Contents

Unit 3

C	HAPTER 1 Scientific investigation	1				
1.1	Planning scientific investigations	4				
1.2	Conducting investigations	12				
1.3	Data collection and quality	22				
1.4	Data analysis and presentation	29				
1.5 1.6	Conclusion and evaluation Reporting investigations	45 49				
How do fields explain motion and electricity?						
	REA OF STUDY 1					
Hov	v do physicists explain motion in two din	nensions?				
	HAPTER 2 Newtonian theories of motion	61				
2.1		62				
	Circular motion in a horizontal plane	70				
2.3		80				
2.4 2.5	Circular motion in a vertical plane	85 94				
2.5	Projectiles launched horizontally Projectiles launched obliquely	100				
2.0	Chapter 2 Review	106				
■ CH	HAPTER 3 The relationship between force,	100				
	energy and mass	109				
3.1	Conservation of momentum	110				
3.2	Impulse	118				
3.3	Work done	126				
3.4 3.5	Elastic potential energy Kinetic and potential energy	132 138				
3.6	Conservation of energy	147				
0.0	Chapter 3 Review	155				
Area	a of Study 1 • Review questions	158				
•••••						
	REA OF STUDY 2					
	v do things move without contact?					
	HAPTER 4 Gravity	163				
4.1	Newton's law of universal gravitation	164				
4.2 4.3	Gravitational fields Work in a gravitational field	175 185				
4.3	Chapter 4 Review	193				
_ CI	HAPTER 5 Electric and magnetic fields	197				
5.1	Electric fields	199				
5.2	Coulomb's law	208				
5.3	The magnetic field	212				
5.4	Forces on charged objects due to magnetic fields	220				
5.5	Comparing fields—a summary	230				
	Chapter 5 Review	234				
	HAPTER 6 Application of field concepts	237				
6.1 6.2	Satellite motion DC motors	238 254				
6.3	Particle accelerators	261				
-10	Chapter 6 Review	270				
		· •				

Area of Study 2 • Review questions

274

■ AREA OF STUDY 3

How are fields used in electricity generation?

■ CH	APTER 7 Electromagnetic induction and		
transmission of electricity			
7.1	Inducing an EMF in a magnetic field	278	
7.2	Induced EMF from a changing magnetic flux	284	
7.3	Applications of Lenz's law	295	
7.4	Producing electricity—photovoltaic cells	302	
7.5	Supplying electricity—transformers and large-scale		
	power distribution	306	
	Chapter 7 Review	319	
Area	of Study 3 • Review questions	322	

Unit 4 How have creative ideas and investigation revolutionised thinking in physics?

AREA OF STUDY 1

How has understanding about the physical world changed?

	has anasistanang assat the physical morta	01101
8.1	APTER 8 Light as a wave Wave interactions Standing waves in strings Evidence for the wave model of light Chapter 8 Review	327 328 335 343 355
■ CHAPTER 9 The dual nature of light and matter		
9.1	The photoelectric effect	360
9.2	The quantum nature of light and matter	370
9.3	Light and matter	378
	Chapter 9 Review	389
■ CH	APTER 10 Einstein's special theory of relativity	393
	Einstein's special relativity	394
10.2	Einstein's Gedanken train	400
10.3	Time dilation	404
10.4	Length contraction	414
10.5	Einstein's mass-energy relationship	422
	Chapter 10 Review	434
Area of Study 1 • Review questions		

AREA OF STUDY 2

Heinemann Physics 12 5th edition includes a comprehensive set of resources to support Area of Study 2 via your Pearson Places bookshelf.

ANSWERS	XX
GLOSSARY	441
INDEX	XX
ATTRIBUTIONS	XX