

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 checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	14	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
2	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	15	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
3	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	16	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
4	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	17	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
5	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	18	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
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10	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	23	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
11	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	24	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
12	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	25	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
13	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" 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	B	16	C
2	C	17	B
3	D	18	D
4	A	19	A
5	A	20	B
6	B	21	C
7	A	22	A
8	A	23	D
9	C	24	B
10	C	25	B
11	B		
12	C		
13	D		
14	C		
15	B		

SECTION B - WRITTEN RESPONSES**Question 1**

- a Two 1 mark
- b Female – yellow, male – yellow 1 mark
- c $\frac{2}{3}$ yellow and $\frac{1}{3}$ agouti (grey) 1 mark
- d $\frac{1}{3} A^yA$ $\frac{1}{3} A^ya$ $\frac{1}{3} Aa$ 1 mark

Total Question 1: 4 marks**Question 2**

- a The final expression of colour would be due to a series of chemical reactions (1). The product of the **I** allele would block this pathway, resulting in no final product and hence no colour (1). 2 marks
- b As **r** is recessive, the onion needs to have the genotype **rr** for the yellow to be expressed (1). The genotype for the inhibitor gene needs to be **ii** so the colour is expressed, therefore all yellow onions will have the same genotype **rrii** (1). 2 marks
- c **RrIi RRiI rrIi RrII RRii rrII**
(all 6 right for 3 marks, 4 or 5 right for 2 marks, 2 or 3 right for 1 mark, 1 right = 0 marks) 3 marks
- d (i) **rrII** 1 mark
- (ii) **RRii** 1 mark

Total Question 2: 9 marks

Question 3

- a X-linked dominant 1 mark
- b All daughters of affected fathers show the trait (1). It is dominant as III1 and III2 have children without the trait and they both have the trait (1). 2 marks
- c (i) 100% 1 mark
- (ii) 0% 1 mark
- Total Question 3: 5 marks**

Question 4

- a If genes are regulated this means that they are only activated when required in particular cells and this conserves energy. 1 mark
- b Transcription is the process of copying the genetic instructions present in DNA to messenger RNA. 1 mark
- c Pre-messenger RNA is formed according to complementary base pairing using the DNA template strand (1).
The introns are removed from the pre-mRNA forming mRNA (1). 2 marks
- d A mutation 1 mark
- e If the regulatory sequence of DNA has been changed, the regulatory protein would not be able to attach properly to this regulatory sequence of DNA (1) and as a result transcription would not be able to take place effectively and the gene product would not be formed (1). 2 marks
- f A mutation in the regulatory sequence of DNA for the tb1 gene has meant that more tb1 gene product has been produced causing inhibition of branches and greater development of ears in the maize. 1 mark
- g Selective breeding or artificial selection. 1 mark
- h In the wild population of teosinte, there would have been some plants with larger ears and fewer branches (1).
The seeds of these plants would have been selected by the Indians for planting (1).
This favourable trait would have been inherited and passed on to the next generations of plants increasing the frequency of the trait in the population (1). 3 marks
- Total Question 4: 12 marks**

Question 5

- a It is autosomal as it is on chromosome 14 (1) and it is co-dominant as both alleles make a contribution to the production of AAT (1). 2 marks
- b Transgenic organism. 1 mark
- c The plasmid is acting as a vector. 1 mark
- d The plasmid needs to be inserted into the nucleus of the cells (1) as the DNA of the plasmid needs to be taken up by the nuclear DNA in order to be expressed (1). 2 marks
- e The AAT is a glycoprotein and this type of post-translation modification cannot be done by prokaryotes. **Or** AAT comes from humans that have introns and bacteria cannot remove introns whereas sheep cells can. 1 mark
- Total Question 5: 7 marks**

Question 6

- a As these fossils are only ~ 11,000 years old, they could be dated using radioactive carbon dating. 1 mark
- b (Any two for two marks)
Red Deer cave skull has
- More pronounced brow ridges **or**
 - Broader nose and eye sockets **or**
 - Flatter cheeks that flare widely to the side. 2 marks
- c The change in allele frequencies due to chance. 1 mark
- d Extract DNA from the fossils and compare it to DNA from modern man and primitive forms such as Neanderthals. 1 mark
- e Either of
- DNA is difficult to extract from bone fossils **or**
 - Ancient DNA tends to break down over time 1 mark
- f Heat loss is less restricted as air flow increases the rate of evaporation from the naked skin. 1 mark
- g Diagram 1 shows the human, chimpanzee and gorilla evolved away from each other, the parasites that were on them evolved away from each other at the same time. 1 mark
- h Scientists observe the amino acid sequence of the particular protein product of a particular gene, or the DNA sequences, which is the same for the species under consideration (1).
By knowing the rate of change of the amino acid sequence a time of divergence can be estimated (1). 2 marks
- i (i) This species of louse has evolved from the ancestor of the chimpanzee species and would have diverged as the humans diverged from the chimpanzees as the evolutionary dates are similar. 1 mark
- (ii) This louse must have moved directly from the gorilla to humans later and then continued to evolve (1) as humans diverged from the gorilla 11.8 mya and the gorilla louse and the pubic louse only diverged 3.3 mya (1). 2 marks

Total Question 6: 13 marks
Total Section B: 50 marks
Total examination: 75 marks

END OF SUGGESTED SOLUTIONS