

Student Guide

Activity Title: Structure is Key

Task One: Weight Support

You will need:

Paper (x1 A4 sheet divided into eighths)
Masking tape
Scissors
Ruler

Time:

20 minutes total

Team:

Your team will include 2-3 members of your class

Objective:

Build a stable platform that can withstand 1kg of weight with the given materials

Instructions:

Once your design is complete, bring the platform to the instructor for testing. If an attempt fails, you may attempt it again with a new set of paper after any other group has finished testing. DO NOT reuse any paper from the previous attempt. Once the structure succeeds, you will be allowed to move on to the second task

Specifications

The platform should be:

- *At least 8cm tall*
- Stable and free standing, you should not have to hold it up!
- Able to support 1kg



Task Two: Paper Bridge

You will need:

Paper (One A4 sheet)
Scissors
Ruler

Time:

20 minutes total

Team:

Your team will include 2-3 members of your class

Objective:

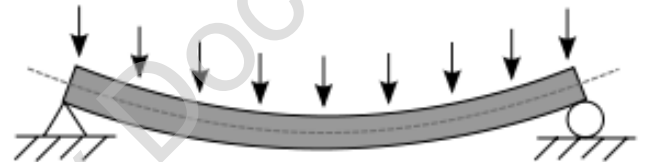
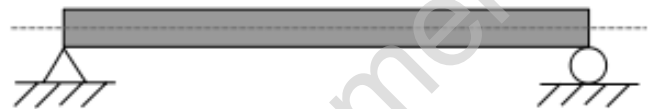
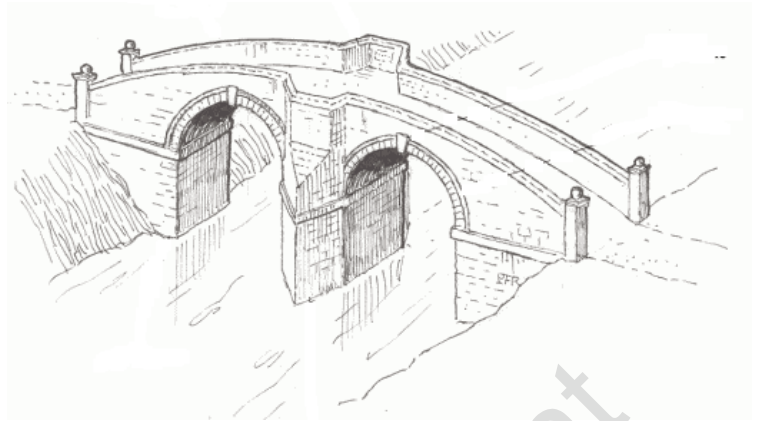
Build a paper bridge between two platforms that supports as much weight as possible.

Instructions:

- Once you think that your group is ready to test your bridge, ask the instructor for weights.
- Keep on trying different forms and designs. Consider the examples of structural design covered in class.

Specifications:

- The bridge must span a 15cm gap without attaching it to platforms.
- You will be able to place weights in any way you wish as long as they are placed between the platforms and above gap



Background Information:

Crossrail is among the most significant infrastructure projects ever undertaken in the UK. From improving journey times across London, to easing congestion and offering better connections, Crossrail will change the way people travel around the capital.

With 40 stations along the Crossrail route, including 10 brand new ones, the refurbishment and construction of stations along the Crossrail route is critical because without stations, people won't be able to use the incredible new rail service.

The primary task of **Architects** and **Civil Engineers** is designing and overseeing construction of structures. They are responsible for making these buildings safe and functional. Whether it is a home, Canary Wharf skyscraper, or tube station, buildings are designed to support much more than its own weight.

Have you ever wondered how the large structures like skyscrapers or long bridges support themselves?

How do old structures that are hundreds to thousands of years old manage to still stand?



A typical building has to be able to support thousands of tons of its own weight as well as the weight of everything inside it.

This is made possible through **Structural Design**. Structures are arrangements of materials designed for stability. They come in various shapes and sizes depending on their application and make better bridges and buildings. Therefore structural design is crucial in creating the smallest houses to the tallest skyscrapers.

What kind of shapes exist in bridges and buildings?

With the right structure, you could build the sturdiest of buildings with even the weakest materials like paper!

What dangers threaten the stability of a building or bridge? Are these dangers all physical?

