

Biology

2006
Higher School Certificate
Trial Examination

General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using black or blue pen
- Draw diagrams using pencil
- Board-approved calculators may be used
- Write your student number and/or name at the top of every page

Total marks – 100

Section I – Pages 2 - 16

Total marks (75)

This section has two parts, Part A and Part B

Part A – 15 marks

- Attempt Questions 1–15
- Allow about 30 minutes for this Part

Part B – 60 marks

- Attempt Questions 16–26
- Allow about 1 hour and 45 minutes for this Part

Section II – Pages 17 - 29

Total marks (25)

Attempt ONE question from Questions 27–31

Allow about 45 minutes for this section

This paper MUST NOT be removed from the examination room

STUDENT NUMBER/NAME:

Section I

Total marks (75)

Part A

Total marks (15)

Attempt Questions 1–15

Allow about 30 minutes for this part

Select the alternative A, B, C or D that best answers the question and indicate your choice with a cross (X) in the appropriate space on the grid below.

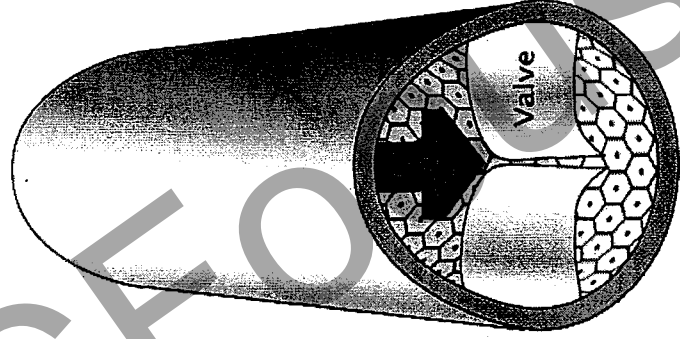
	A	B	C	D
1				
2				
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1. How is oxygen transported around the body?

- (A) As tiny bubbles in the blood plasma
- (B) It attaches itself to dissolved ions in the blood plasma
- (C) It combines with haemoglobin to form oxyhaemoglobin
- (D) It combines with water in red cells to form bicarbonate ions

2. The diagram below shows a cross section of a vessel found in the body.

What type of vessel is this most likely to be?



- (A) A capillary because of the large number of cells lining the inner walls
- (B) A vein because of the one way valve
- (C) An artery because of the thick outer wall
- (D) A lymph vessel because blood is flowing in one direction

3. Which of the following would lead to an increase in genetic variability?

- (A) Cloning
- (B) Sexual reproduction
- (C) Spore formation
- (D) Mitosis

4. In Shorthorn cattle, both alleles for red and white hair can be expressed in the phenotype. As neither allele is dominant, cattle can have a mixture of red and white hairs over their body and are called roan.

What do we call this type of inheritance?

- (A) Dominant
- (B) Recessive
- (C) Sex-linked
- (D) Co-dominance

5. Which of the following is an example of a non-infectious disease?

- (A) Lung cancer
- (B) Diphtheria
- (C) Polio
- (D) Smallpox

6. The picture below shows a fossil named *Tiktaalik*. It possesses some features of fish such as scales and fins, but also some features of limbed animals (tetrapods) such as a functional neck and special ribs used for breathing. It is thought to be a “missing link” in the evolution of fish to amphibians.



What area of study in Evolutionary Theory does this example show?

- (A) Convergent evolution
- (B) Biochemistry
- (C) Biogeography
- (D) Palaeontology

7. In pea plants, the allele for tallness T is dominant over the allele for shortness t.

If two heterozygous tall plants are crossed, what will be the expected ratio of homozygous pea plants in the first generation?

- (A) 33%
- (B) 50%
- (C) 75%
- (D) 100%

8. What is the main function of enzymes in metabolism?

- (A) They slow down chemical reactions in the digestive system so that food is absorbed fully.
- (B) They are secreted into the synapse so that impulses are transmitted from one neurone to the next.
- (C) They lower the activation energy needed for chemical reactions to occur in cells.
- (D) They help to remove wastes from the large intestine and keep the excretory system "clean".

9. How did Pasteur contribute to our understanding of infectious disease?

- (A) He disproved the theory of spontaneous generation and showed that microbes come from pre-existing microbes.
- (B) He developed a procedure for determining if a particular microbe was responsible for causing a particular disease.
- (C) He discovered an antibacterial chemical called an antibiotic.
- (D) He discovered that malaria, an infectious disease, can be spread by mosquitoes.

10. "Any molecule that the body recognises as being foreign".

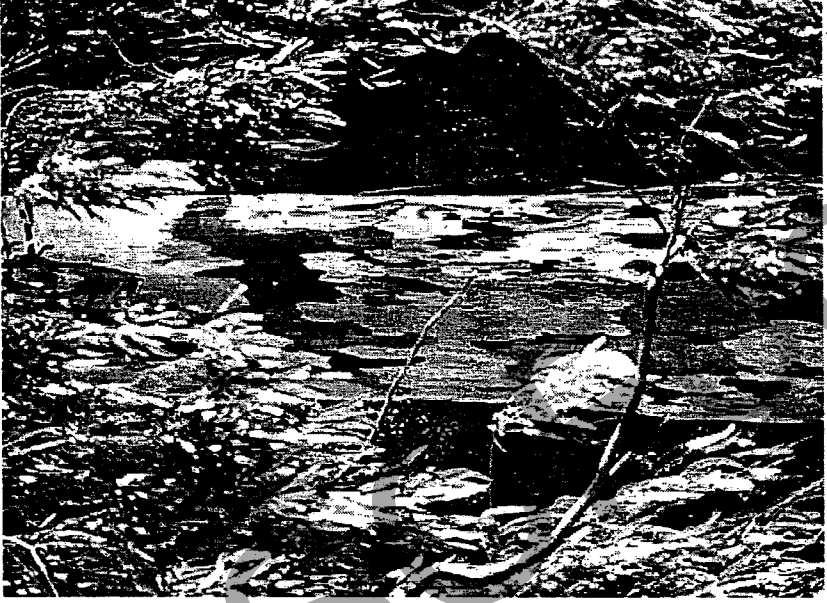
What word best describes this statement?

- (A) Antibody
- (B) Antigen
- (C) Vaccine
- (D) Pathogen

11. What defines the term mutagen?

- (A) A natural or man-made agent which can alter the structure of DNA.
- (B) A nitrogen base from a section of DNA.
- (C) The offspring from an organism that has been affected by a mutation.
- (D) The chemical responsible for transferring information from DNA to the ribosomes.

12. The diagram below shows the leaves of a Eucalypt called Eucalyptus grandis hanging vertically.



How is this an adaptation for minimising water loss in dry conditions?

- (A) It allows maximum exposure of the leaf surface to the sun improving photosynthetic rate.
- (B) It helps to shade the trunk of the tree from excessive sun.
- (C) It reduces the surface area of leaves exposed to the sun during the hottest part of the day.
- (D) It allows water to collect at the end of the leaf thus reducing transpiration.

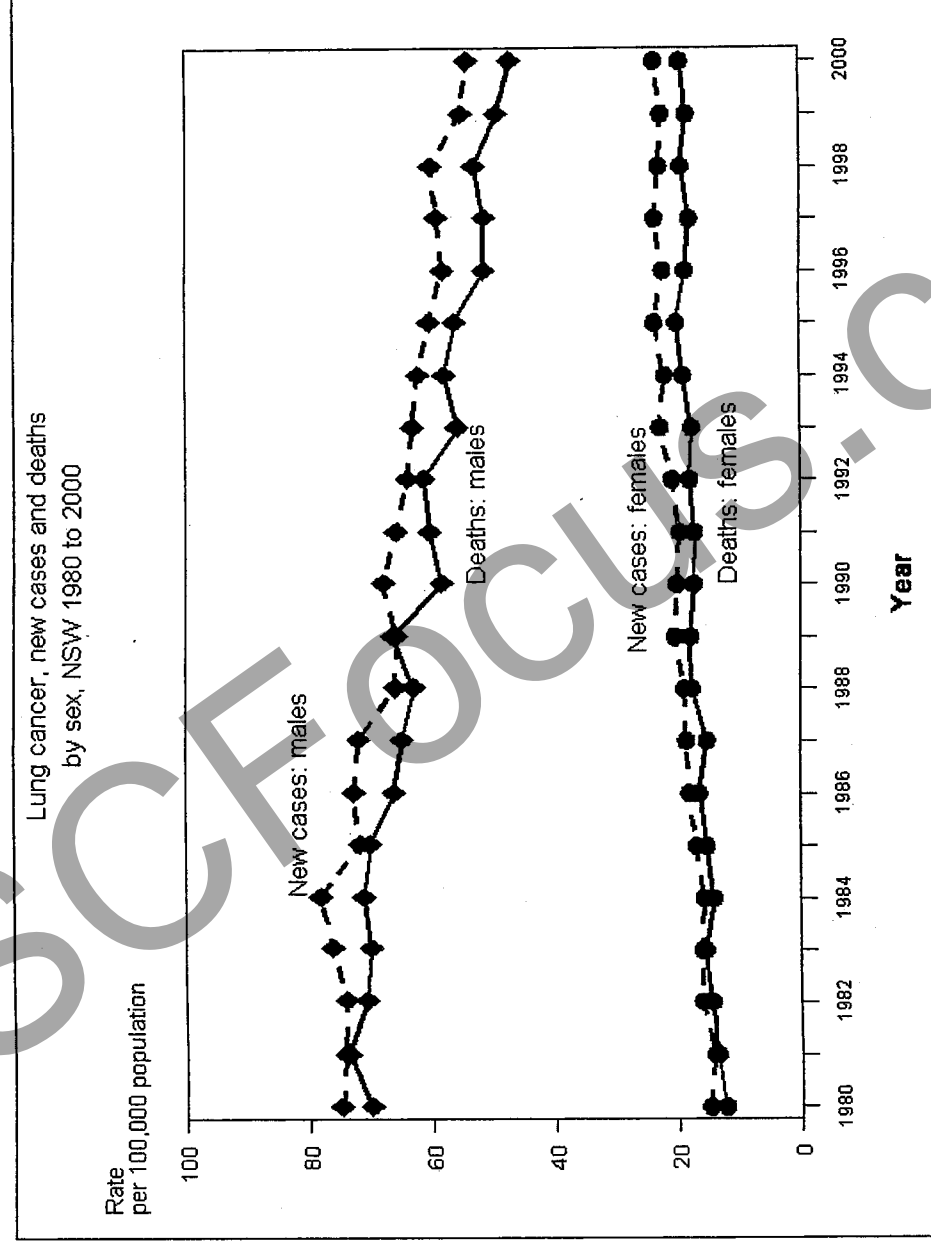
13. What is the main difference between active and passive transport?

- (A) Active transport involves the use of energy to move substances, passive transport does not.
- (B) Active transport involves conscious thought processes from the brain, passive transport does not.
- (C) Active transport moves all substances, passive transport only moves liquids.
- (D) Active transport is osmosis whereas passive transport is diffusion.

14. What is the main purpose of quarantine?

- (A) To prevent the entry of harmful plant and animal diseases into Australia
- (B) To develop disease resistant animal stock and crops
- (C) To allow natural predators of insect pest into the country to control their numbers
- (D) To reduce the numbers of disease-causing organisms in a country

15. Study the data in this graph and then answer the question below.



In the period from 1990 to 2000, the overall trend in males was an 18% decrease in new cases and 22% decrease in the death rate from lung cancer.

What is the best explanation for this trend?

- (A) A switch to low tar cigarettes
- (B) Improved treatments for lung cancer
- (C) Less males are smoking
- (D) An increase in the number of females smoking

Section I (continued)

Part B

Total marks (60)

Attempt Questions 16–26

Allow about 1 hour and 45 minutes for this part

Answer the questions in the spaces provided.

	Marks
Question 16 (4 marks)	
(a) Define the term <i>homeostasis</i>	1
(b) Draw a labelled diagram to explain how feedback mechanisms assist in maintaining homeostasis.	3

Question 17 (3 marks)**Marks**

The human body has a number of defences against pathogens.

- (a) Outline ONE defence barrier to pathogens.

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- (b) Compare this defence mechanism to the immune response mediated by B-lymphocytes.

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Question 18 (4 marks)

- (a) Describe the process of punctuated equilibrium in evolution.

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- (b) Explain how punctuated equilibrium differs from the process proposed by Darwin.

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- (c) Identify ONE modern example of *natural selection*.

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Question 19 (9 marks)

Marks

- (a) Outline a process used to produce transgenic species.

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- (b) Justify the use of transgenic technology. Use examples from secondary sources to support your answer.

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- (c) Discuss ethical issues that may arise from the development and use of transgenic species.

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STUDENT NUMBER/NAME:

Question 20 (6 marks)

Marks

In 1967 the World Health Organization (WHO) started a worldwide campaign to eradicate smallpox. This goal was accomplished in 10 years due in a large part to massive vaccination efforts. The last endemic case of smallpox occurred in Somalia in 1977. On May 8, 1980, the World Health Assembly declared the world free of smallpox.

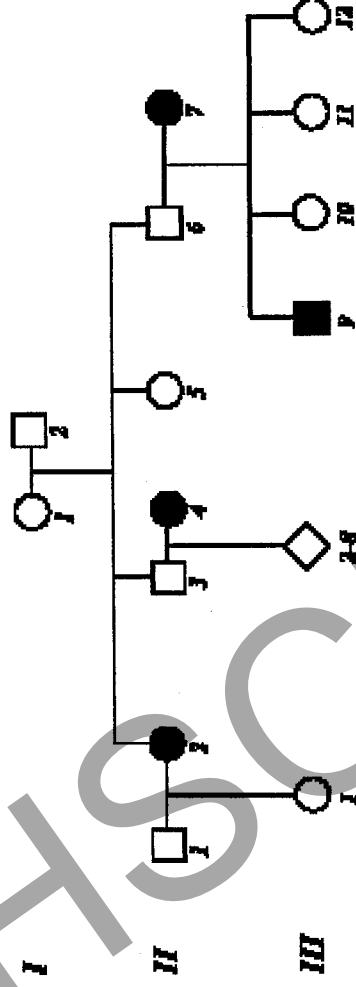
Evaluate the effectiveness of vaccination programs in preventing the spread and occurrence of common diseases such as smallpox.

9

Question 21 (4 marks)**Marks**

Using the pedigree below to answer question 21.

For this question assign the letter A to the dominant allele and a to the recessive allele.



- (a) Identify if the trait is dominant or recessive. Explain your answer.

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- (b) For individual *III-1* indicate the most likely genotype. Explain your answer.

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Question 22 (5 marks)

Marks

- (a) Define the term gamete?

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- (b) Gametes are often described as haploid, which means that they have half of the number of chromosomes of a normal body cell.

Explain the significance of this for generating variability in the offspring of a sexually reproducing organism.

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- (c) Describe two other mechanisms that lead to genetic variability in the offspring of a sexually reproducing species.

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Question 23 (7 marks)

- (a) Define the term *enantiostasis*.

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Question 23 continues on the next page

Question 27 - Communication (25 marks)

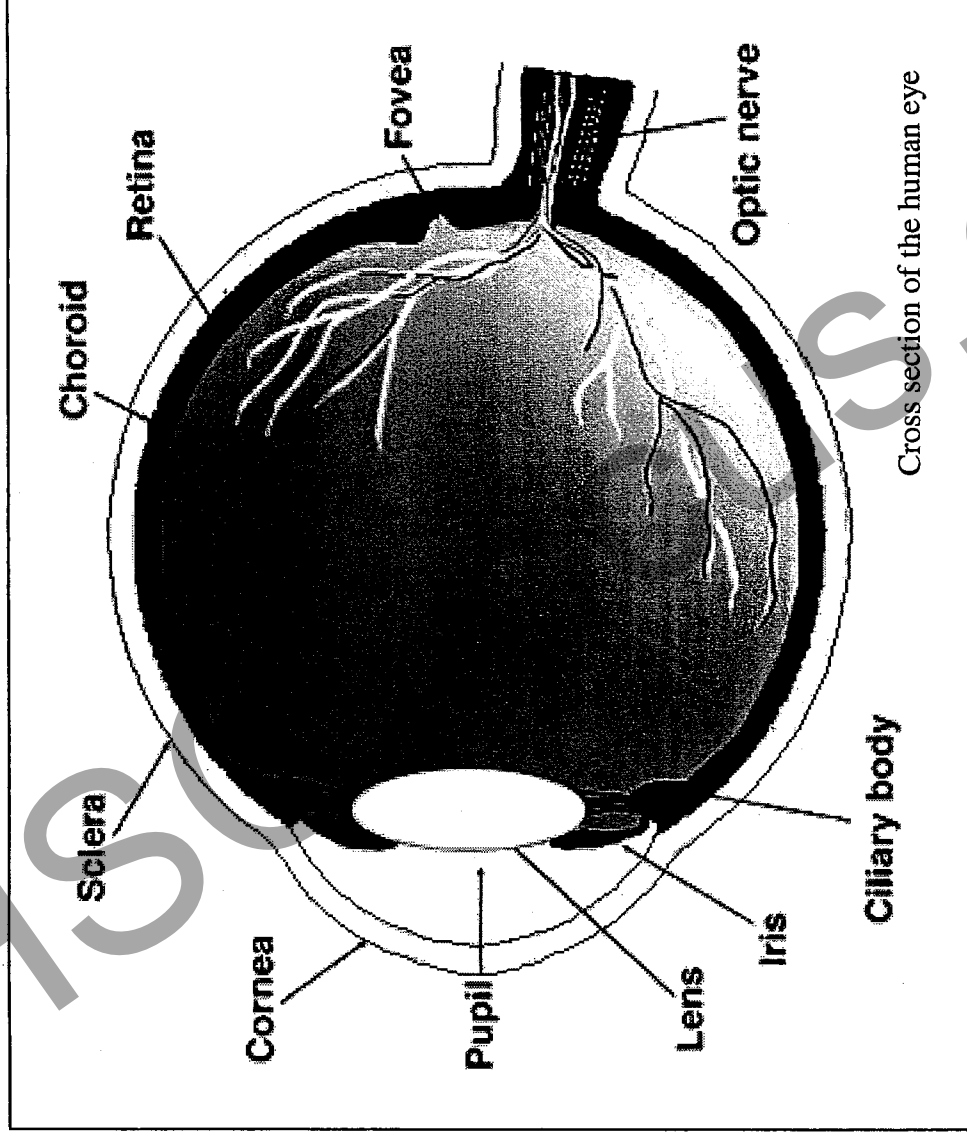
Marks

- (a) (i) Identify the role of receptors in communication.

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- (ii) Choose THREE structures from the diagram above and describe the function of EACH.

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Question 27 continues on the next page

Question 27 (continued)

Marks

- (b) (i) Distinguish between myopia and hyperopia.

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- (ii) Describe ONE technology that can be used to prevent cataract blindness and discuss the implications this has for society.

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- (c) Analyse the use of colour for communication and relate this to the occurrence of colour vision in animals.

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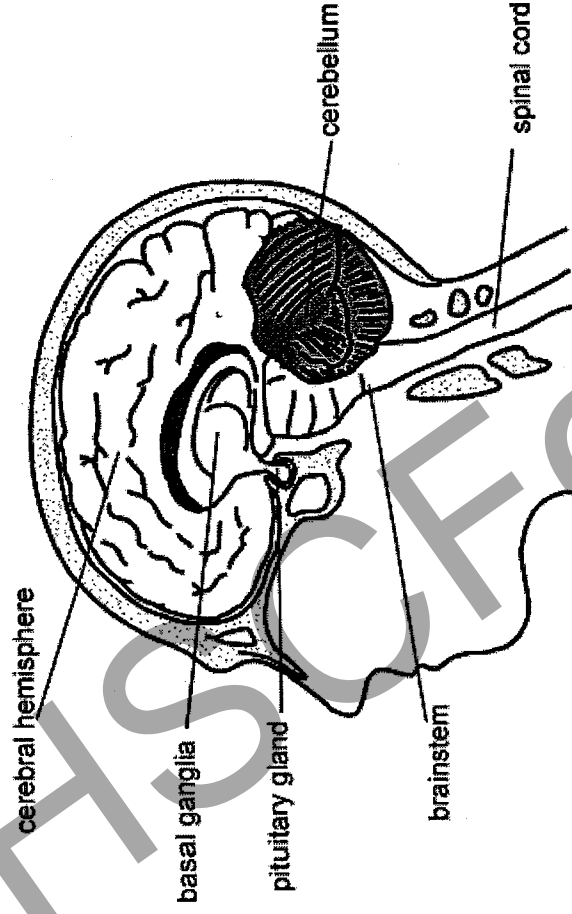
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Question 27 continues on the next page

*Question 27 (continued)***Marks**

- (d) (i) On the diagram below, circle the areas of the brain associated with speech, sight and sound.

2**CROSS SECTION THROUGH THE BRAIN**

- (ii) Outline the range of frequencies detected by Humans as sound and compare this range with two other mammals.

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- (ii) Explain the importance of correct interpretation of sensory signals by the brain for the coordination of animal behaviour.

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