

***Our Intent is: To support our pupils in answering the question, "How do we design, make and evaluate solutions to real and relevant problems?" Using creativity and innovation, we inspire pupils to develop skills which impact on daily life.***



**Forton Primary School  
Design and Technology**

**Pendle Class  
Spring 1  
Year B**

**N.C. LINKS: Design and Technology**

When designing and making, pupils should be taught to:

**Design**

- 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
- generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design

**Make**

- 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

**Evaluate**

- investigate and analyse a range of existing products

**Key Concept: Structures**

**Focus : Frame structures**

**Key Question: How can I make sure that my structure is stable and strong?**

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	<ul style="list-style-type: none"><li>• evaluate their ideas and products against their own design criteria and consider the views of others to improve their work</li><li>• understand how key events and individuals in design and technology have helped shape the world</li><li>• <b>Technical knowledge</b></li><li>• apply their understanding of how to strengthen, stiffen and reinforce more complex structures</li><li>• understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]</li><li>• understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]</li><li>• apply their understanding of computing to program, monitor and control their products</li></ul>
<p><b>Unit Overview:</b></p> <p>To use previous knowledge of structures to design and create a strong, stable structure.</p>	<p><b>Vocabulary:</b></p> <p>frame structure, stiffen, strengthen, reinforce, triangulation, stability, shape, join, temporary, permanent</p>
<p><b>Possible Outcome:</b></p>	

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playground shelter   market stall   bus shelter   tent   play  
house   gazebo   bird hide   parasol   park furniture   adventure  
playground equipment

design brief, design specification, prototype, annotated sketch,  
purpose, user, innovation, research, functional

**Intended User:**

themselves   parents   younger/older children local community  
walkers   market trader   gardeners   mountaineers   bird  
watchers

**Building on Prior learning when B follows A:**

- 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.

**Key Skills (Disciplinary)**

**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**

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- 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 3-D frameworks.
- Know and use technical vocabulary relevant to the project.

### **Sequence of Lessons:**

#### **1. Investigative and Evaluative Activities**

- Children investigate and make annotated drawings of a range of portable and permanent frame structures, e.g. tents, bus shelters, umbrellas. Use photographs and web-based research to extend the range e.g. *How well does the frame structure meet users' needs and purposes? Why were materials chosen? What methods of construction have been used? How has the framework been strengthened, reinforced and stiffened? How does the shape of the framework affect its strength? How innovative is the design? When was it made? Who made it? Where was it made?*
- Children could research key events and individuals related to their study of frame structures e.g. Stephen Sauvestre – a designer of the Eiffel Tower; Thomas Farnolls Pritchard – designer of the Iron Bridge. They could also learn about locally important design and technology activity related to their project.

#### **2. Focused Tasks**

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- Use a construction kit consisting of plastic strips and paper fasteners to build 2-D frameworks. Compare the strength of square frameworks with triangular frameworks. Ask the children to reinforce square frameworks using diagonals to help develop an understanding of using triangulation to add strength to a structure.
- Demonstrate how paper tubes can be made from rolling sheets of newspaper diagonally around pieces of e.g. dowel. Ask children to use these tubes and masking tape or paper straws with pipe cleaners to build 3-D frameworks such as cubes, cuboids and pyramids. *How could each of the frameworks be reinforced and strengthened?*
- Demonstrate the accurate use of tools and equipment. Develop skills and techniques using junior hacksaws, G-clamps, bench hooks, square section wood, card triangles and hand drills to construct wooden frames, as appropriate.
- Demonstrate skills and techniques for accurately joining framework materials together e.g. paper straws, square sectioned wood. Ask children to practise these, mounting their joints onto card for future reference.

### **3. Design, Make and Evaluate Assignment**

- Discuss the brief of designing and making a small-scale frame structure e.g. *Who is the intended user and what is the purpose of the frame structure? Will it be permanent, or can it be easily dismantled? What materials will you use? How will it be joined? How will it be reinforced? How will it be finished?* Children should be encouraged to generate innovative ideas, drawing on their research. Ask children to develop a simple design specification to guide their thinking.
- Children should produce a detailed, step-by-step plan, listing tools and materials.
- Children's sketches should be annotated with notes to help develop and communicate their ideas.
- Encourage children to model their ideas first using materials such as paper, card and paper straws e.g. *How will you make it stable? How will it stand up? How could you make it stronger? Where are the weak points? How could you reinforce them? What tools and materials will you need? How can you improve the design?*
- Encourage children to make their products with accuracy. They should regularly evaluate their work and their completed product, drawing on their design specification, and thinking about the intended purpose and user.

**Enhancements: A local walk to park.**

**End of Unit Outcome:  
Freestanding strong and stable structure.**