

Warlingham
Sixth Form College

Year 11 > Year 12 Transition
Summer Term 2021
A Level Physics

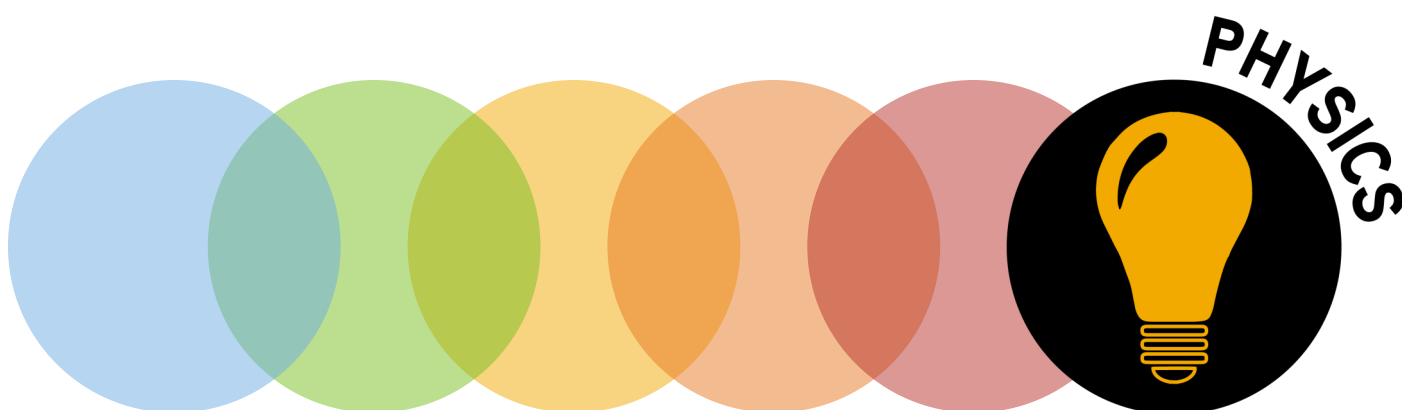












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COURSE OVERVIEW

Welcome to A level Physics. Studying Physics after your GCSEs really develops your practical and mathematical skills. If you enjoy experimenting in the lab, you'll love it.

Physics is about understanding the universe and the world around us. Physicists explore the fundamental nature of almost everything we know of. They study everything from the fundamental particles that build matter, to the galaxies that make up the universe itself.

Studying Physics at Warlingham Sixth Form College will allow you to explore a wide range of topics, hone your practical skills and give you the opportunity to visit CERN, one of the world's largest and most respected centres for scientific research as well as a chance to observe the Aurora Borealis in Iceland.

We follow the AQA A Level Physics course (7408). The 2-year course consists of 8 core units and a choice of optional topic.

Year 1:

1. Measurements and their errors
2. Particles and radiation
3. Waves
4. Mechanics and materials
5. Electricity

Year 2:

6. Further mechanics and thermal physics
7. Fields and their consequences
8. Nuclear physics
9. Optional topic: Astrophysics, Medical Physics, Engineering Physics, Turning points in Physics

Throughout the course you will be given opportunities to develop your practical skills. You will produce a lab book as a record of your skills and experience and this, along with teacher assessment during practical activities, will form the basis of a practical skills endorsement.

You will be assessed at the end of the 2 years during three 2-hour examinations. Paper 1 examines Year 1 content as well as Further Mechanics from Year 2. Paper 2 examines Thermal Physics, Fields and Nuclear Physics as well as assumed Year 1 knowledge. Paper 3 examines Practical skills, data analysis and the optional topic.

A Level Physics is an impressive course for your CV and UCAS application form. Potential degree courses include physics, mathematics, engineering, computer science, economics, business and medicine.

Possible career choices include engineering, architecture, physics, teaching, research, radiation protection, meteorology, astrophysics chemical physics, computer programming, banking and finance.



OUR EXPECTATIONS

College Expectations for Academic Success

The College will work closely with all students and parents to create a purposeful, creative and stimulating environment in which students are encouraged to fully develop - both academically and personally.

We will expect you to take responsibility for your own behaviour and learning. The current College Committee along with the student body have discussed and agreed that students should commit to:

- Ensuring academic success through regular attendance and punctuality at all required registrations, lessons, supervised study lessons and Inspire Periods. Attendance which drops below 95% reduces Key Stage 5 performance by at least one grade, so it is taken very seriously.
- Completing all set tasks on time to the best of your ability, making full use of study periods and homework to enable you to meet all deadlines.
- Using study time effectively by bringing all required equipment and resources with you and making full and regular use of the College study rooms and LRC, respecting the need for silent studying conditions.
- Working closely with all your teachers to develop an effective working relationship based on mutual respect and discussing your work with them on a regular basis and meeting targets set.
- Developing your skills as an independent, self-evaluative learner and work closely with your tutor in monitoring and discussing your academic progress. As an independent learner, if you miss a lesson, it is your own responsibility to find the teacher and catch up with the work missed.
- Organising your work efficiently and effectively into folders for each subject, making full use of individual subject expectations and using Cornell Notes daily to ensure work in your folders is relevant and meaningful.
- Keeping mobile phones out-of-sight in all classrooms and during assemblies so that lessons are not disturbed and/or important information is missed.
- Attending all parents' evenings and arrange appointments with your teachers to discuss your progress and work.

Course-specific Expectations for Academic Success

- Arrive to lessons on time.
- If you are not able to attend the lesson then please see/email the teacher in advance and collect the work from the teacher.
- Bring all equipment to lessons (including a calculator and your textbook).
- Complete the homework each week as set by your class teacher.



OUR EXPECTATIONS

- Your homework must be handed in as requested by your teacher without fail. If you do not hand your work in you will need to stay behind after school to complete it.
- If your test scores are below your target grade you will be required to repeat the work.
- In addition to your set homework, you should also aim to complete the summary questions from the text book chapters covered in the lessons. This will ensure your understanding of the topics.
- Green pen any areas for development weekly using the detailed checklists you will be provided with.
- Use Isaacphysics.org / physicsandmathstutor.com / khanacademy.org to improve your understanding of the topics taught and attend after school sessions for additional help as required.
- The transition from GCSEs to A Levels is challenging, and we as teachers expect mature and organised students, but most of all we want you to be passionate about our subject. It is vitally important that you stay on top of your learning. If you are unsure you must come and talk to your teachers. We are here to help you and ignoring a problem does not make it go away. Physics is a challenging and rewarding subject and you need to be prepared to work hard.





USING CORNELL NOTES

The Cornell Notes system is a note-taking system devised by Walter Pauk, an education professor at Cornell University. It is a proven method that establishes a more effective learning process.

It is designed to help the user think and reflect upon the notes they have made as well as making them more useful for revision purposes.

Please [click here](#) to watch a video that explains how to take Cornell Notes properly.

12.1 Electric current and charge Name: LSp. Date: 2/2/20

Defin. cu	Electric current is the flow of charge - measured in
Calculate the charge flow in a circuit	Equation Symbols $\Delta Q = I \Delta t$ Words charge = Current x time Units C A s (Coulomb) (second)
Questions you might get asked	eg. Current = 0.35 A passing a charge $Q = It = 0.35 \text{ A} \times 10 \text{ s} = 3.5 \text{ C}$
Define charge carriers	Charge carriers are charged particles that carry electric charge - electrons in a wire/circuit - ions in a solution (charged atoms)
Summary:	Conversion for current flow + \rightarrow - Charge on one electron = $1.6 \times 10^{-19} \text{ C}$

Summary:

- Electric current is
- $Q = It$
- Charge carriers carry charge

Summary notes
→ make flashcards



REVIEW / REVISE

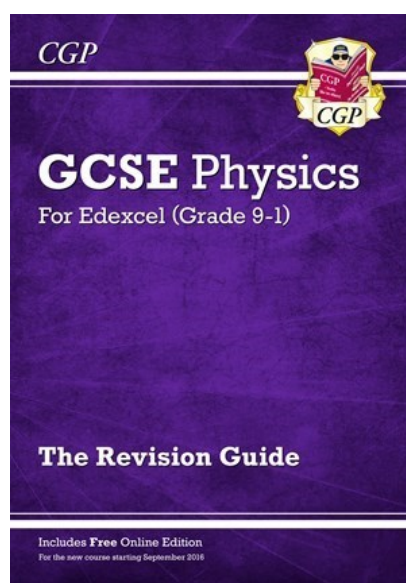
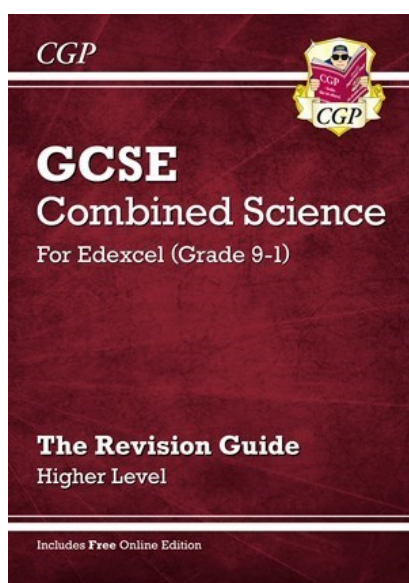
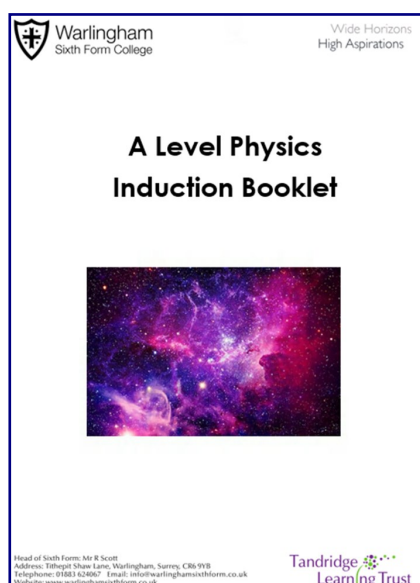
A Level Physics requires a sound understanding of the following topics from GCSE:

- Waves
- Light and the Electromagnetic Spectrum
- Forces and motion
- Energy, work and power
- Electricity
- Magnetism and electromagnetic induction
- Materials—density and springs
- Radioactivity

There are also several areas in which students struggle at A Level:

- Use of symbols
- Use of SI units
- Use of a calculator
- Use of formulae
- Graph skills

An induction booklet has been prepared giving you the opportunity to review this content and practice the skills listed above. This will be handed out during the Induction sessions. You will need your GCSE Revision Guide (Physics or Combined Science).





WATCH

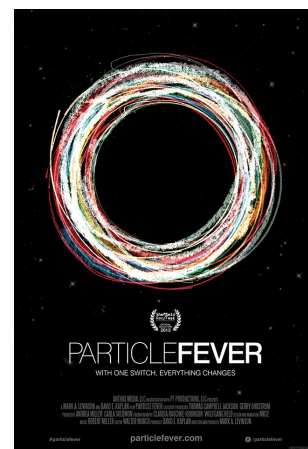
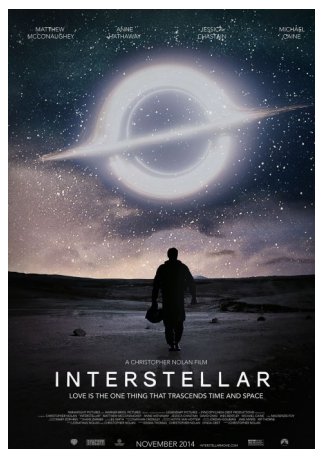
- Watch any or all of the “Schools Lecture series” videos made by the Institute of Physics. Don't be put off by the title—they are all presented by experts in physics at the right kind of level, and the topics covered will really help you understand some of the details of the A Level course.

<http://www.iop.org/resources/videos/education/>

- There are huge numbers of physics videos online—some recommended ones are:
 - Minute Physics <http://www.youtube.com/user/minutephysics>
 - Veritasium <https://www.youtube.com/user/1veritasium>
 - Sixty symbols <https://www.youtube.com/user/sixtysymbols>
 - Richard Feynman's “Messenger Lectures” on physics, archived with transcripts on Microsoft's Project Tuva website <http://www.research.microsoft.com/apps/tools/tuva/>
- Horizon is an excellent series covering a range of interesting topics:
<https://www.bbc.co.uk/iplayer/episodes/b006mgxf/horizon>
- Of general science interest:
 - Vsauce <https://www.youtube.com/user/Vsauce>
 - Institute of Physics <https://www.youtube.com/user/InstituteofPhysics>

Here are some films that you may have seen already but are worth a watch:

- Interstellar (2014)
- The Martian (2015)
- Contact (1997)
- Gravity (2013)
- Particle Fever (2013)
- The Theory of Everything (2014)
- Einstein and Eddington (2008)
- The Abyss (1989)



Then watch how the science in them has been pulled apart:

<https://www.youtube.com/user/CinemaSins>



LISTEN TO

Below are links to podcasts that cover a range of science-based and physics topics. It is not essential to listen to these but it will give you a glimpse into the wider world of science and may answer some questions you didn't realise you had.

Science in Action

<https://www.bbc.co.uk/programmes/p002vsnb>

The Infinite Monkey Cage

<https://www.bbc.co.uk/programmes/b00snr0w>

The Life Scientific

<https://www.bbc.co.uk/programmes/b015sqc7>

Undiscovered by Science Friday

<https://www.wnycstudios.org/podcasts/undiscovered>

Flash Forward

<https://www.flashforwardpod.com/>

The Titanium Physicists

<http://titaniumphysicists.brachiolopemedia.com/>

In our time

<https://www.bbc.co.uk/programmes/b006qykl>





READ

Listed below are some useful sources to help prepare you further for the A Level Course:

Prepare for the challenge of A Level Physics: Study Guide to bridging the gap between GCSE and A Level Physics by Kitt Betts-Masters (2020)

Essential Maths Skills for A Level Physics by CGP (2015)

Headstart to A Level Physics by CGP (2015)

Recommended Books on Physics, Maths and Science

A brief history of time by Stephen Hawking

Big Bang: The origin of the universe by Simon Singh

Six Easy Pieces by Richard Feynman

Hyperspace by Michio Kaku

The Order of Time by Carlo Rovelli

The Code Book by Simon Singh

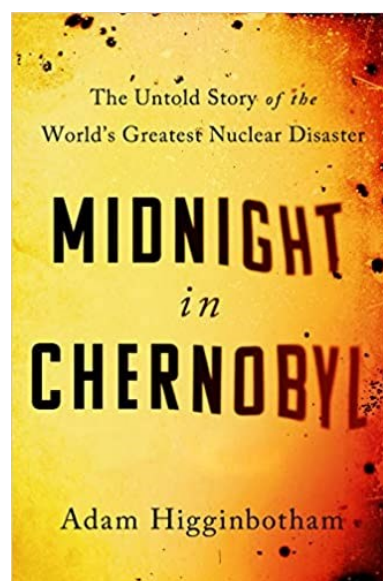
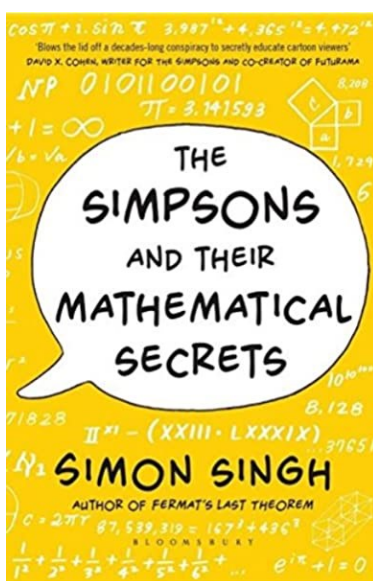
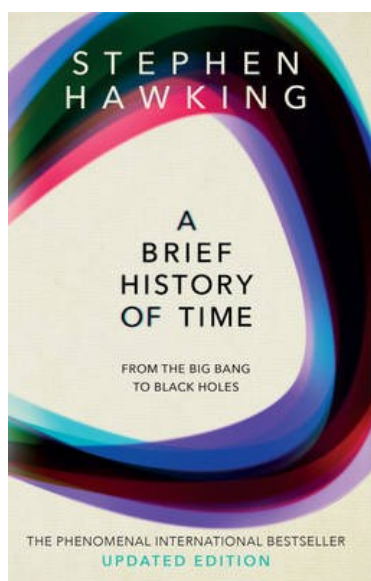
The Simpsons and their Mathematical Secrets by Simon Singh

Longitude by Dava Sobel

The Immortal Life of Henrietta Lacks by Rebecca Skloot

The Selfish Gene by Richard Dawkins

Midnight in Chernobyl by Adam Higginbotham



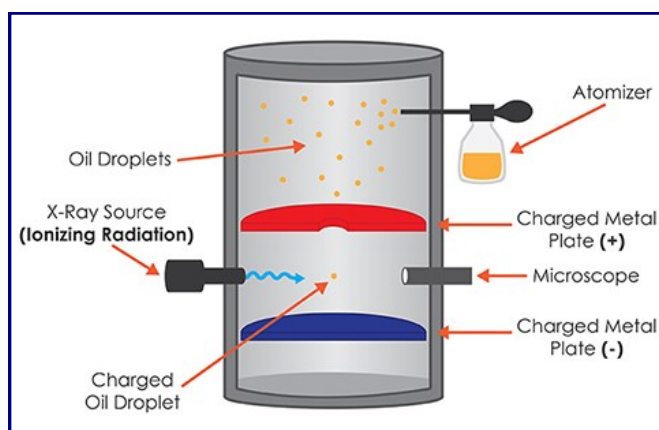


RESEARCH

You are going to research **two** key experiments and prepare a short report on each:

Choose from the following list:

- Young's Double slit experiment
- Millikan's Oil drop experiment
- Rutherford's Scattering experiment
- Fermi's Chicago Pile
- Franklin's X-ray diffraction DNA photograph
- Bell Burnell's Pulsar
- Eratosthenes' measurement of the Earth's circumference
- Foucault's pendulum



Your report should include:

- The title of the experiment
- When the main discovery was made
- Who the main scientist(s) was/were
- A short background to put the experiment in context of the understanding of that field of science at the time
- A description of the experiment performed (diagrams may be helpful)
- The main evidence gathered
- The conclusions that were drawn
- How it changed our understanding



COMPLETE

Compulsory

You should bring **both** of these to your first Physics lesson in September.

1. The completed A Level Physics Induction booklet. Please [click here](#).
2. Your **two** short reports on the key experiments you have researched.

Enrichment (Optional)

You should aim to watch at least one TV programme, listen to a podcast and read a book from the lists given. Asking questions and increasing our knowledge and understanding of the world is a core attribute of a successful physicist and student.

My personal favourites are:

TV programmes

Horizon—The Pleasure of Findings Things Out <https://www.bbc.co.uk/iplayer/episode/p018dvyg>
Mythbusters (2003-2018)

Podcasts

Jocelyn Bell Burnell <https://www.bbc.co.uk/programmes/b016812j>
Brian Cox on Quantum Mechanics <https://www.bbc.co.uk/programmes/b04hvx9z>
Carlo Rovelli on Why time is not what it seems <https://www.bbc.co.uk/programmes/b0b1r1cw>

Films

Interstellar (2014)
The Abyss (1989)
Contact (1997)

Books

A Brief History of Time by Stephen Hawking
The Code Book by Simon Singh

Join: Qubit the e-Newsletter from the Institute of Physics

http://www.iop.org/education/student/youth_membership/page_41684.html

Try: these websites to participate in current research:

<https://setiathome.berkeley.edu/>

<https://www.schoolsobservatory.org/discover/projects/asteroidwatch>

<http://www.galaxyzoo.org/>



APPENDICES / RESOURCES

Class Textbooks

- AQA Physics: A Level Year 1 and AS by Jim Breithaupt, 2015
ISBN: 978-0198351863
- AQA Physics: A Level Year 2 by Jim Breithaupt, 2015
ISBN: 978-0198357728
- AQA A Level Physics (Year 1 and Year 2) by Jim Breithaupt et al, 2015
ISBN: 978-0198351870

The textbooks will be available to borrow from the school for a small deposit if you do not wish to buy your own copy to keep.

Revision Resources

- AQA A Level Physics Revision Guide by Jim Breithaupt, 2017
ISBN: 978-0198351894
- CGP A Level Physics (AQA) Complete revision and practice, 2018
ISBN: 978-1789080322
- CGP A Level Physics (AQA) Exam practice workbook, 2018
ISBN: 978-1782949169

Exam Board Resources

Specification: <https://filestore.aqa.org.uk/resources/physics/specifications/AQA-7407-7408-SP-2015.PDF>

Practical Handbook: <https://filestore.aqa.org.uk/resources/physics/AQA-7407-7408-PHBK.PDF>

Subject specific vocabulary: <https://www.aqa.org.uk/resources/science/as-and-a-level/teach/subject-specific-vocabulary>

Data sheet: <https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2018/june/AQA-74081-INS-JUN18.PDF>