St James' Church of England Primary School
Design & Technology Overview Sheet

Year 5 – Structures: Bridges

Rationale: Pupils who are **secure** will be able to:

- Identify stronger and weaker shapes.
- Recognise that supporting shapes can help increase the strength of a bridge, allowing it to hold more weight.
- Identify beam, arch and truss bridges and describe their differences.
- Use triangles to create simple truss bridges that support a load (weight).
- Cut beams to the correct size, using a cutting mat.
- Smooth down any rough cut edges with sandpaper.
- Follow each stage of the truss bridge creation as instructed by their teacher.
- Complete a bridge, with varying ranges of accuracy and finish, supported by the teacher.
- Identify some areas for improvement, reinforcing their bridges as necessary.

Learning Objectives:

- Generate, develop, model and communicate their ideas through discussion and prototypes
- Select from and use a wider range of materials, components and construction materials according to their functional properties and aesthetics
- Investigate and analyse a range of existing products
- Apply their understanding of how to strengthen, stiffen and reinforce more complex structures
- 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
- Select from and use a wider range of tools and equipment to perform practical tasks

Overview:

Lesson 1: Arch and Beam Bridges - To explore how to reinforce a beam (structure) to improve its strength.
Lesson 2: Spaghetti truss bridges – To build a spaghetti truss bridge.
Lesson 3: Building Bridges – To understand where their food come from
Lesson 4: Finalising Bridges – To complete, reinforce and evaluate my truss bridge

Cross Curricular Links

Geography – human geography, including: types of settlement and land use, economic activity including trade links, and the distribution of natural resources including energy, food, minerals and water

Resources

• Two piles of books/bricks/blocks – these will need to be arranged so they are the same height (about 10 cm) • Eight single sheets of A4 card • Weights that can be used to test the strength of the bridge • A ruler • Glue • Scissors • Sticky tape or masking tape • Paper straws, paper tubes • Square rod wood pieces (10 x 10mm) • Saws (preferably tenon saws and bench hooks) • Sandpaper (small section per pupil) • Files (helpful, not essential) • Jelutong or Balsa wood (10x10mm or 5x5mm)

Impact/Assessment

Most Children will: • Identifying stronger and weaker shapes and points where structures typically failed. Recognise that supporting shapes can help increase the strength of the bridge and allow it to hold more weight. • Identifying beam, arch and truss bridges and describing their differences. Using triangles to create a simple truss bridge and supports a load (weight). • Cutting the required beams to the correct size, using the *Truss bridge cutting mat* as a visual reference. Smoothing down the rough cut edges with sandpaper. • Provide extra help by doing the making stages one at a time and reviewing with the children before moving on, this can break up the activity and also make it feel more manageable.

More Able Children will: • Recognising key factors that impact the strength of the bridge, including factors that they have not yet explored, for example, supports and materials. They can suggest a variety of ways to reinforce structures at the points at which they failed and provide verbal thoughts and solutions. • Articulating the difference between beam, arch, truss and suspension bridges and making an accurate and well-constructed truss bridge • Planning and cutting the required beams to the correct size, using a ruler and square to measure accurately after being provided with the sizes on Slide 11 or on the *Truss bridge cutting mat.* • Express the need to achieve a high-quality finish, sanded down, accurate with no gaps and secured at all joints effectively. Employ them as 'Construction assistants' to support the rest of the class or an assigned pupil if they finish their truss bridge ahead of schedule and can do no more to improve its strength.