

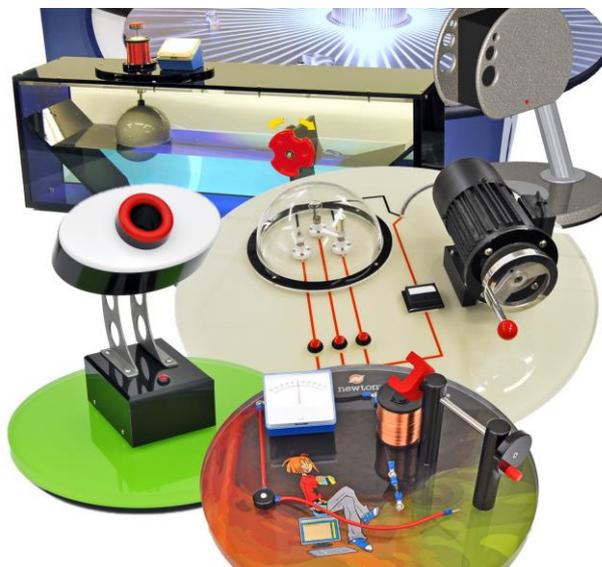
Mini-interactives

These are our existing designs

We also produce custom designs and larger interactives

by Ian Russell

October 2023



THE CONCEPT.....	3
SETS OF MINI-INTERACTIVES.....	6
PAYMENT TERMS.....	6
WARRANTY	6
<i>MINI-INTERACTIVES</i>	7
BERNOULLI BLOWER (PRICE £3515)	7
BLACK BOX (PRICE £3570).....	8
BUBBLE COLOURS (PRICE £1983)	8
CAMERA OBSCURA (PRICE £4620)	10
CHAOS PENDULUM NON-ILLUMINATED (PRICE £2716), ILLUMINATED (£3766)	10
COUPLED PENDULUM (PRICE £1235).....	11
ELECTRIC CONFETTI (PRICE £1702)	11
ELECTRIC MOTOR (PRICE £1983).....	12
ELECTRICAL POWER (PRICE £5760)	12
ELECTROSCOPE (PRICE £2668).....	13
FINGERPRINT (PRICE £2740).....	14
FLYWHEEL (PRICE £3588).....	15
FRICTION WHEEL (PRICE £1387)	15
GHOST FINGER (PRICE £2391)	16
GYROSCOPE (PRICE £2499).....	16
HEAT PUMP (PRICE £4377)	17
HOME INSULATION (PRICE £3400).....	17
HOVERING AND TURNING MAGNETS (PRICE £2854)	18
INFINITE REFLECTIONS? (PRICE £1744)	18
IRIS (PRICE £2737).....	19
IS IT A CONDUCTOR? (PRICE £2070).....	19
KALEIDOSCOPE (PRICE £1983)	20
LIGHT THE LAMP (PRICE £2229)	20
LIGHT-RAYS (PRICE £2229).....	21
LUNGS (PRICE £2290 OR £2596).....	22
MAGNET AND COMPASSES (PRICE £1983).....	22
MAGNETIC FIELD FROM A COIL (PRICE £4500)	23
MAGNETIC PENDULUM (PRICE £2601).....	23
MILLION TURNS (PRICE £2433)	24
PRAXINOSCOPE (PRICE £2931 OR £3201).....	25
PRESSURE (PRICE £1237)	25
SEISMOGRAPH (PRICE £2508).....	26
SIMPLE GENERATOR (PRICE £1600)	26
SKELETAL ARTICULATION	27
SOLAR POWERED HOUSE (PRICE £3000)	27
SPINNING DISKS (PRICE £1929)	28
STREAMLINES (PRICE £2106).....	28
STREAMLINED FISH-SHAPE (PRICE £3300)	29
TUNING FORK (PRICE £2058).....	29
TURBULENCE DOME (PRICE £2208).....	30
WATER TORNADO (PRICE £3363).....	30
WATER-POWER (PRICE £8424).....	31
WAVE-POWER (PRICE £5070).....	32
WIND TURBINE, SIMPLE VERSION (PRICE £2110).....	32
WIND TURBINE WITH GENERATOR (PRICE £2881).....	33

The concept

Mini-interactives are 'exploratory' exhibits

Our mini-interactives are designed to provide a relaxed environment in which people feel free to *explore*, playfully.

Real science is about thoughtful curiosity, not just absorbing information. It is so important to encourage curiosity! This is what motivates people to seek knowledge and understanding for themselves. Curiosity must come first.



Compact size

Our mini-interactives are cost-effective, scaled-down versions of the most appealing, engaging, 'exploratory', interactive exhibits.

No interactive exhibit stands alone: they should be displayed so they can function together in their diversity, in a carefully set out learning environment.

Appeal and engagement

Engagement-time is prolonged by carefully composed graphic texts, with plenty of thought-provoking, basic, open-ended, challenging questions to encourage exploration. We can assist with interpretive text if required.

Circular bases

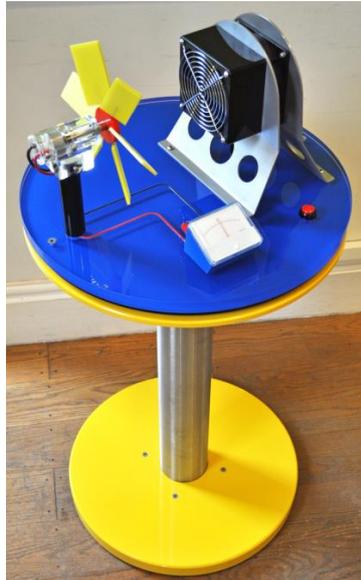
The clear acrylic base of typically 40cm diameter and 2cm thick. (Some are larger, and any can be specially ordered to any size.) Each base has an additional, slightly recessed, 1cm thick black acrylic layer below, with four soft rubber feet.

The underside of the 2cm layer is coated with a cellulose paint finish or an applied printed image, attractively visible from above through the clear acrylic. Any colours can be specified, with Pantone, BS, or RAL codes, for example.

If required, we can provide fixing holes for permanent or semi-permanent table mounting.

Pedestals (Prices from £1288)

Any mini-interactive, including the electrically powered ones, can be pedestal mounted if required, with easily removable fixing screws to allow separate tabletop use when necessary.



Colours and graphics

Often, the mini-interactives are colour coded according to various subject-themes. We are happy to advise, but the bases can be any colour at all.

Graphics can incorporate client's and/or sponsors' logos, in printed artwork below the circular base, or in the hanging interpretive label.

Typically, the hanging interpretive labels are 11.5cm x 20.5cm, printed with any desktop colour printer, laminated in stiff 250-micron pouches, trimmed and a single hole made with an ordinary office hole-punch. The labels are then attached to the angled, 5mm diameter stainless steel hangers that we supply with each mini-interactive, using a miniature split 'key-ring'.



Hanging label



Label hanger

Mini-interactives requiring a mains electrical power connection

Certain items require a mains electrical connection. Low voltage PSUs are included and the wiring connection can easily be hidden below the mounting surface for permanently fixed mini-interactives. (Others, with very low power consumption, can be supplied with long-lasting interchangeable batteries.)

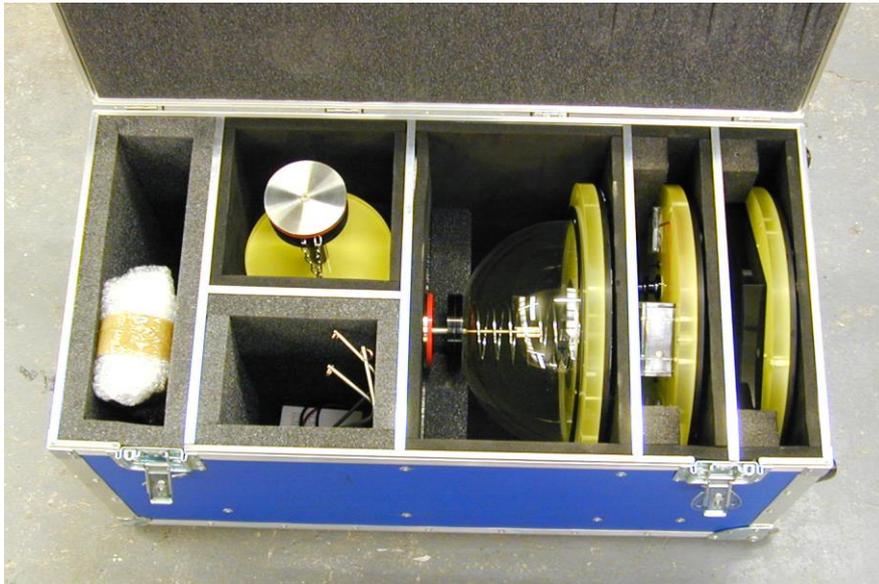
Special tables, designed to order



Please contact us for advice on table design, electrical power supply if required, and recommended mini-interactives for permanent displays.

Fitted flight cases (Prices from £800)





We can supply specially designed, wheeled, lockable flight cases to fit any selection of mini-interactives. Any size is possible. For guidance, approximately 1m is a convenient length, with wheels at one end and lifting handles at both ends.

If flight cases are ordered, we do not need disposable wooden crates for export packing, which reduces the cost of delivery.

Sets of mini-interactives

A typical set of Mini-interactives might include:

- *Special tables, each displaying three mini-interactives*
- *Centrepiece 'lollipop-sign' graphics if required*
- *Pedestal-bases, if required*
- *Flight cases, as illustrated above, each case usually holding several items*
- *Steel label hangers*
- *Concise interpretive text for (translation and) printing by the client*
Examples of such text are shown below in italics for some of the exhibits.
- *Operation and maintenance documentation*
- *Information for obtaining any necessary spare parts*

Payment terms

Prices quoted are in GB Pounds (GBP) and payments are to be made in this currency. 40% with order, 50% after examination of goods and before despatch, 10% within 30 days of delivery. The prices quoted are 'Ex Works' and do not include VAT (Value Added Tax) or delivery costs (please ask for estimates). Local import taxes for overseas orders are also not included.

Warranty

By their very nature, and according to normal practice in 'hands-on' exhibitions elsewhere, it is generally accepted that wear and tear resulting from public use happens even to the best interactive exhibits.

Therefore, the need for occasional repair work is to be considered normal and is the responsibility of the customer. Some spare parts will be included. Clear guidance and sources of additional spare parts will be detailed in the maintenance document.

Interactive Science Ltd will continue to provide advice and guidance relating to

maintenance of the goods by phone or email for at least twelve months from the date of delivery.

Interactive Science Ltd cannot accept responsibility for repairs arising from wear and tear. The term 'wear and tear' includes occasional damage to exhibits caused by people handling them, whether such damage is wilful or accidental.

Interactive Science Ltd has an outstanding reputation in this specialised field and will use its long experience and best endeavours to work to designs and specifications which minimise wear and tear.

The customer shall arrange daily examination and appropriate supervision of the exhibits, also regular maintenance work following the written guidelines supplied with the exhibits.

On condition that the customer agrees to the above terms, Interactive Science Ltd undertakes a 'return-to-base' warranty against defective design or workmanship for 12 months after the delivery date.

MINI-INTERACTIVES

Bernoulli blower (Price £3515)



A balloon hovers above a low-voltage fan. Turbulence in the air stream is minimised by a 'straightener' unit above the fan. Turning the red knob adjusts the angle of a vane, deflecting the air flow and causing the balloon to hover to one side. A great crowd-puller!

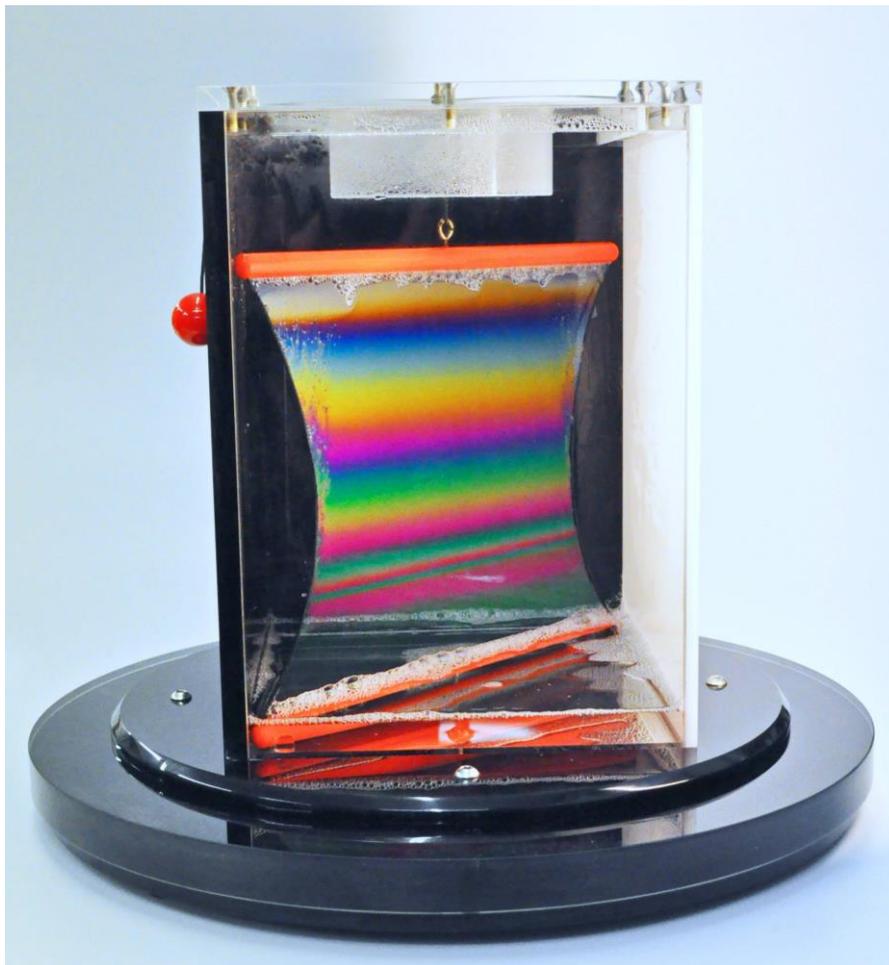
Black box (Price £3570)



What colour is it inside?

Looking through the hole in the lid, the box seems dark-black inside. Pushing down the lid to open it, people are surprised to discover that the inside of the box is in fact white. This exhibit is superbly crafted in smooth black Corian. The elegantly designed opening lid swings closed because of a simple counterweight inside.

Bubble colours (Price £1983)



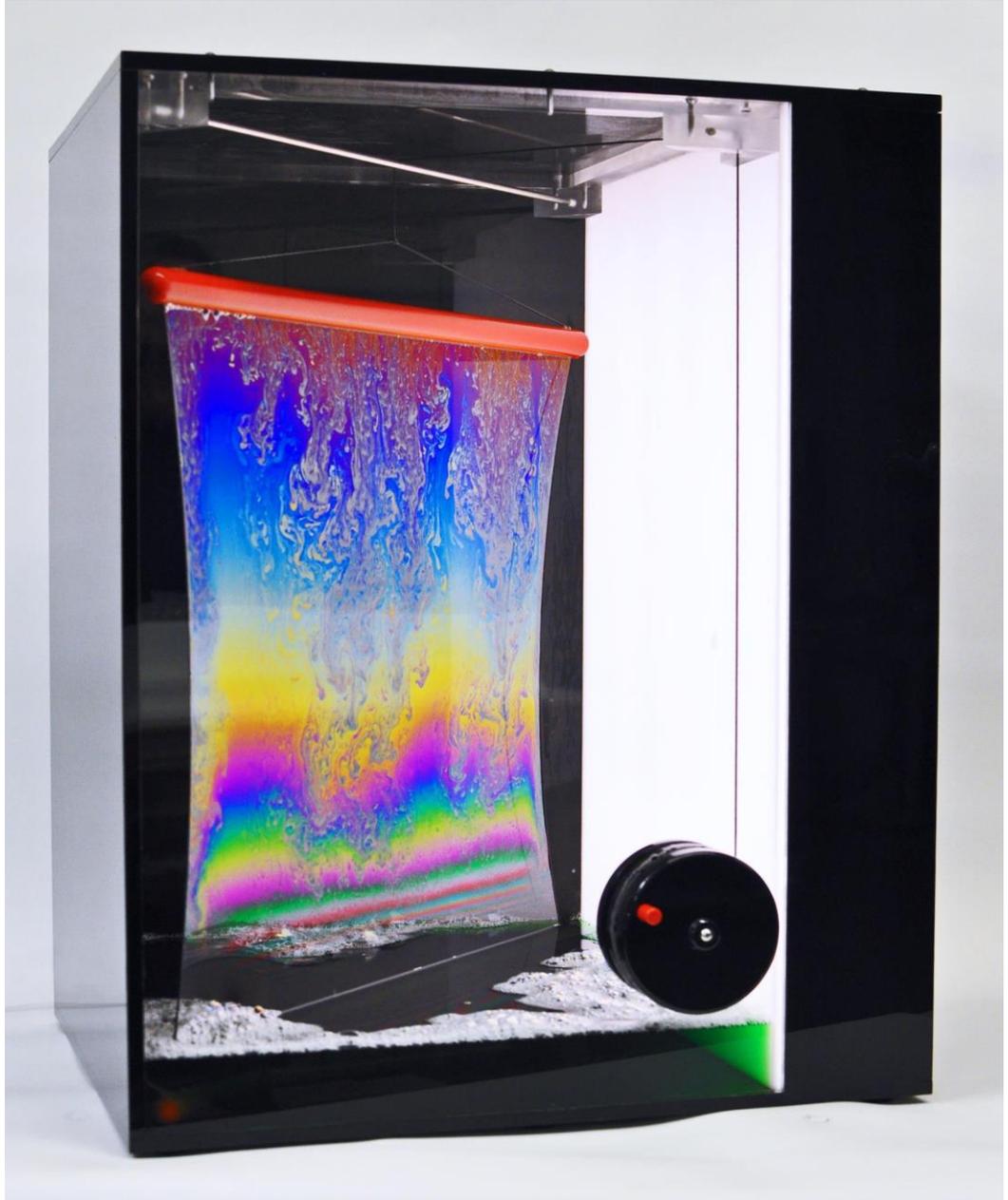
With the cord, gently pull the plastic bar up out of the mixture of water and dishwashing liquid.

How many things can you discover about the amazingly colourful, swirling patterns in the microscopically thin layer of water?

The thickness of the water layer is close to the length of a single light wave, and this is what causes the colours we see in soap bubbles.

The 'soap film' is angled to reflect the translucent white surface, showing brilliant colours against a black background.

(We also make an extremely beautiful, larger version. Ask us for details.)

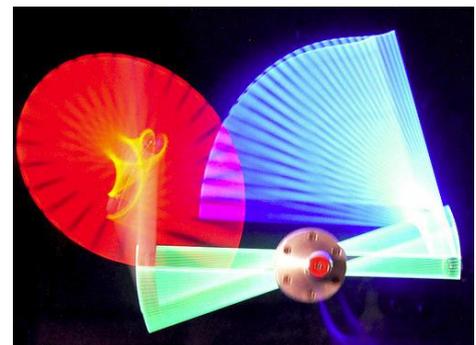


Camera obscura (Price £4620)



The mirror (which folds away for packing) reflects light downwards through a converging lens, forming an image on the horizontal screen inside the box. Using two red knobs, the screen can be raised and lowered to focus nearer or more distant objects. The whole unit can also be rotated on its base to 'scan' the view.

Chaos pendulum non-illuminated (Price £2716), Illuminated (£3766)



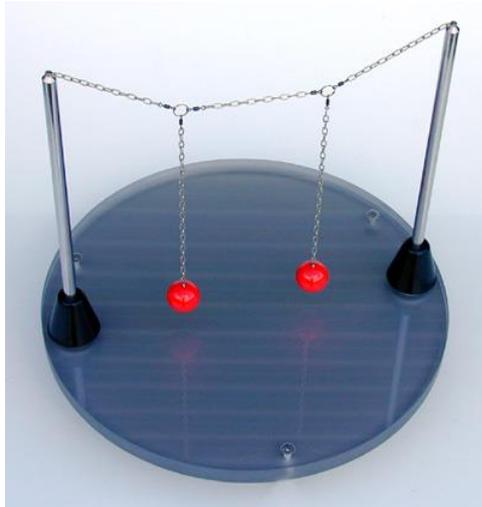
Start the chaos by gently turning the red knob.

Each time, the pendulum does something completely different.

*However carefully you try, it is **impossible** to make it repeat exactly the same movements.*

This really is one of the very best chaos pendulums you have ever seen. Not only that, but it has fluorescent arms illuminated by high-intensity ultraviolet LEDs. The effect is totally stunning!

Coupled pendulum (Price £1235)



Make sure everything is still, then swing just one of the pendulums.

Now step back, wait and watch what happens. First one pendulum stops swinging, then the other.

Energy goes from one pendulum to the other.

Electric confetti (Price £1702)

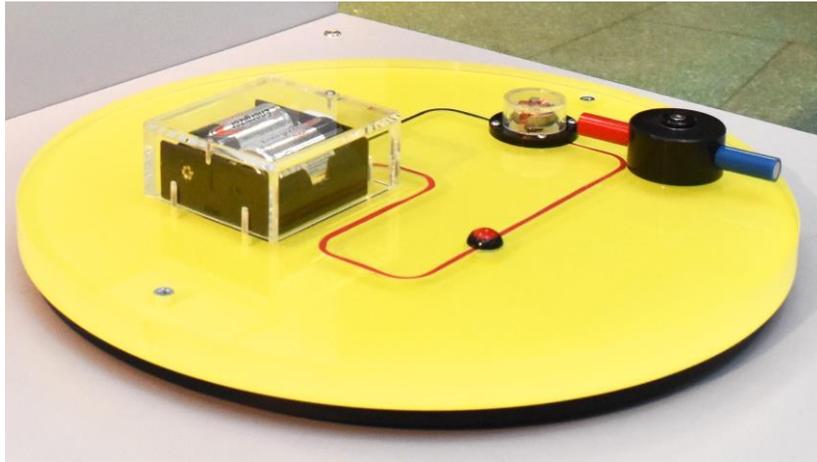


Rub the clear plastic dome with a dry hand.

Or rub a balloon on your clothes and bring it near. How much can you discover about the way the pieces of paper move?

By rubbing, you separated positive and negative charges. Positive and negative charges attract each other, but similar charges are forced apart.

Electric motor (Price £1983)



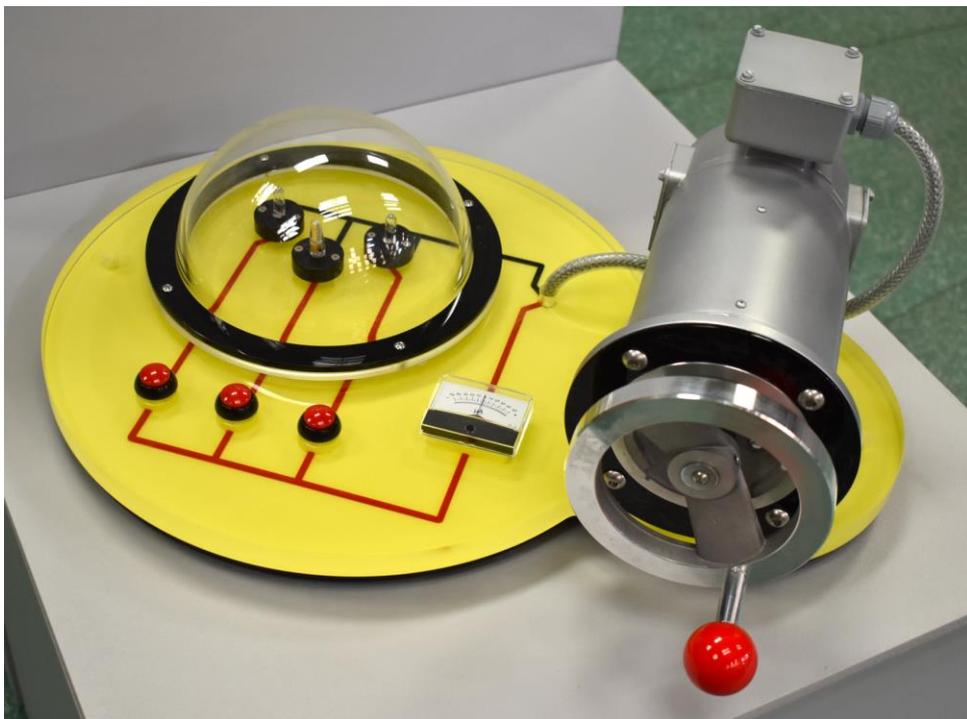
Press and hold the button with the magnet close to the motor.

Notice that the motor will only spin if an electric current is flowing through it AND if a strong magnetic field is also present.

When the current flows the coiled wire becomes an 'electromagnet' producing its own magnetic field. Then it moves because of the bar magnet nearby.

The motor's internal magnets have been removed, so it does not rotate unless the rotatable bar magnet is brought close to the coil while the current is flowing. The direction of rotation can be reversed by reversing the magnet.

Electrical power (Price £5760)



Press any of the red buttons while turning the handle.

Notice the extra effort needed when you switch the light bulbs on.

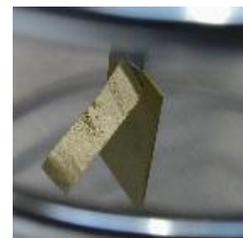
The energy that lights them has to come from somewhere. It comes from you. It is harder work to supply enough energy to light more lamps or lamps rated at a higher 'wattage'.

The high-efficiency LED lamp is dazzlingly bright yet requires surprisingly little power input.

The lamps are 3W LED, 10W halogen, 20W halogen. These can be labelled.
Electrical Power is one of our most popular exhibits.



Electroscope (Price £2668)



Make sure the chain is not touching the table or anything else.

Rub a balloon on your clothes to produce an electric charge. Can you make the very thin "gold-leaf" move, in the middle of the electroscope?

What happens if you touch the top of the electroscope or the chain while the "gold-leaf" is sticking out sideways?

This is a great exhibit for encouraging personal interaction with trained 'facilitators'. A whole routine of additional demonstrations can be performed with it.

Fingerprint (Price £2740)



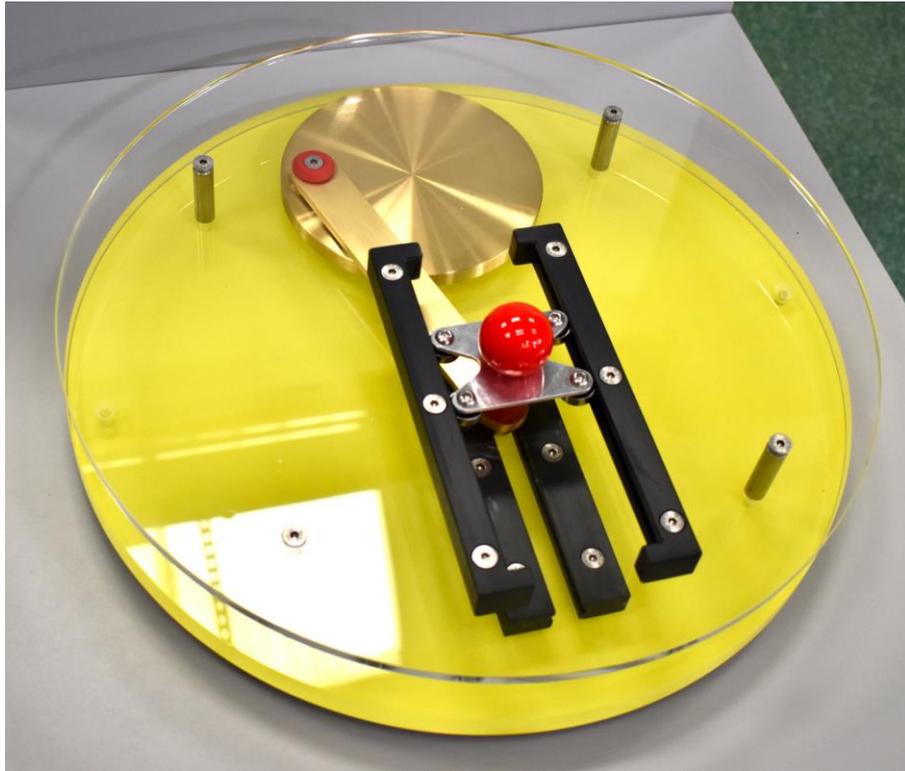
Find the red ring at the back of this exhibit. Now press the tip of one finger against the middle of the red ring.

Can you see your fingerprint when you look through the eyepiece?

Nobody else in the whole world has exactly the same fingerprint-pattern as you. Your DNA has made you special.

With long-life replaceable batteries, pushbutton switch and internal LED illumination.

Flywheel (Price £3588)



Carefully slide the red knob to-and-fro at just the right rate to turn the flywheel.

The knob is magnetically linked to the flywheel's connecting-rod for safety reasons, preventing children from spinning the heavy flywheel dangerously fast and possibly trapping fingers. This magnetic linkage also makes the experience more interesting, because it slips loose if the red knob is moved at the wrong speed.

Friction wheel (Price £1387)

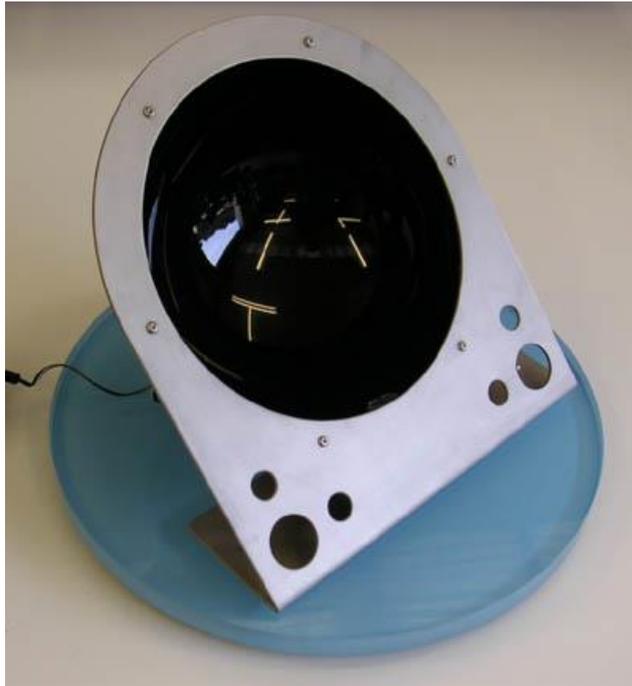


Spin the wheel, then stop it by letting the rubber edge rub against your hand.

Can you feel the heat generated by friction?

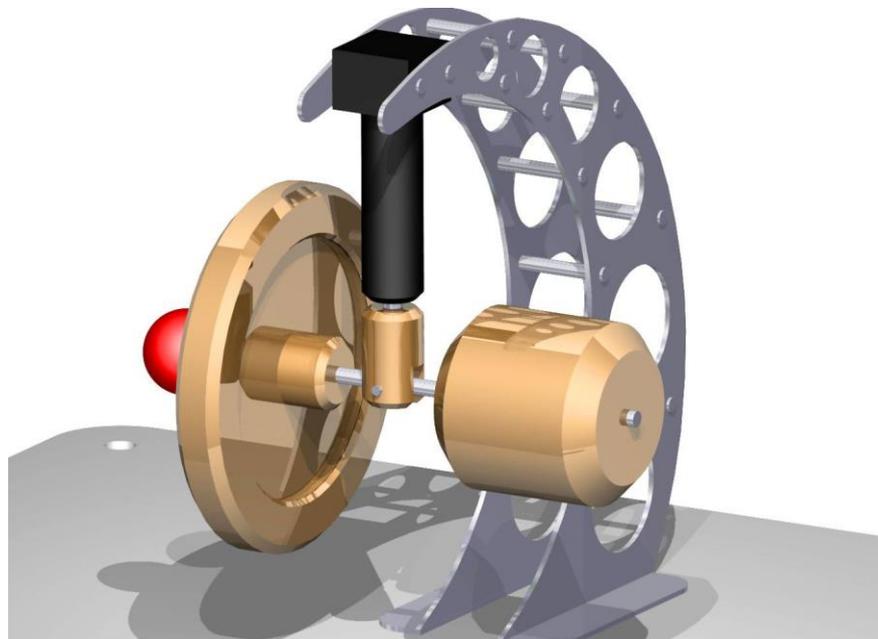
Alternatively, you can continue to turn the disc using the red finger-hole. The 'movement-energy' of the wheel changes into heat energy when you use your hand as a brake.

Ghost finger (Price £2391)



A bright LED light source shines upwards onto your finger when you hold it in front of the concave black dome. The 'ghost' reflection of your finger floats amazingly in front of the black mirrored inner-surface of the dome. There is a low voltage power supply unit.

Gyroscope (Price £2499)



Spin the counterbalanced wheel, then use the red knob to tilt it up or down.

Notice how strongly (and strangely!) it twists sideways and pushes against your hand.

This 'gyroscopic effect' applies to all spinning objects and makes it easier to ride a bicycle when the wheels are spinning faster.

Heat pump (Price £4377)



Put your hand on the metal 'hand' and turn the handle of the electrical generator.

Depending on which direction you turn the handle, one part of the hand-panel becomes warmer while the other becomes cooler.

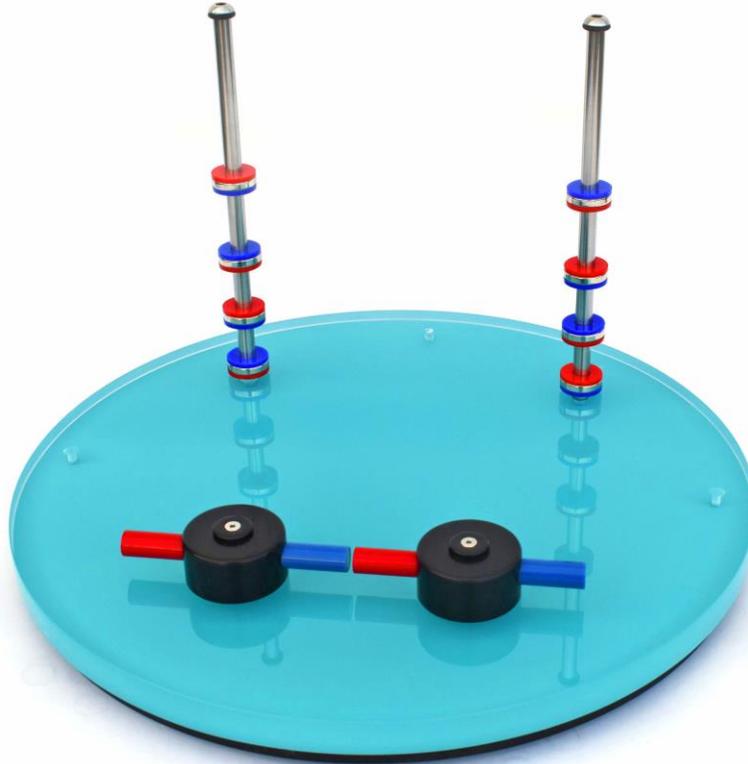
The two white rectangles are Peltier cells, in which the electric current flows across the junction between two different metals.

Home insulation (Price £3400)



A simple model house with each of the four sides insulated differently: glass, stone, rock-wool, polystyrene foam. An internal electrical lamp provides a source of heat. The different temperature of each outside wall can be measured with a separate thermal camera or an inexpensive infrared thermometer (not included).

Hovering and turning magnets (Price £2854)



The hovering ring-magnets have red and blue coloured faces to indicate their north and south poles. Rotating one of the bar magnets by hand immediately causes the other one to flip round. This is a strangely appealing phenomenon to 'play' with. Holding both magnets at the same time gives an impressively tactile experience of magnetic repulsion.

Infinite reflections? (Price £1744)



This is not an original idea, but provides plenty of scope for enjoyable experimentation. Each mirror has a central peep-hole giving an 'infinity tunnel' effect. Moving either mirror causes the 'tunnel' to 'bend'.

(The right-hand photo shows a larger version, for permanent installation.)

Iris (Price £2737)



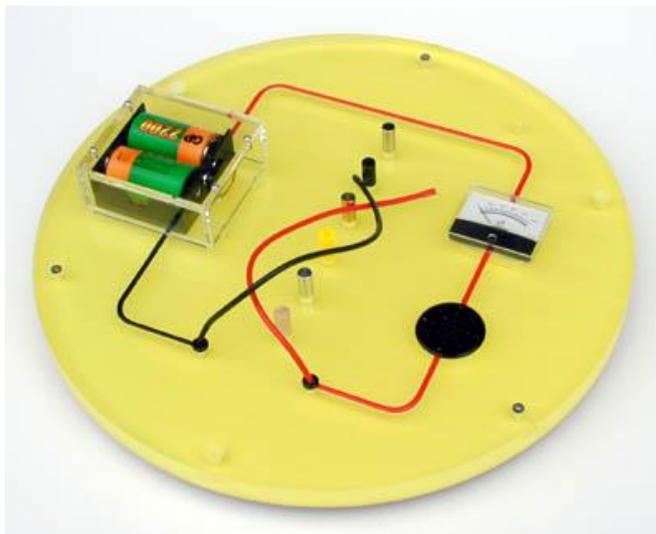
Put one eye as close as possible to the red eyepiece. Press the red button and look inside.

Can you see a magnified reflection of your eye?

The iris is the ring around the black pupil in the centre. The muscles in the iris control how much light enters the eye by making the pupil smaller when you switch the light on. Notice the patterns in your iris. Nobody else in the world has the same iris-pattern as you. You are unique!

In the example shown above, the internal LED light is powered by replaceable long-life batteries.

Is it a conductor? (Price £2070)

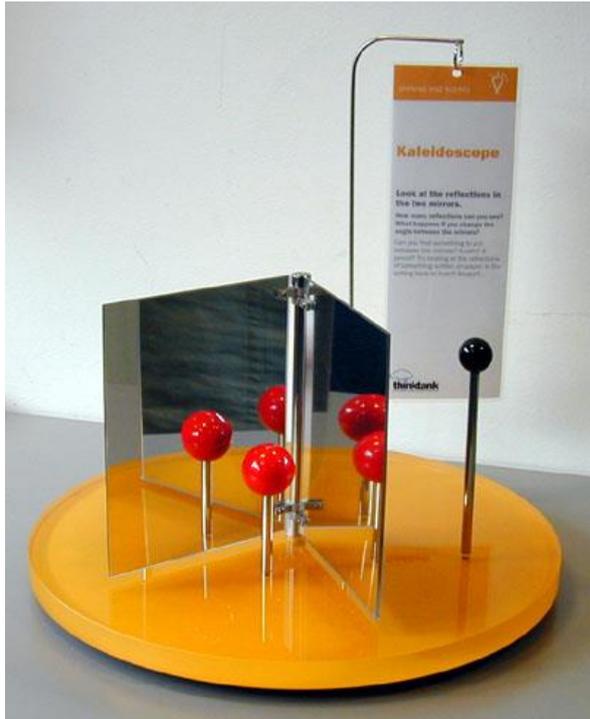


Two loose leads are used to find out which of the various material samples (plastics, metals, wood) allow current to pass through. Users are also prompted to search their pockets for more samples to test!

Current is indicated by an ammeter and a buzzer. The arrangement of the circuit and its connection to the power supply are clear and obvious.

This can be powered by replaceable batteries, or by an external low-voltage power supply unit, with disconnected batteries remaining visible.

Kaleidoscope (Price £1983)



Look at the reflections in the two mirrors.

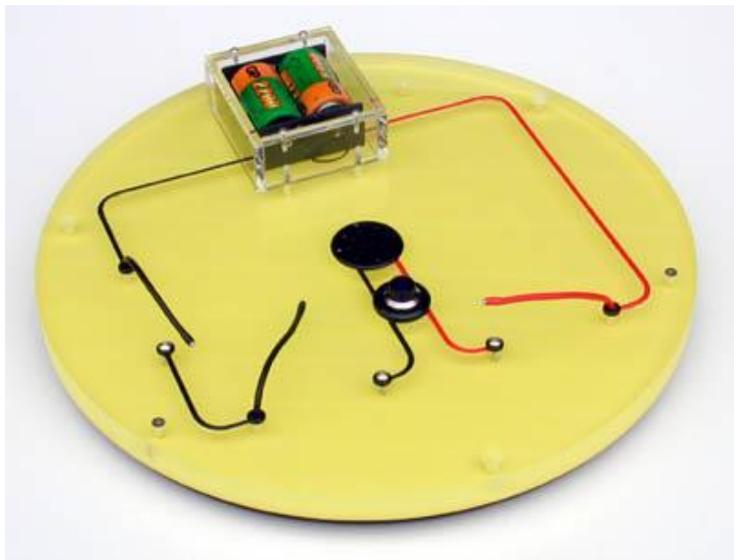
How many reflections can you see? What happens if you change the angle between the mirrors?

Can you find something to put between the mirrors? A coin? A pencil? Try looking at the reflections of something with writing on. Is the writing back to front? But is it still back to front after being reflected first from one mirror, then from the other?...

How does the angle between the two hinged mirrors affect the number of reflections that can be seen?

You might also provide pieces of coloured paper to be laid out between the mirrors to explore patterns and symmetry reversals.

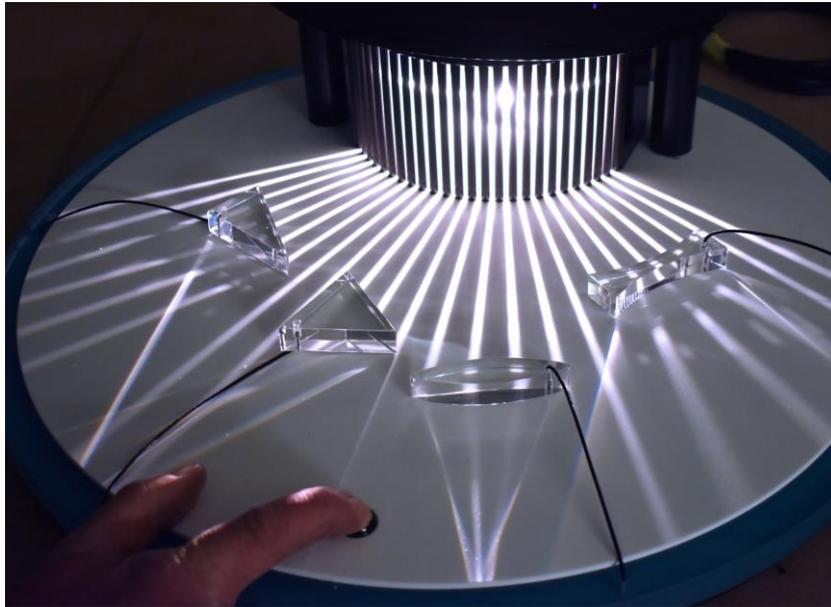
Light the lamp (Price £2229)



The simple challenge is to figure out how to light the lamp and sound the buzzer, using the three loose leads. It may look too easy, but this is soundly based on educational research. The 'naive notion' is that it should light if only one side of the circuit is connected.

You can't easily do this by yourself because there are (deliberately) three connections which come apart when you let go and you only have two hands. You must ask a friend to help. Then you discuss it together...

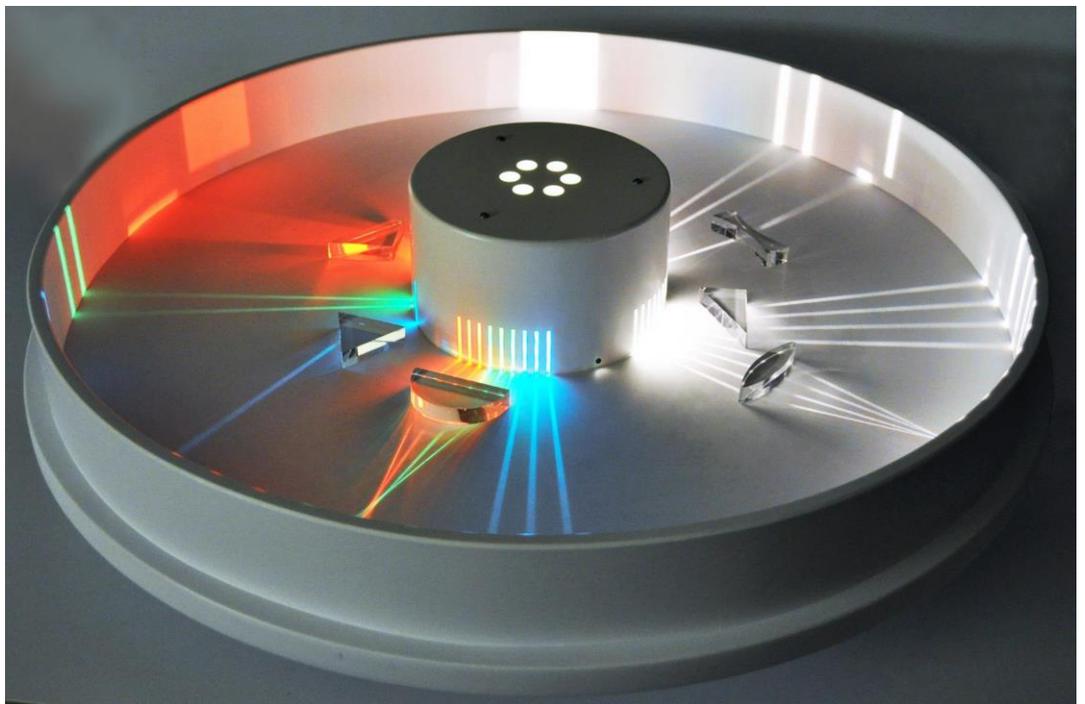
Light-rays (Price £2229)



Press and hold the red button to shine rays of light across the white surface.

Experiment with the clear plastic shapes to discover what effects they have on the rays.

The halogen lamp is connected to a low voltage power supply unit.



(This can also be made as a larger exhibit, approximately 1m diameter. Ask about prices.)

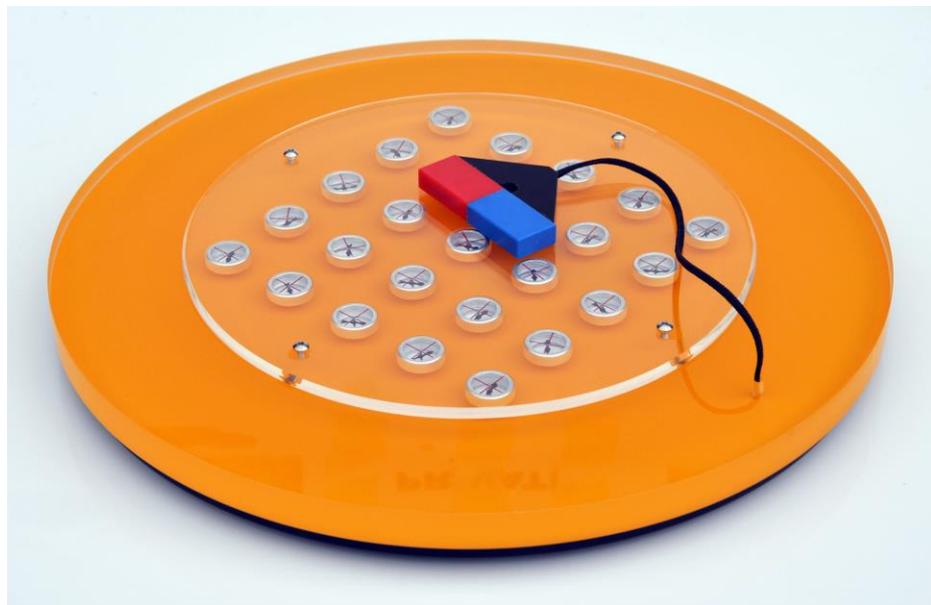
Lungs (Price £2290 or £2596)



You pull down the red ball connected to a black rubber diaphragm. Air is drawn into the thin plastic bags through the Y-shaped tubes. If you put your finger over the top tube, you can feel the air flowing. It causes a 'wheezing' sound. The mirror underneath makes the red operating knob easily visible when the exhibit is displayed on a table of typical height.

Available in two sizes: 400mm diameter and 600mm diameter.

Magnet and compasses (Price £1983)



The compass needles are sensitive at a considerable distance from the coloured bar magnet and show the shape of the magnetic field.

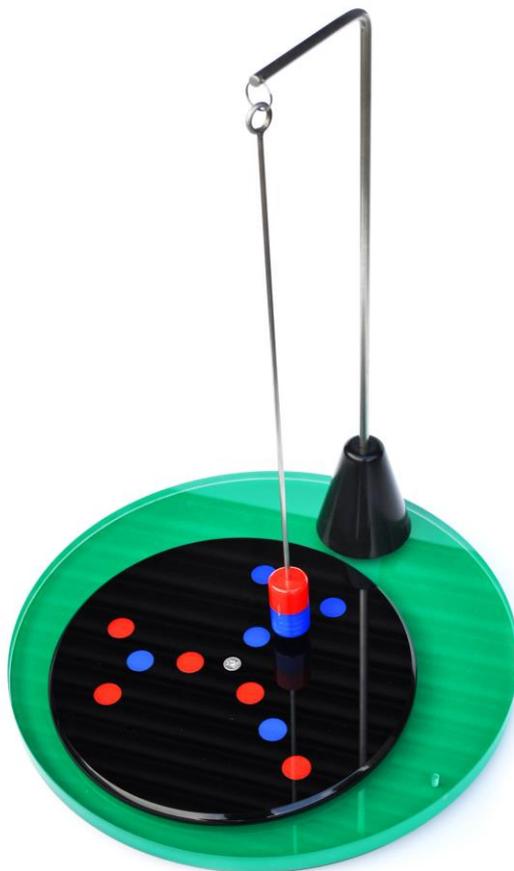
For maximum durability in an unsupervised environment, we recommend our improved design (same price) that uses a central rotating magnet (as seen in *'Hovering and turning magnets'*) instead of the tethered magnet shown here.

Magnetic field from a coil (Price £4500)



Pressing and holding a button to switch on an electric current through the coil produces a strong magnetic field, whose pattern is shown by the compass needles.

Magnetic pendulum (Price £2601)



Gently swing the magnetic pendulum.

Watch how crazily it swings above the other magnets. Which coloured magnets attract the pendulum and which push it away?

The north poles of the magnets are red and the south poles are blue.

*You can turn the black disc to select different sets of magnets below.
This exhibit is extremely popular with visitors.*

Million turns (Price £2433)



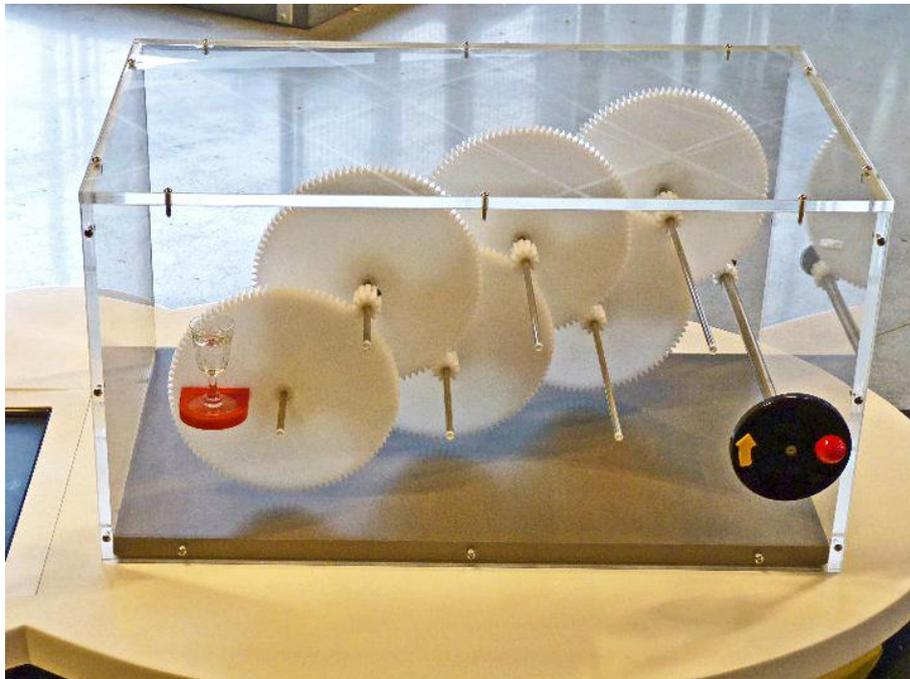
Turn the red wheel in the direction of the arrow.

Notice how slowly the gear wheels turn.

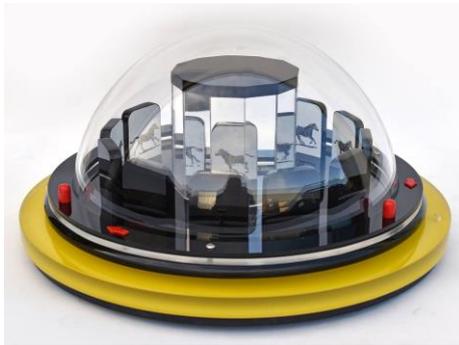
The bigger gears have 100 teeth. The smaller gears have 10 teeth. Can you see why you have to turn the red wheel a million (1,000,000) times before the 6th gear wheel turns once?

The quoted price is for steel gears. Can be made on our standard 40cm diameter base to match other mini-interactives in a set, but a rectangular base looks better.

(Brass gears are available, also a larger design with Delin gears: ask for prices.)



Praxinoscope (Price £2931 or £3201)

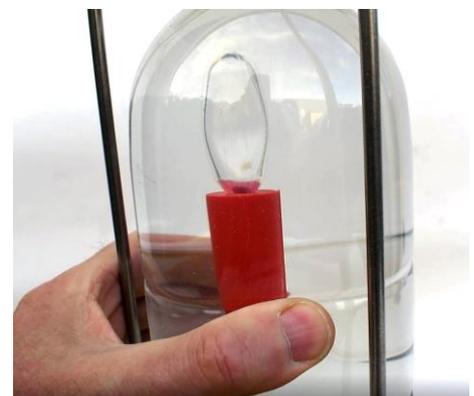


Spin the dome and watch an impressive '12-frames' repeating animation in the polygonal mirror. The left-hand version shows a 2D image of a running animal. The right-hand version shows (for example) a 3D animation of the fission of a uranium atomic nucleus.

Another version shows 'bendy men' dancing. With a 400mm or 500mm diameter base.



Pressure (Price £1237)



Squeeze the bottle and watch what happens.

Notice the sides of the sealed plastic pipette bulb being squashed when you squeeze the bottle. The air inside is being squeezed, reducing the volume and causing it to sink.

Does it make any difference if you squeeze the bottom of the bottle instead of the top?

'Pressure' is a very engaging, robust and maintenance-free exhibit.

Seismograph (Price £2508)



The LED draws a glowing line on the slowly rotating photophosphorescent plastic disc. The line fades within one rotation. The upper part of the exhibit is on flexible rubber mounts. When the 'hanging gate mechanism' is shaken, the LED draws a wiggly, line.

This is often displayed beside our 'Earthquake' mini-interactive.

Simple generator (Price £1600)



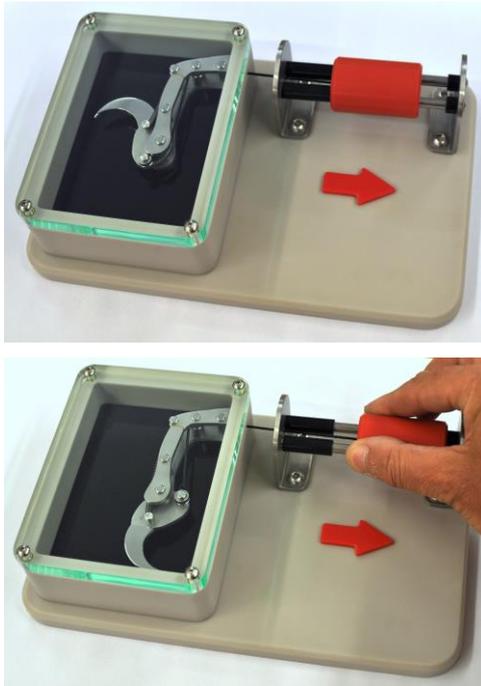
Can you make an electric current by moving the magnet near the coil?

You will need to close the circuit, by pressing and holding either of the two red buttons.

*One of the buttons is connected to a small, black **diode** that only lets current flow in one direction. What difference does it make if you press and hold the other button?*

(The photo shows an older version with only one push-button and no diode.)

Skeletal articulation



This life-size model of a lion's claw was specially created for the Museum of Natural Sciences, Brussels. We would be pleased to discuss similar exhibits based on this principle.

Solar powered house (Price £3000)



Can you change the reading on the electrical meter?

When you shade the solar panel with your hand, its electrical output is reduced.

No light source is included. It may be necessary to place something like a table lamp nearby.

Spinning disks (Price £1929)



Slowly spin each disc and watch the pattern carefully. Try to find the most effective speed for each illusion.

One of the patterns produces a strange, three-dimensional effect, like a wobbly cone. 'Benham's Disc' somehow causes your brain to see colours. Spin the spiral disc clockwise and stare at it for a while before looking at your friend's nose. The nose will grow bigger!

Streamlines (Price £2106)



Gently press down the edges of the spring-mounted tank to make the little ball roll across, leaving a trail behind itself.

Also notice the air bubbles as they slide across in the opposite direction to the rolling ball. Watch the swirling trails they leave behind when they move through the water?

Special, shiny particles in the water show flow-patterns that are usually invisible. If the particles have settled to the bottom, you can stir them up by spinning the tank around.

Streamlined fish-shape (Price £3300)

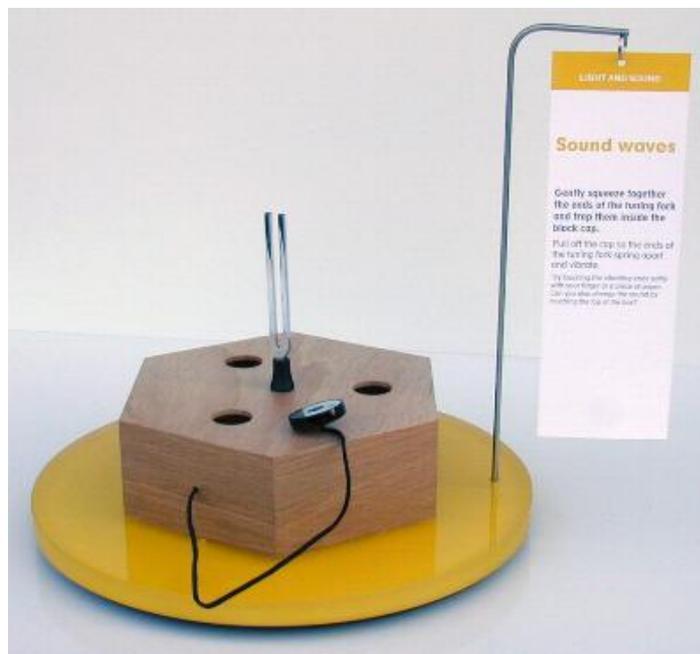


Turn the handle to make the 'fish' swim round in either direction.

Notice the turbulent trail it leaves behind.

Which swimming direction causes the least water disturbance?

Tuning fork (Price £2058)



Gently squeeze together the ends of the tuning fork and trap them inside the black cap.

Pull off the cap so the ends of the tuning fork spring apart and vibrate.

Try touching the vibrating ends softly with your finger or a piece of paper. Can you also change the sound by touching the top of the box?

Turbulence dome (Price £2208)



Gently turn the dome and watch the patterns in the water.

Perhaps they remind you of swirling atmospheric weather systems around planets.

Tiny, flat crystals are suspended in the water. When different 'layers' of water flow past each other at different speeds, these crystals tend to be pulled into parallel alignment with others nearby. Because the crystals are also shiny and reflect light, we can SEE complex flow patterns that would normally be invisible.

Water tornado (Price £3363)



Turn the handle and watch what happens to the water.

Can you make a "whirlpool"? How many things can you discover about it?

What tricks can you make the floating beads perform?

This is another extremely popular exhibit.

Water-power (Price £8424)



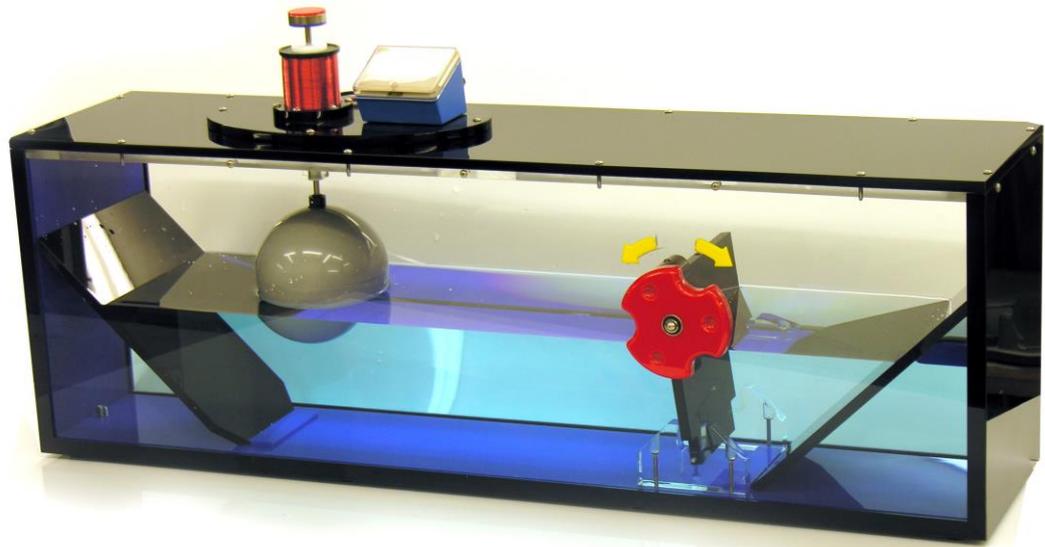
Press and hold the red button to operate the electric water pump.

Water fills the upper tank until a self-starting siphon causes to empty itself, flowing past the turbine.

The electric current from a small generator is shown by the needle of an analogue ammeter.

A low voltage power supply unit is attached.

Wave-power (Price £5070)



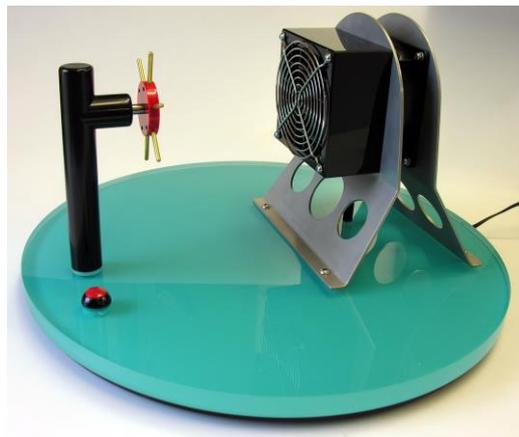
Rotate the red knob backwards and forwards to make waves. How far can you make the electrical meter needle move?

Notice the red and blue magnet moving up and down near the coil of copper wire. The meter needle and the LED lamps show that you are generating an 'alternating' electrical current: its direction is constantly reversing.

The coil of wire and the moving magnet form a simple electrical generator. Large electrical generators work on the same basic principle.

Rotating the red knob moves the magnetically linked wave-maker to-and-fro. The floating ball causes a red and blue magnet up and down above a coil. The electric current is shown by a moving needle on a centre-zero analogue ammeter. This is a larger mini-interactive (0.9m long) for which a special wheeled flight case can be supplied if required.

Wind turbine, simple version (Price £2110)

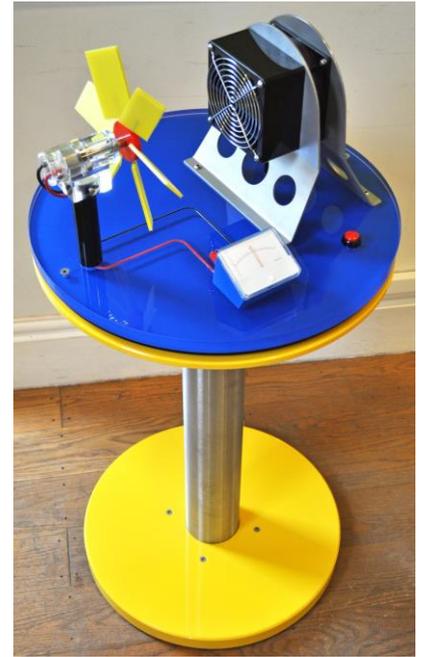
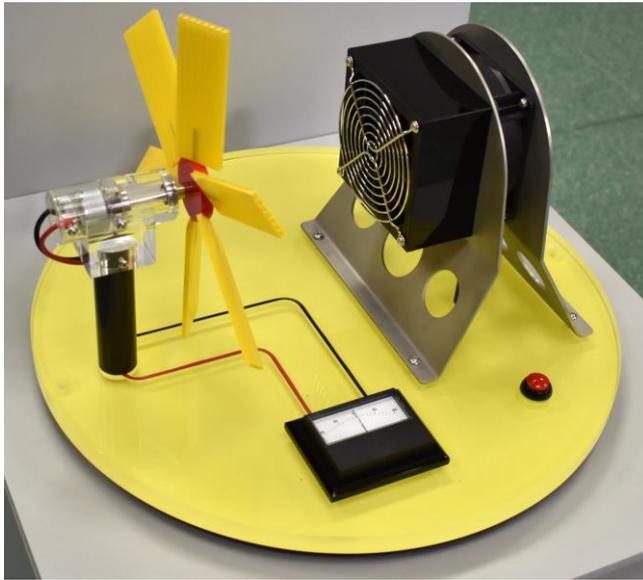


Press and hold the red button to switch on the 'wind'.

Design your own wind turbine by pushing pieces of cardboard or fluted plastic sheet onto the pegs. Adjust the angle of each piece to improve the efficiency of your turbine.

You could put out pre-cut turbine blades or your users could use safety scissors to cut them from material you provide. Corrugated cardboard pieces from most packing boxes will push easily onto the brass spokes.

Wind turbine with generator (Price £2881)



Like the simple version, but with an electrical generator, a meter with moving needle and a larger 50cm diameter base.

(Pedestals are available at extra cost for most of our mini-interactives.)