

Contents

* Watch for this symbol, below and throughout the book. It indicates spreads or parts of spreads that have been included to provide extension material to set physics in a broader context.

For information about the link between spreads and the CIE syllabus, see pages 7–8.

Syllabus and spreads 7



□ 1.01	Numbers and units	10
□ 1.02	A system of units	12
□ 1.03	Measuring length and time	14
□ 1.04	Volume and density	16
□ 1.05	Measuring volume and density	18
□ 1.06	More about mass and density	20
	Examination Questions	22
	Revision Checklist	24



□ 2.01	Speed, velocity, and acceleration	26
□ 2.02	Motion graphs	28
□ 2.03	Recording motion	30
□ 2.04	Free fall	32
□ 2.05	More motion graphs	34
□ 2.06	Forces in balance	36
□ 2.07	Force, mass, and acceleration	38
□ 2.08	Friction and braking*	40
□ 2.09	Force, weight, and gravity	42
□ 2.10	Action and reaction*	44
□ 2.11	More about vectors	46
□ 2.12	Moving in circles	48
	Examination Questions	50
	Revision Checklist	52



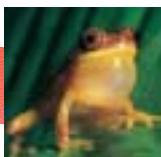
□ 3.01	Forces and turning effects	54
□ 3.02	Centre of mass	56
□ 3.03	More about moments	58
□ 3.04	Stretching and compressing	60
□ 3.05	Pressure	62
□ 3.06	Pressure in liquids	64
□ 3.07	Hydraulic systems*	66
□ 3.08	Pressure from the air	68
□ 3.09	Gas pressure and volume	70
□ 3.10	Pressure problems	72
	Examination Questions	74
	Revision Checklist	76



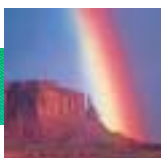
□ 4.01	Work and energy	78
□ 4.02	Energy transformation	80
□ 4.03	Calculating PE and KE	82
□ 4.04	Efficiency and power	84
□ 4.05	Energy for electricity (1)	86
□ 4.06	Energy for electricity (2)	88
□ 4.07	Energy resources	90
□ 4.08	How the world gets its energy	92
	Examination Questions	94
	Revision Checklist	96



<input type="checkbox"/> 5.01	Moving particles	98
<input type="checkbox"/> 5.02	Temperature (1)	100
<input type="checkbox"/> 5.03	Temperature (2)	102
<input type="checkbox"/> 5.04	Expanding solids and liquids	104
<input type="checkbox"/> 5.05	Heating gases	106
<input type="checkbox"/> 5.06	Thermal conduction	108
<input type="checkbox"/> 5.07	Convection	110
<input type="checkbox"/> 5.08	Thermal radiation	112
<input type="checkbox"/> 5.09	Liquids and vapours	114
<input type="checkbox"/> 5.10	Specific heat capacity	116
<input type="checkbox"/> 5.11	Latent heat	118
	Examination Questions	120
	Revision Checklist	122

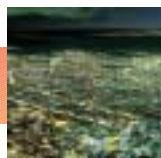


<input type="checkbox"/> 6.01	Transverse and longitudinal waves	124
<input type="checkbox"/> 6.02	Wave effects	126
<input type="checkbox"/> 6.03	Sound waves	128
<input type="checkbox"/> 6.04	Speed of sound and echoes	130
<input type="checkbox"/> 6.05	Characteristics of sound waves	132
<input type="checkbox"/> 6.06	Ultrasound	134
	Examination Questions	136
	Revision Checklist	138

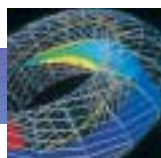


<input type="checkbox"/> 7.01	Light rays and waves	140
<input type="checkbox"/> 7.02	Reflection in plane mirrors (1)	142
<input type="checkbox"/> 7.03	Reflection in plane mirrors (2)	144
<input type="checkbox"/> 7.04	Refraction of light	146
<input type="checkbox"/> 7.05	Total internal reflection	148
<input type="checkbox"/> 7.06	Refraction calculations	150
<input type="checkbox"/> 7.07	Lenses (1)	152
<input type="checkbox"/> 7.08	Lenses (2)	154
<input type="checkbox"/> 7.09	Camera, projector, and enlarger*	156
<input type="checkbox"/> 7.10	The human eye*	158

<input type="checkbox"/> 7.11	Electromagnetic waves (1)	160
<input type="checkbox"/> 7.12	Electromagnetic waves (2)	162
<input type="checkbox"/> 7.13	Communications*	164
	Examination Questions	166
	Revision Checklist	168

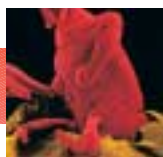


<input type="checkbox"/> 8.01	Electric charge (1)	170
<input type="checkbox"/> 8.02	Electric charge (2)	172
<input type="checkbox"/> 8.03	Electric fields	174
<input type="checkbox"/> 8.04	Current in a simple circuit	176
<input type="checkbox"/> 8.05	Potential difference	178
<input type="checkbox"/> 8.06	Resistance (1)	180
<input type="checkbox"/> 8.07	Resistance (2)	182
<input type="checkbox"/> 8.08	More about resistance factors	184
<input type="checkbox"/> 8.09	Series and parallel circuits (1)	186
<input type="checkbox"/> 8.10	Series and parallel circuits (2)	188
<input type="checkbox"/> 8.11	Electrical power	190
<input type="checkbox"/> 8.12	Mains electricity (1)	192
<input type="checkbox"/> 8.13	Mains electricity (2)	194
<input type="checkbox"/> 8.14	Electrical energy calculations	196
	Examination Questions	198
	Revision Checklist	200



<input type="checkbox"/> 9.01	Magnets	202
<input type="checkbox"/> 9.02	Magnetic fields	204
<input type="checkbox"/> 9.03	Magnetic effect of a current	206
<input type="checkbox"/> 9.04	Electromagnets	208
<input type="checkbox"/> 9.05	Magnetic force on a current	210
<input type="checkbox"/> 9.06	Electric motors	212
<input type="checkbox"/> 9.07	Electromagnetic induction	214
<input type="checkbox"/> 9.08	More about induced currents	216
<input type="checkbox"/> 9.09	Generators	218
<input type="checkbox"/> 9.10	Coils and transformers (1)	220
<input type="checkbox"/> 9.11	Coils and transformers (2)	222
<input type="checkbox"/> 9.12	Power across the country	224
	Examination Questions	226
	Revision Checklist	228

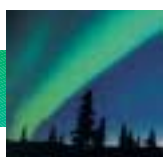
10



Electrons and Electronics 229

- 10.01 Electronic essentials 230
- 10.02 More on components 232
- 10.03 Transistors (1) 234
- 10.04 Transistors (2) 236
- 10.05 Logic gates (1) 238
- 10.06 Logic gates (2) 240
- 10.07 Electron beams (1) 242
- 10.08 Electron beams (2) 244
- Examination Questions 246
- Revision Checklist 248

11



Atoms and Radioactivity 249

- 11.01 Inside atoms 250
- 11.02 Nuclear radiation (1) 252
- 11.03 Nuclear radiation (2) 254
- 11.04 Radioactive decay (1) 256
- 11.05 Radioactive decay (2) 258
- 11.06 Nuclear energy* 260
- 11.07 Fusion future* 262
- 11.08 Using radioactivity 264
- 11.09 Atoms and particles (1) 266
- 11.10 Atoms and particles (2)* 268
- Examination Questions 270
- Revision Checklist 272

12



History of Key Ideas 273

- 12.01 Force, motion, and energy* 274
- 12.02 Rays, waves, and particles* 276
- 12.03 Magnetism and electricity* 278
- 12.04 The Earth and beyond* 280
- Key developments in physics 282

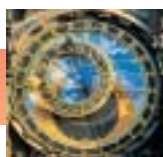
13



Experimental Physics 283

- 13.01 Safety in the laboratory 284
- 13.02 Experimental procedures (1) – planning 286
- 13.03 Experimental procedures (2) – obtaining the evidence 288
- 13.04 Experimental procedures (3) – analysing and concluding 290
- 13.05 Experimental procedures (4) – evaluating the evidence 291
- 13.06 Some experimental investigations 292
- 13.07 Taking a practical test 296
- Key experimental skills checklist 298

14



Mathematics for physics 299

- The essential mathematics 300

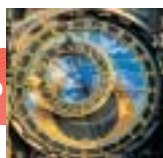
15



IGCSE Practice Questions 303

- Multichoice questions 304
- IGCSE theory questions 306
- IGCSE alternative-to-practical questions 318

16



Reference 321

- Useful equations 322
- Units and elements 324
- Electrical symbols and codes 325
- Answers to questions 326
- Index 334