Minimise Study Time
Maximise Scores

VCE Exam Advice – Unit 3 & 4 Biology

In preparation for the exams, students should spend the majority of their time actively learning information "off by heart", as well as working through as many examination papers/questions as possible. You should also read through the previous Assessment Reports that have been written by the Chief Assessors so that you can secure the best possible examination scores. These reports include valuable information regarding how to set out answers as well as common errors made by students.

The biggest change to the VCAA Year 12 Biology subject occurred in 2013 when the exam became a combined Unit 3 and 4 paper (this was the major change in study design). Most of the assessed theory however was quite similar to previous years. The **current study design (2020 - COVID-19) has considerable deletions** to the previous course so be mindful any VCAA/trial exam prior to 2017 will require amendments when answering questions from them.

Suggestions:

- Learn by "oral testing" (often recommended at tertiary level as the brain is at its most active in this type of testing):
    - Using your notes/books, deliver 12 questions to a partner who has no aids for assistance.
    - Any problem areas are briefly noted (in writing) by your partner.
    - Reverse roles.
    - Repeat this process for up to 90 mins before having a break.
    - Review problem areas later in your own time.
- Read out aloud while revising.
- Use **images** for learning concepts – most brains record images more effectively than words.
- Use **examples** for every concept. Examples can remind you of a briefly forgotten conceptual definition.
- Use and watch **animations** to consolidate theory and enhance your understanding – they say "a picture is worth a thousand words", so what would an animation be worth? Watch as many animations that are at a Yr 12 level and topic specific as you can. Many Unit 3 concepts (fluid mosaic model, polymerisation, photosynthesis, respiration, signal transduction and immunity) are very well shown by animations. YouTube and Khan Academy are great places to look.
- Invent a sentence to learn a sequence of terms, use the first letter of each word as a cue for the necessary term.
- Complete as many past exam and/or trial papers as possible. After completing one or two papers without time restrictions, ensure that you keep to the 15-minute reading time and 150-minute writing time regime that you will experience in the exam. Completing a trial paper is like only doing half a job – you **must** then **check solutions/examiners report** for immediate feedback.

PTO

- Avoid general responses to questions. If your response is not as specific as that given in the VCAA Assessment Report, consider your score to be zero!

- Responses are required to be specific and of a standard expected of a Year 12 Biology student. For example, a quaternary protein is defined as 'the interaction of two or more polypeptide chains'. Many students neglect the word 'chains' in there responses and therefore are not being specific enough. At a Year 12 level this is **not** acceptable and thus a score of zero will be given. These little oversights and lack of specificity in responses often result in students not being able to access all of the marks they should be.

- Learn to spell key biological terms. Although students' spelling and grammar are not assessed, students need to be aware that errors in the spelling of biological terms which result in a lack of clarity could result in failure to gain credit for a response. For example, the distinction between 'thymine' and 'thiamine' may not be clear with incorrect spelling.

- Examine the VCAA assessor reports for the definitions required in past papers, and use these as the basis for your definitions.

- Become a statistical analyser! The assessor's reports are not just super valuable for understanding the correct answers but some of their greatest value is found when looking at the average mark awarded for short answer questions. VCAA has a habit of examining content that has been poorly answered in the past so focus in on these areas, understand the content and then you'll be best placed to create separation between yourself and the whole Biology cohort.

- Significant amounts of the 2006-2012 and 2013-2016 study design is still relevant to the current Year 12 Biology study and therefore the VCAA exams (and other company exams) over these periods are still highly useful. However, as mentioned earlier, you will need to make amendments/ignore questions when completing these dated papers as part of your revision process.

    - Major topics and concepts that you should **omit** from dated papers include:

        - Patterns in biological change (divergent/convergent evolution)
        - mtDNA and the molecular clock
        - DNA hybridisation techniques
        - Master regulatory genes such as BPM4 and the effect on Galapagos finches/Cichlid fish.
        - Consequences of cultural evolution in humans
        - Significant changes in life forms in Earth's geological history
        - Genetic screening and DNA profiling
        - Rational drug design (including Relenza)
        - Chemical agents such as antibiotics and antivirals and their role against pathogens.
        - Carbohydrates
        - Lipids
        - Cell reproduction (binary fission, mitosis, meiosis, DNA Replication)
        - Patterns of inheritance (all genetic crosses and pedigree analysis)

- Attempt all 2010-2019 Unit 3 and Unit 4 papers. Preferably these should be completed in timed conditions – before you attempt these papers go through and omit dated material and then make an on balance judgement of what your new time allocation to complete that particular paper would be.

- Be aware that the **Year 12 VCAA Biology exam** is **now** worth a total of **120 marks.** This is an increase of 10 marks from the previously combined Unit 3 and 4 exams from the 2013-2016 period (short answer section is now worth 80 marks). The **time allocation** to complete this is still the same at **2.5 hours.**

- Be sure to expose yourself to as many current trial exams as possible. These will all be in the new format and also focus on new inclusions to the current study design.

PTO

A Selection of Remedies for Common Examination Faults

- Take an extra few seconds to carefully read the information in a question before responding to it. Many marks are lost each year to students who rush-read a question, consequently misinterpreting it. This often results in a correct response to an imagined question, which cannot gain any marks!

- Use the reading time to analyse the questions in Section B and begin the complex thought processes required to answer these questions adequately. You are not required to complete these items in sequential order, so if one or two questions appear to be more difficult, complete the other items first before returning to these.

- You will be instructed to complete Section B in pen. The use of pencils in Section B is strongly discouraged as responses are often difficult to read and interpret, however, it is important to note that if you start writing in pencil and then remember the instruction, there is no need to go over the answers in pen.

- Use legible handwriting and correct spelling. If an assessor cannot read an answer, the response cannot be awarded marks.

- If required to draw ensure that your diagrams are clear, large and fully labelled. Remember that an examiner will be marking what you have drawn so it's in your best interest to make them as easy to interpret as possible!

- Use the marks and the space provided for the answers as a guide to the amount of information required in a response.

- Always **cite figures** in questions that provide tables or graphs. Don't forget to include the unit or percentage. Familiarise yourself with the molecular structures of macromolecule monomers, e.g. amino acids.

- You must endeavour to use common biological terms correctly. Any ambiguous terms should be avoided.

- Although well-known abbreviations such as DNA, ATP, NADPH and chemical symbols such as H_2O are acceptable in general questions, non-standard abbreviations should be avoided as they may be open to misinterpretation. Inappropriate abbreviations would be 'rER' for rough endoplasmic reticulum and 'phs' for photosynthesis. If you wish to use an abbreviation and are unsure then you should define it first, e.g. adenosine triphosphate (ATP).

- Ensure you read questions carefully, and therefore reduce the chance of neglecting to cover an area simply because you overlooked it.

- Never ever move onto a new question in any subject without reading the question that you have just completed. Many students miss out on valuable marks as they did not provide the required answer.

- If you do come across a question that looks similar to what has appeared in previous exams, proceed with caution. Read the question very carefully as it is quite likely that the requirements or answers being sought are different from what was asked in previous years.

- Sit two VCAA examination papers under examination conditions the week before the actual exam so that you can determine the speed at which you need to work at in order to complete the paper within the given time.

PTO

Approaching the Questions

You are more likely to be awarded full marks for a question when answers are clearly expressed, and the information included is organised logically with questions addressed directly, i.e. formulate an answer that clearly covers all parts of the question. Avoid vague responses at any cost.

One Mark Questions:

Even though they are worth one mark, one-word answers are often unlikely to be awarded marks.

Name Questions:

If asked to name something, it is important that you do so. It is not necessary to elaborate, and if incorrect information is given in your elaboration, the mark cannot be awarded. Remember, abbreviations are not accepted when a name is sought in the question. e.g. 'Name the molecule of inheritance.' Answer is deoxyribonucleic acid, not DNA.

Using Data:

These questions expect you to explain how the data is used to arrive at a conclusion. More successful answers **specifically mention figures** from the data.

If citing figures from a graph, always specify the **units of measurement**, e.g. 30°C

Conclusion – Requires a general statement of the trend or outcome of the result mentioning the independent variable.
Evidence – requires actual results to be quoted to support the conclusion.

If asked to make a comparative statement between two graphs, you must comment on the similarities and differences between the graphs.

Be careful not to simply describe the graphs if you are asked to explain them.

Agree or Disagree Questions:

Do not simply write 'yes' or 'no' as this is an ambiguous response. You need to firstly state your decision and then provide an explanation for your decision.

Generally if there are two options to select from in an item no mark is awarded for this part of the question – the marks are allocated for the reasons behind your choice.

What is the Difference?

These questions require you to state a specific feature of the first term mentioned and then a statement on how it is different from the second term, e.g. how is humoral immunity different to cell-mediated immunity?

Questions Worth Three Marks or More:

As you know the greater the mark allocation to a particular question, the more detail you are required to give. When looking at the average marks received by students in the assessors reports for short answer questions, you will note that for questions worth three or more marks, the average mark received by the Biology cohort for that particular year is always only around half, and usually less than half of the allocation (eg. for a four mark question the state average will be around/below two).

PTO

Answering these types of questions takes skill – you must first and foremost understand what the questions is asking, know your theory and then most importantly answer it correctly.

Your answer needs to be thought out and ideally written in a logical and sequential manner. While this is not an English exam, basic grammar is important and adds to the flow of your answer. Also, discussing all the key ideas is vital and indeed necessary to achieve full marks.

Often students write one long, convoluted paragraph which has little grammar, structure and substance. Answers in this mould also frequently do not address all aspects of the question and thus do not receive full marks.

One way that may help/give logical flow to your responses to these questions is through the use of dot points. Dot point answers are very much **accepted** by examiners. Answering in this way does not mean that your answer will be shorter and of less detail; rather it may give order to your answer and may increase the likelihood of you discussing all of the key points (which sometimes are unknowingly omitted by students when writing the long, convoluted paragraph-style answers).

So, what's the best way to answer these types of questions? If English and grammar is not a strength, the use of dot points may be advantageous to you. If you are a talented writer then stick to your strengths. Either way these questions are a great way to created the separation you want between yourself and the rest of the Biology cohort.

Remember the averages for these extended questions are typically low – practice them and you will excel!

Experimental Design Questions:

As a 'Scientific Poster' is now part of your internal assessment, expect Experimental Design questions and associated skills to be assessed more frequently in examinations. Traditionally, this very important area has been under taught/studied which has been reflected in low state average marks for these questions (Eg. 2016 VCAA Exam Q2c: Experimental Design Question - worth four marks; the state average was a horribly low 1.1 marks)

If you are asked to state a hypothesis, provide a clear predictive statement of a single idea that can be tested. Your hypothesis also needs to link the Independent Variable (IV) with the Dependent Variable (DV) so be sure to state these in your statement (eg. if plants receive sunlight (IV), then photosynthesis (DV) will occur. Do not confuse this with an aim, and never write it as a question.

- When analysing experimental data, you are asked to compare results, discuss **both groups** of the experiment
- Describe systematic and random errors, including potential sources for these in key experiments (such as cellular respiration and photosynthesis)
- Use two large groups (for example 20) of similar subjects.
- Treat the experimental group with the variable under investigation (the independent variable).
- The other group, the control group, is given a placebo or no treatment of the variable under investigation. Keep all other factors constant, such as diet, space, water and temperature – you need to list at least two of these factors.
- Provide a statement of what results would be required for the hypothesis to be supported. You need to mention the results (i.e. the values of the dependent variable - for example the amount of oxygen produced if hypothesis is referring to photosynthesis) for both the experimental and control set ups.

A suitable control group, to test the effect of injection of a vaccine into an experimental group, would be the injection of a saline solution into another group. Hence, any difference in response between the two groups would have been due to the vaccine, not the saline.

PTO

Students who wrote the function of the second group was to serve 'as a control' or 'as a comparison', with no further information, would not gain a mark. The key point of a control is to make a **valid comparison** and to show that the variable is responsible for the result; in this case, it is the vaccine that led to the production of antibodies**, not** the saline, i.e. a control set up must be explained **in the context of the experiment**.

Questions requiring an explanation always provide a greater challenge for students. Students must realise that their responses should address the questions being asked. Marks are not awarded if a student merely restates information provided in the stem of the question; however, this information should be used to help formulate an answer to the question. The space provided for the answer gives an indication of the detail that is required in the response. Students who write much longer answers than required often waste valuable time. Students are also reminded to use the number of marks awarded for the question as an indication of the detail required in the answer.

The questions that require a conclusion to be made after experimental results have been provided are typically challenging for students. Making conclusions from experimental data is **not** the same as summarising the results of an experiment. Students should read through the practical activities completed during the year and examine the way conclusions can be drawn from experimental data.

Additional Watchouts

- Distinguish between the terms elements and subunits of a macromolecule (proteins and nucleic acids).
- Comparative style-questions (Question 9/10) require you to utilise information from the passage. Quote this.
- Whenever you describe a process, you must also specifically name it (e.g. osmosis).
- Consider making a rough Venn diagram before answering **"Compare"** style questions. Include similarities and differences for each term. These questions are **consistently** not answered well.
- When making comparisons of experimental data, **quote** the **data AND unit** used in the first instance (e.g. an average of 0.6 cm^2 was eaten by A, with an average of 0.15 by b – 2017 VCAA SAQ 2c)
- **"Suggest"** style questions require you to use the information provided to justify a possible answer.
- Refer to the **action** of active sites when responding to questions regarding enzyme activity. Distinguish between the reasons for the decline in enzyme activity when temperature falls below the optimum value, and when temperature rises significantly above the optimum value. Refer to the formation of enzyme-substrate complexes where appropriate.
- When describing natural selection, clearly structure your response to incorporate variation, isolation (selective pressure), survival advantage of one phenotype to reproductive age before a change to the genotype.
- When **discussing** (explain why) tertiary proteins, ensure you mention the importance of the 3D structure at this level of organisation.
- Distinguish between the roles of cellular components (e.g. helper T cells) and that of the non-cellular components (e.g. complement proteins) of the immune system. How are helper T cells activated?
- Signal transduction is a favoured area of exam writers; ensure you are very clear when comparing hydrophilic and hydrophobic signalling molecules, where they bind to their receptors and what responses they induce within the cell.

PTO

- The words '**specific**' and '**complementary**' are so vital when explaining many ideas but in particular enzyme action, translation and cell signalling. When referring to enzyme action, an enzymes active site is complementary with the substrate. When discussing translation, a tRNAs anticodon is complementary to the mRNAs codon; tRNA molecules carry specific amino acids. A signalling molecules binds to a specific protein receptor on or within the target cell.

- If asked to give a function of a structure, a description or definition of the structure will not suffice. Its role needs to be clearly explained. When students were recently asked to provide a function of a porin, those who wrote "the porin is a protein channel" did not gain the mark.

- Be aware of errors in spelling that cause a lack in clarity of meaning such as 'glycogen' and 'glucagon'. Remember glucag**ON** is the horm**ON**e. Th**IA**mine (vitamin) is not accepted misspelling for the nitrogenous base, Th**YM**ine(T).

- Keep answers brief, e.g. when asked to describe Electron Transport, it's enough to say hydrogen combines with oxygen to produce water and 32/34 ATP/glucose. Simply include the inputs and outputs and the amount of ATP produced if that is all that is asked for in a stage of respiration or photosynthesis.

- Watch for the switches in focus within questions, e.g. a question may start asking about DNA structure, then switch to mutations and genetic engineering techniques such as gel electrophoresis, and then move onto forensic investigation. Another question may start asking about mutations and variation, and then move on to relatedness between species and then finish with natural selection. It would be very plausible for a question to start asking about enzymes, then follow up with enzyme inhibition and then move into how proteins are synthesised – transcription and translation.

- Often students waste valuable exam time by giving answers that are too long and complicated. Use the available marks and amount of space provided as a guide for the expected length of your response.

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

Good luck with your exam preparations!
TSFX