

# ACET Junior Academies

Scheme of Work for Design Technology

Y1 Structures - Freestanding Structures



**About this unit:** In this unit, pupils will explore a range of structures in their local environment, identifying what they are and what they are used for. Pupils will use construction kits, reclaimed materials and craft materials to explore building structures and will learn how to strengthen and stiffen them. Pupils will use their learning to generate their own ideas for building a structure for a given purpose. They will use knowledge and skills from their learning to create their structures before evaluating them against the original criteria.

**Final piece ideas:** enclosures for farm/zoo animals, bridge for the Billy Goats Gruff - link Science, Living things, bridges - Historical link to significant individual Isombard Kingdom Brunell, playground equipment - link back to Geography, local area

## Unit structure

1. Investigate and Evaluate - What are freestanding structures?
2. Focused Tasks - How can you build freestanding structures?
3. Designing - What could I make?
4. Making - Can I make the product I designed?
5. Making - Can I improve the appearance of my product?
6. Evaluating - How did I do?

## Links to previous and future National Curriculum units

- EYFS - experience of building with construction kits, reclaimed materials and craft materials.
- LKS2 - Shell Structures
- UKS2 - Frame Structures

## 1: Investigate and Evaluate – What are freestanding structures?

Links to previous learning	Knowledge and second order concepts	Skills, Concepts and Vocabulary:	Assessment criteria:	Curricular links:
<p>Experience of using construction kits to build walls, towers and frameworks.</p> <p>Experience of using basic tools e.g. scissors or hole punches with construction materials e.g. plastic, card</p> <p>Experience of different methods of joining card and paper</p>	<p><b>Substantive knowledge:</b> (<i>What students should know.</i>)</p> <p>Understand that products have been designed and produced.</p> <p>That there are different kinds of structures made for different users and for different purposes.</p> <p>That structures can be made from different materials.</p> <p>That structures need to be made strong and stable.</p> <p><b>Second order concepts:</b> (<i>What students should understand</i>)</p> <p>Evaluation</p> <p>User</p> <p>Purpose</p>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Explore products and talk about what it is and who it is for.</li> <li>• Explore what a product is for and how it is used.</li> <li>• Explore how a product works</li> <li>• Begin to identify and name some of the materials used to make the product</li> <li>• Talk about what they like or dislike about a product</li> </ul> <p><b>Key vocabulary/concepts:</b> <a href="https://20353.stem.org.uk/Nuffield%20Glossary2/index.html">https://20353.stem.org.uk/Nuffield%20Glossary2/index.html</a></p> <p>Structure, wall, tower, framework, weak, strong, base, metal, wood, plastic, stone, brick, evaluate, user, purpose, product, function, materials, appearance, appealing</p>	<p><b>Can your children:</b></p> <p>Identify structures in the local area and talk about their use and the intended user.</p> <p>Identify the materials structures have been made from and explain why those materials might have been chosen.</p> <p>Identify how structures have been made strong and stable.</p>	<p><b>Horizontal:</b></p> <p>Geography – local area</p> <p>History – changes within living memory</p> <p>English – participate in discussion, taking turns and listening to what others have to say. Ask relevant questions to extend their knowledge and understanding.</p> <p>Build technical vocabulary.</p> <p>Labelling pictures.</p> <p><b>Vertical:</b></p> <p>LKS2 – Shell Structures</p> <p>UKS2 Frame Structures</p>
<b>Suggested activities:</b>		<b>Resources:</b>	<b>Useful links:</b>	
<p>Pupils could go on a walk in the local area or look at photographs of the local area to explore structures such as playground equipment, street furniture, walls, buildings and bridges. Develop pupils understanding of structures and use</p>		<p>Camera</p>	<p><a href="https://www.data.org.uk/media/1462/clickable-progression-framework-ks1-2.pdf">https://www.data.org.uk/media/1462/clickable-progression-framework-ks1-2.pdf</a></p> <p><a href="https://www.google.com/url?sa=t&amp;rct=j&amp;q=&amp;esrc=s&amp;source=web&amp;cd=&amp;ved=2ahUKewiX-">https://www.google.com/url?sa=t&amp;rct=j&amp;q=&amp;esrc=s&amp;source=web&amp;cd=&amp;ved=2ahUKewiX-</a></p>	

<p>of technical vocabulary through asking questions e.g. <i>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?</i></p> <p>Ask 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. <i>wall, tower, framework, base, joint, metal, wood, plastic, brick, 2D/3D shape names</i></p>		<a href="http://3A%2F%2Fhillsgrove.net%2Fdownload%2Fi%2Fmark_dl%2Fu%2F4010976058%2F4632903854%2FY1%2520Freestanding%2520structures.pdf&amp;usq=AOvVaw2qxxoybzUVr8yi8VG_Yn_-">8Kx3_zpAhUKRBUIHZUTCf0QFjAAegQIBRAB&amp;url=http%3A%2F%2Fhillsgrove.net%2Fdownload%2Fi%2Fmark_dl%2Fu%2F4010976058%2F4632903854%2FY1%2520Freestanding%2520structures.pdf&amp;usq=AOvVaw2qxxoybzUVr8yi8VG_Yn_-</a>
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## 2: Focused Tasks - How do you build freestanding structures?

Links to previous learning	Knowledge and second order concepts	Skills, Concepts and Vocabulary:	Assessment criteria:	Curricular links:
<p>Pupils will have explored range of structures. They will know what structures are and will be able to talk about the different structures in the local area. They will understand that structures have different purposes and are made for different users. Pupils will be able to identify the materials that structures are made from and some will be able to explain why these materials might have been chosen.</p>	<p><b>Substantive knowledge:</b> (<i>What students should know.</i>) How to make freestanding structures stiffer and stronger. Know and use technical vocabulary</p> <p><b>Second order concepts:</b> (<i>What students should understand</i>) Stability Strengthening</p>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Know about the simple working characteristics of materials and components</li> <li>• Know how freestanding structures can be made stronger, stiffer and more stable</li> <li>• Begin to learn and use the technical vocabulary relevant for the projects they are working on.</li> <li>• Measure, mark out, cut, score and assemble materials and components with more accuracy.</li> <li>• With support, join, assemble and combine materials and components</li> </ul> <p><b>Key Vocabulary/concepts:</b> Structure, wall, tower, framework, weak, strong, stable, cut, fold, join, fix,</p>	<p><b>Can your children:</b> Use construction kits to explore making freestanding structures. Identify ways of making structures stronger and more stable. Choose suitable materials to make structures. Use a range of techniques to make their structures, including measuring, cutting and joining. Make materials stronger and stiffer by folding.</p>	<p><b>Horizontal:</b> Maths - use appropriate standard and non-standard measures. Name common 2D and 3D shapes Science - Properties of materials English - Ask relevant questions to extend their knowledge and understanding. Build technical vocabulary.</p> <p><b>Vertical:</b></p>

		material names, equipment names	
<b>Suggested activities:</b>	<b>Resources:</b>	<b>Useful links:</b>	
<p>Pupils could explore a range of models of the structures they have seen in the local area. These could be made from a range of materials, including new and reclaimed materials, and construction kits, including plastic interconnecting bricks, wooden blocks and kits to make frameworks.</p> <p>Measuring, marking out, cutting and joining should be modelled to the pupils. Pupils should also be shown how folding materials can make them stronger, stiffer, stand up and be more stable.</p> <p>Pupils could use materials independently to replicate the models in a carousel of activities.</p> <p>Develop thinking by asking questions e.g. <i>How can you stop your structures from falling over? How can they be made stronger and stiffer in order to carry a load? Why is this a suitable material? What are its characteristics?</i></p>	<p>Photographs of various structures</p> <p>Construction kits for building walls, towers, frameworks</p> <p>New materials e.g. paper, card, plastic sheet, straws, pipe cleaners,</p> <p>Reclaimed materials e.g. cardboard tubes, cotton reels, cardboard boxes,</p> <p>String, masking tape, PVA glue, Plasticine, scissors, hole punch, stapler</p>	<p><a href="https://www.stem.org.uk/resources/elibrary/resource/25329/bridges-and-structures">https://www.stem.org.uk/resources/elibrary/resource/25329/bridges-and-structures</a></p>	

### 3: Designing - What could I make?

Links to previous learning	Knowledge and second order concepts	Skills, Concepts and Vocabulary:	Assessment criteria:	Curricular links:
<p>Children will have experienced using construction kits and new and reclaimed materials to make freestanding structures. They should know a range of techniques for strengthening and joining materials.</p>	<p><b>Substantive knowledge:</b> (What students should know.)</p> <p>That products need to be designed before they are made.</p> <p>That designs should always meet the needs of the user and purpose.</p> <p>That design ideas can be communicated in different ways.</p> <p><b>Second order concepts:</b> (What students should understand)</p> <p>Design</p> <p>User</p> <p>Purpose</p> <p>Criteria</p>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Talk about the product they will be designing and making</li> <li>• Explain who their product will be used by</li> <li>• Describe what their product will be used for</li> <li>• Begin to use simple design criteria to develop ideas</li> </ul> <p><b>Key Vocabulary/concepts:</b></p> <p>Design, make, user, purpose, ideas, design criteria, product, function</p>	<p><b>Can your children:</b></p> <p>Explain what they are going to design and make and who the intended user will be.</p> <p>Describe how they will make their product, including the materials they will use and how they will make it strong and stable.</p> <p>Communicate their ideas through discussion, mock-ups and design plans.</p>	<p><b>Horizontal:</b></p> <p>History - Changes beyond living memory - Bridges (Isombarb Kingdom Brunell?)</p> <p>Science - Living Things- animal enclosures</p> <p>English - Ask relevant questions to extend their knowledge and understanding. Build technical vocabulary.</p>

				Communicate ideas through labelled drawings and writing.  <b>Vertical:</b>
<b>Suggested activities:</b>		<b>Resources:</b>	<b>Useful links:</b>	
<p>Discuss with the children the kind of structure they will be designing, making and evaluating e.g. animal enclosures, bridge for the Billy Goats Gruff, Tower for Rapunzel, playground equipment. Develop ideas through questions e.g. <i>Who will your product be for? What will its purpose be? What materials will you use? How will you make it strong and stable?</i></p> <p>Generate simple design criteria with the children e.g. the structure should stand up on its own, it should be strong enough to hold the largest Billy Goat. Encourage children to develop their ideas through talking, drawing and making mock-ups of their own with construction kits and other materials. Pupils could complete a design plan for their intended product.</p>		<p>Photos of structures, examples of structures from previous session, planning sheets</p>	<p><a href="https://www.bing.com/videos/search?q=building+structures+ks1&amp;adlt=strict&amp;view=detail&amp;mid=79514241745FCC1099DE79514241745FCC1099DE&amp;&amp;FORM=VRDGAR&amp;ru=%2Fvideos%2Fsearch%3Fq%3Dbuilding%2Bstructures%2Bks1%26FORM%3DHDRSC3">https://www.bing.com/videos/search?q=building+structures+ks1&amp;adlt=strict&amp;view=detail&amp;mid=79514241745FCC1099DE79514241745FCC1099DE&amp;&amp;FORM=VRDGAR&amp;ru=%2Fvideos%2Fsearch%3Fq%3Dbuilding%2Bstructures%2Bks1%26FORM%3DHDRSC3</a></p>	

#### 4: Making - Can I make the product I designed?

<b>Links to previous learning</b>	<b>Knowledge and second order concepts</b>	<b>Skills, Concepts and Vocabulary:</b>	<b>Assessment criteria:</b>	<b>Curricular links:</b>
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<p>Children will have identified the structure they are going to make. They will be able to talk about the purpose, intended user and the materials from which it will be built. Pupils will be aware of design criteria and will know the order in which they will make their product.</p>	<p><b>Substantive knowledge:</b> (<i>What students should know.</i>) That their product needs to be made in a particular order. Know the materials, tools and equipment suitable for the task. Know the skills and techniques they are going to use to make their product.</p> <p><b>Second order concepts:</b> (<i>What students should understand</i>) Evaluate Stability Problem solving</p>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Choose suitable tools for making</li> <li>• Choose suitable materials and components for their products based on suitability of their properties</li> <li>• Measure, mark out, cut, score and assemble materials and components with more accuracy.</li> <li>• With support, join, assemble and combine materials and components</li> </ul> <p><b>Key Vocabulary/concepts:</b> Cut, fold, join, fix, structure, stiff, stable, strong, freestanding, materials/tools names</p>	<p><b>Can your children:</b> Talk about the steps they will take to make their product. Choose tools, techniques and materials that are suitable for the task. Use problem solving skills when things go wrong. <i>Y2 Explain choices made.</i></p>	<p><b>Horizontal:</b> Maths - use appropriate standard and non-standard measures. Name common 2D and 3D shapes Science - Properties of materials that make them suitable or unsuitable for particular purposes. English - Speaking and Listening - Build technical vocabulary</p> <p><b>Vertical:</b></p>
<p><b>Suggested activities:</b></p>		<p><b>Resources:</b></p>	<p><b>Useful links:</b></p>	
<p>Ask the children to revisit their design plans from last week. As a class, plan the order in which the structures will be made. Children collect the materials and tools required for their product. Encourage the children to evaluate their developing products by referring to the design criteria - <i>Does your structure stand up on its own? Is your structure strong enough? Is it stable?</i> Encourage children to problem solve when things go wrong - <i>What could you do to solve that problem? How can you make it stronger? How can you make it more stable?</i></p>		<p>examples of freestanding structures from previous session, construction kits, new and reclaimed materials, string, scissors, masking tape, glue</p>		
<p align="center"><b>5: Finishing - Can I improve the appearance of my product?</b></p>				
<p><b>Links to previous learning</b></p>	<p><b>Knowledge and second order concepts</b></p>	<p><b>Skills, Concepts and Vocabulary:</b></p>	<p><b>Assessment criteria:</b></p>	<p><b>Curricular links:</b></p>

<p>Pupils will have experienced making products using their choice of materials, tools and techniques. They will have evaluated their evolving work and will have experienced solving problems when things go wrong.</p>	<p><b>Substantive knowledge:</b> (<i>What students should know.</i>) That products need to be finished well to make them appealing to the user. Know a range of finishing techniques suitable for the product, including skills used in Art and Design.</p> <p><b>Second order concepts:</b> (<i>What students should understand</i>) Evaluate Finish Appearance Appeal</p>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Begin to use simple finishing techniques including skills learnt in Art</li> </ul> <p><b>Key Vocabulary/concepts:</b> Finish/finishing, appearance, appealing</p>	<p><b>Can your children:</b> Use simple finishing techniques suitable for the product they are making? Evaluate their developing products and use problem solving skills when things go wrong?</p>	<p><b>Horizontal:</b> Art and Design - use colour, line, pattern and shape. Use and develop drawing skills. Science - Properties of materials that make them suitable or unsuitable for particular purposes. English - Speaking and listening - Build technical vocabulary</p> <p><b>Vertical:</b></p>
<p><b>Suggested activities:</b></p>		<p><b>Resources:</b></p>	<p><b>Useful links:</b></p>	
<p>Remind the children about the importance of finishing their product and of the finishing techniques they investigated. Encourage children to return to their plans. <i>How are you going to make your products appealing? What finishing techniques did you plan to use. Do you still plan to use the same techniques?</i> Children finish their products with their choice of technique.</p>		<p>Finishing resources, e.g. pens, pencils, paint, computing software, collage materials</p>		
<p><b>6: Evaluating - How did I do?</b></p>				
<p><b>Links to previous learning</b></p>	<p><b>Knowledge and second order concepts</b></p>	<p><b>Skills, Concepts and Vocabulary:</b></p>	<p><b>Assessment criteria:</b></p>	<p><b>Curricular links:</b></p>

<p>Pupils will have made and finished products using a range of techniques. They will have evaluated their evolving work. They will have used problem solving skills to overcome any problems.</p>	<p><b>Substantive knowledge:</b> (<i>What students should know.</i>) That all new products are evaluated. That evaluations help products to develop. To evaluate their product by discussing how well it works in relation to the purpose and the intended user. To evaluate whether the product meets the design criteria.</p> <p><b>Second order concepts:</b> (<i>What students should understand</i>) Evaluate Improve Develop</p>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Begin to talk about their design ideas and what they have made</li> <li>• Begin to make simple judgements of how the product met their design ideas and criteria.</li> <li>• Begin to identify ways in which their product could be improved.</li> </ul> <p><b>Key Vocabulary/concepts:</b> Evaluate, design criteria, user, purpose, function, product, ideas, appeal, finish, improve</p>	<p><b>Can your children:</b> Make simple judgements about their products in relation to how well it works, whether it suits the intended user and whether it meets the design criteria. Identify ways that products could be improved.</p>	<p><b>Horizontal:</b> English - Speaking and Listening - participate in discussion, ask relevant questions</p> <p><b>Vertical:</b></p>
<p><b>Suggested activities:</b></p>		<p><b>Resources:</b></p>	<p><b>Useful links:</b></p>	
<p>Pupils engage in discussions about their own and other pupils' work. Develop evaluation through asking questions e.g. <i>Does the product suit the purpose? Does it suit the intended user? Does the product stand up on its own? How stable is the product? How well has the product been finished? Are the materials suitable for the product? How could the product be made more stable? More appealing?</i> Pupils complete an evaluation for their own product.</p>		<p>Evaluation sheets</p>		