

BIOLOGY

Unit 4

Trial Examination

ANSWER BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks	Suggested times (minutes)
A	25	25	25	30
B	4	4	50	60
Total			75	90

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.
- No calculator is allowed in this examination.

Materials supplied

- Question and answer book of 19 pages with a detachable answer sheet for multiple-choice questions inside the front cover.

Instructions

- Detach the answer sheet for multiple-choice questions during reading time.
- Write your **name** in the space provided above on this page and on the answer sheet for multiple-choice questions.
- All written responses should be in English.

At the end of the examination

- Place the answer sheet for multiple-choice questions inside the front cover of this 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.	A		C	D
2.	A		C	D
3.	A	B		D
4.	A	B		D
5.		B	C	D
6.	A	B	C	
7.	A	B		D
8.	A		C	D
9.	A	B		D
10.		B	C	D
11.		B	C	D
12.	A		C	D
13.	A	B	C	

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

SECTION B - WRITTEN RESPONSES**Question 1**

- a Genes that occupy different loci on the same chromosome are linked. 1 mark
- b The result of all red pointed leaves would be expected as both these characteristics are dominant according to the data (1) and will be expressed in the next generation of the cross between pure breeding parents red pointed and white smooth.(1) 2 marks
- c Going down the table the genotypes are: $\underline{rp}$, $\underline{RP}$, $\underline{rp}$, $\underline{Rp}$
 rp rp rP rp 2 marks
- Answers should show linkage notation using underlining. 2 marks
- d Phenotypes expected would be: white smooth; red pointed; white pointed; red smooth. Ratio of 1:1:1:1. ie approximately equal numbers of each phenotype. 2 marks
- e Recombinants 1 mark
- f Total number of offspring = $10+14+40+36=100$
 Number of recombinants = 24
 $\% = 24\% = 24$ map units 2 marks

Total Question 1: 10 marks

Question 2

- a *X-linked* 1 mark
- b *The majority of X-linked conditions are recessive (1) and the male only has one X chromosome so that all alleles will be expressed. In order for a female to express a recessive X-linked condition she must have inherited both alleles as she has two X chromosomes and this is less likely. (1)* 2 marks
- c *When only one allele is present for Retts, as is the case in males, the condition could be lethal and the embryos die in utero.* 1 mark
- d *The mother must have undergone a mutation in her egg cells and passed the condition on to her daughter. She would not show the condition as all her body cells would have the normal alleles.* 2 marks
- e *Polymerase chain reaction.* 1 mark
- f *To increase the amount of DNA under investigation to an amount able to be worked with.* 1 mark
- g *These are the parts of the gene that code for protein or form mRNA.* 1 mark
- h *Thymine , Cytosine (one mark each for correct spelling)* 2 marks
- i *A point mutation.* 1 mark
- j *In the protein formed Threonine has been inserted instead of alanine.* 1 mark
- k *This results in a frame shift (1) that causes all codons downstream from the insertion to be misread, leading to many changes in amino acid sequences. (1)* 2 marks

Total Question 2: 15 marks**Question 3**

- a *Various answers such as*
 - *availability of food at the tops of the trees*
 - *absence of predators at the tops of the trees.*
1 mark
- b *There is variation in the alleles of the genes that influence geotaxic behaviour in flies. (1) Flies that find food (or whatever was suggested earlier) by flying upwards survive and breed. (1) Over many generations flies in this population all have this inherited negative geotaxic behaviour. (1)* 3 marks
- c *The two populations would be geographically and reproductively isolated in their niches. (1) Eventually two separate species of flies may evolve. (1)* 2 marks
- d *In the wild the opposite extremes (flying upwards and flying downwards) are being selected for and the intermediate trait (flying in the middle range) is being selected against, resulting in two non-overlapping populations ie the original population is disrupted into two, and could end up as two new species, ie diversified.* 2 marks
- e *A mutation can change the DNA of the fly (1) so that the fly has a different genotype and phenotype (direction of flight) to its parents. (1)* 2 marks

Total Question 3: 10 marks**Question 4**

- a *An ancient animal (in this case) from which two or more later animals evolved.* 1 mark
- b *Modern apes are quadrupedal (walk on 4 feet) most of the time.* 1 mark
- c *Lucy walked upright, probably on grassy terrain. She probably rarely climbed trees. She was able to seek food at ground level and move between clumps of trees.* 1 mark
- d *No, they were unlikely to interbreed successfully (1) because they have been classed as different species, scientists must believe that they were sufficiently different that they could not have interbred. (1)* 2 marks
- e *Large brain gave better problem solving ability which made Homos better able to develop survival strategies.* 1 mark
- f *Any sensible reason such as:*
 - *Population was becoming too big for available resources.*
 - *Conflict within population groups caused some to flee.*
1 mark

- g Any sensible explanation such as:
- *H.sapiens* may have killed *H.erectus* in Africa, but it took some time for *H.sapeins* to migrate throughout Eurasia and kill all the *H.erectus* there too.
 - A disease may have killed the African population of *H.erectus*, but the Eurasian population were not exposed to it and something else killed them much later.
- h The chimpanzee (1) as these primates show the least divergence in the DNA sequences **compared to human DNA** in the data provided. (1) 1 mark
- i Gorilla and chimpanzee (1) 2 marks
- j A is gorilla, B is chimp, C is orangutan (all or nothing mark) 1 mark
- k Divergent evolution (1) 1 mark
- l Speciation in humans is NOT likely in the next 100 years. (1)
- Any sensible reason such as: (1)
- Humans travel a great deal now and gene pools are becoming closer, not farther apart.
 - Evolution takes a lot longer than 100 years.
 - Humans are rarely subjected to selection pressures anymore.
- 2 marks
- Total Question 4: 15 marks**
- Total section B 50 marks**
- Total examination 75 marks**