

Physics Units 3 & 4

Contents

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Series contents

This series comprises **ten content workbooks**, cumulative **topic tests**, and a **practice-examination booklet**, covering the complete VCAA Physics Units 3 & 4 course. Each content workbook follows the same structure: concise theory, scaffolded and unscaffolded worked examples, graded practice questions, a compact answer key, and fully-worked solutions. Each topic test comprises **Test A** (multiple-choice) and **Test B** (short- and extended-answer), taken under scientific-calculator conditions with the formula sheet, cumulative over the chapters of that topic.

Unit 3: How do fields explain motion and electricity?

Area of Study 1 — How do physicists explain motion in two dimensions?

Chapter 1 — Newton's laws of motion (38 pp)

1A Newton's laws of motion · 1B Uniform circular motion · 1C Projectile motion

Chapter 2 — Force, energy and mass (48 pp)

2A Work and energy · 2B Momentum and impulse · 2C Springs and energy transformations

Topic 1 Test A (multiple-choice) and Test B (written responses), with fully-worked solutions, are included at the end of this workbook.

Area of Study 2 — How do things move without contact?

Chapter 3 — Gravitational fields and orbits (37 pp)

3A Gravitational fields · 3B Gravitational potential energy · 3C Satellite motion

Chapter 4 — Electric and magnetic fields (54 pp)

4A Electric fields and forces · 4B Magnetic fields and forces · 4C DC motors and particle accelerators

Topic 2 Test A (multiple-choice) and Test B (written responses), with fully-worked solutions, are included at the end of this workbook.

Area of Study 3 — How are fields used in electricity generation?

Chapter 5 — Generation of electricity (48 pp)

5A Photovoltaic cells · 5B Electromagnetic induction · 5C DC generators and alternators · 5D Sinusoidal AC

Chapter 6 — Transmission of electricity (47 pp)

6A Peak and rms values · 6B Transformers · 6C Transmission losses

Topic 3 Test A (multiple-choice) and Test B (written responses), with fully-worked solutions, are included at the end of this workbook.

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

Area of Study 1 — How has understanding about the physical world changed?

Chapter 7 — Light as a wave and as a particle (27 pp)

7A The wave model of light · 7B The particle model of light

Chapter 8 — Matter waves and quantisation (40 pp)

8A Matter as particles or waves · 8B Light–matter similarities and spectra

Topic 4 Test A (multiple-choice) and Test B (written responses), with fully-worked solutions, are included at the end of this workbook.

Chapter 9 — Einstein's special theory of relativity (56 pp)

9A Postulates and evidence · 9B Time dilation and length contraction · 9C Relativistic applications · 9D Mass–energy equivalence

Topic 5 Test A (multiple-choice) and Test B (written responses), with fully-worked solutions, are included at the end of this workbook.

Area of Study 2 — How is scientific inquiry used to investigate fields, motion or light?

Chapter 10 — Scientific investigation and data analysis (60 pp)

10A Measurement, uncertainty and error · 10B Graphing, linearisation and analysis · 10C Designing an investigation · 10D Communicating scientific ideas

Practice Examinations

Practice Examinations (141 pp)

Six complete practice examinations, each mirroring the VCAA Physics examination structure — Section A (20 multiple-choice questions) and Section B (short- and extended-answer questions, 100 marks), for a total of 120 marks — with a house formula sheet and fully-worked solutions. The six papers span three difficulty levels and cumulatively cover the complete Units 3 & 4 course, including the key science skills.

≈ 602 pages across the series.