Building
STAGE 2 SUGGESTED CLASSROOM ACTIVITIES

Science

ST2-14BE - Describes how people interact within built environments and the factors considered in their design and construction

Student Activity:
Do some research on each of the following different types of bridges:

• Beam bridge
• Arch bridge
• Truss bridge
• Suspension Bridge
• Cable Stay Bridge

Explain what each type of bridge is, how it works and where it has been used. Include a drawing of each different type of bridge.

ST2-5WT - Applies a design process and uses a range of tools, equipment, materials and techniques to produce solutions that address specific design criteria

Student Activity:
Explain to your students that bridges are categorized into three primary types: suspension, beam, and arch. Each is designed and built according to certain principles of engineering. Instruct students to research and compile a list of materials required for bridge engineering. In groups students are going to make a bridge using the following materials: 20 drinking straws, one metre masking tape, two stacks of books, metre ruler, jar of coins. They need to follow these rules of engineering:

• For the two ends of the span, students will use two stacks of books placed 25 centimetres apart.
• The only materials students may use for the bridge itself are 20 drinking straws and 1 metre of masking tape.
• The straws may be shortened, bent, or cut.
• No part of the bridge may touch anything between the two ends of the span.

Using their knowledge of bridge engineering they must choose which type of bridge to build, brainstorm ideas, make sketches, choose a final design and build their bridge. At completion, the bridges need to be tested and modified. Groups present their bridges and test each one by seeing how many coins can be placed on them.
### Mathematics

**MA2-14MG** - Makes, compares, sketches and names three-dimensional objects, including prisms, pyramids, cylinders, cones and spheres, and describes their features, selects, analyses, presents and applies research and experimentation from a variety of sources

**Student Activity:**
Have a look at pictures of the following types of bridges: beam, arch, truss, suspension, cable style. Ask students to use any knowledge that they gained to make one of the bridges from 200 paddle pop sticks and glue. Do this in groups of 3 or 4. The bridge will have to span a 20 cm space and be able to hold a full 600 ml water bottle. The bridge will be tested by being put on two chairs 20cm apart to see if it can hold the weight. Students should verbally plan their bridge, and then draw a plan of their bridge. This plan should be approved by the teacher and then made from the paddle pop sticks.

**MA2-9MG** - Measures, records, compares and estimates lengths, distances and perimeters in meters, centimetres and millimetres and measures, compares and records temperatures

**Student Activity:**
In groups of 5 or 6 students, design and build bridges out of materials in the classroom. Tables, chairs, lego or cardboard could be useful. Estimate, measure and record all lengths and distances as you go. List these recordings as centimetres as well as millimetres. Test the strength of your bridge carefully. To increase the complexity set a target weight that the bridges need to be able to hold, for example 3 books or 3 kilos.

### English

**ENS2-5** - Thinks imaginatively, creatively, interpretively and critically about information and ideas and identifies connections between texts when responding to and composing texts

**Student Activity:**
Research and list all the bridges within 100 KMs from your school. Find out what type of bridge each one is (suspension, beam or arch.) Also find out when it was built. Suppose all these bridges were closed for a whole week? What effect would that have on your local area? Discuss with a partner and record your answers. What are some specific ways that people would adapt to not using bridges? Record your answers and share with the class.

*Mapped to Australian Curriculum and NSW BOSTEC standards as at March 2014*
BUILDING
STAGE 2 SUGGESTED CLASSROOM ACTIVITIES

Name

Pick one of the following famous bridge collapses and answer the questions at the bottom of the page

<table>
<thead>
<tr>
<th>Bridge Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quebec Bridge, Canada</td>
<td>Douro River Bridge, Portugal</td>
</tr>
<tr>
<td>Silver Bridge, Ohio</td>
<td>Daman Bridge, India</td>
</tr>
<tr>
<td>Koror-Babeldaob Bridge, Palau</td>
<td>Hyatt Regency Skywalks, Kansas City</td>
</tr>
<tr>
<td>Songsu Bridge, Seoul</td>
<td>Bihar Bridge, India</td>
</tr>
<tr>
<td>I-35W Bridge, Minneapolis</td>
<td>Volgograd Bridge, Russia</td>
</tr>
<tr>
<td>Tacoma Narrows Bridge</td>
<td>Motorway Bridge, Granada</td>
</tr>
<tr>
<td>Rainbow Bridge, China</td>
<td>Sunshine Skyway Bridge, Florida</td>
</tr>
<tr>
<td>Injaka Bridge, South Africa</td>
<td>Hintze-Ribeiro Bridge, Portugal</td>
</tr>
</tbody>
</table>

Bridge Name:

Bridge location:

Year of collapse:

Deaths:

Age of bridge at time of collapse:

Cause of collapse:

Materials used to build the bridge:

Was the bridge replaced? When?

Other interesting facts about the bridge collapse and / or rebuild:
## Science

**ST3-5WT** - Plans and implements a design process, selecting a range of tools, equipment, materials and techniques to produce solutions that address the design criteria and identified constraints.

**Student Activity:**
Watch the following 2 minute video: [http://science.howstuffworks.com/29829-understanding-bridge-designs-video.htm](http://science.howstuffworks.com/29829-understanding-bridge-designs-video.htm). Work in groups of 4 to build a bridge. You can use 200 paddle pops sticks and glue. Your bridge will have to span 35 cm's and at completion must hold a 600mL bottle of water. Plan which bridge your group will build and draw a plan of your bridge. You will need to plan, design, predict and evaluate.

**ST3-14BE** - Describes systems in built environments and how social and environmental factors influence their design.

**Student Activity:**
Use the following video to find out about 25 of the most unique bridges in the world: [https://www.youtube.com/watch?v=MFXKi7xI9xw](https://www.youtube.com/watch?v=MFXKi7xI9xw). Choose ten of the bridges shown in this video and discuss how environmental factors influenced their design.

## Mathematics

**MA3-9MG** - Selects and uses the appropriate unit and device to measure lengths and distances, calculates perimeters, and converts between units of length.

**Student Activity:**
In groups of 5 or 6 students, design and build bridges out of materials in the classroom. Tables, chairs, lego or cardboard could be useful. Test the strength of your bridge carefully. To increase the complexity set a target weight that the bridges need to be able to hold, for example 3 books or 3 kilos. Measure lengths, distances and perimeters and record them in both centimetres and millimetres. Present this in a table.

## Creative Arts

**VAS 3-2** - Makes artworks for different audiences, assembling materials in a variety of ways.

**Student Activity:**
Do some online research: “best bridges in the world” and search for images. Use these as your inspiration to create your best art work ever! Choose one specific bridge which will then become the name of your artwork. Choose whatever medium with which to work. Enjoy!

**Student Activity:**
Print a variety of images of bridges onto an A4 page each. Make sure there are enough for each student in the class. An online search for “unique bridges of the world” will present some great images. Hand these out to students and ask them to find and measure all the angles they can find. See if they can name the different types of angles they find as well.
Name

1. Pick one major international bridge collapse. Write an information report and present it using a ‘Power-Point’ presentation. Write the name of your bridge here:

2. Make a list of ten different bridges in Australia:

3. Plan and design the building of a town of 15 families. In your town there must be a house for each family, a river, a way to cross the river, a petrol station, a collection of shops, a school, roads and ways to make the town a beautiful place to live. Begin by designing your plan here:
Certificate of Achievement

Congratulations

........................................
on completing your studies of
BUILDING
From
“Enquiring Minds”.
You are well on your way to becoming an ENGINEER

Signed Dated
### Building

**STAGE 4 SUGGESTED CLASSROOM ACTIVITIES**

#### English

**EN4-2A** - Effectively uses a widening range of processes, skills, strategies and knowledge for responding to and composing texts in different media and technologies

**Student Activity:**

Research a bridge disaster. Write a newspaper article reporting on the bridge failure as if it had just occurred.

#### History

**HT4-1** - Describes the nature of history and archaeology and explains their contribution to an understanding of the past

**Student Activity:**

Students choose a well-known building from the time period they are studying and create a research report on it. Students are to gather as much information as they can about the people and the society from the design, structure and function of the building they are researching.

#### Geography

4.8 - Describes the interrelationships between people and environments.

**Student Activity:**

Students select a cultural site from the World Heritage Listings. Create a poster on that site - what it is? What it is or was used for? How was it built? What is the significance of the site to society?