King Edward VII School Physics Department

A Level Physics Transition material

Helping you prepare to study A Level Physics

Introduction

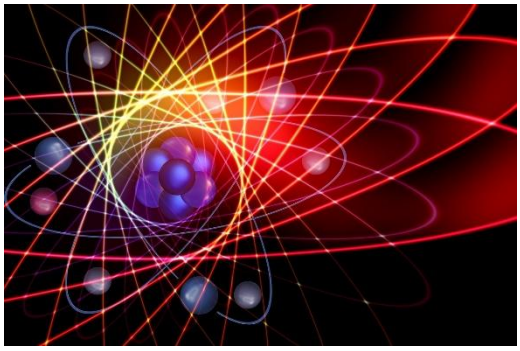
This is an exciting time! Physics is one of the most interesting A-levels, and you're about to embark on a fascinating journey of discovery.

You might not be completely sure which A-levels you want to study at this point, and that's ok. It's a big decision, and it's worth taking time to make the right choices for you. Start by reading the next section – it's called "Why study A-level Physics?". It also has some useful suggestions about how to pick a good combination of subjects. Think of the next few weeks as an opportunity – an opportunity to learn whatever you want to learn, and to study in whatever style suits you.

Everything that you learn in the coming weeks and months will make the transition to A-levels easier. It might even help you decide what you want to do with your life beyond A levels! This pack is full of ideas and suggestions, and we encourage you to follow whichever ones appeal most. There are some web links - it really is worth following them!

A good routine is essential to preparing well for your A-levels. It's much better to do a few hours of study and exploration each week and to keep going until July, than to work so hard in the next few days that you burn yourself out! It doesn't have to all be serious GCSE-style work: mix in some inspiring videos, fun quizzes and fascinating podcasts, and you'll find the time flies by!

TOP TIP: if you ever you start to feel frustrated or bored with any of your Physics preparation, stop & swap! Swap to a different topic or different book or website – perhaps do a home experiment or watch your favourite Physics YouTube channel to re-energise yourself. The most effective way to learn sustainably over the holidays is to enjoy it! If you think that the bit you were struggling with was really important start a list of things to ask for help with in September.



At King Edward VII School, we study the Edexcel A Level Physics course.

Best of luck, and take care this summer!

KES Physics team

Why study A-level Physics?

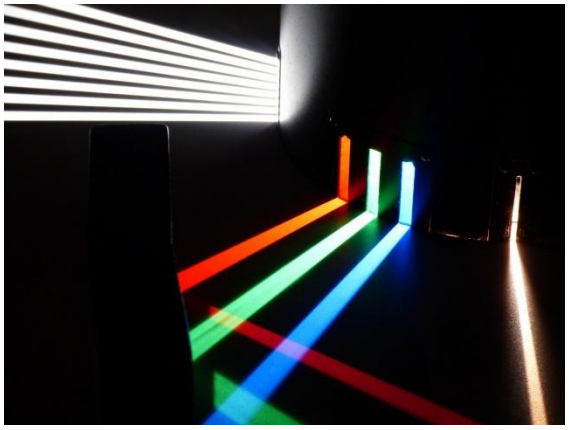
Physics is THE most fascinating subject to study at A-level! It's also well recognized for developing useful skills for a wide range of careers such as problem-solving, analysis and communication. You'll be taught in a small class with lots of individual help available, and your teachers are very experienced.

Start by reading this guide to A-level Physics from the Institute of Physics: https://www.iop.org/careers-physics/your-future-with-physics/a-levels-highers-leaving-cert. 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 particle physics, quantum physics and astrophysics.
- There's more time for everything – 4-5 hours per week. It means there's time to learn about fascinating real-world applications, extra practice of anything tricky, and better practical work!

- Better practical work – A-level practical work is 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 practical work 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.



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 (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 should you focus on this summer?

If you want to do really well in A-level Physics next year and beyond, we suggest you set these three goals for your summer studying.

1) **Explore the Physics that interests you!**
   This is the really fun part, and it is just as important as the other two goals! A-levels require a lot more independent study than GCSEs, so motivation matters. Physics is so interlinked that no matter what you choose to investigate, you will be learning something relevant to at least one A-level Physics topic, and it'll help you enjoy those topics even more next year. These explorations can also be pivotal in discovering what you want to do with your life after A-levels! Finally, the research you do now will be invaluable if you apply to University. University applicants have to write a UCAS "personal statement" with evidence of their commitment to learning and passion for the subject. One of the best ways to show this is to learn about something outside of lessons, and now is the perfect time to do that!
2) **Maintain & develop your GCSE Physics knowledge**
   Physics A-level has a reputation for being tricky, but it's a lot easier if you have all the facts you learned at GCSE at your fingertips! It'll help so much next year if you've already found and fixed any gaps in your GCSE knowledge. It will also give you a great deal of satisfaction to complete a refresher of the whole GCSE – commitment is key.
3) **Maintain & develop your Maths skills**
   Did you know that students lose 2.6 months' worth of maths skills over the summer holidays, on average? And this year the summer holiday is especially long! All you need to do to maintain your skills is to practise them. An hour a week will make a world of difference. It really works! And maths can be really meditative once you get into the zone – like a good Sudoku puzzle.
4) **Transition work**
   Set up an account on isaacscience.org the transition work using code QQ8PM6 or accessed from https://isaacscience.org/account?authToken=LJ3UYP and have a go at other problems on there!

1) Explore the Physics that interests you & build evidence for applications

What really fascinates you? Is it the future of the Universe, the northern lights, quantum physics, superconductors or something else? Or maybe you're most interested in the way Physics is applied in healthcare, architecture, engineering, modern technology or to save our planet from climate change? This section is where you get full freedom to follow your own curiosities – relax, take your time and enjoy it!

Not sure what your interests are?

Not a problem! To get started, we recommend you look up citizen science projects, online courses and books, and watch a few documentaries, YouTube channels, podcasts etc. You'll soon find something that captures your imagination!

Can't choose which interesting topic to research?

That's ok! In fact it's better to investigate several topics as that'll give you a broader sense of what Physics is about. You'll probably find that some of your investigations finish when your curiosity is satisfied, and others lead you deeper

What topic(s) would be most helpful for A-level Physics?

We encourage you to branch out – A-level Physics is so broad that any topic you choose will be helpful! However, if you're really keen to keep your explorations close to the A-level specification, we suggest you find out more about Particle Physics, which is fascinating, and often in the news. Key terms to look into might include: antimatter, neutrinos, leptons, quarks, hadrons, baryons, exchange particles and the standard model. Another very interesting year 12 topic is Quantum Physics, especially wave-particle duality.

What evidence should I gather for University applications?

Universities will be particularly impressed with activities that have a slightly higher time commitment: the citizen science projects, online courses, and books, for example. They'll also be impressed if you've explored one topic or idea enough to be able to write or talk about it.

Online courses (MOOCs)

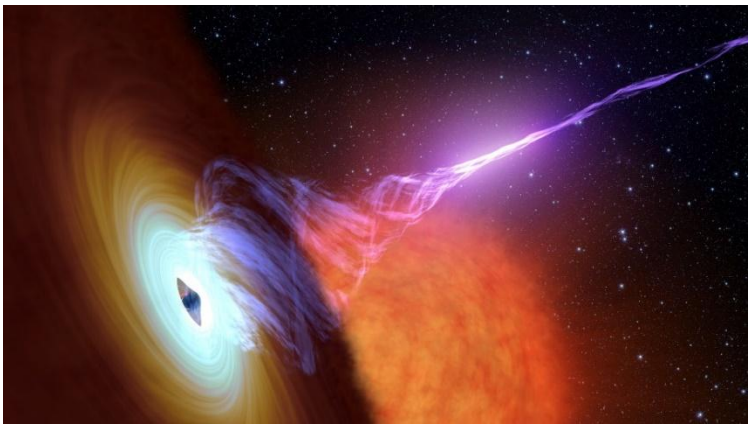
MOOCs are short, free online courses run by Universities. You can study almost anything, and they're aimed at the general public, not geniuses!

They often involve some videos, reading, web chats and interactives, and you can often get a certificate at the end.

If you want to study something relevant to your course, we recommend Particle Physics or Quantum Physics – both are very new and exciting! But feel free to try anything else that appeals to you.

2) Maintain & develop your GCSE Physics knowledge

Have a look at these resources and choose ONE or TWO that suit you best. They are alternative options – you don't have to do them all! Keep it manageable - if it's taking too long or you're losing motivation, try a different resource, take a break with an easier topic, or reduce the weekly amount.



- CGP Headstart to Physics book (We suggest 4 pages per week for 10 weeks (finish mid-July!)
- Seneca online https://senecalearning.com/ – Choose GCSE Physics. We suggest 8-10 mini sections per week to cover the whole course by July OR focus only on your weaker topics.
- GCSE Physics online – videos, worksheets & review sessions on GCSE topics, plus A-level preparation tasks https://www.gcsephysicsonline.com/
- BBC Bitesize interactive tests – https://www.bbc.co.uk/bitesize/examspecs/zsc9rdm (click on a topic, and then the "Test" Section for example: https://www.bbc.co.uk/bitesize/guides/z8hsrwx/test) We suggest 1-2 tests per week on your weaker topics, OR to cover it all, 3 tests per week for 12 weeks.
- Prepare for the Challenge of A Level Physics book (free with a free trial of Amazon Unlimited, or £2.49 kindle edition which can be read on any phone, laptop or ipad)
- OR make use of GCSE resources that you already use and like!

3) Maintain & develop your Maths skills

As with the Physics knowledge, don't try to do all of this – just choose ONE favourite book or website and run with that, referring to the others only if you need extra practice with a skill. Skip anything that's so easy it's boring, and don't worry about anything so hard you're struggling – there's no benefit from either. Whatever your level of maths in September we will help you build on it… it'll just be a lot easier if you've maintained your current skills through practice!

- *Edexcel A-level Transition Pack* – The exam board has pulled together a set of recommended Maths Activities for the summer: https://qualifications.pearson.com/content/dam/pdf/A%20Level/Physics/2015/teaching-and-learning-materials/AS_and_A_level_Physics_Maths_Student_Guide.pdf (see page 9 onwards).
- *Isaac Physics* – We'll use this quite often next year. For the summer, you could:
    - Join their mentoring scheme https://isaacscience.org/pages/isaac_mentor.
    - Pick a topic https://isaacscience.org/pages/gcse_quizzes or https://isaacscience.org/books/pre_uni_maths (choose level 1) or https://isaacscience.org/books/physics_skills_19 (choose section A)
- *Equation list* – You don't need to memorise many equations for A-level Physics, so feel free to use a list of equations for calculations. https://tinyurl.com/y8kdxfw5
- *Essential Maths Skills for A-Level Physics books* – Both books have information and practice questions. Skip logarithms and exponentials – we don't need them until year 13.

4) **Transition work**

5) Set up an account on isaacscience.org/, complete the transition work using code LJ3UYP or accessed from https://isaacscience.org/account?authToken=LJ3UYP and have a go at other problems on there!