Level 5 exemplar

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 *

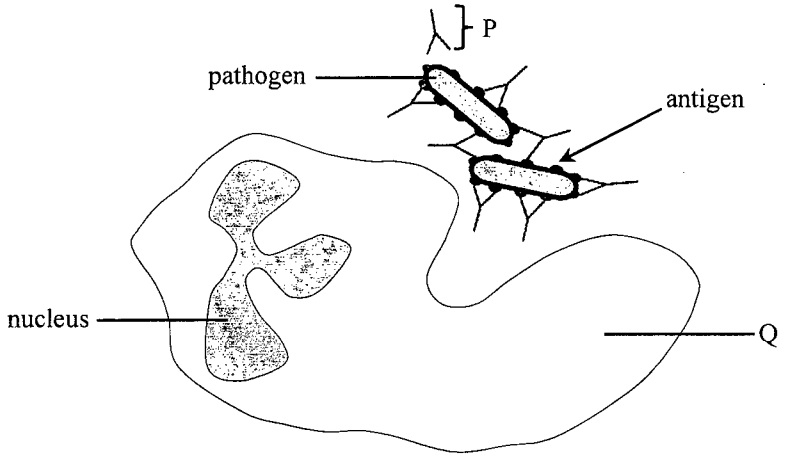
SECTION B

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, 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 is the antibody. The antibody P recognize the antigen of the pathogen then clump the pathogen together, such that phagocyte can engulf the clumped pathogen easier and more efficient. P promotes phagocytosis.

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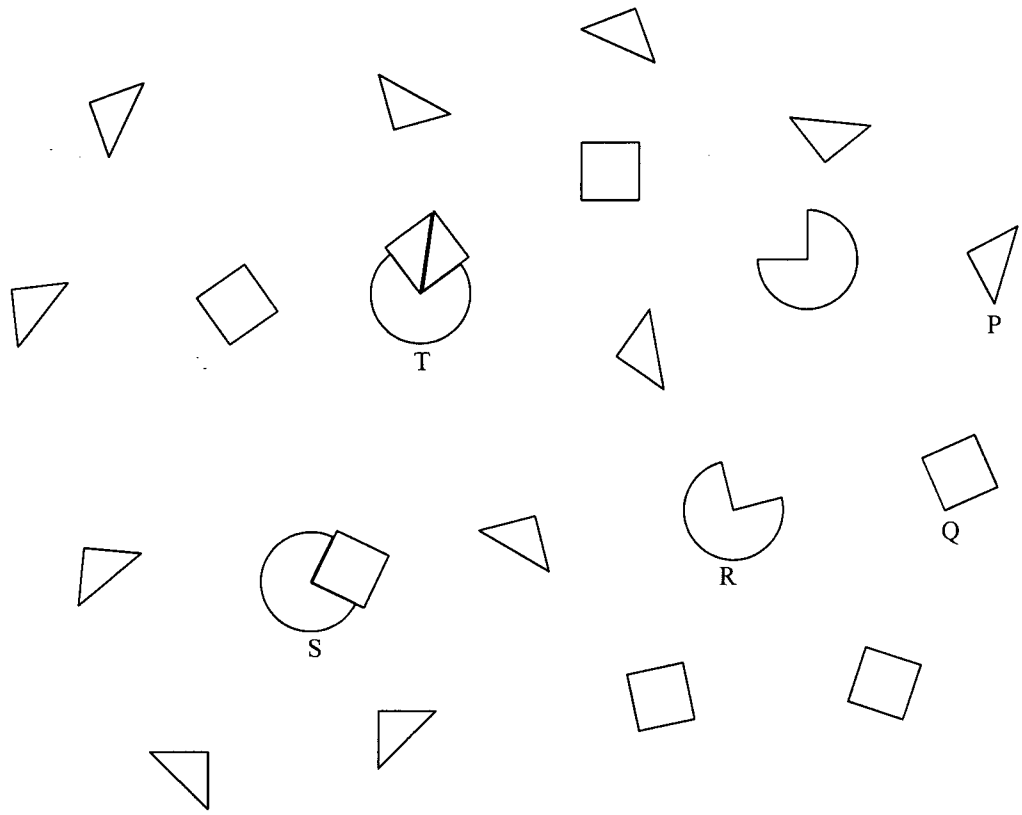
2. The schematic diagram below shows a reaction mixture of an anabolic reaction catalysed by an enzyme. Drawings P, Q, R, S, and T represent different components of the mixture:



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

P is the substrate in this reaction. As this is an anabolic reaction, larger products are produced from smaller substrates. P is the substrate and Q is the product.

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

R is the enzyme. R has an active site which ~~attaches~~ substrate is specific to the substrate, and the reaction can be catalysed by the enzyme

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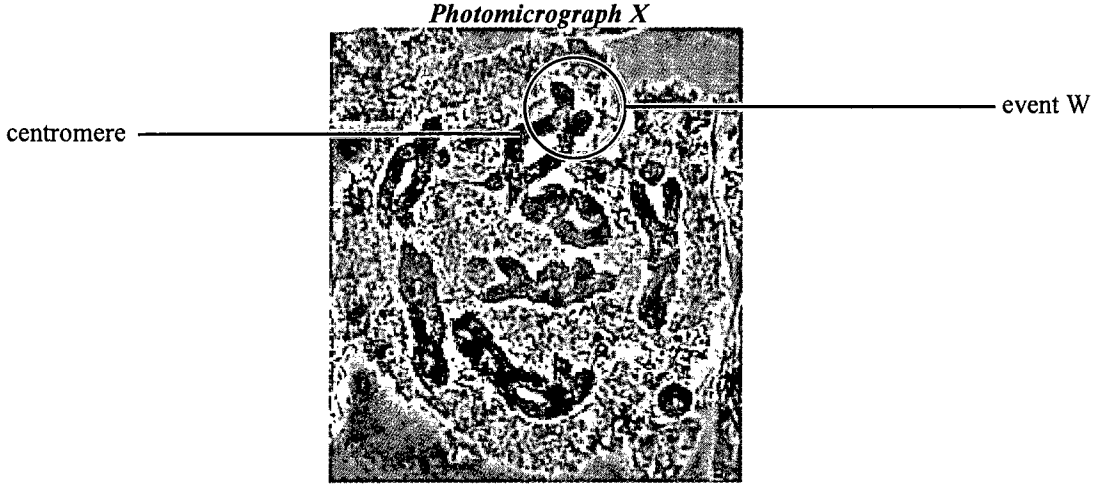
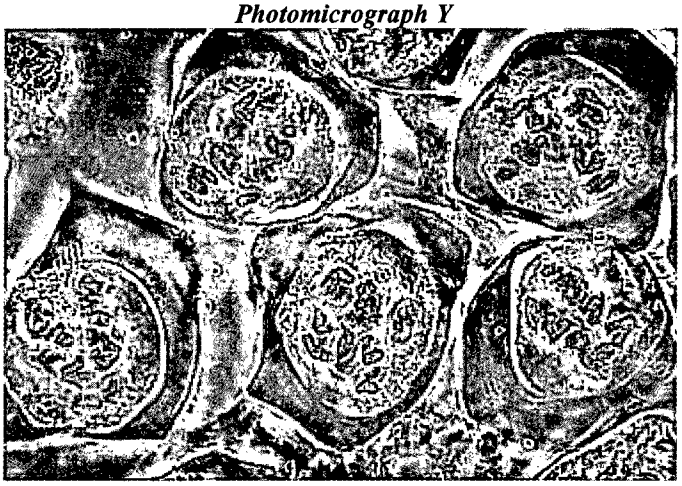
3. The photomicrographs below show some stages of meiosis taking place in a flower:

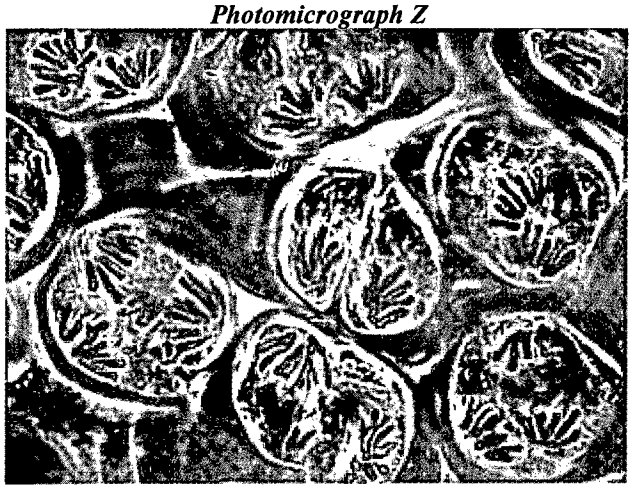
Photomicrograph X



Photomicrograph Y



Photomicrograph Z



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

Anther

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

Crossing over

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

In event W, homologous chromosome pair exchange a segment of the chromosome each other. This can increase the genetic variation of the gamete produced in the meiotic cell division

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

Photomicrograph Y. In Y, homologous chromosome pairs are seperated to form only two daughter cells. This means that first meiotic division occurs.

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

The purpose of first meiotic division is to seperate homologous chromosome pair, such that haploid gametes for sexual reproduction is produced.
The purpose of the second meiotic division is to seperate sister chromatids, such that 4 haploid cells are produced.

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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

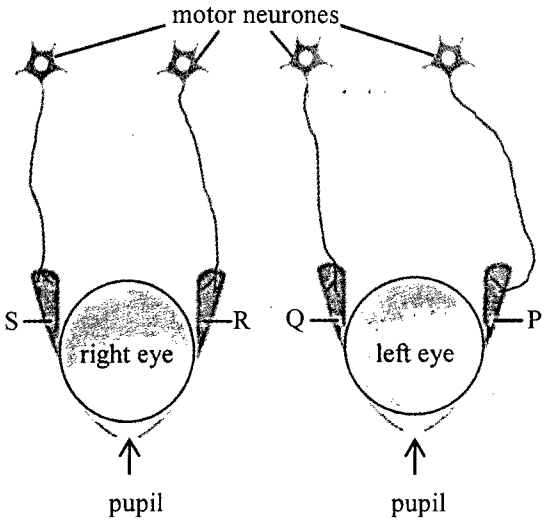
Diagram I

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)

Q, S

(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)

This means that muscle R cannot fully contract. The defects may be the decreased amount of neurotransmitter at the synapse and degeneration of myelin sheath of axon of motor neurones.

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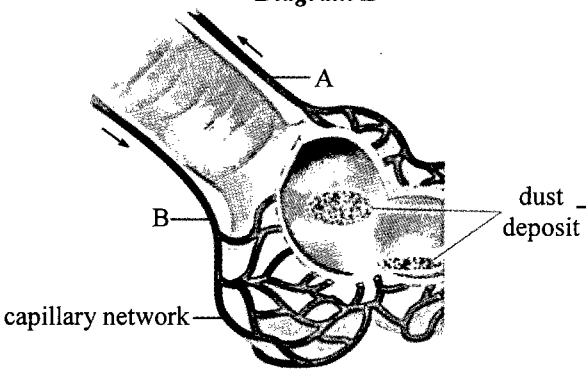
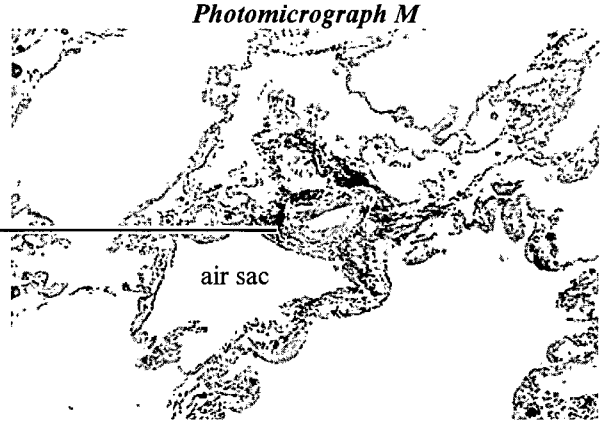
5. Diagram L below shows part of the lung in a patient suffering from a certain lung disease. A hardened layer of dust deposit was found on the respiratory surface of the air sacs. Photomicrograph M shows the lung tissue taken from the patient.

Diagram L



Photomicrograph M



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

Vessel A has a higher oxygen content. ~~The~~ Blood flow from vessel B, to the capillary network, then to A. Vessel B is from the pulmonary artery, which carries deoxygenated blood. At the capillaries, carbon dioxide is removed from blood and oxygen enters blood. Vessel A, which leaves the capillary network carries oxygenated blood to the pulmonary vein. Vessel A has a lower glucose content than vessel B. Glucose is diffused to cell in air sac when passing through the

(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 deposit lowers the surface area for gas exchange. The dust deposit blocks and reduces the area of gas exchange. The surface area for gas exchange is low, the efficiency and rate of gas exchange is also lowered. This hinders gas exchange.

The dust deposit absorbs the water film

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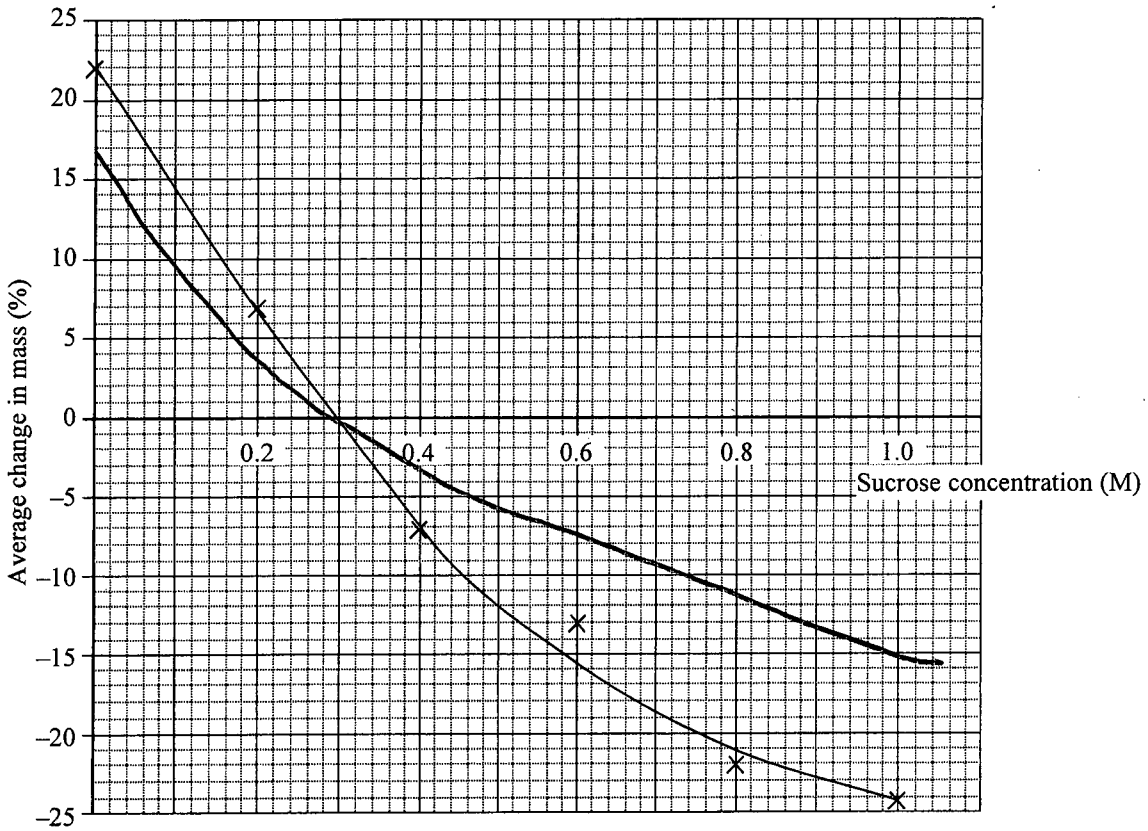
6. Johnny conducted an experiment to determine the water potential of potato tuber cells. He measured the masses of fresh potato cylinders before and after immersing them in sucrose solutions at different concentrations (0M, 0.2M, 0.4M, 0.6M, 0.8M, and 1.0M). Below shows the major steps in the experiment:

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)

Sucrose solution of 0.3 M. From the graph, at sucrose concentration 0.3 M, the average change in mass is 0%. This means there is no net loss and gain in water by the potato cells and therefore means that the sucrose solution at 0.3 M has the same water potential as potato cells.

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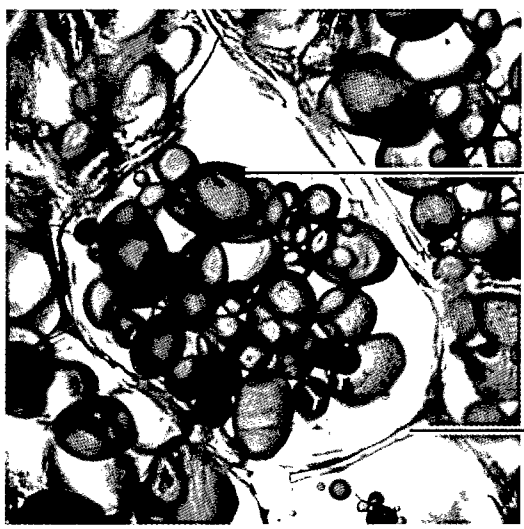
(b) If Johnny skipped step 2 by mistake for all samples, how would this affect the curve and the deduced value of the concentration of the sucrose solution in (a)? Sketch a curve on the graph on the facing page to show the effect. (1 mark)

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

To minimize individual error and the percentage error of the experiment

(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 grains

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)

Using vegetative propagation, potato of identical genetic material are produced. Therefore, the potato grown have almost no genetic variation. Once a pathogen infects the potato plants, all potato plant will die to the pathogen since the potato

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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)

Secondary ecological succession, since there was plants and an ecosystem on the hillside before the landslide

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

The soil nitrogen content drops in the first 2 years after the landslide. This is because plants are killed in the landslide. Less plants are decomposed to form nitrogen compounds in the soil. The soil nitrogen content then rises from 2 years after the landslide to 20 years after landslide. More plants die and be decomposed to form nitrogen compounds 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)

After 2 years of landslide, herbaceous plants have a larger proportion of species. After landslide, some seeds are still remained. As herbaceous plants grow faster than woody plants, more species of herbaceous plants grow in the first 2 years than that of woody plants. After 20 years, more woody plants grow. As woody plants can out compete herbaceous plants in terms of capturing light for photosynthesis, the number of species of woody plants increase after 20 years and the number of species of herbaceous plants decrease.

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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)

Bats do not depend on vision to avoid obstacles

(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	The conclusion of bats use ultrasound for navigation is based on the experiment results of tested on bats about their ability to avoid obstacles.
Scientists build on the work of other scientists	
Technology has impacts on the development of science	Griffin used the apparatus invented by Pierce to show that bats emit ultrasound, thus can work out the method but use to avoid obstacles

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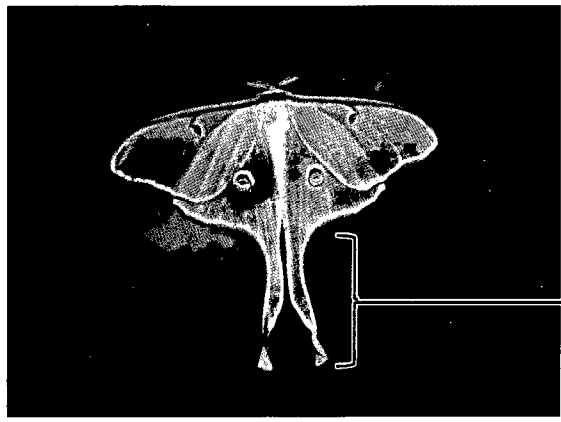
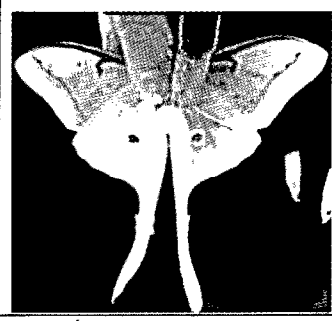
(b) Bats prey on moths. The photograph below shows a type of moth which has long wing tails:



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)

It is concluded that the successful rate of escape does not depend on whether the tail has been cut or not. To show that the successful rate of escape is only dependent on the length of the wing tail, whether the wing tail has been cut or not.

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

Treatment	Conclusion
A and C	The shorter the wing tail length, the lower the successful rate of escape
A and D	The longer the wing tail length, the better the disturbance to ultrasound, the higher the successful rate of escape

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

It is concluded that the wing tail can disturb the ultrasound emitted by bats, such that the bats cannot detect the position of the moths and help moths to escape. Longer wing tail cause more disturb to ultrasound and the higher rate of escape.

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

The longer the wing tail, the easier for moths to survive as it disturbs ultrasound more and prevent bats from eating them. Due to natural selection, the moths with a longer wing tail has a higher survival rate since they are less vulnerable to being eaten. The moth with long wing tail will be able to survive and pass the desired long wing tail factor to the offsprings. The long wing tail moths will become the dominant type and moth are evolved to long wing tail.

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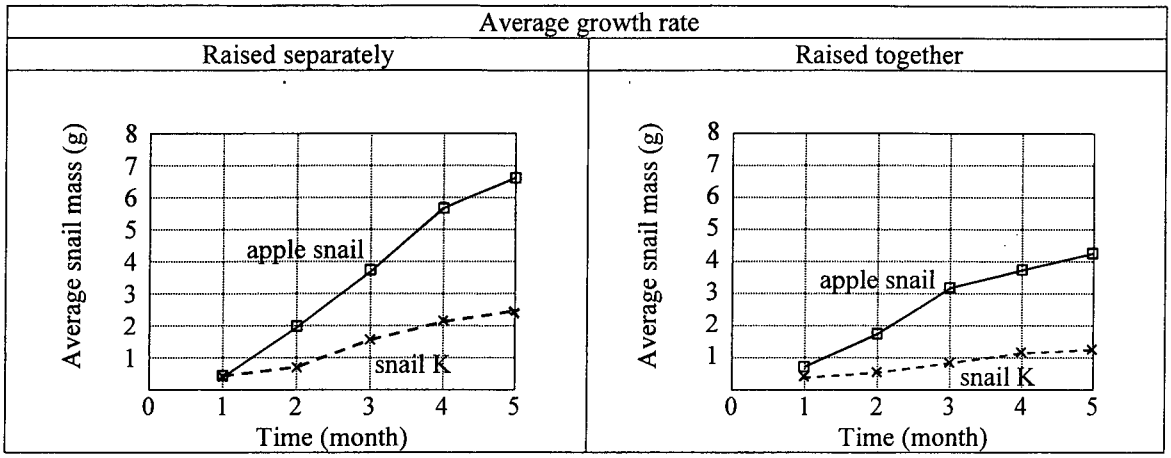
9. The apple snail originates from South Africa. It was first imported to Asian countries for human consumption. However, it escaped to the local wetland habitat. Below are data regarding the average growth rates of apple snail and a local snail species K when they were raised separately and raised together:



(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)

When apple snail and snail K are raised togethr, both the averge growth rate of apple snail and snail K drops, with snail K dropping a layer percentage. Both apple snail and snail K have a similar niche, causing competition when raised together. The perentge of growth of apple snail is still large than that of snail K even when they are raised togethr. Apple snail outcompete snail K when they are placed together. When apple

(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)

Since apple snails consume mostly buds and young leaves of plants, the survival rate of young plants will be much lower. The population of the plant will significantly drop since the young plants are unable to grow and develop into new plants. The survival rate of young plant is lowered, causing adverse

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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)

The imported species have a much higher reproduction rate than the local species.

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

Disposing imported species which are not killed and still alive to the wild habitat in Hong Kong.

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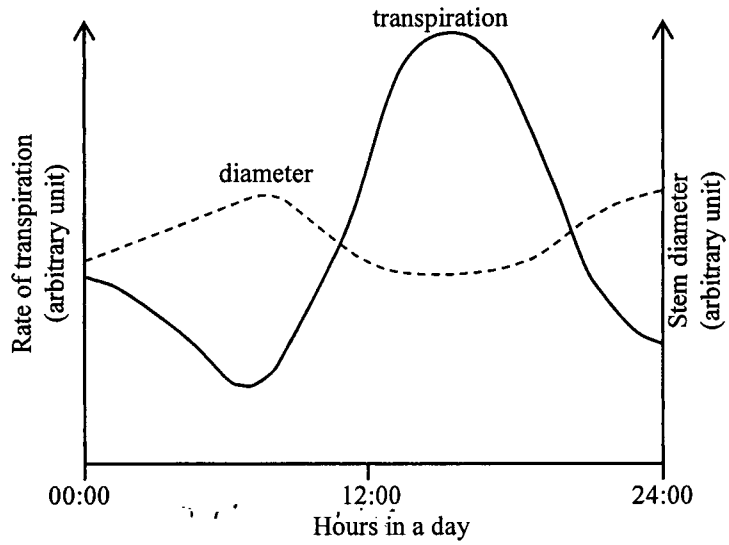
10. The graph below shows the change in the rate of transpiration and the change in stem diameter of a plant over 24 hours:



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

The higher the transpiration rate, the lower the stem diameter

(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)

For transpiration to occur, the leaf mesophyll cells draw water from the xylem vessels. The higher the transpiration rate, the lower the diameter of the xylem vessels, thus the stem diameter, the lower the rate of water loss, thus prevents dehydration.

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

Xylem vessels do not have cell plates between cells. This allows water to flow and to be transported freely with low resistance along xylem.
Xylem vessels are dead, lignified cells without any cytoplasm. This allows transport of water with low resistance and freely.

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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)

Organisms may have genetic disease caused by a defective allele in the genetic material of the organism. The allele causing genetic disease are usually recessive alleles. Usually, individuals having a genetic disease always have a defective phenotype, causing them having a lower survival and reproduction rate than normal individuals. Individuals are often be regarded by natural selection. Therefor, due to natural selection, healthy individual have a higher survival and reproduction rate. If the allele of genetic disease is dominant alleles, according to the law of inheritence, the majority of the offsprings will have genetic disease. Due to natural selection, the majority will have a lower chance of survive and reproduction. The species cannot continue its population from generation to generation. Due to natural selection, genetic disease are often carried by recessive alleles, such that the population can be maintained and the majority of the population can survive and reproduce continuously. Pure-bred pets have a higher risk of

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suffering genetic diseases than the hybrid-pets. The alleles responsible for genetic disease are usually recessive, but the parents of For pure-bred pets, they are usually reproduced by crossing close relatives of the pets. For hybrid-pets, the reproduction are usually crossing non-relatives, which have an larger genetic variation. Since crossing of relatives is performed to reproduce pure-bred pets, the genetic variation of the offsprings and the parents are less. The chance of having the defective allele is higher for the parents of pure-bred pets. Therefore, the chance of the offspring having two recessive defective allele is higher, causing the higher chance of pure-bred pets having the genetic disease. For hybrid-pets, the reproduction of offsprings involve a fusion of more genetic variation gametes. The chance of the offspring having two recessive defective allele is smaller, and the chance of having genetic disease is smaller. Therefore, pure-bred pets have a higher risk of having genetic disease than hybrid pets.

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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.

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

2. 補充答題紙不可撕開使用。
Do not tear the supplementary answer sheet apart.

5.a. capillary network. The glucose content will then drop. Therefore, vessel A has a lower glucose content than vessel B.

5.b. on the surface of the air sac. Oxygen inhaled will be less able to diffuse into the blood vessels, as the water film which is used for dissolving oxygen is absorbed by the dust deposit. This causes the patient to have lower gas exchange rate.

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試題編號 Question No.

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1. 每題另起新頁作答。
   Start each question on a new page.
2. 補充答題紙不可撕開使用。
   Do not tear the supplementary answer sheet apart.

6.e. plants have very little genetic variation and all are vulnerable to the pathogen. Most of the potato will die.

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Start each question on a new page.

2. 補充答題紙不可撕開使用。
Do not tear the supplementary answer sheet apart.

9.a. snails escape to the habitat of snail K, the population of snail K will drop, since apple snails outcompete snail K in resources, and the growth rate and reproduction rate of snail K will drop significantly, causing a drop in population of snail K in long term.

9.b. effects to the wetland habitat. Apple snails consume wetland plants at a high rate. The plants may be eaten before they can successfully ~~pe~~ reproduce, causing the reproduction rate of wetland plants lower than the consumption rate of wetland plants, and the abundance of wetland plants will decrease.

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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.

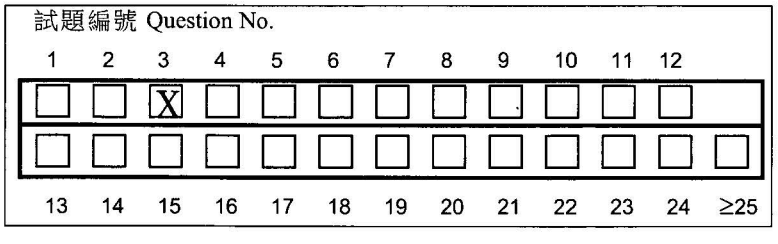
(3) Write on both sides using each line. Do not write in the margins. Answers written in the margins will not be marked.

(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



由考生填寫 To be filled in by the candidate	
試題編號 Question No.	1
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試題編號 Question No.

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

1.a.i. (1). From day 24 in cycle I to day 3 of cycle II, the oestrogen level decreases gradually and reaches the minimum at day 3 of cycle II. During this period of time, in the ovary, degeneration of yellow body occurs. The oestrogen secreted by yellow body decreases as yellow body degenerates

(2). From day 5 to day 11 of cycle II, the oestrogen level rises gradually. Since FSH is at a high level, follicle are stimulated to develop and secrete oestrogen. The oestrogen level will then rise.

ii. (1). From graph 1, when oestrogen level decrease, FSH level increase. When oestrogen level increase, FSH level decrease. From graph 2, when additional injection of oestrogen is applied, the oestrogen level remains high while the FSH level is lowered and keeps steady. Therefore, it is conclude that oestrogen inhibit the secretion of FSH.

(2). The synthetic oestrogen in the contraceptive pill inhibit the secretion of FSH from the pituitary gland. Since the secretion of FSH is inhibited, the level of FSH

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in blood is lower than normal. Follicles in the ovaries cannot develop. As follicles cannot develop, ovulation will not occur, thus fertilization cannot occur. Pregnancy is prevented.

b.i. Since long period of exercise is done, aerobic respiration takes the greatest proportion of respiration throughout the exercise. From the graph, after 110 minutes of exercise, the cardiac output of the dehydrated group is lower than that of the hydrated group. This means after long time of exercise, the amount of oxygen reaching the dehydrated group's muscle is lower than that reaching the hydrated group's muscle for respiration to provide energy for exercising. This means energy for exercising in the dehydrated group is lower than that of the hydrated group. The speed of cycling of the dehydrated group will therefore be slower than that of the hydrated group under constant resistance.

ii.(1). The stroke volume

(2). Since the dehydrated group do not take in any water while they are losing water at a similar rate as the hydrated group, the volume of water in blood of the dehydrated group

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is less than that of the hydrated group. Since the blood volume is lower, the stroke volume of each heart beat will be lowered.

iii. In order to maintain a similar cardiac output when the stroke volume decrease, the heart beat rate should be higher. When For both the hydrated and dehydrated group, the energy consumption is similar. Therefore, the amount of oxygen needed for respiration is also similar. The cardiac output of both group should be similar. Since the stroke volume of the dehydrated group is lower, to achieve a same cardiac output, the heat beat rate should be higher. The increase in heart beat rate will therefore be greater.

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4.a.i. Suspect 2 is most likely to be the criminal among the three suspects, as suspect 2 has all DNA bands same as the body fluid from the crime scene, which is left by the criminal

ii. For different individuals, the number of repeats at the non-coding region of the VNTR is different. When the DNA samples ~~one by~~ of the suspects are being cut by the same restriction enzyme, the lengths of the DNA fragments formed is different. During gel electrophoresis, the DNA fragments move towards the positive terminal. The longer the DNA fragments, the slower the moving speed, thus a shorter distance travelled in a certain time period. Since the DNA fragments of the suspects have different length, the DNA fragments move to different positions under gel electrophoresis, thus showing different DNA fingerprints of the suspect.

iii.(1). Ryan's comment is correct. In blood stain, there are not only red blood cells, but also other cells that have nucleus, such as white blood cells. Those cells ~~for~~ with nucleus can be used for DNA fingerprinting.

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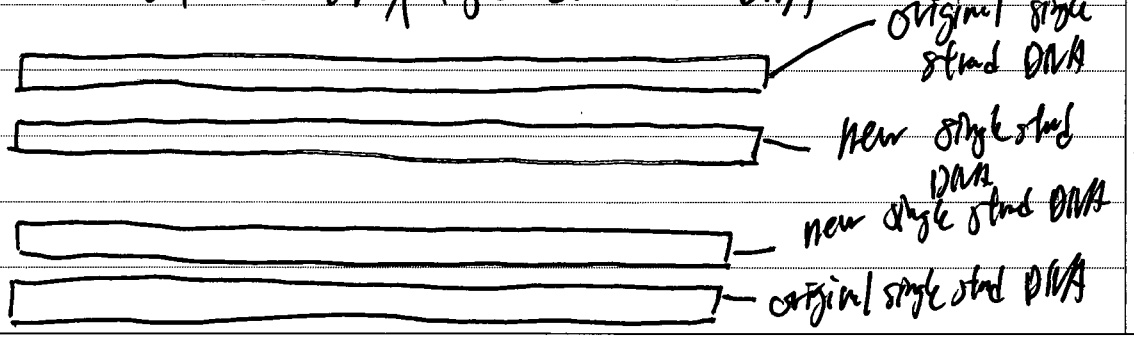
iv. C2). The comment is disagreed.
Haploid gamete cells are produced from meiotic cell division of diploid cells. Therefore, all haploid cell have the same genetic information as the mother diploid cell, no matter to the independent assortment of chromosomes during meiotic cell division. In a sample of semen, all the genetic material inside cell of the haploid cells are same as that in the diploid cells. Therefore, when semen is used for DNA fingerprinting, the results will be the same as the results of using haploid cells for DNA fingerprinting, if the person is the same person. Therefore, the DNA fingerprints of haploid cells is same as that of diploid cells, thus the comment is disagreed.

b.i. Cooling down the mixture and allowing primers to attatch on the 2 ends of single-stranded DNA

ii.



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iii. If primers of fewer base pairs are used, the chance of the primer that are complementary to one of the portion of ~~DNA~~ bases in the middle but not the ends of the DNA strand of the sample is higher. The DNA may replicate ~~in the middle~~ from the middle of the DNA strand instead of from the ends of the DNA strands, producing DNA products which are different in length.

iv. Agrobacterium is a bacteria, in which it has plasmids. The Agrobacterium can be easily transformed by recombinant DNA technology.
Agrobacterium is a bacteria in soil which will easily infect the crop cells. The gene it can be easily integrated into the genome of the crop cells by infecting the crop cells with the transformed ~~be~~ Agrobacterium.

v. For the transgenic crop, it can express gene in such that the crop is able to produce the protein that is toxic to insects that damage the roots of the crop by translation. Therefore, the ~~not be easily damaged~~ transgenic crop will not be easily damaged by those insects. However, the non-transgenic crop are not able to prevent

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three insects from damaging. The transgenic crop has a higher survival rate than the non-transgenic crop, thus having higher yields.

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