

Willerby Carr Lane Primary School – Design and Technology

Topic: Bridges

Year: 5

Strand: Structures

What should I already know?

- Be able to use scissors and cut out carefully
- Be able to measure accurately using a ruler
- Be able to fold paper carefully and accurately
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What will I know / be able to do by the end of the unit?

Know how to strengthen paper	Know that by folding, rolling, weaving paper strengthens paper and that by folding paper backwards and forwards making a fan shape, creates triangles which strengthens the paper
Know that there are different types of bridges	Know that there are different types of bridges: Truss, beam, arch suspension
Know what makes a strong bridge	Evaluate structure of bridges Know that triangulation involves the use of triangular shapes to give stability to structures
Know which 2D shapes make a rigid construction	Know that triangulation involves the use of triangular shapes to give stability to structures Know how to strengthen, stiffen and reinforce more complex structures
Know how to strengthen, stiffen and reinforce more complex structures	Build a bridge using card and paper clips. Use knowledge of how to strengthen and reinforce structures to build a sturdy bridge Be able to score and cut card using scissors and/or snips Be able to use a hole punch or mushroom drill to make holes in card
Know of famous bridge designers and engineers	<u>Key figures in bridge building:</u> Gustave Eiffel Isambard Kingdom Brunel - Clifton Suspension Bridge, Bristol Joseph Strauss - Golden Gate Bridge Zaha Hadid - Sheik Zayed Bridge, Abu Dhabi Thomas Telford - one of first suspension bridges The Menai Suspension Bridge

Vocabulary

	Designing
design	A process that is completed to communicate your ideas clearly.
Structure	The way in which parts of an object are arranged or organised.
rigid	Unable to bend.
	Making
card	A piece of thick, stiff paper.
Paper clips	A device used to hold sheets of paper together, usually made of steel wire bent into a looped shape.
Paper fasteners	Or 'spilt pin' is used for holding multiple sheets of paper together. The fastener is inserted into punched holes in the stack of paper, and the leaves, or tines, of the legs are separated and bent over to secure the paper.
snips	Hand tools which are used to cut through tough materials.
Hole punch	A device or tool for punching holes in paper or thin card.
fold	Bend paper over on itself so that one part of it covers another.
reinforce	To strengthen or support a material.
score	A line scratched into a surface.
	Knowledge and Understanding
Beam bridge	A beam bridge is the oldest and simplest bridge design . Beam bridges are level structures with supports on each end and sometimes additional supports (called piers) in the middle.
Truss Bridge	A truss bridge is a bridge whose load-bearing superstructure is composed of a truss , a structure of connected elements, usually forming triangular units.
Suspension bridge	A suspension bridge is a type of bridge in which the deck is hung below suspension cables on vertical suspenders.
Arch bridge	An arch bridge is a bridge with abutments at each end shaped as a curved arch.
abutment	The substructure at the ends of a bridge span whereon the structure's superstructure rests or contacts. Single-span bridges have abutments at each end which provide vertical and lateral support for the bridge.

Key Design Decisions & Skills

- Investigate ways to strengthen paper
- Investigate which 2D shapes make a rigid structure
- Investigate different types of bridges
- Design and plan a bridge to specific success criteria

Design: Use design criteria to inform the design of a bridge fit for purpose. Generate, develop and communicate their ideas through discussion, annotated sketches/diagrams

Make: Use scissors, snips, hole punches, paper clips and paper fasteners to cut, shape and join card and paper in creating a bridge.

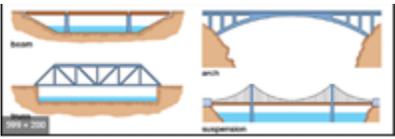
Technical knowledge: Apply their understanding of how to strengthen, stiffen and reinforce more complex structures when constructing the bridge

Evaluate: Test the bridge to see if it fulfils the success criteria. Evaluate their bridges against their own design criteria and consider how to improve their work

Tools and Resources

- paper
- card
- strong cardboard
- scissors and snips
- rulers
- paper clips
- brass paper fasteners
- string
- single hole punchers
- mushroom drill

Pictures





Gustave Eiffel



Isambard Kingdom Brunel



Joseph Strauss



Zaha Hadid



Thomas Telford