ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
General Certificate of Education Advanced Level

BIOLOGY **9190/1**
PAPER 1

NOVEMBER SESSION 2006 **1 hour**

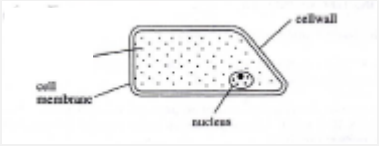
1. Which is not a function of glycolipids in cell membranes?

   A. enhances mechanical stability
   B. provides electrical insulation
   C. act as transport channels
   D. facilitate cell to cell attachment

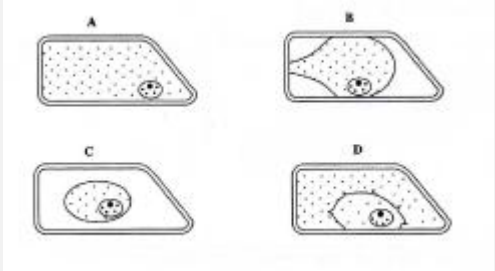
2. Which procedure is correct when preparing materials for the light and electron microscopes?

	Procedure	**Light microscope**	**Electron microscope**
A.	embedding	wax	resin
B.	fixation	osmic acid	electron
C.	sectioning	ultramicrotome	microtome
D.	staining	heavy metals	coloured dyes

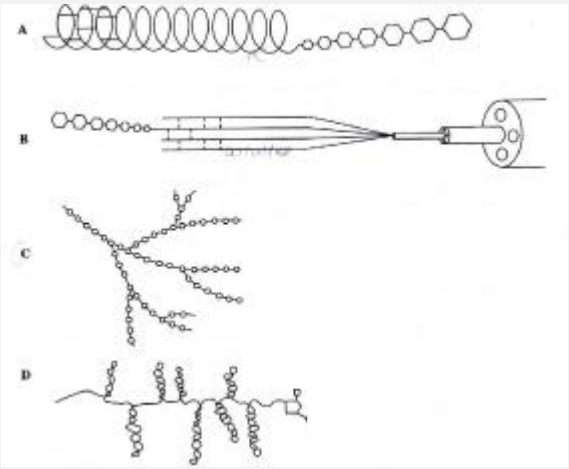
3. Silver nitrate dissociates in water to form silver ions which denature proteins. The diagram shows a normal strained cell of a plant.



Which diagram shows the effect of adding IM Silver Nitrate on the stained cells?



4. The diagrams show the structures of biological molecules. Which molecule is glycogen?



5. Which set of biological molecules forms helices in their structures?

A. starch, messenger RNA, cellulose
B. glycogen, starch, cellulose
C. starchc, collagen, ribosomal RNA
D. glycogen, ribosomal RNA, collagen

6. Lecithin is a phospholipids found in cell membranes that reduces the surface tension of water. What function in the gaseous exchange system does this phospholid carry out?

A. enables a thick film of moisture to develop in the alveoli
B. allows the film of moisture to adhere to the walls of alveoli
C. allows the film of moisture to become more viscous
D. enables the alveoli to inflate easily when breathing

7. Which statement is true about the mode of action of enzymes?

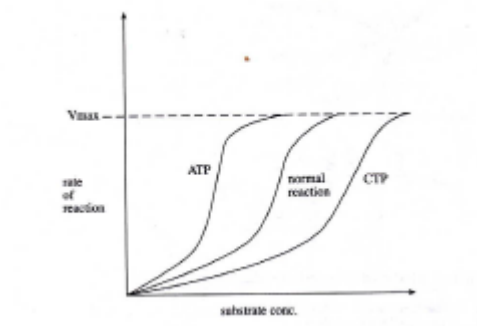
A. They alter the position of equilibrium of reactions.
B. They increase the quantity of products.
C. They alter the nature of the end products.
D. They provide alternative pathways for a reaction.

8. The enzyme aspirtate carbomolyltransferase catalyse the following reaction.

$$\text{carbamoyl} + \text{aspartate} \xrightarrow[\text{carbomoyl}]{\text{aspartate}} \text{carbamoyl} + \text{phosphate}$$

Phosphate transferase aspartate

The graph shows the effect of adenosine triphosphate (ATP) and creatinine triphosphate (CTP) on the normal reaction.



Key ATP = adenosine triphosphate
CTP = creative triphosphate

What type of substances are ATP and CTP?

	ATP	CTP
A.	non competitive inhibitor	competitive inhibitor
B.	activator	non competitive inhibitor
C.	activator	non competitive inhibitor
D.	activator	competitive inhibitor

9. The picture shows the behaviour of chromosomes of Trillium erectma during meiosis.

What process is represented?

A. condensation
B. crossing over
C. random assortment
D. synapsis

10. Which correctly shows features in meiosis and mitosis?

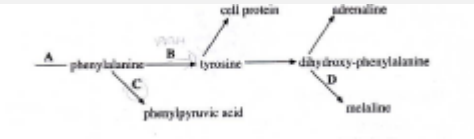
KEY: ∏ present in both
X absent in both

	sister chromatids separate	**exchange of allele between non sister chromatids**	**random assortment of chromosomes at the equator**
A.	∏	∏	∏
B.	∏	∏	X
C.	∏	X	∏
D.	X	X	∏

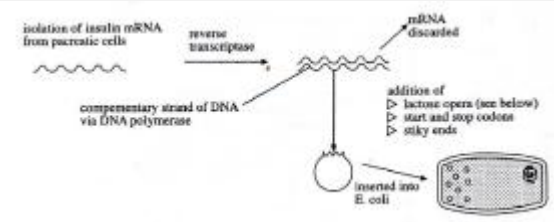
11. Which set shows the correct base pairing in DNA?

	purine	pyrimidine	number of hydrogen bonds between the bases
A.	adenine	thymine	3
B.	thymine	adenine	2
C.	guanine	cytosine	3
D.	cytosine	guanine	2

12. The flow diagram shows a metabolic pathway in a person. Which stage is inhibited when phenylalanie hydroxy lase is present?



13. The flow diagram shows some of the stages in the manufacture of insulin using recombinant DNA technology.



Which enzyme is used to join the plasmid and the cDNA segment?

A. RNA polymerase
B. DNA polymerase
C. Restriction endonuclease
D. DNA ligase

14. A tobacco plant heterozygous for curled leaf (C) and homozygous for hairless leaves (h) was cross pollinated with another variety heterozygous for both curled leaves (C) and hairy stem (H).

What proportion of the progeny is expected to have the genotype Cchh?

A. ¾
B. ½
C. ¼
D. $^{1}/_{8}$

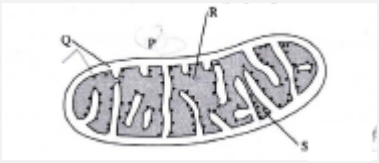
15. Which is true of recessive alleles?

A. They always express themselves in the homozygous condition.
B. They are always located on sex chromosomes.
C. They always arise from chromosome mutations.
D. They are always expressed in the heterozygous condition.

16. Which explains why anti-malarial drugs such as chloroquine are no longer effective in the treatment of malaria?

A. Chloroquine causes the mosquitos to mutate into some resistant forms.
B. Some plasmodia posses alleles which confer resistance to chloroquine.
C. Some mosquitos possess alleles which confer resistance to chloroquine.
D. Chloroquine causes plasmodia to mutate into resistant forms.

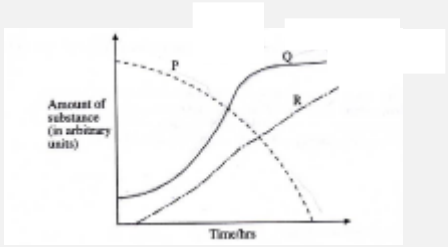
17. The diagram shows the main sites of aerobic respiration in a cell.



What are the main products of the reactions occurring at sites P, Q, R and S?

	P	Q	R	S
A.	pyruvate	acetylcoenzyme A	$NADH_2$	ATP
B.	acetylcoenzyme A	pyruvate	ATP	$NADH_2$
C.	ATP	pyruvate	acetylcoenzyme	$NADH_2$
D.	$NADH_2$	acetylcoenzyme	pyruvate	ATP

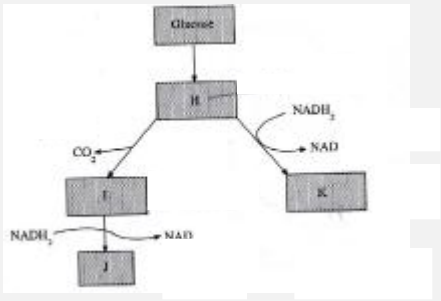
18. The graph below shows results of an investigation to see the effects of depriving actively photosynthesizing green algae of their carbon dioxide source.



Which curves show levels of ATP, RuBP and PGA?

	ATP	RuBP	PGA
A.	P	Q	R
B.	Q	R	P
C.	R	Q	P
D.	P	R	Q

19. The flow diagram shows a summary of anaerobic respiration in both yeast and animal cells.

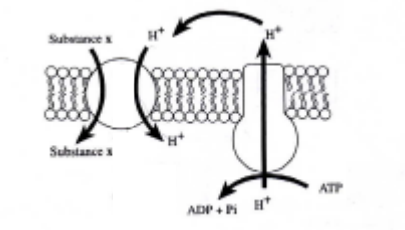


	H	I	K
A.	pyruvate	ethanal	lactate
B.	acetylcoenyme A	ethanal	ethanol
C.	pyruvate	ethanal	ethanol
D.	pyruvate	acetyloenzymmeA	lactate

20. Which substance is the first product of photosynthesis in C_4 plants?

A. oxaloacetate
B. glycerate-3-phosphate
C. malate
D. phosphoenolypyruvate

21. The diagram illustrates a mechanism involved in the transportation of substances across cell membranes.



What is substance x and when does this process occur?

	substance x	when it occurs
A.	electrons	during electron transport chain
B.	nitrates	during absorption from the soil
C.	potassium ions	during nerve impulse transmission
D.	sucrose	during loading into sieve tubes

22. Which is a xerophytic adaptation?

A. C_4 pathway of carbon dioxide fixation instead of C_3
B. more stomata on the underside than on the upper side
C. mosaic arrangement of leaves on the stem
D. deep and extensive root system

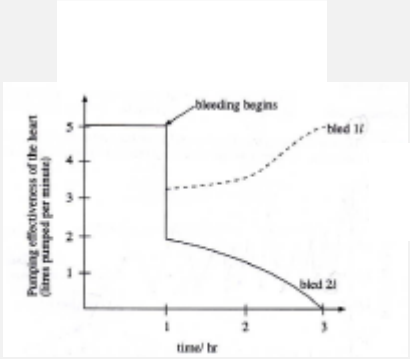
23. The table shows rates of release of carbon dioxide under different conditions.

Conditions	Time / arbitrary units				
bicarbonate + acid Phosphate buffer soln	0	0.2	0.4	0.5	0.6
bicarbonate + acid phosphate buffer soln + blood	0.1	0.8	1.3	1.4	1.5

What is the best explanation of these results?

A. Blood is necessary for the release of CO_2.
B. Blood is the source of CO_2 released.
C. Carbonic anhydrase in blood catalyses faster release.
D. Blood causes rate of CO_2 release to increase with time.

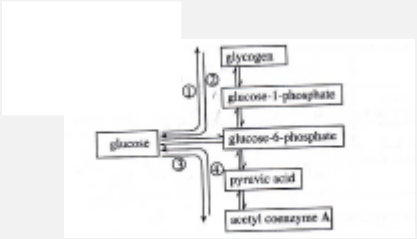
24. The graph shows the effect of bleeding on the pumping effectiveness of the heart.



What conclusion can be drawn from the graph?

A. Losing 1 litre of blood has no effect on the pumping effectiveness of the heart.
B. Losing 2 litres of blood has a positive feedback effect on the pumping effectiveness of the heart.
C. Losing 1 litre of blood has a positive feedback effect on the pumping effectiveness of the heart.
D. Losing 2 litres of blood has a negative feedback effect on the pumping effectiveness of the heart.

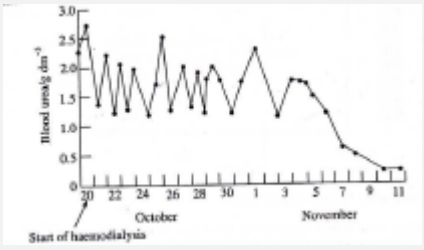
25. The flow diagram summarizes biochemical pathways associated with glucose and glycogen metabolism in mammals.



What name is given to each of the processes represented by arrows numbered 1 to 4?

	1	2	3	4
A.	glycogenolysis	gluconeogenesis	glycolysis	glycogenesis
B.	glycogenesis	glycogenolysis	glycolysis	gluconeogenesis
C.	glycolysis	glycogenolysi	gluconeogenesis	glycogenesis
D.	gluconeogenesis	glycogenesis	glycolysis	glycogenolysis

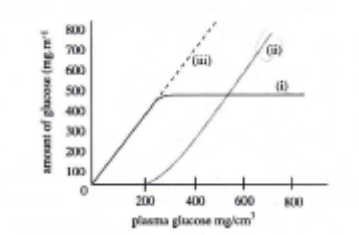
26. Two days after a heart operation a patient was given haemodialysis treatment for 13 days and he subsequently recovered. The graph shows the blood urea levels in the patient over a period of time.



Using the above information, how many times did the patient receive hemodialysis?

A. 4
B. 9
C. 10
D. 13

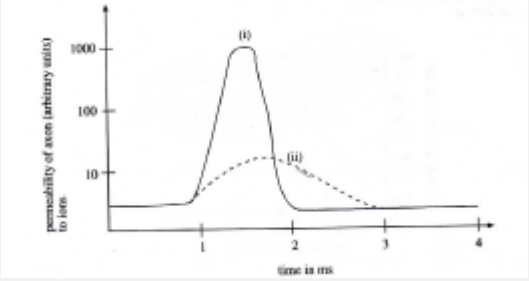
27. The three curves labeled (i), (ii) and (iii) show the amount of glucose excreted, filtered and reabsorbed in the kidney in mg/min as human plasma glucose increases in a person suffering from diabetes.



Which curve represents the glucose excreted, filtered and reabsorbed?

	excreted	**filtered**	**reabsorbed**
A.	(i)	(ii)	(iii)
B.	(i)	(iii)	(ii)
C.	(ii)	(i)	(iii)
D.	(ii)	(iii)	(i)

28. The graph shows changes in the permeability of axons to ions during nerve impulse transmission.



What ions are represented by curves (i) and (ii)?

	Curve (i)	Curve (ii)
A.	K^+	Ca^{2+}
B.	Na^+	Ca^{2+}
C.	Na^+	K^+
D.	K^+	Na^+

29. The gases listed below are released into the atmosphere due to various human activities.

1. carbon dioxide
2. ammonia
3. flurochlorocarbons
4. nitrogen dioxide
5. sulphur dioxide

Which gases are largely responsible for causing acid rain, green house effect and ozone depletion?

Acid rain	Green house effect	Ozone depletion
A 5	1	3
B 2	5	4
C 4	3	5
D 1	5	2

30. The table shows details of four species in a food chain living in a mopani woodland.

Type of Species	**Number of organisms**	**Individual biomass**	**Energy per unit mass**
P	10	800 000	0.5
Q	11	10.0	0.1
R	200	0.8	2.0
S	1 600	0.1	1.0

Which correctly represents the food chain?

A. S → R → Q → P
B. R → S → P → Q
C. P → S → R → Q
D. P → Q → R → S

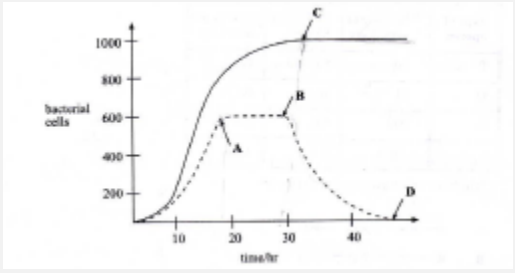
31. The following are events occurring in a water body following prolonged run off from nearby agricultural fields.

1. increased biochemical oxygen demand
2. massive death of aquatic species
3. increase plant nutrients
4. production of algal blooms
5. increase in biomass of decomposers

In which order do these events occur in a eutrophicated water body?

A. 3 → 5 → 4 → 1 → 2
B. 3 → 5 → 1 → 2 → 4
C. 3 → 1 → 4 → 2 → 5
D. 3 → 4 → 5 → 1 → 2

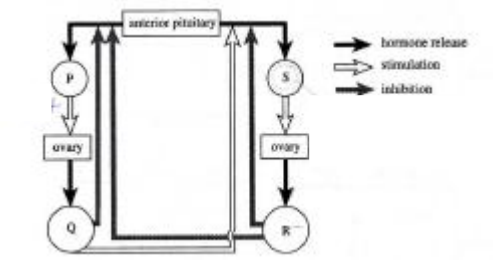
32. The graph shows changes in the number of bacterial cells (both living and dead) in a culture medium. At which point do bacterial cells stop multiplying?



33. Which statement best describes self incompatibility as an out breeding mechanism in plants?

A. pollen incapable of germinating on self stigma
B. pollen grain ripening before stigma is receptive
C. stigma receptive before pollen grains ripen
D. stigma positioned above the anthers

34. The diagram summarises the interplay of four hormones labeled P, Q, R and S which are associated with the menstrual cycle.



If hormone P is follicle stimulating hormone (FSH) what are the identities of hormones Q, R and S?

	Hormone Q	Hormone R	Hormone S
A.	luteinising hormone	progesterone	osesterogen
B.	progesterone	oestrogen	luteining hormone
C.	oestrogen	progesterone	luteinising hormone
D.	progesterone	luteinisign hormone	oestrogen

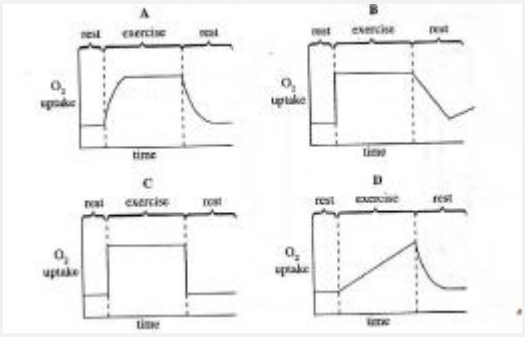
35. What is the effect of nicotine on fetal development?

A. Reduced zinc levels in fetal blood
B. Reduced vitamin C uptake by fetus
C. Constricted fetal blood vessels
D. Altered facial characteristics

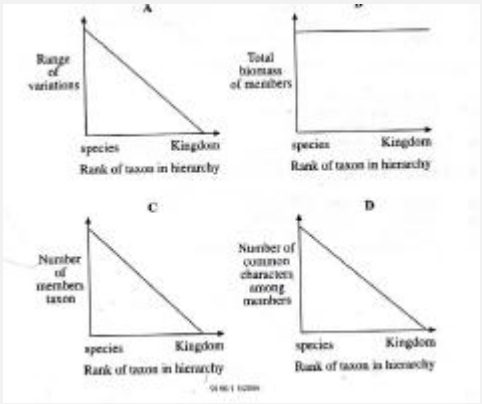
36. Which is an effect of emphysema on the structure of alveoli?

A. Alveoli walls become thinner.
B. Elasticity of the alveoli walls is lost.
C. The lumen of alveoli become constricted.
D. Permeability of alveoli walls to gases is reduced.

37. Which graph shows the effect of exercise on oxygen consumption?



38. Which graph correctly shows the relationship between the rank of a taxon and the variable shown on the y-axis?



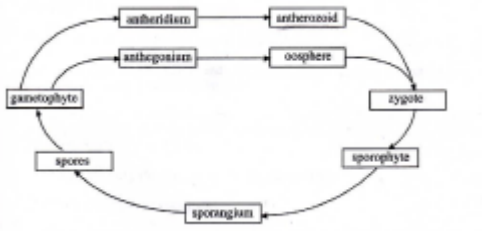
39. An organism was found to have the features listed below.

1. diploblastic
2. true tissues
3. radially symmetrical
4. tentacles armed with single opening
5. digestive tract with single opening
6. lacks organs

To which phylum does this organism belong?

A. cnidaria
B. nematoda
C. platyhelminthes
D. mollusca

40. The diagram summaries the life cycle of a certain plant.



Given that the sporophyte is the dominant generation to which group does this plant belong?

A. Angiospermophyte
B. Bryophyte
C. Coniferophyte
D. Filicinophyte