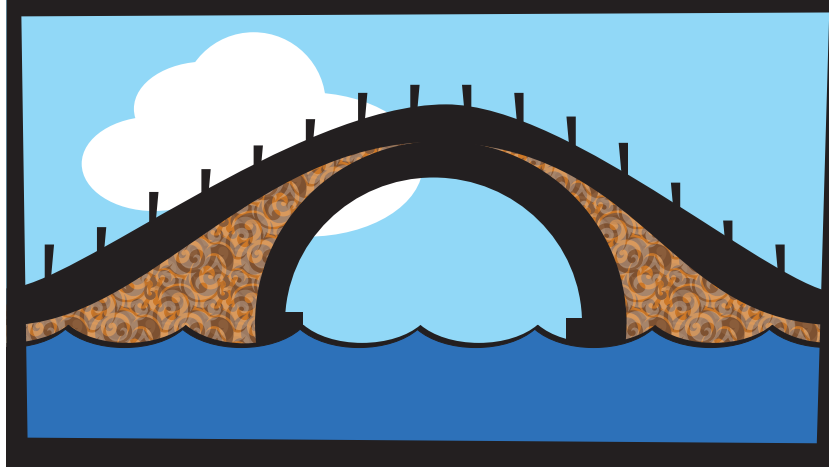


# tiny tinkering tasks

## Task theme Building Bridges



### Task title How does shape affect strength?

#### Learning outcomes

- To understand how the shape of a material can make it stronger.
- To appreciate that engineers must consider what shapes to use when designing structures.
- To work together to create and adapt models.

#### EHoM link



#### ADAPTING

Embrace an iterative approach alternating between plan (doesn't have to be written) and create.

#### EDP link



Key Stage/Year Group LKS2 – Year 3

#### Resources required

- Books to act as the supports (abutments) for the beam. Hardback school dictionaries or equivalent sized books are perfect for this activity. Children should be encouraged to construct piles that are the height of a school ruler (approximately 30cm).
- Sheets of A4 paper
- A selection of uniform objects to use as weights – this could be copper coins, multilink, counters – depending on what you have available in the classroom.

## How to run the task

1. Engage the children in looking at a range of bridges – locally, UK-wide and globally. A useful source of information can be found at: <https://kids.kiddle.co/Bridge>
2. Explain to the children that they are going to investigate how the shape of a bridge affects its strength. To do this they are going to be using paper in different ways and testing the strength by seeing how much weight the structure can stand before it collapses.  
Note: To make this a fair test, the paper should always be placed lengthways, and the bridge abutments on each side (piles of books) should be 14cm apart.
3. Encourage the children to explore by first placing a single sheet of A4 paper onto the books and test its strength by placing coins in the middle until the bridge collapses. Use two pieces of paper and test again.
4. Use one piece of paper, but this time fold up the sides to make a walled bridge.
5. Make an arched bridge using two pieces of paper – one laid flat and the other folded into an arch shape underneath.
6. Using two pieces of paper, place one onto the supports and fold the other piece into ridges (corrugated) then place on top.

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## Top Tips

- Encourage the children to choose their own ‘weights’ and discuss why uniformity is important. This could lead to a conversation about how people weighed objects before standard units of measurement were invented.
- Ask the children to order their bridges in terms of weight bearing.
- Links to maths – draw a bar chart of the results.
- Extend – challenge the children to investigate bridge strength using corrugated cardboard. Cut two A4 sized pieces of cardboard from an old box with the corrugation running different ways – one along the length of the strip and the other across the width.

Place each piece on the supports and add weights as before. Does the way in which the corrugations run affect the strength?

- Support – have ready-made example of the different structures to show to children who are struggling.

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## Evaluate learning

- What have you found out about bridges?
- Which was the most successful design? Why do you think this is?
- What was it that you changed?
- What would be the problem of having a corrugated surface?
- If you change the distance between the supports, will the bridge support the same weight? Why do you think this is?

**Author: Mrs Julie Wiskow, SEERIH Teacher Champion | Rode Heath Primary School**

As a practising teacher, Julie has written these 12 tasks to encourage more children to engage in engineering in primary schools. They have been stimulated by real-world engineering and inspirational ideas shared by others. They are linked to the Tinkering for Learning research and development project run by SEERIH.



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