

# Advice for PH1A students

Thibaut Lacroix  
tfml1@st-andrews.ac.uk

University of St Andrews — November 2020

## Disclaimer

This document is here to give you some advice regarding how to approach PH1A exam. Nevertheless, I hope that what's written here can be useful in a broader context. The sections are not ordered by importance but in a mix of chronological order and from specific to general. The content of this document is only my personal point of view on the subject, formed by personal experience and discussions.

## 1 Glance over the full exam paper

Have a look at all the pages, all the figures and have an idea of what each part is about. Hence you can start with what you are the most comfortable with. You don't necessarily have to start the exam by the first question (but inside a given part (*e.g.* waves and optics), please answer the question in order).

## 2 Understand the problem

Once you have started a part of the exam, read thoroughly the paragraph which is before the questions. That's where the problem is set up. Try to visualize the problem in your mind and don't be afraid to use your everyday life knowledge. For example, in an optics question about what a goldfish in a fish tank would see, use the memory of the last time you look at the sky underwater in a swimming pool. It can help you to find a path from the question to the answer and/or to check your results in the end.

## 3 Draw figures

If a situation is described and there is no figure on the exam paper, draw one. Don't be afraid to draw large figures if it helps you.



**Waves and Optics** If in a question you are asked to trace ray diagrams or if you want to trace one to illustrate your answer, always use a ruler.

## 4 Read the next questions

When you start to answer a question, read the next two/three questions to have a global picture of what the exercise is asking you to do and where it's trying to lead you to. It can help you identify the strategy to use to answer the question and it prevents you from answering the next questions inadvertently.

## 5 Explain your reasoning

This is one of the most important piece of advice. The point of the exam is to determine, broadly speaking, two things:

- have you understood the content of the lectures (e.g. do you know what is a virtual image?)?
- have you assimilated the techniques and methods (e.g. how to apply conservation of energy)?

Writing a series of equations (even if they are perfectly correct and lead to the right result) is not the way to do it. You have to write sentences (even extremely short ones) to explain what you are doing and why.



### Example

#### Question 1

Blablabla... Skier at rest...

Find the speed of the skier when it arrives at the point P..

Applying conservation of energy because there is no friction:

$$E_{\text{initial}} = E_{\text{final}}$$

$$\frac{1}{2}mv_{\text{initial}}^2 + mgh_1 = \frac{1}{2}mv_{\text{final}}^2 + mgh_2$$

$$\Rightarrow v_{\text{final}}^2 = 2g(h_1 - h_2)$$

The final speed is  $v_{\text{final}} = \sqrt{2g(h_1 - h_2)} = \sqrt{2 \cdot 9.81 \cdot (100 - 20)} = 39.6 \text{ ms}^{-1}$ .



**Don't forget units** A result should always have relevant units! An answer without units (when it should have some) is wrong.

This way the person marking doesn't lose time and energy trying to understand what you have done, and if you made a mistake at some step the person marking will identify it more easily (trust me, even if it doesn't sound like it, it's at your advantage!) and grant you all the marks you deserve. Also, if your reasoning was wrong, the person marking will be able to see why more easily and will thus be able (and have time) to write a feedback.

## 6 Put the numbers at the end

Use literal formula until the ultimate line of calculation (as shown in the example above). It's easier to read for you and for the person marking.

For you: it makes it easier to spot a careless mistake and therefore to correct it; it makes it easier to check units at the end of a calculation; it makes it easier to understand the physical meaning of the result (and therefore to check it); and it prevents successive rounding errors from the repetitive use of your calculator. For the person marking: as above, it makes it easier to understand and follow what you are doing and thus to give you all the marks you deserve and useful feedback.

## 7 If you are stuck

Don't panic, it happens to everyone to be stuck on one or several questions of an exam. First, try to write on your paper the information provided in the question and see how they relate to the previous question. For example, the previous question asked you to state some equation and the current question gives you numerical values for some quantities  $X$  and  $Y$ , and asks you to find out  $Z$ ; Are these quantities involve in the equation? If not, are they related to the one in the equation? If you are stuck on a question in the middle of a given part, try the next questions in the same part. They might be independent or you might be able to see how to answer one of them and work your way back to the question you didn't know how to answer. Otherwise, jump to a different part of the exam.

## **8 Take a break**

If more than half of the time of the exam has passed and *if you need it*, you can take a small break (maximum 5 minutes). Take a real break, drop your pen, stop thinking about the exam and look through the window or close your eyes and rest. The idea is to rest your mind for a few minutes and go back to the exam with more energy and to be more focused.

## **9 5 minutes before the end**

Don't start a new question 5 minutes before the end of the exam (unless it is very short and you already know explicitly how to answer it in one minute). Instead, go back at the beginning of your paper and skim through what you have written to spot mistakes you can correct (for example, a sign mistake in an equation or a number of significant figures that doesn't match the one asked for in the question).

## **10 Don't work all night before an exam**

Don't study all night before an exam. Have a full night of sleep. You won't learn everything in one night or even remember correctly what you have studied. You will perform better by being well-rested with all your cognitive abilities at nominal values than by being sleep deprived and vaguely remembering something that was said in a lecture.

**GOOD LUCK!**