



**BIOLOGY
HIGHER LEVEL
PAPER 1**

Friday 2 November 2007 (afternoon)

1 hour

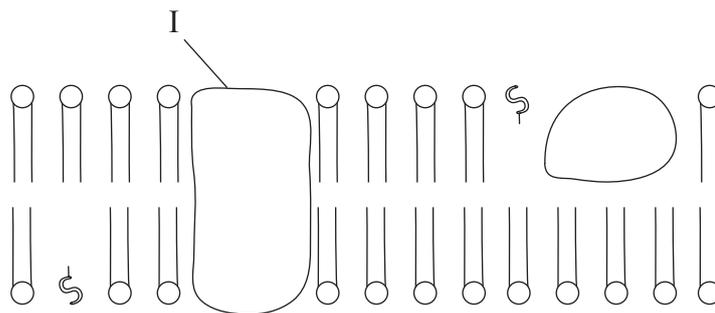
INSTRUCTIONS TO CANDIDATES

- 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. Viruses have a non-cellular structure. What components make up their structure?
- A. Lipid bilayer surrounding cytoplasm
 - B. Lipid bilayer surrounding DNA or RNA
 - C. Protein coat surrounding DNA or RNA
 - D. Protein coat surrounding active mitochondria

2. What advantages does electron microscopy have over light microscopy?
- I. Excellent resolution throughout magnification range.
 - II. Biological material is easy to prepare and stain.
 - III. Movement of living cells can be seen.
- A. II and III only
 - B. I and II only
 - C. I only
 - D. III only

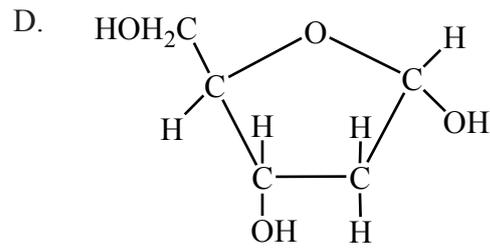
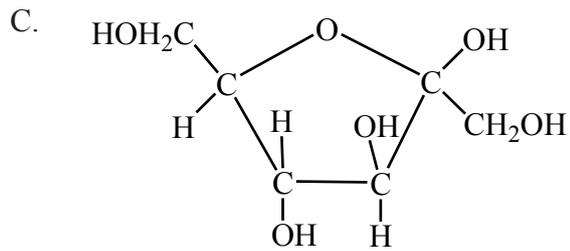
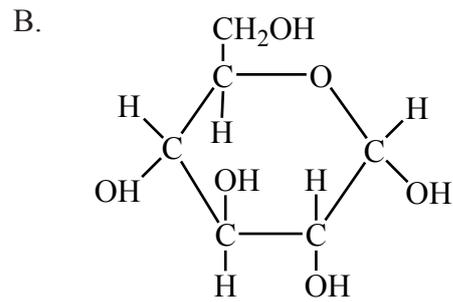
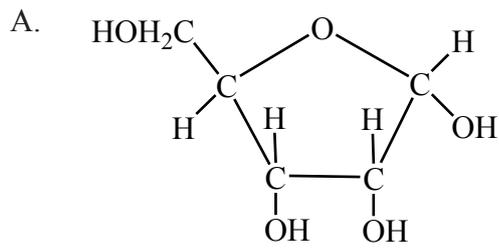
3. The diagram below shows part of a plasma membrane. What label should be used for structure I?



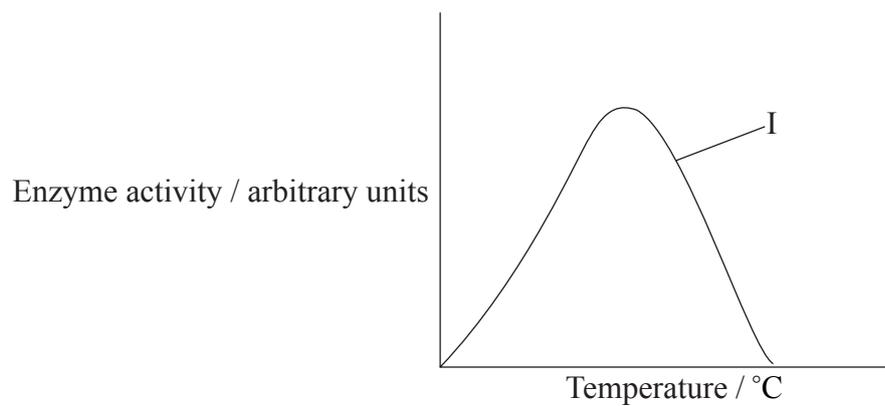
- A. Peripheral protein
- B. Phospholipid
- C. Cholesterol
- D. Integral protein

4. What is occurring in the cell cycle during interphase?
- A. Centromeres split
 - B. DNA replication
 - C. Nuclear membrane breaks down
 - D. Chiasmata form
5. During the process of translation which of the following statements describes the relationship between nucleic acids?
- A. Anticodons on mRNA bind to complementary codons on DNA.
 - B. Anticodons on tRNA bind to complementary codons on mRNA.
 - C. Bases on DNA bind to complementary bases on mRNA.
 - D. A single strand of mRNA is produced from the DNA in the nucleus.
6. What chemical substances are used during the manufacture of organic molecules in photosynthesis?
- I. Hydrogen
 - II. ATP
 - III. Carbon dioxide
- A. I and III only
 - B. I and II only
 - C. II and III only
 - D. I, II and III

7. Which of the following diagrams is the structure of ribose?

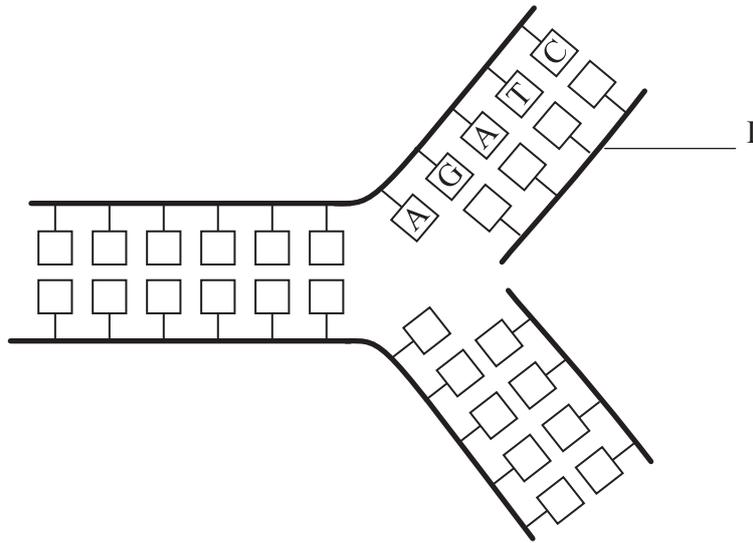


8. The graph below shows enzyme activity plotted against temperature. What is happening at point I?



- A. The enzyme is being denatured.
- B. pH changes are slowing the reaction.
- C. The concentration of the substrate remains constant.
- D. The reaction is increasing in speed.

9. The diagram below shows the bases on a short section of DNA during replication. Identify the sequence of bases on the new complementary strand labelled I in the diagram.

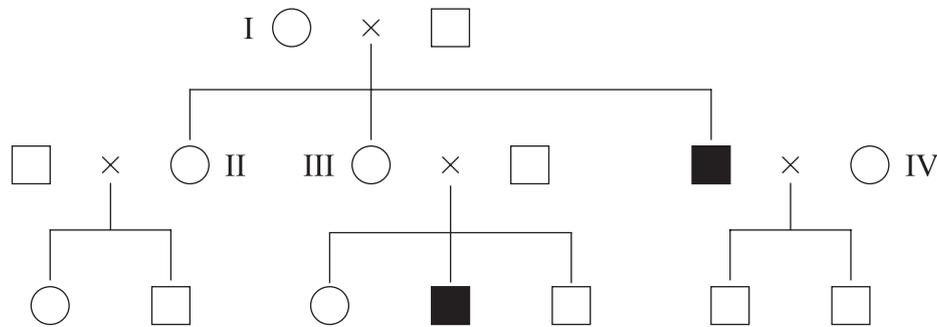


- A. CTAG
B. CUAG
C. TCGA
D. AGCT
10. What are the end products of aerobic cell respiration?
- A. carbon dioxide and ethanol
B. lactate and ATP
C. water, ATP and oxygen
D. water, carbon dioxide and ATP

11. What is a test cross?
- A. Crossing a possible heterozygote with a homozygous recessive
 - B. Any genetic cross to determine genotype
 - C. Crossing a possible homozygote with a homozygous dominant
 - D. Crossing a possible heterozygote with another heterozygote

12. What is the aim of the Human Genome Project?
- A. Identify human infectious diseases
 - B. Make improvements to the human genome
 - C. Allow transfer of genes from other species to humans
 - D. Sequence genetic information in humans

13. Colour blindness in humans is caused by an X chromosome linked recessive allele. In the pedigree chart below which **two** individuals must, for certain, be carriers of colour blindness?

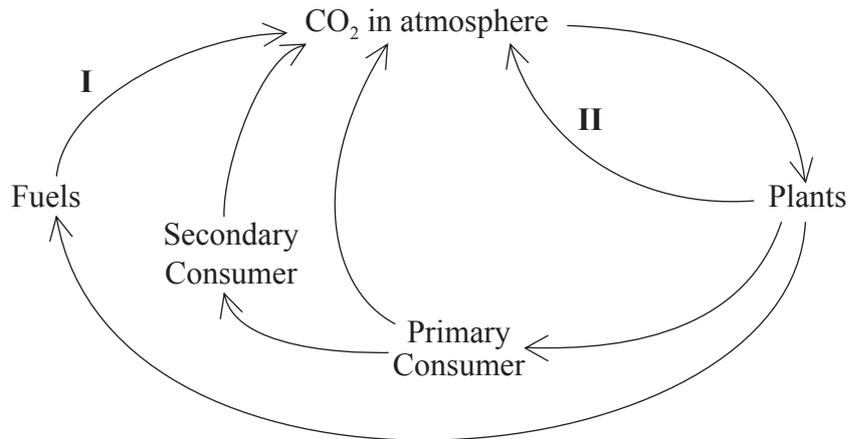


Key: □ male normal ■ male colour blind ○ female

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

14. What is natural selection?
- A. Making a random choice of partner for reproduction
 - B. Increased reproductive success by those with favourable variation
 - C. Variation due to mutations in a population
 - D. The survival of the largest organisms in a population
15. What name is given to an organism that is able to manufacture its own food from simple chemical materials?
- A. Heterotroph
 - B. Saprotroph
 - C. Autotroph
 - D. Detritivore
16. What is the sequence of the seven levels of hierarchy of *taxa* used in classification?
- A. phylum, kingdom, class, order, family, genus and species
 - B. kingdom, family, phylum, class, order, genus and species
 - C. kingdom, phylum, class, family, order, species and genus
 - D. kingdom, phylum, class, order, family, genus and species
17. Why has evolution resulted in antibiotic resistance in bacteria?
- A. Not completing a course of antibiotics allows resistant bacteria to develop.
 - B. Bacteria resistant to the antibiotic survive to pass on this characteristic to their offspring.
 - C. Bacteria change their metabolism to cope with the presence of antibiotics.
 - D. Bacteria have learnt how to neutralize the effects of the antibiotic and they pass this onto their offspring.

18. The diagram below shows a simplified version of the carbon cycle.



What processes are involved in the transfer of carbon at stages I and II?

	I	II
A.	combustion	photosynthesis
B.	photosynthesis	respiration
C.	combustion	respiration
D.	fossilization	respiration

19. Which of the following outlines the roles of the two hormones oxytocin and progesterone during childbirth?

	Oxytocin	Progesterone
A.	causes uterine contraction	level rises allowing oxytocin production
B.	level falls allowing progesterone production	causes uterine contraction
C.	stimulates oestrogen production	level falls allowing oxytocin production
D.	causes uterine contraction	level falls causing oxytocin production

20. How do endocrine glands function when they are involved in homeostasis?
- A. They release hormones directly into the blood system.
 - B. They release hormones through ducts to where they are used.
 - C. They release digestive enzymes from the pancreas.
 - D. They cause positive feedback in the body's structures.
21. What is a pathogen?
- A. An organism that transmits a disease to humans
 - B. A factor that causes lethal mutations
 - C. A gene that makes a disease lethal
 - D. An organism causing a disease
22. Why are there many different types of lymphocyte in the body?
- A. Each type can recognize one specific antibody and produces a specific antigen against it.
 - B. Each type can recognize one specific antigen and produces a specific antibody against it.
 - C. Each type can recognize one antigen and engulf it by phagocytosis.
 - D. Each type can recognize one antibody and engulf it by phagocytosis.

23. What substances are normally removed from the body by the kidney?

- I. Excess salts
- II. Water
- III. Glucose

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

24. What happens to the zygote immediately after fertilization?

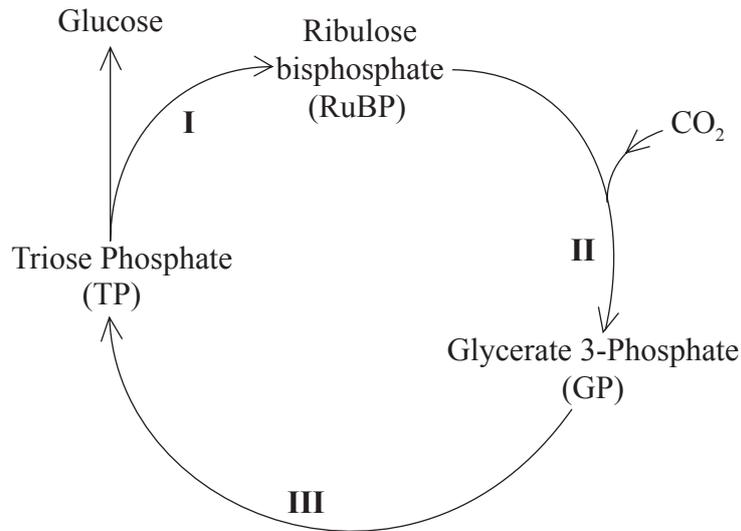
- A. It remains in the uterus until placenta develops.
- B. It implants in the wall of the uterus.
- C. It divides by meiosis to form an embryo.
- D. It divides by mitosis to form a blastocyst.

25. What is absorption?

- A. Food entering the mouth and being chewed
- B. Food entering the stomach for digestion
- C. Taking digested food into the blood stream
- D. Making complex organic molecules in cells using digested foods

26. What is *in vitro* fertilization?
- A. Fertilization using donated sperm
 - B. Artificial fertilization of an egg inside the body
 - C. Fertilization of an egg outside the body
 - D. Cloning technique to help couples conceive
27. What occurs in the induced fit model for enzyme catalysed reactions?
- A. There is an exact fit between a specific substrate and a specific enzyme.
 - B. The enzyme can change shape to accommodate the substrate.
 - C. The substrate can change its shape to fit a number of enzymes.
 - D. Other substrates can bind away from the active site.
28. What is a nucleosome?
- A. The protein core of a chromosome
 - B. Histone proteins and DNA
 - C. A chain of ribosomes
 - D. The material within the nuclear membrane
29. What is an intron?
- A. The 3' → 5' strand of a DNA double helix
 - B. The 5' → 3' strand of a DNA double helix
 - C. A section of mRNA removed before translation
 - D. A tRNA with a start anticodon

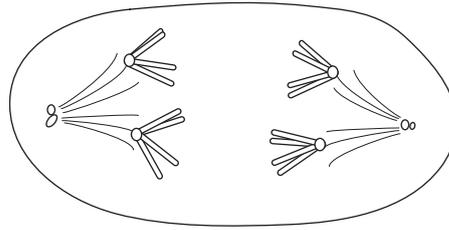
30. The diagram below shows the light independent stage of photosynthesis (the Calvin Cycle).



Where is energy, from ATP generated during the light dependent stage, used in this cycle?

- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
31. What is the key function of acetyl CoA in cellular respiration?
- A. Involved in carbohydrate and fatty acid metabolism
 - B. Used in anaerobic respiration to oxidize pyruvate
 - C. Introduces amino acids into the Krebs cycle
 - D. Used as a hydrogen carrier in the link reaction

32. The diagram below shows a cell undergoing meiosis. What is this stage of meiosis?



- A. Anaphase I
 - B. Prophase I
 - C. Anaphase II
 - D. Telophase II
33. A pure breeding tall plant with smooth seeds was crossed with a pure breeding short plant with wrinkled seeds. All the F_1 plants were tall with smooth seeds. Two of these F_1 plants were crossed and four different phenotypes were obtained in the 320 plants produced.

How many tall plants with wrinkled seeds would you expect to find?

- A. 20
 - B. 180
 - C. 60
 - D. 30
34. What is the function of the epididymis?
- A. Mucus production
 - B. Production of nutrient fructose solution
 - C. Storage of sperm during maturation
 - D. Secretion of alkaline solution

35. During oogenesis how many gametes are produced from **one** oogonium, the cell that starts to divide to produce gametes?
- A. 1
 - B. 2
 - C. 3
 - D. 4

36. Some infectious diseases are treated by injecting the patient with antibodies after they have been exposed to the disease.

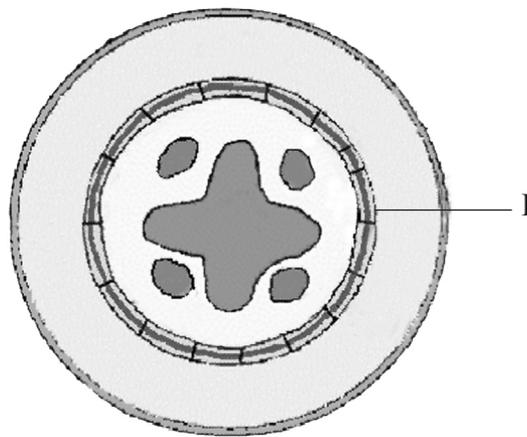
What type of immunity is this?

- A. artificial and active
 - B. artificial and passive
 - C. natural and passive
 - D. natural and active
37. When a nerve impulse is received by skeletal muscle it initiates a number of processes that result in contraction. What are the roles of Ca^{2+} , tropomyosin and ATP in contraction?

	Ca²⁺	Tropomyosin	ATP
A.	binds to troponin	exposes binding site	binds to myosin
B.	binds to myosin	exposes binding site	binds to troponin
C.	binds to actin	exposes binding site	binds to myosin
D.	binds to troponin	binds to myosin	binds to actin

38. What part of the kidney is affected by anti-diuretic hormone (ADH)?
- A. Proximal convoluted tubule
 - B. Loop of Henle
 - C. Collecting duct
 - D. Glomerulus

39. The diagram below shows a cross section through part of a dicotyledonous plant. What is the tissue labelled I?



- A. Cortex
 - B. Phloem
 - C. Endodermis
 - D. Xylem
40. What route can water from the soil take as it passes through the root?
- A. Active transport
 - B. Symplast pathway
 - C. Translocation
 - D. Endocytosis