

CONSTRUCTION

BOX 4:

Building a Lego Brick Bridge

a blended learning activity for
primary aged children at home
or in school, developed by

NASCENT



PLACE 21

Connections, Qualifications
and Character Strengths



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AN INTRODUCTION TO THE CONSTRUCTION BOXES:

Over the last few years, scientists at West Suffolk College have been developing “science boxes” for primary schools, to ensure that children of all ages get to do practical, hands-on science throughout their school life. In response to these unusual times, since March 2020 the science boxes have been adapted to be used for “blended learning” this means they are now suitable not just for schools but also for carrying out in the home, they became “virtual” science boxes.

We are now delighted to begin providing virtual Construction Boxes: using the same simple, easy to read portfolio format with concise instructions, curriculum links and further guidance pathways.

Unlike science, construction is not a part of the primary curriculum, however practical construction projects such as this do encompass many areas of the curriculum such as numeracy and mathematics, language and literacy, science and working scientifically, art and design.

While all the construction box projects can be carried out by a single child, they are designed for groups giving pupils the opportunity to collaborate in a work-like project where a variety of skill sets are needed.

This is the “portfolio” and it contains all the information needed to carry out the activity at home or in school. Where appropriate, notes for non-teachers such as parents and carers are highlighted in yellow to further support home delivery.

SUMMARY:

This is a simple summary of the activity and what the children are going to be learning about

This activity involves building a bridge using Lego bricks, and for many children no guidance will be necessary.

KIT LIST:

This page describes all the “kit” that you’ll need, as well as any hazards that may arise from using it... in other words, what you’re going to need and what to be careful about

You will need?

Lego bricks. Initially you will need an assortment of bricks, it really doesn’t matter what exact bricks they are if you have a good assortment of bricks and plates (flat bricks). Having constructed a bridge of random bricks you may wish to challenge the children to use just one type of brick.

Potential Hazards

Treading on Lego bricks can cause injury without shoes.

This is what you
are going to do 😊

ACTIVITY OUTLINE:

1. Investigate Real Bridges:

The following links and references give some examples of real bridges and their construction as well as teaching guides for all ages and scenarios.

Teaching Bridges: The Rochester Bridge Trust

This trust has an excellent range of resources and lesson plans for primary schools on the topic of bridges, this is a great place to start as pupils are guided around the website by Langdon, a friendly lion who loves to learn about bridges and wants to share what he knows with the pupils.

<http://www.rochesterbridgetrust.org.uk/>

Institute of Civil Engineers (ICE) Do-at-home activities for all ages

These activities have been designed to be done in the home using house-hold items for ages 4 upwards, with add-on challenges for 11-16s and 16-18s, some parental supervision required, the best one is the Chocolate Bar Bridge! <https://www.ice.org.uk/what-is-civil-engineering/inspire-the-next-generation/educational-resources#primary>

The History of Bridges

We've come a long way since the Romans figured out how to cross a wide river using timber and this online timeline from ICE contains some of the most spectacular examples. Starting in 1826 with the Menai Suspension Bridge and culminating with some of the most stunning bridges currently under construction. <https://www.ice.org.uk/events/exhibitions/ice-bridge-engineering-exhibition/the-history-of-bridges>

Bridge Engineering Exhibition

Virtually visit the ICE Bridge Engineering Exhibition using a 3D video to walk around. It uses the same approach as Google Earth, simply click on the arrows to move yourself around the exhibition. <https://www.ice.org.uk/events/exhibitions/ice-bridge-engineering-exhibition/walk-around-the-exhibition-online>

World Record Breaking Lego Bridge

In the summer of 2016, the Institution of Civil Engineers (ICE) attempted to break a Guinness World Record using LEGO bricks. In this video, ICE member and civil engineer Claire Gott takes us behind the scenes of the bridge build and follows the engineering story behind the world record break. <https://www.youtube.com/watch?v=UwltJLBf5Wk>

See how the Lego bridge was built and the engineering skill that went into this record-breaker - it may be made of simple 'interlocking plastic bricks' but it still needed the same talent and experience that goes into its steel equivalents – as these three videos show.

<https://www.ice.org.uk/events/exhibitions/ice-bridge-engineering-exhibition/building-the-lego-bridge>

Home-Schooling Lego Bridge Activity

This link shows how an American mum runs this activity with her children at home.

<https://frugalfun4boys.com/lego-bridge-building-challenge/>

Engineering for Nursery and Reception Classes

Nursery rhymes contain a surprising amount of engineering. Here are some ideas you could discuss with the teacher if you want to engage the very young, the first topic in this useful set it bridges. <https://www.ice.org.uk/ICEDevelopmentWebPortal/media/Documents/what-is-civil-engineering/Nursery-to-reception-ICE-STEM-activity-workbook.pdf?ext=.pdf>

Civil Engineering in your Town

Another great resource from ICE, a 30-40 minute classroom activity for younger primary school children. Spot the civil engineering projects in this fun picture of a town.

<https://www.ice.org.uk/ICEDevelopmentWebPortal/media/Documents/what-is-civil-engineering/ICE-Civil-Engineering-in-Your-Town-activity-sheet.pdf?ext=.pdf>

Twinkl Bridge Building Activity

This teacher-made activity guides children through the process of planning, designing and making a bridge from basic materials, like cardboard, paper, sticky tape, masking tape, glue and a glue gun. <https://www.twinkl.co.uk/resource/t2-d-071-structures-planning-designing-and-evaluating-a-bridge-booklet>

KS2 Arch and Beam Bridges PowerPoint

This excellent TES PowerPoint exposes children to a range of pictures of arch and beam bridges, explains their main features and encourages children to design and label their own bridges using straws. <https://www.tes.com/teaching-resource/ks2-arch-and-beam-bridges-powerpoint-6423491>

2. Set the scene:

In our imaginary Lego brick world there is a river running through the centre of a town called Ogel (Can you work out where we got this name from? It is Lego spelt backwards).

Most people live on one side of the river, but the schools and shops are on the opposite side, so the people must use boats to cross. The people in Ogel care about the environment and don't like to use power boats and cars for short journeys, they like to cycle or walk and to cross the river using rowing boats.

Lenny has only one arm and he must use a power boat to take his children to and from school, Lucy is finding her rowing boat harder and harder work as she gets older and she really wants to be able to cycle into town to do her shopping.



Luckily their friends have come up with a plan, they are going to build a bridge that the people of Ogel can walk and cycle across to join the two sides of the town.

Can you help Lena, Lata, Lenny, Lars and Lucy build the bridge for the town of Ogel?

3. Locating the Bridge

Some children may find visual goal of the distance their bridge should span, this could be drawn onto sheets of paper, a piece of blue fabric or a length of tin foil.

If the activity is being conducted outside a tray of water could be utilised or even a puddle or stream but remember Lego bricks don't fix together if they are packed with mud and debris to this activity may be best carried out indoors.

Remember the wider the bridge, the greater the challenge.

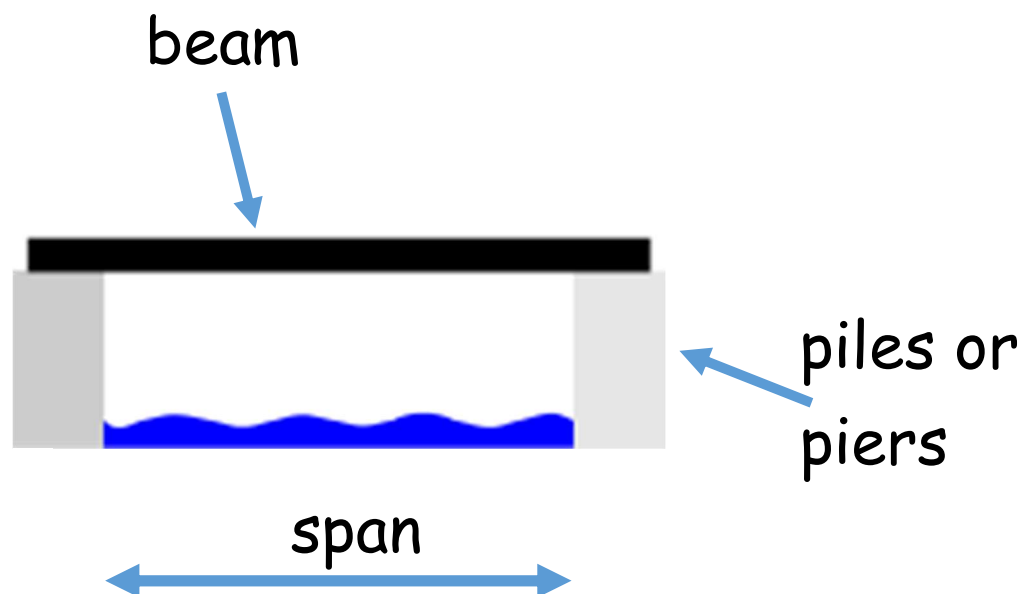
4. Constructing the Bridge

Having explored the topic by looking at the example links provided the children will have a strong idea of where to begin, they will learn by trial and error what works and what doesn't, they will begin to be able to explain why what they tried didn't work and will be able to work independently.

5. Discussing Bridges

There is opportunity to extend vocabulary; they will learn about the concept of a bridge's **span**; what it means to **reinforce** something; how **overlapping** bricks adds strength; what is the bridge's **beam** (the horizontal part of the bridge); the bridge's **piles or piers** (the upright supports).

Older children might draw and label the part of a bridge, this is an extensive topic and is an opportunity for online research.



6. Extending the Activity

This activity might be extended by adding a set weight that the bridges might support; by increasing the span (and thus the potential need for more piles); by limiting the number or type of bricks that might be used; or by ensuring the bridge is perfectly symmetrical.

CROSS-CURRICULAR LINKS:

Construction is not part of the primary curriculum, but as described in this brief list, it links many core areas

Numeracy and mathematics:

The building materials can be counted, measured and calculations made as to quantity and overall dimensions made depending upon the ability of the pupils.

Language and literacy:

Nursery rhymes contain a surprising amount of engineering references and in general construction activities give an opportunity to broaden vocabulary and concepts.

Science:

Children shall work scientifically while investigating the bridge construction.

Art and design:

Having created a functional bridge, the children might be encouraged to improve on the appearance and explore the relationship between form and function.

FIND OUT MORE: USEFUL LINKS

These links of short videos and written resources should help you and your children understand more about the construction box activity

Many links and references for this activity are included in section 1 of the Activity Outline beginning on page 4.

WEB RESOURCE: The national curriculum in England Key stages 1 and 2

The entire national curriculum for primary schools as a PDF or Word Document

<https://www.gov.uk/government/publications/national-curriculum-in-england-primary-curriculum>

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