



Design a Bridge



Preparation

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| CLASS LEVEL | First – sixth class |
| OBJECTIVES | <p>Content Strands and Strand Units Energy & forces, Forces, Materials, Properties and characteristics of materials The child should be enabled to investigate how forces act on objects SESE: Science Curriculum page 45. The child should be enabled to investigate how materials may be used in construction SESE: Science Curriculum page 66.</p> <p>Skill development Through completing the strand units of the science curriculum the child should be enabled to carry out simple investigations where the problems, materials and methods are suggested by the teacher SESE: Science Curriculum page 37. Exploring how to make a paper bridge stronger would enable the children to achieve this objective.</p> <p>Designing and making</p> |
| CURRICULUM LINKS | <p>SESE: History Local studies/explore some feature of local environment, e.g. ...bridge.../my locality through the ages/important events...erection of bridges/Early people and ancient societies/ Where people settled in Ireland (near rivers and built bridges, e.g. Ath Cliath) Continuity and change over time/ technological and scientific developments over long periods</p> <p>SESE: Geography Human environment/ features of the built and natural environment / County, regional and national centres/ origins and geographical significance of place names, e.g. Newbridge.</p> <p>Visual arts Construction / making constructions / make drawings from observations to analyse the structures of buildings Construction / looking and responding / look at collections or photographs of built structures</p> <p>Mathematics Shape and space / 3-D shapes</p> |
| BACKGROUND | Children will have played with building blocks and made simple structures. |
| MATERIALS/EQUIPMENT | Paper, Coins, Blocks or books (i.e. things to make two banks of a river). Other materials as available |
| PREPARATION | Gather the materials. Decide a suitable span for the bridges made during the activity. For fair testing a width of 'river' of 14 cm, and A4 paper lengthways works well. |
| BACKGROUND INFORMATION | The material from which a structure is made is important but you can strengthen a material by changing its shape. Bridge designers often use different shapes, e.g. arches and triangles. The curve of the arch spreads the load on the bridge and makes it stronger. |

Design a Bridge

Activity

SETTING THE SCENE

Find a context where children have to think about crossing a river. This might be a story or a local river crossing. Find out what children think and know about bridges. They may mention tunnels as well as a means of getting across.

Have a display of pictures of bridges.

Visit a local bridge.

Do this introductory work on the day prior to doing the activity.



TRIGGER QUESTIONS

What is a bridge?

Where would you find bridges?

What are bridges made of?

What makes a good bridge?

What types of bridges are there? Can you name any?
(Bridge designs include arch, suspension etc.)

Can you find out about the tallest bridge in the world, opened in December 2004?

Ask the children to draw a bridge they know or have crossed. They can count how many bridges (if any) they meet on the way home.



DEVELOPMENT OF ACTIVITY

What can be changed about a bridge?

Ask the children. (Generally the shape and the materials.)

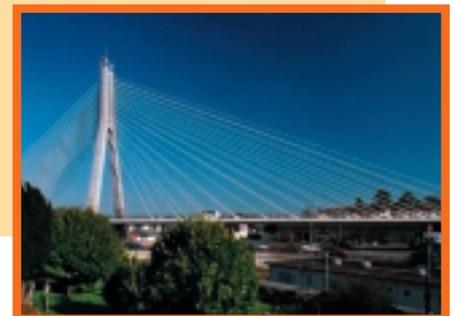
Decide where the river will be. Two piles of books the same distance apart on each table will provide opportunities for children to test any bridges they make.

Get the children to make a simple bridge using e.g. 1 page of A4 paper. The children can test its strength by adding coins or other masses.



SAFETY

Care with coins (weights) falling.





Design a Bridge

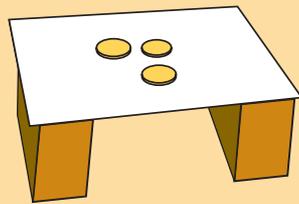


ACTIVITY

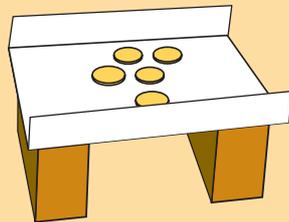
Explore how to make a paper bridge stronger

Using the blocks or books, paper and coins ask the children to design a bridge that will take the heaviest weight. (For fair testing use the same width of 'river', e.g. 14 cm, and use A4 paper lengthways).

Try the following and record the results:

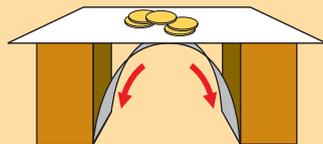


- 1) Make a bridge from one piece of paper and test its strength by adding coins or other masses until the bridge collapses.

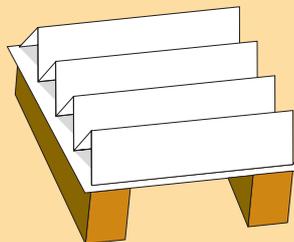


- 2) Use two pieces of paper and test again.

- 3) Use one piece of paper and fold up sides, i.e. a walled bridge



- 4) Make an arch (using two pieces of paper).



- 5) Make a corrugated bridge.

- 6) Make a bridge out of a different material.

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Review

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| REVIEW | <p>Ask the children to review their investigation.</p> <p>What have they found out about bridges?</p> <p>What have they changed about the bridges they made? <i>(They have changed the materials and the shape of their bridges.)</i></p> <p>What else could they change?</p> <p>If you change the distance between the supports will the bridge support the same load? <i>(Try it, make the river wider!)</i></p> <p>Note: <i>A shape which is weak in one direction may be stronger in another. The weakest bridge is often the flat sheet of paper. Then, in order of increasing strength, the walled bridge, the arched bridge, and finally the corrugated bridge. The children may be amazed at the strength of the corrugated bridge. Sheets of steel which are used to make the floor of a car have folds put in them. But this sort of bridge might be hard to drive across - how could you make a smooth roadway across a corrugated bridge?</i></p> |
| ASSESSMENT | <p>Ask the children to draw a picture of their favourite bridge and to explain the design features.</p> <p>Discussion and observation – the teacher and the child/children could discuss their work about bridges. The teacher could ‘actively and purposefully’ observe the children’s work, She/he could make notes about how the children are learning and what they are learning and understanding.</p> |
| FOLLOW-UP ACTIVITIES | <p>A similar open-ended activity could be conducted using art straws instead of paper.</p> <p>The children could be asked</p> <ul style="list-style-type: none">🎯 Can you come up with a design of your own?🎯 How would you build your bridge?🎯 How would you build a bridge that would support 1 kg (e.g. a bag of sugar)? <p><i>For more work on bridges see</i></p> <p>http://www.exploratorium.edu/structures/index.html</p> |

