INTERNATIONAL BACCALAUREATE
BACCALAURÉAT INTERNATIONAL
BACHILLERATO INTERNACIONAL

BIOLOGY
STANDARD LEVEL
PAPER 1

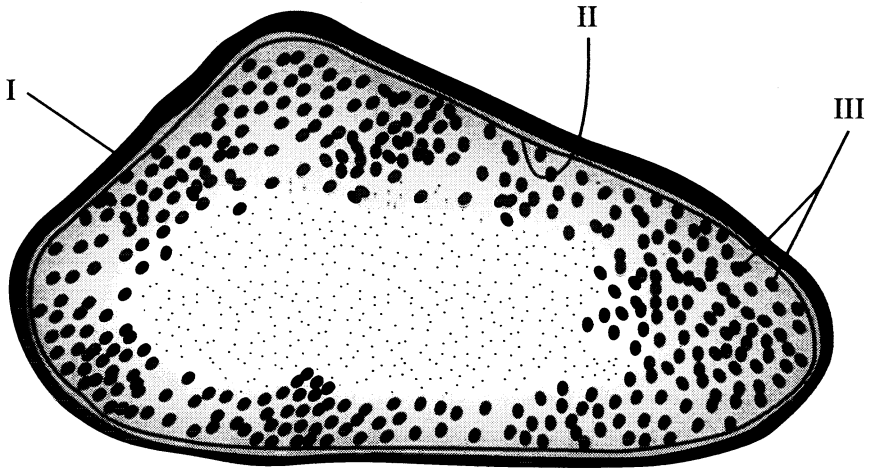
Monday 21 May 2001 (afternoon)

45 minutes

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. The drawing below shows the structure of a cell of *Arthrobacter crystallopoietes*, a prokaryote. What are the structures labelled I, II and III?



	I	II	III
A.	cell wall	cell membrane	mitochondria
B.	cell membrane	cell wall	ribosomes
C.	cell wall	cell membrane	ribosomes
D.	cell membrane	cell wall	mitochondria

2. Cells in the placenta take in droplets of fluid from the maternal blood. Vesicles containing the fluid are formed by this process. The vesicles are visible in the cytoplasm of the placenta cells. What is the transport mechanism involved?

A. Pinocytosis

B. Exocytosis

C. Phagocytosis

D. Carrier-assisted transport

3. Which compounds are organic?

I. glucose

II. oxygen

III. water

A. I only

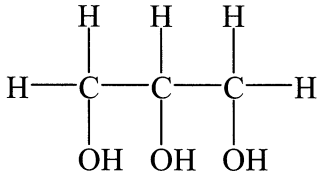
B. I and II only

C. II and III only

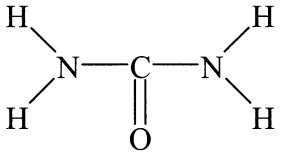
D. I, II and III

4. What is the general structure of an amino acid?

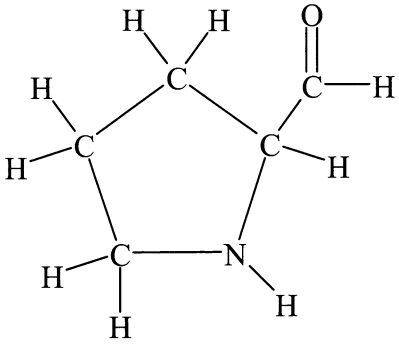
A.



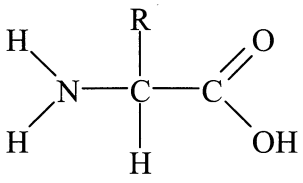
B.



C.



D.



5. The equation below shows a reaction which occurs during digestion of foods.

disaccharides + water → monosaccharides

What type of reaction is it?

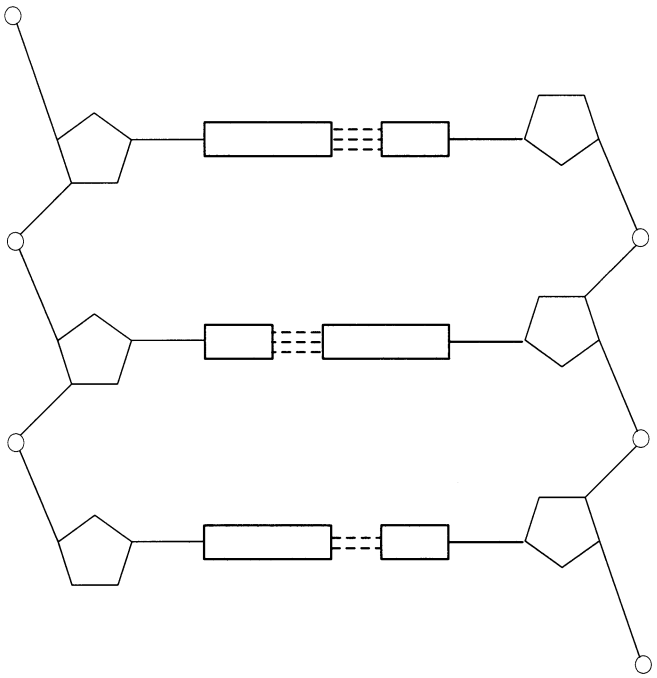
A. condensation

B. combustion

C. hydrolysis

D. photolysis

6. The diagram below shows the structure of a small section of DNA.



What is represented by the shapes in the diagram?

	○	⬠	▭
A.	base	ribose	phosphate
B.	deoxyribose	phosphate	base
C.	phosphate	deoxyribose	base
D.	base	phosphate	deoxyribose

7. What causes the two DNA molecules formed by replication to have the same base sequence as the original molecule?

A. helicase

B. RNA polymerase

C. complementary base pairing

D. mitosis

8. The genetic code is *degenerate*. What does this mean?

A. It is not universal.

B. The code is not stable.

C. It contains both codons and anticodons.

D. There is more than one codon for some amino acids.

9. What could be achieved by DNA profiling using gel electrophoresis?

A. The chromosome number of an organism could be counted.

B. It could be proved that human tissue found at the site of a crime did not come from a person suspected of having committed the crime.

C. The quality of a new breed of farm animal or a new variety of crop plant could be assessed.

D. Extinct species of living organism could be brought back to life.

10. How many changes to the amino acid sequence of haemoglobin are caused by the sickle cell anaemia mutation?

A. none

B. one

C. three

D. four

11. The zygote produced by sexual reproduction in mice (*Mus musculus*) contains 40 chromosomes. How many chromosomes are there in cells produced by the first division of meiosis in mice?

A. 10

B. 20

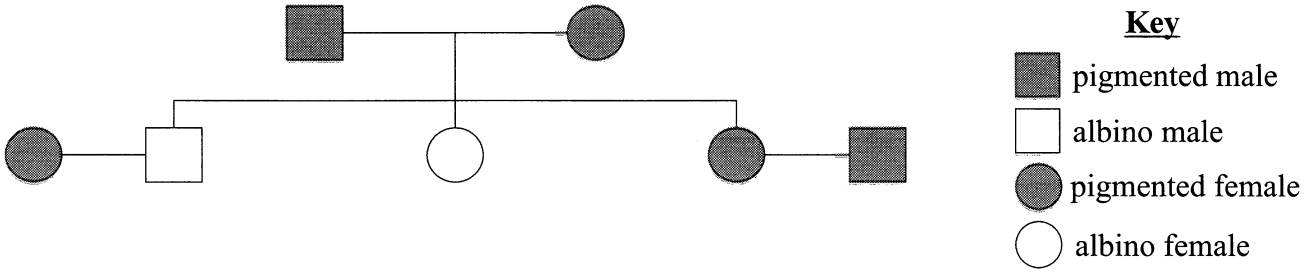
C. 40

D. 80

12. If there are two co-dominant alleles of a gene, there are three possible genotypes: homozygous for one of the co-dominant alleles, homozygous for the other co-dominant allele or heterozygous. How much effect would **one** of the co-dominant alleles have in the phenotype of heterozygous and homozygous individuals?

	Heterozygous Individuals	**Homozygous individuals**
A.	Some effect	Greater effect
B.	Greater effect	Some effect
C.	No effect	Large effect
D.	Large effect	No effect

13. The pedigree chart below shows a family in which two albino children were born. Albino children cannot make the pigment melanin and so have unpigmented skin, hair and eyes. Albinism is not sex-linked.



The albino son and the pigmented daughter both married members of other families in which albinism has never been found. What is the chance of their first child being albino?

	Chance of the son's first child being albino	Chance of the daughter's first child being albino
A.	0 %	0 %
B.	25 %	0 %
C.	50 %	50 %
D.	100 %	25 %

14. There are ethical arguments for and against the cloning of human embryos. Which is the strongest argument **for** cloning?

A. Cloning is needed to complete the Human Genome Project.

B. Mothers would be able to have children and return to work more quickly, if their embryos were cloned.

C. Cloning allows parents to choose the characteristics of their children.

D. Cloning happens naturally when identical twins are formed.

15. What is investigated in ecology?

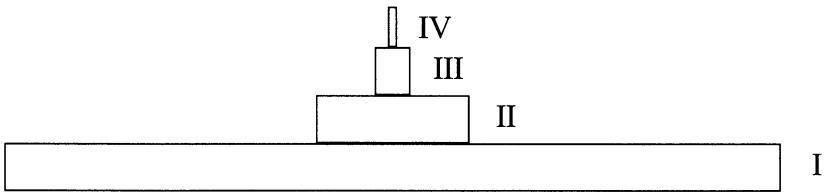
A. All of the characteristics of living organisms on Earth.

B. Only the physical and chemical properties of the environment.

C. Only the relationships between organisms and their environment.

D. Only the ways in which humans can exploit the Earth's resources.

16. The diagram below shows a pyramid of energy for a forest. Each of the four bars represents the annual energy flow through a trophic level. To which trophic level does each bar refer?



	I	II	III	IV
A.	primary consumers	secondary consumers	tertiary consumers	saprotrophs
B.	autotrophs	heterotrophs	detritivores	saprotrophs
C.	producers	primary consumers	secondary consumers	tertiary consumers
D.	producers	saprotrophs	consumers	saprotrophs

17. Potato crops in Ireland were devastated in 1845-47 by potato blight. During this period, more than 20 % of the people died of starvation and 2 % moved to other countries. Which statement explains probable population changes during this period?

A. Mortality and emigration were equal to natality and immigration.

B. Mortality and natality were equal to emigration and immigration.

C. Mortality and emigration were greater than natality and immigration.

D. Mortality and immigration were greater than natality and emigration.

18. The following statements are parts of the theory of evolution by natural selection.

I. Only the best adapted individuals survive and pass on their genes.

II. More offspring are produced than the environment can support.

III. As one generation follows another the characteristics of the species gradually change.

IV. There is a struggle for survival in which some individuals are more successful than others.

What is the correct sequence of statements?

A. I, II, III, IV

B. II, IV, I, III

C. III, I, IV, II

D. IV, III, II, I

19. What human action could have an impact on the whole biosphere?

A. Burning fuel in vehicle engines.

B. Releasing crude oil from an oil tanker into the sea.

C. Building a dam across a major river.

D. Establishing a national park in a desert area.

20. In ecology, a square frame with sides of 1 metre is sometimes used. What is the purpose of this frame in investigations of ecosystems?

A. To measure the size of animal populations by trapping and release.

B. To compare the means of two pairs of frequency distributions.

C. To evaluate graphical representations of ecological data.

D. To estimate the size of plant populations by random sampling.

21. To which part of the digestive system is the pancreas connected by a duct?

A. stomach

B. large intestine

C. small intestine

D. oesophagus

22. Through which sequence of vessels and heart chambers does carbon dioxide pass, to travel from a respiring cell to the organ of the body that excretes it?

A. vena cava → left atrium → left ventricle → pulmonary vein

B. vena cava → right atrium → right ventricle → pulmonary vein

C. vena cava → right atrium → right ventricle → pulmonary artery

D. vena cava → left atrium → left ventricle → pulmonary artery

23. How does heart muscle contraction differ from the contraction of other muscles in the human body?

A. It can contract without stimulation from nerves or hormones.

B. It is stimulated to contract by hormones but not nerves.

C. It is stimulated to contract by nerves but not hormones.

D. Nerves speed up its rate of contraction but hormones slow it down.

24. What are antibodies?

A. Substances that stimulate the production of antigens.

B. Proteins produced by the body which can recognise foreign material.

C. Cells produced by bone marrow which fight diseases.

D. Foreign cells or tissues which are rejected by the body.

25. The process of breathing in and breathing out air is known as *ventilation of the lungs*. What is the main reason for this process?

A. To expel water vapour and excess heat from the alveoli.

B. To expel dust and mucous from the alveoli.

C. To keep the lining of the alveoli moist using water from the air outside.

D. To maintain a large concentration gradient of oxygen in the alveolus.

26. What change occurs during resting, after a period of vigorous exercise?

A. The pH of the blood decreases.

B. The breathing rate increases.

C. The carbon dioxide content of the blood decreases.

D. The temperature of the body increases.

27. Heat centres in the brain respond to increases and decreases in body temperature by causing changes to heat loss and heat generation in the body. What change causes less heat to be lost?

A. An increase in shivering.

B. A decrease in sweating.

C. Vasodilation of arterioles leading to the skin.

D. An increase in cell metabolism.

28. The kidney carries out the process of excretion by producing urine, which passes out of the body. What is contained in urine?

A. Toxic waste products of metabolism.

B. Indigestible foods and harmful bacteria.

C. Excess glucose and amino acids.

D. Water and plasma proteins.

29. What structure secretes luteinising hormone (LH)?

A. The corpus luteum

B. The embryo

C. The ovary

D. The pituitary gland

30. What does amniocentesis involve?

A. Removal of amniotic fluid, culturing of cells and karyotyping.

B. Bursting of the amniotic sac before childbirth.

C. Bursting of the amniotic sac, removal of embryos and resealing of the amniotic sac.

D. Production of amniotic fluid to protect the fetus.