



**BIOLOGY**  
**STANDARD LEVEL**  
**PAPER 1**

Wednesday 15 November 2000 (afternoon)

45 minutes

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**INSTRUCTIONS TO CANDIDATES**

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

1. Which scientist first used the term *cell*?
  - A. Robert Hooke
  - B. Anton van Leeuwenhoek
  - C. Theodore Schwann
  - D. Rudolf Virchow
  
2. Which of these functions are carried out by the plant cell wall?
  - I. Providing support to the cell and to the plant
  - II. Controlling the diffusion of solutes into and out of the cell
  - III. Active transport of mineral nutrients into the cell
  - A. I only
  - B. I and II only
  - C. II and III only
  - D. I, II and III
  
3. The table shows the normal concentration of two ions in red blood cells and in the surrounding plasma:

Ions	concentration / mM dm <sup>-3</sup>	
	Red blood cells	Blood plasma
Potassium (K <sup>+</sup> )	150	5
Sodium (Na <sup>+</sup> )	26	144

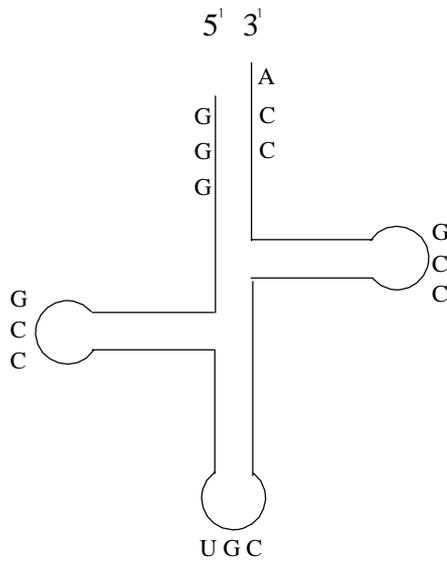
What does this information show?

- A. Sodium is actively transported out of the cell.
- B. Sodium is transported out of the cell by diffusion, but potassium does not move.
- C. Sodium moves into the red blood cells by diffusion and the potassium moves out by diffusion.
- D. Osmosis is occurring.

4. Amino acids are used to synthesise proteins. What elements are contained in proteins?
- A. carbon, hydrogen and oxygen
  - B. carbon, hydrogen, oxygen and sulphur
  - C. carbon, hydrogen, nitrogen and oxygen
  - D. carbon, hydrogen, nitrogen, oxygen and sulphur
5. Monosaccharides are the building blocks of polysaccharides. By which process are polysaccharides formed?
- A. Addition of hydrogen
  - B. Removal of hydrogen
  - C. Hydrolysis
  - D. Condensation
6. Which property of enzymes makes them useful for biotechnology?
- A. Enzymes work in a wide pH range.
  - B. Enzymes can increase the rate of specific reactions.
  - C. The active site of enzymes can bind many different substrates.
  - D. Enzymes are not easily denatured.
7. What is the arrangement of sub-units in a DNA nucleotide?
- A. sugar – base – phosphate
  - B. sugar – phosphate – base
  - C. phosphate – sugar – base
  - D. sugar – phosphate – base – base – phosphate – sugar

8. What is the function of helicase in DNA replication?
- I. Breaking hydrogen bonds between complementary bases
  - II. Forming hydrogen bonds between complementary bases
  - III. Unwinding the double helix
- A. I only
- B. I and III only
- C. II and III only
- D. III only

9. Which is the complementary codon to this tRNA?



- A. UGG
- B. UGC
- C. ACG
- D. CGG

10. What does all gene therapy involve?
- A. The insertion of non-defective genes into cells
  - B. The removal of harmful genes from embryos
  - C. *In vitro* fertilisation
  - D. Plasmids
11. What is the difference between the alleles of a gene?
- A. Their position on the chromosome
  - B. Their amino acid sequence
  - C. The number of codons that each contains
  - D. Their base sequence
12. In which substance(s) does gene mutation occur in animals?
- I. DNA
  - II. RNA
  - III. Protein
- A. I only
  - B. I and II only
  - C. I and III only
  - D. I, II and III
13. What is the cause of Down's syndrome?
- A. 21 pairs of chromosomes
  - B. Trisomy 21
  - C. Non-disjunction of sex chromosomes
  - D. Fertilisation of the egg by two sperm

14. Two heterozygous black guinea pigs are mated and produce one offspring. What is the probability that this offspring is homozygous and black?
- A. 0.00
  - B. 0.25
  - C. 0.50
  - D. 0.75

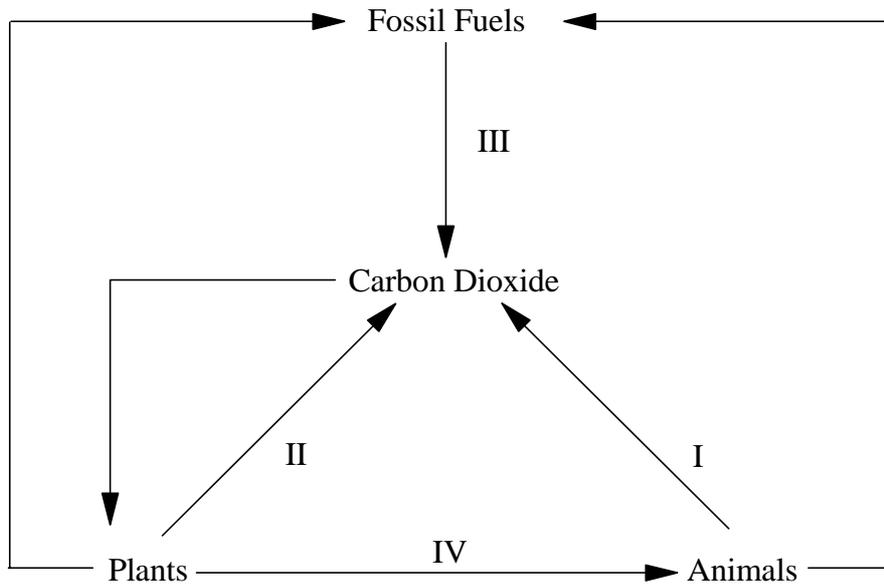
The following table refers to question 15

Families	Blood Groups	
	Child 1	Child 2
I.	AB	AB
II.	A	B
III.	O	O

15. In which of the families could one parent have had blood group A and the other blood group B?
- A. I only
  - B. I and II only
  - C. II and III only
  - D. I, II and III
16. What is the difference between detritivores and saprotrophs?

	Detritivores	Saprotrophs
A.	Feed on living organic matter	Feed on dead organic matter
B.	Autotrophic	Heterotrophic
C.	Ingest organic matter and then digest it	Digest organic matter and then absorb it
D.	Found in communities	Found in ecosystems

The diagram below shows part of the carbon cycle. It refers to question 17.



17. Which arrows show respiration?

- A. I only
- B. I and II only
- C. I, II and III only
- D. I, II, III and IV

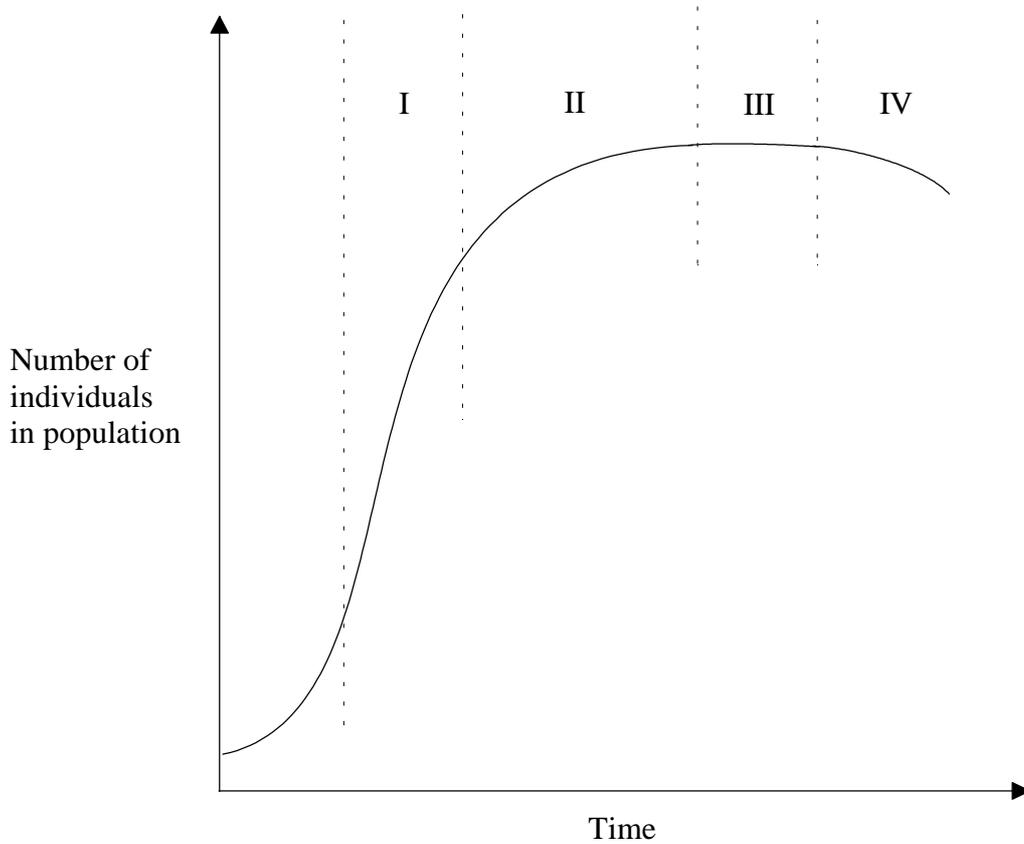
Part of a food chain is shown below. It refers to question 18.



18. The locusts ingest 50 MJ of energy. What is the maximum amount of this energy that could be passed to the eagles?

- A. 5 MJ
- B. 500 kJ
- C. 50 kJ
- D. 500 J

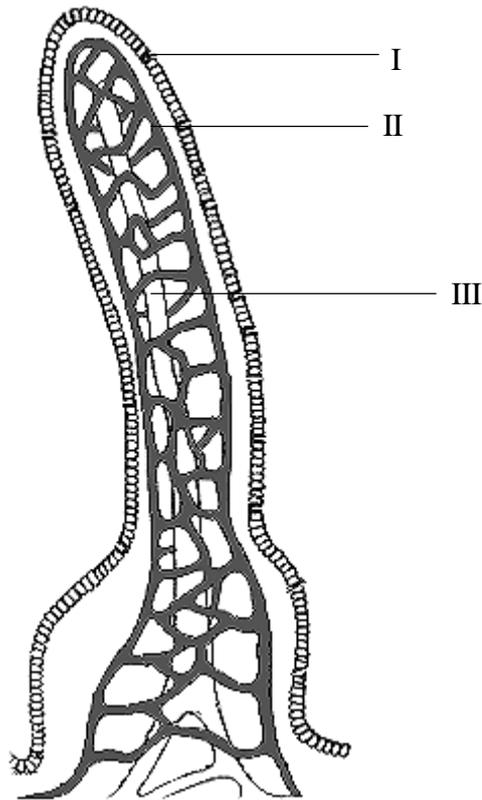
The graph below represents a population growth curve. It refers to question 19 and 20.



19. In which phase do limiting factors **start** to have an effect?
- A. I
  - B. II
  - C. III
  - D. IV
20. In which phase is (mortality + emigration) larger than (natality + immigration)?
- A. I and II only
  - B. III and IV only
  - C. III only
  - D. IV only

21. What is the cause of the greenhouse effect?
- A. Global warming
  - B. Increases in the human population
  - C. Destruction of the ozone layer
  - D. The presence of certain gases in the atmosphere
22. In a large population of insects the mean length of a wing is 38.3 mm, with a standard deviation of 2.7 mm. What percentage of the population will have a wing length between 35.6 and 41.0 mm?
- A. 5 %
  - B. 32 %
  - C. 68 %
  - D. 95 %
23. What is the function of pancreatic amylase in humans?
- A. Digestion of starch (amylose) to maltose in the pancreas.
  - B. Digestion of starch (amylose) to glucose in the pancreas.
  - C. Digestion of starch (amylose) to maltose in the small intestine.
  - D. Digestion of starch (amylose) to glucose in the small intestine.

The diagram below shows a section through part of the human digestive system. It refers to question 24.



24. What are the structures I, II and III?

	I	II	III
A.	epithelium	capillaries	lacteal
B.	epithelium	capillaries	artery
C.	mucus	muscle fibres	artery
D.	mucus	muscle fibres	lacteal

25. What is a feature of the human heart?

- A. It only beats when stimulated by the central nervous system
- B. It is not affected by hormones
- C. Its contractions are myogenic
- D. Its left side pumps more blood per minute than its right side.

26. AIDS has many possible symptoms. Which feature is always present in AIDS sufferers?

- A. Inactive antibodies
- B. Reduced number of helper T-cells
- C. Increased number of antibodies
- D. Increased activity of phagocytic leucocytes

27. What route does carbon dioxide follow as it leaves the body?

- A. pulmonary vein → alveolus → bronchus → bronchiole
- B. pulmonary artery → alveolus → bronchus → bronchiole
- C. pulmonary vein → alveolus → bronchiole → bronchus
- D. pulmonary artery → alveolus → bronchiole → bronchus

28. What happens when the glucose level in blood is low?

- A. The liver secretes glucagon.
- B. The liver secretes insulin.
- C. The pancreas secretes glucagon.
- D. The pancreas secretes insulin.

29. Which hormones are present in healthy adult human males?

✓ = present      X = not present

	<b>FSH</b>	<b>LH</b>	<b>Insulin</b>
A.	X	X	✓
B.	✓	X	✓
C.	✓	✓	✓
D.	X	X	X

30. What does *in vitro* fertilisation (IVF) require?
- A. Genetic screening of sperm
  - B. The stimulation of the ovaries to produce many eggs
  - C. Collection of eggs at many stages of development from the ovaries
  - D. Implantation of fertilised eggs into the vagina
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