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Level 1 Exemplar 1

2023-DSE
BIO
PAPER 1B

B

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2023

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.

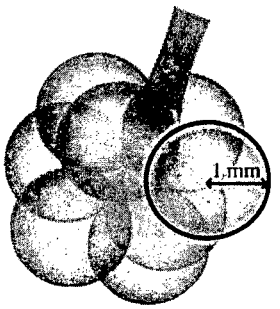
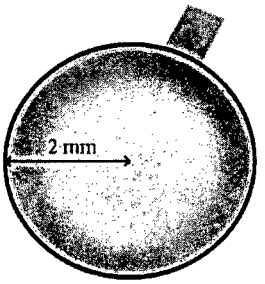
(8) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

* 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)

12.6 × 8 = 100.8

(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)

A smaller air sacs can seprate the fresh air and the dust into the lungs

(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.

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)

The lens will be less elastic

(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)

Root cell.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

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

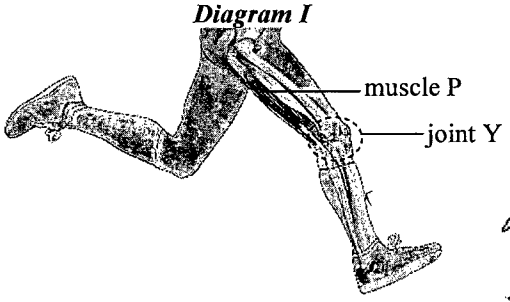
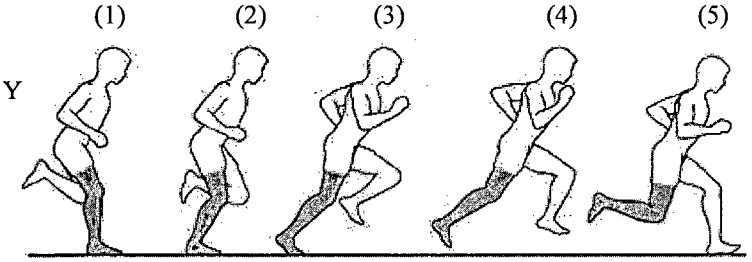


Diagram II



(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)

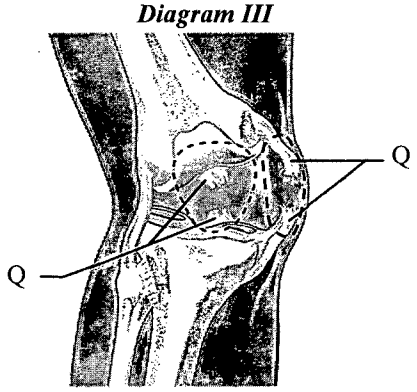
Muscle P will change from contract to relax.

(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) it ; contracts

(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)

It is not connect with the joint. It cannot move normally and the end of the bone cannot reach to each other Therefore, the person cannot walk.

Answers written in the margins will not be marked.

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Answers written in the margins will not be marked.

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)

Mosquito

(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)

It often rain and the regions are near the forest. There will be accumlated water after the rain, which give the mosquito oppuntunity to reproduce. Forest is a suitable habitat for the mosquito to reproduce.

(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)

White blood cell can kill the virus that infect in our body.

(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)

There're no injection treatment for the DENV. It cannot stimulate the memory cells to remember the virus.

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

Spray the pesticles to the grass.

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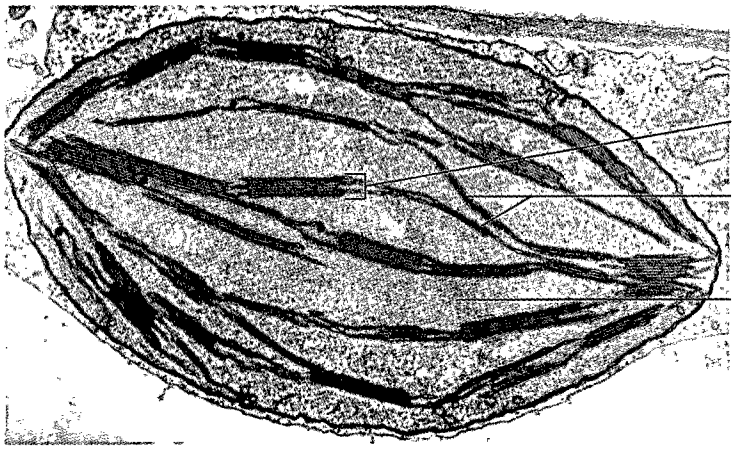
Answers written in the margins will not be marked.

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



chlorotin

(a) Label structure Y. (1 mark)

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

X contain the green pigment. which can absorb the sunlight to do the photosynthesis.

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

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Answers written in the margins will not be marked.

(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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Go on to the next page

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)

Cone cell is aim to detect the bright colour.

(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)

Men only have one X-chromosome and women have two X chromosome. Since the X-chromosome is recessive. If the women are heterozygous. The X chromosome might be masked. However, men only have one X chromosomes. Therefore, the red-green colour blindness allele is in men's X chromosomes is higher than in women's.

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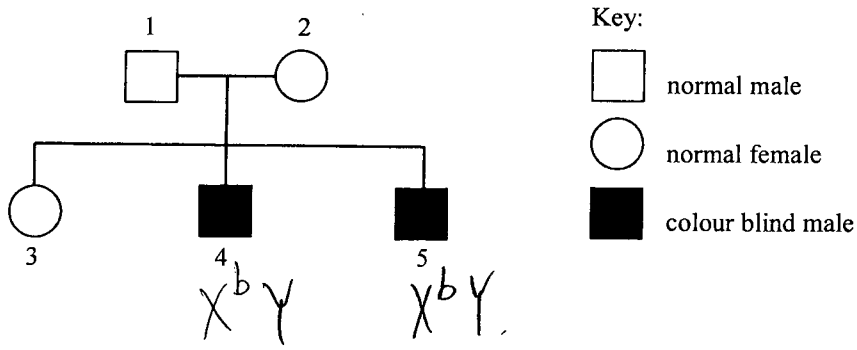
(c) The pedigree below shows the inheritance of red-green colour blindness in a family:



X^bY X^bY

(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.)

a genetic diagram of the newborn being girl with red-green colour blindness possibility

parents = 1 × 2

gametes = X^B Y × X^B X^b

phenotype = X^BX^B X^BX^b X^BY X^bY

0%

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

Identical twins. They got the same phenotype.

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Answers written in the margins will not be marked.

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)

Both of the frog type eat small insects. Therefore, they will have competition about the food. Also, both of them live in woodland and shrubland. Therefore, they will have competition about the space. Since greenhouse frog size is bigger than Romer's tree frog. Romer's tree frog might not be won. Therefore, greenhouse frog is a threat to the Romer's Tree frog.

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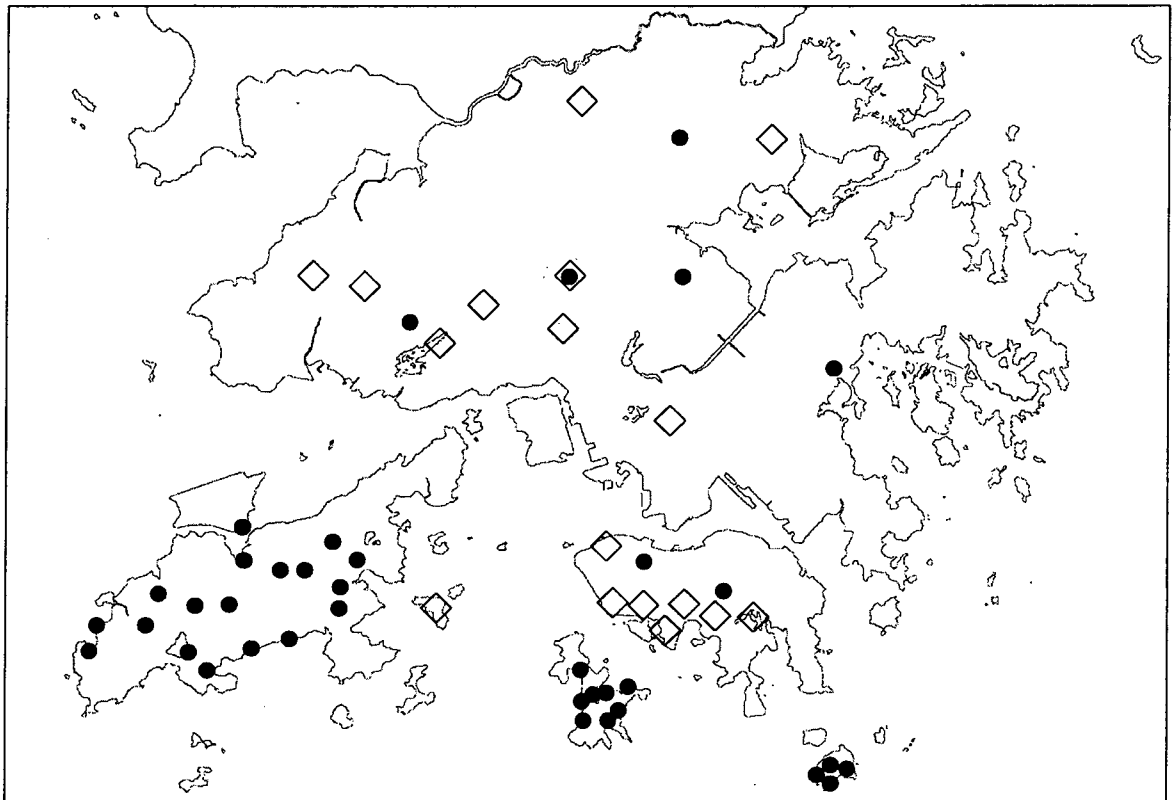
Answers written in the margins will not be marked.

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



Key:

● habitats of Romer's Tree Frog

◇ locations where greenhouse frogs were spotted in the survey

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

Most of the romer's frog 's habitats are not the same location of greenhouse frog. They cannot meet.

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

Put both of the frog type in one lab and observe their action toward each other.

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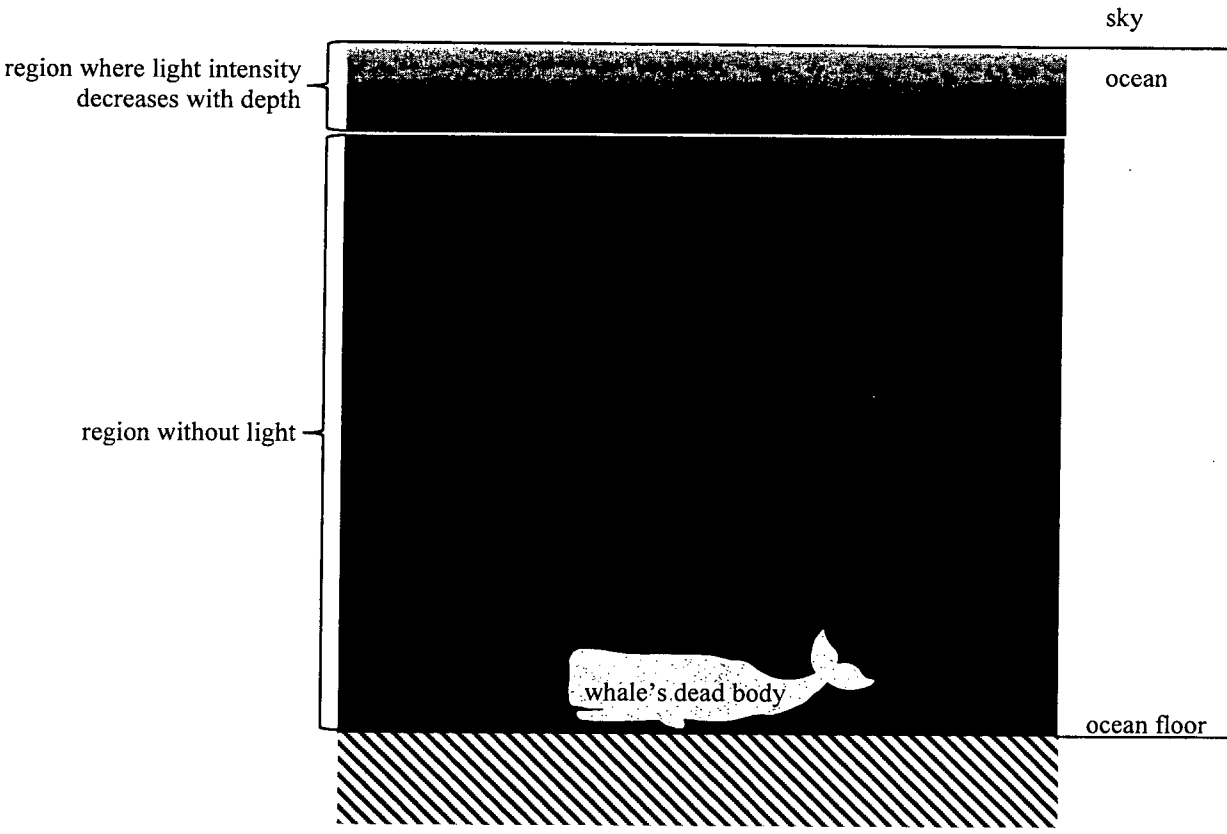
Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

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)

decomposer

(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)

Ocean floor contain some soil or dust. The decomposer can absorb the dead body of the whale 's nutrients and do respiration.

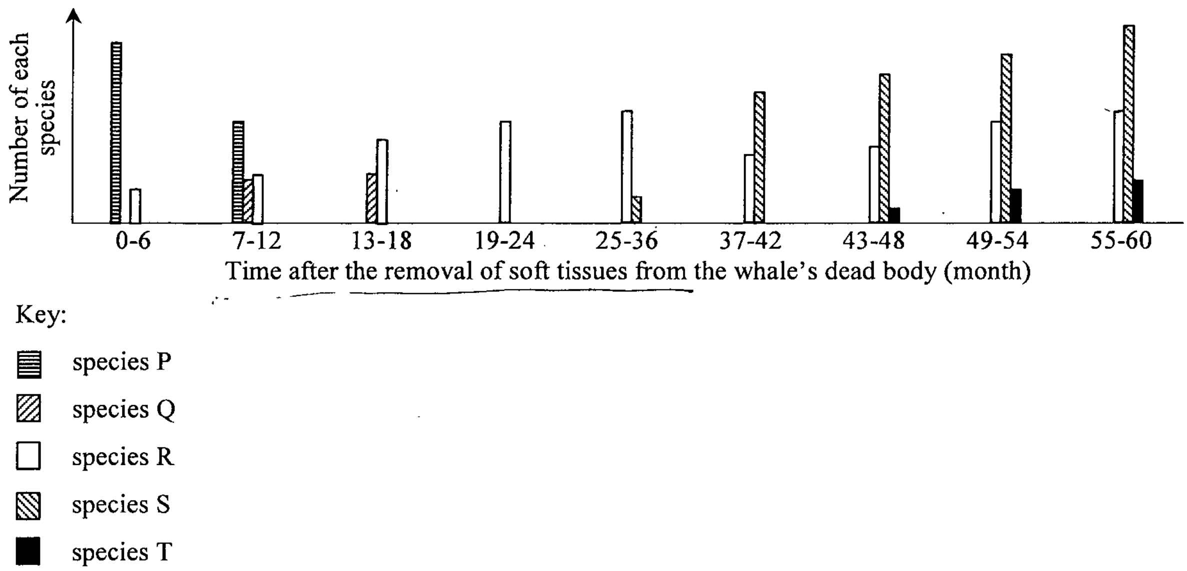
(b) What is the role of the organisms that feed on the soft tissues of the whale's dead body in the cycling of materials? (1 mark)

~~decomp~~ do ~~decomposition~~ ~~bacteria~~ ~~bacter~~ decompostition bacterium.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

(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:



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) ~~Number of species might ... disappear ... the month~~	In the month 25-60 Species Q appear and feed on the whale's lipid. Species Q didn't appear before 25 months.
(ii)	In month 0~12, Species appear. and start to feed on the whale's lipid.

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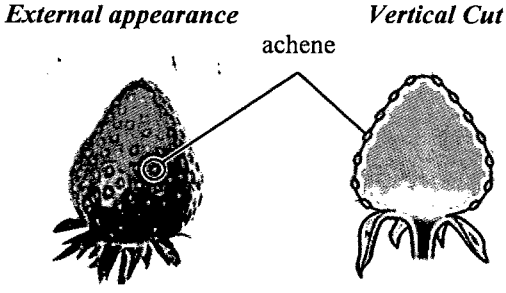
Answers written in the margins will not be marked.

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.		

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

(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	Treatment 1 is achenes remained intact. The strawberry grow normally in day 20. but Treatment 2 is not enlarge
2 versus 3	All achenes were removed in day 1 in treatment 2 the strawberry doesn't enlarge. In treatment 3 the achenes was remove but spray in auxin. In the strawberry is enlarge but not in normal size.
1 versus 3	Treatment 1 grows normally in day 20. Treatment 3 is enlarge but not a normal size.

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

The achenes contain auxin to make the strawberry enlarge.

(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)

Treatment 4 can be observed if one part of auxin is removed and the strawberry is enlarge

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

auxin will avoid the uniform light. once there are light in right. The auxin will move to the left. The plant will grow while bending to left.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

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)

mouth. small intestine.

(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)

33.7 kg.

(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)

His blood protein level will be lower than normal healthy boys of same age. Since he daily absorb not ~~enough~~ enough *protein.

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

~~protein provide~~ ~~contain~~ of tissue fluid made of protein. Therefore, His absorb not enough protein lead ~~to~~ his tissue fluid cannot transport ~~well~~. Protein is to increase the muscles ~~on~~ and repair the tissues. If there are not enough protein. The muscle cannot contract ~~well~~ properly. The tissue fluid will accumulate in his feet and not be able to transport to his whole body.

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Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

(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)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

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)

There are some ~~concern~~ concerned of the scientist. First of all, ~~although reproduce asexually is asexually~~ Due to the global warming, many crops might not be able to adapt the temperture of the global. They might ~~be~~ die. Also, there might be some disease in the crops like virus and bacteria ~~to~~ infect. Doing asexually reproduction might lead the disease to the offspring. The crops will die. Due to the global warming. Some ~~so~~ crops might only survive under a specific temperture like in winter. ~~G~~Global warming will lead the ~~temperture~~ temperture gets higher. Due to the adaptability of the crops. the survival oppu~~r~~tunity ~~is~~ will get lower. The ~~is~~

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Answers written in the margins will not be marked.

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.

2023 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

由考生填寫 To be filled in by the candidate	
試題編號 Question No.	1
	2

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.

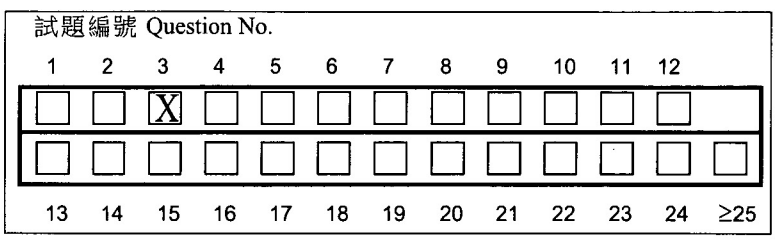
(3) Write on both sides using each line. Do not write in the margins. Answers written in the margins will not be marked.

(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
X											

13	14	15	16	17	18	19	20	21	22	23	24	≥25

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

寫於邊界以外的答案，將不予評閱。
Answers written in the margins will not be marked.

(a)(i) ovary. When the oestrogen gets too high, the yellow body will be detected while degenerating. Then, the yellow body will release FSH to the oestrogen from release too much. However, looks like Susan's FSH is much higher than normal range. Her yellow body might be released too many. While the yellow body is degenerating. The FSH is released too much. That's why it is higher than normal range. Too much FSH will press down the oestrogen level. Which lead Susan's oestrogen level is lower than normal range.

(ii) The degenerate yellow body will release the FSH to control the level of oestrogen. Once the oestrogen level gets too high, the receptor in yellow body will detect it. Which will lead it release the FSH to press the level down. Which is the negative feedback of the oestrogen and FSH.

(iii) Susan's FSH is too much. Which will release more than one follicle. It will

寫於邊界以外的答案，將不予評閱。
Answers written in the margins will not be marked.

寫於邊界以外的答案，將不予評閱。
Answers written in the margins will not be marked.

試題編號 Question No.

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13	14	15	16	17	18	19	20	21	22	23	24	≥25

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

have be more days. [illegible]

iv) FSH. This hormones will stimulate the follicle. to have ovulation. The level of the hormones should be increase..

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Answers written in the margins will not be marked.

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試題編號 Question No.

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13	14	15	16	17	18	19	20	21	22	23	24	≥25

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

寫於邊界以外的答案，將不予評閱。
Answers written in the margins will not be marked.

1b i) ~~The muscle need to detect the~~ The receptor in muscle needs to detect the ~~heart~~ movement ~~therefore, than~~ so that the muscle can do anaeobic respiration to realease energy while the volunteers are running on the treadmills. The muscle needs to squeeze faster and stronger. The blood flow can flow faster ~~when~~ to the whole body to transport the oxygen.

ii) 1) The skin blood flow in exercise group decrease more and faster than resting group. Then their body temporture reach from 37.0°C to almost 38.0°C. the skin blood flow raise lesser than rest group.

skin blood flow

ii 1) The exercise group's ~~body temperature~~ decrease from 20 to almost 0. ~~when that because~~

2) They run on treadmills.

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Start each question on a new page.

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iii) In resting group. Their body temperture raise from 36.5°C to 37.5°C taser than exercise group. That's because the room they stay in's temperture is higher than human average temperture (37°C). Therefore, Although they haven't exercise. The room will evaporte their body to sweat and increase their temperture.

Another different, the blood flow of resting group when it reaches 37.5°C. the blood flow. stay in 100. However exercise group only stay in 60. That's because in a high temperture room, the blood will increase its temperture. Therefore, even if they haven't exercise. their blood flow will remain high to blance the whole body temperture.

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Start each question on a new page.

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Answers written in the margins will not be marked.

2a) 7) In graph II, the frequency of seafood consumption the highest is > 9. which ~~mean~~ mean the seafood contain a lot of ~~toxic chemical~~ pollutant X

In graph ~~graph~~ once the seafood in polluted by pollutant X and human ate it. Human will also polluted. Then the pollutant X is passed to the baby by the breast milk.

i7) 1) metal ~~waste~~ waste pollution, ship oil and the plastic material.

2) milk ~~is~~ can be get by cow. if the cow is ~~infec~~ infected. Human drink them will be infected as well

ii7) pour the metal wate to the river. throw the rubbish to the sea. especially the plastic bag.

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2b7) the original seawall has 4 species and the tiles has 17 species in. The higher crevices, the more species will be found on the surface.
The 2 only have 8 species. and 3 has 13.

ii)1) so the rubbish in surface can be struck in the eco-engineered tiles. Avoid the rubbish like plastic bag will disturb the species while swimming. and accidently kill them

2) let the small fish hide inside the tile to avoid got swing away by the wave.

iii)1) how wide between each of the crevices

2) the of the fish can reproduce

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Start each question on a new page.

In the ~~seal~~ seawall and it to the seawall can protect the 0 species from threats.

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Level 1 Exemplar 2

2023-DSE
BIO
PAPER 1B

B

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2023

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.

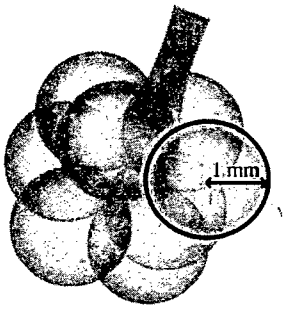
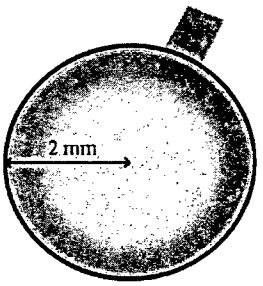
(8) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

* 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)

$50.3 \times 2 = 100.6\ (mm^2)$

(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)

Because having a smaller air sacs can shorten the length for diffusion for the water film which is more faster than the bigger air sacs. Also, smaller air sacs are facilitate the material exchange from blood which bigger air sacs is slower than the smaller one.

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

Air sacs are specialised at tissue level for gas exchange as during gas exchange, hydrostatic pressure occurs which are only suitable to use at tissue level for gas exchange.

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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)

guard cell.

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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

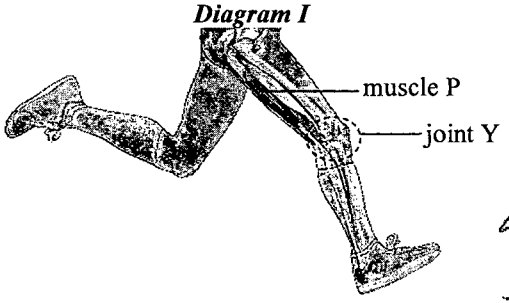
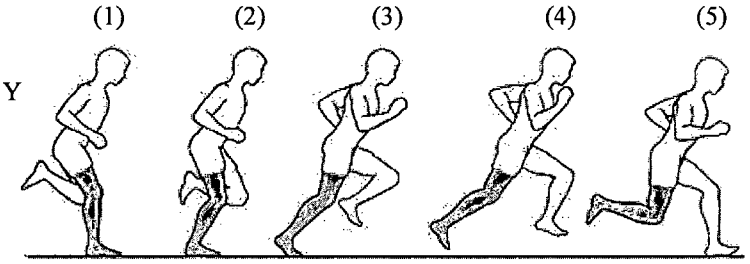


Diagram II



(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)

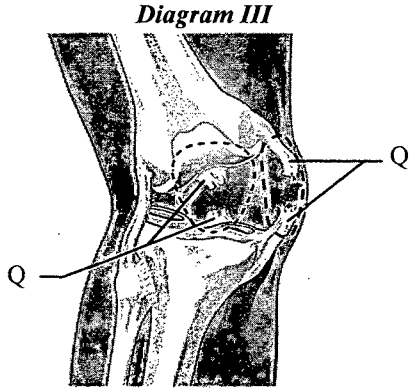
Stage 5, muscle P contracts.

(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) muscle P contracts.

(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)

when structure Q was torn, which means that ~~the lower part of the~~ when muscle P contracts, it cannot bend its leg, as the Q (tendon) are inelastic, so Q cannot attach to the bones and affect people to walk.

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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)

Vectors.

(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)

Since the weather in tropical and subtropical regions were humid, which attracts more vectors to go there, and have stagnant water in the breeding and hiding place which they can survive and produce more offspring due to the hiding place and lead to a higher risk of contracting dengue fever.

(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)

When there are bacteria ~~or~~ enter in, phagosytosis occurs. Antigen will attach to antibody which forms a big clumps, which use enzyme to digest the bacteria. Also, lysis is also one of the types of white blood cells that can aid the recovery.

(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)

Because antigen in the body can only last for a short period of time, thus the other subtypes of DENV due to mutation which becomes different type of sickness that antigen in the body were not the same as the DENV and cannot protect.

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

to remove breeding or hiding place from the mosquito, to remove the stagnant water in the breeding place.

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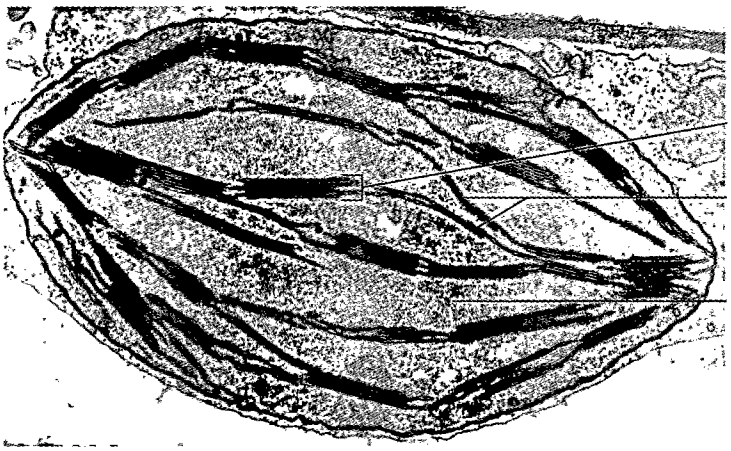
5. An electron micrograph of a chloroplast is shown below:



(a) Label structure Y. (1 mark)

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

Calvin cycle is the process which takes place at X. The energy conversion is the reducing of 3-C compound.

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

Z belong to the anabolic reaction.

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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)

Because cone cells in the retina is not functioning, which red-green colour blindness is different from others

(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)

As the ~~Men~~ number of men of red-green colour blindness are more than the women which men have a more inherited disorder due to defective functioning of the cone cells in the retina. But if they have total colour blindness which means cone cell and rod cell were both not functioning, ~~which~~ and there were only a few people that both of the receptors were not functioning

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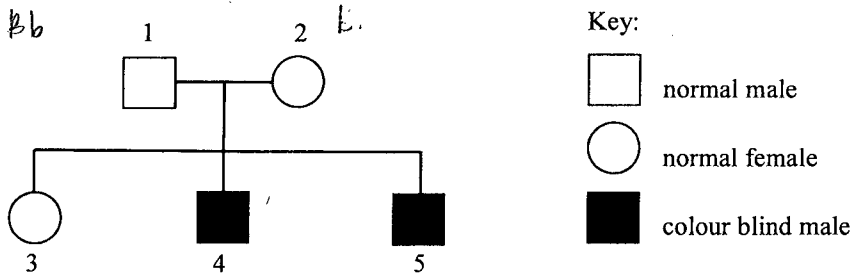
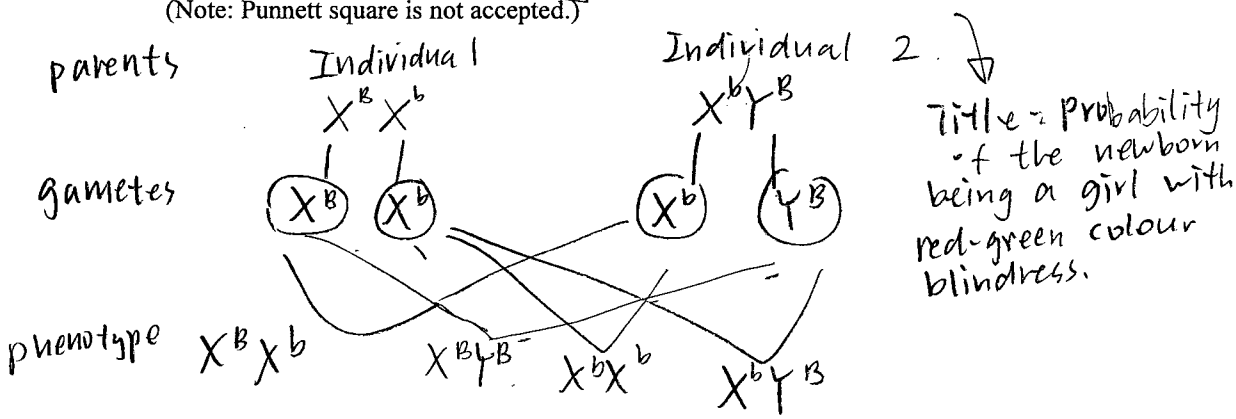
(c) The pedigree below shows the inheritance of red-green colour blindness in a family:



(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.)



∴ The probability of this newborn being a girl with red-green colour blindness is 0.

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

they are identical twins because as ~~Red-green~~ colour blindness of the allele were recessive, so both of their allele must be colour blindness.

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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)

-ve

For the breeding site and habitat, Romer's Tree Frog are mostly located on Wetland, small and temporary water bodies but Greenhouse Frog ~~is~~ located on Woodland, urban park, agricultural which ~~are~~ resulted that Romer's Tree Frog are mainly located on the humid region but Greenhouse Frog usually live in a dry region which can found many in local areas. Also, Greenhouse Frog usually eat small insects and snails but Romer's Tree Frog only eat small insects which Greenhouse Frog can have more food and grow taller and rapidly and the size of Greenhouse Frog is bigger than the Romer's Tree Frog.

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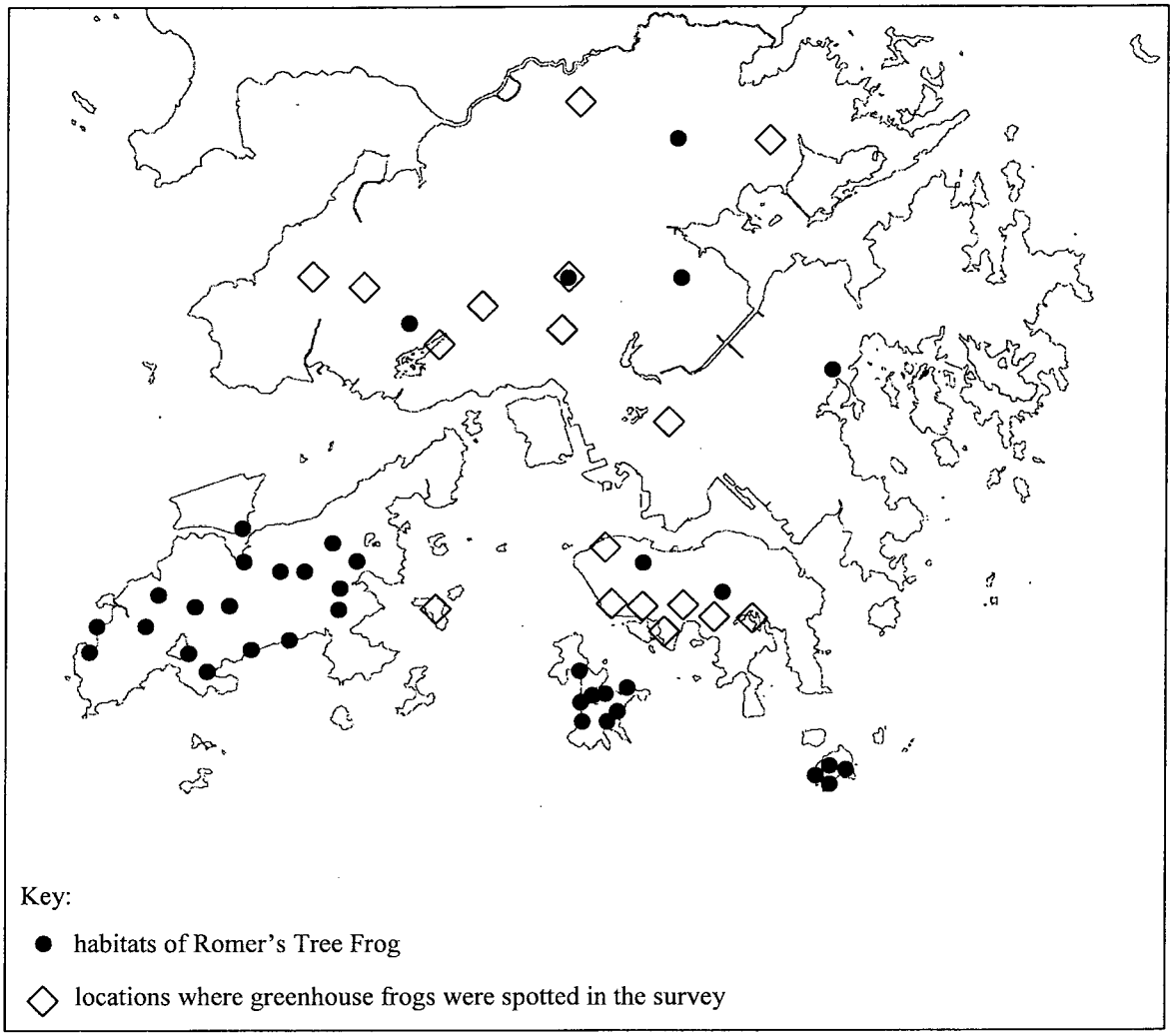
(b) The map below shows the distribution of the two frog species in Hong Kong:



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

Because the number of Romer's Tree Frog is more than the greenhouse frogs.

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

Collect the actual number of Romer's Tree Frogs and greenhouse frogs. Investigate the habitats of Romer's Tree Frog and greenhouse frogs and compare with them and see how ~~Romer's tree~~ greenhouse Frogs post a threat to the Romer's Tree Frog.

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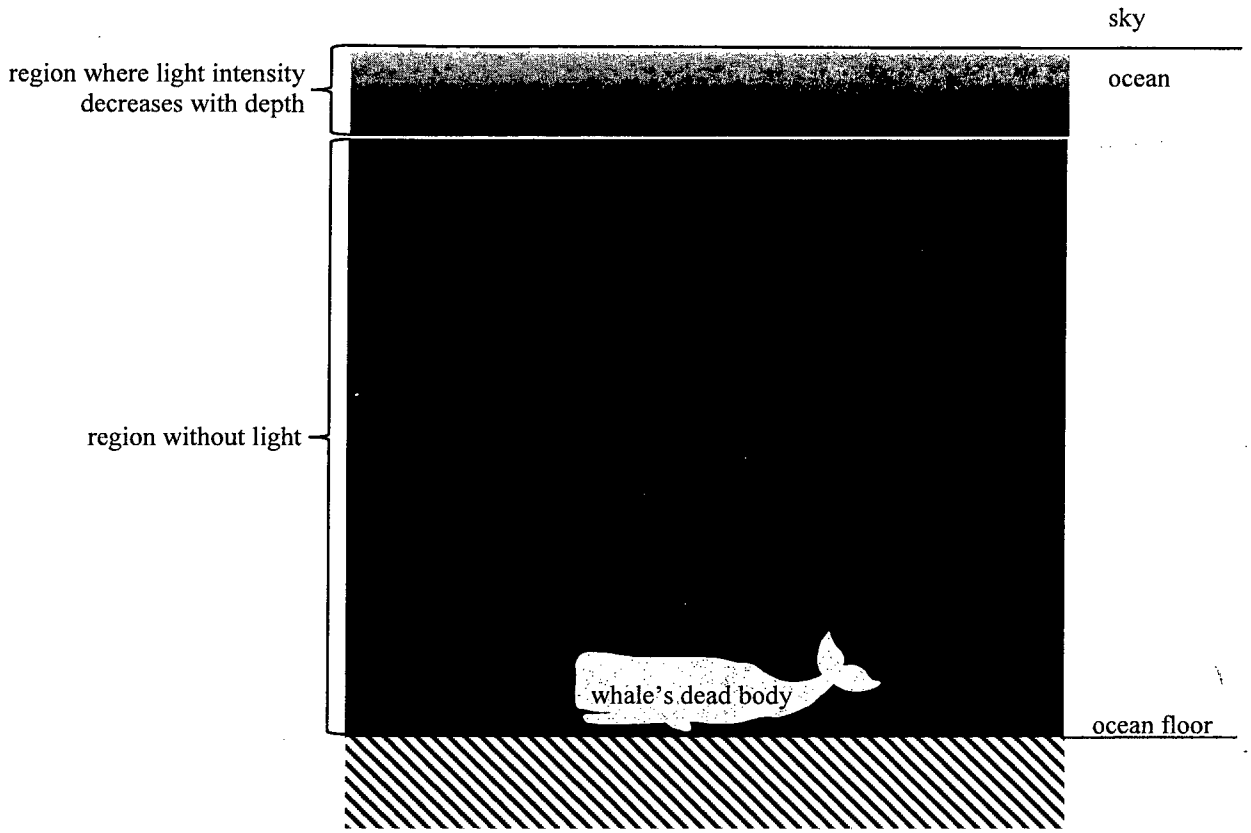
8. When whales die, their dead bodies sink to the bottom of the ocean. The whale carcasses support a unique community known as whale fall community. The diagram below shows different regions of the ocean and the location of a whale's dead body:



(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)

heat energy.

(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)

~~whale's dead body~~ Decomposer will decompose whale's dead body and turn the decompose into annominum compound for nitrification to do nitrogen cycle.

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

decomposition.

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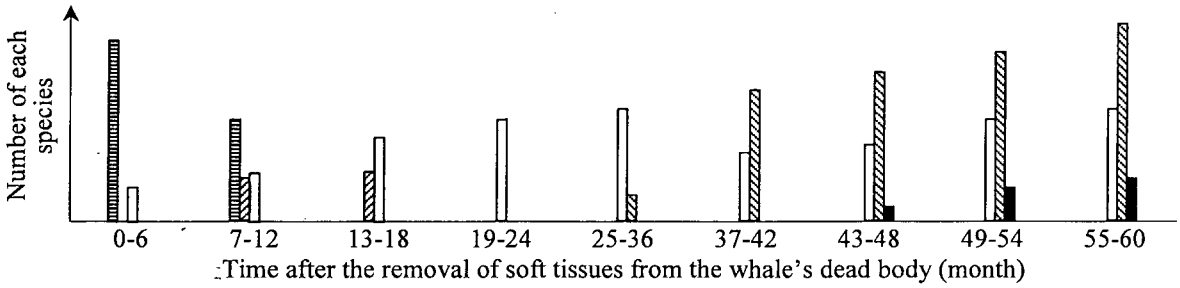
(c) After the soft tissues of the whale's dead body have been consumed, another group of organisms start to feed on the remaining nutrients from the skeleton. For an average-sized whale, it could have 2 000 – 3 000 kg lipid stored inside its skeleton. The bar chart below shows the abundance of different 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) Secondary succession, more nutrients and more species which increase the biodiversity.	number ~~species~~ of species P increase from 37-60 months. And the ~~no~~ number of species of species R, S, T also increased.
(ii) Primary succession, ~~the species decrease~~ there were only pioneer ~~com~~community such as grass at first, ~~there were no~~ the species is decreasing.	From 0 – 12, species P were decreasing.

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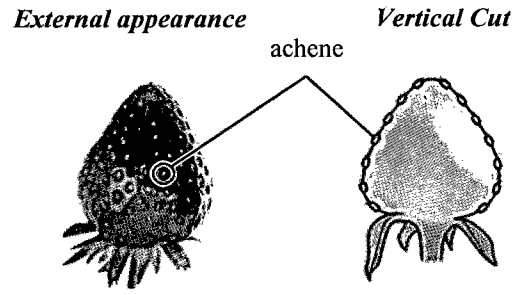
9. The diagram below shows the external appearance of a strawberry and its vertical cut. The achenes found on the surface of the strawberry are the fruits:



(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.		

Answers written in the margins will not be marked.

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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	Achenes remained intact is the essential key to facilitate the growth of the strawberry.
2 versus 3	Regular sprayed with auxins without achenes can also facilitate the growth of strawberry.
1 versus 3	Achenes remain intact and auxin can facilitate the growth of strawberry.

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

Achenes can facilitate the growth of strawberry.

(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)

The advantage of ~~Compared to~~ Treatment 4 can ensure that ~~Achenes~~ is not the upper part or lower part of the strawberry for the growth, it is about the achenes to facilitate the growth and is more accaqurate than 1 and 2.

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

plants, ~~auxins in the~~ when there is a strong light intensity of the plants with auxin in the left hand side, auxin will move to the right side and grow to the right side to facillitate the plant growth.

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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)

mouth cavity and small intestine.

(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

55.0

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)

25 000 g.

(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)

350 (g per 100 g dry weight)

(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)

The blood protein level of normal healthy boys of the same age will be higher than the 16-year old boy relies only on cassava for food. Since the protein of cassava is less than the normal daily food, so blood protein level of normal boy will be higher.

(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)

mitochondria matrix.

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

His blood lactate level will decrease.

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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)

There are some reasons of the increasing yield of the crops due to global warming and the rationale bind the concern of the scientists.

First, if global warming persists, crops from the yield will not have enough water due to the increasing high temperature which crops may fail to produce.

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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.

2023 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

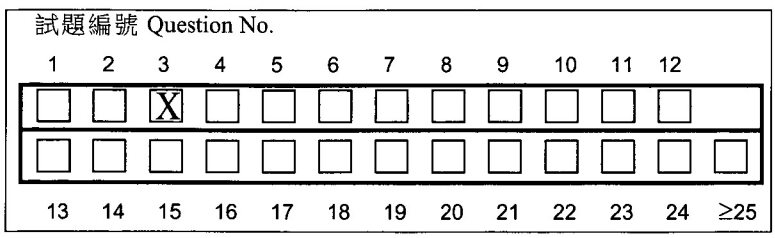
考生須知

(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.	Q 29
	Q 2b
	Q 4a
	Q 4b

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.

Q2ai) First, ~~the~~ as the frequency of seafood consumption increase which increase the concentration of ~~Pollution~~ pollutant X, Furthermore, when the age group of the age is higher which ~~it~~ also increase the concentration of pollutant X. Espically age group in 37-38 got the highest concentration of pollutant X got around 5000 (arbitrary unit) so increasing age and eating seafood consumption more than 9 times a week will further increase the pollutant X that can be accumulated in the human body.

ii 1)

2) Because milk have protein which can easily detect the concentration of pollutant X and see if there's pollutant

iii)

iii) ~~throw rubbish on the floor~~, reclamation, ~~not recycled~~ did not recycle the materials e.g. bottles and throw it to the rubbish bin, ~~with increase~~ fishing, deforestation.

寫於邊界以外的答案，將不予評閱。
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2b i) Compare to treatment 1 and 2, the deduction is tiles with flat surface and increase the number of invertebrate species found on the surface. And it is more than the original seawall surface. Tiles with flat surface can increase the ~~num~~ number of invertebrate species found on the surface.

Compare to the treatment 3 and 4, the deduction is the deeper the tiles with crevices depth installed on the seawall, the higher the number of species is. The ~~deep~~ deeper tiles will increase the number of invertebrate species found on the surface.

ii ① tiles can let the seawall became stronger, which can clearly measure the water level at low tide.

② ~~tiles~~ prevent strong wave energy, and will not easily ~~eee~~ ~~eroes~~ affect due to erosion when there are wave actions.

iii ①. Treatment 2, tiles with flat surface installed on the sea wall.

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iii(2). These requirements are the length of the eco-engineered line. And the number of the species in each eco-engineered tile.

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Start each question on a new page.

4ai) ~~#~~ Have to use the same restriction enzyme to cut the DNA fragment and insert into the plasmid.

ii) The step of IV is to ~~will~~ see that will ~~be~~ plasmid will eliminated by ampicillin. To ensure that the ~~presence~~ Present of the GFP gene, to check that if this GFP will emits green ~~to~~ fluorescence when exposed to ultra-violet light.

iii) Because some of ~~the~~ GFP gene do not emits green fluorescence.

iii) ~~using PE~~ Recombinant DNA.

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4bi) gene therapy

ii(1). rice line W, X and Z

i(2) sample Y have PCR detection for HR gene which HR gene is present.

iii(1) Group 1, because the leaf area with visible injury in 81-100% of group1 is 15, which the the highest number of the group.

(2) rice sample Y because in Gel II there is no PCR detection for HR gene, don't have antigen to protect the leaves from herbicide.

(3) Alough there is more than one rice line with successful insertion of the HR gene, yet the herbicide which have different toxic chemicals will also injured the leaves a lot.

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