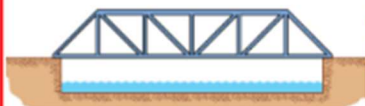
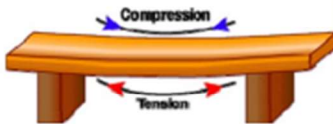


Key Knowledge

Learn this information

There are 4 main types of bridge construction:

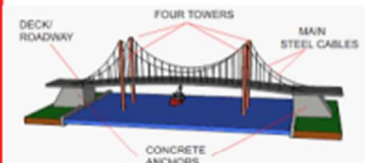
Beam bridge – The force of compression manifests itself on the top side of the beam bridge's deck (or roadway). This causes the upper portion of the deck to shorten. The result of the compression on the upper portion of the deck causes tension in the lower portion of the deck. This tension causes the lower portion of the beam to lengthen.



Cantilever/Truss bridge - a bridge built using cantilevers, structures that project horizontally into space,

supported on only one end. For small footbridges, the cantilevers may be simple beams; however, large cantilever bridges designed to handle road or rail traffic use trusses built from structural steel, or box girders built from prestressed concrete.

Arch bridge - a curved design, which does not push load forces straight down, but instead they are conveyed along the curve of the arch to the supports on each end. These supports (called abutments) carry the load of entire bridge and are responsible for holding the arch in the precise position unmoving position. Conveying of forces across the arch is done via central keystone on the top of the arch.



Hanging/Suspension bridge - suspend the roadway by cables, ropes or chains from two tall towers. These towers support the majority of the weight as compression pushes down on the suspension bridge's deck and then travels up the cables, ropes or chains to transfer compression to the towers. The towers then dissipate the compression directly into the earth.

Key Skills

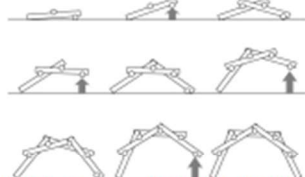
Practise and perform these skills

Create successful bridges, including Da Vinci bridges out of

1) Wooden blocks and lolly sticks (small scale)



2) Longer lengths of wood and dowels (larger scale).



How to build a large scale Da Vinci Bridge video:
<https://www.youtube.com/watch?v=QKdQV2q5PRk>



Bridges can **collapse** if they are not strong enough, or if they are put under too much force. Bridge disasters have previously been caused, this can be due to **worn out or inferior parts and materials** during construction and maintenance, **adverse weather** or **too much load** or traffic. Therefore, regular safety checks are very important.

Key Vocabulary

Understand these key words

Word	Definition	Word	Definition
Bridge	A structure across a river, road, or other obstacle.	Pressure	Continuous physical force exerted on or against an object.
Arch bridge	A semi-circular structure with abutments on each end.	Span (beam)	The distance between two bridge supports.
Abutments	Supports that carry the load of the bridge.	Framework	An essential supporting structure of an object.
Hanging/suspension bridge	A bridge that has its roadway suspended from two or more cables and is anchored at the ends.	Suspension	Supported by attachment from above; hanging.
Beam bridge	A rigid horizontal structure that is resting on two piers, one at each end.	Support	A thing that bears the weight of something or keeps it upright.
Cantilever bridge	A cantilever bridge is a bridge built using a cantilever.	Cantilever	Something that sticks out sideways from a support. It is only supported at one end.
Bascule bridge	A moveable bridge with an upward swing to provide clearance for boat traffic.	Truss	A truss is an assembly of beams or other elements that creates a rigid structure.
Draw bridge	Commonly refers to all types of moveable bridges, including bascule bridges.	Forces	Forces make things move and stop moving.
Compression	What happens when you push down on a spring and collapse it? - You compress it, and shorten its length.	Tension	What happens to a rope during a game of tug-of-war? - It undergoes tension from the two teams pulling on it.
Keystone/locking stone/Voussirs	Forces are carried across the arch via the keystone because its weight pushes the surrounding stones	Girder	A large iron or steel beam.

What I should already know

Through research and development of designs, I can make a functional, appealing product that is fit for purpose

Sketches of models can be annotated and cross-sectional

A wide range of tools and materials can be used to perform practical tasks

Investigate and analyse a range of existing products, evaluate their design and consider how they can improve their work

By the end of this unit:

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

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 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

Apply their understanding of how to strengthen, stiffen and reinforce more complex structures

TASK: Design a bridge and build a prototype model to scale.

Design Criteria

The bridge must span a gap of 50cm.

It must allow traffic to pass in both directions.

It must have a clearance of at least 20cm.

It must be strong.

It must be attractive.

(The prototype model for this bridge will be 100:1 scale)