



# Summer School

Physics



## Summer activities – Physics

Physics is the study of how the universe works—it explains everything from the behaviour of subatomic particles to the trajectories of galaxies as they move through the expanding universe. At Prior Pursglove we follow the OCR A specification, which is highly respected by universities and will give you an excellent grounding in the foundations of physics. Physics is assessed entirely by examination at the end of the second year, and there is a separate component to the course, known as the practical endorsement, which is awarded separately and is based on skills demonstrated throughout your two years of A level study.

A typical physics class involves direct teacher instruction on theory as well as plenty of time for students to work individually or in groups on physics problems; within a given week, usually at least one lesson is given over to practical experiments, and we have an excellent set of laboratory resources for students to use in practical sessions.

Physics relies heavily on maths—40% of the qualification is based on mathematical calculations—so students must arrive in physics ready to rearrange equations and apply trigonometric functions.

### What makes a good Physics student?

The best physics students are persistent and determined to succeed. A level physics is a huge step up from GCSE and many students find it quite daunting initially; those who see mistakes as a chance to improve, who continue to work hard in the face of setbacks, are often the most successful. Some of the best tactics from previous students include:

- 1) **Forensically analysing their performance on past paper questions to find the gaps in their own knowledge.** One recent student who got an A\* would routinely say, “I can see that the mark scheme shows to do the problem this way, and I see what they’ve done now – but *why* did they do it that way?”
- 2) **Taking the initiative to do extra work.** Students who take the time to do extra past papers or make revision cards will always outperform their peers who do the bare minimum. This is especially critical at college, where you have a lot of free time; the better use you make of your free time, the better you will do.
- 3) **Paying attention to detail and taking a logical approach.** The heavy emphasis on mathematics rewards students who lay out their calculations in a methodical and easy-to-follow format, showing all their working out to earn method marks even if they make a mistake along the way. If you rush, take shortcuts and do the working out in your head or on your calculator, writing down only your final answer, you are likely to drop a lot of marks due to silly mistakes.
- 4) **Putting in the time.** As is true for all A levels, the more time you spend on the subject, the better you will do. The specification we use (OCR A) expects students to have an understanding of certain fundamentals—for example, the definitions of units such as the joule or the volt, or the relationship between forces on a body falling through air. These can be memorised, which rewards students who work hard. Many A level physics students are used to relying on their innate intelligence rather than hard graft, and it is difficult to satisfy the requirements of the examination when students rely on their own words rather than committing to learning the key words and phrases that accurately describe the physics. The best students at A level physics accept that they will now need to really study!
- 5) **Having an interest and enthusiasm for the subject.** Like all things in life, it’s a lot easier to put time into something you enjoy. Students who like reading around the subject, paying attention to current news articles or reading popular non-fiction about physics, will find that they have more interest in the subject and can contextualise their learning.

## Additional reading

### Books:

*A Brief History of Nearly Everything* – Bill Bryson

*Surely You're Joking, Mr Feynman* – Richard Feynman

*The Quantum Story* – Jim Baggott

Anything by Brian Greene – *The Fabric of the Cosmos*, *The Elegant Universe*

*Cosmos* – Carl Sagan

*Beyond Weird* – Philip Ball

*The World According to Physics* – Jim Al-Khalili

### YouTube channels:

Crash Course Physics:

[https://www.youtube.com/watch?v=OoO5d5P0Jn4&list=PL8dPuuaLjXtN0ge7yDk\\_UA0ldZJdhwkoV](https://www.youtube.com/watch?v=OoO5d5P0Jn4&list=PL8dPuuaLjXtN0ge7yDk_UA0ldZJdhwkoV)

Lectures by Walter Lewin: <https://www.youtube.com/channel/UCiEHVhv0SBMpP75JbzJShqw>

NPS Physics: [https://www.youtube.com/channel/UCBFM9\\_vlxMCmOdUt22CZbAQ](https://www.youtube.com/channel/UCBFM9_vlxMCmOdUt22CZbAQ)

Practice some physics problems online at Isaac Physics: <https://isaacphysics.org/>

### Current research news:

<https://phys.org/physics-news/>

<https://physicsworld.com/>

## Content

### Suggested tasks:

- 1) News diary: keep a diary of news topics related to physics. You may need to check some science-specific websites, or follow some accounts on social media that focus on sharing science/physics content.
- 2) Choose one of the YouTube channels above and watch some of the videos. Make notes of anything interesting and new you learn.
- 3) Google how to determine the speed of light using your microwave and a tray of chocolate or cheese. This is an easy experiment you can carry out at home!
- 4) Read one of the books suggested above. Make notes of anything new and interesting you learn.
- 5) Trigonometry is essential for physics. Create a “Trigonometry for Dummies” guide explaining when and how to use the trigonometric functions to determine sides of a triangle or to find angles when the sides of a triangle are known.