

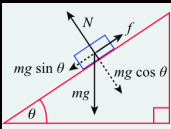



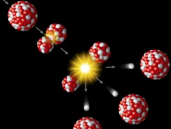






Physics at Hurtwood House

We cover the following topics in the A Level specification:

Topic 1: Particles and Radiation	Topic 2: Waves and Optics	Topic 3: Mechanics and Materials	Topic 4: Electricity	Topic 5: Further Mechanics & Thermal Physics	Topic 6: Fields	Topic 7: Nuclear Physics	Topic 8: Option topic
							
Matter, Quarks and Leptons, Quantum Phenomena	Progressive and Stationary, Polarisation, Refraction, Interference	Moments, Forces, Newton's Laws, Young's Modulus	Fundamentals, EMF & internal resistance, Potential Dividers	Circular motion, SHM, internal energy, gas laws	Gravitational, Electric, Capacitance, Magnetic, EM Induction	Radioactive decay, binding energy and mass deficit, fission & fusion	Astrophysics, Engineering Physics, Turning Points in Physics
	Practical Work: Comprehensive training in equipment and techniques, covering all required practical experiments and skills, including using lasers, radioactive sources and data logging equipment.						

Full details of the AQA A Level specification (7408) can be found [at this link.](#)

Listed below are some suggestions for activities that could broaden your horizons beyond what you may have studied so far, that would also be useful for studying A Level Physics.

Interesting things to watch (click the title for the link):

[The Planets.](#) Professor Brian Cox tells the extraordinary life story of our solar system. For four and a half billion years each of the planets has been on an incredible journey, filled with astonishing spectacle and great drama. Using the data from our very latest explorations of the solar system combined with groundbreaking CGI this series reveals the unimaginable beauty and grandeur of eight planets whose stories we are only just beginning to understand.

[From Ice to Fire: The Incredible Science of Temperature.](#) Everything around us - from the tiniest insect on Earth to the most distant stars of the cosmos - exists somewhere on a vast scale from cold to hot. In this series, physicist Dr Helen Czerski explores the extraordinary science of temperature. She unlocks the extremes of the temperature scale, from absolute zero to searing heat of stars - and reveals how temperature works, how deep its influence on our lives is, and why it's the hidden force that has shaped our planet and the entire universe.

[Royal Institution Christmas Lectures.](#) The Christmas Lectures (from the Royal Institution) have been inspiring children and adults alike since 1825. The Lectures were initiated by Michael Faraday at a time when organised education for young people was scarce. He presented 19 series himself, establishing an exciting new way of presenting science to young people.

[Mind-bending questions from physics.](#) A series of fascinating TED talks that seek to unravel some of the most fundamental, yet unexplainable parts of the cosmos. These talks include:

[Have we reached the end of physics?](#) - by Harry Cliff

[This telescope might show us the beginning of the universe](#) - by Wendy Freedman

[Is our universe the only universe?](#) - by Brian Greene

[How we explore unanswered questions in physics](#) - by James Beacham

[The search for planets beyond our solar system.](#) - by Sara Seager

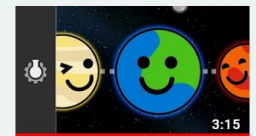
More excellent TED talks on [Physics](#), [Engineering](#) and [Product Design](#) can be found by clicking the links.

There are some wonderful YouTube channels that examine areas of Physics. Here are some of the best videos from these channels:



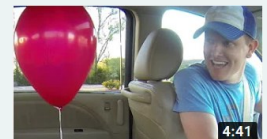
[Immovable Object vs. Unstoppable Force—Which Wins?](#) This outstanding video from Henry at [MinutePhysics](#) contains some excellent Physics and is thoroughly entertaining at the same time. See also [Is it Better to Walk or Run in the Rain?](#) and [Why is the Solar System Flat?](#) for other great examples.

[Which Planet is the Closest?](#) by [CGP Grey](#). This channel produces videos on a wide range of topics, all of which serve to make you think in new and more interesting ways. It's worth watching the follow up [Re: Which Planet is the Closest?](#) too.



[The Best Test of General Relativity \(by 2 Misplaced Satellites\)](#) and [Parallel Worlds Probably Exist. Here's Why](#) by [Veritasium](#). With more detailed and advanced Physics included, these videos give an insight into some of the topics A Level Physics students will start to grapple with over their two year course.

[A Baffling Balloon Behaviour](#) and [Mind-Blowing Magic Magnets](#) from [Smarter Every Day](#). Some of the videos on this channel look at slow-motion work to examine details you might not ordinarily be able to see, such as [Holding an Explosion at 20,000 fps](#) or [Handheld Tesla Coil Gun at 28,000fps](#).



[Stacked Ball Drop](#) and [Crazy Pool Vortex](#) from [Physics Girl](#). Some of these videos deal directly with topics studied at GCSE and A Level Physics, whereas others cover interesting Physics that goes beyond A Level. [Ballistic Ping Pong Ball vs. Tennis Ball at 450km/h](#) also takes an interesting look at Physics relating to other areas.

Interesting things to listen to (click the title for the link):



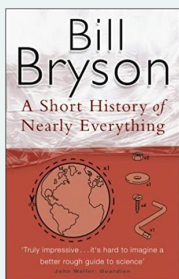
[13 Minutes to the Moon](#) by the BBC World Service. An amazing podcast presented by Kevin Fong, with theme music by Hurtwood alumnus Hans Zimmer, with season 1 using the 13 minute descent to the moon by Apollo 11 crew to look at the journey up to that point. Season 2, about Apollo 13, has started (Apr 2020).

[The Infinite Monkey Cage](#), presented by Brian Cox and Robin Ince. Described as a witty, irreverent look at the world through scientists' eyes, the podcast features special guests with expertise in various fields, and is a light-hearted, comedic way to learn some new science.

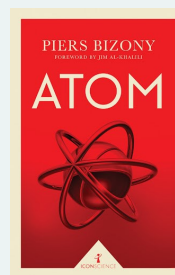


[The Life Scientific](#) is a slightly different science podcast. Professor Jim Al-Khalili talks to leading scientists about their life and work, finding out what inspires and motivates them and asking what their discoveries might do for us in the future. His interview with [Dame Jocelyn Bell Burnell](#) is a particular highlight.

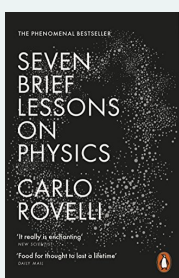
Interesting things to read:



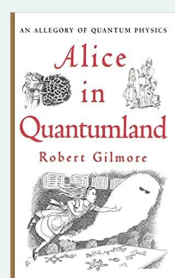
Bill Bryson's 'A Short History of Nearly Everything' covers an amazing array of science, and is described as Bryson's quest to find out everything that has happened from the Big Bang to the rise of civilisation - how we got from there, being nothing at all, to here, being us.



Piers Bizony's Atom is the history of our understanding of the atom, from 'young misfit' Ernest Rutherford onward through Niels Bohr and others into quantum theory, and then to the dawn of the atomic era. A fascinating book that brings the science and people behind it to life.



Carlo Rovelli's Seven Brief Lessons on Physics is an astounding book. Going into things in more detail than those listed previously, the chapters within will change the way you think. A quote: 'Here, on the edge of what we know, in contact with the ocean of the unknown, shines the mystery and the beauty of the world. And it's breathtaking.'

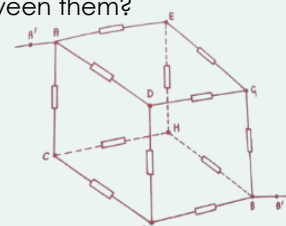


Robert Gilmore's 'Alice in Quantumland: An Allegory of Quantum Physics' takes Lewis Carroll's Alice through a television set on a series of unusual encounters. Illustrated by the author, the book covers wave functions, spin, the Pauli Exclusion Principle, Heisenberg's Uncertainty Principle and others, making the complex more accessible.

Magazines: [Physics World](#) is excellent, as is [New Scientist](#).

Online: [Science News for Students](#) is very good, as is [Inside Science](#) for shorter articles.

Some further tasks for you:

<p>The NASA Pi Day Challenge</p> <p>Although NASA's Pi Day Challenge has been and gone for this year, the problems (and solutions!) are still available to try. Some of these are reasonably straightforward, whereas some use more complex (A Level standard) material.</p> <p>Feel free to send me your solutions!</p>	<p>See the moon, planets and stars!</p> <p>If you're lucky enough to have access to a telescope, and a way to safely look at the night sky, Earthsky Tonight can give you an excellent idea of what you might be able to see. If you don't have access to a telescope, there is some excellent software, Stellarium, that will allow you to explore from your</p>	<p>Try a difficult problem</p> <p>Imagine a cube, along each edge of which is a resistor of resistance R. If you connected across any two opposite vertices (A' and B' below), what would be the total resistance between them?</p> 
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Please feel free to keep in touch – ask questions, or show me what you've been working on. I'm happy to provide assistance and support, or further interesting things to do!

Richard (Head of Physics)

richard.meanwell@hurtwood.net