INTERNATIONAL BACCALAUREATE
BACCALAURÉAT INTERNATIONAL
BACHILLERATO INTERNACIONAL

BIOLOGY
STANDARD LEVEL
PAPER 1

Monday 5 November 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. What is the resolution of a microscope?

A. The ratio of the size of the image to the actual size of the object

B. The control used to focus the microscope

C. The ability to distinguish two points as separate

D. The wavelength of the light or electron beam used in the microscope

2. Which statement correctly describes the Golgi apparatus?

A. It is found in prokaryotic and eukaryotic cells.

B. It is composed of a stack of disc-shaped structures.

C. It is only found in plant cells.

D. It is situated within the endoplasmic reticulum.

3. What happens during the process of mitosis?

A. The chromosome number is halved.

B. Identical DNA molecules are separated.

C. The cell grows until its volume has doubled.

D. All of the DNA in the nucleus is replicated.

4. Which two substances are ions needed by plants?

A. Oxygen (O_2) and water (H_2O)

B. Water (H_2O) and carbon dioxide (CO_2)

C. Carbon dioxide (CO_2) and potassium (K^+)

D. Potassium (K^+) and phosphate (PO_4^{3-})

5. With which part of an amino acid does the amino $(-NH_2)$ group of another amino acid react, in order to form a peptide linkage?

A. Carboxyl group (–COOH)

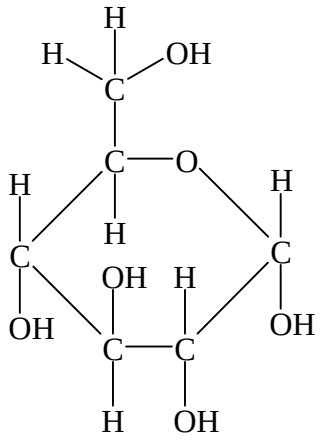
B. Amino group $(-NH_2)$

C. Hydrogen (–H)

D. Side chain (–R)

6. What is the structure of glycerol?

A.



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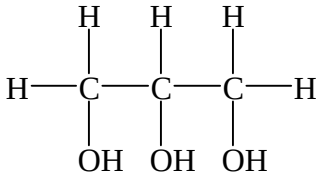

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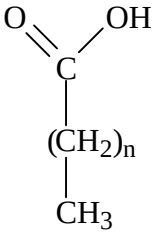

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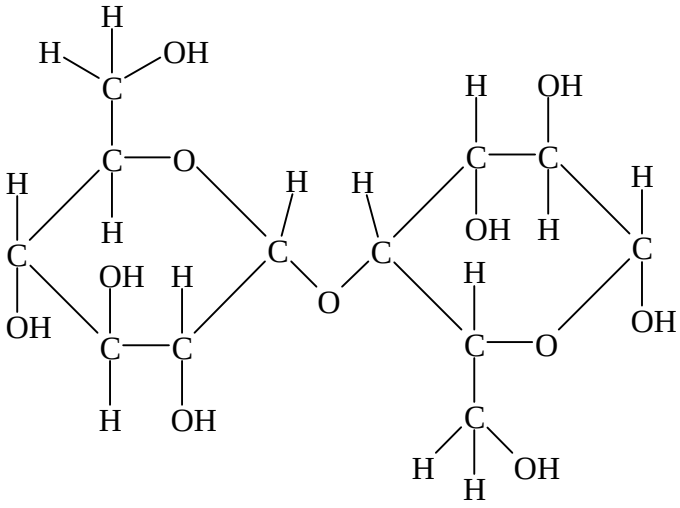


7. If an enzyme was extracted from *Sulfolobus acidocaldarius* (a bacterium found in acidic hot springs with temperatures up to 90 °C), what is likely to cause the fastest denaturation of the enzyme?

A. Dissolving the enzyme in a solution with a very high pH

B. Placing the enzyme in a very high substrate concentration

C. Storing the enzyme in a refrigerator at 4 °C

D. Storing the enzyme in oxygen-free (anaerobic) conditions

8. What are the components of a DNA nucleotide?

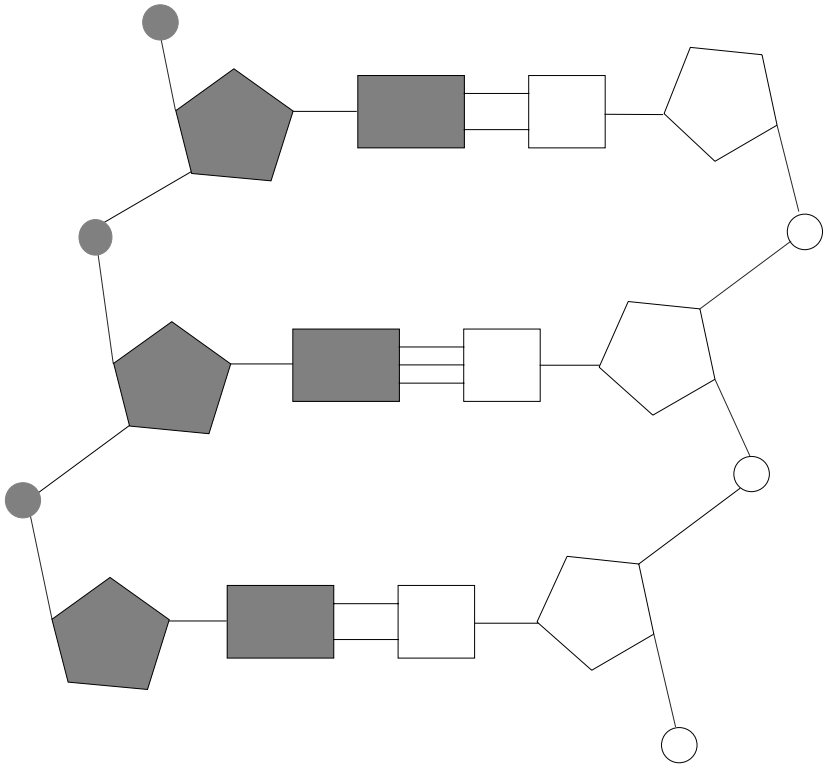
A. A pair of complementary bases

B. A double helix held together by hydrogen bonds

C. A deoxyribose sugar, a base and a phosphate

D. A triplet of bases that form a codon

9. The diagram shows part of a molecule produced by replication of DNA. What is the significance of the shaded and unshaded regions?



A. The shaded parts are DNA and the unshaded parts are mRNA.

B. The shaded parts contain adenine and thymine and the unshaded parts contain guanine and cytosine.

C. Helicase cannot bind to both the shaded and the unshaded parts at the same time.

D. One of the parts has been newly synthesised and the other was part of a pre-existing DNA molecule.

10. The antibiotic streptomycin is thought to bind irreversibly to the ribosomes in bacteria, preventing them from functioning normally. Which process is the first to be affected?

A. Translation

B. Transcription

C. Cellular respiration

D. Active transport

11. What is a plasmid?

A. DNA obtained from a virus

B. A small circular piece of DNA

C. DNA produced by the polymerase chain reaction

D. A mixture of DNA from two different organisms

12. What is the minimum number of base changes needed to change one codon into a different one?

A. One base substitution

B. Two base substitutions

C. Three base substitutions

D. Three base insertions

13. Which **one** of the following statements describes a characteristic of a dominant allele?

A. It has a greater effect on the phenotype in heterozygotes than in homozygotes.

B. Heterozygotes always have two dominant alleles.

C. It has the same effect on the phenotype in heterozygotes as in homozygotes.

D. It is more likely to be passed on to the next generation than the recessive allele.

14. Duchenne muscular dystrophy in humans is caused by a recessive allele of a gene. This gene is located on the X chromosome and not on the Y chromosome. How frequently will Duchenne muscular dystrophy occur in females?

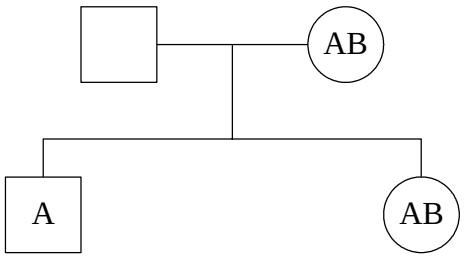
A. No females will have Duchenne muscular dystrophy.

B. Fewer females will have Duchenne muscular dystrophy than males.

C. Equal proportions of females and males will have Duchenne muscular dystrophy.

D. More females than males will have Duchenne muscular dystrophy.

15. The pedigree chart below shows the blood groups of two children and their mother. What could be the blood group of the father?



A. A only

B. A or B only

C. A, B or AB only

D. A, B, AB or O

16. Which **one** of the following statements describes a difference between cloning and breeding of farm animals?

A. More animals can be produced by cloning than by breeding.

B. Cloning can conserve a useful combination of genes but breeding can result in a better combination.

C. The animals produced by breeding are genetically identical and those produced by cloning are different.

D. There are ethical arguments against breeding but not against cloning.

17. What are the members of one species in a particular area at a particular time called?

A. A community

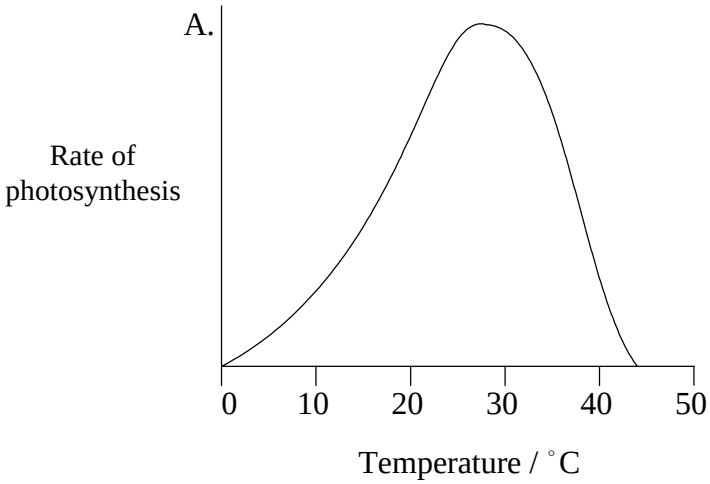
B. An ecosystem

C. A population

D. A habitat

18. Which graph represents the relationship between temperature and the rate of photosynthesis?

A.



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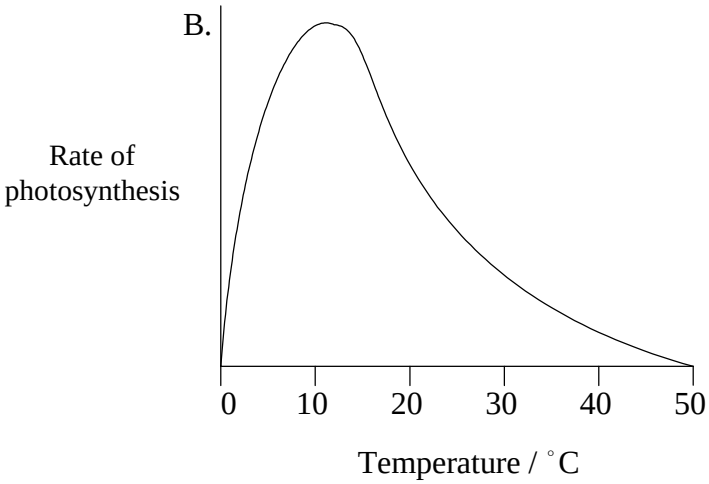

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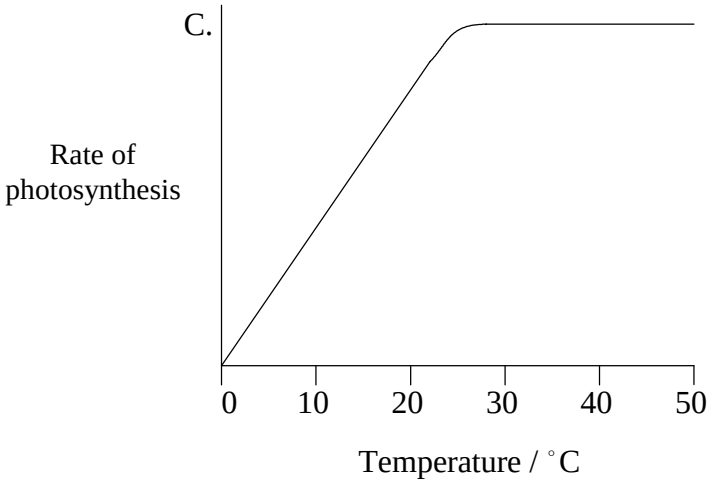

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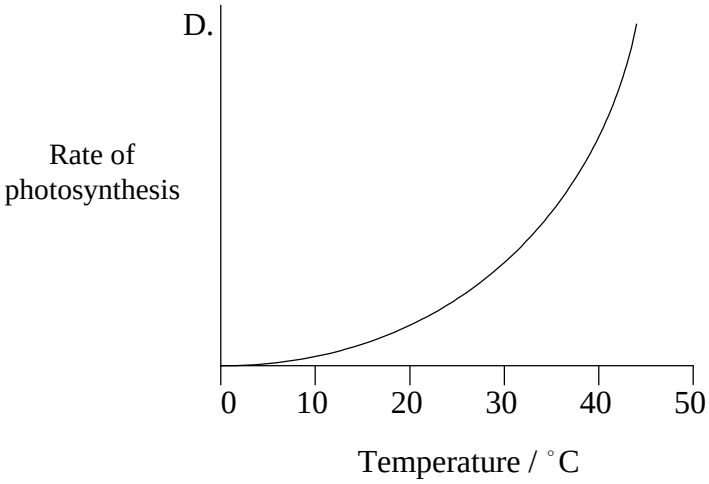
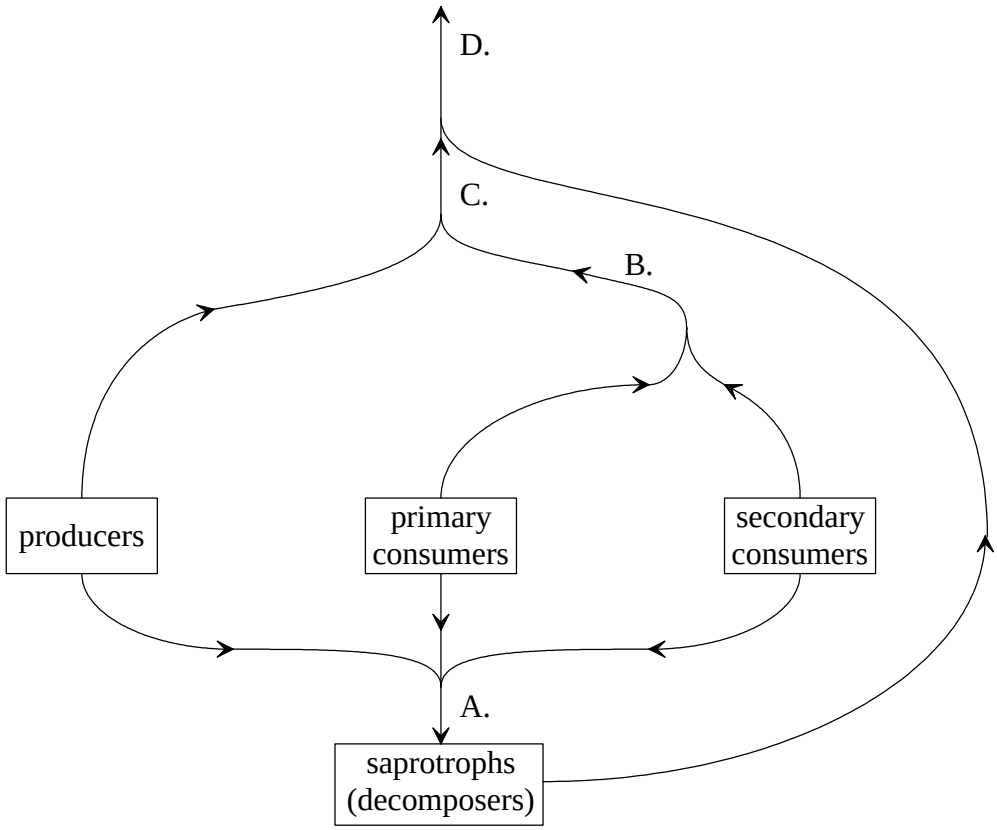


19. Which arrow in the energy flow chart below represents the heat produced by all respiring organisms in a habitat?



20. Which processes add carbon dioxide to the atmosphere and which processes remove it?

\+ = adds carbon dioxide – = removes carbon dioxide

	Combustion	**Fossilisation**	**Photosynthesis**	**Respiration**
A.	+	+	–	+
B.	+	–	–	+
C.	–	+	+	–
D.	–	–	+	–

21. Which **one** of the following options describes a cause and a result of the increased greenhouse effect?

	Cause of the increased greenhouse effect	**Result of the increased greenhouse effect**
A.	release of CFCs	skin cancer
B.	burning of fossil fuels	acid rain
C.	burning of fossil fuels	climate change
D.	release of CFCs	urban pollution

22. What are three abiotic factors that affect plants?

A. Light intensity, light wavelength, day length

B. Carbon dioxide concentration, air temperature, number of leaves

C. Soil temperature, soil nitrogen content, number of saprotrophs (decomposers)

D. Number of seeds, rainfall, soil oxygen concentration

23. Which statement correctly describes the absorption of glucose in the digestive system?

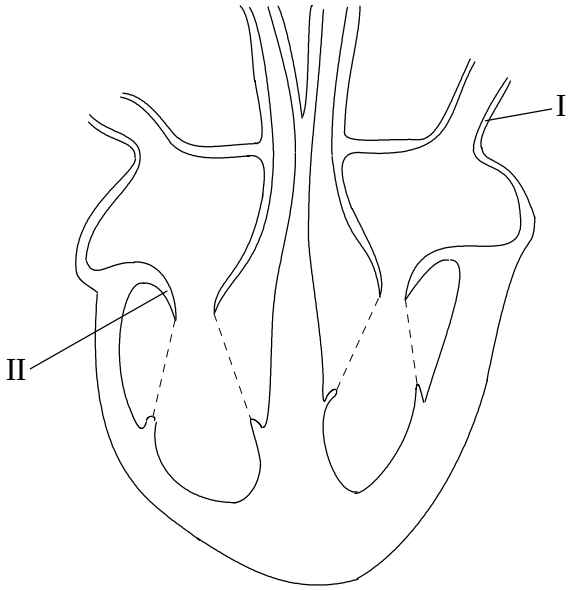
A. It is stimulated by the hormone insulin.

B. It occurs in the large intestine.

C. It occurs in the small intestine.

D. It is stimulated by the hormone glucagon.

24. What are the structures labelled I and II on the diagram of the heart below?



A. I is the pulmonary vein and II is the atrio-ventricular valve.

B. I is the pulmonary artery and II is the atrio-ventricular valve.

C. I is the pulmonary vein and II is the semi-lunar valve.

D. I is the pulmonary artery and II is the semi-lunar valve.

25. What is carried by blood?

✓ = carried ✗ = not carried

	Antibodies	**Carbon dioxide**	**Platelets**	**Testosterone**
A.	✓	✓	✗	✗
B.	✓	✗	✓	✓
C.	✓	✓	✓	✗
D.	✓	✓	✓	✓

26. How do the mucus membranes help to protect the body from infectious disease?

A. They form a barrier.

B. They produce antibodies.

C. They release phagocytic leucocytes.

D. They absorb mucus.

27. What action decreases the glucose level in blood?

A. An increase in the level of glucagon

B. A decrease in the level of glycogen

C. An increase in the level of insulin

D. A decrease in the level of amylase

28. The levels of oestrogen, progesterone, FSH and LH vary during the menstrual cycle in women. Each hormone reaches its maximum level at a different stage in the cycle. In what sequence do the hormones reach their maximum level, if the cycle begins at the start of menstruation?

A. LH, progesterone, FSH, oestrogen

B. FSH, progesterone, LH, oestrogen

C. LH, oestrogen, FSH, progesterone

D. FSH, oestrogen, LH, progesterone

29. What is the function of the placenta?

A. To regulate the temperature of the fetus.

B. To protect the fetus from mechanical damage.

C. To transfer blood from the mother to the fetus.

D. To exchange materials between the maternal and fetal blood.

30. What could be developed by human embryo research?

A. Improvements to the safety of childbirth

B. Methods of avoiding pain during menstruation

C. Improvements to the safety of amniocentesis

D. Methods for early detection of chromosome abnormalities