Name _____

# A-Level Physics

# Accelerator Pack


# Leventhorpe

## Welcome to Physics!

This pack has been designed to introduce you to A-Level Physics, to make sure that you understand what you have let yourself in for, and to make sure you are ready for your course in September.

You will start by looking at the Topics covered in Year 12 in the Advancing Physics Course and then be given an idea of how the course will be structured, what resources are available and when you will be doing tests, exams and practical assessments.

## How Hard is This Physics Course Going To Be?

Physics is one of the most challenging A-levels you could have chosen!

The students who work the hardest do the best.

Over the course you will have around 5 hours of lessons a week which will cover all the theory and practical skills you need.

You will be given homework questions nearly every lesson and these will be expected to be completed by the next lesson in most cases.

At A-level, you are expected to be spending 9 hours every week out of class completing homework, reviewing your work and reading around the subject. Many other students around the country who you are competing against will be doing more.

If you are doing 3 A-levels that means you should timetable an extra 27 hours out of lessons every week. **There are NO free periods.**

In addition to the lessons you receive, there is plenty of support available:

**Teachers:** Your teacher is the first point of call as they are the experts – we have 3 specialist Physics teachers who will always offer their time when they are available to help you in and out of lessons.

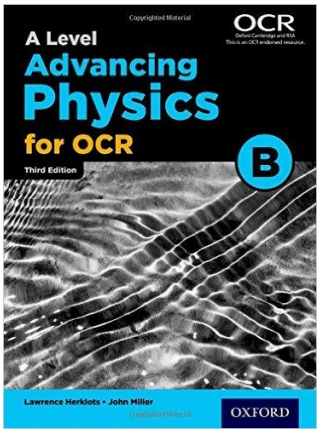
Mrs H. Cunningham – Teacher of Physics/ Head of Science/ Head of Physics

Dr P. Stanley – Teacher of Physics/ KS5 Coordinator

Mr D. Tentes – Teacher of Physics.

**Notes and questions:** We have produced a full set of notes that accompany each Topic. These notes are targeted to the specification and have questions which tie in with the learning objectives. You will be expected to print these off, organise these in a folder and add any extra notes that you write in or out of lessons. You will be expected to bring these along to lessons where we will check your progress regularly.

**Textbook:** You will be given a textbook. These have notes, questions, revision tips and quizzes.




**Advancing Physics for OCR B**

**Series Editor Lawrence Herklots**

**Authors Lawrence Herklots, John Miller, Helen Reynolds**

**Oxford University Press (2015)**

All past papers except for the most recent year are available with answers from OCR:

http://www.ocr.org.uk/qualifications/as-a-level-gce-physics-b-advancing-physics-h159-h559/

## The First Year Course

The first year course includes the following Modules and Chapters:

**1. Imaging, signalling and sensing**

Imaging; Signalling; Sensing

**2. Mechanical properties of materials**

Testing materials; Looking inside materials

**3. Waves and quantum behaviour**

Wave behaviour; Quantum behaviour

**4. Space, time and motion**

Motion; Momentum, force and energy

**Assessments and Intervention**

At the end of each Topic you will be given a test which will be used to assess your progress. If you are not reaching your target grade you will placed in an Intervention programme which will require you to give up more time at home and a lunchtime to do catch up work.

There are also 6 required practicals (PAGS) which are done throughout the year in class and test your practical skills.

1. Investigating motion
2. Investigating properties of materials
3. Investigating electrical properties.
4. Investigating electrical circuits
5. Investigating waves
6. Investigating quantum effects

These are written up in a lab book and marked by your class teacher.

## The Second Year Course

The second year course includes the following Modules and Chapters:

**5. Creating models**

Imaging; Modelling oscillations; The gravitational field; Our place in the Universe

**6. Matter**

Simple models of matter; The Boltzmann factor.

**7. Fields**

Electromagnetism; The electric field.

**8. Fundamental particles**

Looking inside the atom; Using the atom.

There are also 6 additional PAGS:

7. Investigating ionising radiations
8. Investigating gases
9. Investigating capacitors

10. Investigating simple harmonic motion
11. Investigation
12. Research skills

Any practical skills that you have failed to achieve in lessons will be retested in additional PAGS.

The full specification can be viewed and downloaded from OCR:

http://www.ocr.org.uk/qualifications/as-a-level-gce-physics-b-advancing-physics-h157-h557-from-2015/

**Be Prepared to Fail**

Many students have difficulty in the first months of an A-level because they will not do well, possibly for the first time in their school lives. This is normal and a part of embracing the challenges of an A-level.

The grade boundaries at A-level are very different to those at GCSE. You will need 35% just to get an E and then it generally goes up a grade approximately every 10%.

Students who get an 8 at GCSE will be doing extremely well to get A or B at A-level.

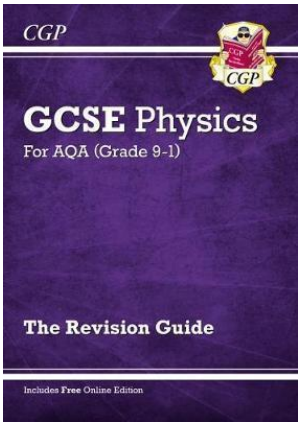
Students who get a 6 at GCSE will be doing extremely well to get D or E at A-level.

**Book list**

The following books need to purchased **before the start of your course** and used to practise your skills and keep the GCSE content fresh in your mind.

Exercises from them will be used throughout your course **from Week 1.**

1. GCSE Physics – The Revision Guide

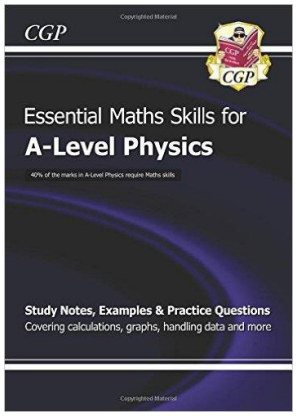


Published by CGP (2016)

Editors Emily Garrett, Frances Rooney, Charlotte Whiteley, Sarah Williams and Jonathan Wray

ISBN: 978 1 78294 558 1

2. Essential Maths Skills for A-level Physics

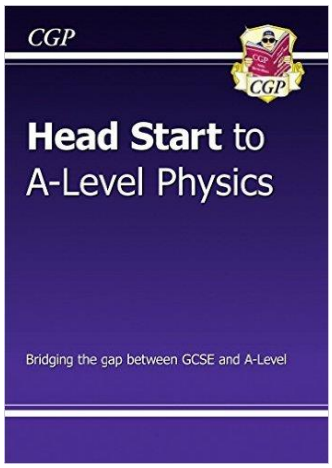



Published by CGP (2015)

Editors Emily Garrett, Rachel Marshall, Sam Pilgrim, Charlotte Whiteley, Sarah Williams

ISBN: 978 1 78294 471 3

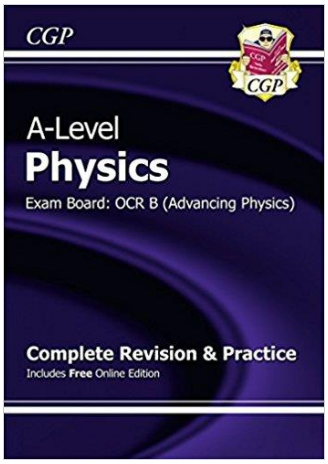
3. Head Start to A-level Physics




Published by CGP (2015)

Author Richard Tattersall
ISBN: 978 1 78294 281 8

4. A-Level Physics




Published by CGP (2015)

Editors Emily Garrett, David Maliphant, Rachael Marshall, Sam Pilgrim, Frances Rooney, Charlotte Whiteley, Sarah Williams and Jonathan Wray

ISBN: 978 1 78294 307 5

## Do I Need To Be Good At Maths?

The simple answer to this is yes – it helps.

BUT the course has been developed so that all of the physics in Year 1 can be explained with a good understanding of GCSE mathematics.

In Year 2 some more difficult maths is necessary to help explain concepts and analyse data but these skills will be developed as you study.

If you have chosen to do maths as one of your A-level courses then you will have an advantage, especially if you are taking mechanics modules as there is a big overlap, but it is not essential.

A summary of the mathematical requirements appears below:

1. **Arithmetic and numerical computation**

(a) recognise and use expressions in decimal and standard form

(b) use ratios, fractions and percentages

(c) use calculators to find and use power, exponential and logarithmic functions

(d) use calculators to handle sin x, cos x, tan x when x is expressed in degrees or radians

2. **Handling data**

(a) use appropriate number of significant figures

(b) find arithmetic means

(c) make order of magnitude calculations

3. **Algebra**

(a) understand and use the symbols = < > ~

(b) change the subject of an equation

(c) substitute numerical values into algebraic equations using appropriate units for physical quantities

(d) solve simple algebraic equations

4. **Graphs**

(a) translate information between graphical, numerical and algebraic forms

(b) plot two variables from experimental or other data

(c) understand that y = mx + c represents a linear relationship

(d) determine the slope and intercept of a linear graph

(e) draw and use the slope of a tangent to a curve as a measure of rate of change

(f) understand the possible physical significance of the area between a curve and the x axis and be able to calculate it or measure it by counting squares as appropriate

(g) use logarithmic plots to test exponential and power law variations

(h) sketch simple functions including $y = k/x$; $y = kx^2$; $y = \sin x$; $y = \cos x$; $y = e^{-x}$

5. **Geometry and trigonometry**

(a) calculate areas of triangles, circumferences and areas of circles, surface areas and volumes of rectangular blocks, cylinders and spheres

(b) use Pythagoras' theorem, and the angle sum of a triangle

(c) use sin, cos and tan in physical problems

(d) understand the relationship between degrees and radians and translate from one to the other

(e) use relationship for triangles:

$$a/\sin A = b/\sin B = c/\sin C$$