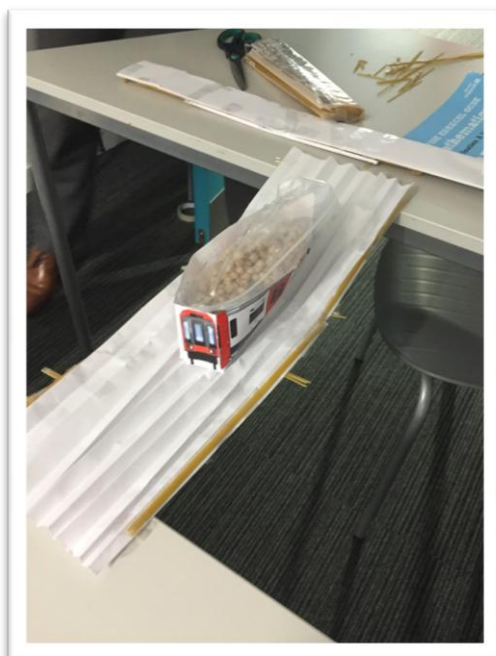
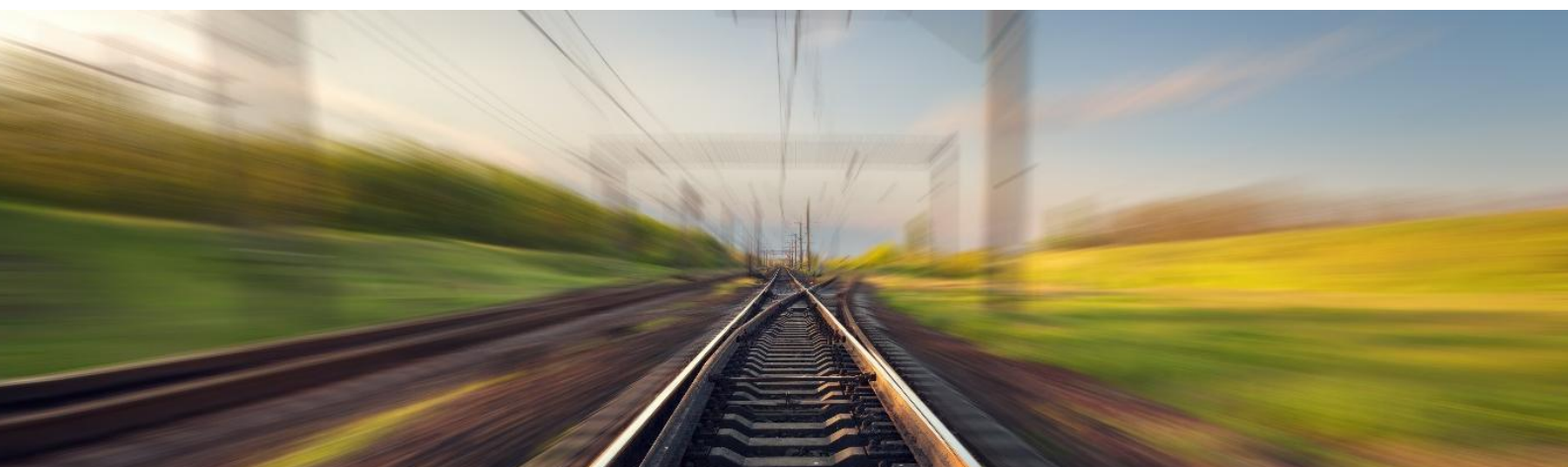


Rail Activity for Education

Railway Bridge Building Exercise



Ambassador/ Teacher Session Guide



Introduction & Activity Overview

This activity is designed with the idea to promote critical thinking, basics of design, engineering and innovation. This will in turn encourage teamwork and leadership from all those involved. This is a hands-on and fun activity to do, providing some introduction and insights to some areas of the railway industry.

The activity sets out a task for students to design and build a small scale railway bridge with provided materials capable of supporting the weight of a “train carriage” of varying load. This activity aims to teach basic structural knowledge, design, project planning, quantity surveying, and most importantly team work.

Activity Timings

Overall activity time: 60 minutes

Activity breakdown:

<u>Time</u>	<u>Description</u>
5 minutes	Set-Up and Activity Explanation
10 minutes	Design
30 minutes	Build
10 minutes	Test and Competition
5 minutes	Clean-up

Materials/ Equipment

Support Equipment:

- Session plan sheet (see below)
- Train cut-out sheet
- Dry chickpeas separated into two bags of different weights (to represent half laden and crush laden train scenarios)
- At least 2 tables with 50cm gap between (for bridges to span)

Building Materials:

- Packet of Spaghetti
- Packet of A4 Paper
- Roll of sellotape
- Spool of string

Step by Step Instructions

Please refer to the *Example Session Plan* (below) for reference to the activity sheet.

- Before beginning the activity, set up the room with a number of tables for students to work around in groups; 4-5 students per table is ideal.
- Ensure you have two tables set up with a 50cm gap between them for the bridge to span.
- As part of the activity will involve the students pre-planning how many materials they wish to “buy” to build their bridge, the materials need to be split up into pre-defined amounts they can buy. **1 credit** corresponds to the following amounts which should be pre-prepared:
 - 5 x Spaghetti
 - 2 x Sheets of A4 Paper
 - 50cm of Sellotape
 - 50cm of String
- Pre-prepare the “train” cut outs to hold the “passengers” (see Figure 1 below).
- When the students arrive, split them into groups of 4-5 and assign them to a “workspace” (table).
- Before you begin the activity, introduce yourself and explain about your job in the Railway to give the students some context. This should lead into the challenge faced in the rail industry of how railways cross rivers.
- Ask the students how they think this problem is addressed. Hopefully they will suggest tunnels or bridges, but if not then give them some assistance, eg. “What could help a train get over the water or under the water?”
- Now that the idea of railway bridges has been brought up, you’re ready to introduce the activity.
- Using the Activity Sheet for reference, explain to the students that their task is to build a 1:100 scale model of a temporary bridge that can be lifted into place and span the gap between the two tables. Explain that this model is to represent a temporary bridge that will span a damaged section of the rail bridge between Imperial Wharf and Clapham Junction, while a more permanent solution can be found. (Feel free to adapt this location if you’re not London based).
- Ask the students to split themselves into different team roles, for example:
 - *Project Manager* – Responsible for managing the project and leading the team members
 - *Designer* – Responsible for how the bridge will be made and how it will look
 - *Quantity Surveyor* – Responsible for working out the quantities of materials needed for the build and purchasing
 - *Construction* – Responsible for fabricating the bridge.
- The steps the students must follow for their bridge build are as follows:
 - Set project requirements (what the bridge needs to be capable of)
 - Design the bridge on paper
 - Work out how many of each material they will need for their design and set out a budget (NOTE: If during building stage a team discovers they require extra materials, cost for these subsequent materials doubles)
 - Build the bridge

- For the competition element of this activity, each group must offer their bridge up to the pre-set span across two tables. The challenges and scoring criteria are as follows:

Challenge	Scoring
Does the bridge support its own weight?	Yes = 0 points No = 5 points
Does the bridge have room for the train?	Yes = 0 points No = 5 points
Can the bridge support a half laden train load?	Yes = 0 points No = 5 points
Can the bridge support a crush laden train load?	Yes = 0 points No = 10 points
How much did the bridge cost?	Number of credits spent = number of points
Extra points	An extra point reduction (up to -10) may be awarded for aesthetics at the discretion of the organiser.

Important Note: This activity is suited to any size group of students but individual teams should comprise 4-5 students.