

GGA Knowledge Organiser - Year 5 STEM Autumn Investigation – Structures, Forces and Loads

Making - Learning using Tools and Equipment

FPT – Focused Practical Task

Use paper straws and masking tape to trial your ideas before committing to using the actual materials. This ‘mock-up’ of your intended ideas will allow you to spot any potential problems before you use the actual materials which could result in wasted time and materials.

Temporary Construction

‘Dry Build’ your construction so that you can disassemble and re-arrange your design before committing to a final construction that has the components (parts) fixed in place. Discuss with your team the most effective methods using your knowledge from the glossaries terms and descriptions.



Craft sticks – like giant lollipop sticks, will act as your frame work for building your truss bridge.



Glue-guns are efficient because the glue dries quickly at room temperature. The glue is extremely hot after the trigger has released the glue so it is important that you do not touch it with your bare hands.



Making Tape is a temporary tape that will hold the different components in place whilst the glue dries as it can be re-positioned. It isn’t an efficient long-term joining method to secure your constructions.



Research, Designing & Planning

Kolb’s Learning Cycle (below)

Use this cycle to help you to continuously improve your design ideas and refine them until you have a successful outcome within the time constraints of the project.

Using your DT booklet, plan and prepare using the step by step pages of guidance number below.

1. Design Specification

Go through the specification carefully with your teacher to ensure you understand the task. Understand who or what you are designing for depending on your project.

2. Planning

The careful selection of tools, equipment and resources in order to make your 3D design accurately and with a good quality finish. Consideration is given to why they have been selected.

3. Design Development

To develop and refine the design on paper to ensure that any potential problems are identified before making (and possibly wasting materials)

4. Making and adapting

Making the design as per the instructions given, always adapting and adjusting the 3D model to get the most accurate and precise finish possible.

6. Evaluating

To understand your experience and learn from it e.g. new skills acquired, new knowledge gained

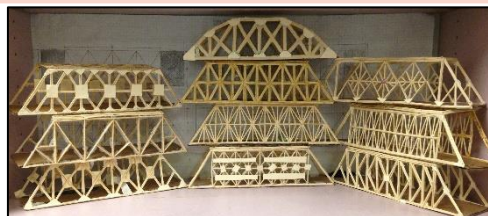


Why are we learning this?

To know how: to gain a basic understanding of the different types of structures and the forces and loads that affect them

Why is it important?

So that we understand how to: apply our learning to design engineer our own truss bridges based on the designs of Isambard Kingdom Brunel



Cross Curricular Opportunities

Art	Creativity to make the structure aesthetically pleasing
English	Evaluating your product in your DT booklet
Maths	Measuring, marking out and structuring the bridge design to ensure that assembly is accurate and meets all requirements
Science	Investigating structures, forces and loads

Key Technical Vocabulary-Glossary

Structures (man-made and natural)

- **Frame** – A network of bars/beams/poles e.g. Eiffel Tower, bicycles, Truss bridge, bird’s nest, tree boughs/branches
- **Shell** – Often light in weight acting as protection a ‘skin’ e.g. aeroplane, egg, aluminium drinks cans etc.
- **Mass** – A solid and dense structure e.g. dams and walls

Forces

- **Push** – exert pressure and force something in a specific direction – usually away
- **Pull** – to move something towards yours yourself by exerting pressure
- **Torsion** – to twist and force the two ends in opposite directions creating a spiral effect and narrower centre
- **Shear** – a force applied to cut or split a structure e.g. scissors cutting paper or card. a knife cutting bread or vegetables, an axe cutting wood etc.
- **Compress** – to squash and flatten by squeezing and/or adding pressure
- **Tension** – the opposite of compression, a pulling motion e.g. stretching out an elastic band or the strain on handles on a carrier bag full of heavy shopping

Loads

- **Static Load** – static, to be still e.g. a building putting pressure on the foundations/land it is built upon on, the load remains at the same weight .
- **Dynamic Load** – movement e.g. a lorry moving across a bridge and therefore the pressure is changing and being applied to the different areas it is travelling over
- **Point Load** – acting over a small area e.g.. pressure applied to a very specific point e.g. a hammer hitting a nail or columns bearing the weight of a roof
- **Distributed Load** – to distribute /spread out e.g. the load of the water distributed over the dam wall or a fizzy drink inside an agitated bottle/can (what happens when these mass and shell structures split?) The pressure of the river/cola bursts out.

Construction

Noun – to describe something that has already been built e.g. ‘the tower is a sturdy construction’
Verb - ‘the bridge is under construction, it is being steadily assembled’

Reinforce

To strengthen and/or support a structure with additional materials to fortify it and ensure it is secure.

Truss Bridge

A frame structure made from a series of wooden or metal triangles – known as trusses. Triangles are difficult to distort/misshapen when put under stress from various forces making them n extremely strong and reliable framework.

