

Ambassador Guide

Activity Title: Structure is Key

Resources needed:

Screen for Presentation and explanation.
Enough Table space for crafts, accommodating the class size

Suggested Student Group Size:

3 - 4

Materials needed:

Weights (2kg total, 100g blocks x 20)
Two wooden Blocks (Can be substituted by two hardcover textbooks)

Materials needed Per Group:

Paper (40 precut eighth segments and 10 whole sheets)
Scissors
Masking Tape
Ruler

Optional materials

A box of Chocolates or Candy is suggested as prizes.

Related subjects:

Kinematic Physics, Material Science

Documents included:

Ambassador Guide
Ambassador PowerPoint
Student Activity Sheet
Evaluation Form

Total Estimated Time: 1 hour 30 minutes

Activity	Time (min)	Slides
1. Introduce Crossrail and Engineering	10	2-7
2. STEM Background	15	8-16
3. Introduce Activity	5	17-18
4. Activity Time	40	19-20
5. Discussion.	10	21-22
6. Presentation of design and Winner	10	23
7. Additional Activity	Additional Time	24
Total:	90	24

This Ambassador Guide is designed specifically for the **Structure is Key** activity. It includes information for the activity, and tips on how it could be best implemented. Please use this guide with the Ambassador Presentation to effectively conduct the programme.

Before the Classroom Checklist

- Get in contact with Young Crossrail (youngcrossrail@crossrail.co.uk) to ensure that you have the kits/materials needed to present the lesson.
- Review and customize the PowerPoint to your liking.
- Make sure you have sheets of A4 paper cut into eighth segments.

In the Classroom

- Prepare the precut paper in stacks of 8 to be given to the students.

Activity Instructions

Instructions

1. Give each group their designated materials
2. Explain requirements of the activity.
3. Facilitate building and oversee student testing
4. Distribute materials for second groups to groups finished with first task
5. Initiate Testing Phase
6. Await students who require replacement materials or want to test.

Requirements and Restrictions

These are also noted on the student activity sheets. They are meant to encourage students to apply the STEM principles they've learned. Be aware of these when testing their structures.

First Task: Supporting Weight

Materials to Distribute: 8 Strips of paper (eighths of A4), Masking Tape, Scissors, and Ruler

- Students build a stable platform that can withstand 1kg of weights with the given materials.
- Platform must be **at least 8cm** tall,
- Platform must be **stable** and **free standing**

Second Task: Paper Bridge

Materials to Distribute: One sheet of A4 paper, Scissors, and Ruler

- The bridge must span a **15cm** gap without attaching to platforms
- When testing students may place weights on the bridge in any way they wish, as long as they are placed between the platforms and above the gap.

Organization

Keep track of time during the activity and closely monitor students' progress to ensure they are moving at an adequate pace

Phase	Time (min)
Explanation	5
First task	20
Second Task	20

There will be testing required for both tasks. Be aware of what order students came in and how much materials they are using.

After the Lesson

Ensure that all the materials have been returned by completing the check list in each kit.

Activity Tips

Q: What if the students are struggling to construct a platform or bridge?

A: Allow students to think about the issue. Ask them to remember what was covered in the presentation and give hints or reminders. If they are still struggling, show them a diagram or example picture from slides 8-13.

Q: My students have difficulty further improving their initial bridge design.

A: Explain that there is always a better way of solving the problem or making something better. Ask them to keep trying, and give a prize for each step of improvement.

Q: What if the students' designs don't work?

A: Sometimes things go wrong. It's important to show the students what worked in other cases and what didn't work in their case. Try asking what they could have done better and what they learned.

Presentation and Discussion Tips

Q: How do I deal with disruptive behavior in the classroom?

A: One effective way of preventing this is to set ground rules for students when the presentation begins, such as no talking when the ambassador is talking, no talking over others, etc. Making sure that the class as a whole agrees to follow such rules allows you to enforce the rules when they are broken.

Remember that you are not the only responsible adult in the classroom and that there are full time teachers who will help oversee the students. Ask the student for a reason behind the misbehaviour and if there is anything that you can do to help. Offer different seating arrangements, or show them that they are disrespecting the other students.

Q: There are students who dominate the discussion or activity work, while others are too shy to speak out and hardly participate. How do I promote equal participation?

A: Repeatedly emphasize that the most important element of engineering is planning and teamwork. Encourage students to work as a team and come to decisions for the activity after discussion amongst themselves. Allow students to produce responses to questions as a small group, so that students who are too shy to speak out in class are still able to contribute within the team. If a single student is repeatedly answering questions, you can always engage others by saying something like, “I think we haven’t heard from this side of the class yet?”

Q: There are students who show disinterest in the presentation and the subject material. How should I handle this kind of students?

A: The first step is to get them involved. Use small prize elements such as chocolates to reward correct answers and participation in questions. This will initially make students focus more on what is being presented, but eventually allow them to find an element that interests them.

Second, remember to address how the subject matter and the engineering challenge is relevant to their day to day lives. Connect real-world examples and applications to the engineering principles instead of presenting them as just another subject.

Third, when providing your professional background, remember to bring up exciting experiences relating to your work, and how math and sciences are a tool you use in work, rather than just a subject you learnt.

Q: How do I make sure that students will have a positive, educative experience with the programme?

A: When the activity progresses, ask students to justify their actions and decisions. Utilize the reflection prompting questions that are provided with the Ambassador Presentation and Activity Sheets.

After you explain information, ask simple questions that allow students to review what they have learnt. This way, the key concepts are fresh in their minds as they begin the activity.

Remind students that the activity could easily be replicated or adapted to crafts at home. Encourage students to try different activities at home using materials they have seen being used.

Additionally, if a student makes a good point in a classroom discussion, be sure you give them ownership of that contribution, with prize or recognition. Students will gain confidence and actively participate.

Q: What are some different ways I can structure the discussion?

A: There are two main ways you could structure the discussion

One way, called “Snowball” for various opinions and details to collect and be accessible to everyone in the class. Begin by engaging the students with discussion questions in their respective groups. Then, after a certain amount of time, join two or three groups to share their discussions. Finally, bring the discussion to the entire class, allowing individual students to speak out about their group’s approach to the activity, design of the product, etc. and see how each group had different ideas.

Another way to make sure individual students are participating is called the “Marketplace Format.” Allow students to discuss their approach to the challenge provided in the activity in their activity groups. Then, ask the students to form groups consisting of one member from each activity group, and ask them to share what they did to members from different activity groups. This allows individual students to explain the groups design, and promotes each student’s participation in discussing and sharing ideas.