

Physics

for the IB Diploma

Sixth Edition

K. A. Tsokos

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Options

Option A Relativity

Option B Engineering physics

Option C Imaging

Option D Astrophysics

Additional Topic questions to accompany coursebook

Detailed answers to all coursebook test yourself questions

Self-test questions

Assessment guidance

Model exam papers

Nature of Science

Answers to exam-style questions

Answers to Options questions

Answers to additional Topic questions

Options glossary

Appendices

A Astronomical data

B Nobel prize winners in physics

Introduction

This sixth edition of *Physics for the IB Diploma* is fully updated to cover the content of the IB Physics Diploma syllabus that will be examined in the years 2016–2022.

Physics may be studied at Standard Level (SL) or Higher Level (HL). Both share a common core, which is covered in Topics 1–8. At HL the core is extended to include Topics 9–12. In addition, at both levels, students then choose one Option to complete their studies. Each option consists of common core and additional Higher Level material. You can identify the HL content in this book by ‘HL’ included in the topic title (or section title in the Options), and by the red page border. The four Options are included in the free online material that is accessible using education.cambridge.org/ibsciences.

The structure of this book follows the structure of the IB Physics syllabus. Each topic in the book matches a syllabus topic, and the sections within each topic mirror the sections in the syllabus. Each section begins with learning objectives as starting and reference points. Worked examples are included in each section; understanding these examples is crucial to performing well in the exam. A large number of test yourself questions are included at the end of each section and each topic ends with exam-style questions. The reader is strongly encouraged to do as many of these questions as possible. Numerical answers to the test yourself questions are provided at the end of the book; detailed solutions to all questions are available on the website. Some topics have additional questions online; these are indicated with the online symbol, shown here.

Theory of Knowledge (TOK) provides a cross-curricular link between different subjects. It stimulates thought about critical thinking and how we can say we know what we claim to know. Throughout this book, TOK features highlight concepts in Physics that can be considered from a TOK perspective. These are indicated by the ‘TOK’ logo, shown here.

Science is a truly international endeavour, being practised across all continents, frequently in international or even global partnerships. Many problems that science aims to solve are international, and will require globally implemented solutions. Throughout this book, International-Mindedness features highlight international concerns in Physics. These are indicated by the ‘International-Mindedness’ logo, shown here.

Nature of science is an overarching theme of the Physics course. The theme examines the processes and concepts that are central to scientific endeavour, and how science serves and connects with the wider community. At the end of each section in this book, there is a ‘Nature of science’ paragraph that discusses a particular concept or discovery from the point of view of one or more aspects of Nature of science. A chapter giving a general introduction to the Nature of science theme is available in the free online material.



Free online material

Additional material to support the IB Physics Diploma course is available online. Visit education.cambridge.org/ibsciences and register to access these resources.

Besides the Options and Nature of science chapter, you will find a collection of resources to help with revision and exam preparation. This includes guidance on the assessments, additional Topic questions, interactive self-test questions and model examination papers and mark schemes. Additionally, answers to the exam-style questions in this book and to all the questions in the Options are available.

Note from the author

This book is dedicated to Alexios and Alkeos and to the memory of my parents.

I have received help from a number of students at ACS Athens in preparing some of the questions included in this book. These include Konstantinos Damianakis, Philip Minaretzis, George Nikolakoudis, Katayoon Khoshragham, Kyriakos Petrakos, Majdi Samad, Stavroula Stathopoulou, Constantine Tragakes and Rim Versteeg. I sincerely thank them all for the invaluable help.

I owe an enormous debt of gratitude to Anne Trevillion, the editor of the book, for her patience, her attention to detail and for the very many suggestions she made that have improved the book substantially. Her involvement with this book exceeded the duties one ordinarily expects from an editor of a book and I thank her from my heart. I also wish to thank her for her additional work of contributing to the Nature of science themes throughout the book.

Finally, I wish to thank my wife, Ellie Tragakes, for her patience with me during the completion of this book.

K.A. Tsokos