



Subject: Design & Technology

Topic: Structures - Bridges

Prior Learning:

- * To understand what a frame structure is.
- * To know that a 'free-standing' structure is one which can stand on its own.

National Curriculum:

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
- 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

Technical knowledge

- apply their understanding of how to strengthen, stiffen and reinforce more complex structures
- understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
- understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]
- apply their understanding of computing to program, monitor and control their products.

Teacher Knowledge

Teachers must read lesson plans and watch Kapow teacher videos prior to teaching each lesson. These cover the key knowledge for each lesson, as well as main concepts and skills that will be covered.

They can be found here:

<https://www.kapowprimary.com/subjects/design-technology/upper-key-stage-2/year-5/structure-bridges/>

Unit outcomes:

- Identify stronger and weaker shapes.
- Recognise that supporting shapes can help increase the strength of a bridge, allowing it to hold more weight.
- Identify beam, arch and truss bridges and describe their differences.
- Use triangles to create simple truss bridges that support a load (weight).
- Cut beams to the correct size, using a cutting mat.
- Smooth down any rough cut edges with sandpaper.
- Follow each stage of the truss bridge creation as instructed by their teacher.
- Complete a bridge, with varying ranges of accuracy and finish, supported by the teacher.
- Identify some areas for improvement, reinforcing their bridges as necessary.

Substantive knowledge	Disciplinary Knowledge	Vocabulary	
To understand some different ways to reinforce structures To understand how triangles can be used to reinforce bridges To know that properties are words that describe the form and function of materials To understand why material selection is important based on their properties To understand the material (functional and aesthetic) properties of wood	Designing a stable structure that is able to support weight Building a range of different wooden shaped bridges Independently measuring and marking wood accurately Select appropriate tools and equipment Using the correct techniques to saw safely Identifying where a structure needs reinforcement Adapting and improving own bridge structure Suggesting points for improvement	beam bridge arch bridge truss bridge strength technique corrugation lamination stiffness rigid factors stability visual appeal aesthetics joints	mark out hardwood softwood wood file/rasp sandpaper/glasspaper bench hook/vice tenon saw/coping saw assemble material properties reinforce wood sourcing evaluate quality of finish accuracy