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Introduction to the series

This book shows the relevance and importance of understanding the science of everyday materials. The book is a series of activities to supplement any teaching you do on these topics and is designed for slower learners of any age but who are operating at the level of achievement normally associated with pupils at KS1 and KS2.

It is NOT a complete textbook on all aspects of the area of Everyday Materials.

The activities follow the guidelines of science concepts as outlined in the Programmes of Study of the National Curriculum (2014 edition) for years 1–3 and selected topics of year 4 and year 5. The activities should help to develop the essential Scientific Enquiry skills as outlined in the National Curriculum, namely those of 'Observation', 'Predicting', 'Recording', and 'Drawing Conclusions' through the activities included in the book.

The books contain a mixture of paper-based tasks and also some 'hands on' activities. The following symbols on each sheet have been used to indicate the type of activities.



What to do



Think and do



Read



Investigate

The sheets involving practical investigations use materials readily available in most schools or homes. The activities have been vetted for safety, but as with any classroom based activity, it is the responsibility of the classroom teacher to do a risk assessment with their pupils in mind.

The sheets generally introduce one concept area per sheet. They are designed to be used by single pupils or as a classroom activity if all the pupils are working in the same ability range. Alternatively they can be used as a separate sheet for slower learners working on the same topic as the rest of the class, hence helping differentiation within the topic area. They have also been found useful for pupils in hospital or who are away from school for prolonged periods. The sheets are easily modified for specific pupils or groups. They can be used in any suitable order as there is no hierarchy with the sequence in the books.

The sheets can be used for assessment purposes or homework tasks.

The sheets use simple language and clear black line illustrations to make them easy to read without colour distractions. They have reduced number of words and a straight forward vocabulary to help poor readers or pupils whose language skills might be limited. Written responses are required so helping writing and communication skills of pupils. The completion of the sheets can be done by a support teacher responding to a verbal or a sign instruction by the pupil. It is essential that all pupils feel a sense of success and achievement when doing science as it is part of their everyday life.

No particular reference has been made to any specific type of learning difficulty or disability as the material has been successfully tested with a wide range of pupils. The teachers can modify the method of use as the sheets can be enlarged or the instructions read onto a sound disc or computer. The sheets are easily converted to be shown on larger screens or computer screens.

The topics of this book match the New (and old) National Curriculum and cover the area of 'Everyday Materials' and help the pupils use the various processes and methods of science.

The worksheets in this book sometimes overlap with other activities but this will help the pupils to grasp the concepts in a different context. Some topics also take ideas from another science area just to show the links between the everyday science we use. The worksheets can be used in any suitable sequence as this is not a logical teaching scheme. They are designed to give flexibility and diversity to teachers with pupils working with a wide range of abilities within a class. Some topics have been chosen from the POS of year 4 to 6 but written with the slower pupils in mind. Other topics can be linked with geography, eg Rocks and minerals. Any numeracy work is at the lower levels of expectancy.

Some sheets encourage direct answers to specific questions whereas other activities require some degree of thinking before making a written response. The symbols on the sheets give an indication of this. The questions and presentation are simple but the level of pupil response can often reveal higher levels of understanding than expected.

National Curriculum POS and the Activities of this book

Because the New NC does not clearly indicate separate statements of the POS by using a nomenclature of numbering or letters within any areas it has been found convenient for OUR books to code and summarize these main sections of the NC. This will help the teacher see how the topics covered in this, and the other books in the series, cover the POS of the National Curriculum. They are all covered by the activities, some more than once.

New National Curriculum 2014

Letter headings are ours but refer to the NC statements quoted on the pages of NC

Processes needing to be covered:	Content of the POS
<p>KS1 Our Summary of POS which are appropriate for Pupils both in Year 1 and Year 2, 'Working Scientifically', (WS) page 139 of NC.</p> <p>WSa Asking questions, and answering WSb Observing and using simple equipment WSc Testing ideas Wsd Identifying and Classifying WSe Using observations to suggest answers WSf Gathering data to answer questions</p>	<p>KS1 Our Summary of POS for Year 1 'Everyday Materials', (M) pages 141–142 of NC</p> <p>M1 What are things made of? M2 Identifying everyday materials M3 Simple properties of everyday materials M4 Comparing different materials M5 Changing shapes of solid materials</p>
<p>The more elaborate 'Working with Science' POS generally used in Year 3 and Year 4 will be applied as necessary within the activities undertaken with the slower learners.</p>	<p>KS1 Our Summary of POS for Year 2, 'Using Everyday Materials' page 146 of NC</p> <p>M6 Identifying and comparing everyday materials M7 Comparing how things move on different surfaces</p>
	<p>Lower KS2 Our Summary of POS for year 3 and year 4 see page 149 of NC year 3 Rocks see page 152 of NC</p> <p>M8 Comparing rocks M9 How fossils are formed M10 What soils are made of M11 Solids, liquids, gases groupings M12 Changes of state with temperature M13 Water Cycle, evaporation and condensation</p>

Links to the National Curriculum

Page Number	Title of Activity	National Curriculum Working Scientifically (WS)	National Curriculum Everyday Materials (M)
10	Natural or made?	a,d	M 1,2,4
11	Different materials	a,d	M 1,2,3,6
12	Made of what?	a,c	M 1,2,3,6
13	Water or not?	a,c,d,e	M 1,2,3
14	See-through properties	a,c,d,e	M 2,3,4
15	Gases	a,c,d	M 1,6,11,12,13
16	Liquids other than water	a,c,e,f	M 3,4,6
17	Solids	c,d,e	M 1,3,4,5
18	Float or sink?	a,c,d	M 1,3,4
19	Fizzy drinks	a,c,e,f	M 1,2,3,4
20	Ice and water	a,b,c,e,f,	M 3,4,5,6
21	Melting	a,c,e,f	M 1,3,4,6
22	Burning wood	a,b,e,f,	M 1,3,4,6
23	Barbeque heat	a,b,e	M 1,3,4,6
24	Stick to magnets	a,b,c,d,f	M 1,2,3,4,6 See also Physics areas P9,P10,P11
25	Rusting	a,b,c,d,e	M 1,2,3,4,6
26	Dissolving	a,b,c,d,e	M 1,2,3,4,6
27	Investigate dissolving	a,b,c,d,e,f,	M 2,3,4,5
28	Drinking chocolate	a,b,c	M 1,2,3,4,6
29	What happens to Smarties?	a,b,c,d,e,f,	M 1,3,5
30	Tea Bags	a,b,c,e,f,	M 1,2,3,4,6
31	Filtering	a,b,c,e,f	M 1,2,3,4,6
32	Changes	a,c,e	M 1,2,3,6
33	Toasting bread	a,b,c,d,e	M 1,2,3,5,6
34	Changes to a flame	a,b,c,e,f,	M 1,2,3,5
35	What is changing	a,b,c,e	M 1,2,3,4,6
36	Burning candles	a,b,c,e	M 1,2,3,6
37	What is in the bubbles?	a,b,c,e	M 1,2,3,4,6
38	What is needed?	a,d,f	M 2,3,4
39	Compost	a,c,d	M 1,2,3,4,6
40	Water cycle	a,e	M 1,2,3,6,12,13
41	What happens?	a,b,c,e,f,	M 1,2,3,4,6
42	Snowman	a,c,e	M 1,2,3,4,5,6
43	Jelly and plaster	a,b,c,e	M 1,2,3,4,5,6
44	The lost ring	a,b,c,e,f	M 1,2,3,4,6
45	How much will dissolve?	a,b,c,e,f	M 1,2,3,4,6
46	Concrete	a,b,c,e,f	M 1,2,3,4,5,6
47	Hot and cold	a,b,c,e,f	M 1,2,3,4,5,6

48	Gases in liquids	a,b,c,d,e,f	M 1,2,3,4,6
49	Problem solving, 1	a,b,c,e,f	M 1,2,3,4,6
50	Problem solving, 2	a,b,c,e,f	M 1,3,4,6
51	Problem solving, 3	a,b,c,e,f	M 1,2,3,4,5,6
52	Problem solving, 4	a,b,c,e,f	M 1,2,3,4,6
53	Rocks, 1	a,b,c,d,e,f	M 8,9 10
54	Rocks, 2	a,b,c,d,e,f	M 8,9,10
55-56	Rocks, 3	a,b,c,d,e,f	M 8,9,10,12,13

Below are the possible answers to the problems and investigations for the activities on pages 49 to 52.

Page 49 Problem solving, 1 Sailor on the island

- ◆ The sailor can use the heat from the sun to evaporate the water from the salt water so slowly turning some into water vapour (salt does not evaporate). He could then hang a bottle of cold water over the hot salt water and as the water evaporated it will slowly condense on the cold outside surface of the bottle and form droplets of pure unsalty water. Let the pupils try this on a sunny day.
- ◆ The farmer should filter the water through muslin or a paper filter (like a coffee filter).
- ◆ The engineer could use a magnet as the steel girders can be detected through the plaster.

Page 50 Problem solving, 2 Simple thermometer

- ◆ Warming the water by holding the bottle in the hands, causes the water to expand and the water level in the tube to rise. Surrounding it with cold water or ice causes the level to fall. This is the principle of a thermometer.
- ◆ The wire when heated with a small candle flame (or sometimes with the heat from a radiator or hair dryer or in strong sunlight on a window sill) expands and the pointer goes up. The rule can be marked at different times of the day. The pivot can be counter balanced with a small weight (or plasticine) on the other side to get it to just balance or use a longer length of rod (to make it heavier) on the side opposite to the small weight.

Page 51 Problem solving, 3 Burning candle also Melting ice

- ◆ Candles use up oxygen when they burn, leaving behind unreactive nitrogen of the air (plus the products of the burning candle, mainly carbon dioxide); so the water level inside the jar will rise to take the place of the oxygen which has been used up.

- ◆ The water level will remain about the same as the ice cubes contract when they melt so taking up the space of the cube. Water expands when it freezes, that's why ice cubes float.
- ◆ The balance should remain about the same as the ice and the melted water have the same weight (mass). You can use a simple kitchen scales instead of the balance.

Page 52 Problem solving, 4 Rusting

- ◆ The air can be dried with a little bit of silica gel or simply warmed up. Rusting needs both moisture and oxygen (in the air) together. Make sure the nails are sandpapered or washed in detergent first as some are covered with a greasy layer to prevent rusting when bought.
- ◆ Air, particularly breathed out air in a cool bedroom, contains moisture which condenses on the cold windows.
- ◆ The iron gate has rusted in wet air (if not painted) and the limestone wall is attacked by acid rain (not so the clay brick). Old grave stones also wear away if they are made of marble or limestone.