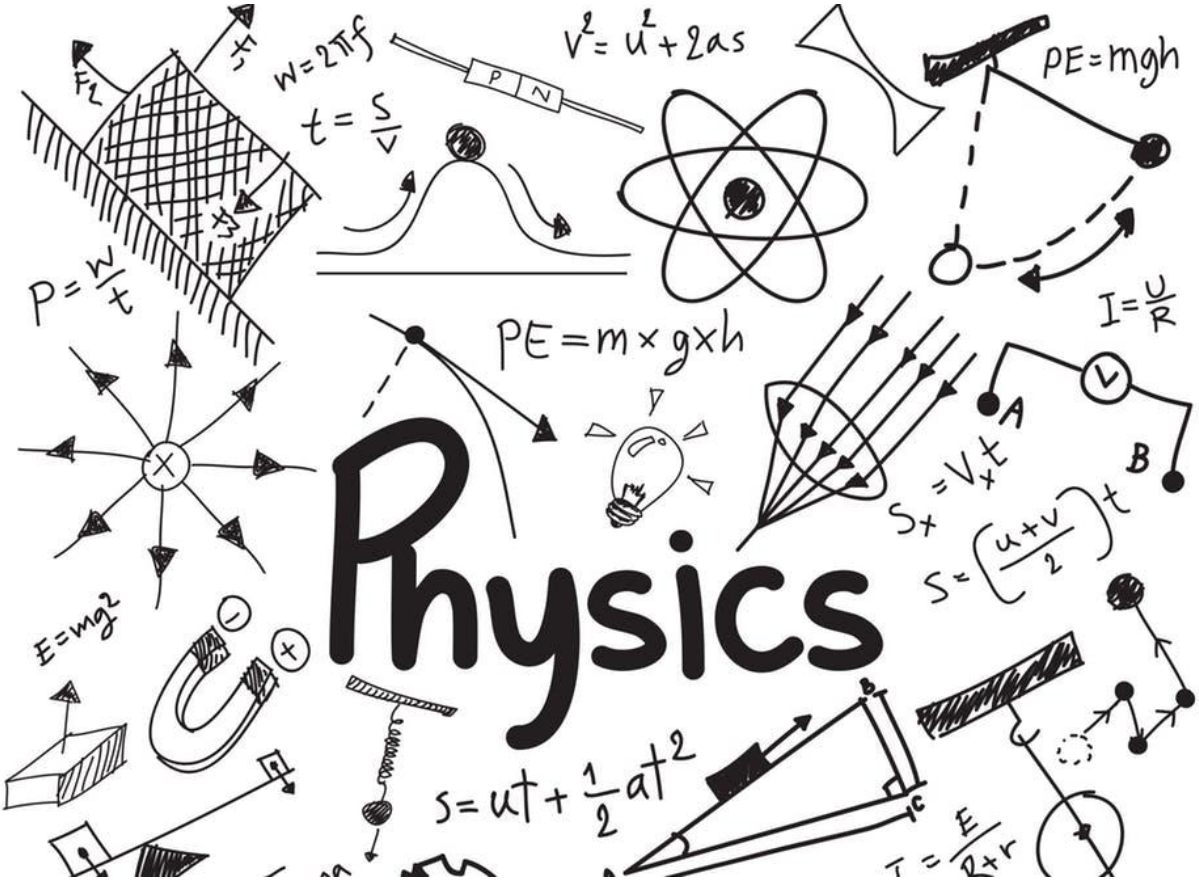
THE NATIONAL MATHEMATICS AND SCIENCE COLLEGE

PHYSICS DEPARTMENT

Summer Preparation Work for PreA Physics



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Introduction

Congratulations on choosing to join us at NatMatSci! We're looking forward to meeting you in September. As part of your PreA course you'll study Physics. We'll learn about Forces, Kinematics, Light, Stars, The Universe and more.

Students come to us from a wide variety of countries, education systems and with a range of past experiences. You might feel very well prepared for your physics course, or you might be concerned because you haven't studied this subject much in the past. Either way, we want to help you to succeed. This booklet has been created to explain some of the skills which are useful from the beginning of our course, to allow you to prepare and practise.

Expectations

- Spend time over the summer studying the materials this document describes. Try to spend equal time **learning** and **practising**. Learning a topic will take a different amount of time for every student, so we will not list an exact amount of time here. However, we strongly suggest that you do a little bit of work **regularly**, rather than sitting down for many hours at once.

- There is no definite list of things you need to know before you join us. Each student will come with a different level of English and a different amount of previous education in Physics, so we do set definite lists of topics to learn. **Explore the areas that interest you**!

- Learning should be enjoyable. Hopefully you'll have fun following some of the internet links in this document.

Recommended Study Resources

Our PreA course is designed to be accessible and interesting for all students, regardless of whether or not you have studied much Physics in the past. However, many students find that if they spend time over the summer revising or studying important concepts, they perform better after joining us.

BBC Bitesize Physics

This is a revision / learning website designed for UK examinations. This page:

https://www.bbc.co.uk/bitesize/examspecs/zqpshv4

takes you to a menu. From here you can select 37 topics within physics to learn about. Each one contains an explanation of the important ideas in that topic, often with images and videos. There are also short tests and longer practice questions which you can use to check your understanding. It's possible to spend many many hours on this website.

Physics and Maths Tutor

This is another revision website designed for UK examinations. This page:

https://www.physicsandmathstutor.com/physics-revision/gcse-aqa/

takes you to a menu with different topics in physics listed. From here you can follow links to reach pages like this:

https://www.physicsandmathstutor.com/physics-revision/gcse-aqa/energy/

which contains **definitions** of key terms, **mind maps**, **summary notes**, and lots of **practice questions** with answers.

There is a huge amount on this site – **you are not expected to work through a whole physics course by yourself!** However if there are topics which you would like to review, or read about for the first time, then this is a very good place to start.

Video Notes

Many students find reading large amounts of text at home difficult. You might find that you learn more effectively using videos, and making Cornell notes to help you to understand and remember.

Youtube – Cognito

This YouTube channel has a series of 88 videos explaining important concepts in physics. You can find the playlist here:

https://tinyurl.com/y8yvjej4

The presenter speaks quite slowly and clearly, and there are subtitles available to make the videos accessible to students who are still developing their English.

More Online Resources

There's an almost infinite amount of information on the internet, but it's not always easy to find. These websites will take you to many hours of interesting physics. Explore and enjoy!

- You could spend your whole life watching physics video clips on YouTube. No need, however, as the **minutephysics** channel is all you'll ever really need – and all clips are only a minute long. They're great! **http://www.youtube.com/user/minutephysics**

- TED Talks are short lectures given by experts on a large number of subjects. There are a huge number of them, and you can search by topic. **https://tinyurl.com/y7yh7o26**

- xkcd is a webcomic which often features content relevant to physics. The author also writes 'What if?' articles, using his knowledge of physics to answer silly questions. **www.xkcd.com**

- Science United is a website which allows users to join their computers to a large group, which uses their processors to help solve scientific problems. Read some of the current research being done to see some modern applications of physics. **https://scienceunited.org**

- If you're interested in Astronomy, then this is another area where you can do some real research from your home computer, before even getting to NatMatSci. Asteroid Watch allows you to search for Near Earth Objects (i.e. asteroids) in observations that have been made, and report back their positions. **https://www.schoolsobservatory.org/discover/projects**

- Galaxy Zoo – to understand how galaxies, and our own, formed we need your help to classify them according to their shapes — a task at which your brain is better than even the most advanced computer. If you're quick, you may even be the first person in history to see each of the galaxies you're asked to classify. **http://www.galaxyzoo.org/**

- Zooniverse – many other projects similar to galaxy zoo: solar stormwatch, planet hunters, the Milky Way project. **https://www.zooniverse.org/**

- PhET interactive simulations. Fun, interactive, research-based simulations of physical phenomena from the PhET project at the University of Colorado. This site will be used again and again during your A-level course. **http://phet.colorado.edu/**

Film / Movie recommendations.

Perhaps you have some time to watch a film over the break?

Consider some of these for good physics content.. Moon (2009); Gravity (2013); Interstellar (2014); The Imitation Game (2015); The Prestige (2006)

Also consider some of these, for **terrible** physics content…The Core (2013); 2012 (2009); Armageddon (1998); Independence Day (1996); Anything by Star Trek; Anything by Star Wars; Anything with The Avengers. Don't misunderstand me – these are fun films, but I wouldn't try to learn any physics from them. Maybe you could think about errors in them whilst you eat your popcorn?

Conclusion

We hope that you find resources here which excite you, and that you enjoy spending some of your summer exploring physics. We look forward to meeting you in September and introducing you to many more ideas!