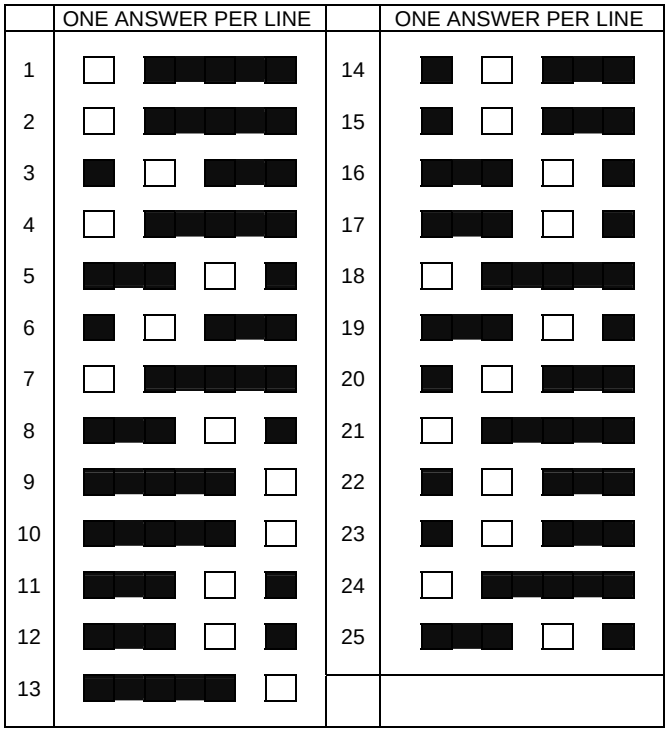
BIOLOGY
Unit 4
Trial Examination

SOLUTIONS BOOK

Published by STAV Publishing. STAV House, 5 Munro Street, Coburg VIC 3058 Australia.
Phone: 61 + 3 9385 3999 • Fax: 61 + 3 9386 6722 • Email: stav@stav.vic.edu.au Website: http://www.sciencevictoria.com.au/stavpublishing/

ABN 61 527 110 823

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.



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

SECTION B – WRITTEN RESPONSES

Question 1

a *One* *1 mark*

b X^B *and* X^b *1 mark*

c $X^B X^b$ x $X^b Y$ *(1)*

$X^B X^b$ $X^b X^b$ $X^B Y$ $X^b Y$

Only these plants survive as pollen X^b *is non-viable (1).*

All plants will be male in a ratio of 1:1 broad leaf to narrow leaf (1). *3 marks*

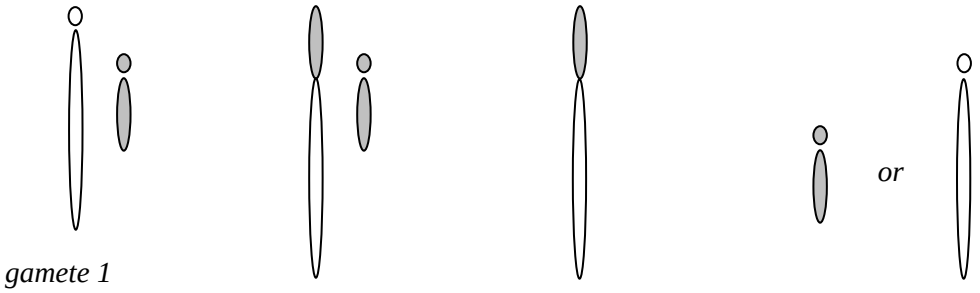
Total Question 1: 5 marks

Question 2

a *45* *1 mark*

b *They still effectively have two chromosomes 14 and two chromosomes 21 with regard to functional genes.* ***Or*** *The lost genes are replicated elsewhere.* *1 mark*

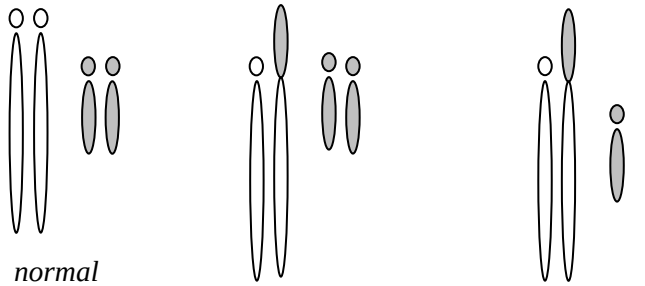
c



gamete 1 *gamete 2* *gamete 3* *gamete 4*

All gametes for 2 marks *2 marks*

d



normal *Robertsonian Downs* *balanced Robertsonian translocation or carrier*

"Three" chromosome 21 *3 marks*

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

Question 3

a *The process of copying the genetic instructions present in DNA to messenger RNA.* *1 mark*

b *Genes need to be regulated so that they are only expressed when they are needed in order to save energy and time.* *1 mark*

c *If the cell cycle is held here, before the DNA is synthesized, for long enough, then the DNA repair proteins will have time to fix the damaged DNA before new DNA is synthesized.* *1 mark*

d *Apoptosis* *1 mark*

e *Proteins on the mitochondria are activated (1). Caspases (enzymes) enter the nucleus and break the DNA and protein (1). The cell breaks into small membrane enclosed fragments. Organelles are recycled and phagocytes engulf fragments (1).* *3 marks*

f *If the DNA is damaged then there are likely to be mutations. If the cell is allowed to continue to divide this could lead to genetic instability such as cancer.* *1 mark*

Total Question 3: ***8 marks***

Question 4

a *Co-evolution.* *1 mark*

b
- *The original population of newts would contain some newts with stronger toxins as a result of mutations (1).*
- *These newts would have a selective advantage by surviving attacks by snakes and would survive to reproduce and pass on the characteristic of stronger toxins (1).* *2 marks*

c *The garter snakes being more resistant to the toxin.* *1 mark*

d *These snakes, because of their slow movement, would have more difficulty escaping from predators.* ***Or***
The snakes may not be fast enough to catch prey. *1 mark*

e *The number of prey for the garter snake is limited in these areas therefore they tend to prey mostly on the newts.* ***Or***
The number of predators killing the snakes is limited in these areas therefore the fact that they are slow moving is not a problem. *1 mark*

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

Question 5

a *Mainly an aquatic habitat.* *1 mark*

b *Transitional fossil* *1 mark*

c *Morphology* *1 mark*

d *The same mutation may occur independently in two unrelated species.*
Or
A mutation in one spot could change again and correct itself. *1 mark*

e *Scientists could examine more than one gene.* *1 mark*

f *The SINES once inserted stay there and do not occur independently in the same spot.* *1 mark*

g *1. camel 2. pigs 3. peccaries 4. chevrotains 5. pecorans 6. hippopotami 7. toothed whales 8. baleen whales All right 2 marks. Most right 1 mark* *2 marks*

Total Question 5: ***8 marks***

Question 6

a *As the sagittal crest facilitates the attachment of large jaw muscles and this early hominin also had large molar teeth (1), this would tend to suggest that the diet of P.robustus was vegetarian. (1).* *2 marks*

b *Two of:*
- *Reduced teeth*
- *Large brain case or increased brain size*
- *Reduction of body hair* *2 marks*

c *Reduction of teeth – meat eating diet selective advantage of more protein.*
Large brain – selective advantage development of language skills for communication.
Reduction of body hair – selective advantage of fewer parasites.

(Correct association of feature with selective advantage for two marks.) *2 marks*

Total Question 6: ***6 marks***

Question 7

a	*Selective breeding is a process whereby humans choose organisms with particular favourable traits and breed them.*	*1 mark*
b	*By selecting out desirable traits other traits can be lost leaving less genetic variety in the offspring. This can be described as a genetic bottleneck.*	*1 mark*
c	*A genetic marker is a section of DNA that is linked to the gene in question.*	*1 mark*
d	*A marker may be easier and cheaper to screen for than the gene itself.*	*1 mark*
e	*This will reduce the likelihood of crossing over between the marker and the gene of interest and increase the chance of the marker and the gene being inherited together.*	*1 mark*
f	• *The DNA is made single stranded by heating.* • *Primers are bound and extended using DNA polymerase enzyme* • *The process is repeated.*	*2 marks*
g	*Use of enzymes called restriction endonucleases (or restriction enzymes)*	*1 mark*
h	*Genetic engineering to produce genetically modified food crops involves the insertion of a gene from an unrelated species into the genome of the food crop (1) whereas the MAS breeding of new varieties involves only genes within the species (1).*	*2 marks*
	Total Question 7:	***10 marks***

Total Section B: ***50 marks***

Total examination: ***75 marks***

END OF SUGGESTED SOLUTIONS