



A Level Physics

Pre-Enrolment Project



Task 1: Problem solving

An ability to be able to think creatively to solve physical or mathematical problems is an essential skill in physics. The questions below will test your problem-solving abilities, and do not require any knowledge of the A-Level course. You may need to apply some general science concepts and basic mathematical techniques, such as algebra, trigonometry and finding surface area or volume of simple shapes.

The answers to these problems are not important (in some cases, there may be no correct answer). What we want to see is the approaches and thought processes you take to solve them, so make sure you clearly show your methods and ideas.

Problems

1. A physicist is on holiday, and is sitting on the balcony of her seafront hotel looking at a ship on the horizon. She estimates that the balcony is 20m above sea level. How far away is the ship?
2. While walking across a bridge spanning a 3 lane motorway, a physicist notices that the cars below are travelling at about 30m/s, and are separated by an average distance of 100m. Approximately how many cars pass under the bridge per hour?
3. A physicist is having a birthday party, and bakes a cylindrical cake which has a height of 10cm and a diameter of 30cm. The cake has a density of 250kg/m³. The guests arrive, and each person shakes hands with each other person once. A total of 66 handshakes took place. If the cake is divided evenly between the guests, how much cake does each person eat?
4. A physicist decides to buy some chickens to produce eggs. He works out that 1.5 hens can lay 1.5 eggs in 1.5 days. How many hens does the farmer need to produce 12 eggs in 6 days?
5. All of the students in a Physics class also study Maths. Half of those who study English also study Maths. Half the students in the maths class study Physics. Thirty students study English and twenty study Physics. Nobody who studies English studies Physics. How many students in the Maths class study neither Physics nor English?
6. A physicist takes her daughter to see the daughter's grandmother. The physicist is about as many weeks old as her daughter is in days. The daughter is approximately as many months old as the grandmother is in years. All three of their ages add up to 120 years. How old is the physicist?

If you would like some hints to help you solve these problems, send an email to
physicsproblemhints@gmail.com

(you will receive an automatic reply, any specific questions sent to this address will not be seen)



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Task 2: Presenting work correctly

Another important aspect of further study in Physics is knowing how to correctly present and interpret certain types of information. Science is full of what are referred to as 'conventions' – certain ways to phrase, lay out or otherwise present information so that it is clear to any reader. In this task, you are going to find out about some of the scientific conventions used throughout the Physics course.

Task 2.1 – S.I. Units

Find out what the system of 'S.I. Units' is, and some of the history behind it. Write a short summary (about a page) which includes:

1. The history of the formation of the S.I. system
2. The S.I. base quantities and units, as well as their historical and current definitions
3. A description of what is meant by a 'derived' S.I. unit, and some examples
4. Your interpretation/opinion on why a system such as S.I. is important

Task 2.2 – Greek Alphabet

Try to learn the names of the letters in the Greek alphabet. You will be quizzed on it in the first few weeks of term.

Many letters from the Greek alphabet are used in Physics, as symbols in formulae, unit prefixes or to represent physical quantities. If you are familiar with Greek letters and their names, then you will be more comfortable using the equations which contain them.

Task 2.3 – Researching

Use a **minimum of 6 sources** of information to produce a short (approx. 300 words) summary on a scientific topic of your choosing.

Although you won't do many essays or research assignments as part of the A Level course, you should be consulting online sources regularly as part of your independent study. It is important to ensure that you are using **appropriate** and **reliable** sources of information, so as part of this task we will be looking at which sources you have chosen to use. This means that you need to **include a bibliography** that references your sources.