

Bridge Building Workshop

Notes for Teachers



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This is a workshop which Chris has run in many schools. It is great fun and teaches about forces, structures, planning and team work

Objective.

The objective is for each team to build a bridge between two classroom tables. The winning team or bridge is the one which will carry the greatest load before it fails. The bridge has failed when the middle (the point where the load is hung from) has dipped below the level of the table tops. The bridges are made of sticky tape, drinking straws and string.

Items required:

- Pairs of two tables. (1 pair of tables per team.)
- 10 drinking straws per team (not the bendy type)
- A roll of sticky tape
- 2 or 3 metres of string



A winning bridge.
Very simple suspension bridge design.



More complex - Arch bridge.



Not such a good design.
The problem is that the main beam is already below the desk level - it has already "failed".
(The load had to be hung from the higher part.)

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Workshop programme – suggested structure:

A short talk at the beginning with pictures. 10 or 15 minutes. (See the other PDF - For display in classroom.)

1 explain or ask what bridges are for. I find that questions get the class better engaged.

2 show some pictures (supplied in the PDF For display in classroom)

3 A Bridge has to carry some given load: Maybe lorries or trains or pedestrians etc.

Ask the question: is it a good idea to use lots of materials to make a bridge strong enough to carry its design load or is it better to use the minimum amount of materials?

Show some more bridge pictures

Explain that some bridge designs are very good at carrying a large load but using very small amounts of material. The best example for this is the Suspension bridge.

Show some suspension bridges.

Explain that string, drinking straws and sticky tape are very good materials for making suspension bridges, but that the teams can make whatever type of bridge they like.

I usually repeat:

Suspension bridges can be made very well from string, straws and sellotape! (I repeat this to give a very heavy hint; but still some teams make all sorts of other designs.

(It is always a suspension bridge which wins. So far anyway...)

Rules There are only a few simple rules:

1. The tables will all be set 60 cm apart
2. The bridge is built to span the gap
3. No part of the bridge can be below the level of the table-tops.
4. The load is hung from the middle of the bridge IE the mid-point between the tables
5. The load will be placed in a bag which is hooked onto the bridge. weights will be added until the bridge fails.
6. **IMPORTANT** The bridge has failed when any part of the bridge dips below the level of the table-tops.
7. There can be no supports built up from the ground!

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Building.

It will probably take the teams 30 or 45 minutes to build their bridges.

The teams should be encouraged to spend a few minutes at the beginning, planning out what sort of bridge they are going to build.

For the simpler designs, often the strongest, 30 minutes is plenty of time to build it.

Judging.

To judge which bridge is the strongest, you will need:

Either

a hook (EG strong paperclip opened up a bit)

A bag to hang weights in

Some weights: I use books

Some scales to weigh the load carried in the bag

OR

Some sort of spring balance or sensitive luggage weighing device which you can hook over the middle of the bridge and pull downwards to load it.

You will need to keep a careful watch so that you see the reading when the bridge fails.

It might happen quite quickly, IE a “catastrophic failure”!



Bridge Testing Time.

This bridge was so strong that the bag was full of books and rolls of tape. Then more books had to be added on top.

The bridge “failed” when the point where the load was applied had dipped below the table tops.