaluative Activities (IEAs)</td><td>Related Learning</td><td>Key Vocabulary</td></tr>
<tr><td rowspan="2">Structures (Shell)

Shell Structures using CAD

Design, make and evaluate a _____ (product) for _____ (user) for _____ (purpose).</td><td rowspan="2"><u>What could children design, make and evaluate?</u>
gift boxes, desk tidy, lunchboxes, packaging, cool boxes, party boxes, mystery boxes, toy car, body shell, moneyboxes

<u>Intended users</u>
Themselves, siblings, parents, relatives, friends, younger/older, children party guests, shop customers, community group, neighbours

<u>Purpose of products</u>
Packaging, storage, protection, marketing, presentation, display, celebration postage

<u>Links to curriculum/enquiry</u>
Shape and Space, Shopping, Going Green, Festivals, Celebrations, Healthy Eating, Our School, Toys and Games

<u>Possible contexts</u>
Home, school, shopping, culture, enterprise, local community, wider environment</td><td>1. Children investigate a collection of different shell structures including packaging. Use questions to develop children's understanding e.g. What is the purpose of the shell structure – protecting, containing, presenting? What material is it made from? How has it been constructed? Are the materials recyclable or reusable? How has it been stiffened i.e. folded, corrugated, ribbed, laminated? What size/shape/colour is it? What information does it show and why? How attractive is the design?
2. Children take a small package apart identifying and discussing parts of a net including the tabs e.g. How are different faces of the package arranged? How are the tabs used to join the 'free' edges of the net?
3. Evaluate existing products to determine which designs children think are the most effective. Provide opportunities for the children to judge the suitability of the shell structures for their intended users and purposes. Discuss graphics including colours/impact of style/logo/size of font e.g. What do you prefer and why? What style of graphics and lettering might we want to include in our product to meet users' preferences and its intended purpose? Which packaging might be the best for…?</td><td>Science – discuss the properties and suitability of materials for particular purposes.

Mathematics – compare and sort common 2-D and 3-D shapes in everyday objects. Recognise 3-D shapes in different orientations and describe them.

Spoken language – ask relevant questions to extend knowledge and understanding. Build their technical vocabulary.</td><td rowspan="2">shell structure, three-dimensional (3-D), shape, net, cube, cuboid, prism, vertex, edge, face, length, width, breadth, capacity, marking out, scoring, shaping, tabs, adhesives, joining, assemble, accuracy, material, stiff, strong, reduce, reuse, recycle, corrugating, ribbing, laminating font, lettering, text, graphics, decision, evaluating, design brief design criteria, innovative, prototype</td></tr>
<tr><td>Focused Tasks (FTs)
4. Demonstrate simple drawing software such as Techsoft 2D Primary or Microsoft Word. Ask children to explore the interface and drawing tools to practise drawing and manipulating shapes such as rectangles, squares, ellipses, trapezoids and triangles.
5. Ask children to use the software to open existing drawings including nets and to draw nets of their own, using gridlines and pre-shaped tools.
6. Let the children explore and be guided to try out different fill and font tools to become familiar with the graphic design aspects of the available software to achieve the desired appearance of their products.
7. Practise making nets out of card, joining flat faces with masking tape to create 3-D shapes. Experiment with assembling pre-drawn nets in numerous ways using scoring, cutting and assembling techniques. Allow children to construct a simple box and show how a window can be cut out and acetate sheet added.</td><td>Related Learning
Mathematics – use a ruler to measure to the nearest cm, half cm or mm. Draw 2-D shapes and make 3-D objects using modelling materials.

Computing – design and create digital content on screen, creating nets for their products and combining text with graphics.</td></tr>
<tr><td>Prior Knowledge</td><td>Key Learning in Design and Technology</td><td>Design, Make and Evaluate Assignment (DMEA)</td><td>Related Learning</td><td>Resources</td></tr>
<tr><td>• 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.
• Familiarity with general purpose software that can be used to draw accurate shapes, such as Microsoft Word, or simple computer-aided design (CAD), such as 2D Primary by Techsoft.</td><td>Designing
• Generate realistic ideas and design criteria collaboratively through discussion, focusing on the needs of the user and the functional and aesthetic purposes of the product.
• Develop ideas through the analysis of existing shell structures and use computer-aided design to model and communicate ideas.

Making
• Plan the order of the main stages of making.
• Select and use appropriate tools and software 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 computer-generated finishing techniques suitable for the product they are creating.

Evaluating
• Investigate and evaluate a range of 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 nets of cubes and cuboids and, where appropriate, more complex 3D shapes.
• Develop and use knowledge of how to construct strong, stiff shell structures.
• Know and use technical vocabulary relevant to the project.</td><td>8. Develop a design brief with the children within a context which is authentic and meaningful.
9. Discuss the uses and purposes of their shell structure e.g. What does the product need to do? Who is it aimed at? How will the purpose and user affect your design decisions? Agree on design criteria that can be used to guide the development and evaluation of children's products e.g. How will we know that we have designed and made successful products?
10. Ask the children to develop a design using computer-aided design (CAD) software to create nets, addressing the needs of the user and the purpose.
11. Using computer-aided design (CAD) software ask the children to print out their nets to develop prototypes in order to evaluate and refine their ideas e.g. What will you need to include in your design? How can you improve it? What materials will you use? How will you make sure your product works well and has the right appearance?
12. Ask children to identify the main stages of making and the appropriate tools and skills they learnt through focused tasks. Encourage the children to work with accuracy, using their computer-aided design (CAD) skills as appropriate.
13. Evaluate throughout and the final products against the intended purpose and with the intended user, where safe and practical, drawing on the design criteria previously agreed.</td><td>Spoken language – ask relevant questions to extend knowledge and understanding. Build technical vocabulary.

Art and design – use and develop drawing skills.

Writing – write for real purposes and audiences.

Computing – design and create digital content on screen using computer-aided design (CAD) software, creating nets for their products and combining graphics with text.</td><td>collection of shell structures for different purposes and users card, squared paper, coloured paper, adhesive tape, masking tape, PVA glue, glue spreaders, acetate sheet, pencils, felt-tip pens, rulers, scissors, computer with computer-aided design (CAD) software such as Techsoft 2D Primary or Microsoft Word, printer.</td></tr>
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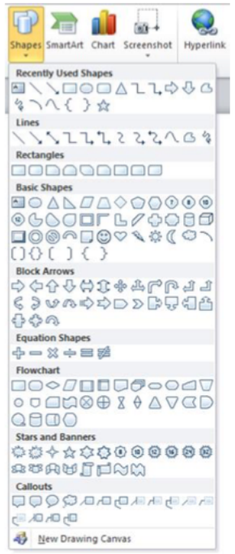
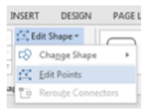
Year Three
Structures (Shell)

Using Microsoft Word

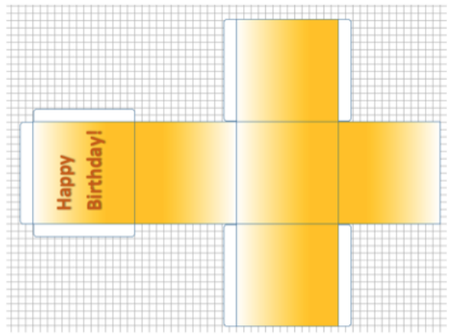




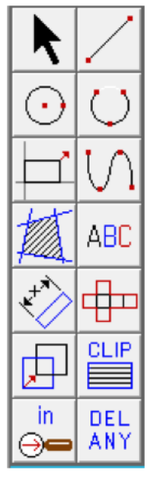
Turn on gridlines and use the pre-set shapes to draw simple nets. Shapes can be edited if you choose.

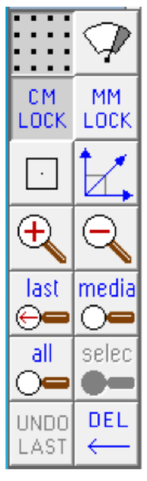
Text boxes and colouring using the format tab will allow children to come up with a range of designs.

Microsoft Word has many features that allow children to draw and manipulate accurate shapes, import or paste in graphics and print the final designs without having to use dedicated CAD software.



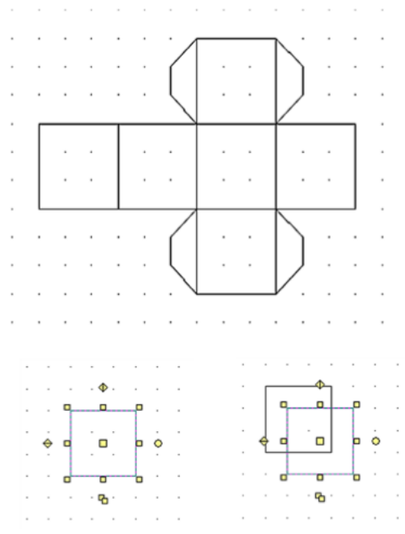
Using TechSoft 2D Primary





Explore and use the different drawing tools and zoom, grid and locking tools to help ensure accurate drawings.

Demonstrate how to draw a simple net and ask children to practise using the copy and move 'handles'.



Tips for Teachers

- Many software packages have demonstration versions with tutorials that you can try out without paying a charge.
- Visit a local shop or supermarket to investigate different types of card packaging.
- Make a collection of shell structures of various shapes and, where possible, flatten them to show the nets and for storage.
- Put together an image board of packaging so children can see the range of fonts and consistency with a brand.
- Discuss environmental issues relating to the wastage of materials when packaging items including the three R's - reducing, recycling and reusing.
- If children are designing and making packages for a food product, they will need to choose materials appropriate for direct contact with food.
- You may want to restrict children to using particular standard shapes when designing their nets and final products.
- Ensure that the children include sufficient tabs in their drawings for assembling their nets.
- Use the options in Microsoft Word and other software to display rulers and grids that can help with generating nets and other items.
- Using copy and paste will ensure that objects are of a consistent size.
- Ensure that the children have a good understanding of the associated vocabulary and of 2-D and 3-D shapes in maths before carrying out this project.

Designing, making and evaluating a strong chair for a 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 product am I designing and making the packaging for? How will it safely protect the product? How will my product appeal to my intended user?	Discussing and researching ideas, generating design criteria, drawing annotated sketches
How can CAD help me make a package that is accurate, strong and appealing? Which materials will I use?	Investigating and evaluating possible tools and materials
Which shape(s) will be the best to keep the food safe? How will I strengthen my structure?	Discussing, constructing and comparing different nets Exploring strengthening techniques Evaluating prototypes against success criteria
How can I use CAD to get the graphic effects that I want?	Discussing, exploring, trialling and evaluating graphic effects
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?	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

When to use CAD

- When the children understand the value of using it to improve the accuracy and appearance of their products.
- Where children have been taught and practised the skills.
- Where it achieves learning objectives more efficiently.

Glossary

CAD- computer-aided design.
Shell structure- a hollow structure with a thin outer covering.
Edge- where two surfaces meet at an angle
Face- a surface of a geometric shape
Vertex- the corners of a geometric shape where edges meet.
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.
Cuboid- a solid body with rectangular sides.
Prism- a solid geometric shape with ends that are similar, equal and parallel.