

Contents

ENERGY

Energy stores and systems	8
Changes in energy stores	10
Energy changes in systems: specific heat capacity	13
Power	16
Energy transfers in a system	17
Efficiency	19
National and global energy resources	21
Review It!	24

ELECTRICITY

Standard circuit diagram symbols	25
Electrical charge and current	27
Current, resistance and potential difference	28
Resistors	30
Series and parallel circuits	32
Mains electricity	34
Electrical power, energy transfers in appliances and the National Grid	35
Static charge and electric fields	38
Review It!	40

PARTICLE MODEL

Particle model and density of materials	41
Changes of state and internal energy	43
Particle model and pressure	45
Review It!	48

ATOMIC STRUCTURE

The structure of the atom	49
Developing a model of the atom	51
Radioactive decay and nuclear radiation	52
Nuclear equations	54
Half-life of radioactive elements	56
Hazards and uses of radioactive emissions	59
Nuclear fission and fusion	61
Review It!	63

FORCES

Forces and their interactions	64
Resultant forces	66
Work done and energy transfer	69
Forces and elasticity	71
Moments, levers and gears	74
Pressure and pressure differences in fluids	76
Distance, displacement, speed and velocity	78
Distance–time relationship	80
Acceleration	82
Newton's laws of motion	85
Stopping distance	88
Momentum	90
Review It!	92

Topic 1

Topic 2

Topic 3

Topic 4

Topic 5

Topic 6

WAVES

Transverse and longitudinal waves	93
Reflection and refraction	96
Sound waves	98
Electromagnetic waves	100
Lenses	103
Visible light	106
Emission and absorption of infrared radiation and black body radiation	108
Review It!	110

Topic 7

ELECTROMAGNETISM

Magnetism	111
Motor effect	113
Electromagnetic induction	117
Transformers	121
Review It!	124

Topic 8

SPACE PHYSICS

Our solar system	125
Life cycle of a star	127
Red-shift	128
Review It!	130

Glossary/Index	131
Answers	135