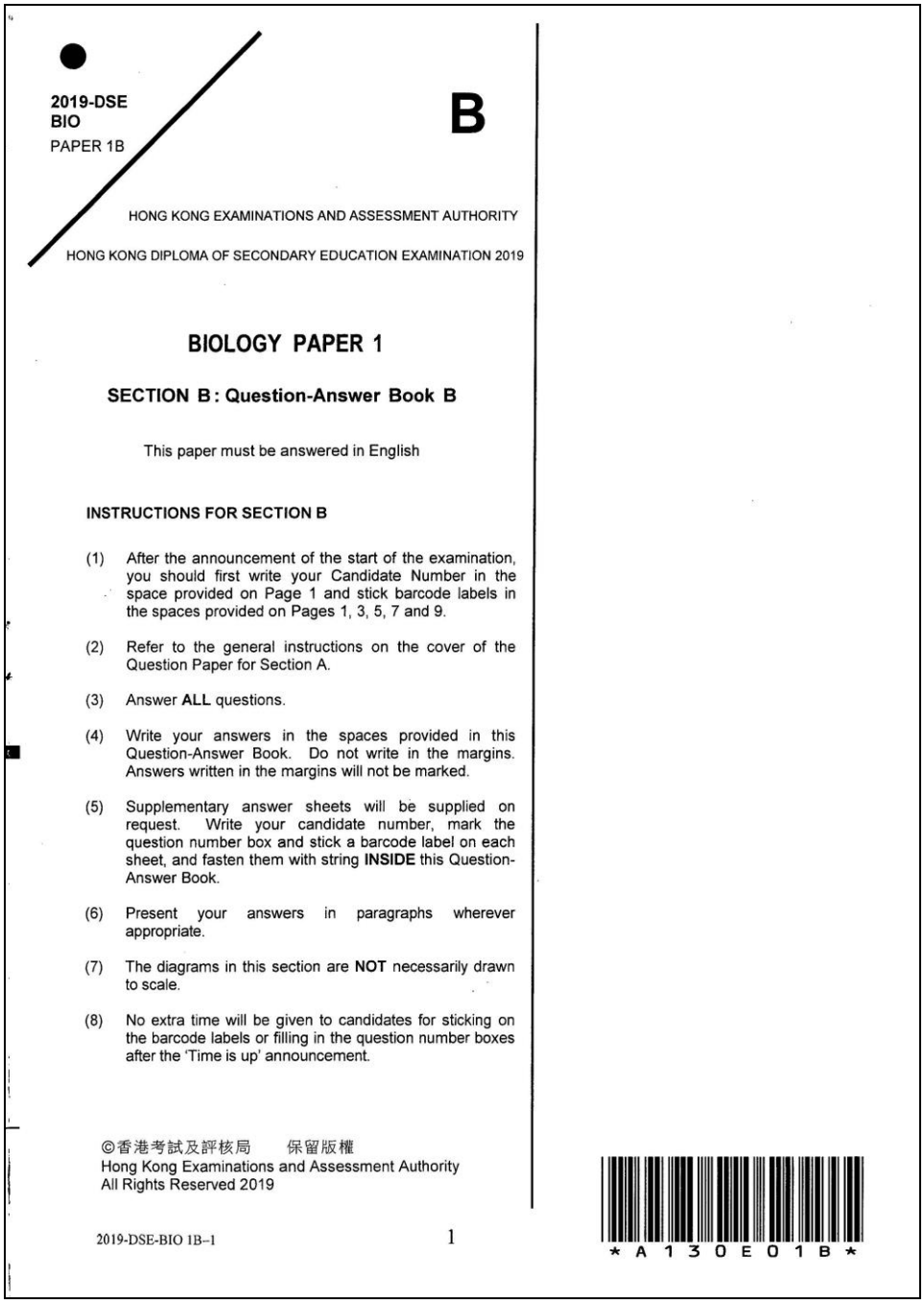
Level 3 exemplar

Comments

The candidate's answers show adequate knowledge and understanding of the facts, concepts and principles in the curriculum. In handling questions related to scientific investigation, he/she was able to identify some structures shown in the micrographs/diagrams (Paper 1B Q.3 and Q.6(d)). He/she was able to give simple descriptions of data (Paper 1 Q.10(a)) and draw simple conclusions (Paper 1 Q.8(a)(i)). For questions set on familiar situations (Paper 1B Q.2, Q.3 and Q.5(a)), he/she failed to apply relevant knowledge fully to explain the given phenomena. In the essay type question (Paper 1B Q.11), he/she was able to apply a little relevant knowledge.



2019-DSE
BIO
PAPER 1B

B

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2019

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 *

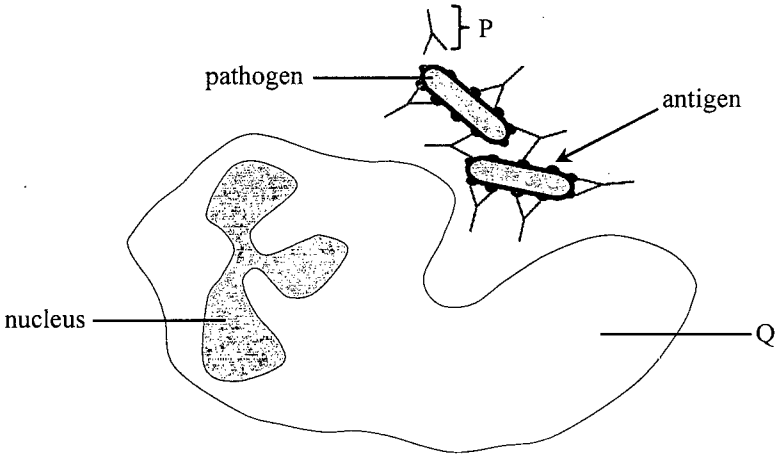
SECTION B

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

1. (a) Physical and chemical barriers are the first line of defence in the human body. Select from Column II ***all*** correct example(s) that belong(s) to the two types of barriers in Column I and put the letter(s) in the spaces provided. (2 marks)

Column I		*Column II*	
(i)	physical barrier A, D	A.	skin ✓
		B.	tear
(ii)	chemical barrier B, C, E	C.	antibody
		D.	blood clot ✓
		E.	gastric juice

(b) The diagram below shows the process of phagocytosis. Q is a phagocyte while P is a protein molecule produced by a type of lymphocyte.



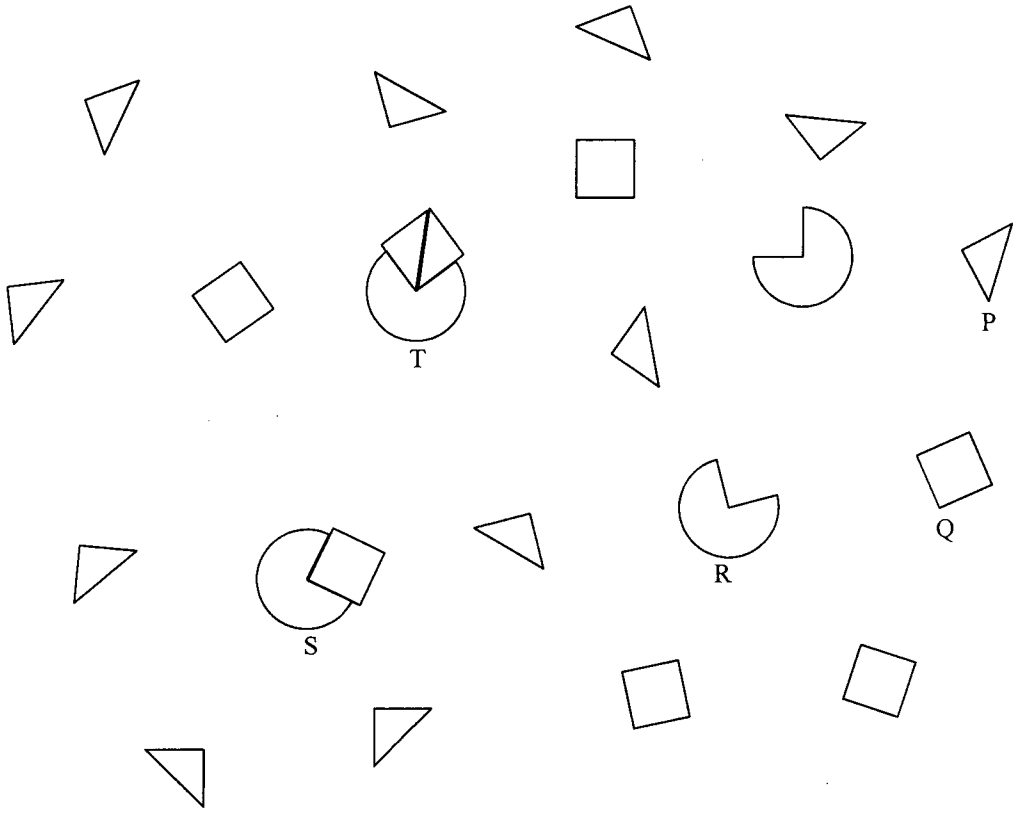
Describe the function of P in phagocytosis. (3 marks)

P ⊗ prevent the pathogen touch together, to prevent the ~~repro~~ reproduction of pathogen. And slow down pathogen for the white blood cell kill the pathogen.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

2. The schematic diagram below shows a reaction mixture of an anabolic reaction catalysed by an enzyme. Drawings P, Q, R, S, and T represent different components of the mixture:



(a) Which drawing represents the substrate in this anabolic reaction? Explain your answer. (2 marks)

P. Because two P is combined by T, then the complex is Q.

(b) Which drawing represents the enzyme? Explain your answer. (2 marks)

R is the enzyme. After the enzyme - substrate complex in S. Q is combined by two P and R has no change and reusable.

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Answers written in the margins will not be marked.

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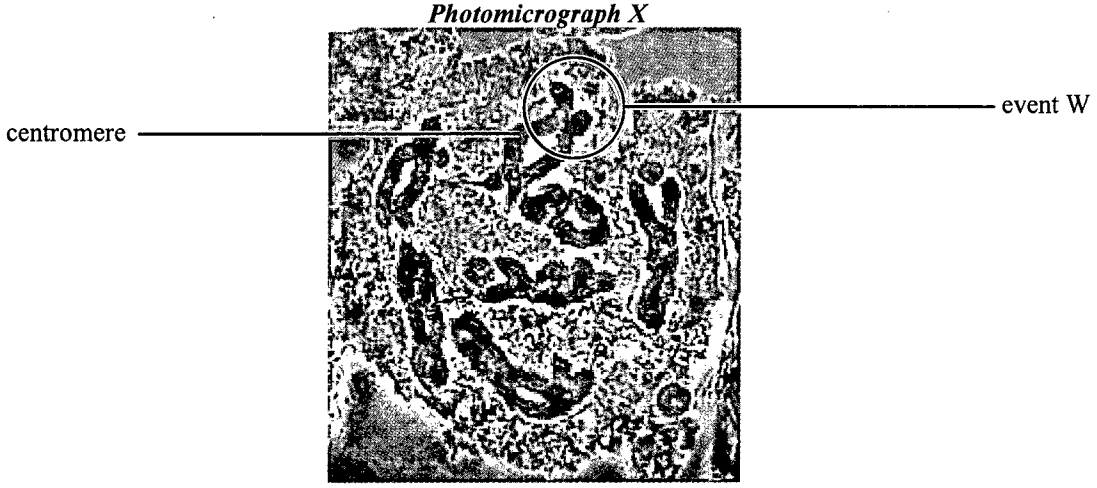
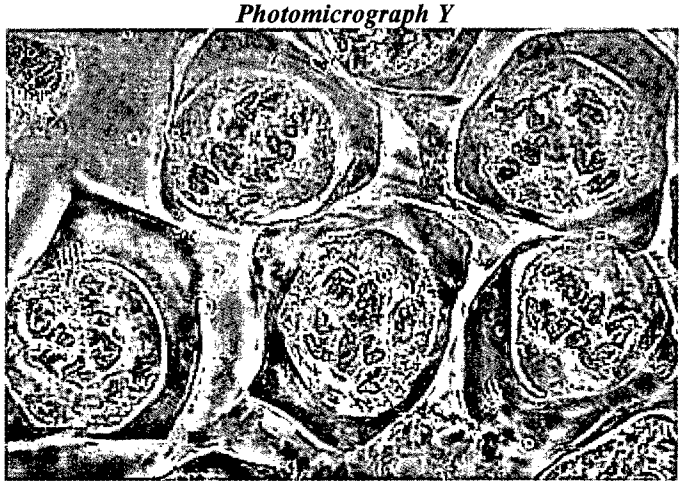
3. The photomicrographs below show some stages of meiosis taking place in a flower:

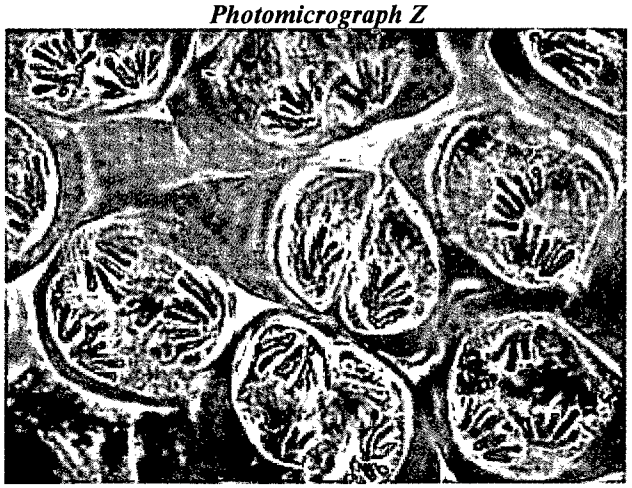
Photomicrograph X



Photomicrograph Y



Photomicrograph Z



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Answers written in the margins will not be marked.

(a) State ***one*** floral structure in which this type of division takes place. (1 mark)

cytoplasm

(b) (i) Name event W shown in Photomicrograph X. (1 mark)

cross - over

(ii) Briefly describe what happens in event W. What is the importance of event W? (2 marks)

The chromosome cross - over for changing the gene. Provide gene variation to next offspring

(c) (i) Which photomicrograph, Y or Z, shows the first meiotic division? Give a piece of evidence to support your answer. (2 marks)

Y show the first meiotic division. Because there are pair of chromosome line up.

(ii) What is the purpose of the first and second meiotic divisions respectively? (2 marks)

In first division, it is for the gene variation.

In second division, it is for separation, make the number of chromsome same with egg.

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4. Diagrams I and II below show a person with both eyes moving right and then left. This eyeball movement is brought about by the coordination of different eye muscle pairs. Diagram III shows four of the muscles (P, Q, R, and S), all connected to motor neurones controlling eyeball movement.

Key: ⟵⟶ directions of eyeball movement

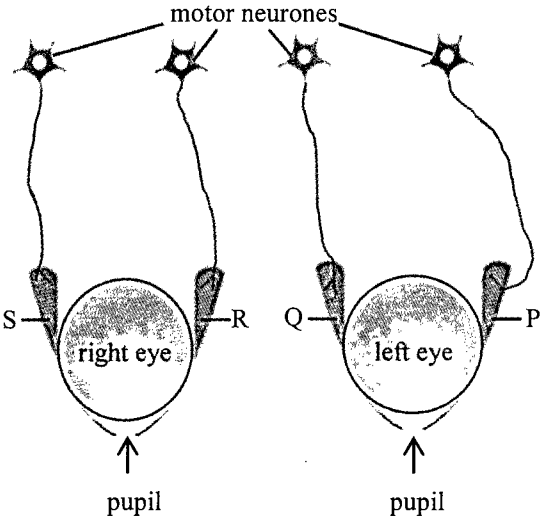
Diagram I

right ⟵ left

Diagram II

right ⟶ left

Diagram III (top view)



(a) To bring about the eyeball movement shown in Diagram I, which muscle(s) (P, Q, R, or S) contract(s)? (1 mark)

S and Q

(b) A person suffers from impaired eyeball movement when turning his eyes from right to left, as shown in Diagram IV.

Diagram IV

right ⟶ left

It is found that one of his eye muscles cannot fully contract. Based on your knowledge of neurotransmission at the neuromuscular junction, suggest ***two*** possible defects that would lead to the impaired eyeball movement shown in Diagram IV. (2 marks)

~~The neuro transmitter neuro~~ transmitter

The neurotransmitter can not send from neuromuscular junction. The ~~nerve~~ ~~impluse~~ impulse can't send out.

The neuromuscular junction is blocked.

The chemical can't stimulate the neuromuscular junction, can't send nerve impulse

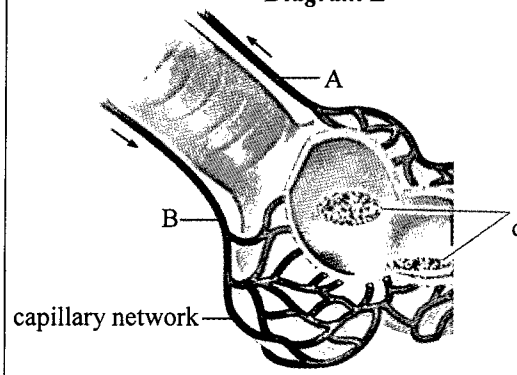
Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

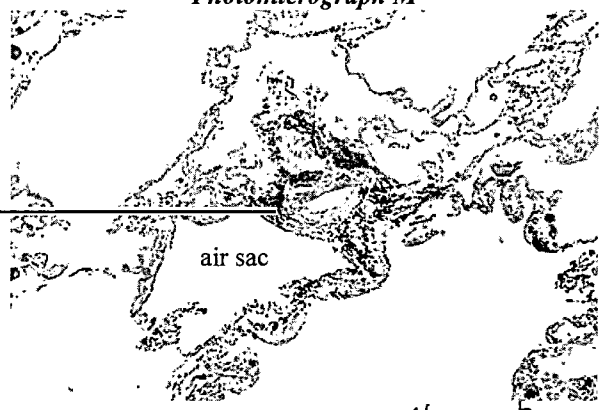
Answers written in the margins will not be marked.

5. Diagram L below shows part of the lung in a patient suffering from a certain lung disease. A hardened layer of dust deposit was found on the respiratory surface of the air sacs. Photomicrograph M shows the lung tissue taken from the patient.

Diagram L



Photomicrograph M



(a) Compare the oxygen and glucose content of the blood in vessels A and B. Explain your answer. (4 marks)

Oxygen content of blood is ~~target~~ higher in vesseles A than B. Because the oxygen and carbon dioxide is exchange in air sac. So the blood in vessels A is contain oxygen after gas exchange. The glucose content of blood is higher in vesseles B than A. Because the blood though the air sac will provide glucose to air sac. So the blood in A vessels is lower.

(b) With reference to the above information about the lung disease, suggest *two* possible ways in which the disease adversely affects gas exchange in the patient. (4 marks)

The dust block the air sac. The surface area of diffusion decrease, the rate of gas exchange decrease. The infection of air sac be lead by dust, so the air sac is hurt by ~~the~~ infection, the air sac can't exchange gases, rate of gas exchange decrease

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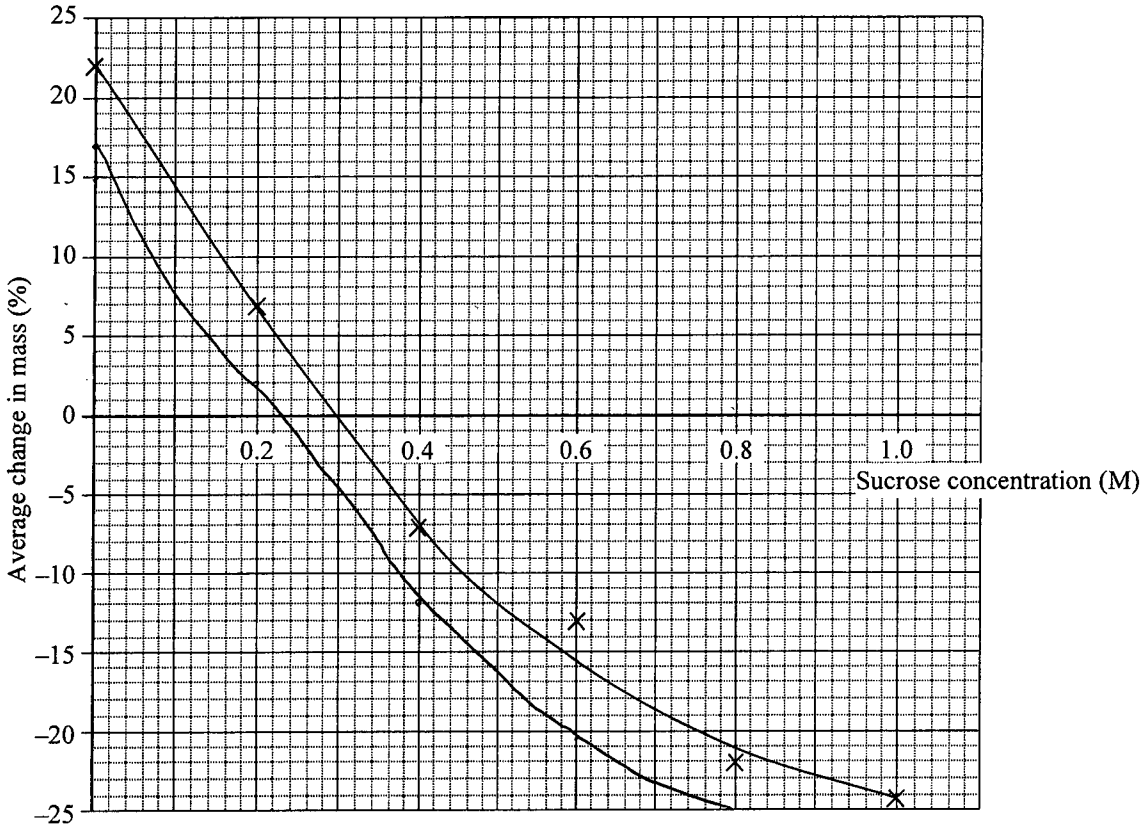
Answers written in the margins will not be marked.

6. Johnny conducted an experiment to determine the water potential of potato tuber cells. He measured the masses of fresh potato cylinders before and after immersing them in sucrose solutions at different concentrations (0M, 0.2M, 0.4M, 0.6M, 0.8M, and 1.0M). Below shows the major steps in the experiment:

Step 1: Cut potato tubers into cylinders
Step 2: Blot dry the surface of the potato cylinders
Step 3: Weigh the potato cylinders (initial mass)
Step 4: Immerse three potato cylinders in each concentration of sucrose solution for two hours
Step 5: Remove and blot dry the surface of the potato cylinders
Step 6: Reweigh the potato cylinders (final mass)
Step 7: Calculate the average percentage change in mass of the potato cylinders in each solution

The results are shown in the graph below:



(a) With reference to the graph, which sucrose solution concentration has the same water potential as the potato cells? Explain your answer. (3 marks)

0.3 sucrose concentration sucrose. Because there are no change in mass. No net gain and loss ~~water~~ of water pass though diffentially membrane by osmosis. So the water potential is same

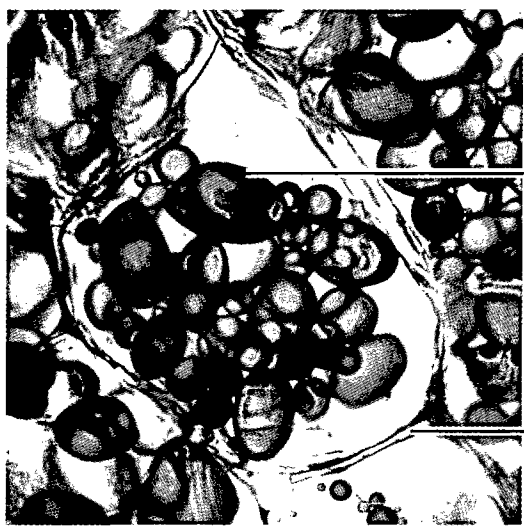
Answers written in the margins will not be marked.

(b) If Johnny skipped step 2 by mistake for all samples, how would this affect the curve and the deduced value of the concentration of the sucrose solution in (a)? Sketch a curve on the graph on the facing page to show the effect. (1 mark)

(c) In terms of experimental design, what is the importance of putting three potato cylinders in each concentration of sucrose solution? (1 mark)

To observe the different change in mass of potato in different concentration

(d) Johnny prepared a slide of freshly sectioned potato cylinder and stained it with iodine solution. The photomicrograph below shows the section. Label structures X and Y. (2 marks)



X: Starch

Y: Cell wall

(e) In the middle of the 19th century, there was a severe attack on potato crops by a plant pathogen in Ireland. As the potato was the major staple food at that time, many Irish people died of starvation. Vegetative propagation of potatoes was blamed for the high vulnerability of the potato crops. Explain the rationale for this claim. (2 marks)

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7. The table below shows the changes in soil nitrogen content and the number of species of herbaceous plants and woody plants before and after a landslide on a hillside:

	Soil nitrogen content ($mg\ g^{-1}$)	Number of plant species	
		Herbaceous plants (e.g. grass)	Woody plants (e.g. shrubs and trees)
Before landslide	6	10	15
2 years after landslide	1	17	2
20 years after landslide	3	14	9

(a) What type of ecological succession occurred on the hillside after the landslide? Explain your answer. (2 marks)

first succession. Because after landslide, the ~~herbaceous~~ herbaceous plants is become more.

(b) (i) Explain the change in the soil nitrogen content shown in the above table. (3 marks)

After landslide, the woody plants become less. The animal in that succession become less too. The amount of animal dead bodies, excretion become less. Less organic material be broken down the soil nitrogen content decrease. ~~After~~ 20 year after landslide, the tree become more, ~~more~~ attract more animal, more nitrogen in soil.

(ii) With reference to the change in soil nitrogen content, explain the change in the plant composition after the landslide in terms of the number of species of herbaceous and woody plants. (3 marks)

landslide → 2 years after: The herbaceous plants needs less nitrogen. So the soil nitrogen content is lower. But woody plants needs more nitrogen. So the soil nitrogen content is higher, the ratio of woody plant is higher, the nitrogen content is higher

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8. (a) Bats are night-time animals. The mystery of how bats avoid obstacles in darkness has puzzled scientists for centuries. Below shows some major events in the research on how bats use ultrasound to navigate as they fly:

Time	Scientist	Event
Late 18th Century	Spallanzani	He noted that blind bats could avoid obstacles.
	Jurine	He plugged the ears of bats with wax; the bats collided with obstacles.
Next 140 years	Various scientists	Despite the work of Spallanzani and Jurine, scientists continued to explore the possible use of other senses for navigation in bats.
1930s	Pierce	He developed an apparatus that could detect ultrasound.
1938	Griffin	He used Pierce's apparatus to show that bats emitted ultrasound.
	Griffin and Galambos	They worked out how bats used the ultrasound they produced in navigation.

(i) With regard to the observation of Spallanzani, what conclusion can you draw about bats' ability to avoid obstacles? (1 mark)

The bat's ability to avoid obstacles is not from the sight.

(ii) Below are some aspects of the nature of science which can be demonstrated by the discovery of ultrasound navigation of bats. Choose any ***two*** aspects of nature of science and elaborate on how these are demonstrated in the above events. (2 marks)
(Note: Only the first two will be marked if you give more than two aspects.)

Nature of Science	Elaboration
Science is based on evidence from experiments	
Scientists build on the work of other scientists	Griffin used Pierce's apparatus (in bat) to show various scientists despite the work of Spallanzani and Jurine, scientists continued to explore the possible use of other senses for navigation
Technology has impacts on the development of science	Griffin used Pierce's apparatus to show that bats emitted ultrasound

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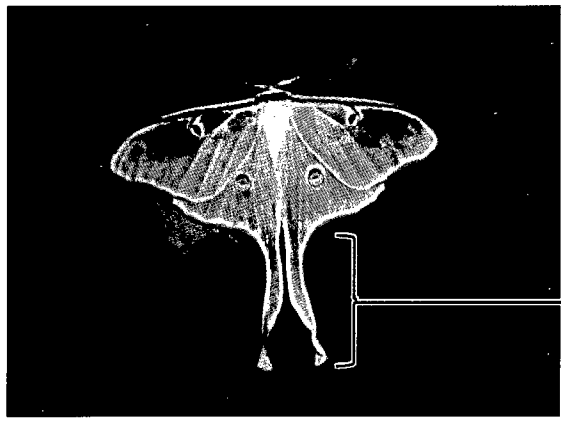
(b) Bats prey on moths. The photograph below shows a type of moth which has long wing tails:



After the discovery of ultrasound navigation in bats, scientists hypothesised that the wing tails of the moths may disturb the ultrasound emitted by bats and thus help moths to escape from a bat attack.

To test this hypothesis, scientists manipulated the wing tail length of the moths and then determined their rate of successful escape from bat attacks. The treatments of the wing tails and the results are shown below:

Treatment of wing tails	A: No treatment	B: Cut and glued back	C: Cut	D: Elongated
				
Wing tail length (cm)	5	5	2	6
Successful rate of escape (%)	57	57	26	65

(i) What can you conclude from the results of treatment A and B? What is the purpose of treatment B in the experimental design of this study? (2 marks)

The successful rate of escape is same when the wing tail length is same. The movement will not be affected by the wing have been cut.

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Answers written in the margins will not be marked.

(ii) What further conclusion can you draw when comparing the results of the following treatments? (2 marks)

Treatment	Conclusion
A and C	The wing tail length become shorter will affect the movement be slower the successful rat of escape decrease
A and D	The wing tail length become longer will affect the movement be faster, the sucessful rate of escape increase.

(iii) What is the overall conclusion of this study? (1 mark)

The length of wing tail longer will move faster

(c) With reference to the hypothesis stated in (b), describe how the long wing tail could have evolved in the moths. (4 marks)

The long wing tail moths ~~can~~ have a higher chance to escape. The long wing tail moths can survial and ~~reproduction~~ reproduce. The offspring is long wing tail. The proportion of ~~bat increa~~ long wing tail ~~is~~ be larger. So the long wing tail moths have evolved.

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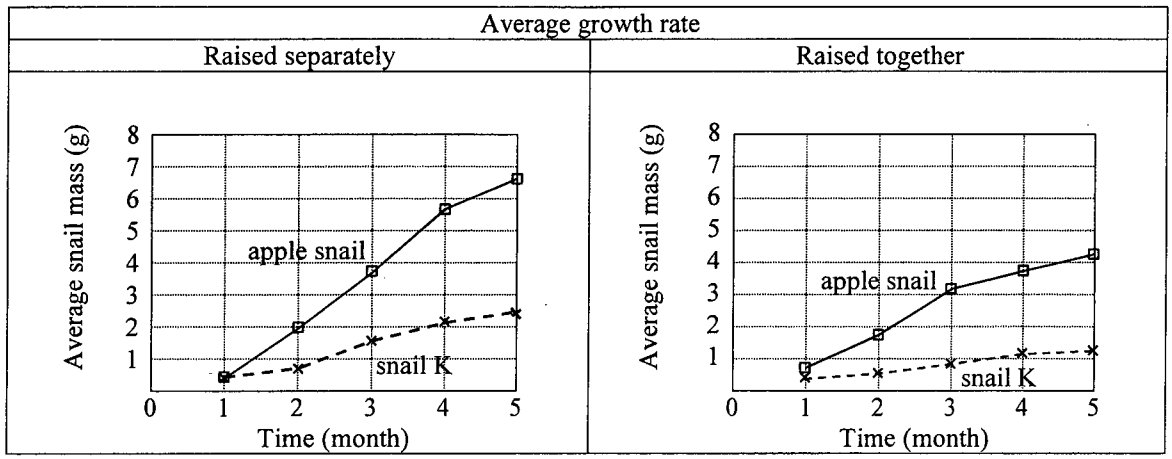
9. The apple snail originates from South Africa. It was first imported to Asian countries for human consumption. However, it escaped to the local wetland habitat. Below are data regarding the average growth rates of apple snail and a local snail species K when they were raised separately and raised together:



(a) With reference to the above data, what would happen to the population of snail K in the wetland habitat once the apple snails have escaped to this habitat? Support your answer with data from the graphs above. (4 marks)

apple snale and snail k is competitive. The snail k raised together with apple snail is about 1 g mass. After apple snale escaped to thae habitat. snail k and apple snail will raised separately. The snail k will increase the mass. The Snail k grow stronger ~~(hard)~~. larger ~~proportion~~ population of snail k

(b) It has been noted that apple snails consume wetland plants at a high rate, especially buds and young leaves. Suggest why the feeding habits of apple snails may have an adverse effect on the community of local wetland habitats. (3 marks)

Plant is producer, apple snail consume bud and young leaves a lot. The food produced by plant reduce. The food decrease lead the ~~food~~ animal in local wetland habitats ~~get~~ get not enough food.

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(c) Apart from the above, suggest another biotic factor which may explain why an imported species would turn into an invasive or dominant species. (1 mark)

nature selection

(d) Suggest ***one*** human activity which might lead to an invasion of imported species in Hong Kong. (1 mark)

Over - hunting

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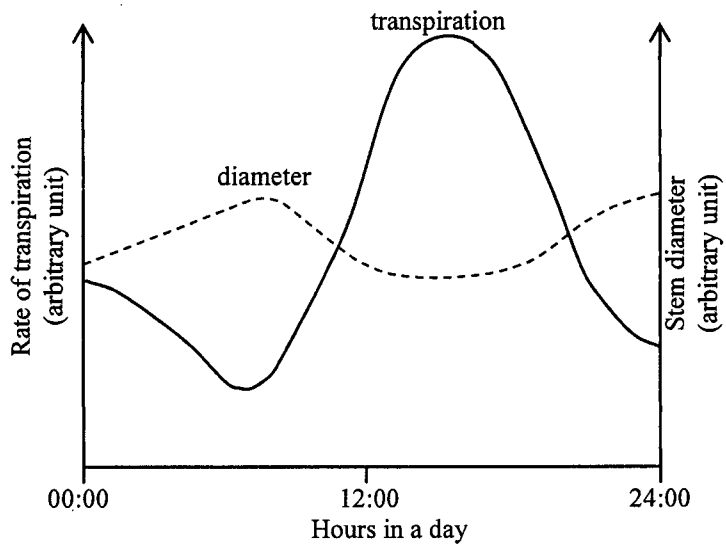
10. The graph below shows the change in the rate of transpiration and the change in stem diameter of a plant over 24 hours:



(a) Describe the relationship between the rate of transpiration and stem diameter. (1 mark)

The diameter will rise as the rate of traspiration decrease.

(b) It is known that the change in stem diameter is related to the diameter of the xylem vessels. With reference to the way in which water is transported along the stem, explain the relationship between the rate of transpiration and stem diameter described in (a). (2 marks)

(c) Describe and explain *two* adaptive features of xylem vessels as a structure for water transport. (4 marks)

No end wall. Reduce ~~red~~ resistance of transport water.

Xylem is dead cell. Reduce resistance of transport water

Answers written in the margins will not be marked.

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Answers written in the margins will not be marked.

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

11. Nowadays, keeping pets (such as dogs and cats) is becoming popular in Hong Kong. Some people prefer pure-bred pets to hybrid pets. However, pure-bred pets usually have higher risks of suffering from genetic diseases than hybrid pets because of the ways they are bred. Pure-bred pets are produced by [crossing close relatives] to keep a pure bloodline. Explain why genetic diseases are often carried by recessive alleles. By comparing the effects of the two breeding processes on the genetic composition of the offspring, discuss why pure-bred pets are at a [higher risk] of suffering from genetic diseases than hybrid pets. (11 marks)

Because genetic diseases in dominant alleles have a lower chance to survial, They have no chance to reproduce, The genetic disease in dominant alleles will not pass to next ~~on~~ offspring.

In pure-bred condition, pure-bred pets are prodnced by crossing close relatives, that lead the pure bloodline have no gene variation, The genetic diseases will ~~pass~~ be passed by the pure-bred's parents

But, in hybrid ~~pet~~ pet. They are not produce by crossing close relatives. The gene variation will be occured, the chance of suffering the genetic ~~do~~ disease from parents will be lower,

Thus pure-bred pets are at a higher risk of suffering from genetic disease than hybrid pet

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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.

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Answers written on this page will not be marked.

2019 DSE (C)

香 港 考 試 及 評 核 局
HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

香 港 中 學 文 憑 考 試
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION

答 題 簿
ANSWER BOOK

考生須知

(一) 宣布開考後，考生須首先在第 1 頁之適當位置填寫考生編號，並在第 1、3 及 5 頁之適當位置貼上電腦條碼。

(二) 每題 (非指分題) 必須另起新頁作答，並須在每一頁的相應試題編號方格填畫「X」號，以表示選答的題號 (見下例)，並在第一頁之適當位置填寫作答的試題編號。

(三) 紙張兩面均應使用，並應每行書寫。不可在各頁邊界以外位置書寫。寫於邊界以外的答案，將不予評閱。

(四) 如有需要，可要求派發方格紙及補充答題紙。每一紙張均須填寫考生編號、填畫試題編號方格、貼上電腦條碼，並用繩縛於**簿內**。

(五) 試場主任宣布停筆後，考生不會獲得額外時間貼上電腦條碼及填畫試題編號方格。

INSTRUCTIONS

(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 and 5.

(2) Start each question (not part of a question) on a new page. Put 'X' in the corresponding question number box on each page to indicate the appropriate question number (see the example below), and write the question number(s) of the question(s) attempted in the space provided on Page 1.

(3) Write on both sides using each line. Do not write in the margins. Answers written in the margins will not be marked.

(4) Graph paper and 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 book.

(5) 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.

例 Example:

試題編號 Question No. = 3

試題編號 Question No.

1	2	3	4	5	6	7	8	9	10	11	12	
☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13	14	15	16	17	18	19	20	21	22	23	24	≥25

由考生填寫 To be filled in by the candidate	
試題編號 Question No.	

試題編號 Question No.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	≥25
X																								

每題另起新頁作答。
Start each question on a new page.

a.i (1) The ~~oestrogen is~~ plasma oestrogen level is decreasing during day 24 of cycle I to day 5 of cycle II. Because FSH is inhibited by progesterone. FSH level decrease, lead oestrogen level decrease

(2) The plasma oestrogen level is increasing during day 5 to day 11 of cycle II, Because the FSH level is high. Leading ~~ovary~~ follicle develop, the oestrogen level increase

ii (1) After the injection of additional oestrogen, the oestrogen maintain the uterine lining thinkness. The uterine lining don't broken down. The ~~menstr. follicle~~ ovlue and yellow body will not out the body, The follicle will not need to develop by FSH. So the FSH will be in a low level during the day taking injection of additional oestrogen.

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(2) The function of oestrogen is used for maintain the ~~thick~~ thickness of uterine ~~lining~~ lining. Because ~~the~~ oestrogen with progesterone can used to maintain the thickness of uteringe lining.

(constant energy produced)

bi In hydrated group. The cardiac output have no drop. ~~So~~ That cause the constant rate of respiration in hydrated group. So the ~~speed~~ cycling speed of the hydrated group was constant. But in dehydrated, their cardiac output is dropping, the rate of respiration decrease, the energy produced decrease. So the cycling speed of dehydrated group will be dropped

ii (1) ~~the The increase of beating time~~
The time of beat increasing per minutes and the stroke volume decrease per beating

(2) In dehydrated group. The beating time increase smaller than the stroke volume decrease relatively. So the cardiac ~~output~~ output

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of dehydrated group is lower

iii Because the ~~oxygen su~~ dehydrated group s troke volume of dehydrated is lower than hydrated group. So dehydrated group oxygen supply is not enough to supply body. ~~the body of heart of do~~ The carbon dioxide concentration in blood increase. The PH value of blood decrease. It is detected by chemoreceptor. Lead the ~~pace maker~~ medulla send more herve implase, the pace maker send more electroic, the heart of dehydrate contract faster.

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a) Suspect 2

ii) Because ~~did~~ the choromosome of different people has different density. So the finger prints will show the chromosome different ~~the~~ ~~move~~ moving speed when it attract to positive charge.

iii)(1) Blood stains can ~~not~~ be used in DNA fingerprinting. Because even red blood cell have no nucleus. There are white blood cell or other cell in blood. They contain nucleus for DNA printing. So Ryan is right.

(2) I ~~agree~~ don't agree. In semen, there contain 23 chromosome from the crime. So half of the ~~semen finger~~ ~~printer~~ fingerprinting can show the half chromosome same with crime. So semen can be used for DNA fingerprinting

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bi. Annealing

ii

iii Because primers with fewer bases are used. The PCR will be combined by fewer base. The PCR product size will be smaller

iv Because Agrobacteium is a bacterium that can infect to stem cell of plant. The plant after growth, will have the gene from ~~Agrobacterium~~ Agrobacterium

v Because gene K is protein toxin to insect. So the transgenic crop ~~will~~ have toxin for killing insect. That cause the yields can be more, will not be eaten

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by insect, so produce higher yields than non-transgenic

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