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# Introduction



# How to use this book

This book has been written to be used alongside the four Nelson Advanced Science Physics student books. It aims to help you develop your study skills, to make your learning more effective and to give you help with your revision. You may be entered for Unit Tests at different stages of your course, so you need to be prepared right from the beginning.

The chapters of this book are arranged in the order of the Units of the specification (or syllabus, as it used to be called). Chapters 1–3 deal with the AS content. Chapters 4–6 help you prepare for the A2 assessments if you are studying for Advanced GCE Physics.

The format of each section is:

- Introduction gives an overview of the concepts of the material covered in that section
- Things to understand the important points relating to the material covered
- **Things to learn** the equations, laws, definitions and experiments that you need to learn
- Checklist to help you check that you have covered and understood everything in that section
- Testing your knowledge and understanding a multiple choice 'quick test', some worked examples and a number of practice assessment questions for you to try. Full answers to both the 'quick test' and the practice assessment questions are in the Answers section which follows Chapter 6.



# Assessment of the physics specification

The Edexcel specification for AS physics is assessed by four written tests:

Note: All Tests may include assessment of your understanding of material in the 'General Requirements' section of the specifications (see Appendix 1).

Test	Type and purpose	Duration
PHY1	About 8 structured questions on Unit 1	1 h 15 min
PHY2	About 8 structured questions on Unit 2	1 h 15 min
PHY3/01 PHY3/02	1 structured question on your chosen topic 2 practical questions	45 min 1 h 30 min

Test PHY1 **only** examines material in Unit 1.

Test PHY2 mainly examines the content of Unit 2 but some questions might refer to physical principles contained in Unit 1.

Test PHY3/01 consists of four structured questions, one relating to each of the four topics in Unit 3. You only have to answer **one** of these.

Test PHY3/02 is based on the content of Units 1 and 2. It examines practical laboratory skills: planning; implementing; analysing evidence and drawing conclusions; evaluating evidence and procedures. One of the questions may involve drawing a graph and part of either question may require you to use your experience of practical datalogging techniques.

Note: All these Tests may also include assessment of your understanding of material in the 'General Requirements' section of the specifications (see Appendix 1).

In addition to the above tests, the Edexcel specification for Advanced GCE physics is assessed by four more written tests:

Test	Type and purpose	Duration
PHY4	About 8 structured questions on Unit 4	1 h 20 min
PHY5/01 PHY5/02	About 6 structured questions on Unit 5 3 practical questions	1 h 1 h 30 min
PHY6	4 synoptic questions	2 h

Test PHY4 mainly examines the content of Unit 4. It assumes that Units 1 and 2 have been studied but does not examine their content again in detail

Test PHY5/01 assumes that Units 1, 2 and 4 have been studied. Much of the content of Unit 5 builds on these previous units and this is reflected in the questions, although all are set in the context of Unit 5.

Test PHY5/02 is based on material from Units 1, 2, 4 and 5 of the specification and is designed to build on the practical laboratory skills already tested in Test PHY3/02. At least one of the questions involves drawing a graph, which may involve the use of logarithms, and part of any question may require you to use your experience of practical datalogging techniques.

Test PHY6 examines your accumulated understanding of the whole Advanced GCE specification. This test is answered in a separate answer book. Question 1 involves the analysis of a passage adapted from a scientific or technological book or journal. Question 2 tests your understanding and applications of the principles drawn together in Unit 6. Questions 3 and 4 examine material from the rest of the specification (Units 1, 2, 4 and 5) and each of these questions will require an understanding of principles from more than one Unit.

#### Data, formulae and relationships

A selection of data, formulae and relationships will be printed at the end of each test paper. Appendix 2 gives the full list.



## Study skills

Revision is a personal activity. What works best for you may not be so effective for someone else. However there are some golden rules.

- 1 Revise little and often.
- 2 Revise actively do not sit and stare at your notes or this book. Write down important points or use a highlighter to mark important passages in your notes or in this book (but only if you own it!).
- **3** Work out answers to the questions and then check them with those given.
- 4 Help each other. Explaining a point of physics to another student is a good way of clarifying your own understanding. Test each other by asking simple questions, such as formulae, definitions, units and experimental descriptions.

Do not leave your revision until the last minute. Revision should take place throughout the whole course.

Here are some suggestions to help you study and prepare for your Unit Test papers:

#### Daily tasks

After each lesson check that your notes are complete. Try spending 10 to 15 minutes looking through them. If there is something that you do not understand:

- Read the relevant part in this book or your textbook and, if necessary, add to your notes so that they will be clear when you read them again.
- Discuss the problem with another student.
- If you still have difficulty, ask your teacher as soon as you can.

The more you contribute to solving each problem, the deeper and longer lasting your understanding of it will be.

#### Weekly tasks

- Look through your notes. Highlight important parts.
- Read through the relevant parts of this book and make notes and/or highlight important points.
- Complete any homework assignments.

#### **End of section tasks**

When your teacher has completed a section of work, you should revise that material thoroughly. To do this:

- Work through your notes alongside a copy of that part of the Edexcel specification (syllabus).
- Summarise your notes to the bare essentials.
- Work through the relevant material in this book. Discuss any difficulties with other students.
- Attempt all the 'quick test' questions for that section of work.



## Preparing for the Unit Tests (examinations)

If you have followed the previous advice, you will find it easier to prepare for the assessment tests. Bear in mind that Unit Tests 1 and 4 take place on the same day, as do Unit Tests 2 and 5. You will also be taking tests in other subjects, so you should aim to start your final revision at least four weeks in advance.

- Try spending about 30 minutes revising one subject. Then switch from physics to another subject.
- Take regular breaks.
- Revise actively with pen, highlighter and paper.

When you have fully revised the material in a Unit, read through the 'worked examples' and attempt the 'practice assessment questions' provided in this book. Mark your work using the answers in the Answers section which follows Chapter 6 – or better still mark a friend's work and let him or her mark yours. Then:

- Work out where you went wrong.
- If you obtained low marks for a particular section, go back to your notes and textbooks and look over that section before having another attempt.

The specification can be found on Edexcel's web site at www.edexcel.org.uk Spreading revision this way over the whole course will reduce stress and will guarantee a better grade than you would obtain by leaving it all to a mad dash at the end. Physics is a subject in which knowledge is built up gradually. The more thoroughly you work in the earlier stages, the easier and more enjoyable you will find the study of physics.

#### The day of the Unit Test

If you have followed the advice given here, you should feel confident that you will be able to do your best. Some people find it helpful to spend a little time looking over some physics before going into the test, others prefer to keep their minds clear for the task ahead.

Check that you have:

- Two or more blue or black pens and several pencils.
- Your calculator if the batteries are old replace them beforehand.
- A watch try putting it on the desk in front of you.
- A ruler.
- A good luck charm, if it helps.

Don't take a red pen with you as the awarding body doesn't allow you to use this colour – the examiners use red for marking the papers.



### Tackling the question paper

- Work steadily through the paper starting at question 1.
- The questions in the seven Tests associated with Units 1–5 are answered in the spaces provided on the question paper itself. If you need more room for your answer, look for space at the bottom of the page, at the end of the question or after the last question.
- Use the amount of space given for each answer as a guide to how much you should write. If a question has three lines for the answer, do not write an essay. Work out the essential points that need to be made, and check them against the number of marks to be awarded.
- Do not repeat the question in your answer.
- Pace yourself so that you neither run out of time nor have masses of time to spare at the end. If you get stuck, do not waste time. Make a note of the question number and part that caused you difficulty and go on. Later, if you have time, go back and try that part again.
- Using correcting fluids can waste time while you wait for it to dry. Frequently an examiner sees a thick crust of white with nothing written on it, and wonders whether some marks might have been given for what had originally been written. Rather than using correcting fluid, neatly cross out what you have written. If, later, you realise that what you had first written was correct, write 'ignore crossing out' beside the work that you had crossed out. The examiner will then mark it.

#### Terms used in the Tests

It is important that you understand what the examiners want. Some of the terms that are often used in questions are explained below:

- Calculate: a numerical answer is obviously required! Show your working and set your work out clearly. Don't forget the units.
- Comment: make sure what you write is relevant. Judge amount of detail required from marks/space.
- Complete: add to (circuit) diagrams and/or tables.

If you use space at the bottom of the page let the examiner know by adding 'continued below' or 'continued on page •••' if space is used elsewhere.

- Define: you can define quantities by their equations but remember to explain any symbols used.
- **Describe**: give the main points as precisely as possible. Labelled diagrams can help and are essential when describing experiments.
- Explain: give some reasoning or refer to theory. A labelled diagram will often improve your answer. Judge amount of detail required from marks/space.
- Plot: use scales on graph paper and be precise. Show data points either as a cross or a dot surrounded by a small circle.
- **Show that**: show all your working and give your answer to one more significant figure than the approximate value stated in the question. It is very likely that the stated value will be needed in a calculation later in the same question. So even if you can't do this part, you can still attempt the next!
- Sketch: use labelled axes but only add axes values if told to do so. Sketch roughly but carefully.
- State: a brief sentence giving the required facts. No explanation is required.
- Suggest: there is often no single correct answer. Credit is given for good physics reasoning.
- Use the graph: usually this involves finding either the gradient or the area. Remember that both of these quantities are likely to have units.

#### and finally

Examiners **do** try wherever possible to give you marks rather than looking for ways to take them away.

Be prepared, be confident and you will do your best, which is all that anyone can ask of you.