2012 Assessment Report

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

2012 Biology GA 3: Examination 2

GENERAL COMMENTS

There was great variation in the quality of answers provided to the 2012 Biology examination 2. The more able students applied their knowledge well and many presented papers of an outstanding standard. Students who were able to 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 follow question requirements; for example, using a labelled diagram in Question 4a. or placing an X on the curve in Question 6ai. The marks for each question and the space provided for the answer were a guide to the amount of information expected in a response.

Students must endeavour to correctly spell and use common biological terms. Ambiguous terms are to be avoided.

Students are reminded to follow the request to complete Section B in pen. The use of pencils in Section B is to be strongly discouraged as answers written in pencil are often difficult to read and hence interpret. It is most pleasing to again report that the minimal usage of pencil in Section B has continued. This improved the clarity of the writing and consequently the ease of marking. It is important to note that should a student start writing in pencil and then remember the request, there is no need to go over the answers written in pencil. It is, however, suitable to answer some questions such as those with diagrams – for example, Question 4a. – or to do genetic crosses in pencil.

SPECIFIC INFORMATION

Section A – Multiple-choice questions

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

Question	% A	% B	% C	% D
1	14	48	21	16
2	5	10	82	3
3	6	3	83	8
4	59	12	15	13
5	15	51	24	10
6	81	5	11	4
7	9	8	10	72
8	1	90	3	7
9	19	6	70	5
10	3	72	17	8
11	11	9	6	74
12	92	6	1	1
13	1	1	97	0
14	62	8	25	4
15	2	2	2	93
16	2	15	17	65
17	66	18	12	4
18	5	7	2	86
19	9	85	4	2
20	6	5	81	8
21	22	59	13	5
22	3	14	6	77
23	1	3	11	85
24	75	14	8	3
25	3	86	1	10

Section B – Short-answer questions

This report provides sample answers or an indication of what the answers may have included. Unless otherwise stated, these are not intended to be exemplary or complete responses.

Question 1a.

Marks	0	1	Average
%	17	83	**0.9**

The two stages of protein synthesis are transcription and translation.

Question 1b.

Marks	0	1	2	3	Average
%	26	12	18	44	**1.8**

Three of

- DNA template strand copied
- RNA polymerase involved
- (pre)mRNA produced by complementary base pairing
- introns removed, or polyA tail or methyl cap added to (pre)mRNA.

Students gained full marks if they referred to mRNA as the final product via (pre)mRNA, or that the product was mRNA.

Question 1c.

Marks	0	1	2	3	Average
%	26	18	24	32	**1.6**

Three of the following answers were required for full marks.

Letter representing structure chosen	Role of structure in second stage of amyloid beta-protein synthesis
J	contains the code for protein synthesis, contains rRNA/structural component of ribosomes
K	carries specific amino acid to the ribosome
L	provides energy required for protein synthesis
M	folded to create the protein
R	the site of protein synthesis
S	carries the code for the synthesis of protein

It was important that the organelle's role in the synthesis of amyloid beta-protein was stated.

Question 2

Marks	0	1	2	Average
%	36	18	46	**1.1**

Point of comparison	Discontinuous variation	Continuous variation
number of genes and/or alleles involved	small number	many
impact on phenotypes	few/discrete	many

Many students didn't appear to understand the different types of variation, often mixing them up. There were a variety of ways of expressing the correct answer.

Question 3a.

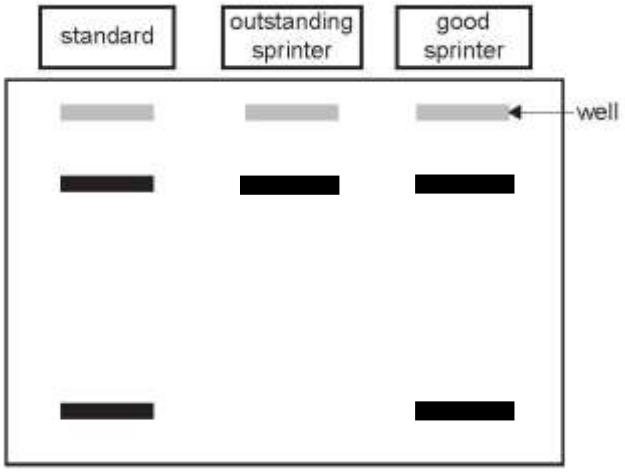
Marks	0	1	2	3	4	Average
%	30	11	14	23	23	2

- heat DNA to approximately 90 °C or to separate strands
- cool to approximately 50 °C or to anneal/attach primers
- heat to approx 72 °C or Taq/DNA polymerase copies strands
- repeat cycle.

Many students set out clear answers that demonstrated a sound understanding of the process. Many other students missed out on full marks by not stating that the process needed to be repeated.

Question 3b.

Marks	0	1	2	3	Average
%	34	13	11	42	1.6



An outstanding sprinter would have only one band as only one allele is present/homozygous. A good sprinter has two different alleles/heterozygous.

Students who could not correctly place bands on the gel were still able to receive two marks for a suitable explanation.

Question 4a.

Marks	0	1	2	3	4	Average
%	37	12	15	20	16	1.7

The diagram should show four of

- DNA polymerase
- DNA unwinding
- suitably labelled replication fork
- leading/lagging strands, Okazaki fragments or DNA ligase in discontinuous replication
- complementary base pairing
- semi-conservative nature.

Some students took this question to be cell replication, not DNA replication, and therefore incorrectly illustrated mitosis.

Question 4b.

Marks	0	1	2	Average
%	75	19	6	0.3

Binary fission differs from mitosis as (two of)

- the chromosome does not line up on the equator
- the chromosome does not separate at the centromere
- there are no spindle fibres

- there are no phases; for example, prophase
- it is quicker.

It was important that students identified how the two processes differed. Therefore, to state that binary fission occurred in prokaryotes was not relevant and did not gain any marks.

Question 4c.

Marks	0	1	2	Average
%	16	18	66	**1.5**

Apoptosis is programmed cell death and reduced apoptosis would result in webbing between the fingers.

Question 4d.

Marks	0	1	2	Average
%	23	8	69	**1.5**

The following is a possible answer.

A: syndactyly, **a**: non-webbed fingers and toes
Ruby: **Aa,** Jonah: **aa**
Offspring: ½ **Aa** ½ **aa**
There is a 50 per cent chance that the child of Ruby and Jonah will have syndactyly.

This question was well answered and students set out their answers clearly.

Question 5
Many students appeared confident with this topic and were generally able to interpret and analyse the data.

Question 5a.

Marks	0	1	Average
%	71	29	**0.3**

Food availability or finding food source

Diet was deemed too vague and was therefore not awarded a mark.

Question 5bi–ii.

Marks	0	1	2	Average
%	2	28	69	**1.7**

5bi.
Molossus molossus or Velvety free-tailed bat

5bii.
One of

- detects insects far away or trees are large
- better chance of finding prey or a mate
- travel better over longer distances.

Question 5c.

Marks	0	1	Average
%	22	78	**0.8**

Divergent or adaptive radiation

Speciation is the product of divergent evolution.

Question 5d.

Marks	0	1	2	Average
%	39	30	31	**0.9**

The Mexican long-tongued and Velvety free-tailed bats had a similar number of differences in their DNA or their DNA when hybridised had a higher melting temperature. The DNA of both the Mexican long-tongued and Velvety free-tailed bats when hybridised with the DNA of the Black myotis bat had a lower melting temperature. The Mexican long-tongued and Velvety free-tailed bats had a smaller number of differences when their DNA was hybridised together.

The question asked for what results would have led to the construction of this phylogeny, but many students incorrectly based their answer on describing the diagram as 'The Mexican Long-tongued and Velvety free-tailed bats are more closely related'.

Question 5e.

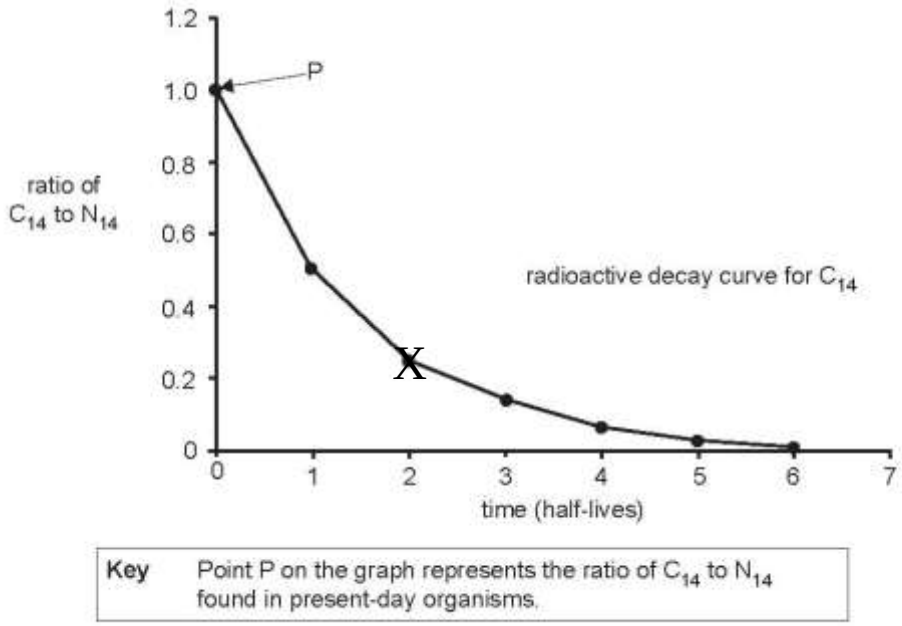
Marks	0	1	2	Average
%	61	18	21	**0.6**

Disagree, as there is no physical barrier. The different species live in the same area.

Question 6ai.–ii.

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

6ai.
The X should have been placed on the curve at coordinates 2, 0.25.



6aii.
12 000

Many students did not mark the graph at all and a considerable number were unable to successfully obtain the answer of 12 000.

Question 6bi.–ii.

Marks	0	1	2	Average
%	22	39	38	**1.2**

6bi.
The fossil is too old or greater than 50 000 years old.

6bii.
One of

- potassium – argon dating or uranium dating
- thermoluminescence
- electron spin resonance.

Question 7a.

Marks	0	1	2	Average
%	64	26	10	**0.5**

Both of

- share a common ancestor or both retain genes relating to animal-like characteristics
- different mutations occurred as each animal evolved or different codons can code for the same amino acid.

Question 7b.

Marks	0	1	2	Average
%	41	39	20	**0.8**

Selective breeding involves humans choosing which organisms will breed. Natural selection is where a selective agent removes the unsuited, and the suited then breed.

Questions 7c.

Marks	0	1	Average
%	44	56	**0.6**

Genetically modified organism (GMO is a suitable abbreviation), transgenic or transfected

Question 8a.

Marks	0	1	Average
%	56	44	**0.5**

Longer upper limbs or prehensile toe

Question 8b.

Marks	0	1	2	Average
%	14	35	51	**1.4**

The precision grip would allow for, for example, the making or using of tools. The projecting nose would allow for, for example, greater sense of smell or thermoregulation.

The precision grip allows fine manipulation in humans to perform tasks such as writing, and the making and using of tools, etc.

Answers such as climbing, which is characteristic of other primates and not dependent on the precision grip, were incorrect.

Question 8c.

Marks	0	1	2	Average
%	24	34	42	**1.2**

Enlarged brain case, accommodating a larger brain. This allowed for more complex thought processes and the ability to adapt to changing new environments.

Question 8d.

Marks	0	1	2	Average
%	21	39	41	**1.2**

Two of

- significance of burning: hygiene, ritual or ability to use fire
- significance of making bed: knowledge passed down, use of tools.

Students were not required to state whether their significances were cultural or technological or both; however, many students set out clear and well-thought-out answers.