

# INTRODUCTION

**TECHNOLOGY TEASERS** contains a collection of 20 challenges relevant to the technology of mechanisms, electronics and control. The challenges are mostly suitable for students who have had some experience with technology tools and processes for example, cogs, pulleys, electrical circuits and so on. Each challenge poses a problem which needs to be solved through using technological principles and systems. There are two pages for each challenge - one for teachers and one for students.

While all design solutions should ideally be reached via authentic 'real-life' contexts, this is not always practical or possible. Sometimes it is useful to teach particular technical skills and approaches to problem solving through discrete pre-planned problems which can be used as a springboard into seeking technological solutions for more authentic problems. This is the aim of the challenges in this book - to help students develop some aspects of their 'technological literacy' which they can then apply to problems which they come up with for themselves.

The challenges in **TECHNOLOGY TEASERS** offer no solutions directly to students, (except in Cheap Cheep, which is a "follow the instructions" activity). However, a possible solution is included in accompanying teachers' notes. This means teachers can choose to direct students to particular solutions if they want to keep the activities brief and contained. Although only one solution is offered, there are many others equally or better suited to the problem and students should be encouraged to try a range of ideas.

Teachers should take the opportunity to set up class visits to places where problem solving, designing and processing work is done. If this is not possible, invite speakers to technology classes to discuss the work they do. It is important for students to see that problem solving is something that occurs everyday in the wider world. Making links with the social or environmental implications of technological solutions is also important.

Whilst use of the design process is not stated in the challenges, it is assumed that students will be familiar with the process and will follow it. The challenges are suitable for students to work with individually, in pairs or small groups.

I hope that teaching with these challenges gives you as much enjoyment as I've had. Thanks to the students who trialled them for me.

*Rob Nelson*

# A WEIGHTY MATTER

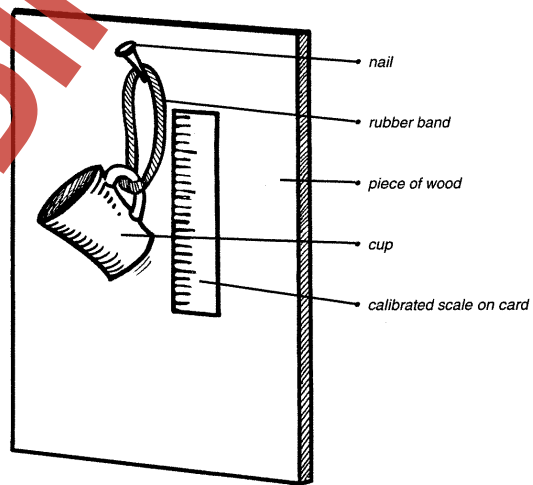
- MATERIALS NEEDED**
- Wood
  - Nails
  - Hammer
  - Cups
  - Strong rubber bands
  - Card
  - A copy of the challenge for each student

**HINTS** One way to build a measuring device is shown below. Using this method, the cup becomes the receptacle for the item to be weighed. Consequently, any item placed in the cup will stretch the rubber band and its mass can be read from the calibrated scale. Students can use the set of weights initially to help them work out the calibrated scale.

There are other possibilities. In discussing solutions with students, the main point to be considered is that the design must ensure a consistent method of measuring the mass.

**NOTE** - after a while the rubber band begins to lose its elasticity, and will begin to give incorrect measurements.

**POSSIBLE SOLUTION**



TEACHER ACTIVITY NOTES

CREATIVITY EXERCISE

# A WEIGHTY MATTER

You are desperate to join the club **MENSA**.

**MENSA** is a club for people who are highly intelligent, with an I.Q. in the top 2% of the population.

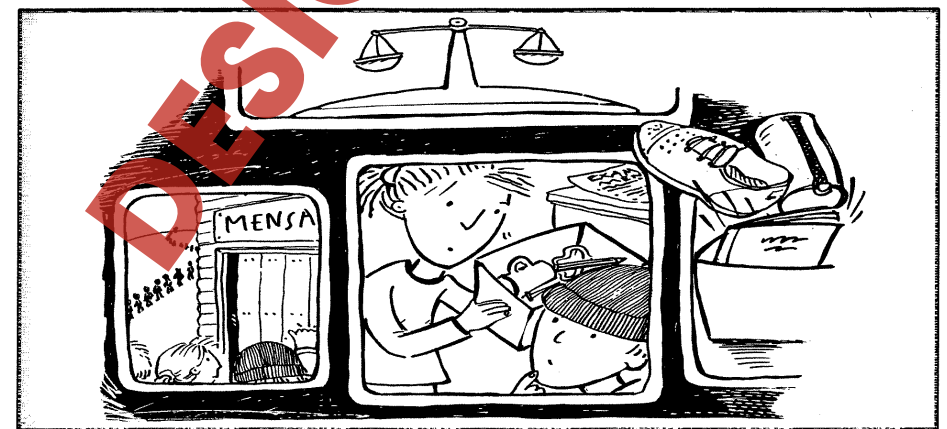
When sitting the entrance examination at **MENSA** you are posed the problem below. Can you solve this problem?

You have the following items:

- a cup
- a piece of wood
- a rubber band
- a nail and a hammer
- a pencil
- a set of weights
- card

Can you design a device that will allow you to measure the mass of a range of items such as:

- A PENCIL CASE?
- A BOOK?
- A SHOE?
- ETC?



# THE DUNGEON

You are on a secret magic mission to save the world but you have been captured by the nasty guards of the Dark Wizard. You have been imprisoned in his huge dungeon which is infested with rats and slimy creatures. You dropped your wand on your way in! Your only chance to escape is to find your wand and make yourself invisible so that you can slip out when the guards return.

You have no matches and the dungeon is pitch black. Luckily, though, you trip over an assortment of rubbish in a corner. Among the rubbish you can find:

- a toilet roll
- batteries for a battery-powered toothbrush
- foil
- cardboard

Also, you happen to have these crucial 'emergency' items in large pockets inside your cloak:

- wires
- tape and glue
- a bulb.
- a paper clip
- a drawing pin

Can you make a flashlight, find your wand, escape and help save the world?



# LOST AND LOUNGING

- MATERIALS NEEDED**
- Popsicle sticks
  - Material scraps / found materials
  - Balsa wood if available
  - Wood glue
  - Cardboard
  - A copy of the challenge for each student

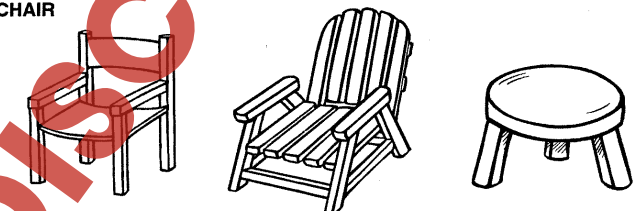
**HINTS CHAIR**

Have a discussion on what outdoor chairs can look like (captain's chairs etc). Simple designs are best. When constructing chairs, students need to take time so as the glue can dry at each stage.

**BED**

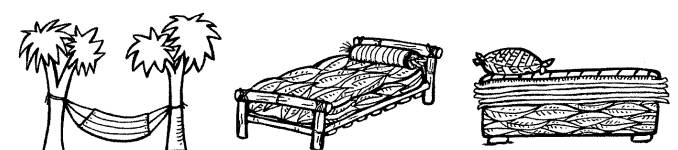
Have a discussion on what different beds may look like. Stress that a variety of designs are possible - hammock, futon, mattress and base, etc. - but that they will be limited by the materials available on the Pacific Island.

**POSSIBLE SOLUTION CHAIR**



**WARNING:** emphasise extreme care when cutting wooden materials

**BED**



TEACHER ACTIVITY NOTES

DISCUSSION

# TABLE CADDY

TEACHER ACTIVITY NOTES

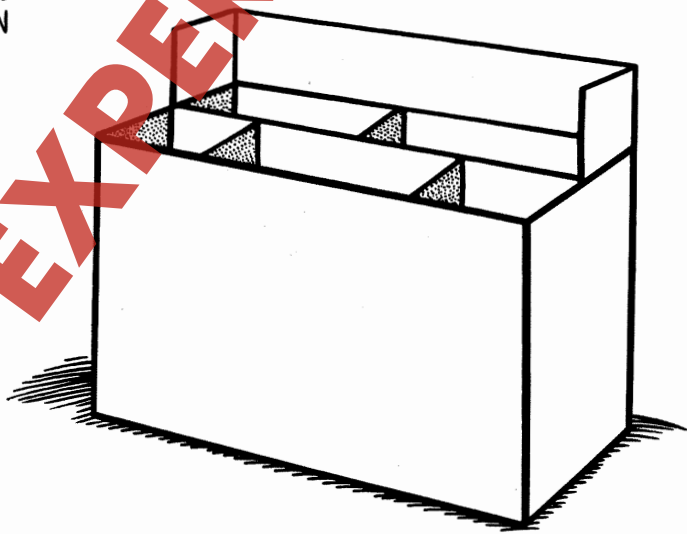
**MATERIALS NEEDED**

- Boxes
- Card
- Popsicle sticks
- Balsa wood (if available)
- Wood scraps
- Adhesives
- Sticky tape and glue etc.
- Any other suitable materials that can be organised
- A copy of the challenge for each student

**HINTS**

Students should find this activity a simple one. Containers like this are readily available as examples. They can choose to begin with boxes and cover them with popsicle sticks, etc. to make them more durable. Encourage students to test their design. Caddys need to hold all the materials that Orville wants it to.

**POSSIBLE SOLUTION**



# WATER-POWERED VESSEL

TEACHER ACTIVITY NOTES

**MATERIALS NEEDED**

- Waterproof box (cut the top off a one liter milk carton)
- Straws or plastic tube (straws should have an elbow)
- Sticky-tak or plasticine
- Boat (made from two liter milk carton if required)
- A copy of the challenge for each student

**HINTS**

This design is based on a child's toy that is readily available.

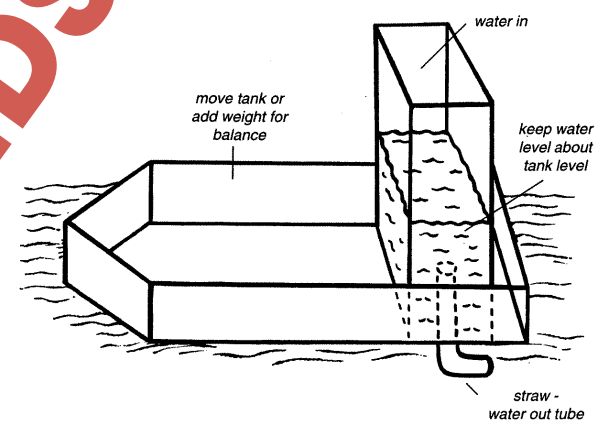
Cut the 2 litre carton to make a boat shape. Use the box (1 liter milk carton) as a reservoir.

Attach a tube or straw with an elbow to the bottom of the reservoir and take it out through the bottom of the boat, facing backwards. Use the sticky-tak or plasticine to seal the tube openings.

When the water is placed in the reservoir, gravity forces it out of the tube to the rear of the boat. This produces a forward motion thrust.

Test whether it works best when the inlet end is larger than the outlet end. To make a constant source of energy, a siphon can be made from similar diameter tubing to draw water in at the same rate water leaves through the 'motor'.

**POSSIBLE SOLUTION**



# PINBALL GAME

Known far and wide as the Pinball Wizard, you set out to build your own pinball game.

**CAN YOU?**

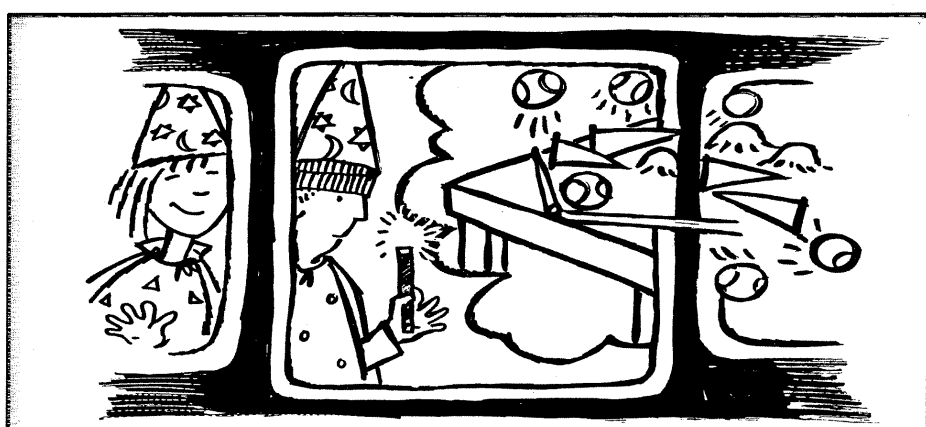
Your game should have the following features:

- Flippers (this will possibly be the hardest part)
- Bumpers
- A Dead Zone (where you lose the ball)

It will probably be necessary to use some of the following ideas in your machine.

- manually place the pinball (marble?) at the start
- instead of scoring, time how long you can keep the ball alive

**YOUR TEACHER HAS PREPARED SOME MATERIAL FOR YOU TO CHOOSE FROM. ALTERNATIVELY, YOU MIGHT LIKE TO BRING YOUR OWN MATERIALS FROM HOME.**



# STUDENT EVALUATION SHEET

NAME \_\_\_\_\_

**IDEA**

- Investigates other contexts
- Devises ways to gather information
- Gives oral/written/drawn idea

**COMMENT**

**DESIGN**

- Records progress of ideas
- Extends initial idea
- Draws design and labels
- Estimates resource needs

**MAKING**

- Identifies material suitable for task
- Selects and uses appropriate tools safely
- Minimises waste
- Uses drawings to assist construction
- Appropriate method of construction
- Modifies where necessary
- Asks for/accepts others suggestions

**TESTING**

- Reviews design
- Comments on design solution
- Justifies decisions made
- Communicates effectively
- Identifies modifications
- Reviews in regard to design brief

**PERSONAL QUALITIES**

- Works co-operatively
- Works independently where necessary
- Perseveres
- Shows originality and creativity

**COMMENTS**

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