Contents

	Biology	
Topic 1 Biology	CELL BIOLOGY	
	Eukaryotes and prokaryotes	
	Animal and plant cells	11
	Cell specialisation	12
	Cell differentiation	13
	Microscopy	14
	Using a light microscope	10
	Mitosis and the cell cycle Stem cells	19
	Diffusion	2
	Osmosis	2
	Investigating the effect of a range of concentrations of salt or sugar	
	solutions on the mass of plant tissue	2
	Active transport	20
	Review It!	2
Topic 2 Biology		
	The human digestive system	28
	Enzymes	3(3)
	Food tests The effect of pH on amylase	3:
	The heart	34
	The lungs	3
	Blood vessels	30
	Blood	3
	Coronary heart disease	38
	Health issues	40
	Effect of lifestyle on health	4:
	Cancer	4:
	Plant tissues	4: 4:
	Transpiration and translocation Review It!	4
Topic 3 Biology	INFECTION AND RESPONSE	
Topic 3 Biology	Communicable diseases	
	Viral diseases	50
	Bacterial diseases	5
	Fungal and protist diseases	5:
	Human defence systems	5
	Vaccination	5
	Antibiotics and painkillers	5
	New drugs Review It!	5 ⁻
		J
Topic 4 Biology		
	Photosynthesis Rate of photosynthesis	5: 5:
	Investigating the effect of light intensity on the rate of photosynthesis	6
	Uses of glucose	6:
	Respiration	6
	Response to exercise	6
	Metabolism	6
	Review It!	6
Topic 5 Biology	HOMEOSTASIS AND RESPONSE	
	Homeostasis	68
	The human nervous system	69
	Reflexes	70
	Investigating the effect of a factor on human reaction time Human endocrine system	7:
	LIGHTON EHOOGINE SYSTEM	

Control of blood glucose concentration

74

Diabetes	75		
Hormones in human reproduction	77		
Contraception	79		
Jsing hormones to treat infertility	80		
Negative feedback	81		
Review It!	82		
NHERITANCE, VARIATION AND EVOLUTION		Topic 6 Biology	
Sexual and asexual reproduction	83		
Meiosis	84		
DNA and the genome	85		
Genetic inheritance	86		
Punnett squares	88		
nherited disorders	90		
/ariation	91		
Evolution	92		
Selective breeding	93		
Genetic engineering	94		
Evidence for evolution	96		
Classification	98		
Review It!	100		
ECOLOGY		Topic 7 Biology	
Communities	101		//_
Abiotic factors	103		
Biotic factors	104		
Adaptations	105		
Food chains	106		
Measuring species	107		
nvestigating the relationship between organisms and their environment	109		
The carbon cycle	110		
The water cycle	111		
The traces system			
Biodiversity	112		
Biodiversity Global warming	113		
Biodiversity	113 114		
Biodiversity Global warming	113		
Biodiversity Global warming Maintaining biodiversity Review It!	113 114		
Biodiversity Global warming Maintaining biodiversity	113 114		
Biodiversity Global warming Maintaining biodiversity Review It!	113 114	Topic 1 Chemistry	
Biodiversity Global warming Maintaining biodiversity Review It! Chemistry	113 114	Topic 1 Chemistry	
Biodiversity Global warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE	113 114 115	Topic 1 Chemistry	
Biodiversity Global warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds	113 114 115	Topic 1 Chemistry	
Biodiversity Global warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds	113 114 115 116 117	Topic 1 Chemistry	
Biodiversity Global warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations	113 114 115 116 117 120	Topic 1 Chemistry	
Biodiversity Global warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography	113 114 115 116 117 120 122	Topic 1 Chemistry	
Biodiversity Global warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography Scientific models of the atom	113 114 115 116 117 120 122 124	Topic 1 Chemistry	
Biodiversity Global warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography Scientific models of the atom Atomic structure	113 114 115 116 117 120 122 124 125 127 129	Topic 1 Chemistry	
Biodiversity Blobal warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography Boientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table	113 114 115 115 116 117 120 122 124 125 127 129 131	Topic 1 Chemistry	
Biodiversity Blobal warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography Scientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals	113 114 115 115 116 117 120 122 124 125 127 129 131 133	Topic 1 Chemistry	
Biodiversity Blobal warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography Scientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Group 1 – the alkali metals	113 114 115 115 116 117 120 122 124 125 127 129 131 133 134	Topic 1 Chemistry	
Biodiversity Blobal warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography Scientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Group 1 – the alkali metals Group 7 – the halogens	113 114 115 115 116 117 120 122 124 125 127 129 131 133 134 136	Topic 1 Chemistry	
Biodiversity Global warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography Scientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Group 1 – the alkali metals Group 7 – the halogens Displacement reactions in group 7	113 114 115 116 117 120 122 124 125 127 129 131 133 134 136 138	Topic 1 Chemistry	
Biodiversity Blobal warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography Scientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Group 1 – the alkali metals Group 7 – the halogens	113 114 115 115 116 117 120 122 124 125 127 129 131 133 134 136		
Biodiversity Global warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography Scientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Group 1 – the alkali metals Group 7 – the halogens Displacement reactions in group 7 Review It! BONDING, STRUCTURE AND THE PROPERTIES OF MATTER	113 114 115 116 117 120 122 124 125 127 129 131 133 134 136 138	Topic 1 Chemistry Topic 2 Chemistry	
Biodiversity Biobal warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Mixtures and compounds Pure substances and formulations Chromatography Bicientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Group 1 – the alkali metals Group 7 – the halogens Displacement reactions in group 7 Review It! BONDING, STRUCTURE AND THE PROPERTIES OF MATTER Bonding and structure	113 114 115 115 116 117 120 122 124 125 127 129 131 133 134 136 138 140		
Biodiversity Biobal warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Mixtures and compounds Pure substances and formulations Chromatography Bicientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Group 1 – the alkali metals Group 7 – the halogens Displacement reactions in group 7 Review It! BONDING, STRUCTURE AND THE PROPERTIES OF MATTER Bonding and structure ons and ionic bonding	113 114 115 116 117 120 122 124 125 127 129 131 133 134 136 138 140		
Biodiversity Biobal warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography Scientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Group 1 – the alkali metals Group 7 – the halogens Displacement reactions in group 7 Review It! BONDING, STRUCTURE AND THE PROPERTIES OF MATTER Bonding and structure ons and ionic bonding The structure and properties of ionic compounds	113 114 115 115 116 117 120 122 124 125 127 129 131 133 134 136 138 140		
Biodiversity Biobal warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Pure substances and formulations Chromatography Scientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Group 1 – the alkali metals Group 7 – the halogens Displacement reactions in group 7 Review It! BONDING, STRUCTURE AND THE PROPERTIES OF MATTER Bonding and structure ons and ionic bonding The structure and properties of ionic compounds Covalent bonds and simple molecules	113 114 115 116 117 120 122 124 125 127 129 131 133 134 136 138 140		
Biodiversity Biobal warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Mixtures and compounds Dure substances and formulations Chromatography Scientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Group 1 – the alkali metals Group 7 – the halogens Displacement reactions in group 7 Review It! BONDING, STRUCTURE AND THE PROPERTIES OF MATTER Bonding and structure ons and ionic bonding The structure and properties of ionic compounds Covalent bonds and simple molecules Diamond, graphite and graphene	113 114 115 116 117 120 122 124 125 127 129 131 133 134 136 138 140		
Biodiversity Biobal warming Maintaining biodiversity Beview It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Diversubstances and formulations Chromatography Bicientific models of the atom Atomic structure Botopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Biroup 1 – the alkali metals Biroup 7 – the halogens Displacement reactions in group 7 Beview It! BONDING, STRUCTURE AND THE PROPERTIES OF MATTER Bonding and structure cons and ionic bonding The structure and properties of ionic compounds Covalent bonds and simple molecules Diamond, graphite and graphene Fullerenes and polymers	113 114 115 116 117 120 122 124 125 127 129 131 133 134 136 138 140		
Biodiversity Biobal warming Maintaining biodiversity Review It! Chemistry ATOMIC STRUCTURE AND THE PERIODIC TABLE Atoms, elements and compounds Mixtures and compounds Mixtures and compounds Dure substances and formulations Chromatography Scientific models of the atom Atomic structure sotopes and relative atomic mass The development of the periodic table and the noble gases Electronic structure and the periodic table Metals and non-metals Group 1 – the alkali metals Group 7 – the halogens Displacement reactions in group 7 Review It! BONDING, STRUCTURE AND THE PROPERTIES OF MATTER Bonding and structure ons and ionic bonding The structure and properties of ionic compounds Covalent bonds and simple molecules Diamond, graphite and graphene	113 114 115 116 117 120 122 124 125 127 129 131 133 134 136 138 140		

	Topic 3 Chemistry	QUANTITATIVE CHEMISTRY	
////		Conservation of mass and balancing equations	- 155
		Relative formula masses	157
		The mole	159
		Reacting masses and using moles to balance equations	161
		Limiting reactant Concentrations in solutions	163 164
		Review It!	166
	Topic 4 Chemistry	CHEMICAL CHANGES	
		Metal oxides and the reactivity series	167
		Extraction of metals and reduction	169
		The extraction of iron in the blast furnace	171
		The reactions of acids	173
		The preparation of a soluble salt Oxidation and reduction in terms of electrons	175 177
		The pH scale and neutralisation	178
		Strong and weak acids	179
		The basics of electrolysis and the electrolysis of molten ionic compounds	180
		The electrolysis of copper(II) sulfate and electroplating	182
		The electrolysis of aqueous solutions	184
		The extraction of metals using electrolysis	186
		Investigation of the electrolysis of aqueous solutions	187
	Ŧ : 5 OL : :	Review It!	189
	Topic 5 Chemistry	ENERGY CHANGES	-
		Exothermic and endothermic reactions	190 191
		Investigation into the variables that affect temperature changes in chemical reactions Reaction profiles	193
		The energy changes of reactions	194
		Review It!	196
	Topic C Chamietra		
	Topic 6 Chemistry	RATES OF REACTION AND EQUILIBRIUM Ways to follow a chemical reaction	- 197
		Calculating the rate of reaction	200
		The effect of concentration on reaction rate and the effect of pressure on	
		the rate of gaseous reactions	202
		Rates of reaction – the effect of surface area	203
		The effects of changing the temperature and adding a catalyst	204
		An investigation into how changing different factors affects the rate of reaction Reversible reactions	206 208
		The effect of changing conditions on equilibrium	210
		Review It!	212
	Topic 7 Chemistry	ORGANIC CHEMISTRY	213
		Hydrocarbons, crude oil and cracking	213 215
		Crude oil, fractionation and petrochemicals Cracking and alkenes	217
		Organic chemistry	219
	T : 0 0 1 : 1		
	Topic 8 Chemistry	CHEMICAL ANALYSIS	-
		Testing for gases	220
		Review It!	221
	Topic 9 Chemistry	CHEMISTRY OF THE ATMOSPHERE	_
		The composition and evolution of the Earth's atmosphere	222
		Climate change	224 226
		Reducing the carbon footprint Atmospheric pollutants	228
		Review It!	230
	Topic 10 Chomistry	USING RESOURCES	
	Topic 10 Chemistry		231
		Finite and renewable resources, sustainable development Life cycle assessments (LCAs)	231
		Alternative methods of copper extraction	235
		Making potable water and waste water treatment	237
		Ways of reducing the use of resources	239
		The Haber process	240
6		Analysis and purification of a water sample	243
		Review It!	245

Physics

ENERGY		Topic 1 Physics
Energy stores and systems	246	
Changes in energy stores	248	
Energy changes in systems: specific heat capacity Power	251 254	
Energy transfers in a system	255	
Efficiency	257	
National and global energy resources	259	
Review It!	262	
ELECTRICITY		Topic 2 Physics
Standard circuit diagram symbols	263	
Electrical charge and current Current, resistance and potential difference	265 266	
Resistors	268	
Series and parallel circuits	270	
Mains electricity	272	
Electrical power, energy transfers in appliances and the National Grid	273	
Static charge and electric fields Review It!	276 278	
		Taria O Dhusias
PARTICLE MODEL Destricts model and density of metaviole		Topic 3 Physics
Particle model and density of materials Changes of state and internal energy	279 281	
Particle model and pressure	283	
Review It!	286	
ATOMIC STRUCTURE		Topic 4 Physics
The structure of the atom	287	
Developing a model of the atom	289	
Radioactive decay and nuclear radiation	290	
Nuclear equations Half-life of radioactive elements	292 294	
Hazards and uses of radioactive emissions	29 4 297	
Review It!	299	
FORCES		Topic 5 Physics
Forces and their interactions	300	
Resultant forces	302	
Work done and energy transfer	305	
Forces and elasticity	307	
Distance, displacement, speed and velocity Distance—time relationship	310 312	
Acceleration	314	
Newton's laws of motion	317	
Stopping distance	320	
Momentum	322	
Review It!	324	
WAVES		Topic 6 Physics
Transverse and longitudinal waves	325 328	
Reflection and refraction Sound waves	328 330	
Electromagnetic waves	332	
Emission and absorption of infrared radiation	335	
Review It!	336	
ELECTROMAGNETISM		Topic 7 Physics
Magnetism	337	
Motor effect	339	
Transformers	343	
Review It!	346	
Glossary	347	
Answers	357	
Index	365	