Student Number: ……..……..…..

2005

HIGHER SCHOOL CERTIFICATE

Sample Examination Paper

BIOLOGY

General Instructions

- Reading Time – 5 minutes
- Working Time – 3 hours
- Write using blue or black pen
- Write your student number at the top of this page

Section I
Part A
15 marks
- Attempt all questions
- Allow about 30 minutes for this section

Part B
60 marks
- Attempt all questions
- Allow about 1 hour and 45 minutes for this section

Section II
25 marks
- Attempt **one** question only
- Allow about 45 minutes for this section

Directions to school or college

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 Product code: 733920

Section I
Part A
15 marks

Attempt all questions
Allow about 30 minutes for this section
Use the multiple choice answer sheet

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1 Which of the following options correctly describes the activity of enzymes?
- A All enzymes work in a wide pH range
- B Enzymes can each catalyse a number of reactions
- C Enzymes function due to a specific substrate active site
- D Enzyme activity increases as reaction temperature decreases

2 In which tissues are the products of photosynthesis transported in multicellular plants?
- A Vascular bundles
- B Cambium tissue
- C Phloem tissue
- D Xylem tissue

3 Which of the following best describes the role of the excretory system in humans?
- A Removal of metabolic waste
- B Removal of respiratory gases
- C Production of metabolic wastes
- D Production of metabolic compounds for storage

4 In which of the following forms is nitrogenous waste carried in the blood?
- A Urea
- B Uric acid
- C Oxyhaemoglobin
- D Hydrogen Carbonate ions

5 Which of the following is an example of an Australian mammal's adaptation to high temperatures only?
- A Nocturnal habits
- B Huddling behaviour
- C Burrowing during the day
- D Long narrow hairy leaves

6 Stromatolites, an ancient cyanobacteria that have survived in Shark Bay in Western Australia, are very similar to those found as fossil remains dating back millions of years. Why have these ancient forms remained unchanged for so long?
- A The stromatolites are able to adapt to any environment
- B The environment has not changed significantly over time
- C The stromatolites have not been able to undergo mutations
- D The stromatolites are not able to adapt to a changing environment

7 In pea plants round seeds are dominant to wrinkled seeds. A homozygous wrinkled seed plant is crossed with a homozygous round seed plant; what would be the expected phenotypes of the offspring?

A all round seeded plants
B all wrinkled seeded plants
C ¾ wrinkled, ¼ round seeded plants
D half wrinkled, half round seeded plants

8 A strand of DNA is represented by the following sequence:

G A T T A C

Which of the following represents the corresponding messenger RNA strand?

A C G A A T G
B C U A A U G
C C T U U T G
D C T U U T G

9 Natural Selection is a mechanism used by Charles Darwin to describe Evolution; this has sometimes been referred to as "survival of the fittest". What does the term fittest refer to?

A The fittest is the best camouflaged
B The fittest can survive anywhere
C The fittest produces the most offspring
D The fittest is the most adaptable to its surroundings

10 What type of information can be obtained from the fossil record?

A Fossils depict how organisms have changed over time
B Fossils describe how organisms are related
C Fossils demonstrate the origin of life
D Fossils depict natural selection

11 From the list below, which cells produce antibodies?

A T-cells
B Plasma cells
C B-cells
D T-memory cells

12 Which one of the following is not contained by the barrier defence system?

A Skin
B Inflammatory response
C Mucous secretions in the nose
D Tears and saliva in the eyes and mouth

13 Which diseases can be treated by antibiotics?

A Those caused by bacteria
B Those caused by viruses
C Those caused by prions
D Those caused by mutations

Part B
60 marks

Attempt all Questions
Allow about 1 hour and 45 minutes for this section

Marks

Question 16

3

Complete the table by filling in column B using the correct corresponding term from the list provided below.

Artery, xylem, capillaries, phloem, vein

Column A	Column B
Thick muscular vessels carrying blood under pressure	
Woody tissue carrying water to the site of photosynthesis	
Thin walled vessels carrying blood to the heart	

Question 17

3

Compare the functioning of the kidney with the process of renal dialysis.

Question 18 (5 marks)

Native Australian terrestrial plants have some unique adaptations that enable them to survive in arid (dry) climatic conditions.

(a) Name one Native Australian plant that is adapted to the Australian arid climatic conditions. **1**

Question 25 (4 marks)

The inheritance of colour blindness in humans is sex-linked.

(a) Identify the chromosome on which the colour blindness gene is carried. **1**

(b) Use a punnet square to show the possible offspring of a cross between a normal male and a carrier female for the colour blind characteristic. State the resulting phenotypes of the resulting offspring. **3**

Question 26 (4 marks)

(a) Draw a diagram to represent a single nucleotide. **2**

(b) Name one base and its complementary base pair **2**

Question 27 (4 marks)

(a) Define the term mutation. **1**

Section II
25 marks

Attempt only *one* Question from this section
Allow about 45 minutes for this section
Answer the question in a writing booklet

Question 33 – Communication (25 marks)

(a) (i) Define the term receptor. **1**

(ii) Using named examples, outline the use of senses involved in communication in humans or other animals. **2**

(b) Outline the structure of the human larynx and the associated structures that assist the production of sound. **5**

(c) (i) Distinguish between myopia and hyperopia. **2**

(ii) Describe how at least two technologies can be used to correct these conditions. **3**

(d) Explain using specific examples the importance of correct interpretation of sensory signals by the brain for the coordination of animal behaviour. **4**

(e) During the course you undertook an investigation using secondary sources.

(i) Identify one investigation you have undertaken in the study of Communication. Do NOT select an investigation that covers material you have used to answer parts (a)–(d) above.

(ii) Describe how you would go about locating additional secondary source material to assist with this investigation. **3**

(iii) State how you would go about assessing the reliability of the data obtained. **2**

(iv) Outline the significant points about the information you found in your investigation. **3**

Question 34 – Biotechnology (25 marks)

(a) (i) Define the term biotechnology. **1**

(ii) Outline one ancient Aboriginal use of biotechnology. **2**

(b) (i) Name one application of aquaculture that you have studied in your course. **1**

(ii) For the named application in (i), identify the tissue or organism involved. **1**

(iii) Describe the process used and the outcome. **3**

(c) (i) Specify two conditions required for the process of fermentation. **1**

(ii) Outline a specific fermentation process, including the micro-organisms involved and the products formed. **4**

(d) Explain why different groups in society may have different views about the use of DNA technology. **4**

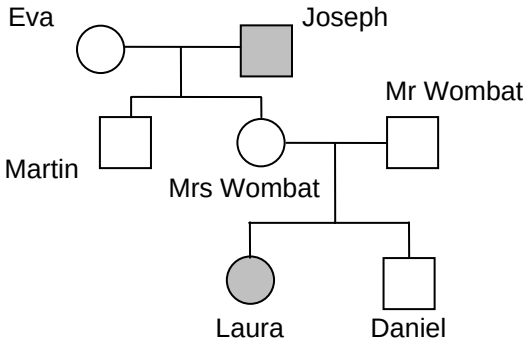
Mapping Grid

Question	Marks	Content area	Outcomes assessed	Performance Band
1	1	Enzyme activity	H13 H6	2–6
2	1	Material transport in plants	H13 H6	2–6
3	1	Metabolic waste	H13 H6	2–6
4	1	Waste removal	H13 H6	3–6
5	1	Adaptations	H13 H6 H8	2–6
6	1	Evolution	H13 H7 H10	4–6
7	1	Genetic crosses	H13 H7 H10	4–6
8	1	DNA	H13 H7 H10	3–6
9	1	Natural selection	H13 H7 H10	4–6
10	1	Fossil record	H13 H7 H10	2–6
11	1	T cells	H13 H6	5–6
12	1	Defence system	H13 H6	2–6
13	1	Antibiotics	H13 H6	4–6
14	1	Immunity	H13 H6	4–6
15	1	Quarantine	H13 H3	2–6
16	3	Blood vessels	H13 H6	2–6
17	3	Kidney function	H13 H6 H3	2–6
18	5	Adaptation	H13 H4 H7 H8	2–6
19	5	Enzyme activity	H13 H6 H8	2–6
20	6	First hand investigation	H13 H11 H12 H14	2–6
21	4	Homeostasis	H13 H6	3–6
22	3	Genes/Alleles	H13 H6 H7 H9	2–6
23	3	Evidence for Evolution	H13 H1 H9 H10	2–6
24	5	Pedigrees	H13 H6 H7 H4	2–6
25	4	Punnet squares	H13 H6 H7 H4	2–6
26	4	DNA	H13 H6 H9	2–6
27	4	Mutation	H13 H6 H9	2–6
28	6	Transgenic species	H13 H6 H7 H9 H2 H3 H4 H5	2–6
29	4	Hygiene	H13 H6 H8 H14 H3 H4 H5	2–6
30	6	Nature of disease	H13 H6 H7 H1	2–6
31	3	Mitosis	H13 H6 H9	3–6
32	6	Immune mechanisms	H13 H6 H7	3–6
33 a	3	Sense organs	H13 H6	2–6
33 b	5	Larynx	H13 H6	2–6
33 c	5	Image formation and technology	H13 H6 H3 H5	2–6
33 d	4	Interpretation of stimuli	H13 H6	2–6
33 e	8	Secondary source investigation	H13 H12 H14 H15	2–6
34 a	3	Use of Biotechnology	H13 H3 H8	2–6
34 b	5	Aquaculture	H13 H3 H8	2–6
34 c	5	Fermentation	H13 H6 H1	2–6
34 d	4	DNA technology	H13 H6 H9 H10	2

Question	Marks	Content area	Outcomes assessed	Performance Band
34 e	8	Secondary source investigation	H13 H12 H14 H15	2–6
35 a	3	Polygenic inheritance	H13 H7	2–6
35 b	5	Human Genome Project	H13 H10 H5 H3 H2	2–6
35 c	5	DNA	H13 H6 H4 H5	2–6
35 d	4	Selective breeding	H13 H6 H3 H5	2–6
35 e	8	Secondary source investigation	H13 H12 H14 H15	2–6
36 a	3	Species	H13 H7	2–6
36 b	5	Hominids	H13 H7 H10	2–6
36 c	5	Polymorphism	H13 H7 H10	2–6
36 d	4	Evolutionary relationships	H13 H7 H10	2–6
36 e	8	Secondary source investigation	H13 H12 H14 H15	2–6
37 a	3	Products of photosynthesis	H13 H6	2–6
37 b	5	ATP	H13 H6	2–6
37 c	5	Chloroplasts	H13 H6	2–6
37 d	4	Photosynthesis	H13 H6 H4 H5	2–6
37 e	8	Secondary source investigation	H13 H12 H14 H15	2–6

Question 24

(a)



Key: box = male, circle = female, blue colour = shaded

Criteria:

Correctly drawn complete pedigree, including key and all information correct	3 marks
Partially correct pedigree, including key	2 marks
Partially correct pedigree, no key	1 mark

(b) Attached earlobes are recessive genes. This can be deduced from the pedigree because Joseph has attached earlobes, but the gene cannot be expressed by Mrs Wombat due to the masking by dominant gene possessed down by her mother Eva. Mr Wombat is therefore heterozygous for the characteristic also as he and Mrs Wombat have a daughter that has attached earlobes.

Criteria:

Correctly identified inheritance type	1 mark

(c) Joseph aa, Mrs Wombat Aa.

Criteria:

Correctly identified genotypes for both Joseph and Mrs Wombat	1 mark

Question 25

(a) X Chromosome

Criteria:

Correctly identified chromosome	1 mark

(b)

	X	Y
X^c	$X X^c$	$X^c Y$
X	XX	XY

The chance of a son being colour blind is 50%, $X^c Y$ represents a colour blind son, XY represents a normal son.