



BIOLOGY
STANDARD LEVEL
PAPER 1

Thursday 16 November 2006 (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. Which ratio limits the size of cells?
 - A. The rate of metabolism to mass
 - B. The surface area to volume
 - C. The mass to volume
 - D. The surface area to mass

2. Which statements are characteristics of diffusion through membranes?
 - I. Polysaccharides can be transported.
 - II. It can be facilitated by special channels.
 - III. It is affected by concentration gradients.
 - A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

3. In animal and plant cells, what is the difference between mitosis and cytokinesis?

	Animal		Plant	
	Mitosis	Cytokinesis	Mitosis	Cytokinesis
A.	centrioles	constriction of membrane	no centrioles	formation of cell plate
B.	no centrioles	constriction of membrane	centrioles	formation of cell plate
C.	centrioles	formation of cell plate	no centrioles	constriction of membrane
D.	no centrioles	formation of cell plate	centrioles	constriction of membrane

4. Which statement is characteristic of tumours?
- A. They occur only in certain animal cells.
 - B. They result from controlled cell division in only some organs.
 - C. They result from uncontrolled cell division and occur in any organ.
 - D. They result from partially controlled transcription.

5. Identify the atoms and ions from the table below.

	Atoms		Ions	
A.	H ⁺	Na ⁺	OH ⁻	Cl ⁻
B.	Fe	K	CH ₃ COO ⁻	H ₂ O
C.	Fe	H ₂ O	Ca ²⁺	N ₃ ⁻
D.	Na	C	I ⁻	NO ₃ ⁻

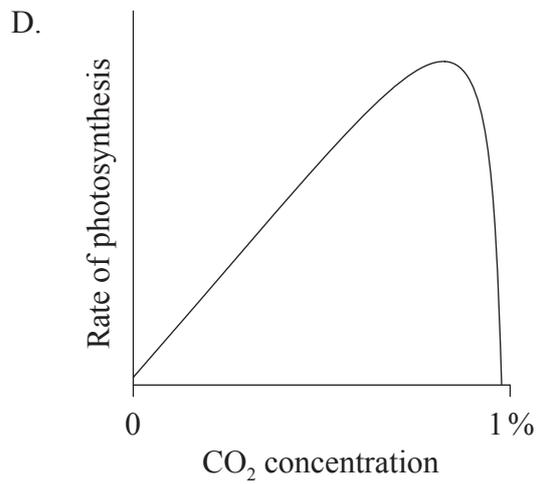
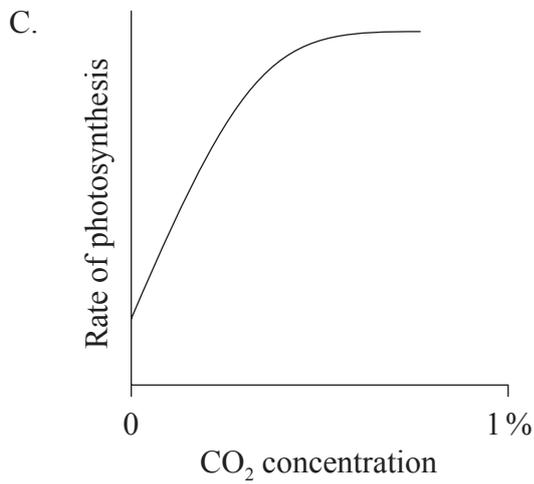
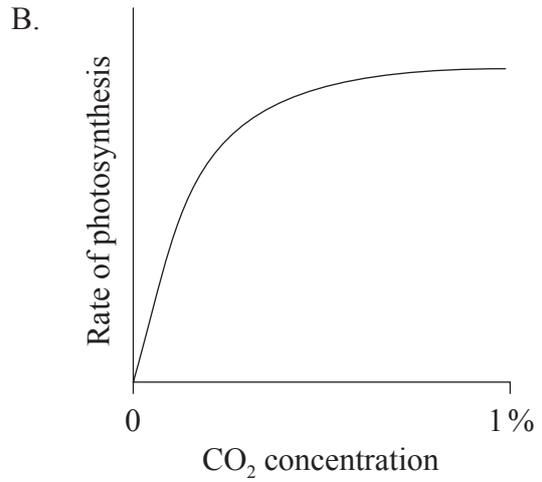
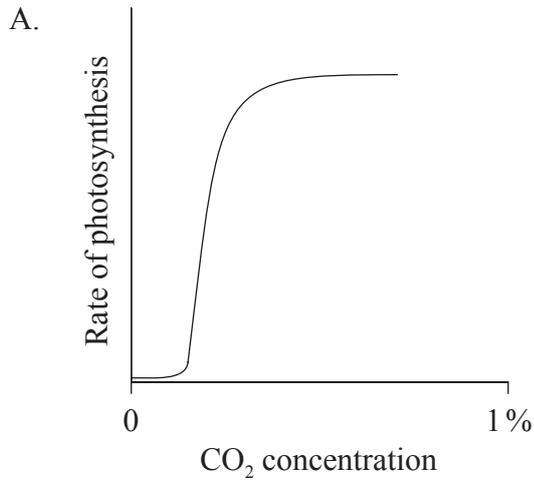
6. Which compounds are both organic **and** found in living organisms?

	Glucose C ₆ H ₁₂ O ₆	Carbon Dioxide CO ₂	Urea OC(NH ₂)	Calcium Carbonate CaCO ₃
A.	✓	×	×	✓
B.	×	✓	✓	×
C.	✓	×	✓	×
D.	✓	✓	✓	✓

Key: ✓ = present × = absent

7. What is an active site?
- A. The part of an enzyme that binds only to the product molecules.
 - B. The sequence of amino acids responsible for the catalytic activity of enzymes.
 - C. The sequence of amino acids responsible for the structure of an enzyme.
 - D. The specific area responsible for the activity of all proteins.
8. Which chemicals are used for energy storage?
- A. Disaccharides and glycerol
 - B. Polysaccharides and glycerol
 - C. Monosaccharides and glycerides
 - D. Polysaccharides and glycerides
9. What is responsible for the conservation of the base sequence during DNA replication?
- A. DNA polymerase working on one strand at the same time.
 - B. Unpaired bases always attracting their complementary nucleotides.
 - C. DNA helicase and polymerase are complementary.
 - D. Both strands are identical to each other.
10. Why is the genetic code defined as being degenerate?
- A. Some codes are stop or nonsense codons.
 - B. Some codes mutate after several generations.
 - C. The codes are the same for all organisms.
 - D. There is more than one triplet code for most amino acids.

11. Which graph shows the effect of increasing carbon dioxide concentration (CO_2) on the rate of photosynthesis?



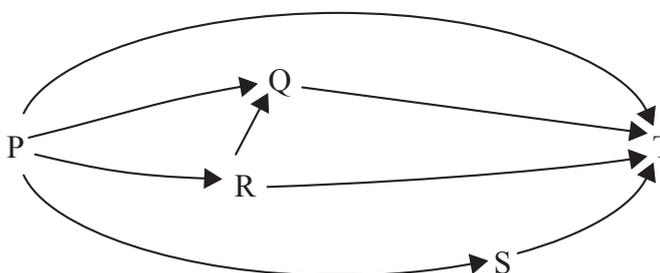
12. What are the components of a eukaryotic chromosome?

- A. One DNA molecule and one large protein
- B. Many DNA molecules and many proteins
- C. One DNA molecule and many proteins
- D. Many DNA molecules and one large protein

13. What is a karyotype?
- A. Maternal and paternal autosomes arranged in pairs.
 - B. Chromosomes arranged in pairs according to the number of their genes.
 - C. Chromosomes arranged in pairs according to their size and shape.
 - D. Chromosomes arranged in pairs according to their size.
14. What is the cause of sickle cell anemia?
- A. Errors in the translation of mRNA
 - B. A base substitution mutation in DNA
 - C. A transcription error that replaces A with U
 - D. A mutation that leads to glutamic acid instead of valine
15. What is the relationship between Mendel’s law of segregation and meiosis?
- A. Only one of a pair of alleles appears in a gamete.
 - B. The separation of “paternal” and “maternal” chromosomes shows no pattern.
 - C. Gametes contain all dominant or all recessive alleles.
 - D. Variation only results from two divisions.
16. What are the possible applications of DNA profiling?
- I. Solving paternity suits
 - II. Aiding certain criminal investigations
 - III. Identifying people who died last century
- A. I only
 - B. I and II only
 - C. II and III only
 - D. I, II and III

17. What is gene therapy?
- A. Removing non-functioning genes
 - B. Replacing defective alleles in some cells
 - C. Replacing defective chromosomes in all cells
 - D. Inhibiting the expression of chromosomes that cause some disorders

18. Consider the simple food web below.



Which organism could be a saprotroph?

- A. P
 - B. Q
 - C. S
 - D. T
19. What is the initial energy source for all terrestrial communities?
- A. Water
 - B. Photosynthesis
 - C. Light
 - D. Glucose

20. Which factors can cause a decrease in a population?

	Emigration	Nativity	Immigration	Mortality
A.	Low	High	Low	High
B.	High	Low	High	Low
C.	High	Low	Low	High
D.	Low	High	High	Low

21. 10 000 melons were collected from plants in the same area. Assuming their sizes are normally distributed, how many melons would you expect to be within two standard deviations of the mean?

- A. 3400
- B. 5000
- C. 6800
- D. 9500

22. What is natural selection?

- A. The mechanism that increases the chance of certain individuals reproducing.
- B. The mechanism that leads to increasing variation within a population.
- C. The cumulative change in the heritable characteristics of a population.
- D. The mechanism that explains why populations produce more offspring than the environment can support.

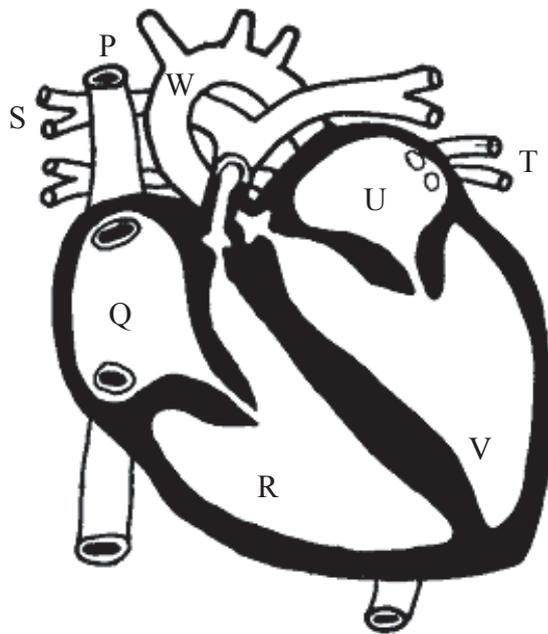
23. Why is most food digested?

- A. Digestive enzymes require a variety of substrates.
- B. It ensures that the diet is balanced.
- C. Most ingested food molecules are large.
- D. To prevent disorders of the intestine.

24. Which types of enzyme are found in the human digestive system?

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

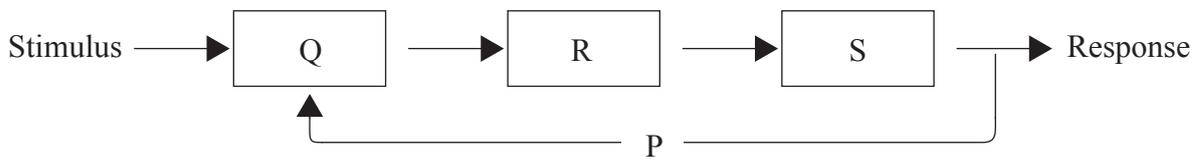
25. The diagram below shows the human heart. Which parts contain the most oxygenated blood?



- A. P and T
- B. Q, R and S
- C. T, U, V and W
- D. T, U, R and S

26. What is a pathogen?
- A. A virus that causes a disease.
 - B. Any organism or virus that causes a disease.
 - C. A disease caused by bacteria or viruses.
 - D. Any organism transmitted from humans to humans.

27. The diagram below illustrates the main features of homeostasis.



What are P, Q, R and S?

	P	Q	R	S
A.	Feedback	Receptor/detector	Controller/integrator	Effector
B.	Receptor/detector	Controller/integrator	Feedback	Effector
C.	Feedback	Receptor/detector	Effector	Controller/integrator
D.	Effector	Receptor/detector	Feedback	Controller/integrator

28. What are responsible for the lowering of blood glucose levels?

- I. β -cells in the pancreas
 - II. Insulin molecules
 - III. α -cells in the pancreas
- A. II only
 - B. I and II only
 - C. II and III only
 - D. I, II and III

29. What is the correct order for the following stages of human reproduction up to implantation?
- A. copulation → ejaculation → fertilization → cell division → blastocyst
 - B. fertilization → ejaculation → copulation → blastocyst → cell division
 - C. copulation → ejaculation → fertilization → blastocyst → cell division
 - D. cell division → copulation → fertilization → ejaculation → blastocyst
30. Which fluid is sampled to try to detect chromosomal abnormalities in a fetus?
- A. Placental
 - B. Umbilical
 - C. Amniotic
 - D. Spinal
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