

BIOLOGY

Unit 4

Trial Examination

SOLUTIONS BOOK

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 marked their answers with a cross. Therefore, any open box with a cross inside it is correct and scores 1 mark.

1.		B	C	D
2.	A	B		D
3.		B	C	D
4.		B	C	D
5.	A		C	D
6.		B	C	D
7.	A		C	D
8.	A	B	C	
9.		B	C	D
10.	A	B	C	
11.	A	B		D
12.	A	B	C	
13.	A	B		D

14.	A		C	D
15.		B	C	D
16.	A	B	C	
17.	A	B	C	
18.		B	C	D
19.	A	B		D
20.	A		C	D
21.	A	B	C	
22.		B	C	D
23.	A	B		D
24.		B	C	D
25.	A		C	D

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

SECTION B - WRITTEN RESPONSES**Question 1**a kk

1 mark

b Unlinked genes are on different chromosomes.

1 mark

c $AA^YKk \times AA^YKk$

1 mark

d

	AK	Ak	A^YK	A^Yk
AK	AAKK	AAKk	AA^YKK	AA^YKk
Ak	AAKk	AAkk	AA^YKk	AA^YKk
A^YK	AA^YKK	AA^YKk	A^YA^YKK	A^YA^YKk
A^Yk	AA^YKk	AA^Ykk	A^YA^YKk	A^YA^Ykk

1/2 yellow and kinky tail

1/4 grey and kinky tail

1/6 yellow and normal tail

1/12 grey and normal tail (2 marks for working, 1 mark for phenotypes, 1 mark for ratios)

4 marks

Total Question 1: 7 marks

Question 2

- a The inheritance is recessive as **I** 1 and **I** 2 do not have the condition, but offspring **II** 2 and **II** 5 have the condition (1). The condition is autosomal as if it was X- linked in order for **II** 2 to have the condition individual **I** 2 would also need to have the condition (1). 2 marks
- b **I** 1, **I** 2, **I** 4, **II** 7, **II** 8 (1 mark for all) 1 mark
- c $\frac{1}{2}$ 1 mark
- Total Question 2: 4 marks**

Question 3

- a This is autosomal as the gene is on chromosome 6 (1) and it is recessive as heterozygotes do not show the trait (1). 2 marks
- b Introns (1) 2 marks
- c Exons (1) 2 marks
- d Transcription (1) 3 marks
- e mRNA (1) 1 mark
- f Translation (1) 3 marks
- g ATA or ATG 1 mark
- e i A change of C to T (1) 2 marks
- ii A point mutation (1) 2 marks
- f The order of amino acids governs the folding of the peptide into a 3 dimensional structure (1). As the order of amino acids has changed as a result of a mutation, the protein could be prevented from fitting into the cell membrane because of its change of shape (1). 2 marks
- g Polymerase Chain Reaction. 1 mark
- h As the anti-monoclonal antibody will only bind to double stranded DNA, it will only react if the probe has bound to the heated and hence the single stranded DNA PCR product (1). The probe will only bind to form double stranded DNA if the specific mutation is present (1). 2 marks
- Total Question 3: 15 marks**

Question 4

- a A plasmid is a small circular fragment of DNA that exists in the cell and replicates independently from the main chromosome. 1 mark
- b Restriction endonuclease enzymes 1 mark
- c DNA ligase enzyme 1 mark
- d The cheese can be labelled GMO free (1) as the cheese is not made using GMO themselves but rather it is the product of a genetically modified organism i.e. the enzyme (1). 2 marks
- e The GM crop can produce pollen that may contain the inserted genes. If there is not an adequate buffer zone this pollen could blow across to non-genetically modified crops of the same species and pollinate them resulting in the spread of the genetically modified crop. **or** If the spray of the herbicide drifts to the farms where crops are still sensitive to it, it will destroy these crops. 1 mark
- Total Question 4: 6 marks**

Question 5

- a (Any two of the following for 2 marks)
Both plants have the same rounded shape. Both have leaves reduced to spikes. Both are succulent plants. Both have a ribbed appearance. 2 marks
- b Convergent evolution. 1 mark
- c Both these plants have evolved in completely different places but show a physical similarity as an adaptation to their similar environmental niches. 1 mark
- d As the plants are not related, the features described in **a** above are analogous (1) as they do not have a common ancestor (1). 2 marks
- e Nuclear DNA comes from two parents whereas the cpDNA is inherited from one parent (1) and therefore does not show the variability due to crossing over and random assortment of chromosomes as in nuclear DNA (1). 2 marks
- Total Question 5: 8 marks**

Question 6

- a The chimpanzee as there are no differences in amino acid sequences in the β chain of haemoglobin between the chimpanzee and humans. 1 mark
- b Lemur, Old world monkey, Gorilla, Human $\leftrightarrow$ Chimpanzee, Gibbon, New world monkey (reading left to right) (all correct 2 marks) 2 marks
- c Another technique is DNA hybridization (1). DNA from two species is made single stranded, mixed and allowed to pair due to complementary base pairing. The pairing will be greater the more the degree of complementarity there is between the two species (1). 2 marks
- d i (Any two of the following with an appropriate selective advantage for 2 marks)
&
ii
- Upright stance
can see over tall grass to spot predators and food **OR**
smaller surface area presented to the sun at midday
 - Bipedalism
more energy efficient means of locomotion.
 - Larger brain case
more learned behaviour possible
 - Precision grip
more dexterity in fashioning tools.
- 2 marks
- Total Question 6: 7 marks**

Question 7

- a About this time agriculture was developed and this resulted in a more permanent regular supply of food for the population. Communities could remain in the one place and better provide for the population. 1 mark
- b (Any sensible example plus how it affects human evolution for 2 marks)
For example:
Reproductive technology allows the prediction of the likelihood of inheriting a genetic disease by prenatal testing. This can enable parents to choose not to have a particular offspring. This could affect the gene pool.
In vitro fertilization has enabled couples who would normally not breed to have children. This could also affect the gene pool.
Stem cell manipulation has allowed research into differentiating stem cells so that such cells can be transplanted into people who need cells such as brain cells.
Medical treatment of people carrying a genetic defect such as haemophilia enabling them to possibly breed could increase the incidence of genetic diseases in the community. 2 marks

Total Question 7: 3 marks**Total Section B: 50 marks****Total examination: 75 marks****END OF SUGGESTED SOLUTIONS**