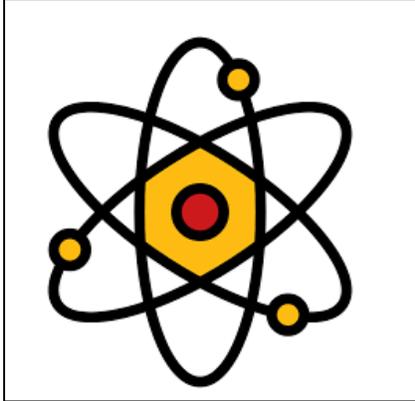




Sixth Form Preparation for Success

Welcome to Physics

AQA Physics 7408



Introduction: Physics is one of the most desirable subjects to study at A level. Only Maths is requested more by universities. If you study Physics, you are opening doors in the future. Physics can be difficult, but if you learn things as we complete them, you'll do well. Let's start by getting some foundations in place.

Part I – Y11 into 12 Physics Specific Bridging Work

Remember that prizes will be awarded for 'exceptional' work that demonstrates effort above expected !

a) Investigate places of interest – If you can't physically visit them, try a virtual tour

1. Science museums. You could visit your nearest science museum. They often have special exhibitions that may be of interest to you.

https://en.wikipedia.org/wiki/List_of_science_museums#United_Kingdom

2. You could also try contacting your nearest university to see if they are running any summer schools for physics and/ or astronomy – they are usually free and give you the opportunity to experience the resources of a University faculty.

3. The Spaceguard centre, part of a project tracking Near Earth Objects (NEOs).

<https://spaceguardcentre.com/>

4. Bletchley Park, home of the codebreakers. <https://www.bletchleypark.org.uk/>

5. Jodrell bank, home of the world famous Lovell telescope. <http://www.jodrellbank.net/>

6. The award-winning National Space Centre is an out of this world experience.

<https://spacecentre.co.uk/>

7. The UK Association for Science and Discovery Centres (ASDC)

This association brings together over 60 major science engagement organisations in the UK.

<http://sciencecentres.org.uk/centres/weblinks.php>

b) Wider reading: 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**
2. **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**
4. **A Short History of Nearly Everything**
5. **Thing Explainer: Complicated Stuff in Simple Words**
6. **Try "The Hitchhiker's guide to the Galaxy" you'll find out the answer to everything!**
7. **Also consider magazines such as "The New Scientist" which provide really useful background material.**
8. **The Physics "Review" is also well worth reading.**

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 (this is highly likely this year!) then 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** <https://www.youtube.com/user/minutephysics>
2. **Wonders of the Universe / Wonders of the Solar System** – available to buy on Netflix or through the BBC
3. **Shock and Awe, The Story of** <https://www.youtube.com/watch?v=Gtp51eZkwol>
4. **NASA TV** <http://www.nasa.gov/multimedia/nasatv/>
5. **The Fantastic Mr. Feynman** <https://www.youtube.com/watch?v=LyqleIXTpw>

c) Compulsory task

Below are 4 topics that you will study in more detail for A-Level Physics. You are to complete the task set for each of them.

Atomic Structure

You will study nuclear decay in more detail at A level covering the topics of radioactivity and particle physics. In order to explain what happens you need to have a good understanding of the model of the atom. You need to know what the atom is made up of, relative charges and masses and how sub atomic particles are arranged.

The following video explains how the current model was discovered

www.youtube.com/watch?v=wzALbzTdnc8

Task: Describe the model used for the structure of an atom including details of the individual particles that make up an atom and the relative charges and masses of these particles.

You may wish to include a diagram and explain how this model was discovered by Rutherford

Forces and Motion

At GCSE you studied forces and motion and at A level you will explore this topic in more detail so it is essential you have a good understanding of the content covered at GCSE. You will be expected to describe, explain and carry calculations concerning the motion of objects. The websites below cover Newton's laws of motion and have links to these in action.

<http://www.physicsclassroom.com/Physics-Tutorial/Newton-s-Laws>

<http://www.sciencechannel.com/games-and-interactives/newtons-laws-of-motion-interactive/>

Task: Sketch a velocity-time graph showing the journey of a skydiver after leaving the plane to reaching the ground.

Mark, on your graph, terminal velocity.

Electricity

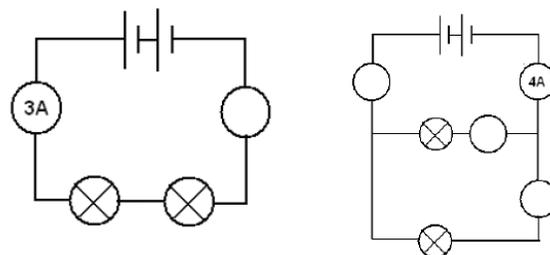
At A level you will learn more about how current and voltage behave in different circuits containing different components. You should be familiar with current and voltage rules in a series and parallel circuit as well as calculating the resistance of a device.

<http://www.allaboutcircuits.com/textbook/direct-current/chpt-1/electric-circuits/>

<http://www.physicsclassroom.com/class/circuits>

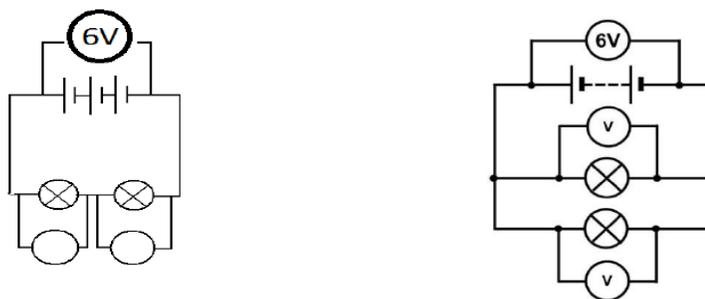
Task:

1a) Add the missing ammeter readings on the circuits shown.



b) Explain why the second circuit has more current flowing than the first.

2) Add the missing potential differences to the following circuits



Waves

You have studied different types of waves and used the wave equation to calculate speed, frequency and wavelength. You will also have studied reflection and refraction. Use the following links to review this topic.

<http://www.bbc.co.uk/education/clips/zb7gkqt>

<https://www.khanacademy.org/science/physics/mechanical-waves-and-sound/mechanical-waves/v/introduction-to-waves>

<https://www.khanacademy.org/science/physics/mechanical-waves-and-sound/mechanical-waves/v/introduction-to-waves>

Task:

1) Draw a diagram showing the refraction of a wave through a rectangular glass block. Explain why the ray of light takes this path.

2) Describe the difference between longitudinal and transverse waves and give an example of each

3) Draw a wave and label the wavelength and amplitude

d) Stretch!

Applications in real life:

Use your online searching abilities to see if you can find out as much about the topic as you can. Start by having a look at Cornell notes. Many students find this very useful.

<http://coe.jmu.edu/learningtoolbox/cornellnotes.html>

You can make a 1-page summary for each one you research (use the Cornell notetaking skills that you developed in the separate 'Skills based bridging work' section):

a) <http://home.cern/about>

CERN encompasses the Large Hadron Collider (LHC) and is the largest collaborative science experiment ever undertaken. Find out about it here and make a page of suitable notes on the accelerator.

b) http://joshworth.com/dev/pixelspace/pixelspace_solarsystem.html

The solar system is massive and its scale is hard to comprehend. Have a look at this award winning website and make a page of suitable notes.

c) <https://phet.colorado.edu/en/simulations/category/html>

PhET create online Physics simulations when you can complete some simple experiments online. Open up the resistance of a wire html5 simulation. Conduct a simple experiment and make a one page summary of the experiment and your findings

d) <http://climate.nasa.gov/>

NASA's Jet Propulsion Laboratory has lots of information on Climate Change and Engineering Solutions to combat it. Have a look and make notes on an article of your choice.

e) <http://www.livescience.com/46558-laws-of-motion.html>

Newton's Laws of Motion are fundamental laws for the motion of all the object we can see around us. Use this website and the suggested further reading links on the webpage to make your own 1 page of notes on the topics.

Part II - Year 12 Head Start! for completion June – September

The link below will take you to a copy of the syllabus for the Physics A level course.

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

The units covered in the first term are:-

3.1 Measurements and their errors.

3.2 Particles and radiation.

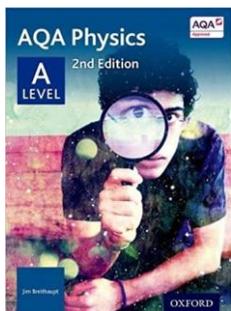
3.3 Mechanics and materials.

“Measurements and their errors” has lots of skills that crop up over and over again during the course. The skills learned in this section are therefore vital, so **make this section a priority**. Once you are happy and confident with it, move onto section 3.2 and 3.3

CGP have kindly provided a free version of their publication “Head start to A level Physics” this is a great resource for you to read through during the Summer. The book is intended to bridge the gap between GCSE and A level Physics. Occasionally, CGP make hard copies of these books available free (do an internet search). However, at the time of writing, free hard copies were not available, but a kindle version can be downloaded from:-

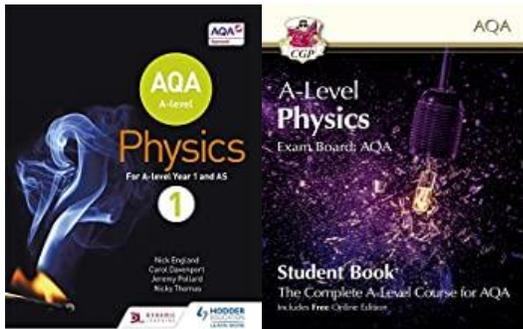
https://www.amazon.co.uk/dp/B00VE2NII4/ref=cm_sw_r_oth_api_i_Dw4FEbBBRGTEV

The textbook used in class is Oxford Physics A level for AQA. It can be bought for Year 1 only, Year 2 only or the combined (Year 1&2) version shown above. This usually retails at £40, but you may be able to pick up bargains by searching on Amazon or EBAY. School has a small supply, which we can sell or rent out. Owning your own textbook is not essential.



If you have access to a textbook, we suggest that you start with Section 5- Skills in AS Physics. Work through each double page spread making notes under each heading. There are useful questions on pages 259, 261, 264, 266. I would suggest you spend the greatest amount of time studying the Graphs section.

All other A level Physics textbooks have similar sections, it really doesn't matter too much which one you use. The following are both recommended.



If you can, read the “Physics review” (a magazine written specifically for A level students), or magazines like “The new scientist”. These provide lots of useful background reading often used as backgrounds for A level questions in future years.

Whatever you do, please don't waste your time over the summer, doing a little work now will bring great rewards in years to come. We wish you all the very best for the Summer and look forward to meeting you all, suitably refreshed, in September.