

BIOLOGY

Standard Level

Wednesday 10 November 1999 (afternoon)

Paper 1

45 minutes

This examination paper consists of 30 questions.

Each question offers 4 suggested answers.

The maximum mark for this paper is 30.

INSTRUCTIONS TO CANDIDATES

Do NOT open this examination paper until instructed to do so.

Answer ALL questions.

For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

Calculators are NOT permitted for this examination paper.

EXAMINATION MATERIALS

Required:

Optically Mark Read (OMR) answer sheet

Allowed:

A simple translating dictionary for candidates not working in their own language

1. Which structure is the smallest?
 - A. A cell
 - B. A virus
 - C. A mitochondrion
 - D. A bacterium

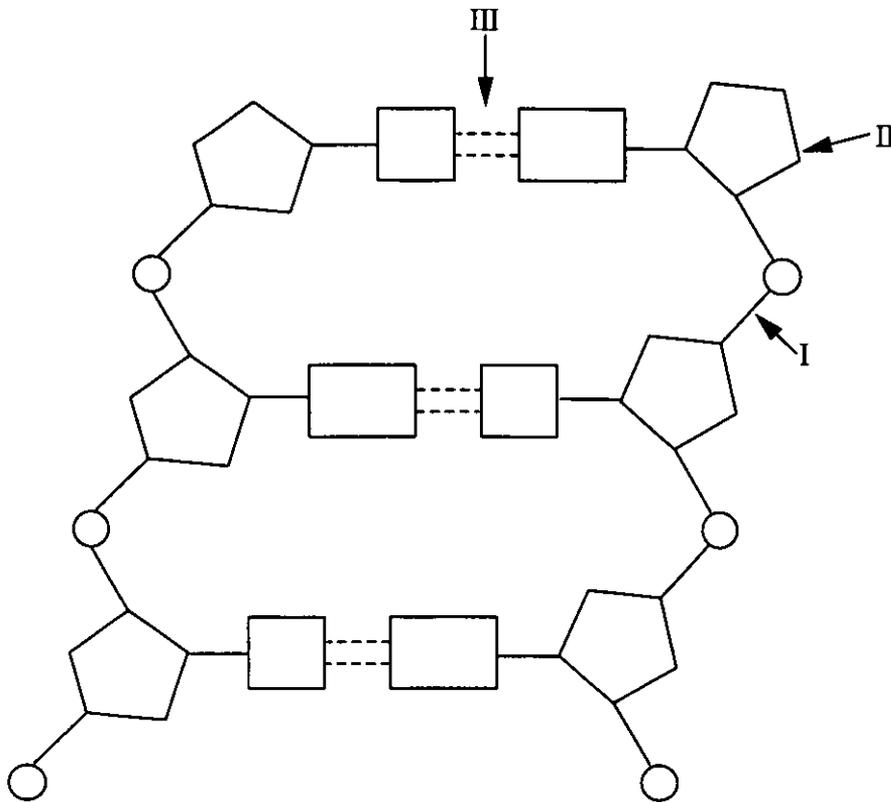
2. Which structure is found in eukaryotic cells but **not** in prokaryotic cells?
 - A. Lysosome
 - B. Plasmid
 - C. Cell wall
 - D. Ribosome

3. The cells of plant roots can take up ions from the soil against the concentration gradient. What is the process used?
 - A. Osmosis
 - B. Passive transport
 - C. Diffusion
 - D. Carrier-assisted transport

4. Why does water provide a relatively stable external environment for aquatic organisms?
 - A. It has a high surface tension.
 - B. It is transparent so light can pass through it.
 - C. Its boiling point is 100 °C.
 - D. Its temperature varies much less than air temperature.

5. What is the name of the type of reaction that involves the production of water when two molecules link together?
- A. Hydrolysis
 - B. Photolysis
 - C. Condensation
 - D. Respiration
6. What is *denaturation*?
- A. A change in the activation energy of a reaction.
 - B. The effect of temperature on the rate of an enzyme-catalysed reaction.
 - C. A change in the structure of a protein or nucleic acid.
 - D. The bursting of a cell surface membrane.

The diagram shows a small section of DNA. It refers to question 7.



7. What do the labels I, II, and III represent?

	I	II	III
A.	Covalent bond	Deoxyribose	Hydrogen bond
B.	Hydrogen bond	Deoxyribose	Covalent bond
C.	Covalent bond	Phosphate	Hydrogen bond
D.	Hydrogen bond	Phosphate	Covalent bond

Refer to the following table of mRNA codons and their corresponding amino acids to answer question 8.

		Second base								
		U		C		A		G		
F i r s t B a s e	U	UUU	Phe	UCU	Ser	UAU	Tyr	UGU	Cys	T h i r d B a s e
		UUC	Phe	UCC	Ser	UAC	Tyr	UGC	Cys	
		UUA	Leu	UCA	Ser	UAA	Stop	UGA	Stop	
		UUG	Leu	UCG	Ser	UAG	Stop	UGG	Trp	
	C	CUU	Leu	CCU	Pro	CAU	His	CGU	Arg	
		CUC	Leu	CCC	Pro	CAC	His	CGC	Arg	
		CUA	Leu	CCA	Pro	CAA	Gln	CGA	Arg	
		CUG	Leu	CCG	Pro	CAG	Gln	CGG	Arg	
	A	AUU	Ile	ACU	Thr	AAU	Asn	AGU	Ser	
		AUC	Ile	ACC	Thr	AAC	Asn	AGC	Ser	
		AUA	Ile	ACA	Thr	AAA	Lys	AGA	Arg	
		AUG	Met*	ACG	Thr	AAG	Lys	AGG	Arg	
G	GUU	Val	GCU	Ala	GAU	Asp	GGU	Gly		
	GUC	Val	GCC	Ala	GAC	Asp	GGC	Gly		
	GUA	Val	GCA	Ala	GAA	Glu	GGA	Gly		
	GUG	Val	GCG	Ala	GAG	Glu	GGG	Gly		

* or start codon

8. Which DNA sequence could code for a stop signal?
- A. AUG
 - B. AUU
 - C. ACT
 - D. CGA

9. Insulin is a protein containing 51 amino acids. How many nucleotides in the mRNA strand will code directly for these amino acids?
- A. 17
 - B. 51
 - C. 102
 - D. 153
10. How are restriction enzymes used in genetic engineering?
- A. To cut DNA at specific recognition sequences
 - B. To splice together two segments of DNA
 - C. To prevent DNA uncoiling
 - D. To speed up the polymerase chain reaction
11. Which type of mutation can cause a change in a DNA sequence from:
- CCGACTCAA
to CCGAATCAA?
- A. Insertion
 - B. Translation
 - C. Deletion
 - D. Substitution
12. Which cross is an example of a test cross?
- A. AA or Aa \times Aa
 - B. $X^R X^R$ or $X^R X^r$ \times $X^R Y$
 - C. $Hb^A Hb^S$ \times $Hb^A Hb^S$
 - D. BB or Bb \times bb

13. In *Drosophila*, the allele for vestigial wings (*vg*) is recessive to the allele for normal wings (*vg*⁺). What is the ratio of phenotypes in the offspring from a cross between homozygous vestigial winged flies and heterozygous normal winged flies?

	Normal	Vestigial
A.	1	0
B.	3	1
C.	1	1
D.	1	3

14. Which characteristics are shown by the gene controlling ABO blood groups?

- I Sex linkage
- II Codominance
- III Multiple alleles

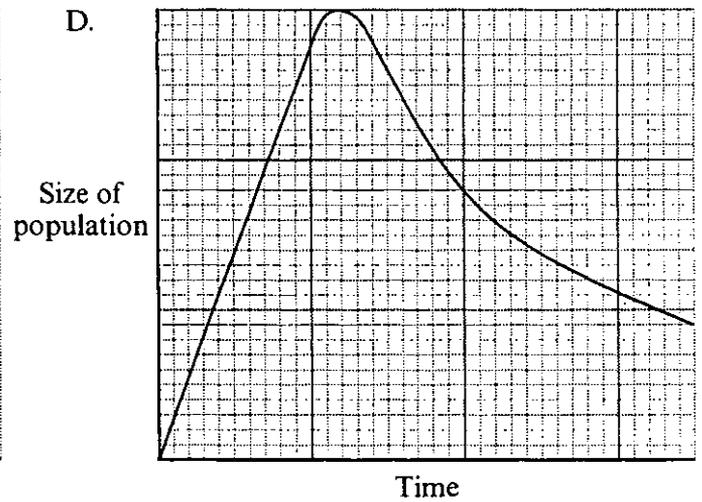
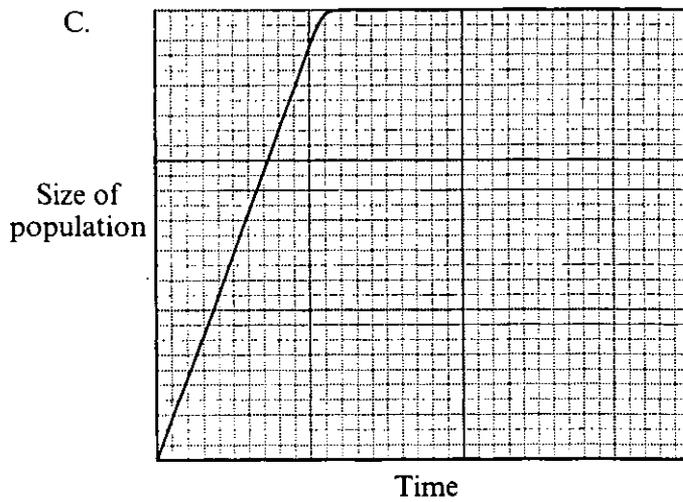
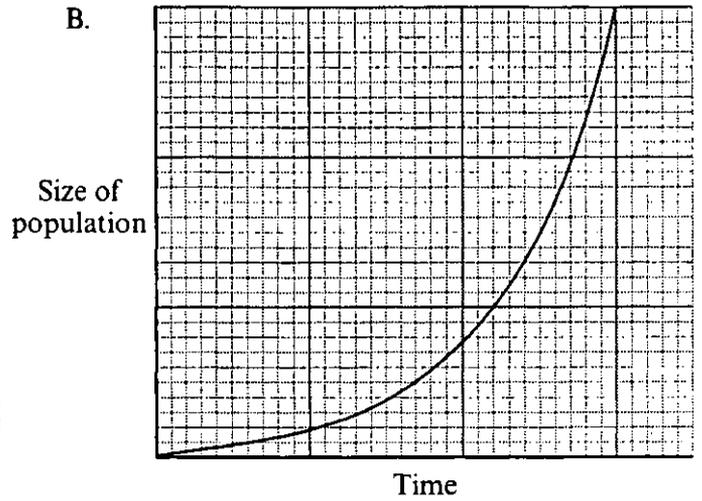
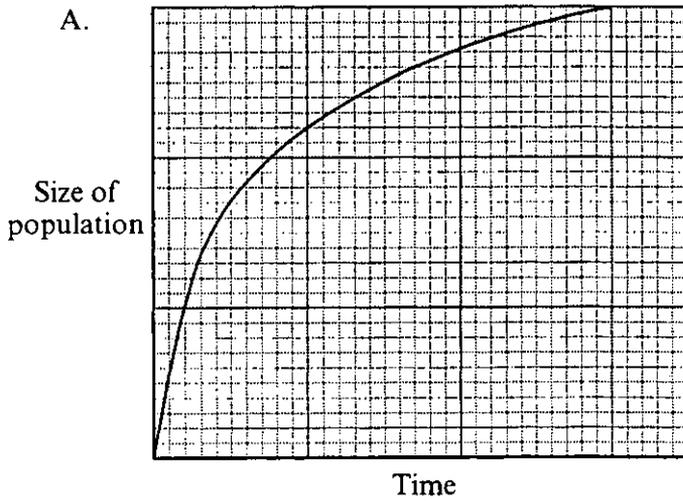
- A. I and II only
- B. II and III only
- C. I and III only
- D. I, II, and III

15. Which sex chromosome(s) can be found in a human ovum?

- A. One X
- B. One Y
- C. Two X
- D. Either one X or one Y

16. What is the biological term for a number of individuals of the same species living together and interbreeding?
- A. Community
 - B. Habitat
 - C. Ecosystem
 - D. Population
17. What is the source of the oxygen produced by plants during photosynthesis?
- A. Carbon dioxide
 - B. Water
 - C. Carbohydrate
 - D. Enzymes
18. What process in saprotrophs results in the release of carbon dioxide to the atmosphere?
- A. Photosynthesis
 - B. Respiration
 - C. Combustion
 - D. Digestion

19. Which of the following population growth curves shows exponential increase?



20. Is there more variation between members of an ecological community and members of a clone than between members of a species?

	Members of a community compared to members of a species	Members of a clone compared to members of a species
A.	Less variation	Less variation
B.	Less variation	More variation
C.	More variation	Less variation
D.	More variation	More variation

21. Which item is an abiotic characteristic of a habitat?
- A. Light
 - B. Biomass
 - C. Soil bacteria
 - D. Producers

The following data were collected in an experiment to examine the difference in body length between two populations of lizards. They refer to question 22.

Body lengths (cm) of two populations of lizard (*Varanus*)

Population A	Population B
21	26
22	28
24	29
24	31
25	32
26	34
27	35
28	37
29	37
31	41
<hr/>	
$\bar{x} = 25.7$	$\bar{x} = 33$
$s = 3.1$	$s = 4.7$

22. Which statement is correct?
- A. The median values for the two sets of data are 24 for A and 37 for B.
 - B. The median values for the two sets of data are 25.7 for A and 33 for B.
 - C. 68% of the values in sample A are within 3.1 cm of the mean.
 - D. The variability in body length is greater in Population A than Population B.

23. Tubes from the gall bladder and the pancreas are used to carry fluids into the digestive system. To which part of the digestive system are each of these tubes connected?

	Tube from the gall bladder	Tube from the pancreas
A.	Liver	Large intestine
B.	Liver	Small intestine
C.	Small intestine	Small intestine
D.	Small intestine	Large intestine

24. What is the sequence of structures through which a molecule of oxygen will pass from its point of entry into the body?

- A. Pulmonary artery → alveolus → left ventricle → aorta
- B. Pulmonary artery → left atrium → left ventricle → aorta
- C. Alveolus → pulmonary artery → left atrium → right atrium
- D. Alveolus → pulmonary vein → left ventricle → aorta

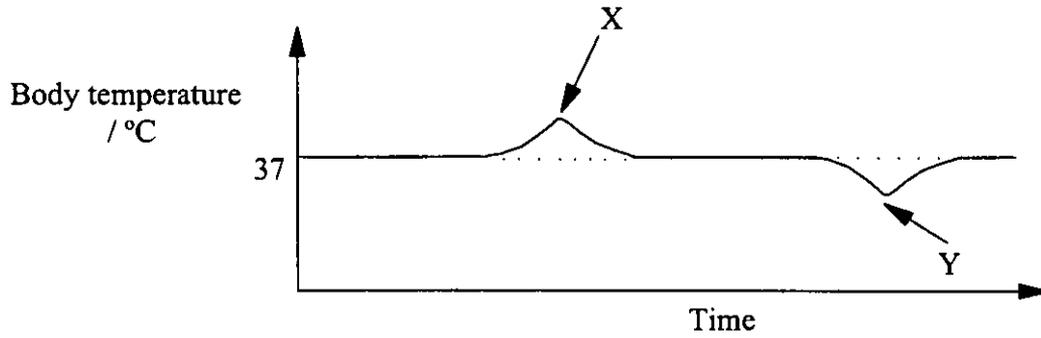
25. Which features are characteristic of gas exchange surfaces in humans?

- I Supplied with many blood vessels
- II Moist
- III Rigid

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

26. Which change occurs with the onset of exercise?
- A. Decreased stimulation of the breathing centre in the brain
 - B. Decrease in pH of the blood
 - C. Decrease in rate of contraction of the diaphragm
 - D. Decrease in carbon dioxide concentration of the blood
27. What is the function of the kidney?
- I Excretion of urea
 - II Osmoregulation
 - III Regulation of blood glucose
- A. I, II, and III
 - B. I and III only
 - C. I and II only
 - D. II and III only
28. What is the function of the semilunar valves of the heart?
- A. Controlling the flow of blood between ventricles and arteries
 - B. Controlling the flow of blood between atria and ventricles
 - C. Controlling the flow of blood between left and right atria
 - D. Controlling the flow of blood between veins and atria

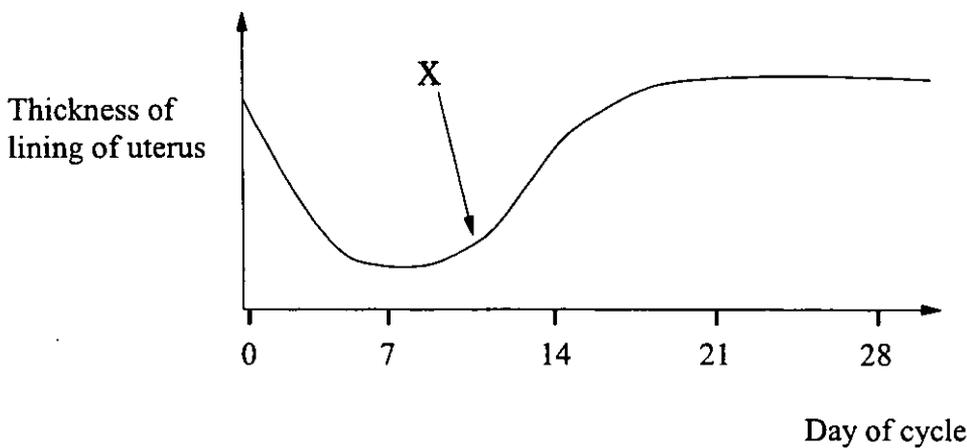
29.



The graph shows small fluctuations in human body temperature over a period of a few hours. What type of feedback control could cause the changes at the points marked X and Y?

	X	Y
A.	Negative feedback	Positive feedback
B.	Positive feedback	Negative feedback
C.	Negative feedback	Negative feedback
D.	Positive feedback	Positive feedback

30. The diagram shows the change in the lining of the uterus during the menstrual cycle. Which hormone is being secreted by the ovary at X?



- A. Progesterone
- B. Oestrogen
- C. FSH
- D. LH