Physics in first year – tips for exam preparation

This document aims to provide some general advice regarding the end-of-semester examination in first-year Physics subjects. It addresses the following questions:

1. Why is there an exam and what skills are being tested?
2. How should I prepare for the exam?
3. What are the arrangements for sitting the exam?
4. What is the format of the exam?
5. How are marks allocated?
6. What do I need to do to pass the subject?

1. Why is there an exam, and what skills are being tested?

The end-of-semester examination in Physics aims to assess your conceptual understanding of the physics principles you learned during the semester and your ability to solve problems using those principles. In particular, it assesses your ability

- to recall relevant information;
- to identify which physical principles are relevant in particular situations;
- to explain how and why particular principles are relevant; and
- to apply the relevant principles to solving problems.

The exam helps the School of Physics to determine:

- whether you have met the learning objectives required to pass the subject; and
- how your understanding compares to that of other students in the same subject.
- whether you are eligible to take Advanced level subjects in the next semester.

2. How should I prepare for the exam?

Exam preparation does not begin in swot vac! In a sense, your entire semester’s work in the subject is part of your preparation for the exam. The end of the semester is a good time to summarise and review what you have learned, so that you have all the relevant information ordered in your mind when you go into the exam. However, this assumes you have already put in sufficient time and effort to learn the material earlier in the semester. Attempting to cram a whole semester of physics into a couple of weeks at the end of semester is usually a recipe for disaster!

During the semester

- Attend all classes (lectures, tutorials and labs). These will give you a good “road map” of the material you need to know for the exam. Reading the textbook will not do that; the book may not even include all the material you need to know.
- Review material as you go. After each section of the material is presented in lectures and/or tutorials, read the relevant parts of the textbook. Update your notes to correct any areas you may have misunderstood. Follow up any questions you have with your lecturer, tutor or other students.
- Use all available resources. If you have questions, don’t forget that you can ask your tutor, or go to the First Year Learning Centre.
Talk to other students. Discussing physics ideas, answering questions, solving problems and arguing about physics with others is a great way to test, develop and solidify your own understanding.

Practice answering questions. Attempt the questions on each tutorial sheet before the relevant tutorial, and make sure you understand the solutions. Do any problems set by the lecturers to complement lectures. Some of these may come from the textbook. Finally, check your understanding by doing additional problems from the textbook, concentrating on the areas you have difficulty with.

**Final exam preparation at the end of semester and during swot vac**

- Write a summary/glossary of each main idea. Include important definitions of physical terms, and important equations. Constructing concept maps for each area of study can also be useful, since doing that allows you to consider how different ideas are connected to each other. The main value here is in the thought you put into the process of organising your knowledge, not the final product.

- Review all the material from lectures and tutorials. This is a good time to think about the big picture and to make connections between different concepts, as well as checking that you understand each individual concept.

- Review your lab notes. This is particularly important for 640-171/2 and 640-182 students.

- Practise explaining concepts. As well as being able to use concepts and formulae to solve problems, you should be able to explain important physical concepts in words, and to give qualitative explanations of the physical processes, significant experiments and applications that have been explained during the semester.

- Use the First Year Learning Centre. Be aware that during swot-vac, and especially close to the day of the exam, the FYLC gets very busy, so you will likely get more time and attention from tutors if you don’t leave it to the last minute to ask questions. Often, it can be useful to study with other students and ask questions as a group, since you will often learn from the answers to other people’s questions.

As you can see, none of this advice is really focussed on the exam – it is all about how best to learn physics. And that is because making sure you understand the physics is the best way to make sure you do well in the exam!

**Using past exam papers**

Exam papers for most subjects from 1998 onwards are available on the Baillieu library web site at www.lib.unimelb.edu.au. This exam archive site is also linked to each first-year physics subject web site – usually via the Assessment Information page. The subject home pages also contain some answers to previous exams – not too many of these as it not productive for students to make previous exams the focus of their study. There are no official complete solutions to past exams provided by the School of Physics. However, you can ask questions about past exams during the revision tutorial conducted during swot vac, or ask the tutors at the First Year Learning Centre.

Past exams are not comprehensive, in that they do not test all parts of each subject in any single exam – that would require more time than is allocated. Therefore, if past exam questions are the only questions you look at during your revision, you might miss revising important parts of the subject which could appear on this semester’s exam.
The exams are useful for getting an idea of the format and types of questions usually asked. Early on in your final revision, it is a good idea to look at past exams to familiarise yourself with the style of exam to expect. This can help you to tailor your revision process.

After you have done the major part of your revision, doing past exam questions can be a good way to check if you have any gaps in your knowledge, and to identify the areas you find the most difficult (and which therefore require more of your study effort).

It is often a good idea to leave one past exam until practically all your revision is done, then to attempt to complete the exam in the allowed time, without referring to your notes.

### 3. What are the arrangements for sitting the exam?

The Student Information System (SIS) at sis.unimelb.edu.au has lots of useful information about exams, including timetables, locations, exam regulations, and so on.

**What can I take into the exam?**

- Loose writing instruments (pens, pencils, erasers, rulers, etc.)
- Mathematical instruments (stencils to draw shapes, protractors, etc.)
- A calculator

You may **not** take a dictionary into a first-year physics exam. This includes English-English dictionaries as well as English-other language dictionaries. Care is taken to make sure that the language used in exams is accessible to all students. You are, of course, expected to be familiar with the technical terms and expressions used in physics.

**What kind of calculator can I use?**

The statement on the front of each first-year physics exam says:

> Calculators are permitted in accordance with the rules of the Faculty of Science. They may be used for the processing of numerical information only. They must not have been programmed nor should they store additional information.

There is no specific prohibition on any calculator, but it is your responsibility to be able to demonstrate that your calculator fulfils these conditions if asked to do so.

**Alternative Examination Arrangements (AEAs)**

If you have a long-term or short-term need for alternative examination arrangements because of a disability it is possible to apply to sit the exam with additional time for reading, writing and rest breaks, or use of a computer or scribe. You will need to apply through the Disability Liaison Unit, with supporting documentation. If it is a very short-term disability, such as a broken arm, you can also apply through your Student Centre Disability Contact Officer.

**What happens if I miss the exam?**

If you have a valid reason, you can apply for Special Consideration online within three working days of the day of the exam. Information about Special Consideration is available from the SIS web site, https://sis.unimelb.edu.au/cgi-bin/special-consideration.pl, or the Science Student Centre web page, http://http://www.ssc.science.unimelb.edu.au/admin/exams/specialconsid.
4. **What is the format of the exam?**

Exams in physics include a mix of qualitative and quantitative questions, in order to test both your conceptual understanding of physics and your ability to apply what you have learned to solving problems. There are usually around 10 questions, each concentrating on a different area of the subject, usually made up of several sub-sections.

In all questions, the examiners are looking for a clear and reasoned application of relevant concepts to the problem at hand. It is therefore important that you express your ideas clearly and display a logical series of ideas and steps leading to a solution or explanation. Attempting to apply formulae blindly usually will not get you very far.

The exam aims to test your understanding of physics – not your capacity for memorising complex formulae. For that reason, a formula sheet is supplied with the exam. Data specific to a particular question is most often included in the question, although some often-used constants are included on the formula sheet. Past exam papers provide a good guide to the kinds of equations and other information likely to be provided.

The formula sheet supplied with the exam usually does not include basic definitions of physical quantities (such as $F = ma$ or $q = CV$). It will, however, often contain useful derived formulae which have wide application, particularly where these are difficult to remember (e.g. Bernoulli’s equation).

The lecturer will inform you of any significant changes from past practice with regard to the formula sheet, or the exam in general.

5. **How are marks allocated?**

In marking each question on the exam, the markers are looking for a logically reasoned application of physical concepts, whether the question requires an explanation in words or a numerical answer.

The marking process is a positive, rather than negative, one. In other words, markers seek to add marks for what you have done right, rather than to subtract marks for your mistakes. (However, this does not mean that you can write down two contradictory responses to a question in the hope that one of them may be right.)

If you think you have made a mistake in an answer and you wish to correct it, cross out your original answer, but make sure it can still be read by the marker. Sometimes, your initial approach may turn out to be correct after all and you may still get some marks for it, even though your second answer is wrong.

Here is some more specific advice for answering different types of questions:

**Questions asking for a qualitative explanation**

- First of all, read the question carefully. One of the most common errors is for students to focus on a couple of words or a phrase in the question and write a general account of that concept rather than actually answering the question. So, don’t waste time writing down everything you know about a particular area of physics, since it won’t gain you any extra marks. In some cases, you may even lose marks if you bring in irrelevant ideas.

- Make sure you understand the meaning of the different types of answers you may be asked to give. The following phrases ask you to do different things: describe what happens when … , explain why … , justify your answer by … , compare the outcomes of …

- This is a Physics exam, not an English exam. Brilliant prose is not required, but clear expression is important.

- Answer the question in a logical sequence – start at the beginning, connect the second idea to the first, the third to the second and so on. You may find that using dot points helps to structure your answer. This is perfectly acceptable.
- Use the time allocated to answering the question as a guide to the level of detail required in your answer.

- Finally, read the question again – have you done what you have been asked to do? If the question asked you to refer to a diagram, or to a graph, or to an equation, or to data in a table, have you actually done that?

**Questions asking you to derive an equation**

- Most questions have marks allocated for each significant step in a derivation, so it is always better to attempt a question than to leave it completely blank, even if you only write down the first step or two and can’t go any further.

- Show all your working. The marker will be looking for a logical progression from one step in your derivation to the next.

- Try to avoid making basic algebraic errors, especially when rearranging a formula to make a particular variable the subject.

**Questions requiring a numerical answer**

- Show all your working. Most questions of this type have marks allocated for each significant step in working out the solution. Even if an answer only requires multiplying two numbers (for example), write down the formula you used along with the numerical answer. That way, if the numerical answer is wrong (perhaps due to a calculator error), you may still get some marks.

- Make sure that all the numerical values you use in a calculation have correct units. If you need to convert units, write down the details of the conversion, including any conversion factor you use.

- Make sure you include appropriate units for all physical values you quote, especially in your final answer. You may lose marks if you do not include units in your answer.

- If the answer is a vector quantity, don’t forget to include the direction as well as the magnitude of the vector.

- Numerical answers should have the correct number of significant figures, which is determined by the number of significant figures in the data given in the question (or on the formula sheet). You may lose marks if you quote answers to an incorrect or unreasonable number of significant figures.

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6. **What do I need to do to pass the subject?**

Your total mark for the subject is made up of your exam mark (60%), and various other forms of assessment (40%). Depending on the particular subject, the other assessment may include tests, laboratory work and seminars.

The handbook description of the assessment in the subject is our “contract” with you. You can find the handbook subject entries at http://handbook.unimelb.edu.au

If you fail the exam (i.e. score less than 50%), then you may still pass the subject if your performance on the other assessment is sufficiently good. However, you must complete laboratory work satisfactorily, in terms of both performance and attendance, to pass the subject.