



STAV Publishing 2009

BIOLOGY

Unit 4

Trial Examination

SOLUTIONS BOOK

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Use this page as an overlay for marking the multiple choice answer sheets. Simply photocopy the page onto an overhead projector sheet. The correct answers are open boxes below. Students should have shaded their answers. Therefore, any open box with shading inside it is correct and scores 1 mark.

ONE ANSWER PER LINE		ONE ANSWER PER LINE	
1	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	14	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	15	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	16	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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5	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	18	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
6	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	19	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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10	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	23	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
11	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	24	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
12	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	25	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
13	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		

TEACHERS, PLEASE NOTE:

In marking the Exam, teachers should keep in mind that the language used in the suggested answers is sometimes more sophisticated than a student would offer, since these answers are written for teachers' information in their correction of the Exam.

*The answers suggested here might not be the only correct responses possible. Teachers must use their professional judgement in awarding marks for other answers offered. However, in accordance with the VCAA practice, students who give a correct response, and then offer a contradictory incorrect response within the same part of the question, should **not** be awarded any marks for the correct part of the response. Also in accordance with the VCAA practice, no half marks should be given.*

SECTION A - MULTIPLE CHOICE QUESTIONS (1 mark each: 25 marks)

1	C	16	A
2	C	17	C
3	B	18	C
4	D	19	D
5	B	20	B
6	A	21	B
7	A	22	D
8	C	23	A
9	B	24	D
10	D	25	A
11	B		
12	C		
13	D		
14	B		
15	D		

SECTION B - WRITTEN RESPONSES**Question 1**

- a hh 1 mark
- b Both in utero and in the nest the rabbit has a uniform warm environment so the enzyme is not activated. Once out of the nest the extremities of the rabbit have low temperatures which activates the enzyme. 1 mark
- c Take two groups of rabbits that are still white. Wrap up the ears and feet of one group so that they are warm and leave the other group unwrapped (1). Expose both groups to a cool environment. After some time the group with the unwrapped extremities should show black pigment in these extremities but the wrapped group should not (1). **Or** could shave the fur off a section of the back of one group and attach ice packs to the area. This area should then grow black fur. 2 marks
- d In a cold environment the dark extremities are less likely to freeze as they can absorb heat more than the white extremities. 1 mark

Total Question 1: 5 marks

Question 2

a Alleles of a gene are codominant when, in the heterozygous individual, the expression of both alleles are in the phenotype.

1 mark

b $SsC^Y C^W$

1 mark

c

	SC^Y	SC^W	sC^Y	sC^W
SC^Y	$SSC^Y C^Y$	$SSC^Y C^W$	$SsC^Y C^Y$	$SsC^Y C^W$
SC^W	$SSC^Y C^W$	$SSC^W C^W$	$SsC^Y C^W$	$SsC^W C^W$
sC^Y	$SsC^Y C^Y$	$SsC^Y C^W$	$ssC^Y C^Y$	$ssC^Y C^W$
sC^W	$SsC^Y C^W$	$SsC^W C^W$	$ssC^Y C^W$	$ssC^W C^W$

All correct 3 marks

3 marks

d

Phenotypes	Ratios
Short hair yellow	3
Short hair cream	6
Short hair white	3
Long hair yellow	1
Long hair cream	2
Long hair white	1

All correct 3 marks

3 marks

Total Question 2:

8 marks

Question 3

a Point mutation

1 mark

b Tyrosine has been replaced by a stop codon.

1 mark

c This will stop the translation of the polypeptide, creating a short polypeptide that will not be able to function as an enzyme.

1 mark

d This is an example of the founder effect (1). As most of the sufferers can trace their family tree back to a particular couple, that would have had the mutation. A larger population has developed from this founding population, and as this is an isolated community the incidence is high (1).

2 marks

Total Question 3:

5 marks

Question 4

a Polymorphs (or Batesian mimicry.)

1 mark

b Those butterflies that look like the toxic ones will be avoided by predators and will therefore survive to reproduce.

1 mark

c As the female lays fertilised eggs it is more beneficial for the species for her to survive to lay her eggs.

1 mark

d Natural selection.

1 mark

e In the original population of African swallowtails there would be variation in phenotypes some of which would resemble the unrelated toxic species living in the same location (1). These phenotypes would survive to reproduce and would become more frequent in the population (1). Eventually only those polymorphs that resembled toxic species would form the population of African swallowtails (1).

3 marks

f If toxic species 2 disappeared from the area the African swallowtail that looked like toxic species 2 would no longer have a selective advantage (1) and as a result this particular polymorph would become less frequent and would probably die out (1).

2 marks

Total Question 4:

9 marks

Question 5

- a Restriction enzymes or restriction endonucleases. 1 mark
- b Each restriction enzyme cuts at a specific site in the DNA molecule. 1 mark
- c Using the same restriction enzyme means that the DNA will be cut only where there is the specific nucleotide pattern, as individuals can differ in their nucleotide pattern the individuals will show a different pattern in the final lengths of DNA cut. 1 mark
- d Individual 1 (as both alleles are cut to produce the same lengths of DNA.) 1 mark
- e Individuals 2 and 7 share one and individuals 4 and 8. 1 mark
- f $200 (2 \times 60 + 2 \times 50 + 2 \times 20)$ 1 mark
- g $0.55 (30 \times 2 + 50 = 110, \text{ then } 110 \div 200)$ 1 mark

Total Question 5: 7 marks**Question 6**

- a If the baby was too large it would not be able to pass down the birth canal and this would have meant the death of the mother (1).
If the baby was too small its chances of survival would be low (1). 2 marks
- b In wealthy developed countries babies that are too large are able to be delivered by caesarean section and babies that are too small or premature can be assisted by advanced neonatal care (1) so there is no selection pressure on birth weight (1). 2 marks

Total Question 6: 4 marks**Question 7**

- a i Half life of a chosen radioactive isotope. 1 mark
- ii Stratigraphy (whereby the oldest fossils are in the lowest strata.) Or Use an index fossil 1 mark
- b Smaller brain case (1) and heavier brow ridges (1) of *Homo erectus* compared to *Homo sapiens*. 2 marks
- c *Australopithecus afarensis* has much larger molars than modern man (1) this would suggest that the diet of *Australopithecus* was made up of harder more fibrous material (1) that needed to be ground up than the diet of modern man. 2 marks
- d DNA sequencing involves identifying the order of nucleotides along a strand of DNA. 1 mark
- e By comparing the genome of Neanderthals to modern man scientists will be able to identify genetic changes that have occurred over the last few hundred thousand years when fully anatomical and behavioural modern man appeared. 1 mark
- f There are problems with degradation and chemical changes to the DNA over time (1). There is a high risk of contamination of the DNA with modern human DNA (1). 2 marks
- g The specimen needs to be protected from the action of decay bacteria such as being deprived of access to oxygen for these bacteria. 1 mark
- h The genus *Homo* as part of their cultural evolution maybe had practices of disposing of dead bodies by burning or burial which were not ideal conditions for fossilisation. 1 mark

Total Question 7: 12 marks**Total Section B: 50 marks**
Total examination: 75 marks**END OF SUGGESTED SOLUTIONS**