2012 Assessment Report

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

2012 Biology GA 1: Written examination 1

GENERAL COMMENTS

This examination was the final Unit 3 June examination for the *VCE Biology Study Design*. From 2013, a single examination covering both Units 3 and 4 will be held in November.

Many students presented papers of an outstanding standard. Students who set out their answers in a logical manner were more likely to gain marks than those who produced answers that appeared to be rushed and were often contradictory. It is important that students read questions carefully, plan their answers prior to writing, and use the marks allocated and the answer space given as a guide to the required depth of the answer. Students should not repeat the stem of the question in their answers.

Students approached the examination with confidence, indicating good use of time and use of advice given in previous Assessment Reports. It was clear that students had organised their time well and used the opportunity to convey their knowledge. Many students presented carefully written and well-expressed answers.

Most students answered Section B in pen rather than pencil as instructed. Although students who write in pencil are not penalised, using pen greatly improves the clarity of the answer and assists the assessors' ability to read and assess the answer.

The inappropriate use of abbreviations has been a problem in the past. It is most pleasing to report that there were no examples of that this year. It is important to again state that suitable abbreviations are DNA, ATP, NADH, etc. and chemical symbols such as H_2O. If students wish to use another abbreviation and are not sure of its appropriateness, then they should define it.

Teachers and students are reminded that the set of key skills (refer to page 12 of the study design) are examinable and school-assessed coursework provides students with firsthand information that can be applied to examination questions such as Question 6.

Resources to support VCE Biology are available on the Biology study page on the VCAA website. These resources are updated regularly and include articles and relevant website links.

SPECIFIC INFORMATION

Section A – Multiple-choice questions

The table below indicates the percentage of students who chose each alternative. The correct answer is indicated by shading.

Question	% A	% B	% C	% D
1	8	3	85	4
2	81	4	11	4
3	12	20	10	58
4	9	25	59	6
5	64	6	29	1
6	61	8	21	10
7	4	3	91	2
8	9	18	7	65
9	17	18	53	12
10	21	64	5	9
11	10	6	77	7
12	13	46	4	37
13	14	16	25	45
14	7	3	89	1
15	5	55	21	19

Question	% A	% B	% C	% D
16	33	7	4	55
17	10	8	8	74
18	17	33	15	35
19	4	71	3	22
20	8	12	77	4
21	12	51	30	7
22	2	9	7	82
23	14	65	12	10
24	8	9	11	72
25	7	11	72	10

In Section A, students are reminded to always read each alternative before deciding on their answer. By doing this, they may realise that they have not chosen the best answer or that they may have misunderstood the question in their first reading.

Section B – Short-answer questions

For each question, an outline answer (or answers) is provided. In some cases the answer given is not the only answer that could have been awarded marks.

Areas of concern in Section B included the following.

- Many students did not make comparative statements when required (Questions 1b. and 6c.).
- Many answers contained words that were spelt incorrectly. While students' spelling and grammar are not assessed, errors in spelling can cause a lack of clarity in meaning and failure to gain marks for the answer. For example, words such as 'glucagon' and 'glycogen' may be indistinguishable if spelt incorrectly or written poorly.

Question 1a.

Marks	0	1	2	Average
%	18	47	35	**1.2**

Name: cell membrane or plasma membrane
Description: a phospholipid bi-layer

A common incorrect answer was cell wall. Many students described a function of the cell membrane rather than describing its structure.

Question 1b.

Marks	0	1	2	Average
%	14	20	66	**1.5**

Plants have a cell wall and animal cells do not.

Any other suitable organelle unique to plant and animal cells such as chloroplasts, centrioles, etc. was acceptable. Comparative statements such as 'Only plant cells have cell walls' were also accepted.

Question 1c.

Marks	0	1	2	Average
%	18	30	52	**1.4**

A lack of mitochondria would mean a lower rate of cellular respiration and the person would tire more readily.

Question 1d.

Marks	0	1	2	Average
%	46	21	33	**0.9**

Cytosol is the fluid part of the cell. Cytoplasm is the fluid part and organelles excluding the nucleus (the area between the nucleus and plasma membrane).

Question 2

Marks	0	1	2	3	4	Average
%	30	16	19	23	12	**1.7**

One mark each was awarded for:

- three correct labels, such as allergen, antibodies, antibody binding site, cross-linking of allergen, histamines, etc.
- elaboration of terms/labels
- a description of events occurring
- a complete description of the allergic reaction.

This question gave students the opportunity to demonstrate their knowledge and be suitably rewarded for the depth of their response.

The following is an example of a good response.

> *Antibodies to the allergen are produced by the humoral response. These antibodies bind to the mast cell and act as receptors to the allergen. When the allergen is again encountered, the mast cells release histamines which cause the allergic symptoms such as swelling and itchiness.*

Question 3a.

Marks	0	1	Average
%	29	71	**0.7**

Protein/polypeptide

Question 3b.

Marks	0	1	Average
%	37	64	**0.7**

The sequence of amino acids

Question 3c.

Marks	0	1	2	Average
%	12	57	31	**1.2**

Animal: pig
Explanation: the amino acid sequence of the alpha chain is the same as in humans **or** the beta chain contains only one difference to humans (1 mark) and would therefore be the most similar shape/structure to the human insulin (1 mark).

Most students were unable to explain why the pig insulin would be the best source of insulin.

Question 3di.–ii.

Marks	0	1	2	Average
%	40	29	32	**0.9**

Question 3di.
The first base of the (triplet in) DNA is different for humans and cows.

Students could have also used the table to give the alternative triplets and indicate that there was a difference.

Question 3dii.
There are four different triplets for this amino acid.

Students could also list the four triplets or state that the third position can have four different bases.

Question 4ai.–ii.

Marks	0	1	2	Average
%	10	29	61	**1.5**

Question 4ai.
Any of:

- B cell/lymphocyte
- plasma cell
- B memory cell
- T_h cell.

A common incorrect answer was T cell.

Question 4aii.
The four-month-old would have a higher level of antibodies.

Students needed to provide a comparative statement and identify the child they were talking about. Many students did not answer the question being asked and instead explained why a four-month-old child would have a higher level of antibodies.

Question 4b.

Marks	0	1	2	Average
%	30	45	25	**1**

Two of:

- there would be an immediate response
- the response would be greater/more antibodies produced
- antibodies would be produced at a faster rate.

Many students answered this question well, providing clear and concise answers. However, some answers were unclear or the words used were open to interpretation such as, 'The response would be stronger and better'. 'Efficient' was also an inappropriate term.

Question 4ci.–ii.

Marks	0	1	2	Average
%	7	29	64	**1.6**

Question 4ci.
One of:

- memory cells depleted
- immunisation schedule not completed
- low level of antibodies.

Many students provided valid answers within the scope of the question.

Question 4cii.
One of:

- give booster shots to adults
- Health Department to provide free vaccinations.

This question provided scope for a variety of answers. Students were awarded the mark if they stated, 'Give the adults another vaccination'; however, it was incorrect to suggest 'Give the adults another injection'.

Question 4d.

Marks	0	1	Average
%	62	38	1

This is an example of the humoral immune response where specific antibodies are produced.

Students could also answer the question by correctly describing the cell-mediated response such as, 'The cell-mediated response involves T_c cells and not antibodies'.

Question 5a.

Marks	0	1	2	Average
%	25	6	69	1.5

As it was ambiguous whether the polypeptide referred to on the *y*-axis of the graph was for the substrate of the reaction or the product of the reaction, there were two ways to answer this part of this question:

- polypeptide is the substrate. At 10 °C the mark should be higher than the 37 °C mark, and the 80 °C mark would be even higher than the 37 °C
- polypeptide is the product. At 10 °C the mark should be lower than the 37 °C mark, and the 80 °C mark would be even lower than the 37 °C.

Students could indicate their value either as a bar/line/cross on the graph or draw a continuous line; for example, a bell-type graph.

Question 5b.

Marks	0	1	2	Average
%	33	21	46	1.1

- 10 °C: The reaction occurs at a slower rate as it is lower than the optimum temperature or there are fewer collisions occurring between the enzyme and substrate molecules.
- 80 °C: The enzyme is denatured.

Too often students referred to the polypeptide/protein being denatured rather than the enzyme being denatured.

Question 6ai.–ii.

Marks	0	1	2	3	Average
%	12	23	37	28	1.8

Question 6ai.

The maintenance of (either of):

- a relatively stable internal environment
- an internal environment within a narrow range of limits.

Question 6aii.

Variable: blood glucose

Explanation: glucose is required for cellular respiration, or too much can cause excessive urination

Other variables could have been oxygen, carbon dioxide or an ion; for example, Na^+.

Careless errors such as choosing insulin rather than blood glucose as the variable or making vague statements such as 'so an organism can function correctly' meant many students were not awarded full marks.

Question 6bi–ii.

Marks	0	1	2	Average
%	20	48	32	1.1

Question 6bi.

It detects the light (stimulus).

Question 6bii.
Either of:

- no, as the original stimulus is not reduced by the response
- yes, if the response such as constriction of the pupil reduces the original stimulus; for example, the light entering the eye.

Question 6c.

Marks	0	1	2	Average
%	27	23	50	**1.3**

Students needed to complete the table by giving two of the following aspects of the nervous and endocrine systems.

Aspect	Nervous system	Endocrine system
speed	fast	slow
duration	short	long
signalling molecule	neurotransmitter	hormone

This question required students to name an aspect common to both systems and to then compare that aspect; however, many students did not attempt the question. Students who did answer this question gave a variety of correct responses.

Question 7a.

Marks	0	1	2	Average
%	43	31	25	**0.8**

Non-cellular (no mark) and two of:

- not made of cells
- does not undergo cellular processes
- only reproduced by a host cell.

Many students provided well-reasoned answers to this question.

Question 7b.

Marks	0	1	2	Average
%	28	29	42	**1.2**

- Scenario 1 (general viral first line of defence)
  Intact skin
  Either: secretions of mucus or ciliated epithelia
- Scenario 2 (students acknowledged that the mosquito carries the virus)
  Two of: Hair or skin as a physical barrier, or secretions; for example, sweat to deter mosquitoes
- Scenario 3 (students acknowledged that the mosquito breaches first line of defence)
  Students needed to include a statement that the skin has been breached and give an example of a defence mechanism, such as cells releasing interferon.

Many answers were accepted for this question. As stated in the stem of the question, Yellow fever is caused by a virus and is transmitted through the bite of a particular species of mosquito, thus bypassing first line of defence mechanisms.

Students were required to answer this question with reference to viruses and not other pathogens, such as bacteria.

Question 7c.

Marks	0	1	2	Average
%	6	32	62	**1.6**

Prevent the disease entering the Australian population and one of:

- quarantine
- treatment
- test for the presence of the virus.

A variety of answers were acceptable and many students gave well-reasoned responses. Vaccination alone was not accepted as a solution.

Question 8ai.–ii.

Marks	0	1	2	Average
%	35	28	37	**1**

i. Input X: water or inorganic phosphate
ii. Compound Y: oxygen

Question 8b.

Marks	0	1	2	3	Average
%	17	15	23	45	**2**

Process	Name of process	Site of process
M	light-dependent reaction	grana of chloroplast
O	glycolysis	cytoplasm/cytosol
P	stages of cellular respiration	mitochondria

Question 8c.

Marks	0	1	2	Average
%	54	33	12	**0.6**

Both of:

- carbon dioxide used in photosynthesis
- more than is produced (in cellular respiration).

Question 8d.

Marks	0	1	Average
%	28	72	**0.7**

Two of:

- suitable temperature
- light
- water/space
- lack of competition.

A wide variety of sensible and suitable answers were provided by students. Oxygen was not accepted.