HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2023

BIOLOGY PAPER 1

8:30 am – 11:00 am (2 hours 30 minutes)
This paper must be answered in English

GENERAL INSTRUCTIONS

(1) There are **TWO** sections, A and B, in this Paper. You are advised to finish Section A in about 35 minutes.

(2) Section A consists of multiple-choice questions in this question paper. Section B contains conventional questions printed separately in Question-Answer Book **B**.

(3) Answers to Section A should be marked on the Multiple-choice Answer Sheet while answers to Section B should be written in the spaces provided in Question-Answer Book **B**. **The Answer Sheet for Section A and the Question-Answer Book B for Section B will be collected separately at the end of the examination.**

INSTRUCTIONS FOR SECTION A (MULTIPLE-CHOICE QUESTIONS)

(1) Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should first stick a barcode label and insert the information required in the spaces provided. No extra time will be given for sticking on the barcode label after the 'Time is up' announcement.

(2) When told to open this book, you should check that all the questions are there. Look for the words '**END OF SECTION A**' after the last question.

(3) All questions carry equal marks.

(4) **ANSWER ALL QUESTIONS**. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured.

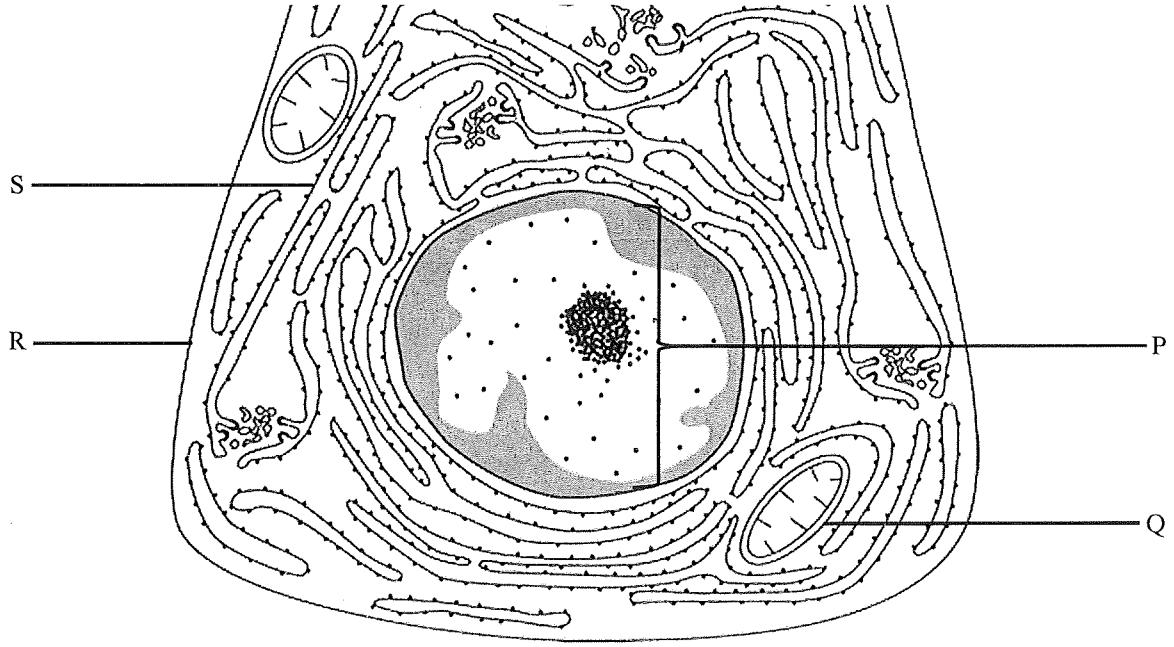
(5) You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.

(6) No marks will be deducted for wrong answers.

Not to be taken away before the end of the examination session

There are 36 questions in this section.
The diagrams in this section are NOT necessarily drawn to scale.

Directions: Questions 1 to 3 refer to the schematic diagram below, which shows part of a pancreas cell:



1. Which of the following cellular components can also be found in a prokaryotic cell?

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

2. If the pancreas cell is supplied with radioactively labelled amino acids, which of the following cellular components is likely to have an increase in radioactivity first?

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

3. The radioactivity is later detected in the content of the small intestine. Which of the following substances is / are responsible for the presence of the radioactivity?

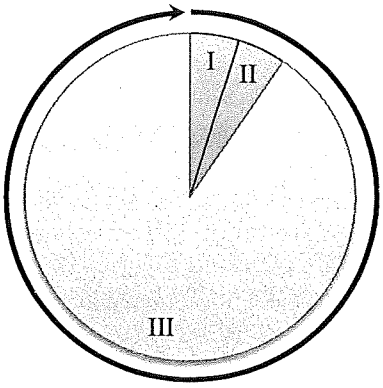
   (1) protease
   (2) glucagon
   (3) sodium hydrogencarbonate

   A. (1) only
   B. (2) only
   C. (1) and (3) only
   D. (2) and (3) only

4. Which of the following processes ***does not*** involve membrane proteins?

A. transcription of DNA to form mRNA
B. absorption of minerals by root hair cells
C. digestion of carbohydrates in the small intestine
D. transmission of nerve impulse between two neurones

Directions: Questions 5 and 6 refer to the diagram below, which shows three stages of a cell cycle:

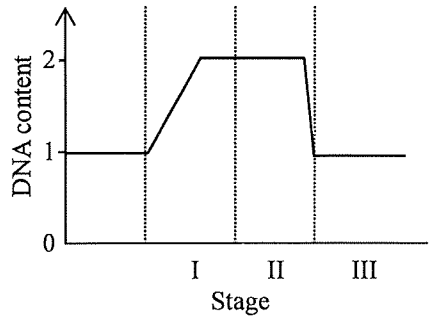


5. Which of the following correctly describes the events in the cell cycle?

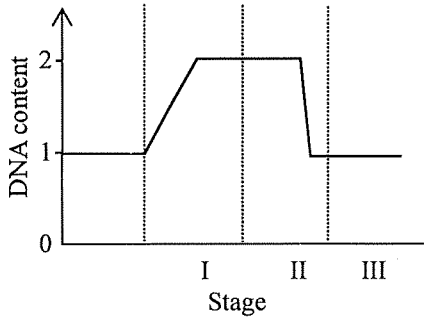
A. The cytoplasm is halved in stage I.
B. Sister chromatids separate in stage II.
C. The cell synthesises more organelles in stage III.
D. Chromatin condenses to form chromosomes in stage III.

6. Which of the following graphs correctly matches the changes in the DNA content in the cell with the three stages of the cell cycle?

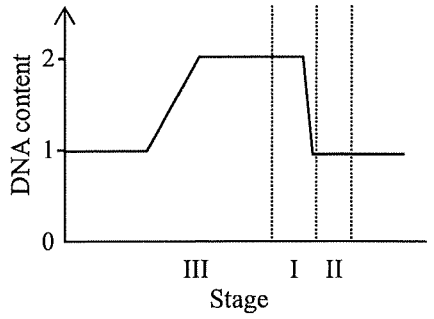
A.



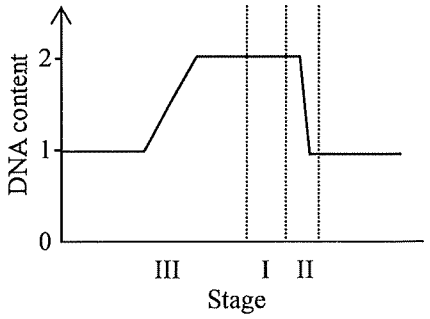
B.



C.



D.



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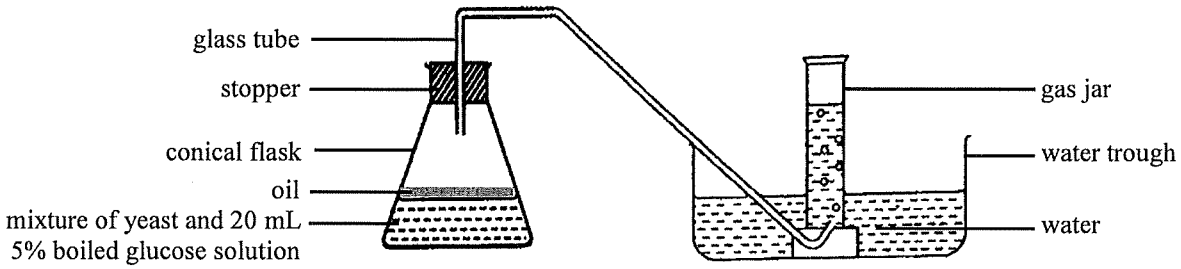
Directions: Questions 7 and 8 refer to the diagram below, which shows a set-up used to investigate the rate of respiration in yeast:



7. Which of the following word equations correctly shows the reaction being investigated?

A. glucose → carbon dioxide + water
B. glucose → carbon dioxide + ethanol
C. glucose + oxygen → carbon dioxide + water
D. glucose + oxygen → carbon dioxide + ethanol

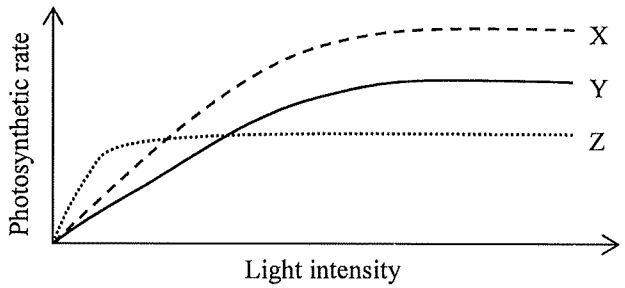
8. Which of the following modifications about the set-up can improve the accuracy of the experiment?

A. use a measuring cylinder instead of a gas jar
B. use a larger conical flask to contain the mixture
C. use a glass tube with a smaller internal diameter
D. use 30 mL instead of 20 mL of 5% boiled glucose solution

9. When we breathe out, some air will be left inside the air sacs in the lungs. Which of the following correctly shows the gas composition of the remaining air inside the air sacs?

	Oxygen	***Carbon dioxide***
A.	16%	0.04%
B.	16%	4%
C.	21%	0.04%
D.	21%	4%

10. The graph below shows the photosynthetic rates of three plant species X, Y and Z in response to the change of light intensity. The three plant species are in the same habitat.



Which of the following can be deduced from the above graph?

A. Species Y is the tallest among the three species.
B. Species Z is most competitive in shady condition.
C. Species Y will outcompete species X in all light conditions.
D. Removal of species Z will increase the photosynthetic rate of species X.

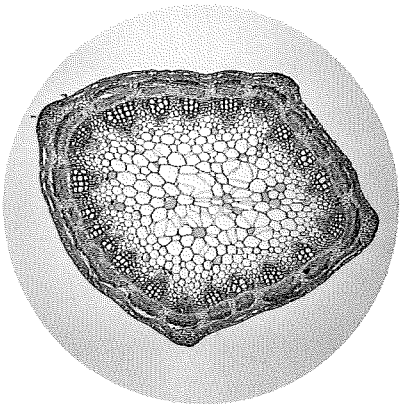
11. Which of the following processes produce ATP?

(1) glycolysis
(2) Calvin cycle
(3) photochemical reactions

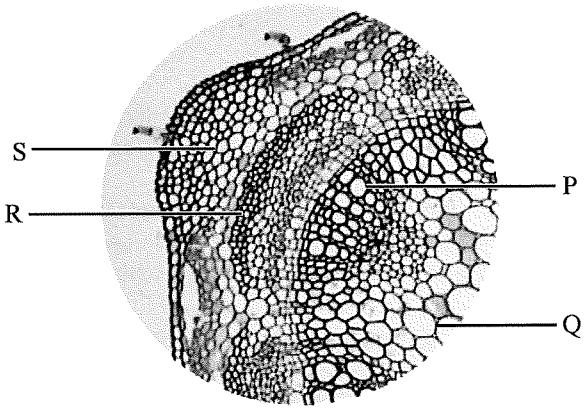
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

Directions: Questions 12 to 14 refer to the photomicrographs below, which show the images of the cross section of a certain part of plant viewed under different magnifications:

Low magnification



High magnification



12. Which of the following combinations correctly matches the part of the plant where the section was taken from and the supporting evidence from the photomicrograph?

	Part of the plant	***Evidence***
A.	root	presence of hairs on the epidermis
B.	root	with thin-walled cells at the centre
C.	stem	presence of cuticle on the epidermis
D.	stem	with vascular bundles at the periphery

13. The images above are shown to scale. Which of the following combinations correctly matches the eyepiece and objective used for the two magnifications (i.e. eyepiece x objective)?

	Low magnification	***High magnification***
A.	10X x 4X	10X x 10X
B.	10X x 4X	10X x 25X
C.	10X x 4X	10X x 40X
D.	10X x 10X	10X x 40X

14. Which of the labelled tissues is responsible for the transport of water?

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

Go on to the next page

Directions: Questions 15 to 17 refer to an investigation about enzymes in fruits. Amy learned that some fruits contained proteases which can be used as meat tenderisers. She wanted to find a suitable fruit juice for the slow cooking of steak, i.e. mixing the steak with fruit juice in a sealed bag and then cooking it in a water bath set at around 50°C to 70°C for 1 hour. The procedure of her investigation is shown below:

1. Extract fruit juice from pineapple.
2. Add 15 mL of pineapple juice in 3 boiling tubes respectively with labels 50°C, 60°C and 70°C.
3. Put the tubes into water baths set at respective temperatures for 1 hour.
4. Let the tubes cool down to room temperature.
5. Add 3 egg white cubes of size 1 cm^3 into each tube.
6. (Step for the measurement of the dependent variable)
7. Repeat the above steps with papaya, kiwi and lemon instead of pineapple.

15. Based on the procedure given, how many independent variable(s) is / are being studied?

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

16. Step 6 is about the measurement of the dependent variable. Which of the following can be used for measuring the dependent variable for this investigation?

(1) the time taken for the disappearance of the egg white cubes
(2) the change in shape of the egg white cubes after a fixed time
(3) the change in weight of the egg white cubes after a fixed time

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

17. Which of the following is the assumption for this investigation?

A. The proteases are present in the fruits tested.
B. The proteases remain active at high temperatures.
C. The proteases are still functioning after extraction.
D. The actions of the proteases on egg white cubes and steaks are similar.

18. Which of the following features of the small intestine allow it to be the major site of food absorption?

(1) It is long.
(2) Its inner wall is highly folded.
(3) It secretes different kinds of enzymes.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

19. Blockage of the Eustachian tube will directly affect the functioning of the

A. cochlea.
B. eardrum.
C. ear bones.
D. oval window.

20. Which of the following correctly explain(s) why reflex actions are usually faster than voluntary actions?

(1) Reflex actions do not involve decision making.
(2) Nerve impulses travel faster in reflex actions.
(3) Reflex actions are inborn.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

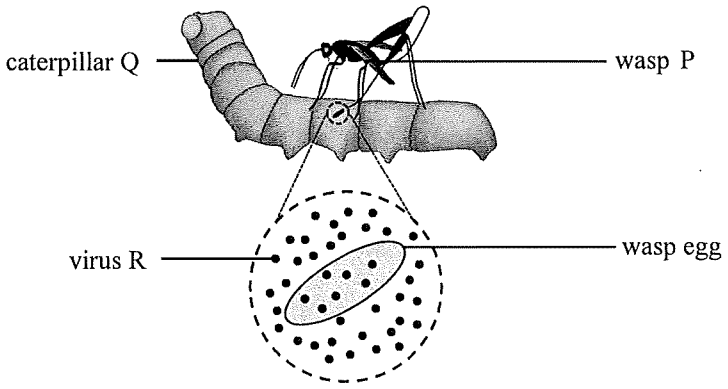
21. Kitchen wastes can be converted to fertilisers. Which of the following processes are essential for this conversion?

A. nitrification and decomposition
B. nitrification and nitrogen fixation
C. denitrification and decomposition
D. denitrification and nitrogen fixation

Directions: Questions 22 and 23 refer to the following information about the interactions of wasp P, caterpillar Q and virus R.

Wasp P lays eggs inside the caterpillar Q. When the eggs hatch, the wasp larvae feed on the body tissues of the caterpillars and kill them eventually.

Recent research showed that these wasps are the host of virus R. The viral DNA becomes part of the wasp genome and passes to the wasp's offspring. The wasps inject their eggs along with virus R into the caterpillars. Virus R protect the eggs by suppressing the caterpillars' body defence mechanism.



22. Which of the following correctly describes their feeding roles?

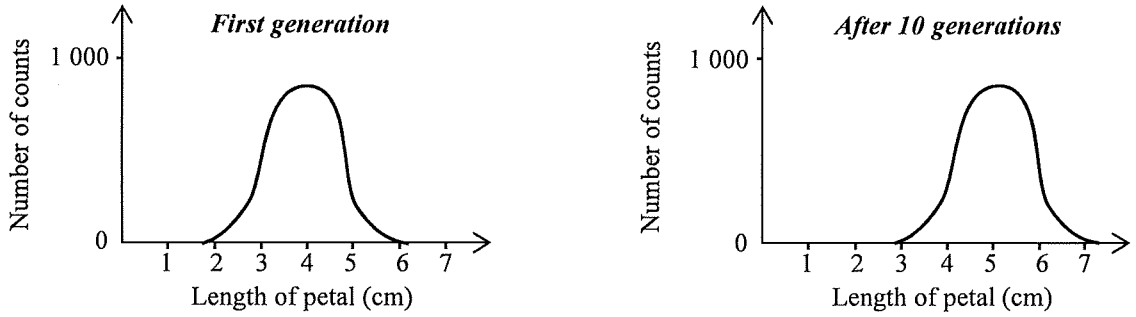
A. The virus is the top consumer.
B. The caterpillar is the producer.
C. The wasp adult is the primary consumer.
D. The wasp larva is the secondary consumer.

23. Which of the following correctly shows the relationship between the wasp and the virus?

A. parasitism
B. mutualism
C. competition
D. commensalism

Go on to the next page

Directions: Questions 24 and 25 refer to the information about the introduction of a foreign plant species to a local botanic garden. Over the years, the gardener noted that there was a change in the size of its flowers. The graphs below show the variations of the petal length of this plant species in the first generation and after 10 generations:



24. Which of the following correctly describe the inheritance of the petal length in this plant species?

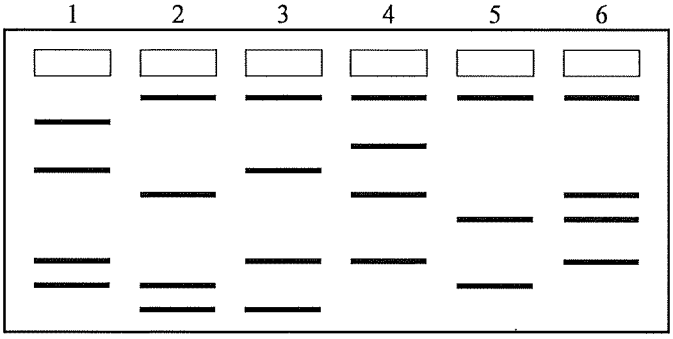
(1) The petal length is affected by environmental factors.
(2) The inheritance of the petal length is controlled by a number of genes.
(3) The variation in the petal length is a result of independent assortment.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

25. Which of the following is the most probable explanation for the change in the petal length of this plant species?

A. Larger flowers produce more nectar.
B. Local climate favours the growth of this plant species.
C. Local insects are attracted by flowers with longer petals.
D. Mutations occur and accumulate throughout the 10 generations.

26. The DNA fingerprints below show the screening of a rare genetic disease in a family of six members:



The onset of the disease occurs in adulthood. Members 2 and 6 have already shown the symptoms of the disease. Which member is likely to have inherited this disease too?

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

Directions: Questions 27 and 28 refer to the following nucleotide sequence found on a mRNA molecule:

AUGGCUAACUAUAACGCU

translation starts

27. How many different codons are found on this nucleotide sequence?

A. 3
B. 4
C. 5
D. 6

28. Which of the following statements about the mRNA molecule are correct?

(1) It can be found in the nucleus.
(2) It can be found in the cytoplasm.
(3) Its corresponding sequence on the DNA coding strand is TACCGATTGATATTGCGA.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

Directions: Questions 29 and 30 refer to the phylogenetic relationship of five bacterial species. Enzyme X is found in most bacteria. The table below shows the number of nucleotide differences in the genes encoding enzyme X of five bacterial species (J, K, L, M and N):

	J	K	L	M	N
J	0	61	32	112	89
K	-	0	50	119	94
L	-	-	0	119	77
M	-	-	-	0	124
N	-	-	-	-	0

29. With regard to the phylogenetic relationship to L, arrange the species in the correct order from closely related to distantly related.

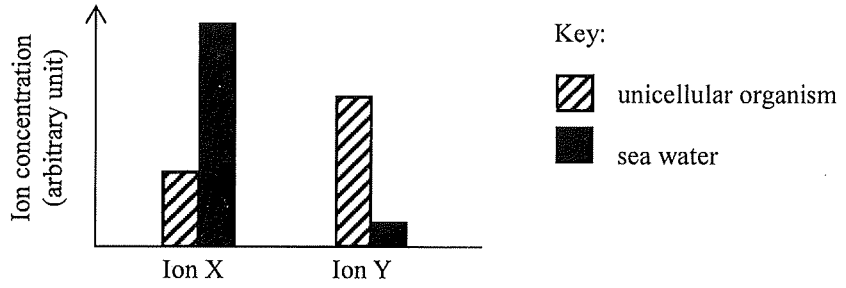
A. L, J, K, N, M
B. L, J, M, N, K
C. L, M, N, K, J
D. L, N, M, K, J

30. The nucleotide sequence of the genes encoding enzyme X have some differences among the five species. Yet, the enzyme X in these five species still serve the same function. Which of the following are possible explanations for this phenomenon?

(1) The polypeptides formed have the same length.
(2) There are more than one genetic code for the same amino acid.
(3) The differences do not affect the shape of the active site of enzyme X.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

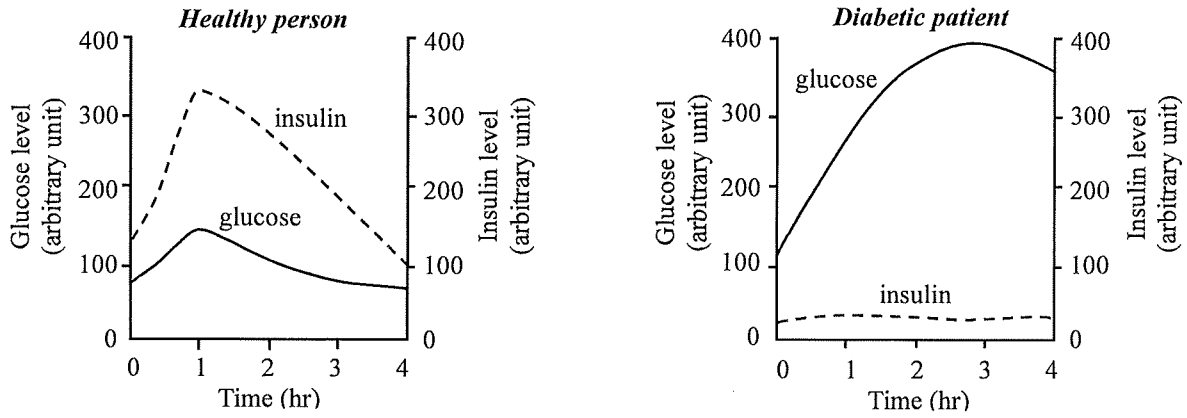
31. The graph below shows the concentration of ions in a unicellular organism and the sea water surrounding it:



Which of the following is most likely to occur in order to maintain the conditions shown in the above graph?

A. Ion X moves out of the organism by diffusion.
B. Ion X moves into the organism by active transport.
C. Ion Y moves into the organism by active transport.
D. Ion Y moves out of the organism by active transport.

Directions: Questions 32 and 33 refer to the graphs below, which show the changes in the blood glucose levels and blood insulin levels of a healthy person and a diabetic patient after consuming a sugary drink:



32. Based on the graphs, which of the following combinations correctly matches the type of diabetes the patient is suffering from and its explanation?

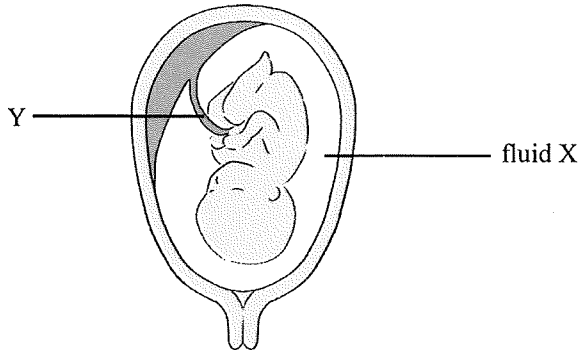
	Diabetes	***Explanation***
A.	type 1	blood glucose level remains high after the patient consumes a sugary drink
B.	type 1	insulin level shows no response to the rise in blood glucose level
C.	type 2	blood glucose level has a sharp rise after the patient consuming a sugary drink
D.	type 2	liver fails to convert glucose to glycogen when blood glucose level is high

33. The blood glucose level of the patient eventually drops because of

(1) the actions of glucagon.
(2) respiration of body cells.
(3) loss of glucose through urine.

A. (3) only
B. (1) and (2) only
C. (2) and (3) only
D. (1), (2) and (3)

Directions: Questions 34 and 35 refer to the diagram below, which shows a foetus and the associated structures inside the uterus:



34. Which of the following statements about fluid X is correct?

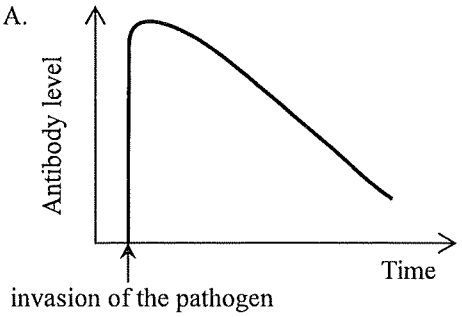
A. It is secreted by the uterus.
B. It provides antibodies to the foetus.
C. It is a medium for material exchange.
D. It provides a stable environment for the foetus.

35. Which of the following combinations correctly compares the blood vessels inside structure Y?

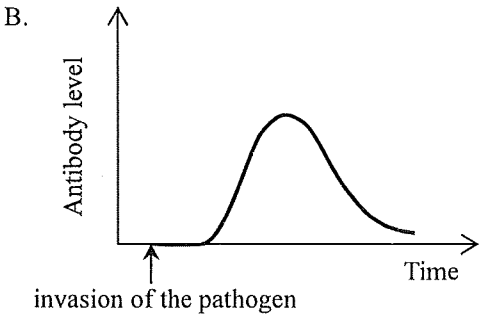
	Artery inside Y	*Vein inside Y*
A.	has a larger lumen	has a smaller lumen
B.	carries oxygenated blood	carries deoxygenated blood
C.	has less glucose in its blood	has more glucose in its blood
D.	blood flows towards foetus' heart	blood flows towards placenta

36. A person is successfully vaccinated against infectious disease P. Which of the following graphs correctly shows the change in the antibody level of this person when he is invaded by the pathogen of disease P?

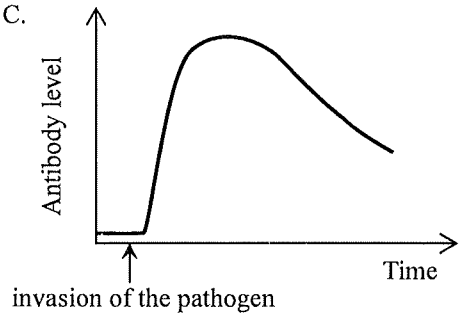
A.



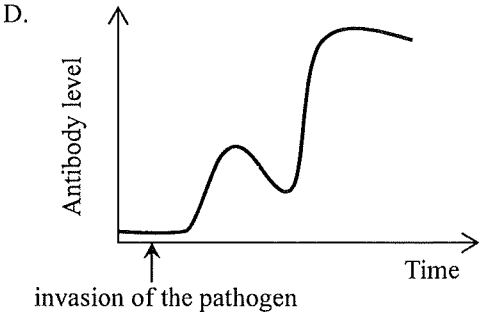
B.



C.



D.



END OF SECTION A
Go on to Question-Answer Book B for questions on Section B

2023-DSE
BIO
PAPER 1B

B

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HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2023

Candidate Number									

BIOLOGY PAPER 1

SECTION B : Question-Answer Book B

This paper must be answered in English

INSTRUCTIONS FOR SECTION B

(1) After the announcement of the start of the examination, you should first write your Candidate Number in the space provided on Page 1 and stick barcode labels in the spaces provided on Pages 1, 3, 5, 7 and 9.

(2) Refer to the general instructions on the cover of the Question Paper for Section A.

(3) Answer **ALL** questions.

(4) Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked.

(5) Supplementary answer sheets will be supplied on request. Write your candidate number, mark the question number box and stick a barcode label on each sheet, and fasten them with string **INSIDE** this Question-Answer Book.

(6) Present your answers in paragraphs wherever appropriate.

(7) The diagrams in this section are **NOT** necessarily drawn to scale.

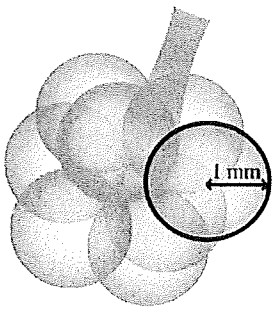
(8) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

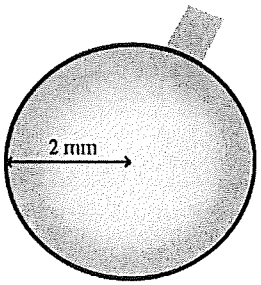
* A 1 3 0 E 0 1 B *

SECTION B

Answer **ALL** questions. Write your answers in the spaces provided.

1. The spheres shown in the diagram below represent the air sacs of different sizes in the lung. The total volume of the eight small spheres with a radius of 1 mm each is equal to the volume of one large sphere with a radius of 2 mm.





surface area of one sphere (mm^2)	12.6	50.3

(a) Calculate the total surface area of eight small spheres. (1 mark)

(b) With reference to the answer in (a), explain why having smaller air sacs in the lungs is more efficient than bigger air sacs for gas exchange. (2 marks)

(c) Apart from (b), explain how air sacs are specialised at tissue level for gas exchange. (1 mark)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Please stick the barcode label here.

2. All cells are derived from stem cells. They undergo differentiation in which the cells change in form and shape which enable them to perform specialised functions.

(a) It is found that the lens of the eye is composed of cells without organelles. If the organelles of these cells had not been degraded during differentiation, describe how the functioning of the lens would have been affected. (2 marks)

(b) Suggest a type of plant cell which also experiences degradation of cellular components during differentiation. Explain the significance of the degradation to the function of the cell type. (2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

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3. Diagram I below shows the right leg with the associated joints and muscles. Diagram II shows a series of motions during running with the right leg highlighted in grey.

Diagram I

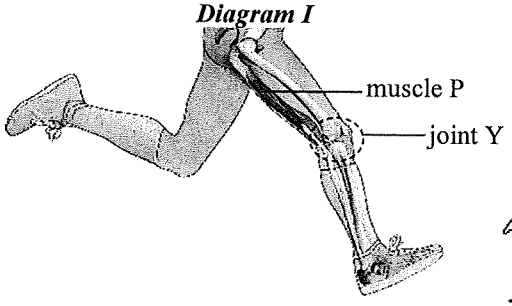
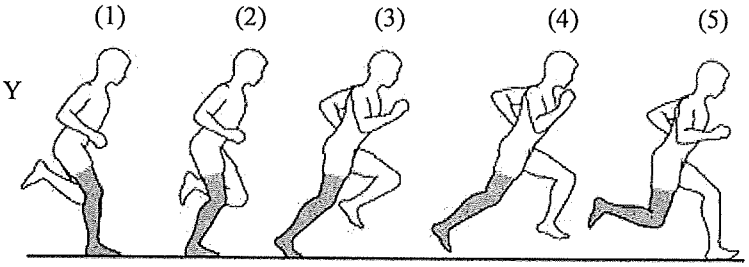


Diagram II



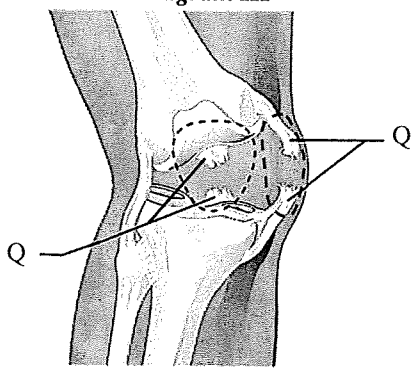
(a) In order to bring about the changes in motion from (3) to (5), what is the change of state of muscle P? (1 mark)

(b) With respect to the answer in (a), state the role of muscle P by circling the following choices in (i) and complete the sentence in space (ii). (1 mark)

Muscle P is a (i) flexor / extensor because (ii) _____

(c) A person injured his knee while running. Diagram III shows the condition of joint Y after the injury:

Diagram III



Structure Q was torn. How would this affect joint Y and its functioning? (2 marks)

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4. Dengue fever is an infection caused by the dengue viruses (DENV). It is an endemic illness in many countries in tropical and sub-tropical regions. DENV encompasses four different subtypes. Each subtype can lead to dengue fever.

(a) What is the way of transmission for dengue fever? (1 mark)

(b) Suggest ***two*** environmental factors in tropical and subtropical regions which lead to a higher risk of contracting dengue fever for people living in these regions. Explain your answer. (3 marks)

(c) Patients infected with a particular subtype of DENV for the first time can recover on their own after about a week without any treatment.

(i) Give ***three*** types of white blood cells that aid the recovery and describe each of their actions. (3 marks)

(ii) Explain why people who have recovered from infection with a particular subtype of DENV can still be infected with other subtypes of DENV in the future. (2 marks)

(d) Suggest ***one*** preventive measure against the spreading of dengue fever. (1 mark)

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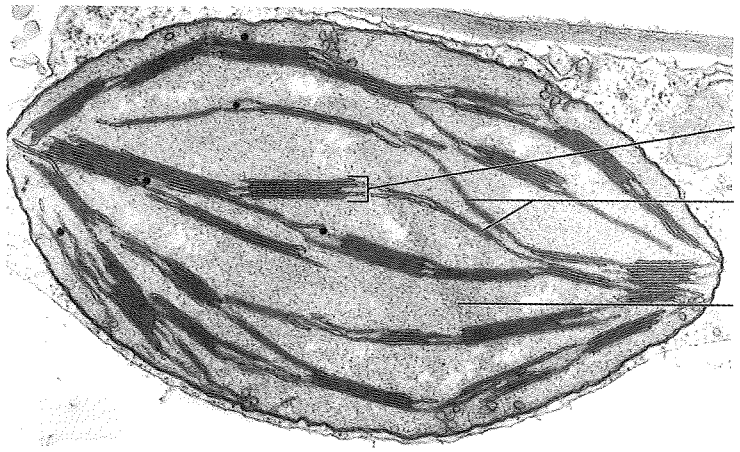
5. An electron micrograph of a chloroplast is shown below:



(a) Label structure Y. (1 mark)

(b) State the energy conversion which takes place at X and its importance in photosynthesis. (2 marks)

(c) To which type of metabolism does the overall reaction at Z belong? Explain your answer. (2 marks)

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(d) Describe how the photosynthetic products of the leaves are stored in the underground tubers of a potato plant. (3 marks)

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6. Colour blindness is an inherited disorder due to defective functioning of the cone cells in the retina. There are many types of colour blindness. For example, people with red-green colour blindness fail to distinguish between red and green colours while those with total colour blindness experience total loss of colour vision.

(a) Based on the functioning of cone cells, suggest why the condition of red-green colour blindness is different from that of total colour blindness. (1 mark)

(b) Red-green colour blindness is caused by a recessive allele on the X-chromosome while total colour blindness is caused by a recessive allele which is located on an autosome. The table below shows the percentage occurrence of red-green colour blindness and total colour blindness in men and women:

	Men	Women
Red-green colour blindness	8%	0.5%
Total colour blindness	0.00001%	0.00001%

With reference to the inheritance of the two types of colour blindness, suggest why the occurrence of red-green colour blindness in men as compared to women differs from that of total colour blindness. (4 marks)

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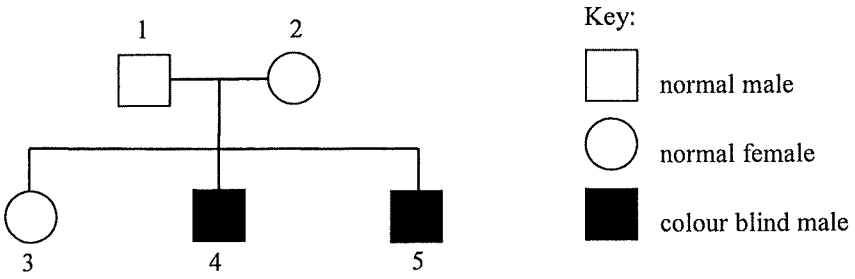
(c) The pedigree below shows the inheritance of red-green colour blindness in a family:



(i) The couple is expecting another child. Using 'B' to represent the allele for normal vision and 'b' to represent the allele for red-green colour blindness, construct a genetic diagram to find out the probability of this newborn being a girl with red-green colour blindness. (4 marks)
(Note: Punnett square is not accepted.)

(ii) Individuals 4 and 5 are twins. Can you determine whether they are identical twins or fraternal twins? Explain your answer. (2 marks)

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7. Greenhouse frog is a foreign species which is now found in many local areas according to a recent survey. There is a concern that these greenhouse frogs might threaten a local endangered species, Romer's Tree Frog.

(a) The table below provides some information about the two frog species:

Name	Romer's Tree Frog	Greenhouse Frog
Size	1.5-2.5 cm	1.2-3.0 cm
Breeding site and habitat	Wetland, small and temporary water bodies; woodland; shrubland; plantations	Woodland; shrubland; agricultural field; urban park
Food	Small insects	Small insects and snails

By comparing the ecological niche of the two frog species, give ***two*** pieces of evidence that support the possibility of the greenhouse frog posing a threat to the Romer's Tree Frog. Explain your answer.

(3 marks)

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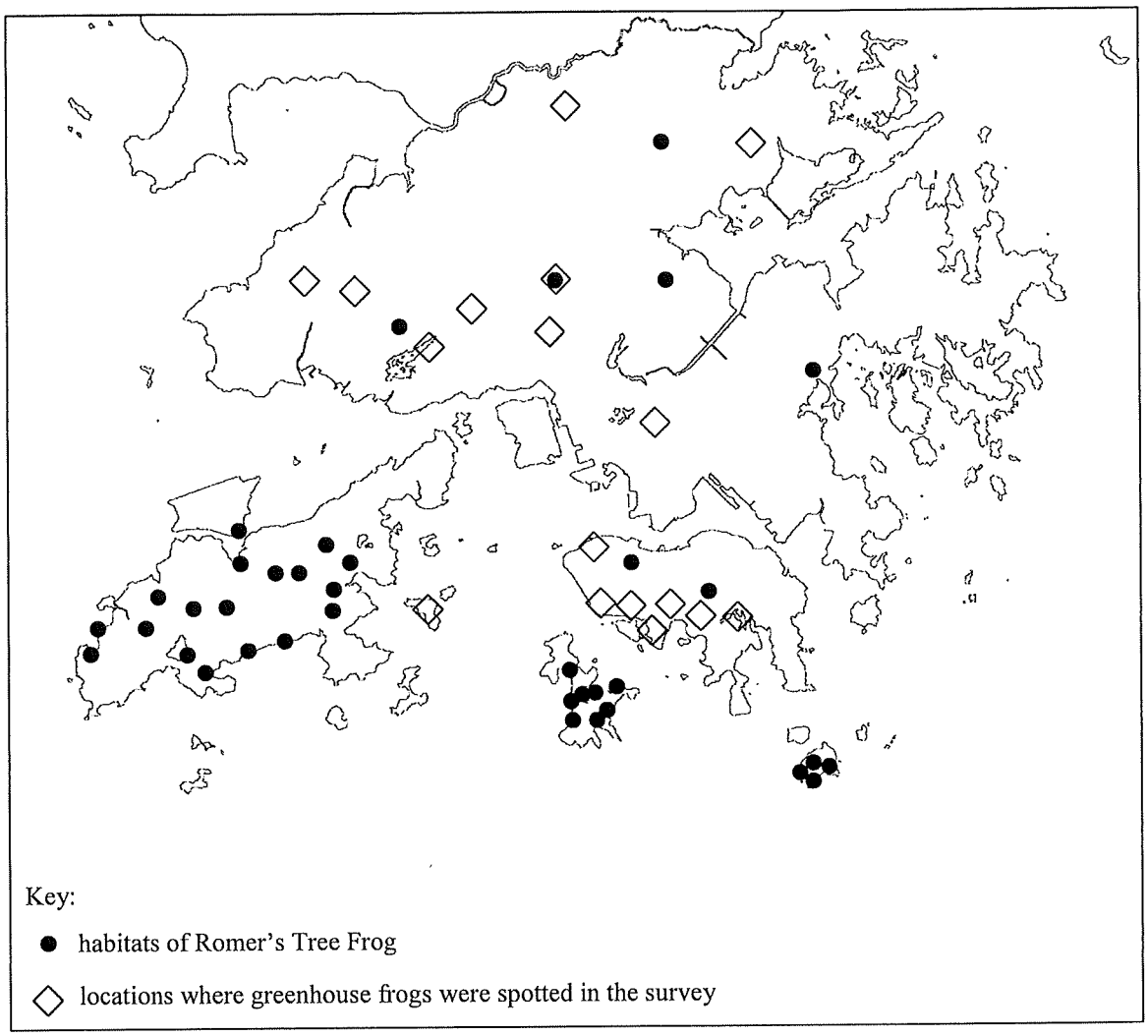
(b) The map below shows the distribution of the two frog species in Hong Kong:



Suggest why the information above ***cannot*** prove that the Romer's Tree Frog is facing a real threat from the greenhouse frogs. (1 mark)

(c) Suggest how you could collect data to show if Romer's Tree Frogs are facing a real threat from greenhouse frogs. (2 marks)

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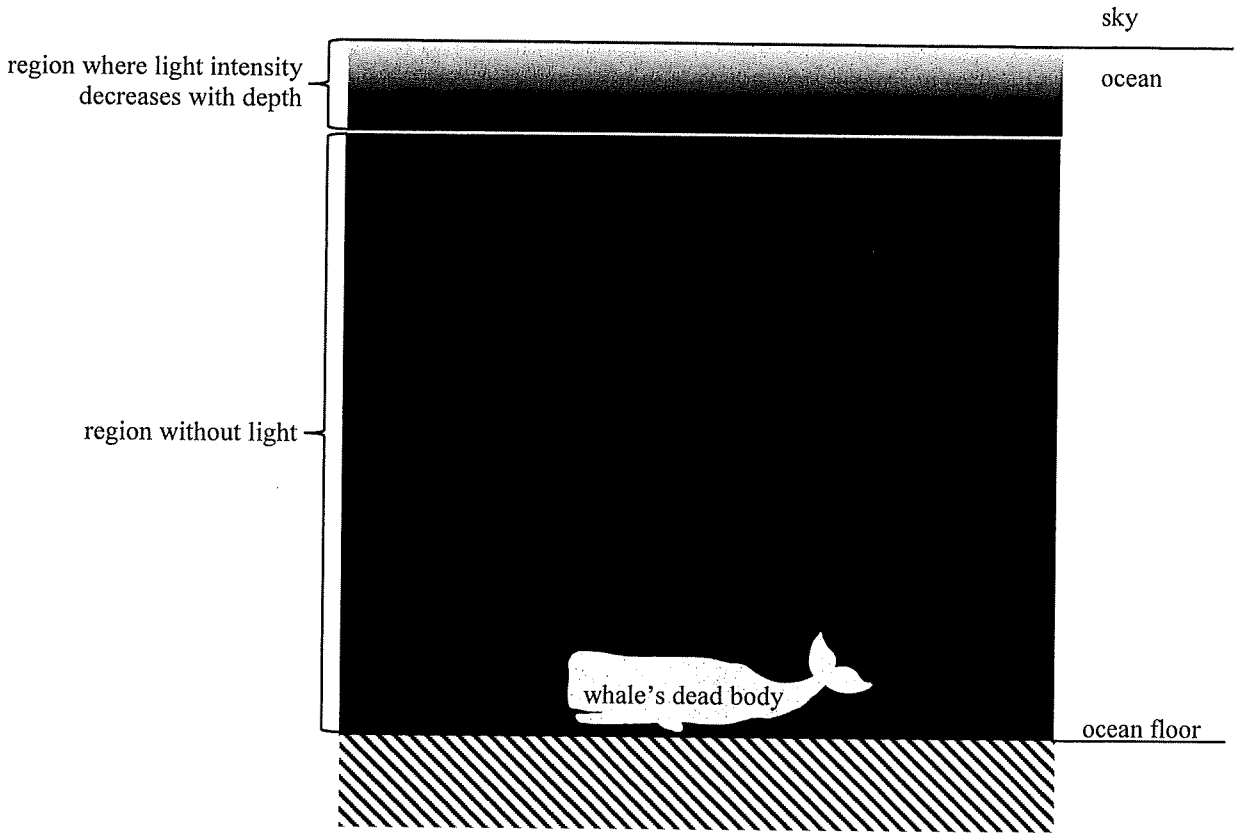
8. When whales die, their dead bodies sink to the bottom of the ocean. The whale carcasses support a unique community known as whale fall community. The diagram below shows different regions of the ocean and the location of a whale's dead body:



(a) (i) With reference to the energy flow in the ecosystem, what is the ultimate source of the energy stored inside the whale's dead body? (1 mark)

(ii) With reference to the above diagram, explain the importance of the whale's dead body to the whale fall community on the ocean floor. (2 marks)

(b) What is the role of the organisms that feed on the soft tissues of the whale's dead body in the cycling of materials? (1 mark)

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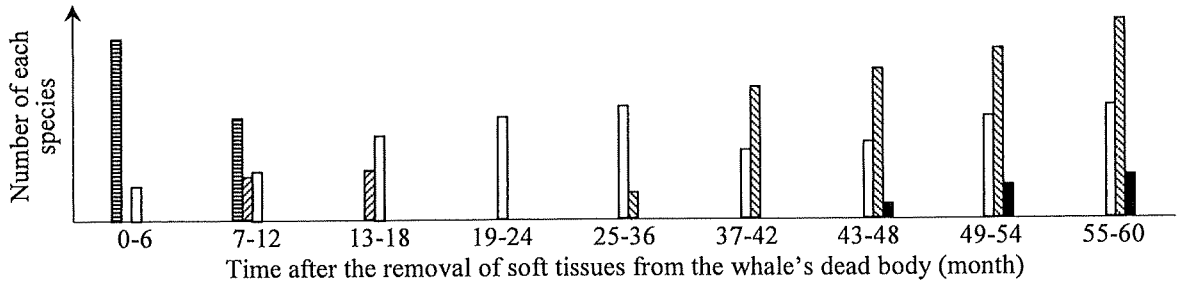
(c) After the soft tissues of the whale's dead body have been consumed, another group of organisms start to feed on the remaining nutrients from the skeleton. For an average-sized whale, it could have 2 000 – 3 000 kg lipid stored inside its skeleton. The bar chart below shows the abundance of different species that feed on the skeleton of the whale over time:



Key:

- species P
- species Q
- species R
- species S
- species T

Complete the following table with evidence from the bar chart to support that the above case is an example of ecological succession. (4 marks)

Characteristics of ecological succession	Evidence from the bar chart
(i)	
(ii)	

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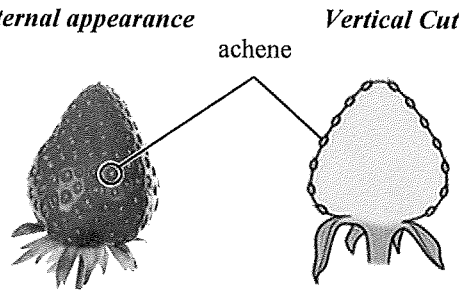
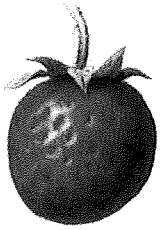
9. The diagram below shows the external appearance of a strawberry and its vertical cut. The achenes found on the surface of the strawberry are the fruits:



(a) An investigation into the role of achenes in the development of a strawberry was carried out as shown below:

Treatment	Relative size and appearance of the strawberry	
	Day 1	Day 20
1. Achenes remained intact.		
2. All achenes were removed on Day 1.		
3. All achenes were removed on Day 1 and the strawberry was then regularly sprayed with auxins.		

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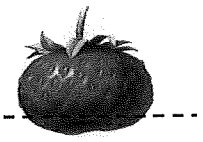
(i) Complete the following table to show what deduction can be made by comparing results of the following treatments: (3 marks)

Treatment	Deduction
1 versus 2	
2 versus 3	
1 versus 3	

(ii) Based on the results, suggest ***one*** hypothesis for the enlargement of the strawberry. (1 mark)

(iii) Study another treatment as follows:

Treatment	Relative size and appearance of the strawberry	
	Day 1	Day 20
4. Achenes were removed from the lower part of the strawberry on Day 1.	Achenes remained on the upper part  Achenes removed from the lower part	

In terms of experimental design, what is the advantage of Treatment 4 as compared to Treatments 1 and 2? (1 mark)

(b) Give ***one*** example of a growth response induced by auxins and state its significance to plants. (2 marks)

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10. Cassava is a crop which grows in areas with poor soil and a low rainfall. It produces starchy root tubers which serve as a major food source in Africa.

(a) Give the location(s) where the chemical digestion of starch takes place in the human digestive tract. (1 mark)

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(b) Table I below shows some nutritional information of cassava while Table II lists the daily energy and protein requirements recommended for boys at age 16:

Table I

Fresh weight (g) from which 100 g dry weight is yielded	250
Energy (kJ per 100 g dry weight)	2 675
Protein (g per 100 g dry weight)	3.5

Table II

	Daily requirement
Energy (kJ)	11 100
Protein (g)	52

In Africa, some low-income families may rely only on cassava for food for a long period.

(i) A 16-year-old boy relies only on cassava for food. Calculate the fresh weight of cassava he needs to consume so as to meet the recommended daily energy requirement. (1 mark)

.....

(ii) After consuming cassava only for a period of time, this boy develops swollen feet due to the accumulation of tissue fluid.

(1) How much protein can he obtain from the amount of cassava consumed in (i)? (1 mark)

.....

(2) According to Table II, predict the difference of the blood protein level of this boy when compared with that of normal healthy boys of the same age. Explain your answer. (2 marks)

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(3) Based on your answer in (2), explain why this would lead to the accumulation of tissue fluid in his feet. (2 marks)

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(c) Cassava contains a natural toxin. Consuming inadequately cooked cassava may result in cyanide poisoning. Cyanide shuts down the oxidative phosphorylation in mitochondria by inhibiting a key enzyme of the process.

(i) Name the structure of the mitochondrion where this enzyme is located. (1 mark)

(ii) A man accidentally consumed some raw cassava. How will his blood lactate level change? Explain your answer. (3 marks)

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You are required to present your answer to the following question in essay form. Criteria for marking will include relevant content, logical presentation and clarity of expression.

11. In agricultural practice, some crops are reproduced asexually to improve production efficiency. An increase in yield of these crops is observed in recent years due to a steady increase in the average global temperature. Meanwhile, some scientists worry that crops reproduced asexually are at high risk of extinction due to environmental changes and diseases if global warming persists.

Explain the increased yield of these crops due to global warming and the rationale behind the concern of the scientists. (11 marks)

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END OF PAPER

Sources of materials used in this paper will be acknowledged in the *HKDSE Question Papers* booklet published by the Hong Kong Examinations and Assessment Authority at a later stage.

Answers written in the margins will not be marked.