



**BIOLOGY
HIGHER LEVEL
PAPER 1**

Wednesday 14 May 2008 (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. A student observes and draws an Amoeba, using the high power lens of a microscope. The diameter of the drawing is 100 mm. The actual diameter of the Amoeba is 100 μm . What is the magnification of the drawing?
 - A. 0.001
 - B. 100
 - C. 400
 - D. 1000

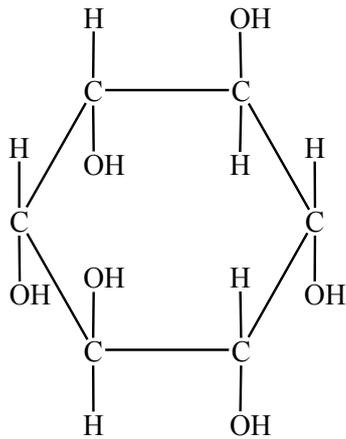
2. What is a difference between plant and animal cells?
 - A. Animal cells burst when they take in excess water by osmosis whereas plant cells do not.
 - B. Plant cells store cellulose whereas animal cells store starch.
 - C. Animal cells have ribosomes whereas plant cells do not.
 - D. Plant cells have a cell wall whereas animal cells have a cell membrane.

3. What ensures that mitosis produces two genetically identical nuclei?
 - A. One of each of the twenty-three types of chromosome is pulled to each pole of the cell by spindle microtubules.
 - B. Half of the chromosomes are pulled to each centriole by mesosomes.
 - C. Identical chromatids are pulled to opposite poles by spindle microtubules.
 - D. DNA molecules are moved to the equator of the cell where they are replicated.

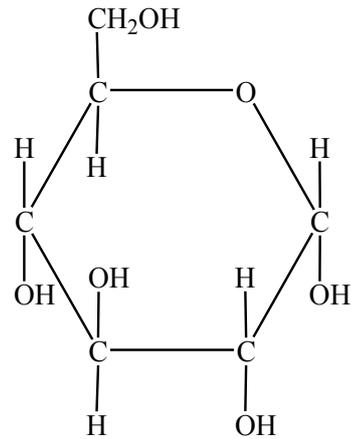
4. What causes water to have a relatively high boiling point?
 - A. Hydrogen bonds between water molecules
 - B. Hydrogen bonds between hydrogen and oxygen within water molecules
 - C. Cohesion between water molecules and the container in which the water is boiled
 - D. Covalent bonds between hydrogen and oxygen within water molecules

5. Which of the following molecules is ribose?

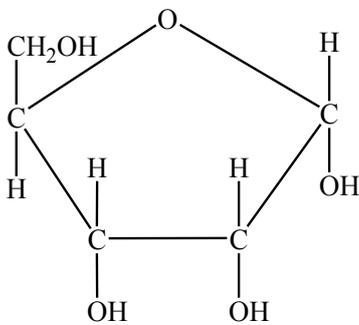
A.



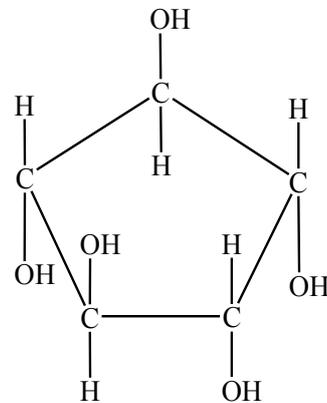
B.



C.



D.



6. When substrate concentration increases, in a reaction catalysed by an enzyme, why does the rate of reaction increase?

- A. The substrate molecules collide more frequently with the active site.
- B. There are more active sites to catalyse the reaction.
- C. The substrate molecules are moving faster.
- D. There are more substrate molecules to catalyse the reaction.

7. If a polypeptide consists of 240 amino acids, what is the minimum number of nucleotides needed on the sense strand of a gene to code for it?
- A. 80
 - B. 240
 - C. 720
 - D. 1440
8. What are the final products when a diploid onion cell, containing 16 chromosomes, undergoes meiosis?
- A. 4 cells, each with 8 chromosomes
 - B. 2 cells, each with 8 chromosomes
 - C. 4 cells, each with 4 chromosomes
 - D. 2 cells, each with 16 chromosomes
9. A gene in cattle controls whether horns develop or not. When cattle without horns are mated together, none of the offspring ever have horns. A male with horns is mated with females without horns. If half of the offspring have horns and half do not, what is the conclusion?
- A. The male is homozygous dominant.
 - B. The male is homozygous recessive.
 - C. The male is heterozygous.
 - D. Only males have horns.

10. Hemophilia is sex-linked and is caused by a recessive allele. A woman’s father has hemophilia, but her husband does not.

What is the probability of the woman and her husband having a child with hemophilia?

	Probability of a son having hemophilia	Probability of a daughter having hemophilia
A.	50%	0%
B.	0%	0%
C.	100%	0%
D.	0%	50%

11. There are many different views on the ethics of reproductive cloning in humans. Which is a valid argument **against** cloning in humans?

- A. It involves the use of donor sperm which is unethical.
- B. It happens naturally when identical twins are conceived.
- C. Only females can be cloned.
- D. The life expectancy of children produced by cloning might be lower than normal.

12. What components are needed to make an ecosystem?

- A. A community and its abiotic environment
- B. A community and its source of energy and nutrients
- C. Producers and consumers only
- D. Producers, consumers and decomposers only

13. What is the ecological role of saprotrophic bacteria?
- A. To recycle energy in dead organic matter
 - B. To digest dead organic matter and release nutrients from it
 - C. To ingest dead organic matter and prevent it from accumulating
 - D. To produce dead organic matter by killing organisms
14. How could a quadrat be used by an ecologist?
- A. To estimate rates of immigration and emigration of animals in a population
 - B. To estimate the sizes of plant populations by random sampling
 - C. To trap animals so that they can be marked and released
 - D. To estimate light intensity from the height of the Sun above the horizon
15. The binomial name for white clover is *Trifolium repens*. Which species name indicates the closest relationship with white clover?
- A. *Tetrafolium persimilis*
 - B. *Trifolium bulbosus*
 - C. *Bifolium repens*
 - D. *Unifolium trifolians*

16. What is a factor that increases the greenhouse effect and what is a consequence of it?

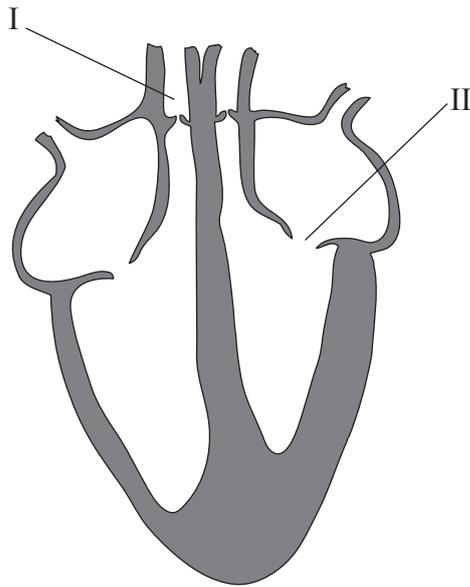
	Factor contributing to increases in the greenhouse effect	Consequence of the increased greenhouse effect
A.	Increasing global temperatures	Rising sea levels
B.	Rising sea levels	Increasing global temperatures
C.	Increasing global temperatures	Burning fossil fuels to run air conditioning
D.	Increases in air travel	Increasing global temperatures

17. Which of the following structures increase the surface area for absorption of digested food in the small intestine?

- I. Microvilli
- II. Protein pumps
- III. Villi

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

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



- A. I is the pulmonary artery and II is the atrio-ventricular valve.
 - B. I is the pulmonary vein and II is the atrio-ventricular valve.
 - C. I is the pulmonary artery and II is the semi-lunar valve.
 - D. I is the pulmonary vein and II is the semi-lunar valve.
19. Why are antibiotics ineffective against viruses?
- A. Viruses do not have metabolic pathways for the antibiotic to target.
 - B. Viruses have developed resistance to antibiotics.
 - C. Viruses destroy T-lymphocytes before the antibiotic can work.
 - D. Viruses mutate quickly when challenged by an antibiotic.

20. What changes would occur if a person moved from a cold swimming pool to a very warm changing room?

	Transfer of heat in blood to the skin	Temperature of the skin	Rate of blood flow in skin arterioles
A.	Decreases	Increases	Increases
B.	Increases	Decreases	Increases
C.	Increases	Increases	Decreases
D.	Increases	Increases	Increases

21. Do the levels of progesterone and FSH increase or remain low during the first few days of the menstrual cycle?

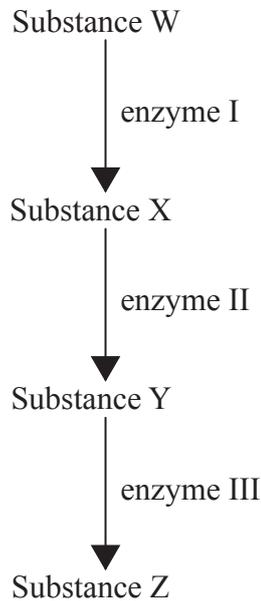
- A. Progesterone and FSH both remain low.
- B. Progesterone remains low but FSH increases.
- C. Progesterone increases but FSH remains low.
- D. Progesterone and FSH both increase.

22. What happens during amniocentesis?

- A. The amniotic sac fills up with fluid to prevent damage to the fetus.
- B. Amniotic fluid is removed to obtain fetal cells for testing.
- C. The amniotic fluid is replaced to avoid rejection problems with rhesus positive fetuses.
- D. Fluid is emptied from the amniotic sac during childbirth.

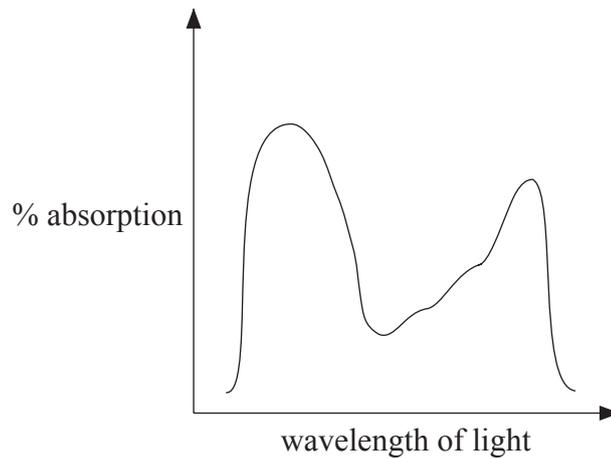
23. Why are the messenger RNA molecules received by eukaryotic ribosomes shorter than the messenger RNA molecules formed by transcription of DNA?
- A. Base deletion mutations make the mRNA shorter.
 - B. Start codons are not at the end of the mRNA molecule.
 - C. Introns are removed before the RNA is translated.
 - D. Bases are removed from the ends of the mRNA each time it is translated.

24. What happens during end product inhibition of the pathway shown below?



- A. Enzyme I is inhibited by substance X.
- B. Enzyme I is inhibited by substance Z.
- C. Enzyme III is inhibited by substance W.
- D. Enzyme III is inhibited by substance Y.

25. What happens to oxygen during aerobic cell respiration?
- A. It is reduced, by accepting electrons at the end of the electron transport chain.
 - B. It is oxidized, by accepting electrons at the end of the electron transport chain.
 - C. It is reduced, by accepting hydrogen at the start of the electron transport chain.
 - D. It is oxidized, by accepting hydrogen at the end of the electron transport chain.
26. What substance is moved into the thylakoids of the chloroplast using energy derived from light?
- A. Carbon dioxide (CO₂)
 - B. Protons (H⁺)
 - C. Glycerate 3-phosphate (GP)
 - D. Adenosine triphosphate (ATP)
27. What colours of light give the two peaks on the graph of the action spectrum of photosynthesis shown below?



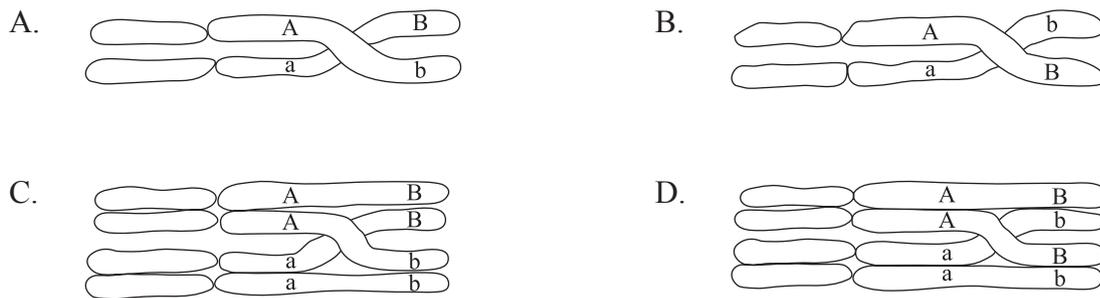
- A. red and infrared
- B. green and red
- C. blue and green
- D. blue and red

28. Humans are in blood group M, N or MN. The alleles for blood group M (M) and blood group N (N) are co-dominant. Humans are also in blood group A, B, AB or O. The alleles controlling these blood groups are I^A , I^B and i .

If two parents have the genotypes $ii MM$ and $I^A i MN$ what is the ratio of possible phenotypes of their offspring?

A.	9 group A, group M	3 group A, group N	3 group O, group M	1 group O, group N
B.	9 group O, group M	3 group O, group N	3 group A, group M	1 group A, group N
C.	3 group O, group M	3 group O, group MN	1 group A, group M	1 group A, group MN
D.	1 group A, group M	1 group A, group MN	1 group O, group M	1 group O, group MN

29. A cell replicates its DNA and then starts to divide by meiosis. What is the expected arrangement of chromosomes if crossing over has taken place between the two genes shown?



30. What is the location and function of Sertoli cells?

	Location	Function
A.	Seminiferous tubule	Feeding developing sperm
B.	Seminiferous tubule	Feeding interstitial cells
C.	Epididymis	Feeding developing sperm
D.	Epididymis	Feeding interstitial cells

31. During fertilization in humans, where do the acrosome and the cortical reactions occur most often?

	Acrosome reaction	Cortical reaction
A.	Vagina	Uterus
B.	Uterus	Oviduct (fallopian tube)
C.	Oviduct (fallopian tube)	Uterus
D.	Oviduct (fallopian tube)	Oviduct (fallopian tube)

32. Which is the correct sequence of events when skin is cut and bleeding occurs?

- I. Thrombin is produced
- II Fibrinogen is converted into fibrin
- III Platelets release clotting factors

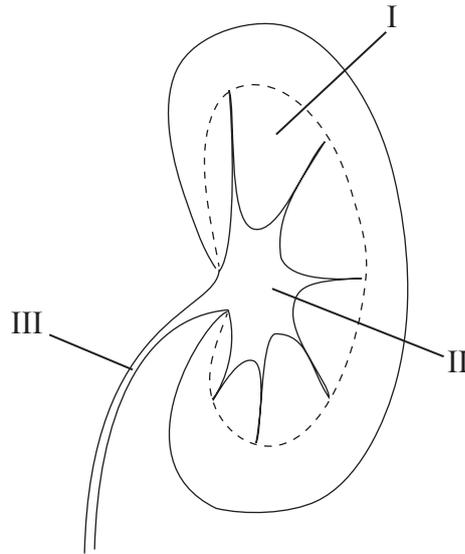
- A. I → II → III
- B. I → III → II
- C. III → II → I
- D. III → I → II

33. What causes artificial active immunity?

- A. Deliberately exposing a child to a disease
- B. Secretion of antibodies in milk
- C. Inoculation with a vaccine
- D. Injection of monoclonal antibodies

34. Which ion is pumped into the axon of a neuron to help maintain the resting potential?
- A. Calcium (Ca^{2+})
 - B. Hydrogen (H^+)
 - C. Potassium (K^+)
 - D. Sodium (Na^+)
35. What structures are used in the locomotion of bony fishes and birds, but not in the locomotion of earthworms and arthropods?
- A. Antagonistic muscles
 - B. Bones to which antagonistic muscles are attached
 - C. Neurons to stimulate muscle contraction
 - D. Fins or wings for swimming or flying
36. In which part of the nephron is the glucose concentration of the filtrate reduced?
- A. Distal convoluted tubule
 - B. Proximal convoluted tubule
 - C. Ascending limb of the loop of Henlé
 - D. Descending limb of the loop of Henlé

37. What structures are labelled I, II and III in the diagram of the kidney below?

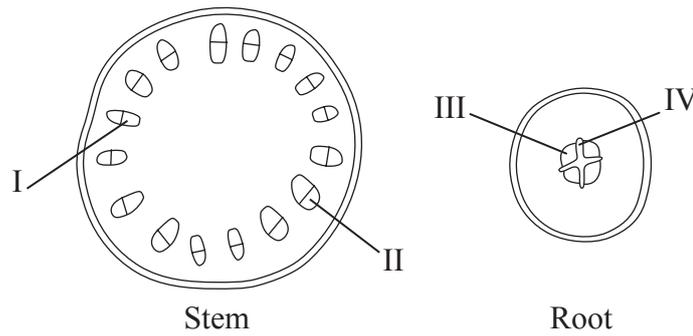


	I	II	III
A.	Cortex	Medulla	Urethra
B.	Medulla	Pelvis	Ureter
C.	Cortex	Medulla	Ureter
D.	Medulla	Pelvis	Urethra

38. Which is an adaptation of hydrophytes?

- A. Water storage tissue
- B. Shallow but widely spreading roots
- C. Reduced thickness of cuticle
- D. Large numbers of stomata in the lower epidermis

39. In the following diagram which tissues are the phloem of stems and roots?



- A. I and II
 - B. I and IV
 - C. II and III
 - D. II and IV
40. What process creates the low pressures needed for the movement of water upwards in the xylem?
- A. Active translocation
 - B. Active transport
 - C. Evaporation of water from mesophyll of leaves
 - D. Evaporation of water from guard cells
-