

A Level Physics Transition Material

Physics is the most fascinating subject to study at A Level! It's also well-recognized for developing useful skills for a wide range of careers such as problem-solving, analysis and communication. You'll be taught in a small class with lots of individual help, and your teacher will be experienced. Start by reading this guide to A-level Physics from the Institute of Physics: https://www.iop.org/publications/iop/2015/file_65520.pdf

It includes information about the A-level, as well as ideas on careers after Physics A-level.

How is A-level Physics different from GCSE Physics?

- ❖ **New, exciting topics** – a lot of the topics will be the same as GCSE, but there are some really exciting new ones, such as antimatter, quantum physics, medical imaging, cosmology (the future of the Universe) and special relativity.
- ❖ **There's more time for everything** – 10 hours every two weeks. It means there's time to learn about fascinating real-world applications, extra practice of anything tricky, and better practicals!
- ❖ **Better practicals** – A-level practicals are fascinating, such as measuring the gravitational field strength (g) on Earth, and getting hands-on with radioactivity! We'll also spend a bit more time on practicals so that you develop the skills to design and run your own investigations.
- ❖ You build a much **deeper understanding** of each topic, because we spend more time on it before moving on.
- ❖ A-level Physics has **more maths** – it's similar to GCSE Higher-Tier Maths, with some trigonometry and simultaneous equations, for example. We'll support you in Physics lessons to develop all of the maths skills you'll need.
- ❖ **You don't have to memorise so many equations!** In A-level Physics exams you're given a booklet with almost all of the equations in it.
- ❖ **An option topic** – in year 13 you'll get to choose a topic to specialise in, such as Astrophysics, Engineering or Medical Physics.

Course Layout

At Crompton House we study AQA Physics over the two years. We cover the following topics:

Electricity
Mechanics & Further Mechanics
Materials
Particle and Quantum Physics
Waves
Fields: Gravitational, Electric, Magnetism and Capacitance
Nuclear Physics
Thermal physics
Option: Astrophysics

Throughout the course there are also required practicals in every topic. You will learn how to do a full practical write up for the practicals and will gain excellent practical skills. You will know how to use the equipment, the limitations of the equipment and the potential errors. At the end of the two years, when you have gained all of the skills, you will be awarded the practical endorsement.

Exams

There are three written exams it at the end of Year 13.

Assessments

Paper 1	Paper 2	Paper 3
What's assessed Sections 1–5 and 6.1 (Periodic motion)	What's assessed Sections 6.2 (Thermal Physics), 7 and 8 Assumed knowledge from sections 1 to 6.1	What's assessed Section A: Compulsory section: Practical skills and data analysis Section B: Students enter for one of sections 9, 10, 11, 12 or 13
Assessed <ul style="list-style-type: none">written exam: 2 hours85 marks34% of A-level	Assessed <ul style="list-style-type: none">written exam: 2 hours85 marks34% of A-level	Assessed <ul style="list-style-type: none">written exam: 2 hours80 marks32% of A-level
Questions 60 marks of short and long answer questions and 25 multiple choice questions on content.	Questions 60 marks of short and long answer questions and 25 multiple choice questions on content.	Questions 45 marks of short and long answer questions on practical experiments and data analysis. 35 marks of short and long answer questions on optional topic.

The **most successful physics students** are the ones who have an interest in physics, not just in the classroom but outside of it too. They do background reading, listening to podcasts, watching TV and YouTube shows about it. It all helps with your overall understanding.

To be successful in the classroom you must:

- Be focussed in every lesson – 10 lessons every two weeks.
- Recap what we cover after each lesson
- Complete all of the homework assignments to a high standard – you use your notes for these.
- Complete the booklets of extra practice questions
- Background reading/activities

Some topics have a lot of practical activities and some, astrophysics for example, have fewer. We try to complete as many practical activities as possible to illustrate the theory.

There are two main trips in A Level Physics; CERN and Jodrell Bank Centre for Astrophysics. The CERN trip runs every two years and the Jodrell Bank Trip is every year for Year 13.

What can I do after A-level Physics?

Physics is known as a facilitating subject – this means that it helps keep your options open as it's highly regarded as preparation for lots of different courses. Businesses and universities really value the subject because of the transferrable skills it gives you. There are some great online tools that help you work out what subjects you can study at University with your combination of A-levels.

Try <https://www.theuniguide.co.uk/a-level-explorer> or https://sacu-student.com/?page_id=5203 (click "start matching now") or <https://www.informedchoices.ac.uk/>

For more general advice on A-level choices, visit: <https://www.theuniguide.co.uk/advice/a-level-choices>

What can I do now? You need to maintain and develop your physics knowledge:

1. We are asking you to **complete** the PiXL Transition Pack for A Level Physics.
2. Book: CGP Headstart to physics. This is free as a kindle book right now!
https://www.amazon.co.uk/Head-Start-level-Physics-Level-ebook/dp/BooVE2Nll4/ref=msx_wsirn_v1_6/259-0922743-4799544?encoding=UTF8&pd_rd_i=BooVE2Nll4&pd_rd_r=ob9dbecd-8c91-43ed-8cb7-95c3137282ef&pd_rd_w=XxLER&pd_rd_wg=adPAb&pf_rd_p=2c73497e-0658-4f6d-8f3c-06c50c0881ec&pf_rd_r=XM9XCBYH1TH593V5EoS9&psc=1&refRID=XM9XCBYH1TH593V5EoS9
3. Book: Prepare for the Challenge of A Level Physics. This is also free as a kindle book right now.
https://www.amazon.co.uk/gp/product/Bo851MGFWZ/ref=as_li_qf_asin_il_tl?ie=UTF8&tag=gorillaphyso6-21&creative=6738&linkCode=as2&creativeASIN=Bo851MGFWZ&linkId=da683336f706916f0618812965d27980
4. Seneca online <https://senecalearning.com/> – Choose AQA GCSE Physics.
5. GCSE Physics online – a weekly video, worksheet & livestreamed review session on GCSE topics, plus A-level preparation tasks <https://www.gcsephysicsonline.com/covid-19> and <https://www.gcsephysicsonline.com/pre-a-level>

Which topics are useful for A Level Physics?

GCSE Physics	Useful for year 12?	Useful for year 13?
Energy	✓ <i>except energy resources & specific heat capacity</i>	✓ <i>specific heat capacity</i>
Electricity	✓ <i>except household electricity & static electricity</i>	✓ <i>Static electricity & AC electricity</i>
Particle model of matter	<i>Only density & states of matter</i>	✓ all of it!
Atomic structure	✓ <i>except half lives, background, fission, fusion</i>	✓ all of it!
Forces	✓ <i>except stopping distances</i>	✓ yr12 skills applied to new topics
Waves	✓ <i>except lenses, uses of EM waves, seismic & ultrasound & blackbody radiation</i>	✓ <i>lenses, ultrasound & blackbody in Astro & Medical option topics</i>
Magnetism and electromagnetism		✓ all of it!
Space physics		✓ in Astro option topic

Home Experiments

There are lots of home experiments you can do too. Make sure you get permission before trying them and be careful! 😊

Physics Girl HOME CHALLENGE



20 Easy Experiments in 5 mins

<https://www.youtube.com/watch?v=8aaXZDazPxs>

Marvin and Milo: DO try this at home!



Over 150 simple and fun experiments!

<http://www.physics.org/marvinandmilo.asp>

Steve Spangler: DIY Sci



Learn how to use do-it-yourself experiments to amaze friends!

<https://www.stevespanglerscience.com/lab/experiment-library/> and

<https://www.youtube.com/user/TheSpanglerEffect/featured> and

<https://www.youtube.com/user/SteveSpanglerScience/videos>

James Dyson Challenge Cards



Can you skewer a balloon without popping it? Coat a nail in copper? What else?

https://www.youtube.com/watch?v=FuAqA_GhVQ0&list=PLpBQHVUIKs3qD7-u1bm164Qs3WJ0ZVU6X and

<https://www.jamesdysonfoundation.co.uk/resources/challenge-cards.html>

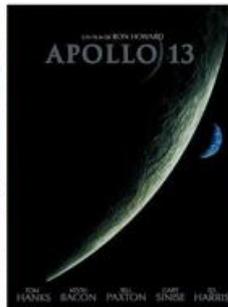
Movies



The Martian (2015)
When astronauts blast off from the planet Mars, they leave behind Mark Watney (Matt Damon), presumed dead after a fierce storm.



Interstellar (2014)
A team of explorers travel through a wormhole in space in an attempt to ensure humanity's survival.



Apollo 13 (1995)
Based on a true story. NASA must devise a strategy to return Apollo 13 to Earth safely after the spacecraft undergoes massive internal damage putting the lives of the three astronauts on board in jeopardy.



Hidden Figures (2016)
Based on a true story. The untold story of three brilliant African-American women working at NASA and serving as the brains behind one of the greatest operations in history.



Moon (2009)
An astronaut miner extracting the precious moon gas that promises to reverse the Earth's energy crisis nears the end of his three-year contract, and makes an ominous discovery



Gravity (2013)
Two astronauts work together to survive after an accident which leaves them stranded in space.



The Boy who Harnessed the Wind (2019)
Based on a true story. Inspired by a science book, 13-year-old William Kamkwamba builds a wind turbine to save his Malawian village from famine.



The Theory of Everything (2014)
Based on a true story. Stephen Hawking, an excellent astrophysics student, learns that he suffers from motor neurone disease and has around two years to live.

YouTube

YouTube Channels

Subscribe to these channels and you'll be amazed what you'll learn!



Physics Girl

<https://www.youtube.com/channel/UC7DdEm33SyaTDtWYGO2CwdA>



The Royal Institution

<https://www.youtube.com/user/TheRoyalInstitution/playlists>



Minute Physics

<https://www.youtube.com/user/minutephysics/playlists>



Crash Course

<https://www.youtube.com/user/crashcourse/playlists>



Veritasium

<https://www.youtube.com/user/1veritasium/playlists>



SciShow

<https://www.youtube.com/user/scishow/playlists>



Reel Truth Science Documentaries

<https://www.youtube.com/channel/UCZSE95RmyMUgJWmfra9Yx1A/playlists>



ABC Science

<https://www.youtube.com/user/ABCTVCatalyst/playlists>



Real Engineering

https://www.youtube.com/channel/UCR1luLEqb6UEA_zQ81kwXfg/playlists



NOVA PBS Official

<https://www.youtube.com/user/NOVAonline/playlists>



TED Ed

<https://www.youtube.com/user/TEDEducation/playlists>



The Spangler Effect

<https://www.youtube.com/user/TheSpanglerEffect/featured>

Please feel free to get in contact if you have any questions at all! Looking forward to seeing you all in September,

Dr Whitworth

l.whitworth@cromptonhouse.org