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Introduction

The combination of science and magic has always fascinated me, especially when used as the basis for the type of interactive displays which are commonly found in science museums. These 'hands on' type displays are not only tremendous fun for all age groups but are also a great aid in stimulating an interest in science, whatever their background.

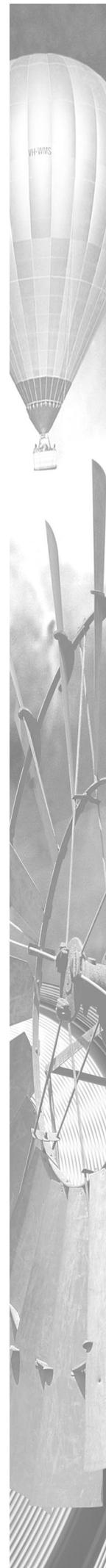
This book aims to not only present ideas for designing and creating your own displays but also how to go about constructing them on a limited budget using the type of materials which are normally easily accessible to schools. The displays aim to demonstrate principles of science in a way not normally seen in the classroom. They also aim to demonstrate the science behind some of the modern-day technology that surrounds us in our day to day lives or even to take the mystery out of some of the so-called psychic phenomena.

The displays described in this book have been designed to be constructed with a minimum of fuss by teachers, lab technicians or anyone with an interest in the fun side of science. They could even be constructed by students as part of a science project. The displays could be used as a focal point for science week or for school open days. They could be placed in the corridor as a promotional tool for the science department and, with over fifty displays described within this book, it would be possible to place a new display out each week of the year.

The book contains the basic information to design and construct a successful display, but do not let this constrain you as you may like to add your own ideas to enhance each display. A display can contain a small gimmick in an effort to catch the attention of passers-by but to also add a sense of realism to the display. For example, toy snakes and imitation jewellery were added to the Indiana Jones (centre of mass) display, toy dinosaurs made an interesting substitution for the balls in the Resonating Objects display.

The ideas for these displays were gained from many sources such as science museums, the Internet, physics books, magazines etc. Initially I thought that I would run out of ideas for displays fairly quickly but soon realised that there really is unlimited scope for showing how things work in a fun way. I am sure that you will think of many more.

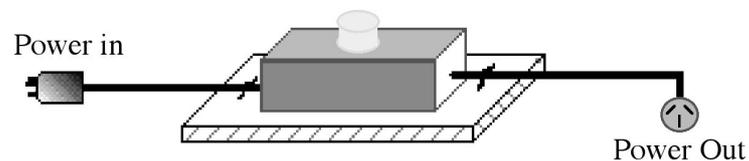
Peter Mansell



Preparing for the displays

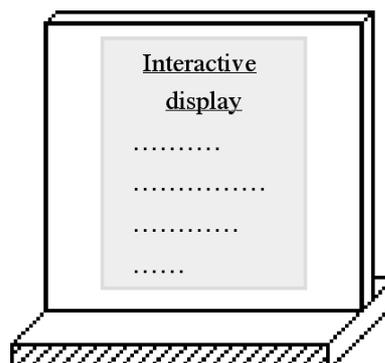
Although the displays described in this book have been designed to be as simple as possible, some basic woodworking skills will be useful. Make a special friend of whoever runs the school's workshop; you never know when you may need that extra bit of help. To begin your own series of interactive science displays, you will require the use of some basic tools and equipment.

- An assortment of screwdrivers, hammer, vice, saws, pliers, wire cutters, soldering iron, sharp knife, wrench, electric drill. Although not essential, a router would be very useful.
- G-clamps, retort stands, boss heads and clamps.
- Timber and particle board scraps such as chipboard or MDF (medium density fibreboard).
- An assortment of nuts and bolts, nails, wood and self-tapping screws.
- Fishing line, string.
- Gaffa (cloth) tape.
- Strong glue such as a two part epoxy glue, silicone rubber.
- Low voltage power supply and leads.
- Morse code type on/off switch.
- A push button timer switch. Ask an electrician to mount one on a board for you with a male plug and female socket on about a metre length of cable.



The timer will power the display for a pre-determined length of time. About a minute should be adequate for most of the displays described in this book.

- A large trolley or bench to set the display up on. A trolley is useful as it can easily be moved in and out of the preparation area whilst the display is being constructed.
- A small board (placed next to the display) to mount an instruction sheet on.



Indiana Jones and the lost jewels

Concept

This display challenges students to think about the centre of mass of a system. The aim is to position six wooden blocks on top of each other in such a way as to make a bridge across the snake pit to rescue the jewels on the island. The blocks must touch neither the island nor the snake pit and so the centre of mass of the system must remain to the left of the snake pit to prevent the blocks from tumbling over.

Materials

2 metres of 70 x 40 mm timber

Plywood or masonite

Papier mâché

Plastic gemstones

Toy snakes

Construction

Cut six 30 cm-long blocks of wood and remove any rough edges.

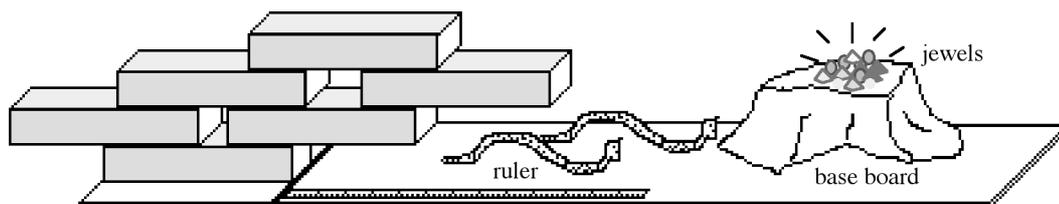
Cut a base board (about 1 metre long) out of ply or masonite.

Mount one of the blocks to the left-hand side of the base board with self-tapping screws.

Make an island from papier mâché and glue to the other end (the island should be about the same height as all the wooden blocks stacked on top of each other). You may have to do some tests to determine the distance between the island and the bottom block; ideally it should be a fraction longer than the longest span that the blocks can make. This will prevent the blocks from touching or resting on the island.

Glue imitation jewels on to the island. Glue a couple of toy snakes to the board (or paint some on) to complete the snake pit.

A metre ruler could be mounted on the board so that the length of the bridge can be measured, and a competition could be run to see who can build the longest span.



Indiana Jones and the lost jewels

You are Indiana Jones and the only thing between you and the lost jewels is a large snake-filled pit.

Your mission is to rescue the jewels, but all you have at your disposal are six blocks of wood. These are to be placed in a way that makes a bridge.

The bottom block is permanently mounted, but the other five blocks may be placed on top of this block in any way that you wish so as to make a bridge across to the island. However, the bridge is not allowed to make any contact with the snake pit or with the island in the middle.

To successfully build a bridge that doesn't topple over, its centre of mass must be kept to the left of the line.

For discussion:

Did your first attempt succeed?

What can you do differently on your second try?

What happens if you put weight on the bridge – does its centre of mass need to be changed? Why?