

Thank you for your interest in MDR Publishing products. This is a DEMO which contains 8 of the 200+ experiment worksheets available in our NEW VERSION of the KS2 Physical Processes experiment guide. If you would like to order the manual you may do so by clicking the buttons above.

Ordering on line is EASY and you do not have to use a credit card. We will only dispatch CD's to SCHOOLS or RECOGNISED INSTITUTIONS.



Experiment Manual for Key Stage 2 (Physical Processes Sc4)

Martin D Roberts

MDR
Publishing

Published by
MDR. Publishing
PO Box 1173
Sorting House
22 Bristol Road
WINTERBOURNE
Glos.
BS36 1RG

© Martin Roberts 2009

All rights reserved; no part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the copyright holders.

First published by MDR Publishing in 2009

ISBN: 978-0-9543512-3-6

Illustrator: M.D Roberts

Contents

Year 3

[3E Magnets and Springs](#)

[3F Light And Shadows](#)

Year 4

[4E Friction](#)

[4F Circuits And Conductors](#)

Year 5

[5E Earth Sun and Moon](#)

[5F Changing Sounds](#)

Year 6

[6E Forces In Action](#)

[6F How We See Things](#)

[6G Changing Circuits](#)

3E Equipment list

Specialised equipment	Recyclable	Standard equipment/ household
5 mm dowel and base	Card	Cereals
Button compass	Container cardboard cylindrical	Various objects with springs
Magnet : bar	Plastic bottles: 2L	Cotton reel
Magnet: horseshoe		Dowel
Magnet: Neodymium		Duck tape
Magnet: ring		Elastic band
Magnetic field viewer (expt)		Electrical cable housing
Magnets: collection		Hole punch
Neodymium mag	Please note that, in order to save space in the DEMO, we have only included the equipment list for this unit. The full version will include equipment lists for all units.	
Nuts 10 mm		
		Rubber band
		Ruler
		Scissors
		Sticky tack
		Thread
		Washing up bowl

3E Magnets And Springs	
	Section 1: Introduction
3E1	Making statues
3E2	Photo survey: pushing or pulling?
	Section 2: Exploring magnets
3E3	The poles of a magnet
3E4	Pushing or pulling?
	Section 3: Finding magnetic materials
3E5	Survey of magnetic materials
3E6	Magnetic material for breakfast
	Section 4: Uses of magnets
3E7	Photo survey: uses of magnets
3E8	Magnetic fish
3E9	Make a paperclip float
3E10	How to build a compass I
3E11	How to build a compass II
	Section 5: Behaviour of magnets
3E12	Which magnet is strongest?
3E13	Floating magnets
	Section 6: Uses of springs
3E14	Photo survey: uses of springs
	Section 7: Compressing and stretching springs
3E15	Comparing springs I
3E16	Comparing springs II
	Section 8: Testing elastic bands
3E17	Comparing elastic bands
3E18	Make a toy car catapult
3E19	Test your toy car catapult
3E20	Make a plastic bottle paddle boat
3E21	Make a cotton reel racer
3E22	Make a come-back

3E9 Make a paperclip float

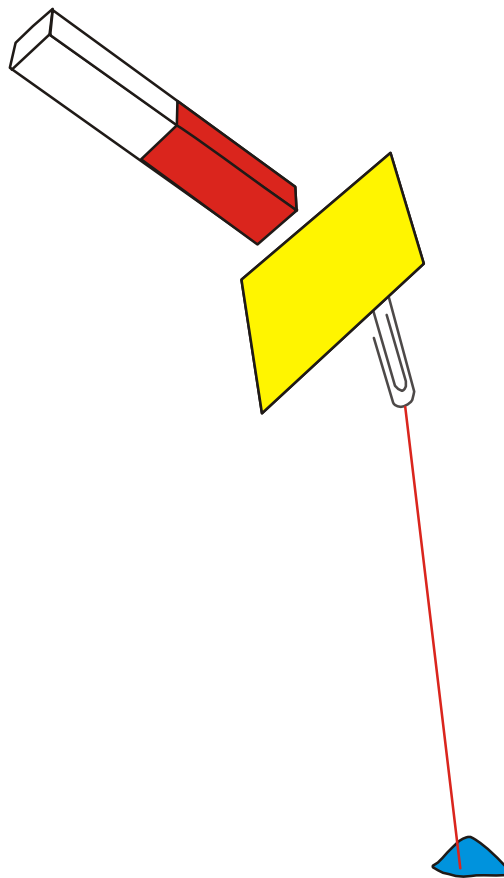
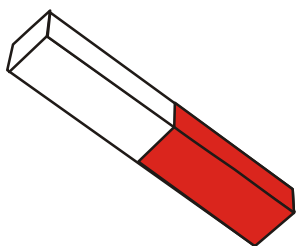
Card Scissors Paper clips Bar magnet Thread Card Sticky tack

2

Without letting the magnet touch the paper clip suspend it in the air as indicated below.

3

While the paper clip is suspended insert a piece of card between it and the magnet.



1

Tie a paper clip to a piece of cotton held at one end to your desk with sellotape or blue tack.

What holds the paper clip in the air, a pushing force or a pulling force?

Would this experiment work with a plastic paper clip?

Why not?

How does this experiment show you that magnetic forces can pass through non magnetic material?

.....
.....
.....

	3F Light and Shadow
	Section 1: Introduction
3F1	Photo survey: Words connected with light
3F2	Survey: Words connected with light
	Section 2: Making shadows
3F3	Blocking light
3F4	Make a silhouette of yourself
	Section 3: Sunlight and shadows
3F5	Chalking shadows
	Section 4: How shadows change through the day
3F6	Make a shadow stick and card
3F7	Measure the length of shadow during the day
	Section 5: Where does the sun shine?
3F8	Wandering star
	Section 6: Observing the position of the sun
3F9	Measuring shadows during the term
3F10	What causes shadows to change
	Section 7: Showing how the earth spins
3F11	Explaining shadows using a globe
	Section 8: Sundials
3F12	Make your own sundial
	Section 9: Light and different materials
3F13	Investigating shadows produced by different materials

3F4 Make a silhouette of yourself

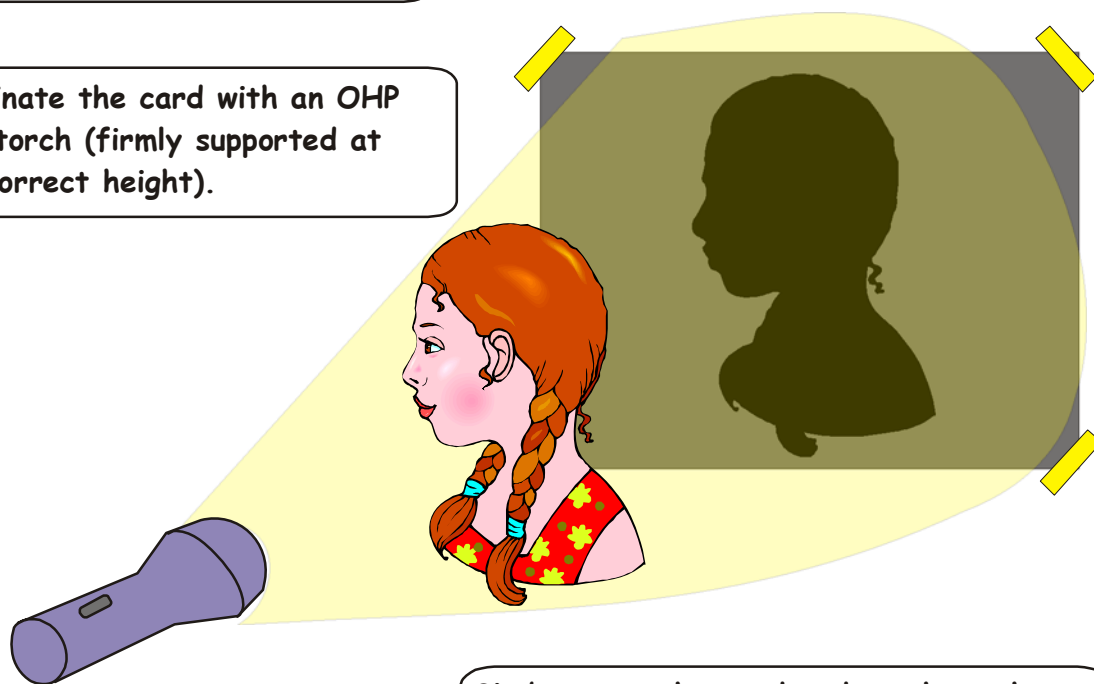
Torch or OHP Card Sticky tape

①

Hold a piece of black A3 card to a wall or whiteboard using tape or sticky tack.

②

Illuminate the card with an OHP or a torch (firmly supported at the correct height).

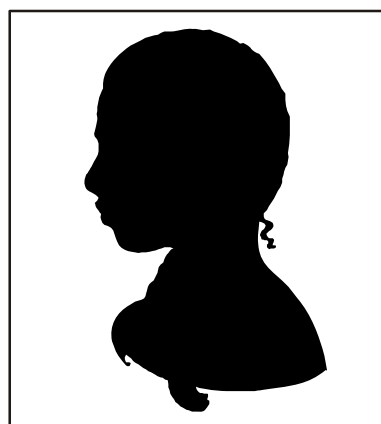


③

Sit between the card and torch so that a silhouette of your head appears on the black card. (you should be able to see the shadow even though the card is black!)

④

Get a friend to draw carefully around the outline of your head and shoulders, then cut out around the outline of the silhouette and stick it on a white background.

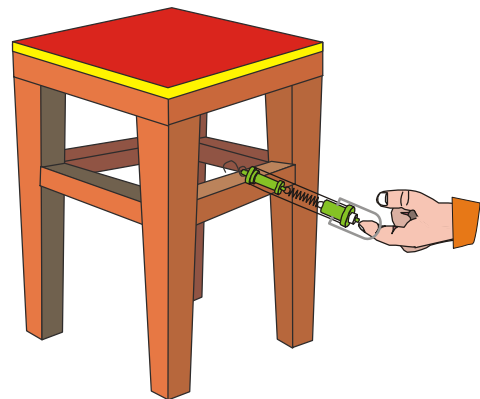
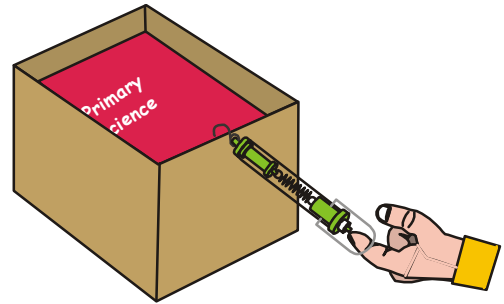
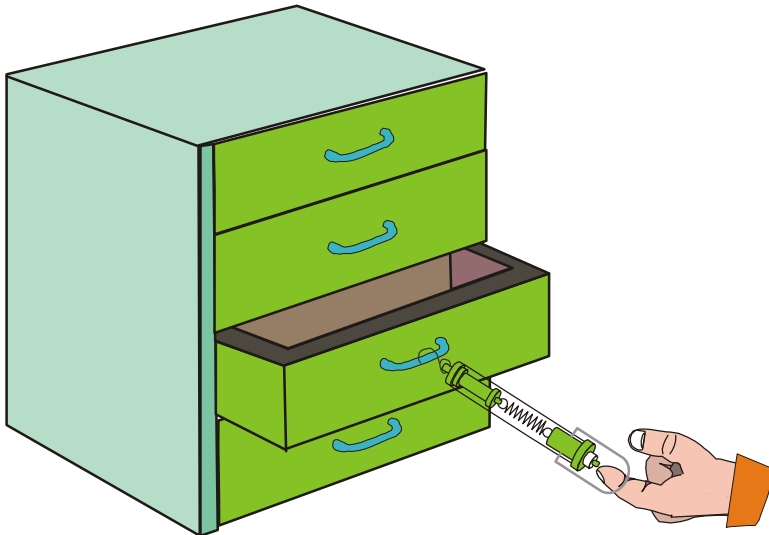


	4E Friction
	Section 1: Introduction
4E1	Review of forces
	Section 2: Measuring force
4E2	Force meters
4E3	Using force meters
4E4	Measuring forces: weight
4E5	Measuring forces: the elastic force
	Section 3: Sliding objects
4E6	Types of force: friction
4E7	Friction produces heat
4E8	Comparing friction between surfaces
4E9	Spinning objects
4E10	Why use wheels?
	Section 4: Using friction
4E11	High or low friction
4E12	A knot race
4E13	Investigating old shoes
4E14	Friction and structures
	Section 5: Water resistance
4E15	Water resistance
	Section 6: Air resistance
4E16	Running with a cardboard
4E17	Making mini kites
4E18	Investigating air resistance I
4E19	Investigating air resistance II
4E20	Jet propulsion
4E21	Make a straw plane
	Section 7: Investigating parachutes
4E22	Build a parachute
4E23	Investigating parachutes

4E3 Using force metres

Collection of force meters Collection of items or devices that can be pushed or pulled

Use your force metre to measure the forces required in the various situations listed below.



Your teacher has provided you with a number of situations in which you have to apply a force. In each case decide which force metre is appropriate then measure the force required. Note your measurements in the table below:

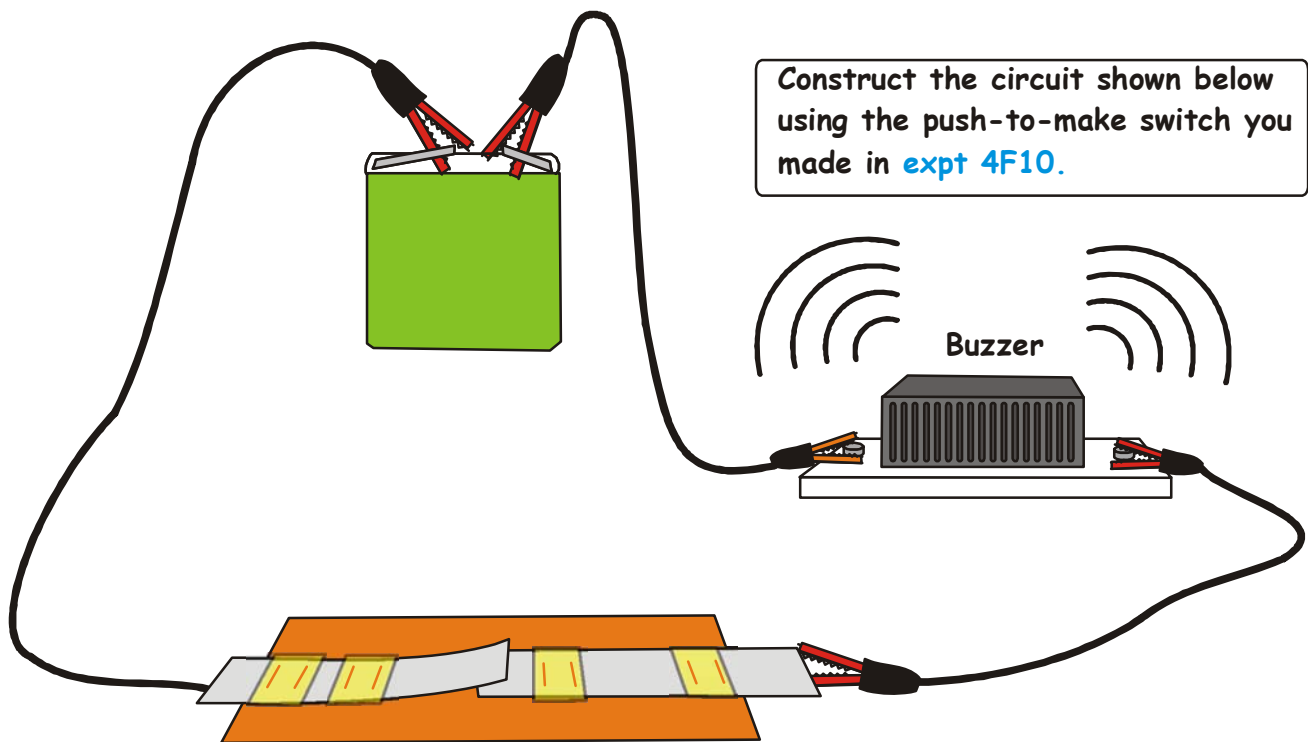
Situation	Force required
Open a drawer	
Pull down a door handle	
Drag a chair across the floor	

Represent your information on a histogram.

	4F Circuits And Conductors
	Section 1: Making circuits that work
4F1	Draw it—make it
	Section 2: Mains and battery-powered circuits
4F2	Photo survey: mains or battery
4F3	Light up an led
4F4	Different types of batteries
4F5	Match the battery!
	Section 3: Conducting electricity
4F6	Inserting devices into a circuit I
4F7	Inserting devices into a circuit II
	Section 4: Conducting and insulating materials
4F8	Conductors and insulators
4F9	Solutions can conduct
	Section 5: Switches
4F10	Build a "push to make" switch
4F11	Make a circuit with a push-to-make switch
4F12	Make a Morse code generator
	Section 6: Adding batteries
4F13	Adding batteries to a light bulb
4F14	Adding batteries to a motor (and changing the poles)
	Section 7: Changing circuits
4F15	Increase the number of bulbs series
4F16	Change the type of battery

4F12 Make a Morse code generator

Cables Battery Push-to-make switch ([previous expt](#)) Buzzer



Now use the code below to send messages to your partner:

A	.-	N	-.	0	-----
B	-...	O	---	1	.----
C	-.-.	P	.-.	2	..---
D	-. .	Q	---.	3	...--
E	. .	R	.-.	4-
F	.. .	S	...	5
G	-- .	T	-	6	-....
H	U	..-	7	--...
I	.. .	V	...-	8	---..
J	W	.-.	9	----.
K	.-.	X	-. .	Full stop	...--
L	.-..	Y	-. .	Comma	---..
M	--	Z	--..	Query	..--..

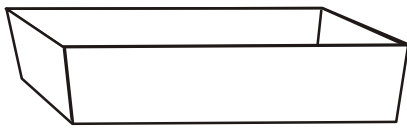
	5E Earth, Sun And Moon
	Section 1: Introduction
5E1	Star, planet or satellite?
	Section 2: Flat or spherical?
5E2	Ship on the horizon
5E3	Is the horizon flat or curved?
	Section 3: Size and distance
5E4	Photos of the Earth, Sun and Moon
5E5	Diameter of the Sun, Earth and Moon
5E6	How far away is the Sun?
5E7	Perspective
5E8	Make a Paper mache Moon
5E9	Make a space shuttle
5E10	Earth - Moon distance I
5E11	Earth - Moon distance II
	Section 4: The changing position of the Sun
5E12	Length and position of a shadow stick
5E13	The passage of the Sun: in London on 21st June
5E14	Which is moving the Sun or the Earth
	Section 5: The movement of the Earth
5E15	What is a day?
	Section 6: The Sun at different times of the year
5E16	Sunset and sunrise at different times of the year
	Section 7: The Earth's orbit
5E17	What is a year?
	Section 8: The Moon's orbit
5E18	What is a month?
5E19	The Moon dance
5E20	Phases of the Moon
5E21	Word soup

5E8 Make a Paper mache Moon

Plastic container Paper PVA glue Hook Paintbrush and paint Old tennis ball or plastic ball

①

Find a ball (small plastic or old tennis) that is about 4 x smaller than your classroom globe. (Precise, 3.66 x smaller)



②

Screw a small hook or eyelet into the ball and secure with appropriate glue.

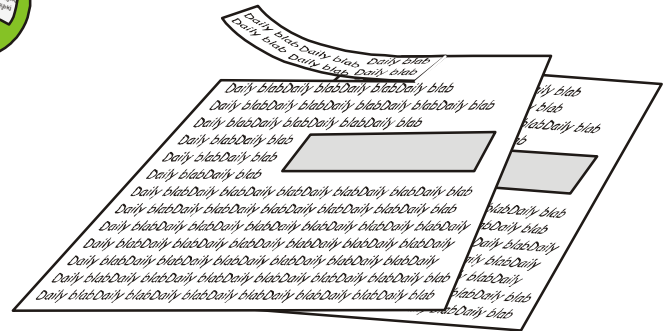
③

Make a mixture of white PVA glue and water in a large margarine tub.



④

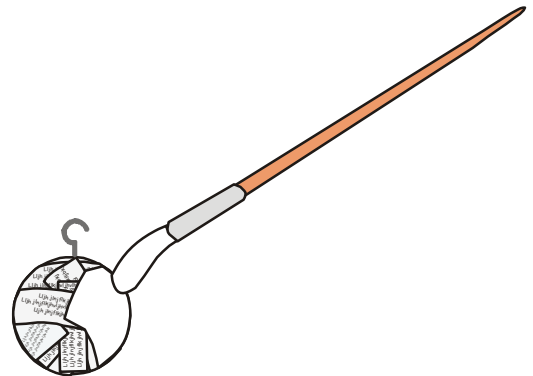
Now soak strips of paper in the mixture and stick them to the ball. Try to produce a crinkly effect on the surface to represent mountains and craters.



⑤

When the paper mache has set paint the Moon white and allow it to dry.

Attach a string and you are now ready to hang your Moon. (See [expt. 5E9](#))



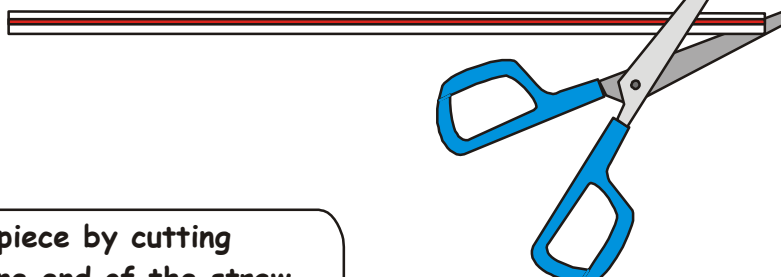
	5F Changing Sounds
	Section 1: Introduction
5F1	The orchestra — loudness and pitch
	Section 2: Observing how sound is made
5F2	Photo survey: Plucking, hitting or blowing
5F3	Musical straws
5F4	Make a kazoo
5F5	Feeling vibrations: the Cymbal
5F6	Speaker vibrations
	Section 3: Vibrations and sound
5F7	Vibrations of a spring: Length
5F8	Vibrations of a spring: Mass
5F9	Vibrations : tuning forks I
5F10	Vibrations : tuning forks II
5F11	Vibrations in a ruler
5F12	Make a wine glass vibrate
	Section 4: How sound travels
5F13	How sound travels through the air
5F14	Make a megaphone/hearing aid
5F15	Transmitting sounds along a tube
5F16	Echoes
5F17	How sound travels in a liquid
5F18	Transmitting sounds along a string
5F19	Sound in solids
5F20	Morse code using radiators
	Section 5: Preventing sound travelling
5F21	Ear protectors
	Section 6: Testing how to muffle sound
5F22	Absorption of sound
5F23	Muffling sound
	Section 8: Describing sounds
5F24	Everyday sounds
5F25	Sirens
	Section 9: Changing sounds
5F26	Make a drum set
5F27	Percussion instruments: musical bottles
5F28	Make a rain stick
	Section 10: Pitch in stringed instruments
5F29	Examining guitars
5F30	Make a guitar

	Section 11: Pitch in wind instruments
5F31	Make a didgeree doo
5F32	Pan pipes using straws
5F33	Pan pipes: using plastic overflow piping
5F34	Musical bottles

5F3 Musical straws

Plastic straw Scissors

You are going to turn a straw into a musical instrument.



①

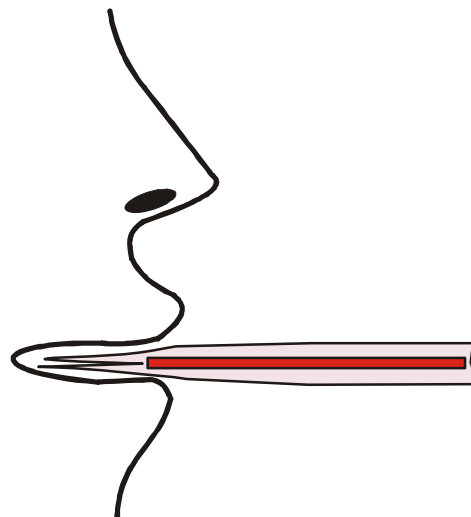
Make a mouth piece by cutting a V shape at one end of the straw as indicated opposite.

Repeat with various lengths of straw.



②

Insert the straw in your mouth, pressing with your lips as indicated opposite, so that the tips of the straw are just separated.



③

Blow so that you get the tips of the straw to vibrate.

Repeat with straws of different lengths and compare their sounds.

	6E Forces In Action
	Section 1: introduction
6E1	Force meters
6E2	Build a force meter
	Section 2: Gravity and weight
6E3	Choosing the correct force meter for the job
6E4	Which way does the rain fall?
6E5	Gravity and falling objects
6E6	Hammer and feather experiment
6E7	Make a water balance
6E8	Weigh things with your water balance
	Section 3: Showing how forces act on objects
6E9	The four effects of a force
6E10	Survey of forces
6E11	Photo survey: Pushing and pulling
6E12	Forces in structures
6E13	Eggstremely strong
6E14	How to spot a hard boiled egg
6E15	Surface tension
6E16	Magic boats
6E17	Floating rice cereals on water
6E18	Hero's engine
6E19	Make a hovercraft
6E20	Uplift: how an aeroplane wing works
6E21	Build a paper aeroplane
6E22	Floating ping pong balls
6E23	Blow the balloons a part
6E24	How to isolate charges
6E25	Deflection of a jet of water
6E26	Attraction of a cereal flake
	Section 4: Weighing in air and water
6E27	The weight of an object in water
6E28	Measuring the up thrust using a balance
6E29	Floating: when forces are balanced
6E30	Cartesian diver
6E31	Investigating Cartesian divers
6E32	Salt water or pure water?

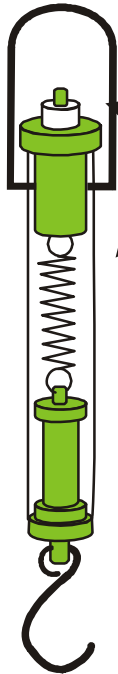
	Section 6: Stretching elastic bands
6E33	Measure the tension in elastic bands
	Section 7: Explaining how paper falls
6E34	Investigating air resistance I
	Section 8: Investigating air resistance
6E35	Investigating air resistance II
6E36	Rocket balloons
6E37	Making spinners

6E3 Choosing the correct force metre for the job

Collection of force meters Objects to lift (see below)

①

Calibrate the force metre.



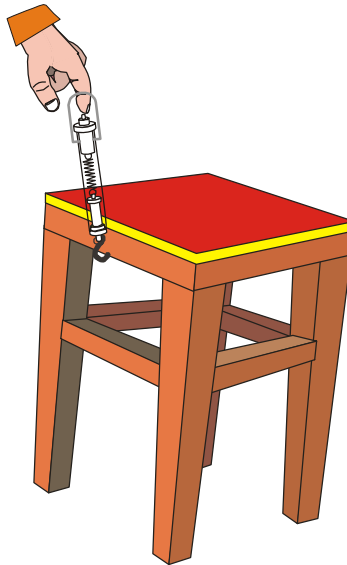
Adjust the knob until the indicator corresponds to 0N

Remove any weights

②

Measure the weight of the objects supplied by your teacher and note down in the table below.

Make sure you chose the correct colour force metre for each object.



Write your results in the table below:

Object	Colour of the force metre	Weight
Stool		
Scissors		

	6F How We See Things
	Section 1: Introduction
6F1	Reflective or luminous?
	Section 2: How light travels
6F2	Light travels in straight lines
	Section 3: How we see light
6F3	Watch your pupils!
6F4	Diffusion of light
	Section 4: Exploring mirrors
6F5	Investigating mirrors
6F6	Make a beam of light move around the classroom
	Section 5: Beams of light
6F7	How to make a beam of light
6F8	Make a magic lantern
6F9	Coloured beams from a CD ROM
	Section 6: Reflection from surfaces
6F10	How to make coloured filter paper
6F11	Reflecting colours
6F12	Why are things coloured?
6F13	Investigating the colours in light
6F14	Reflecting from shiny and diffusing surfaces
6F15	Reflecting light from a yoghurt carton
6F16	Spinning top
	Section 7: Shadows and reflections
6F17	Investigating shadows
6F18	Make a mini silhouette theatre
6F19	Build a viewing screen
6F20	Improving light patterns using tracing paper
	A few tricks of the light
6F21	How to make a pin hole camera
6F22	Viewing a pinhole camera image
6F23	Project an image of your classroom window
6F24	Make the spot disappear
6F25	Put the bird in the cage
6F26	A pencil trick
6F27	Make a coin disappear

6F8 Make a magic lantern

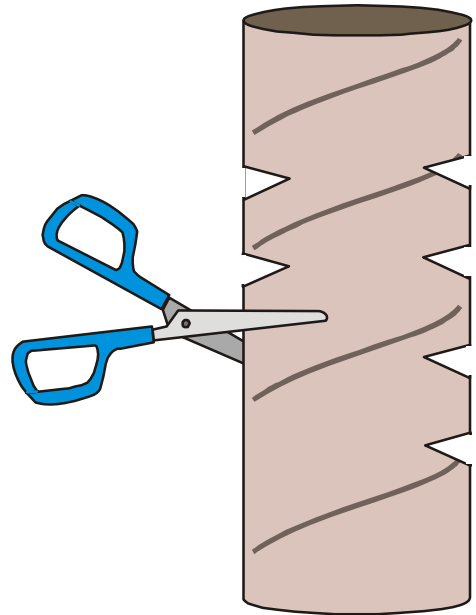
Kitchen towel roll Scissors Coloured transparent paper Rubber band Small torch

①

Flatten a long cardboard roll. The type used for kitchen cleaning towels is best.

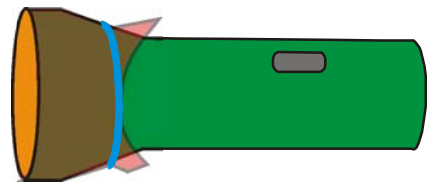
②

Cut geometrical shapes out at the edge as indicated opposite.



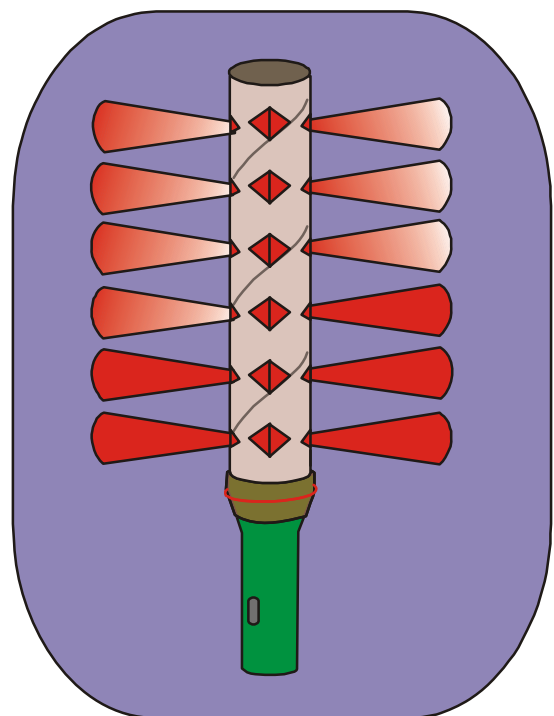
③

Hold a piece of coloured transparency paper over the end of a torch using an elastic band.



④

Make your magic lantern by holding the torch under the kitchen towel roll as indicated opposite.

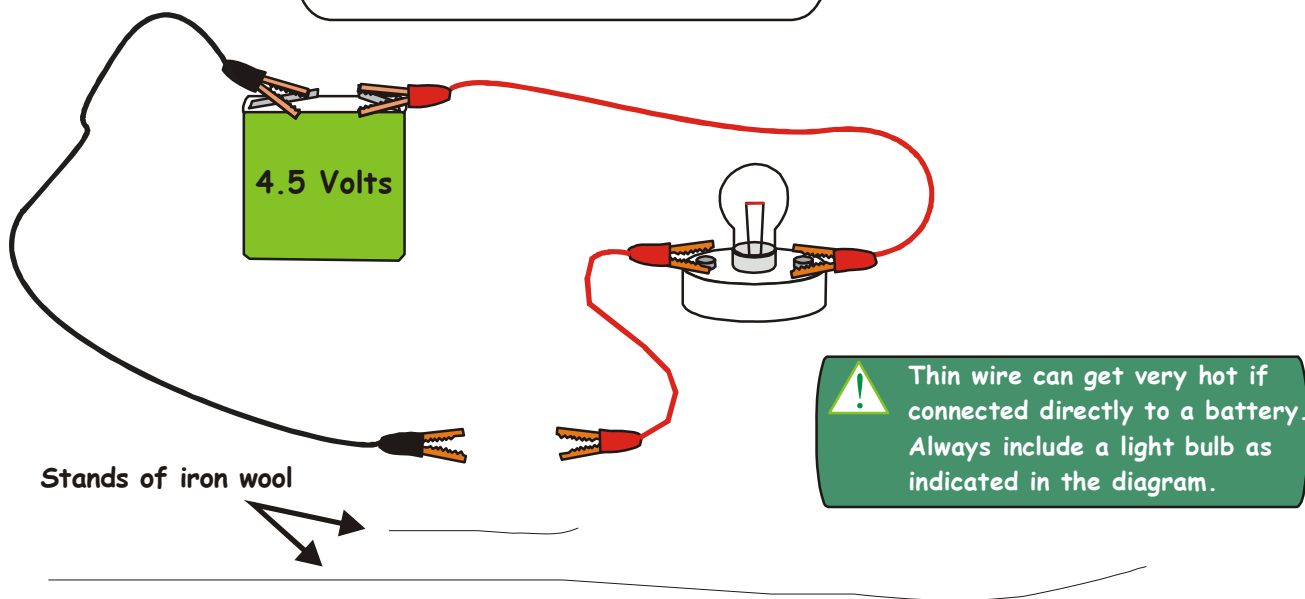


	6G Changing Circuits
	Section 1: Changing circuits
6G1	Mains or battery?
6G2	Connecting light bulbs to batteries
6G3	Changing the voltage in a motor
	Section 2: Drawing circuits with symbols
6G4	Which symbols?
6G5	Make a quiz board
6G6	Electric game 1
6G7	Electric game 2
6G8	Hall light switch
6G9	Bedside lamp
6G10	Clothes peg switch
	Section 3: Testing circuits
6G11	Find the fault
6G12	Bulb brightness and length of wire
6G13	Bulb brightness and thickness of wire
6G14	Bulb brightness and type of wire
	Section 4: Investigating circuits
6G15	Build a pencil lead potentiometer
6G16	Electricity produces heat I
6G17	Electricity produces heat II

6G12 Bulb brightness and length of wire

6V torch light bulb x2 Cables and clips Battery 4.5V Light bulb 6V Strands of iron wool of different length

Connect a 4.5V battery and a torch light bulb to various length strands of iron wool and observe the brightness of the bulb in each case.



Note what happens to the bulb brightness in the table below:

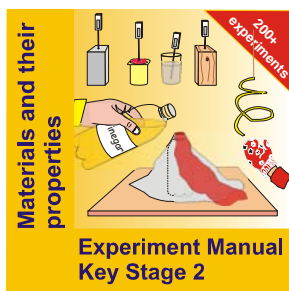
Sample	Bulb brightness
Short strand	
Medium strand	
Long strand	

How does the length of the wire effect the brightness of the bulb?

.....

.....

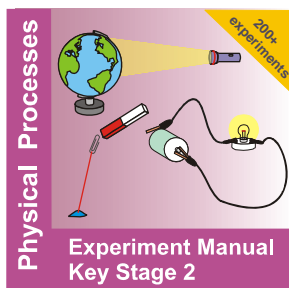
MDR KS2 Science Catalogue



Experiment manual for KS2: MATERIALS AND THEIR PROPERTIES (Sc3)

Provides over 200 experiments, demonstrations and investigations which complement every section of the KS2 schemes of work for Sc3, using simple, inexpensive and safe apparatus. In addition comprehensive equipment lists are included to help with preparation before each unit. Material may be viewed on interactive whiteboards. FULL SITE LICENCE which provides permission to print and photocopy.

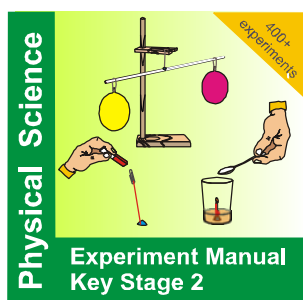
Price £39.99



Experiment manual for KS2: PHYSICAL PROCESSES (Sc4)

Provides over 200 experiments, demonstrations and investigations which complement every section of the KS2 schemes of work for Sc4, using simple, inexpensive and safe apparatus. In addition comprehensive equipment lists are included to help with preparation before each unit. Material may be viewed on interactive whiteboards. The price includes FULL SITE LICENCE which provides permission to print and photocopy.

Price £39.99



Experiment manual for KS2: PHYSICAL SCIENCES: (Sc3 and Sc4)

Provides over 400 experiments, demonstrations and investigations which complement every section of the KS2 schemes of work for Sc3 and Sc4, using simple, inexpensive and safe apparatus. In addition comprehensive equipment lists are included to help with preparation before each unit. Material may be viewed on interactive whiteboards. FULL SITE LICENCE which provides permission to print and photocopy.

Price £69.99



MAKE IT IN SCIENCE: (Science and Design Technology)

Provides over 80 design and construction projects which complement the KS2 science curriculum "hand in glove". The projects use cheap, recyclable materials and cover electricity, light, forces, magnetism and materials. FULL SITE LICENCE which provides permission to print and photocopy.

Price £24.99

School Order N^o:
(if known)

Post to: **MDR Publishing, PO Box 182
RETFORD, DN22 1DR**

Fax : **0844 888 30 15**

Tel : **0845 697 57 27**

Name:

Position:

School:

Address 1:

Address 2:

Town:

Post Code:

Authorised by:

Order Details:

	Licence		Tick or "Yes"
KS2/ Primary			
KS2 Materials and their properties (Sc3)	Full Site	£39.99	<input type="checkbox"/>
KS2 Physical processes (Sc4)	Full Site	£39.99	<input type="checkbox"/>
KS2 Physical Properies (Sc3 + Sc4)	Full Site	£69.99	<input type="checkbox"/>
Make it in science	Full site	£24.99	<input type="checkbox"/>
KS3/ Secondary			
KS3 Materials and their properties (Sc3)	Full Site	£59.99	<input type="checkbox"/>
KS3 Physical processes (Sc4)	Full Site	£59.99	<input type="checkbox"/>
KS3 Physical Properies (Sc3 + Sc4)	Full Site	£109.99	<input type="checkbox"/>
Science Dominoes	Full Site	£29.99	<input type="checkbox"/>

Allow £1.50 for postage.

Please note that items can be sent by email (for free) but check that your mailbox can receive files of up to 10M