

Paper towel roll bridge (variant of short-term challenge no. 1)

This short-term challenge comes from the Creative Challenge guide entitled "Relevez le défis", published by the Conseil de développement du loisir scientifique (CDLS)

All secondary-school students

Key words: resistance of materials

Space: a kitchen table or two wooden chairs or desks

Your mission

You are heading off on an expedition through the woods with your little brother and cousin. The children refuse to leave their trucks behind. During a break, your cousin asks you to build a new bridge. The hard part is trying to find newspaper in the forest.

The challenge

You have 1 hour to build to build a bridge that is 60 cm long x 25 cm wide x 50 cm high, using paper towel or toilet paper rolls, and that is able to support a truck carrying up to 1 kg of sand.

Materials

- Paper towel or toilet paper rolls
- 1 box of toothpicks (approximately 1000 per team)
- 1 tape measure
- Solid shoeboxes or other items that can be used as bridge pillars
- 1 truck measuring 20 cm x 20 cm x 20 cm
- 1 balance
- 1 kg of sand (divided up into 200-g bags)
- String (approximately 30 cm)

A few rules

- You must leave 5 cm at either end to rest your bridge on pillars (shoeboxes).
- The main deck cannot be more than 10 cm thick.

Testing

- Choose the number of tests to which your bridge will be subjected (5 to 10, depending on whether you choose 100- or 200-g loads).
- Weigh the bags.
- Rest your bridge on the pillars.
- Pull the truck across the bridge. It will cross the bridge at least five times carrying a different load.
- The more loads you get across, the more points you win.
- The bridge that withstands the heaviest load will be declared the winner.

Calculation of points

100 g of sand = 20 points

200 g of sand = 20 points

300 g of sand = 30 points

400 g of sand = 40 points

500 g of sand = 50 points

600 g of sand = 60 points

700 g of sand = 70 points

800 g of sand = 80 points

900 g of sand = 90 points

1 kg of sand = 100 points

Scientific principle

This challenge requires imagination, spontaneity and teamwork rather than scientific knowledge. It is an excellent introduction to a discussion on the resistance of materials.

Want to know more?

Make a library or on-line research using the Key words at the beginning of this challenge.