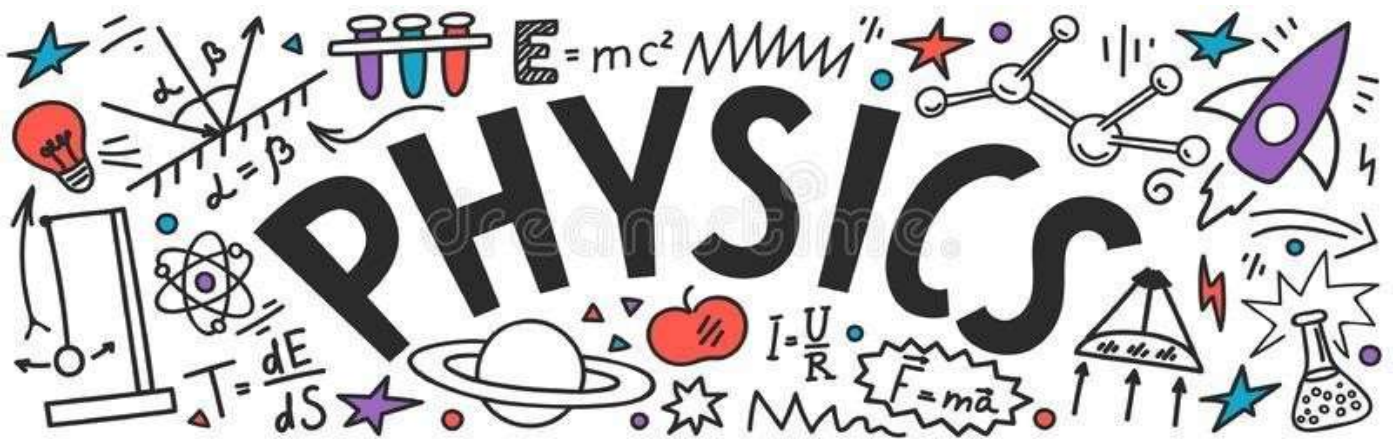


A-Level Physics Bridging Work

Introduction to Physics
A-Level at
Carshalton High School for Girls



Name _____

Introduction to the A-level Physics Bridging Work

If you are considering studying Physics at A-level, we think you're making a great choice. We firmly believe that **Physics** is one of the most fascinating and rewarding fields of study and would encourage you to seriously consider how it may benefit you. Within this booklet you'll find some information on the pathways and careers that a Physics A-level could lead to, details of the course studied at Carshalton High School for Girls and our entry criteria.

We have also compiled a set of resources in the bridging pack that will help you prepare for the transition from GCSE Physics to Physics at A-level. Some of these resources are included in this booklet and others are listed in the "Other documents" section. There are also some tasks that you need to complete before you join in September.

All our new A-level students should read through this booklet to familiarise themselves with the course structure and method of assessment, and, as background research and reading is vital in becoming a successful A-level student, we have included some reading and research for to carry out. The final section of the booklet details of the work that we want you to complete and bring with you to your first A-level Physics lesson. As Maths is such an important part of Physics A-level, this includes a Maths Practice and Science skills workbook.

We very much look forward to welcoming you in September.

Team Physics

Contents of this booklet:

1. Other documents in the transition pack
2. Careers with Physics: Where can A-level Physics take you?
3. What is Physics like at A-level?
4. AQA A-level Physics: course structure and assessment
5. AQA A-level Physics at Carshalton High School for Girls: course organisation and assessment
6. Reading list and movies to watch
7. Summary of Physics A-level preparation tasks

1. Other documents in the Transition Pack

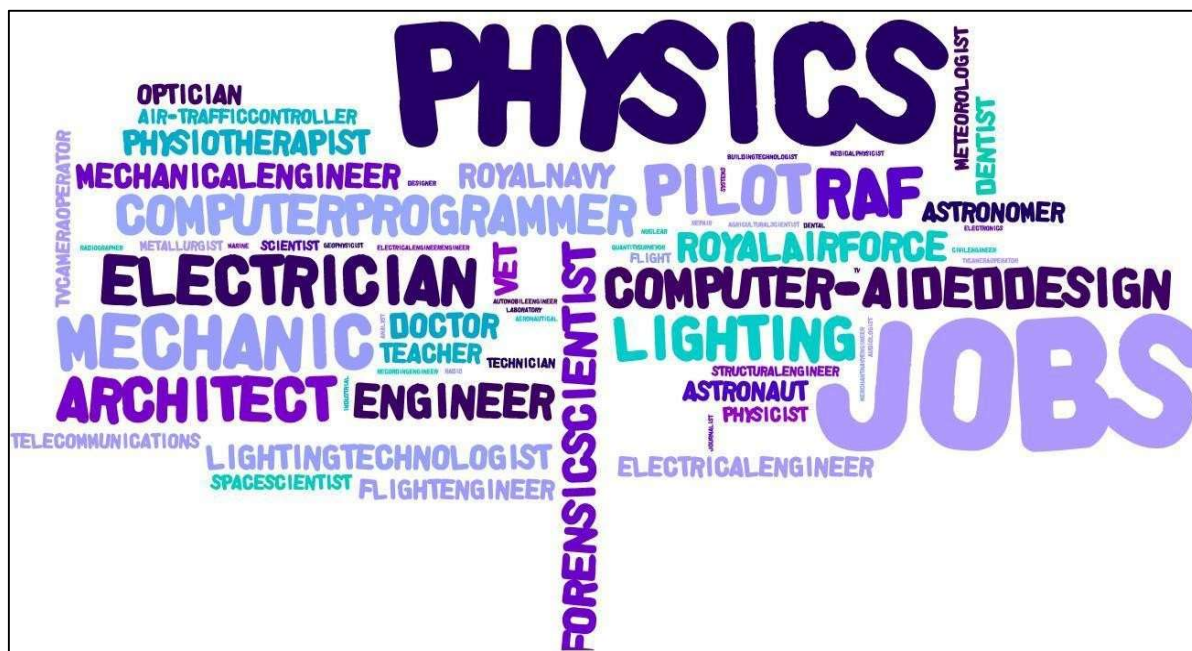
There are a number of other documents that have been provided as part of this A-level Physics Transition pack. You will find them on the school website where you found this booklet. Some of the documents provide useful background information on the A-level Physics course and careers, whilst others include information and tasks for you to complete (see Section 7 for details).

The documents included are as follows:

1. AQA A-level Physics Specification
2. Skills for Transition to Physics A-level

2. Careers with Physics

There are many occupations where Physics A-level is considered to be very useful if not essential. Possible career paths directly linked to Physics include any of the fields of Engineering, as well as Medicine, Forensic Science, Education, Astronomy, Cosmology, Electronics, Power generation, Armed forces and defence, Meteorology, Nanotechnology, Renewable Energy, Scientific Research, Telecommunications and Space exploration industries.



For those not wishing to follow a career path directly related to Physics, choosing to study Physics at A-Level is still an excellent choice. Physics is a highly respected A-level that will enhance your career prospects; many of the skills gained whilst studying it are transferrable to other disciplines and highly sought-after by employers. For example, by achieving a good grade in A-level Physics you will demonstrate to employers that you have analytical and mathematical skills that you can apply to real life situations.

“Physics and the problem solving skills it develops is useful in many different job families including agriculture, plans and land, environmental sciences, construction, engineering and manufacturing, medicine and nursing, medical technology, and science and research.”

UCAS website; May 2020

<https://www.ucas.com/job-subjects/physics>

The benefits of studying Physics at A-level therefore include: enabling you to pursue interesting and fulfilling Physics-related career paths and teaching you skills that enhance your employment prospects in any profession, in addition to learning stimulating subject material. In addition, research on earnings has shown that studying subjects such as Physics significantly increases your earnings, particularly if you are female.

MATHS AND PHYSICS SKILLS BOOST YOUR EARNINGS

STEM graduates can earn **£250,000** more than average across their careers

That's the equivalent of five porsches....



or ten year-long round the world trips...

or an average house price in the UK, with no mortgage!



Female STEM graduates can earn up to **33%** more than their peers

Having just **ONE** STEM A Level boosts your earnings by **15%**



MATHS AND PHYSICS DON'T JUST LEAD TO LAB WORK



Maths and Physics can lead to a **wide range of careers**, from entertainment to space exploration to fashion!

Help solve the world's **biggest problems** from healthcare to climate change



58% of all new jobs will be STEM related

72% of all UK businesses rely on people with STEM skills



With Maths and Physics skills you're **employable all over the world**

3. What is Physics like at A-level?

A-level Physics requires you to both use your imagination to think about abstract concepts such as fields, and to work logically and methodically to apply theories related to these concepts to explain real-life situations, such as how an electric motor works. Calculations are an important part of A-level Physics and you'll use your Mathematical abilities to both quantify values and to explain observations. Practical work is a key element of A-level Physics and will not be limited to just the Required Practicals. You'll spend time learning how to use laboratory to achieve accurate results and through descriptive work you will develop your ability to communicate clearly on paper

4. AQA A-Level Physics:

At Carshalton High School for Girls we study the A-level Physics course from the AQA exam board. You can find detail of the course, including what you will be taught and what you need to know as well as how you will be assessed in the Subject Specification published by the exam board and included in this Transition Pack. This information is also summarised briefly below:

[AQA | Physics | A-Level | A-level Physics](#)

Course Content

The course content set by AQA covers the following core topics:

Year 12: Particles and Quantum Phenomena, Waves and Optics, Forces, Newton's Laws of Motion, Momentum, Work, Energy and Materials, and Electricity and DC Circuits;
and

Year 13: Circular Motion, Simple Harmonic Motion, Thermal Physics and Gases, Gravitational Fields, Electric Fields, Capacitors, Magnetic Fields and Electromagnetic Induction, Radioactivity and Nuclear Energy.

In addition to this, there is also an Options Module, which is studied towards the end of the course in Year 13. We are likely to be studying the Astrophysics module; students find makes a really enjoyable contrast to the other topics studied.

Required Practical Work

All A-Level Science courses include an element of required practical work in a similar way to GCSE Sciences; however, at A-level, students carry out all the practical work for themselves. This gives students the opportunity to learn some of the practical and analytical skills that could be useful to employers and are essential when studying Science-related disciplines. There are twelve Required Practicals for Physics split evenly between Year 1 and Year 2 of the course and you will work to develop their competency in five areas (not necessarily all at once) so that by the end of the course you will have achieved a "Practical Skills

Endorsement" in addition to your A-level Physics grade.

Assessment

The whole of the A level Physics course is examined at the end of the full course in three exams. There are three 2-hour long theory papers and a practical skills assessment. Although there is no coursework element to the course, the Required Practical work and the practical skills developed form part of Paper 3. Your grade is determined by how well you do on the theory papers. Your result in the required practical skills is noted as an endorsement alongside your A-level grade. The papers are:

Paper 1 (85 marks; 34% of grade) covers the Year 12 topics (Sections 1 to 5 of the specification) and 6.1 (Periodic motion). 60 marks of short and long answer questions and 25 multiple choice questions on content.

Paper 2 (85 marks; 34% of grade) covers the Year 13 topics (Sections 6.2 (Thermal Physics), 7 and 8 of the Specification and assumes knowledge from sections 1 to 6.1). 60 marks of short and long answer questions and 25 multiple choice questions on content.

Paper 3 (80 marks; 32% of grade) is in two parts

Section A is a section on practical skills and data analysis that includes 45 marks of short and long answer questions on practical experiments and data analysis

Section B is a section covering the option topic taught and includes 35 marks of short and long answer questions.

5 A-Level Physics at Carshalton High School for Girls

Course Organisation

You will have two teachers for Physics A-level at Carshalton High School for Girls. You will have 9 hours of lesson time per fortnight and each teacher will teach separate topics. Homework tasks will be set by the teacher and you will also need to carry out some independent learning at home. In fact, students that do best are the ones that read ahead to find out what is coming next and better prepare themselves. Regular low stake quizzing enables you to check your understanding and there are longer assessments every half- term to check progress. For students that feel that they need assistance or want to push themselves further, a weekly drop-in Session will be held after school on a day to be confirmed. In the past our A* students have found this drop-in session incredibly valuable to their progress.

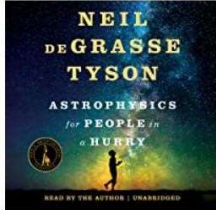
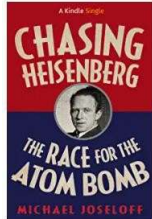
Entry Criteria

Physics can be a challenging subject at times and we want our students to be successful. We therefore ask 6 or higher at GCSE Physics or Combined Science. You need to be comfortable with Mathematics so we ask that students ideally have a grade 6 in Mathematics. Much of what you learn in Physics will complement A

levels in Biology, Chemistry and Mathematics, and there are common topics between Physics and Maths A-level.

6 Reading List

Below are some Physics-related books that you might find interesting to look at, speak to the Physics team for more recommendations.

					
	A Brief History of Time	Storm in a teacup - the physics of everyday life	Astrophysics for people in a hurry	Chasing Heisenberg: The race for the Atomic Bomb	Stuff Matters

7 Summary of Physics A-level Preparation Tasks

In order to have the best possible start to A-level Physics we would like you to do the following:

- 1) Read and familiarise yourself with the specification and complete the following tasks

Task 1 – Système Internationale (S.I.) base quantities and their units

Understanding S.I. units is an important foundation for understanding Physics. Your task is to research all the S.I. units and how their value is determined. A good place to start is: [Current research on the SI units - NPL](#)
All other units are derived from these base units. Can you write the following in terms of their S.I. units?
Momentum, velocity and density.

Task 2 – Forces and motion.

Watch the following clip on 'the monkey in a tree' experiment. Can you describe both the horizontal and vertical components on the forces that are acting on the 'monkey' and the 'bullet'. Explain why the 'bullet' will always hit the 'monkey' (Assuming the hunters aim is good!):

https://www.youtube.com/watch?v=z8S0_SHqoeY

Task 3 – Mathematical skills : Circular motion and space physics.

Can you complete the question below?

Can you complete the question below?

A geostationary satellite with a mass of 2200kg is about to be launched into a synchronous orbit. The orbit will have an orbital radius of 42,200km about the centre of the Earth. The earth has a mass of 5.97×10^{24} kg. Can you calculate the minimum speed the satellite needs to travel at to maintain its orbital radius?

Equations.... $F = \frac{mv^2}{r}$ and $F = -\frac{GMm}{r^2}$ Where F is force (N) m = mass (kg) r = radius (m) $G = 6.67 \times 10^{-11}$ v = velocity (ms^{-1})

Task 4 - Quantum Physics

Watch the following clip on wave particle duality:

https://www.ted.com/talks/colm_kelleher_is_light_a_particle_or_a_wave?language=en#t-243002 This a brief introduction to some ideas behind quantum physics. Using this clip as a starting point – conduct some research investigating wave particle duality and the photoelectric effect. What experiments were carried out? By whom? How does the photoelectric effect support the idea that light is a particle?

Task 5 – Wider reading

Read at least one copy of New Scientist over the summer holidays. Select one Physics-related article and summarise the content for your peers. This should be at least 500-750 words long and you may do additional research on the topic in order to improve your understanding and the written content you produce.

An excellent short book to read over the summer!

https://www.amazon.co.uk/Brief-Answers-Big-Questions-Stephen/dp/1473695988/ref=sr_1_1?keywords=brief+answers+to+the+big+questions&qid=1582546017&sr=8-1