

**BIOLOGY
STANDARD LEVEL
PAPER 1**

Wednesday 13 November 2002 (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 correct order of increasing size for the following biological structures?
 - I. The diameter of a virus
 - II. The diameter of a bacterium
 - III. The thickness of a cell surface membrane
 - IV. The diameter of a eukaryotic cell
 - A. I < III < II < IV
 - B. I < III < IV < II
 - C. III < I < II < IV
 - D. III < II < I < IV

2. What is the function of a plasmid?
 - A. The site of respiration in prokaryotes
 - B. The site of photosynthesis in eukaryotes
 - C. The site of protein synthesis in prokaryotes and eukaryotes
 - D. The site of hereditary material in prokaryotes

3. Which structure is only found in plant cells?
 - A. Mitochondrion
 - B. Cell membrane
 - C. Chloroplast
 - D. Golgi apparatus

4. Which of the following is a feature of exocytosis but **not** endocytosis?
 - A. Lipid bilayer fusion
 - B. Vesicle formation
 - C. Lipid bilayer adhesion
 - D. Secretion

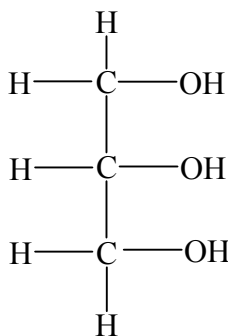
5. Which process occurs during interphase of the cell cycle?

- A. Duplication of chromosomes
- B. Separation of chromatids
- C. Condensation of chromatin
- D. Migration of centrioles

6. Which of the following is an organic compound?

- A. Calcium carbonate
- B. Carbon dioxide
- C. Glucose
- D. Water

7. What molecule does the following structure represent?

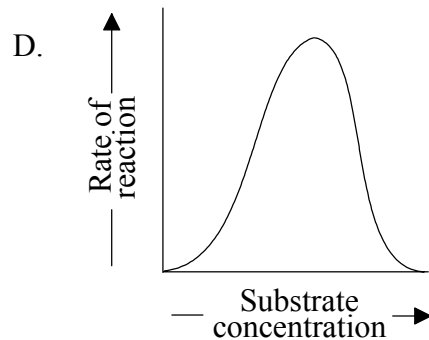
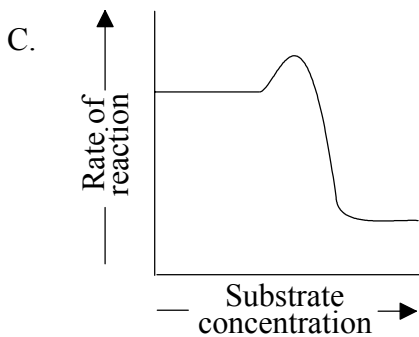
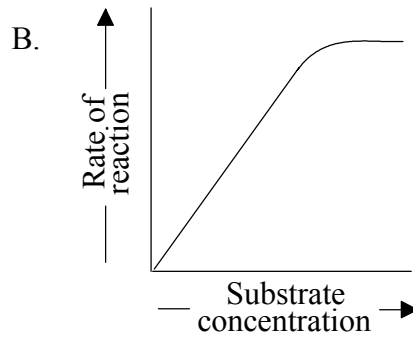
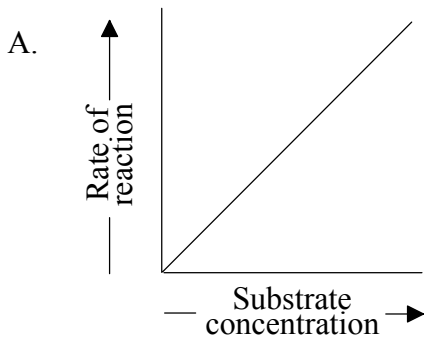


- A. Glycerol
- B. Glucose
- C. An amino acid
- D. A fatty acid

8. Which of the following is the **most** soluble in water?

- A. Olive oil
- B. Glycogen
- C. Glucose
- D. Cellulose

9. Which graph illustrates the effect of increasing the substrate concentration of an enzyme controlled reaction?



10. If mRNA has a codon CAU, what would be the corresponding anticodon on the tRNA molecule?

- A. CAT
- B. GUA
- C. CAU
- D. GTA

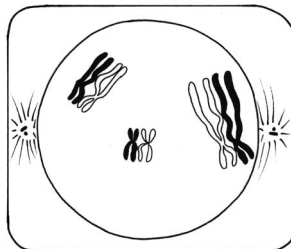
11. In 1993 a team of German scientists investigated the genetic relationships between skeletons of family members who had died between 1546 and 1749. This involved extracting the DNA from the bones, amplifying it, cutting it with enzymes to remove a gene and analysing the size of the gene by separating the pieces of DNA of different sizes. What is this technique called?
- A. Gene expression
 - B. DNA profiling
 - C. Gene therapy
 - D. Gene transfer
12. The chromosomes of a person can be analysed by photographing stained, dividing cells. The pictures of the chromosomes are then cut out and arranged by size, shape and staining patterns. What is this technique called?
- A. Chromatography
 - B. Gel electrophoresis
 - C. Polymerase chain reaction
 - D. Karyotyping
13. A mutation results in a change in the sequence of bases in a DNA molecule, as illustrated below.

Normal DNA: ACCTGCATTG
Mutated DNA: ACGCTGCATTG

What is this type of mutation?

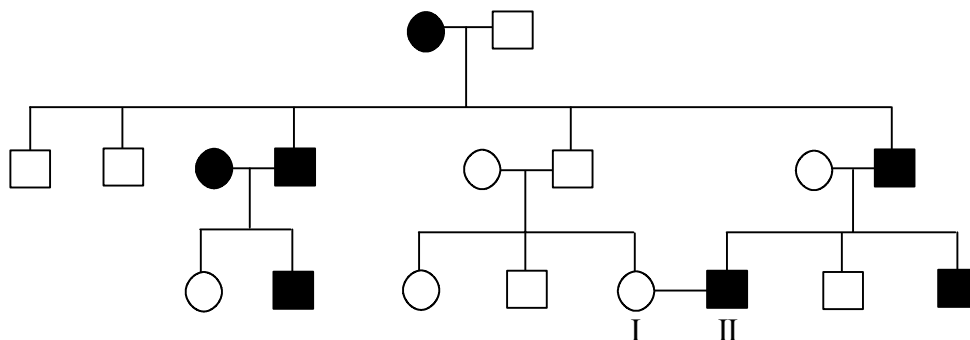
- A. Insertion
- B. Substitution
- C. Inversion
- D. Deletion

14. The diagram below shows the cell of an organism going through the first division of meiosis.



What is the number of different combinations possible for these chromosomes in the haploid cells formed by meiosis?

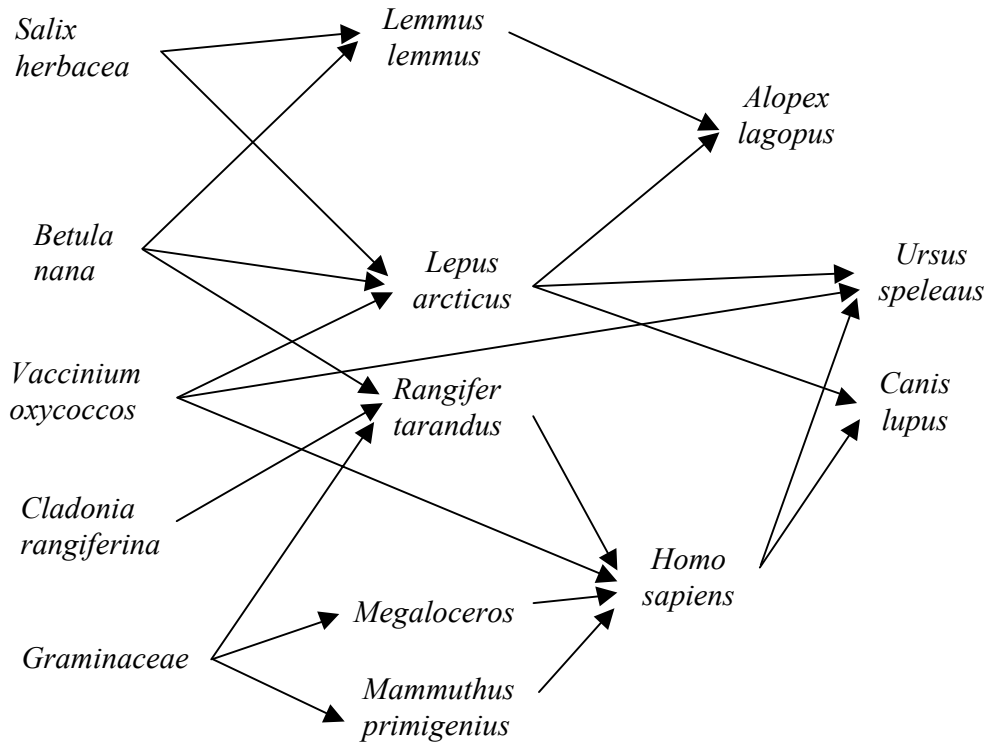
- A. 2
 - B. 6
 - C. 8
 - D. 9
15. The pedigree chart below shows a family affected by brachydactyly. This is a hereditary condition which results in short hands and feet. It is caused by a dominant allele.



What is the chance that the first child of individuals I and II will be normal?

- A. 0 %
- B. 25 %
- C. 50 %
- D. 100 %

16. The food web below shows a community in central France 24 000 years ago.



Which statement is a correct description of *Ursus speleaus*?

- A. It is a top carnivore and a primary consumer.
- B. It is a producer preyed upon by *Vaccinium oxycoccus*.
- C. It is an omnivore which feeds on *Lemmus lemmus*.
- D. It is a decomposer and it competes with *Rangifer tarandus*.

17. What is a community of organisms?

- A. A group of one species
- B. A group of several different species in the same place at the same time
- C. A group of several different species plus abiotic factors at the same time
- D. A group of several different species plus the geographic location

18. Which type of organism feeds on dead organic matter using extracellular digestion?
- A. A detritivore
 - B. A saprotroph
 - C. A parasite
 - D. An autotroph
19. Which substance(s) is (are) used to make organic molecules during photosynthesis?
- I. Carbon dioxide
 - II. ATP
 - III. Oxygen
 - IV. Water
- A. I only
 - B. I and IV only
 - C. I, II and IV only
 - D. I, III and IV only
20. What finally happens to the energy in the bodies of organisms in an ecosystem?
- A. It is lost as heat.
 - B. It is consumed by the decomposers.
 - C. It is recycled to the producers via the soil.
 - D. It is lost to another ecosystem as carbon dioxide.

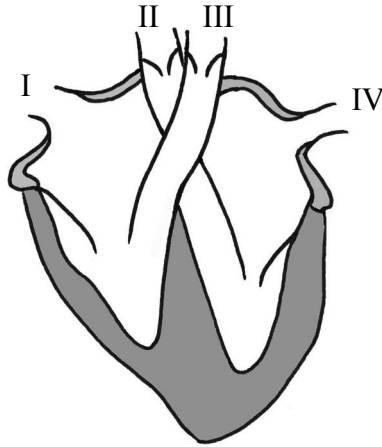
21. White clover (*Trifolium repens*) is a plant which has a flower head made up of many florets. 17 plants were sampled at random in a field and their flower heads were counted. The results are shown below.

29, 32, 34, 35, 36, 43, 45, 45, 47, 52, 53, 54, 57, 62, 64, 65, 70

What is the median number of florets in this sample of white clover?

- A. 45.0
 - B. 46.0
 - C. 47.0
 - D. 48.5
22. What does the digestion of starch by amylase produce?
- A. Lactose
 - B. Sucrose
 - C. Galactose
 - D. Maltose
23. Which of the following factors need to be considered when establishing a balanced diet for a person?
- I. Age of the person
 - II. Daily activity of the person
 - III. Health of the person
 - IV. Climate where the person lives
- A. I only
 - B. I and II only
 - C. I, II and III only
 - D. I, II, III and IV

24. The diagram below shows the ventral view of the heart. In which vessels does oxygenated blood travel?



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

25. Which factors related to mucous membranes protect the body against microbes?

- I. Production of lysozymes
- II. Secretion of alkaline solutions
- III. Trapping of microbes

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

26. Capillaries surround the alveoli in the lungs. Which pair of statements correctly describes the concentrations of oxygen and carbon dioxide in the lungs.

	Oxygen	Carbon dioxide
A.	Higher in the capillaries	Lower in the capillaries
B.	Lower in the capillaries	Lower in the capillaries
C.	Lower in the alveoli	Higher in the capillaries
D.	Higher in the alveoli	Higher in the capillaries

27. Which processes release the products of excretion?

- I. Urinating
- II. Sweating
- III. Breathing
- IV. Egestion

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

28. What messenger is responsible for maintaining a normal blood sugar level at night while we sleep?

- A. Glucagon
- B. Glycogen
- C. Glucose
- D. Glycerol

29. What are the levels of the hormones oestrogen, progesterone, LH and FSH during the menstrual cycle at ovulation?

	Oestrogen	Progesterone	LH	FSH
A.	High	Low	High	High
B.	High	High	Low	High
C.	Low	High	High	Low
D.	Low	Low	Low	Low

30. What is the major role of oxytocin during labour?

- A. Stimulates milk production
 - B. Stimulates progesterone secretion
 - C. Stimulates muscle contraction
 - D. Inhibits oestrogen secretion
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