

STRUCTURAL DESIGN CHALLENGE: MILL RIVER BRIDGE

Your town boasts the biggest paper mill for miles around, so most everything in it has to be built out of paper. The town has hired you to submit three feasible bridge designs for the new bridge to cross the river that still power the paper mill.

Scale: The river is 6 inches wide.

Design Problem: Build three different strong bridges out of paper. The bridges must span at least 6 inches and be able to carry a toy truck.

Materials: Paper (six piece limit per bridge), Glue

Present and Evaluate Your Model:

1. Does your model solve your Design Problem?
2. Why did you build your model as you did?
3. How structurally sound is your model? How are its materials connected?
4. If you could start over, would you build your model differently? How?
5. What changed might you make to the materials to improve the model?
6. What materials from other kits might be useful in a new design?

Teacher's Notes

Mill River Bridge

Concepts: There should be a lot of trying, testing and starting over in this challenge, as the group strives to make the strongest bridge they can out of the simplest of materials – sheets of paper. The students will, of course, want to test and see which bridge design holds the most weight. The students should discover that triangles and cylinders are strong shapes. Encourage them to try arches as a solution.

The post and lintel principle, in evidence in Stonehenge, in post and beam barn, and in most toddler's building block designs- two posts up, one beam across – is a universal as it is powerful.

Extensions:

How would increasing or decreasing the span affect a bridge's strength? How does spreading out the load the bridge is to carry affect its strength? How could the paper be modified to increase its strength? How can several paper arches be combined to form a dome?

Resources:

The Art of Construction (Mario Salvador, Chicago Review Press, 1990)

Building Toothpick Bridges (Pollard, Dale Seymour, 1985)

Bridges and Tunnels (Oxlade, Franklin Watts, 1994)

The Bridge Book (Carter, Simon & Schuster, 1992)