Minimise Study Time
Maximise Scores

VCE Exam Advice – Unit 3 & 4 Physics

- A Physics revision program should commence with making summary notes from the textbook, but some students may already have a good set of class notes. Cross reference these with some professional summary notes, such as those that can be found in books such as 'Checkpoints' or 'A+ publications' to ensure there are no gaps. Complete as many questions from the textbook as possible.

- As all Physics students should now know, they can take one double-sided A3 sheet (or two A4 sheets must be stuck together) of annotated notes into the exam this year. These have become affectionately known as the 'cheat sheet'. Don't take the easy option and download a version from the internet or photocopy from the best student in the class. The cheat sheet is an individual thing. In fact, development of the cheat sheet is a powerful learning experience where you consolidate all those parts that you personally have found difficult. Ideally, this document should develop over the year as topics are completed. Try and complete your cheat sheet before you start working through practice exam papers. You should end up knowing the details of this sheet so well that it may end up not being used in your exam. Many students proudly boast after the exam that they didn't even look at their cheat sheet.

- In the three to four weeks before the exam, work through as many practice papers as possible. In working through these papers, resist the temptation to consult solutions too quickly. It is best to complete an entire topic area, or perhaps the whole paper before checking answers. Some students refer to solutions too quickly and don't spend enough time pondering possibilities – which impedes on how much they learn. It is also worth reading the VCAA Examiner's Reports which provide an insight into areas of difficulty and common problems that students encounter.

- Ensure that you are familiar with the current format of VCAA exams, which commenced in 2017. It will contain two sections as follows:

  - Section A – 20 multiple choice questions worth 1 mark each.

  - For Section A, use reading time to answer multiple choice requiring qualitative response.

  - For Section A, allow 30 minutes – 1 ½ minutes per question.

  - Section B – short answer questions worth 110 marks.

  - For Section B allow 120 minutes – 1 minute per mark.

  - Access as many trial papers written for the new format as possible. Past VCAA papers for both Unit 3 and Unit 4 from 2009 and 2013 are different formats.

  - There are NO DETAILED studies in 2020.

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- Earlier papers from 2004 onwards are still useful but note that some changes will mean that some questions are no longer relevant. Discretion will be needed if attempting these questions to ensure irrelevant topics are not studied.
- Papers from 2009, can use Section A which contain short answer questions.
- Papers from 2009, can use Section B for multiple choice questions only and in the following Detailed studies:
    1. Einstein's special relativity and to lesser extent
    2. Synchrotron and its applications (only some relevant questions).
- Additional good questions on motion and gravity, electric power, and light and matter, can also be found in pre-2004 papers.

- Most students find explanatory questions difficult in Physics exams. Application of Newton's Laws of Motion to explain everyday phenomena is one such area commonly included in exam papers, so make sure that you learn this section of the course well.
- Ensure that you include any mathematical formulae that may be relevant.
- In questions involving calculations, show your working and make the logical development of the solution obvious. Make it clear what formula you are using, and on the following line show substituted values. Your final answer should be expressed with appropriate numbers of significant figures. (Note: Students will not be penalised if an incorrect number of significant figures is given.)

Additional Advice

- Questions worth three or four marks typically have average scores of only about one mark. The main problem is that students usually don't put down enough points. It is critical that students read through the VCAA Assessment Reports so that they can become familiar with what is required in order to obtain full marks.
- Dot points are a good way to separate ideas and put down anything and everything that may be relevant. Highlight key words as this checklists a thorough responses and aids assessors in their marking process. Don't use full sentences.
- Labelled diagrams or a sketch of a graphical relationship can assist an explanation.
- It is also important to develop an appropriate pace to ensure that all questions can be attempted in the available time and that a short period is available for checking over questions. Don't be too concerned if at the beginning of the revision period papers are taking longer than the recommended time to complete. Most students find that time becomes less of an issue as the revision period develops. It is still important however, to complete a number of papers under exam conditions and exam time restrictions in order to establish an appropriate pace.
- Section A – the 20 multiple-choice questions are each worth one mark however allow 1 ½ minutes per question. Many students like to start with this section as it provides a good opportunity to get a little ahead of the clock. For Section B – short answers allow one minute a mark.
- Read each question thoroughly before putting pen to paper. It may help to underline key words in the question such as best option, glossary words, required data etc.
- Students must follow the instructions given in questions. Sometimes working is required or units of measurement are to be given. If this is not done, marks are not awarded.

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- For questions requiring a 50/50 choice, correct choice response is awarded NO MARKS if an appropriate explanation is NOT given.

- Assessors are not expected to guess what a student has written. Illegible answers do not receive marks. This applies particularly to multiple-choice questions where one answer is written over another. Poorly formed 9s and 4s or 6s and 0s or decimal points not preceded by a zero are common problems.

- Look carefully at units in calculations. In many responses, you will need to convert to SI units before using data in a formula. The Examiner's Report in recent years has referred to many students making mistakes in converting units. Be on the lookout for non-standard units.

- With questions where a graph is presented, be mindful of the four possible purposes for providing a graph.

    - Read – read values from the graph with its probable use in calculations so check units and magnitude of order e.g. mA, μA .

    - Gradient – calculate gradient using rise/run method

    - Area – calculate area under the graph using one of two methods:

        - Area of common shapes, squares, rectangles, triangles or trapeziums.
        - Estimating by counting squares and multiplying by the area of one square.

    - Transformations – e.g. sketching the EMF corresponding to the magnetic flux variation over time.

- Remember that when taking units of values read from graphs look carefully at the prefixes on the axis. For example, current may be in mA and your answer could really be out by a factor of 1000 from what you intended.

- Learn your formulae. Although you are given a basic formulae list in the exam, you will still need to know when to use them, what each letter or symbol represents and what the units are for each. Units can be worked out from dimensional analysis.

- Be sure to only use your right hand for the RH Slap and RH Grip rules. This is especially important for students who write right-handed. The left hand will result in opposite answers.

- When investigating light/photons, appropriately choose between the two Planck's constant namely:

    - For energy in joules (J) use h =6.63 x 10^{-34} Js
    - For energy in electron-volt (eV) use h =4.14 x 10^{-15} eVs

    - When calculating matter wavelengths and electron velocities, ensure you use only h =6.63 x 10^{-34} Js

    The photoelectric effect is one of the least well understood aspects of the Unit 4 program.

- It is important to realise that it is the change in flux that induces the EMF, not simply the flux. Many students incorrectly assign the direction of the induced flux as the opposite to the actual magnetic field rather the direction of the flux change. Flux is a vector quantity, and the change in flux is the vector subtraction of the initial flux from the final. This is difficult and may require a lot of practice. A clearly set out example on your note page would be a handy reference.

- In the topic of Electric Power Transmission an understanding of series and parallel circuits, Ohm's Law and circuit calculations of current, potential difference and power is required.

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	Area of Study	Read	Gradient	Area
Displacement vs Time	Kinematics	Position – metres, Duration – seconds	Velocity $m = \frac{rise}{run} = \frac{m}{s}$	NOT APPLICABLE
Velocity vs Time	Kinematics	Velocity or Speed - m/s Time - seconds	Acceleration $m = \frac{rise}{run} = \frac{m/s}{s} = m/s^2$	Displacement (or distance) $A = LxW$ $= \frac{m}{s} \times s$ $= m$
Acceleration vs Time	Kinematics	Acceleration – m/s/s Time – seconds	NOT APPLICABLE	Change in velocity $A = LxW$ $= ms$ $= julesenrgy$
Force vs Time	Momentum, Impulse, Gravitational motion	Force – newtons (N) Time – seconds (beware of ms which abbreviation for milliseconds)	NOT APPLICABLE	Impulse or Change in momentum $A = LxW$ $= Ns$ $= kgm/s$
Force vs distance	Springs	Force – newtons (N) Extension – metres	Stiffness or k value $m = \frac{rise}{run} = \frac{N}{m}$	Elastic potential energy $A = LxW$ $= Nm$ $= J$

- Understand **why** Young's double slit experiment supports the wave model of light: alternating bright and dark bands (maxima and minima of intensity) indicate constructive and destructive interference, which are wave behaviours.
- Remember the correct terms are 'constructive' and 'destructive', in relation to interference. The word 'deconstructive' does not have an accepted meaning within the study design
- Understand **which results** from the Photoelectric Effect support the particle model of light and **why**: no time delay, existence of a threshold frequency, and the independence of electron kinetic energy from the intensity of light.
- If asked to calculate the value of a constant (e.g. Planck's constant) from experimental data, **do not** simply rewrite the value provided in the formula sheet. That will be incorrect. You **must** use the experimental data provided and show your working.
- Make a list of all scientists mentioned in your syllabus and their contribution.

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- For multiple-choice questions in the detailed study section, carefully read questions and answer appropriately before looking at the options available. Remember some of the options are distracters as these values are commonly found during the process of calculating and/or if a common mistake or misconception is used.
- Remember consistency. In a calculation involving more than one stage you will be awarded consequential marks if you correctly use a wrong answer from part (a). in your calculations to answer part (b), part (c) and so on. Always show workings where calculations are using values that you calculated from previous questions.
- Show working in your calculations. You may still be awarded marks even if your final answer is wrong.
- In almost all numerical answers you will be required to express your answer in the units specified in the response box. An exception may be a ratio which have no units such as transformer step-up or step-down voltage ratios.
- For questions involving ratios, the following must be remembered.
    - Need to carefully select the correct formula, as often it only works with a specific formula where some of the dependant variables are only given in qualitative form.
    - Eliminate unknown values when provided variables are given in a qualitative form e.g. both object have SAME mass, Object A twice the distance compared to object B.
    - No units. No need to convert to SI units as long as same units are used e.g. km/hr
    - Order is important so read question carefully.
- Take careful note of energy that can be expressed as either kWhr, J or eV depending on the type of question.
- Any answer that is a vector quantity should be assigned a direction (such as magnetic field strength, B.), unless only a magnitude is required.
- Students will not be penalised if an incorrect number of significant figures is given, **unless a number of significant figures or decimal places are specifically asked for**.
- In responding to explanation questions dot points are acceptable and preferred. As a rule of thumb, try to come up with one more dot point than the number of marks allocated. Diagrams and graphs can be incorporated into explanations to aid explanations and can be counted as a valid dot point.
- For worded responses, do not simply copy pre-written answers from your sheet of notes. This will usually result in an answer that does not appropriately address the focus or the context of the exam question, and may include contradictory material (which will cost you marks). Make sure you read the question carefully and tailor your response to that situation.
- There is no need to restate the question in an answer. Focus on answering the question.
- All questions worth more than one mark require appropriate working to be shown.
- Remember that the study design has been reduced for 2020, which means the exam is likely to include more questions in greater depth on the remaining content.

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- Spring questions that involve energy transformations between SPE, KE and GPE are commonly answered poorly. It is likely that the 2020 exam will include another tricky question on this topic.

- Where values of constants are provided in the stem of the question or on the formula sheet, students are expected to use the number of significant figures given.

- Avoid rounding excessively during working. For example $6.37 \times 10^6 + 2.00 \times 10^7$ should **not** be rounded to 2.6×10^7. Working should maintain as many significant figures and/or decimal places as the data provided in the question stem. Rounding should occur only when the final answer is given

- Answers should be simplified to decimal form – that is, no surds or extraneous decimals.

- Ensure you answers are realistic. Illogical answers should prompt you to check your working.

More subject specific advice will be issued to students at our "VCE Exam Revision Lectures".

Good luck with your exam preparations!
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