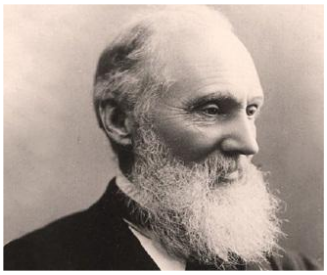
A Level Physics Transition Guide

You're studying AS or A-level Physics, congratulations!

Welcome to A-level Physics. This pack contains a programme of activities and resources to prepare you to start an A-level in Physics in September. It is aimed to be used over the Summer Holidays to ensure you are ready to start your course in September.

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.

Physics is about understanding the Universe around us, so have a go, and remember even some of the greatest Physicists got it wrong!



"X-rays will prove to be a hoax!"

Lord Kelvin

At first, you may find the jump in demand from GCSE a little daunting, but if you follow the tips and advice in this guide, you'll soon adapt.

5 Reasons why being a physicist is cool!

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. We live in a world deep beneath the surface of normal human experience.

Even if you don't decide to work in physics, studying it still develops useful and transferable skills for other careers. You'll develop research, problem solving and analytical skills, alongside teamwork and communication. Universities and business regard all of these very highly.

1. You Can Get Out of a Black Hole

This is actually a joke; there is no way to get out of a black hole (that's why they're black!) But there is a lot of speculation over what would happen if you did fall in – check out ideas on 'spagettification'.

2. Physics Teaches You to Think

Many people who have studied physics report it helps them develop critical thinking and problem-solving skills.

- American Institute of Physics: Skills Physics Bachelor's Use (https://www.aip.org/statistics/data-graphics/knowledge-and-skills-regularly-used-physics-bachelor's-employed-private-0)

3. Physics Explains

Learn why the sky is blue

- HyperPhysics: Blue Sky (http://hyperphysics.phy-astr.gsu.edu/hbase/atmos/blusky.html)

Why the world goes round (you might have heard it was love, but Newton knew the real answer)

- HyperPhysics: Angular Momentum (http://hyperphysics.phy-astr.gsu.edu/hbase/amom.html#am)

Why global warming will have the Alaskans trading in their snow boots for flip-flops

- HyperPhysics: Greenhouse Effect (http://hyperphysics.phy-astr.gsu.edu/hbase/thermo/grnhse.html)

4. Physics is Versatile

Physicists explore the near and far mysteries of the universe as well as the quantum world!

5. Physics Makes Things Possible

Without physics there would be no:

- Grocery laser scanners
- Space rockets
- Light bulbs
- Digital cameras
- Cars
- Cell phones
- Airplanes
- Solar panels
- Fiber optics
- DVD players
- Computers
- MP3 players
- Flatscreen TVs
-

Getting the picture? To learn more about the physics behind these technologies, search for them at Discovery Communications' online resource, *HowStuffWorks*.

- HowStuffWorks Website

Not to mention physics Will Help You Get into College, Get a Job, and Find Love……..!
Physics makes you more attractive to university recruiters, future employers, and that cutie you have your eye on. (You'll just have to trust us on that last one).

Follow the above links and begin to explore the wider world of physics

Course information

- We will be following the AQA A-level Physics syllabus
- You will complete a baseline test in September to check your understanding of topics
- You will sit two exams at the end of Year 12, which you will need to pass in order to progress to Year 13. These exams do NOT contribute to your final A-level qualification.
- You will sit three exams at the end of Year 13, each contributing ≈33% towards your A-level qualification

Physics lesson information and expectations:

- You will attend 5 x 60 minute lessons each week
- Lessons and assessments will consist of both practical skill and theory content
- You must complete at least 12 assessed practical investigations over the course of the A-level course
- Homework must be completed and handed in on time
- Tests will take place at the end of each topic and each unit

Independent study will by completed each week

Specification at a glance

AS and A-level

1 Measurements and their errors

2 Particles and radiation

3 Waves

4 Mechanics and materials

5 Electricity

A-level only

6 Further mechanics and thermal physics

7 Fields and their consequences

8 Nuclear physics

9 Optional topics. You will study one of these: Astrophysics, Medical physics, Engineering physics, Turning points in physics or Electronics

Book Recommendations

Below is a selection of books that should appeal to a physicist – someone with an enquiring mind who wants to understand the universe around us. None of the selections are textbooks full of equation work (there will be plenty of time for that!) instead each provides insight to either an application of physics or a new area of study that you will be meeting at A-level for the first time.

1. **Surely You're Joking Mr Feynman: Adventures of a Curious Character**

   ISBN - 009917331X - Richard Feynman was a Nobel Prize winning Physicist. In my opinion he epitomises what a Physicist is. By reading this books you will get insight into his life's work including the creation of the first atomic bomb and his bongo playing adventures and his work in the field of particle physics.

2. Moondust: In Search of the Men Who Fell to Earth

ISBN – 1408802384 - One of the greatest scientific achievements of all time was putting mankind on the surface of the moon. Only 12 men made the trip to the surface, at the time of writing the book only 9 are still with us. The book does an excellent job of using the personal accounts of the 9 remaining astronauts and many others involved in the space program at looking at the whole space-race era, with hopefully a new era of space flight about to begin as we push on to put mankind on Mars in the next couple of decades.

https://www.waterstones.com/books/search/term/moondust++in+search+of+the+men+who+fell+to+earth

3. Quantum Theory Cannot Hurt You: Understanding the Mind-Blowing Building Blocks of the Universe

ISBN - 057131502X - Any Physics book by Marcus Chown is an excellent insight into some of the more exotic areas of Physics that require no prior knowledge. In your first year of A-Level study you will meet the quantum world for the first time. This book will fill you with interesting facts and handy analogies to whip out to impress your peers!

https://www.waterstones.com/book/quantum-theory-cannot-hurt-you/marcus-chown/9780571315024

4. A Short History of Nearly Everything

ISBN – 0552997048 - A modern classic. Popular science writing at its best. A Short History of Nearly Everything Bill Bryson's quest to find out everything that has happened from the Big Bang to the rise of civilization - how we got from there, being nothing at all, to here, being us.

https://www.waterstones.com/books/search/term/a+short+history+of+nearly+everything

5. Thing Explainer: Complicated Stuff in Simple Words

ISBN – 1408802384 - This final recommendation is a bit of a wild-card – a book of illustrated cartoon diagrams that should appeal to the scientific side of everyone.

https://www.waterstones.com/book/thing-explainer/randall-munroe/9781473620919

Movie / Video Clip Recommendations

Hopefully you'll get the opportunity to soak up some of the Sun's rays over the summer – synthesising some important Vitamin-D – but if you do get a few rainy days where you're stuck indoors here are some ideas for films to watch or clips to find online.

Science Fictions Films

1. **Moon (2009)**
2. **Gravity (2013)**
3. **Interstellar (2014)**
4. **The Imitation Game (2015)**
5. **The Prestige (2006)**

Online Clips / Series

1. Minute Physics – Variety of Physics questions explained simply (in felt tip) in a couple of minutes. Addictive viewing that will have you watching clip after clip – a particular favourite of mine is "Why is the Sky Dark at Night?"

https://www.youtube.com/user/minutephysics

2. HGSS video collection for A Level physics: A variety of videos on curriculum related topics

https://hgss.planetestream.com/Default.aspx?catid=46

3. Shock and Awe, The Story of Electricity – A 3 part BBC documentary that is essential viewing if you want to see how our lives have been transformed by the ideas of a few great scientists a little over 100 years ago. The link below takes you to a stream of all three parts joined together but it is best watched in hourly instalments. Don't forget to boo when you see Edison. (alternatively watch any Horizon documentary – loads of choice on Netflix and the I-Player)

https://youtu.be/Gtp51eZkwoI

4. The Fantastic Mr. Feynman – I recommended the book earlier, I also cannot recommend this 1 hour documentary highly enough. See the life's work of the "great explainer", a fantastic mind that created mischief in all areas of modern Physics.

https://youtu.be/H9fjhQMsDW4

You are not expected to watch / read all recommendations but if you could pick a selection that particularly appeals.

Transition Tasks

1. You need to purchase and complete the 'Head Start to AS Physics' book
    - Publisher: Coordination Group Publications Ltd (CGP) (2nd Mar. 2015)
    - ISBN-10: 1782942815
    - ISBN-13: 978-1782942818.

    All of the questions should be fully answered with clear and structured workings on paper with content titles. *This is to be brought to your first Physics lesson*.

    The step up to A level Physics is a significant one, and your success in this subject will largely depend on your ability to build upon your knowledge from GCSE and revise throughout this year. The CGP book will help you with this transition, as well as introducing you to some key concepts that you will meet next year. It also gives you a chance to develop the layout of your workings and answers.

2. Look at AQA 'Lesson Activity: GCSE to A Level Progression:

    https://www.aqa.org.uk/subjects/physics/as-level/physics-7407/planning-resources?secondaryResourceType=GCSE+to+A-level+progression

There are some useful exercises for you to print off and complete – there is also a mark scheme at the same reference

Pupil Background Information

Name	
GCSE results	
Why you chose to study Physics at A-level?	
What are you most looking forward to about studying A-level Physics?	
What are you most apprehensive about studying A-level Physics?	
What areas physics of interest you the most?	

Please bring the completed background info sheet to your first lesson