

## VCAL NUMERACY - Foundation - Numeracy for Practical Purposes - Design

### OUTCOME 1 - SPAGHETTI BRIDGE UNIT

Aim: - to design and build a successful bridge using spaghetti and hot glue. The bridge will be tested with weights to see how strong it is. The bridge design should also look appealing to the eye.

#### Equipment Needed:

75 g San Remo standard spaghetti, hot glue gun, 1 stick of hot glue (make sure they are all the same), A4 paper for templates, safe storage for Spaghetti Bridge during construction, newspaper, wooden supports (e.g. pencils or paddle pop sticks), weights, string or light wire, plastic container (e.g. 1kg yoghurt)

#### What you need to do:

- Find 6 pictures from the internet showing single span bridges
- Print the pictures as large as possible aiming to place 2 pictures on an A4 sheet of paper
- Write a dot point summary for each bridge picture stating different shapes that appear in the construction of the bridge
- Write an overall dot point summary of the features the 6 different bridges have in common
- Create sketches of a bridge design for your spaghetti bridge. Include shapes that you have identified as being common in bridge design. Show the development of your ideas. Experiment with various shapes and designs. Sketches should be drawn up on A4 paper with a ruler showing the measurements, and reflect the actual size of your bridge if possible. Plans can also be drawn up on Pro Desktop if desired. Your plans will become the design template for your model
- Make A4 size templates for your bridge design. Show a design for the sides, top and ends as well as the support structures because a bridge is three dimensional
- Build a model of your bridge design made from spaghetti and hot glue
- Get photo evidence (2 photos) of you building your bridge
- Write an evaluation of the design and model including any shapes you used in the design, where your bridge broke during testing and how you would improve the design if the bridge were to be rebuilt.

### Specifications for the Spaghetti Bridge

- 75 g of San Remo standard spaghetti
- 1 stick of glue for a hot glue gun
- The span of the bridge must be 150 mm long
- The overall length must be a minimum of 170mm and a maximum of 250 mm
- The width of the bridge must be 50 mm wide at all points and a maximum of 75 mm wide at all points
- The height of the bridge must be a minimum of 40 mm and a maximum of 200 mm
- The bridge should not have a mass of more than 50 g
- The weld material (glue) can only be used on the joints - not to reinforce strands of spaghetti.

### Evidence of successful completion of this task:

- Folio of bridge pictures and dot point summaries
- Design templates showing development of design including accurate measurements
- Photo evidence of completed bridge
- Evaluation
  
- ALL WORK MUST BE YOUR OWN

### PRIZES FOR:

1. Structural Strength - conforms to design specifications and takes heaviest payload
2. Structural Efficiency - carries the greatest payload per gram of bridge weight. This is calculated as follows:
  - $E=P/M$  where
    - E=Efficiency
    - P=Payload at failure of bridge in grams
    - M=Mass of bridge in grams
3. Aesthetic Appeal - does it look good and suit its surrounds?

JUDGES DECISION IS FINAL