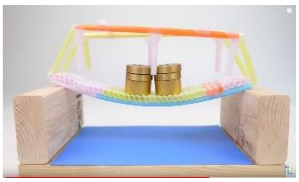
Design Technology

Structures Year 5

National curriculum	Vocabulary
Design To 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. To generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design . **Make** To select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately. To 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** To investigate and analyse a range of existing products. To evaluate their ideas and products against their own design criteria and consider the views of others to improve their work. To understand how key events and individuals in design and technology have helped shape the world. **Technology** To apply their understanding of how to strengthen, stiffen and reinforce more complex structures.	arch assemble attempt beam bridges criteria design doweling join manufacture reinforce research resilience STEM stiffen strengthen suspension

Investigate Technical knowledge	Design	Make	Evaluate
Year 5 / 6 – DT Skills			
-Know about inventors, designers, engineers, chefs and manufacturers who have developed ground-breaking products -How to reinforce and strengthen a 3D framework	Generate innovative ideas, drawing on research -Produce appropriate lists of tools, equipment and materials that they need	-Accurately measure, mark out, cut and shape materials and components -Accurately assemble, join and combine materials and components - Use a range of techniques to strengthen and stiffen structures, -Demonstrate resourcefulness when tackling practical problems	-Critically evaluate the quality of the design, manufacture and fitness for purpose of their products as they design and make
			

Learning objective	Lesson outline
Lesson 1: Investigate **LO: T**o know about engineers and design features of famous bridges. **DT Skills:** -Know about designers and engineers who have developed ground-breaking products	Research different types of bridges and their designs. Who designed them? Who manufactured them? The history of the local Humber Bridge; span, length, scale, suspension and how it is reinforced. Gain an understanding of key events and individuals in design and technology have helped shape the world. Children to identify the features of a suspension, arch, beam and cantilever bridge. In particular looking at the Humber bridge.

Lesson 2: Practical skills **LO:** To experiment with shaping and folding paper to strengthen a structure. **DT Skills:** How to reinforce and strengthen a 3D framework -Use a range of techniques to strengthen and stiffen structures -Accurately measure, mark out, cut and shape materials and components. -Accurately assemble, join and combine materials and components.	Design challenge Bridges and Structures | STEM Working in groups of 3 or 4, students create structures from a single sheet of A4 paper, the tallest free-standing tower and the longest possible span between two end supports. They then have to decide upon the best design, giving the opportunity for them to discuss which criteria to use for awarding marks. Creating two paper towers that can support platform (bridge). Children to experiment making different towers out of paper by folding and shaping to stiffen/strengthen. Which is the best design? What would be best to hold a bridge? Why? Children to take part in the challenge and share their results. Mixed ability competition groups.
Lesson 3: Practical skills **LO:** To experiment with shaping and folding paper to strengthen a structure. **DT Skills:** How to reinforce and strengthen a 3D framework. - Use a range of techniques to strengthen and stiffen structures. - Accurately measure, mark out, cut and shape materials and components. -Accurately assemble, join and combine materials and components.	Design challenge Bridges and Structures | STEM Students also have to test bridge structures for strength, which will require a systematic approach to investigate the best combination of arches and spans to use with three, four or five strips of card Using triangulation suspension techniques and arches to strengthen bridge. Children to experiment using technique from the challenge. Children to work in mixed ability groups and discuss their findings at the end of the lesson. Children to draw and annotate their findings in their books to use when making their bridge.
Lesson 4: Design **LO:** To produce a design for a bridge using knowledge of strengthening structures. **DT Skills:** Generate innovative ideas, drawing on research. -Produce appropriate lists of tools, equipment and materials that they need. -How to reinforce and strengthen a 3D framework.	Children to create their own detailed design of a bridge to replace the Humber Bridge. (not to scale). Children to communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams. Select appropriate materials and tools to create a resilient suspension bridge. Children to use practical skills lessons when considering how they will create the structures. Separate boxes on design paper which will include their findings from the past 2 lessons about how best to make the bridge strong and sturdy. Design criteria- what is it? What must the bridge be able to do? What checks must it meet?
Lesson 5: Make **LO:** To make bridge and adapt design during the making process. **DT Skills:** Accurately measure, mark out, cut and shape materials and components -Accurately assemble, join and combine materials and components. - Use a range of techniques to strengthen and stiffen structures,	Assemble their bridge according to their design, apply their understanding of how to strengthen, stiffen and reinforce more complex structures. Accurately measure, mark out, cut and shape materials and components. Accurately assemble, join and combine materials and components.

-Demonstrate resourcefulness when tackling practical problems.	
Lesson 6: Evaluate **LO:** To evaluate design of bridge using success criteria, saying what they would do to improve and why. **DT Skills:** Critically evaluate the quality of the design, manufacture and fitness for purpose of their products as they design and make.	Children to peer assess against success criteria and **C**ritically evaluate the quality of their design, manufacture and fitness for purpose. Children to fill out a critical evaluation. Children to reflect against their own design criteria. Have they met them? How? What would they need to do in order to meet the ones they didn't meet?

	End of unit assessment	
Working towards	Working at Age related expectations	Working at a greater depth