



## Keyingham Graduate Award – Design and Technology – Year 23 – Autumn: Materials – Complex Structures

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### Element 1 – Materials – Complex Structures

#### What is a structure?

Dictionary definition tell us that a structure is a building or other object constructed from several parts.

#### Exploring Structures:

Have you ever seen a free-standing structure before? These are actually all around us – one of the most famous free-standing structures is the Humber Bridge.

#### What does free-standing mean?

It means not attached or supported by another structure – further examples of these would be: Swings or slides in a park, a chair, the Eiffel Tower and many games you may have played with like a marble run.

#### Stability:

When something is stable, this means it stands strong and is difficult to knock over. As a freestanding structure becomes taller, its centre of gravity rises. Stability in a structure can generally be increased by making the base wider, making the base heavier or adding buttresses (extra parts attached to the sides to give it more strength).

#### The Humber Bridge:



The Humber Bridge is just over 2 kilometres long and is classed as a single-span road suspension bridge. Cables are used, along with the towers, to allow this impressive structure to be supported and secure as hundreds and thousands of vehicles pass over it every week. Fun Fact: Each of the cables weigh 5,500 tonnes and can support nearly 20,000 tonnes.

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### Questions:

- 1) What is a structure?
- 2) What does it mean if a structure is free-standing?
- 3) Can you name 3 examples of free-standing structures you have seen?
- 4) What does 'stability' mean?
- 5) Why would the cables on the Humber Bridge need to be so strong?

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### Element 2

**Design Challenge – Can you make your own model of a bridge that can support objects on it? It must go over at least a gap of 50cm – you could make the gap even larger if you wanted more of a challenge.**

**Perhaps link it to Science and turn it into an investigation – how many objects/toy cars etc can your bridge support before it collapses?**

**Think about the different materials you could use and which properties would be suitable for this task. How could you fix them together? What might you need to add and where to make sure that it is stable?**

**Good Luck! Send a photo into school of your structure when it is built.**



