

## Building the Goliath Crane

### Materials (some optional)

#### For the crane

- › Spaghetti/straws/cardboard/paper
- › Elastic bands/10cm of sellotape and string, Blu Tack,
- › Two bags of sugar/flour and some spare change

#### For the platform

- › Cardboard and string

### Activity Overview

- › Design a new crane for Babcock! Your aim is to build the beam across the top of the crane, and carry as heavy a load as possible (the spare change) on a platform, before your beam cannot take any more weight.

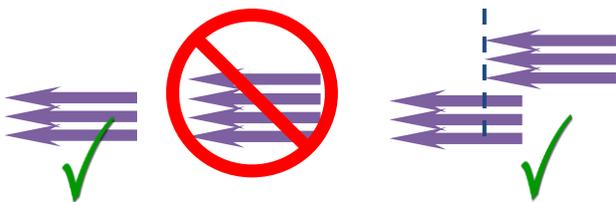
This top beam is what you will be building!



This is the platform

### Activity Plan

- › Collect all the ingredients above, or as many as you can find. The bags of flour or sugar, spare change (you will get back), and then as many of the other materials as you can.
- › Place the two bags of sugar 30cm apart from each other on a flat surface – these will make your supports, which you will place your beam on top of. Remember your beam needs to be longer than 30cm to balance across the top, as you are not allowed to attach it or tie it to the sugar bags.



3-spaghetti rule

› To build the beam, first draw a design of what you want your beam to look like. Think of the different ways to attach the materials together, in order to find the strongest method. Don't forget that you can't overlap more than three spaghetti in a row (see the diagram to the left).

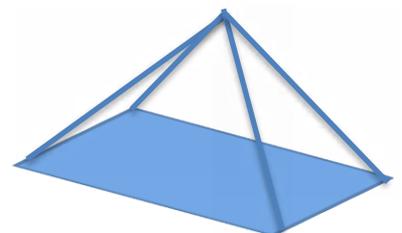
- › Using the materials that you have available, and the design you have drawn, look to build the top beam out of spaghetti, straws, cardboard, elastic bands, sellotape, string and Blu Tack. Remember – you don't need to use all the materials; try to pick the strongest. Think about the forces acting on the crane.

- › Once you have finished building the crane, it's time to test it. However, first, we need to build the platform to hang from our beam.

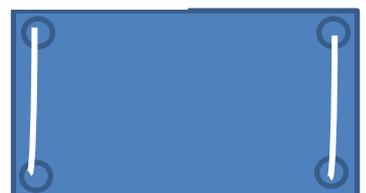
- › For this, get an old cereal box or piece of cardboard and cut out two 10x10cm squares. Put a hole in each corner of two squares, wide enough to fit string through. If you have a hole puncher, use this.

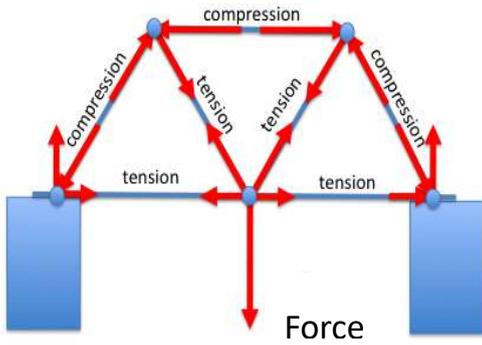
- › Cut two pieces of string 15cm long. Put the two pieces of card that you have cut back-to-back, and thread one piece of string down through the bottom left hole, along the back of the card, then up through the top left. Do the same with the right, and tie all four pieces of string at the centre. Tie or attach this onto your beam. You are now ready to start testing it! Keep adding weight, making a note of how many you manage to place on before the beam can't take any more weight. Try to beat this score next time.

Finished platform



Back view





## Learning Objective

› The Goliath Crane manages three important forces: compression, tension and weight.

If you push or pull too hard on your crane, it could result in the crane buckling. You want the performance of your beam to be strong and stable, minimising bending. Think about how you would achieve this.

## Reflection Questions

- › How many coins did the crane manage to hold?
- › Looking back, did you use the right materials and what would you have changed?
- › How would you rate your design now, and would you have tried something different?
- › Did you think of the force pulling down on the crane?

