HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2020

BIOLOGY PAPER 1

8:30 am – 11:00 am (2 hours 30 minutes)

This paper must be answered in English

GENERAL INSTRUCTIONS

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

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

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

INSTRUCTIONS FOR SECTION A (MULTIPLE-CHOICE QUESTIONS)

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

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

(3) All questions carry equal marks.

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

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

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

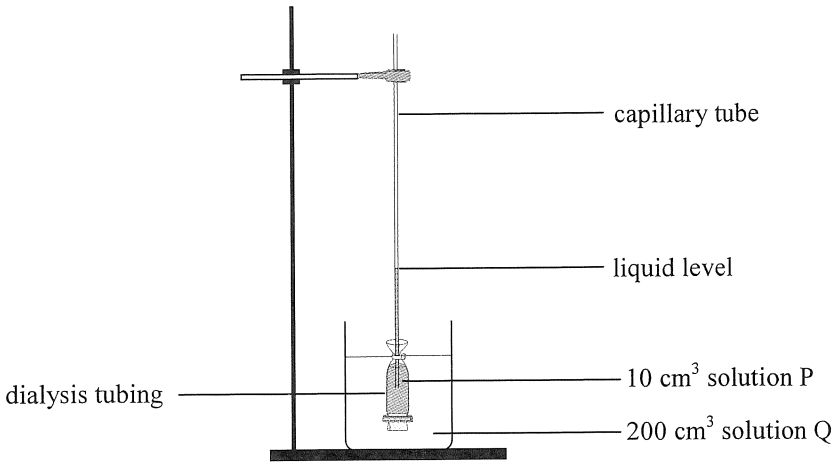
Not to be taken away before the end of the examination session

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

1. Which of the following sub-cellular structures can be found in a prokaryotic cell?

   A. cell wall, ribosome, cell membrane
   B. ribosome, cell membrane, chloroplast
   C. cell wall, cell membrane, mitochondria
   D. cell membrane, chloroplast, mitochondria

Directions: Questions 2 and 3 refer to the diagram below, which shows a set-up for investigating the permeability of dialysis tubing. 10 cm^3 of solution P was added to the dialysis tubing, with one end tied and the other end connected to a capillary tube. The dialysis tubing was then placed in a beaker with 200 cm^3 of solution Q. When solutions P and Q are mixed, a blue colour will be observed.



2. At the end of the investigation, the liquid level inside the capillary tube had risen and only the solution inside the dialysis tubing became blue. Which of the following conclusions can be drawn from the results?

   (1) Solute of solution P can pass through the dialysis tubing.
   (2) Solute of solution Q can pass through the dialysis tubing.
   (3) There is a net movement of water into the dialysis tubing.

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

3. If the investigation is repeated with water instead of solution Q, which of the following results will be obtained?

   A. The liquid level in the capillary tube will not rise at all.
   B. The liquid level in the capillary tube will rise to a lower level.
   C. The liquid level in the capillary tube will rise to a higher level.
   D. The liquid level in the capillary tube will rise to the same level.

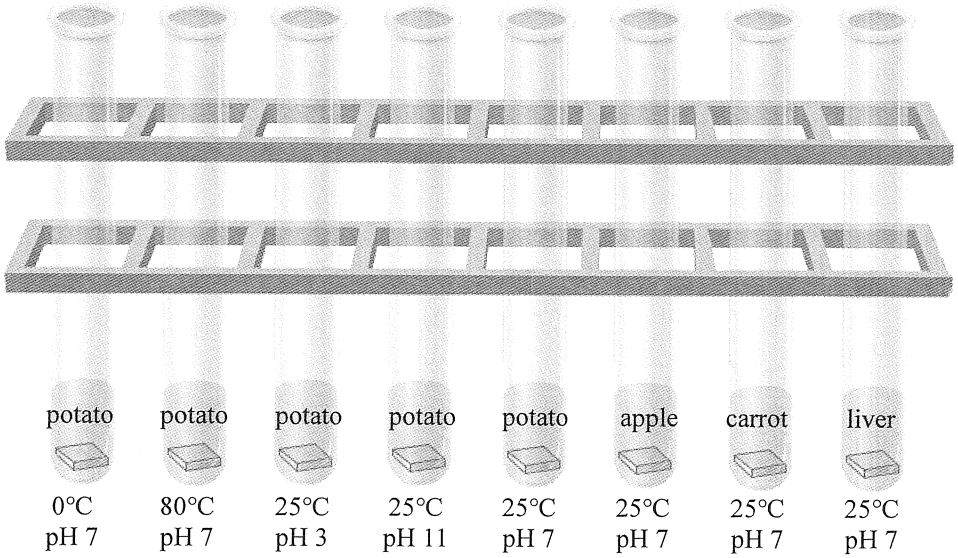
4. Which of the following descriptions of anaerobic respiration in muscles is correct?

   A. It involves glycolysis.
   B. It produces lactic acid and carbon dioxide.
   C. It takes place in the matrix of mitochondria.
   D. It takes place on the inner membrane of mitochondria.

5. Which of the following combinations correctly matches the stages of cellular respiration and the metabolites produced?

	Stage	*Metabolite produced*
A.	Glycolysis	acetyl-CoA
B.	Glycolysis	ATP
C.	Krebs Cycle	NAD
D.	Krebs Cycle	pyruvate

Directions: Questions 6 and 7 refer to the diagram below, which shows a set-up for investigating the activity of catalase in living tissues. Catalase is an enzyme which can break down hydrogen peroxide. Each test tube contains the same amount of hydrogen peroxide solution at the same concentration. A piece of living tissue is added into each tube as indicated below:



6. How many independent variables are being studied in this investigation?

A. 2
B. 3
C. 4
D. 8

7. Which of the following control variables is most important for a fair comparison in the above investigation?

A. mass of living tissues
B. shape of living tissues
C. volume of living tissues
D. surface area of living tissues

8. Which of the following descriptions of the active site of an enzyme is correct?

(1) It can be used again.
(2) It is the part of the enzyme on which its substrate can fit.
(3) Its shape is determined by the amino acid sequence of the enzyme.

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

Go on to the next page

9. The electron micrograph below shows an organelle P:

Which of the following are possibly produced by organelle P in the cells of the pancreas?

(1) amylase
(2) insulin
(3) lipase

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

10. Which of the following explain why a person cannot swallow food and talk at the same time?

(1) The epiglottis covers the opening of the trachea during swallowing.
(2) Swallowing is a reflex action while speaking is a voluntary action.
(3) Air must flow through the larynx to produce sounds.

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

11. Which of the following descriptions of breathing is correct?

A. The air rushes in to expand the lungs.
B. The trachea expands to draw in more air.
C. Pressure in the lungs decreases to draw in air.
D. The expansion of the lungs pushes the diaphragm downward.

12. Which of the following descriptions of the hepatic portal vein is correct?

A. It carries blood away from the liver.
B. It carries blood with lower oxygen content than that in the hepatic vein.
C. It carries blood with lower amino acid content than that in the hepatic artery after meals.
D. It carries blood with lower glucose content than that in the hepatic vein when one is hungry.

13. Both the villi of the small intestine and the air sacs of the lung are sites for material exchange. Which of the following is an adaptive feature common to the epithelium of both structures?

A. The epithelium is one cell thick.
B. There is a water film on the surface of the epithelium.
C. The epithelial cells contain a large number of mitochondria.
D. The epithelial cells have a modified cell membrane to increase surface area.

14. Which of the following combinations correctly matches the water movement in the human body with its major driving force?

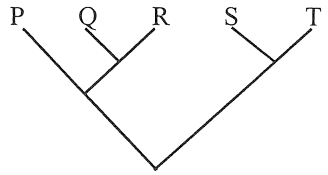
	Water movement	*Major driving force*
A.	water in tissue fluid enters lymph vessels	osmosis
B.	water in blood leaves capillaries at the arterial end	hydrostatic pressure
C.	water in tissue fluid enters capillaries at the venous end	active transport
D.	water enters capillaries from the lumen of the small intestine	diffusion

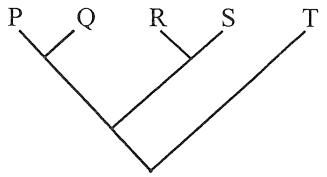
15. The table below shows the presence or absence of some traits in five species:

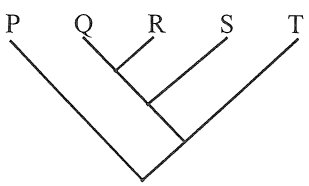
	Trait				
Species	1	2	3	4	5
P	+	+	−	+	−
Q	+	+	−	−	−
R	+	−	−	−	+
S	+	−	+	−	+
T	−	−	−	−	−

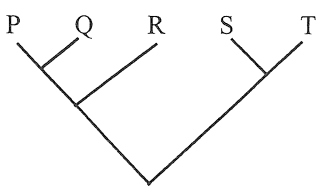
Key:
\+ presence of trait
− absence of trait

Which of the following evolutionary trees best illustrates the phylogenetic relationship of the five species?

A.


B.


C.


D.


16. Australia has some plant and animal species which cannot be found elsewhere in the world. Which of the following is likely to be the key factor that led to the occurrence of these unique plant and animal species in Australia?

A. isolation
B. mutation
C. competition
D. environmental stress

Go on to the next page

17. 'Transgenic organisms produced by recombinant DNA technology have more potential in terms of evolution than those produced by traditional breeding.'

Which of the following is the best reason for this?

A. Recombinant DNA technology creates new species.
B. Recombinant DNA technology produces new phenotypes.
C. Recombinant DNA technology transfers genes within a species.
D. Recombinant DNA technology transfers genes between different species.

Directions: Questions 18 and 19 refer to the following passage about the discovery of DNA structure:

> Many scientists tried to uncover the structure of DNA. In 1952, Franklin took the first X-ray photograph of DNA, which revealed its helical shape. Her colleague, Wilkins, showed some of Franklin's unpublished findings to Watson without her knowledge. Shortly after, Watson and Crick made a crucial advance when they proposed that the DNA molecule was made up of two chains of nucleotides paired to form a double helix. In 1962, Watson, Crick and Wilkins were awarded the Nobel Prize.

18. Which of the following aspects of the Nature of Science can be exemplified in the above story?

(1) A good scientific experiment must include carefully designed controls.
(2) Scientists are both collaborative and competitive by nature.
(3) Doing science requires imagination and creativity.

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

19. Which of the following descriptions of the molecular structure of DNA proposed by Watson and Crick is correct?

A. The two chains run in opposite directions.
B. The bases link up the nucleotides to form a chain.
C. The sugar that makes up nucleotides has two types.
D. The phosphate that makes up nucleotides has at least four types.

20. The amount of DNA in cell P immediately before mitosis is x. After division, there are 4 chromosomes in each daughter cell. Which of the following descriptions is correct?

A. The amount of DNA in the daughter cell is 0.5 x.
B. The amount of DNA in each chromosome is 0.25 x.
C. There are 8 chromosomes in the diploid state of cell P.
D. There are 8 chromosomes in cell P immediately before division.

21. In flowering plants, asexual reproduction is considered less favourable than sexual reproduction in terms of natural selection because offspring produced from asexual reproduction

A. are genetically identical to each other.
B. have keen competition with each other.
C. cannot invade and colonise new environments.
D. can grow rapidly only in favourable conditions.

Directions: Questions 22 to 24 refer to the photomicrographs below, which show the stem section of a plant observed under a microscope. Diagram Y shows a higher magnification of the vascular bundle (Vb) in Diagram X:

Diagram X

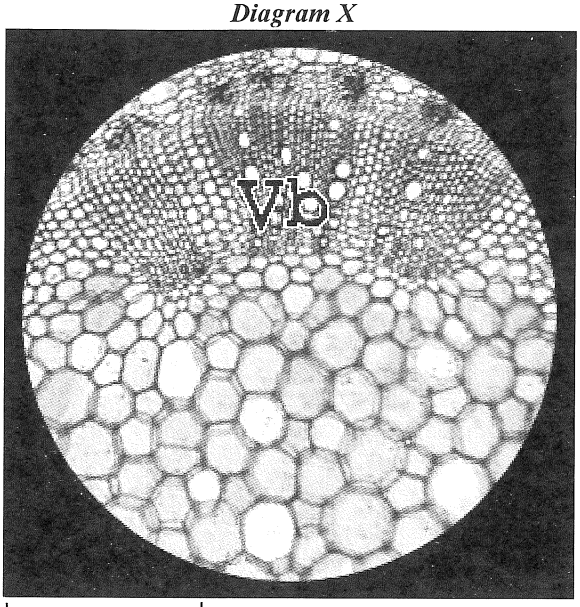
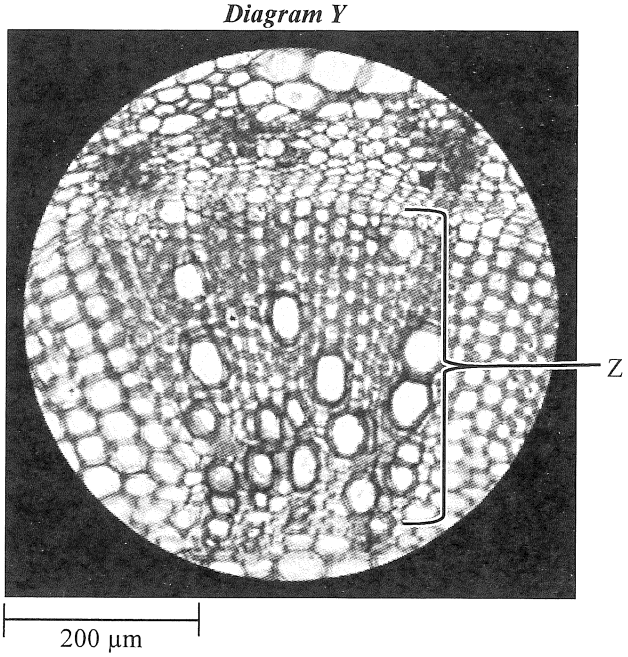


Diagram Y



Key: Vb = vascular bundle

22. Which of the following combinations shows the correct steps for using the microscope in order to obtain the image in Diagram Y from that of Diagram X?

	Step 1	*Step 2*
A.	Move the slide towards the observer so that Vb is in the centre of the field of view.	Change the objective from 4X to 10X and adjust the focus.
B.	Change the objective from 10X to 40X and adjust the focus.	Move the slide towards the observer so that Vb is in the centre of the field of view.
C.	Move the slide away from the observer so that Vb is in the centre of the field of view.	Change the objective from 4X to 10X and adjust the focus.
D.	Change the objective from 10X to 40X and adjust the focus.	Move the slide away from the observer so that Vb is in the centre of the field of view.

23. Which of the following descriptions of the function of tissue Z shown in Diagram Y is correct?

A. It transports proteins upwards.
B. It transports minerals upwards.
C. It transports water downwards.
D. It transports sugars downwards.

24. Which of the following structures is commonly found in all the cells shown in Diagram Y?

A. vacuole
B. cell wall
C. cytoplasm
D. cell membrane

Go on to the next page

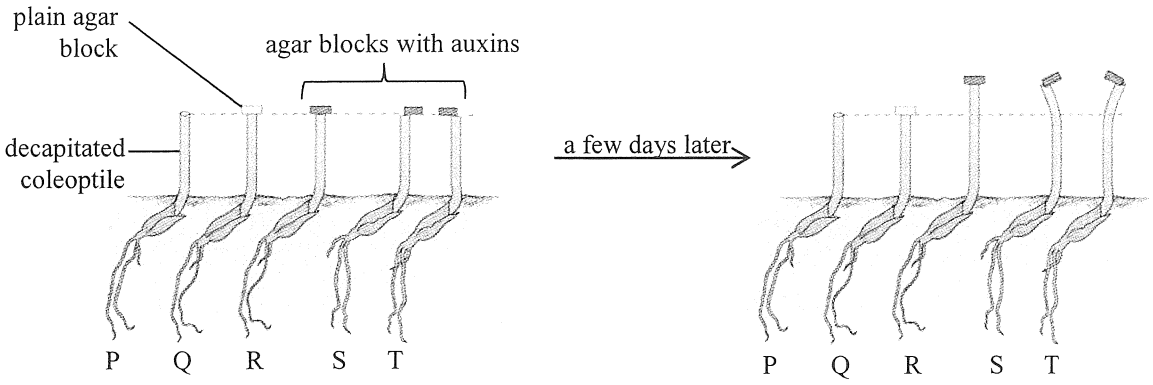
25. Which of the following descriptions of floral structures is correct?

A. The ovule forms seeds.
B. The ovary forms seed coats.
C. Pollen grains are male gametes.
D. The filament contains pollen grains.

26. On which of the following parts of the root can root hairs be found?

A. root cap
B. region of elongation
C. region of cell division
D. region of differentiation

Directions: Questions 27 and 28 refer to the diagram below, which shows an investigation into the effect of auxins on the growth of plant shoots:



27. Which of the following serve(s) as the control set-up(s) in this investigation?

A. P only
B. R only
C. P and Q only
D. Q and R only

28. Which of the following conclusions can be drawn based on the results of the investigation?

A. The tip of the coleoptile produces auxins.
B. Auxins stimulate the growth of coleoptiles.
C. The coleoptile shows positive phototropism.
D. Coleoptiles stop growing when the tip is removed.

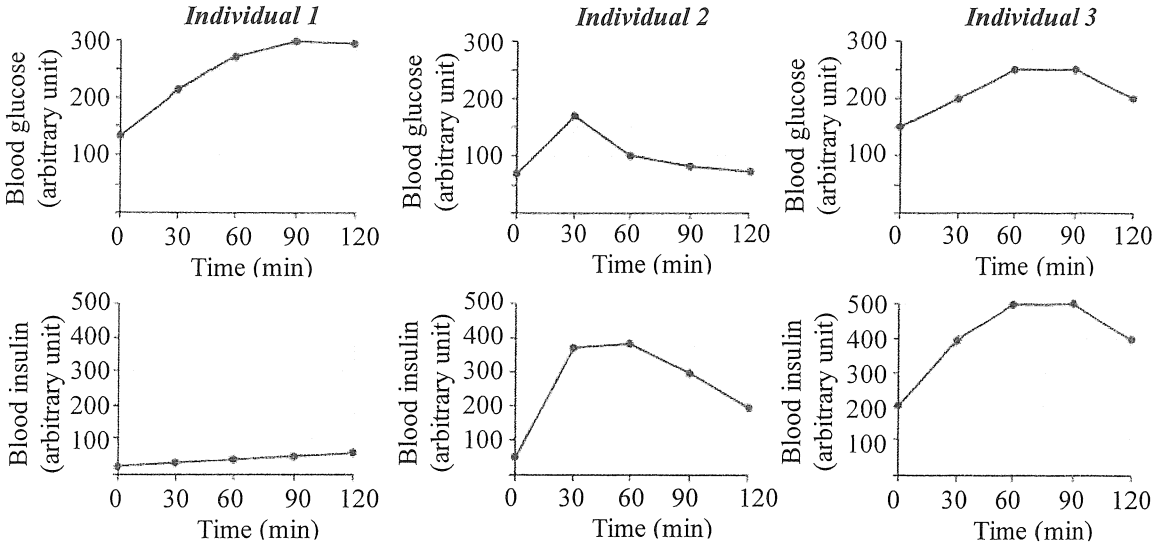
29. Which of the following combinations of causative agents and ways of transmission of infectious diseases is correct?

	Infectious disease	*Causative agent*	*Way of transmission*
A.	cholera	virus	food
B.	cholera	bacterium	body fluid
C.	hepatitis B	virus	body fluid
D.	hepatitis B	bacterium	food

30. Which of the following provides immunity to the human body?

A. phagocytosis
B. inflammation
C. memory cell
D. formation of blood clots

31. The graphs below show the changes in blood glucose level and the blood insulin level of three individuals after consuming a sugary drink:

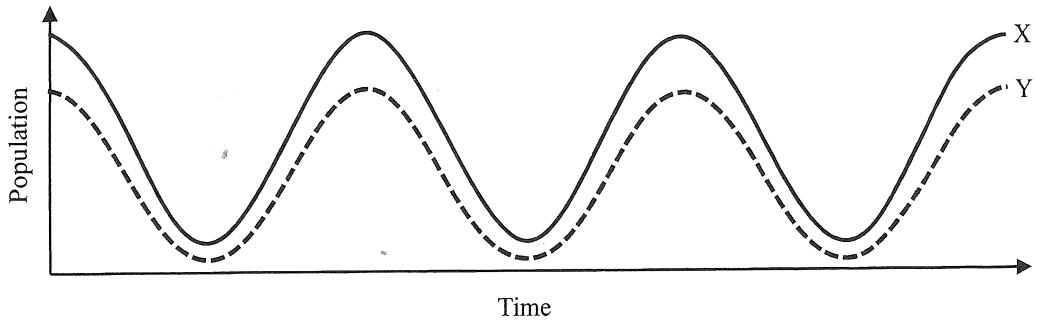


Which of the following combinations correctly shows the health conditions of these three individuals?

	Individual 1	*Individual 2*	*Individual 3*
A.	No diabetes	Type 1 diabetes	Type 2 diabetes
B.	Type 1 diabetes	Type 2 diabetes	No diabetes
C.	Type 2 diabetes	No diabetes	Type 1 diabetes
D.	Type 1 diabetes	No diabetes	Type 2 diabetes

Go on to the next page

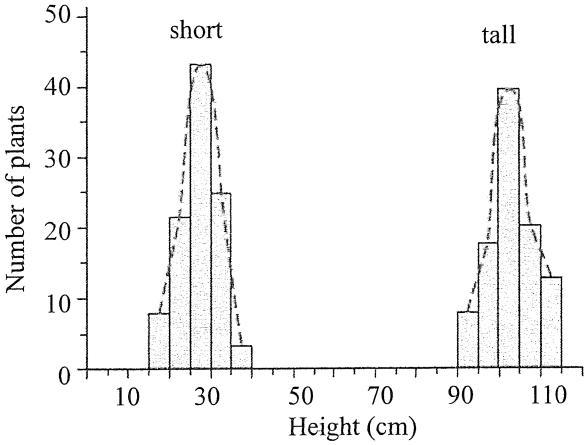
32. The following graph shows the change in the populations of organisms X and Y living in the same habitat:



Which of the following is the most likely ecological relationship between organisms X and Y?

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

Directions: Questions 33 and 34 refer to the following graph, which shows the variations in the height of a certain type of plant:



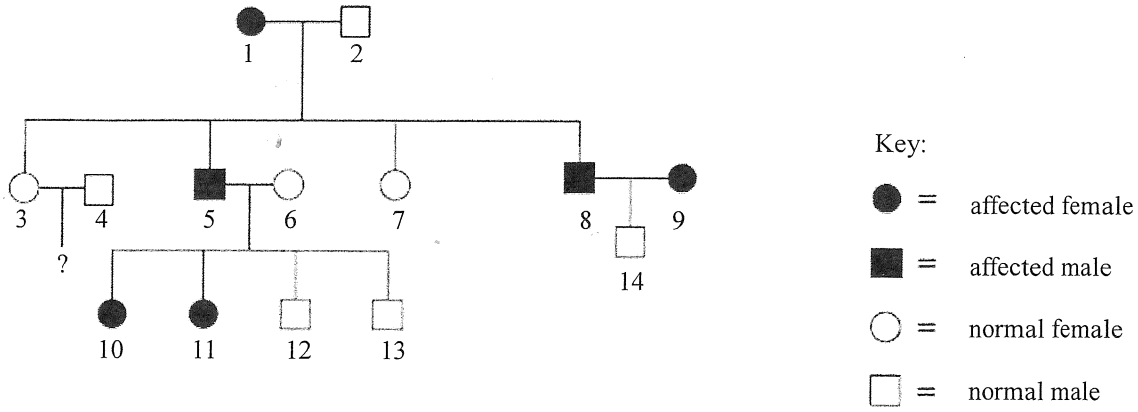
33. Which of the following conclusions can be drawn from the above graph?

A. The short and tall plants are of two different species.
B. The two traits, short and tall, are controlled by a pair of alleles.
C. More samples should be taken to cover the full range of heights.
D. The height of the plants displays the properties of continuous and discontinuous variations.

34. Which of the following factors contributes ***least*** to the variations shown?

A. the height of the parental plants
B. the light intensity in the environment
C. the independent assortment of chromosomes
D. the oxygen concentration in the environment

Directions: Questions 35 and 36 refer to the pedigree below, which shows the inheritance of a genetic disorder.



35. Which of the following combinations correctly shows the possible types of inheritance of this disorder?

	Autosomal dominant	*Autosomal recessive*	*X-linked dominant*	*X-linked recessive*
A.	✓		✓	
B.	✓			✓
C.		✓	✓	
D.		✓		✓

36. What is the probability of individual 3 and individual 4 giving birth to a normal male?

A. 0
B. 0.25
C. 0.5
D. 1

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

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B

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HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2020

Candidate Number									

BIOLOGY PAPER 1

SECTION B : Question-Answer Book B

This paper must be answered in English

INSTRUCTIONS FOR SECTION B

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

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

(3) Answer **ALL** questions.

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

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

(6) Present your answers in paragraphs wherever appropriate.

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

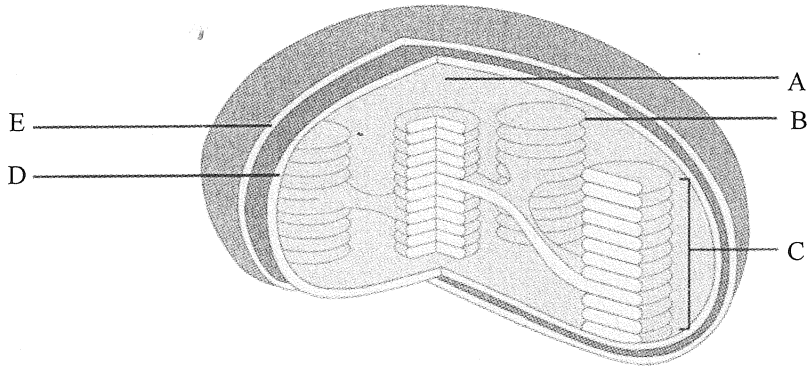
(8) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

* A 1 3 0 E 0 1 B *

SECTION B

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

1. The diagram below shows the structures in a chloroplast:



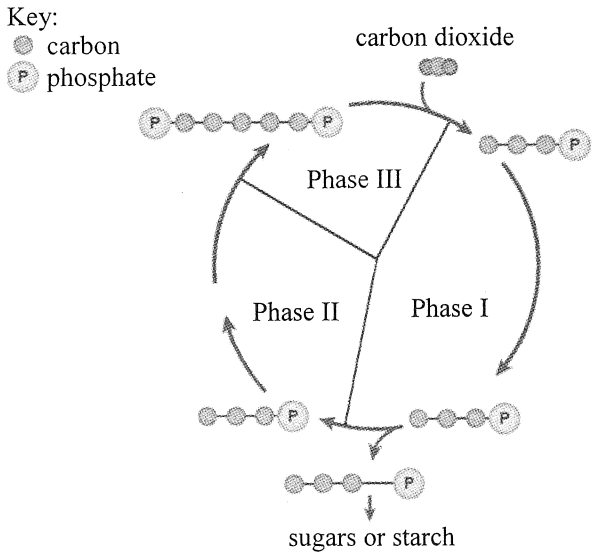
(a) Using the letters from the diagram, list ***all*** of the structures that contain photosynthetic pigments. (1 mark)

.....

(b) Structure C produces intermediates that are used in the Calvin Cycle. State the intermediates. (1 mark)

.....

(c) The diagram below shows a simplified Calvin Cycle:



Match the three phases with the following reactions: (2 marks)

Reactions	***Phase***
Regeneration of carbon dioxide acceptor	.....
Reduction of 3C compound	.....
Carbon dioxide fixation	.....

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

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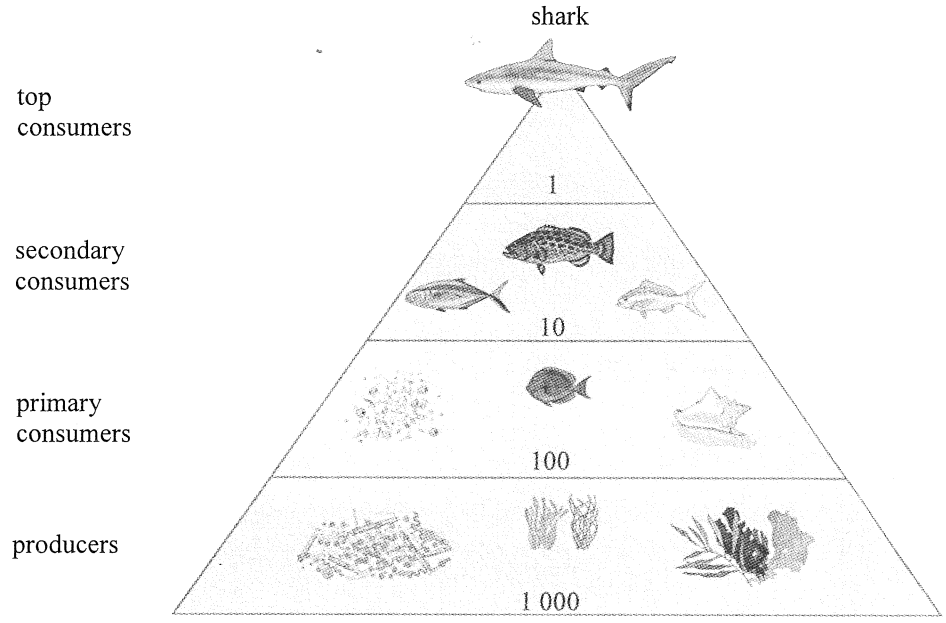
2. The diagram below shows the total biomass (arbitrary unit) at each trophic level in a marine ecosystem:



(a) As the trophic level becomes higher, the total biomass of each level decreases. Give ***two*** reasons for this phenomenon. (2 marks)

Reason 1:

Reason 2:

(b) Sharks, being the top consumers in the ocean, play an important role in keeping the populations of other marine organisms under control. It is predicted that the extinction of sharks would result in overpopulation of producers. Explain how this would happen. (3 marks)

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Answers written in the margins will not be marked.

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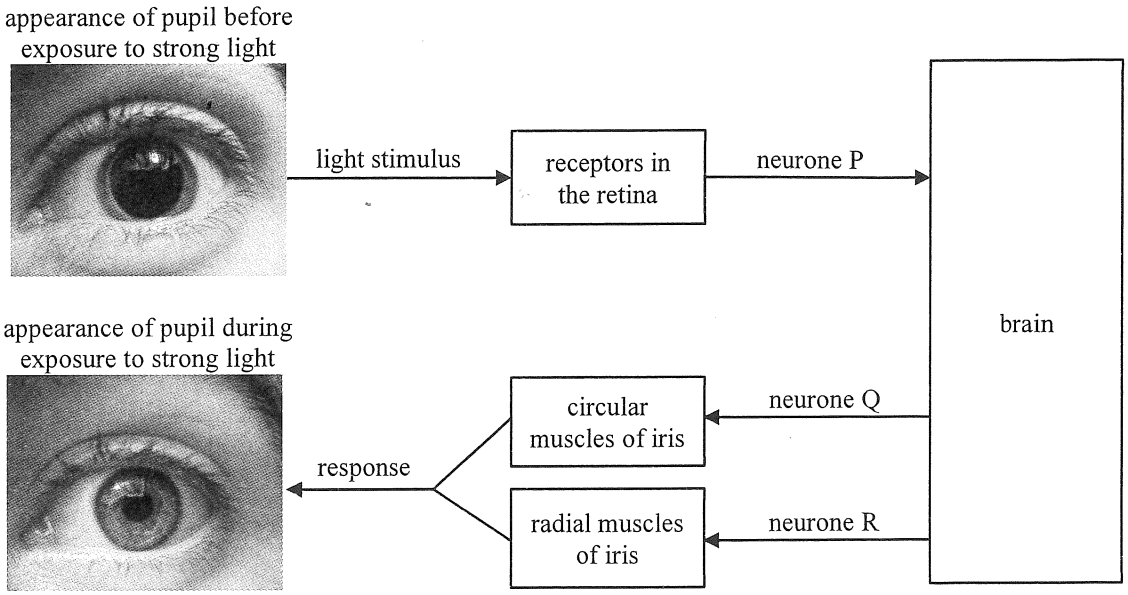
3. The diagram below shows a neural pathway involved in the coordination of pupil size when a human eye is exposed to strong light:



(a) With reference to the above neural pathway,

(i) state the ***two*** types of receptors located in the retina. (1 mark)

.....

(ii) state the type of neurone represented by Q and R. (1 mark)

.....

(b) Describe how the two sets of iris muscles work together to bring about the change in the pupil size shown above. State the significance of this response. (4 marks)

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(c) If someone falls unconscious, the response of the above neural pathway will be assessed to confirm if this pathway is still functioning. What does this assessment tell you about the nature of this neural coordination? (1 mark)

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Answers written in the margins will not be marked.

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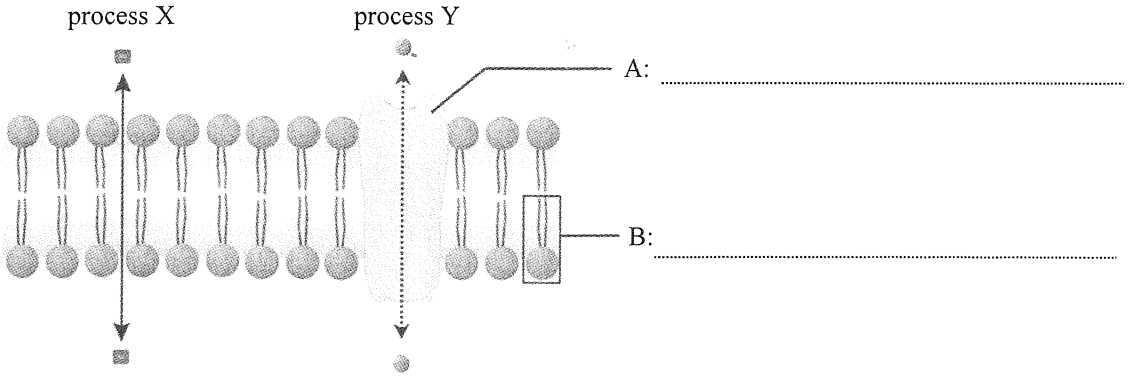
4. The following diagram shows a cell membrane and the movement of some substances across it:



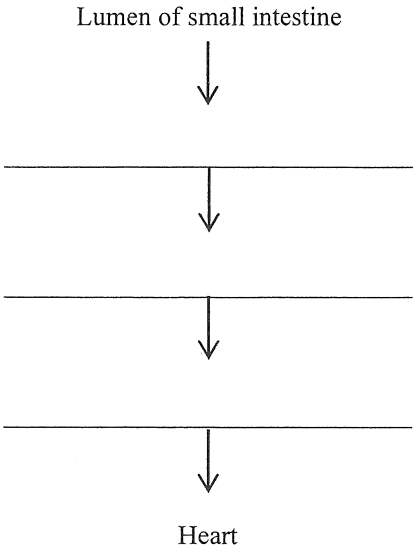
(a) Label structures A and B. (2 marks)

(b) X and Y represent two different processes by which substances pass through the cell membrane.

(i) Give ***one*** digested product which is absorbed through process X in the human body. (1 mark)

(ii) Give ***one*** digested product which is absorbed through process Y in the human body. (1 mark)

(iii) The digested products absorbed through process X are transported from the small intestine to the heart. Complete the following flowchart to show the vessels involved in the transport. (3 marks)



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Answers written in the margins will not be marked.

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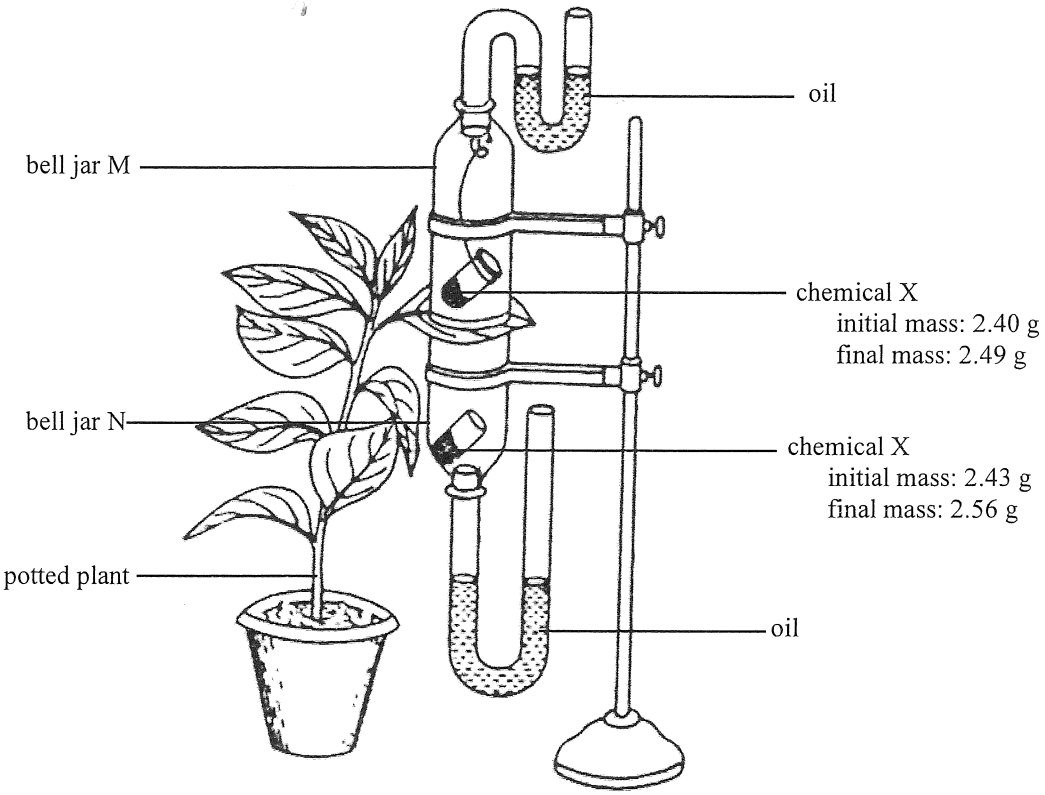
5. The diagram below shows an experimental set-up used to compare the transpiration rates of the upper and lower epidermis of the leaf of a potted plant. The set-up consists of two identical bell jars placed one above the other with the leaf of a potted plant in between. Chemical X was placed into the jars to absorb water vapour. The whole set-up was made air-tight. The masses of the chemical X in the jars were measured at the beginning and after five hours.



(a) (i) Which of the following parameters is used to measure the transpiration rate of the plant in this investigation? Put a '✓' in the appropriate box to indicate your choice. (1 mark)

☐ amount of water lost by the leaf

☐ amount of water absorbed by the leaf

(ii) How can the above set-up measure the parameter chosen in (a) (i)? (2 marks)

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Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Please stick the barcode label here.

(b) List ***two*** variables which have been controlled by this set-up during the investigation. (2 marks)

(c) (i) Compare the changes in the mass of chemical X in bell jars M and N. What conclusion can you draw? (2 marks)

(ii) Suggest ***one*** possible explanation for the conclusion. (1 mark)

(iii) Propose ***one*** workable method to test your hypothesis in (c) (ii). (2 marks)

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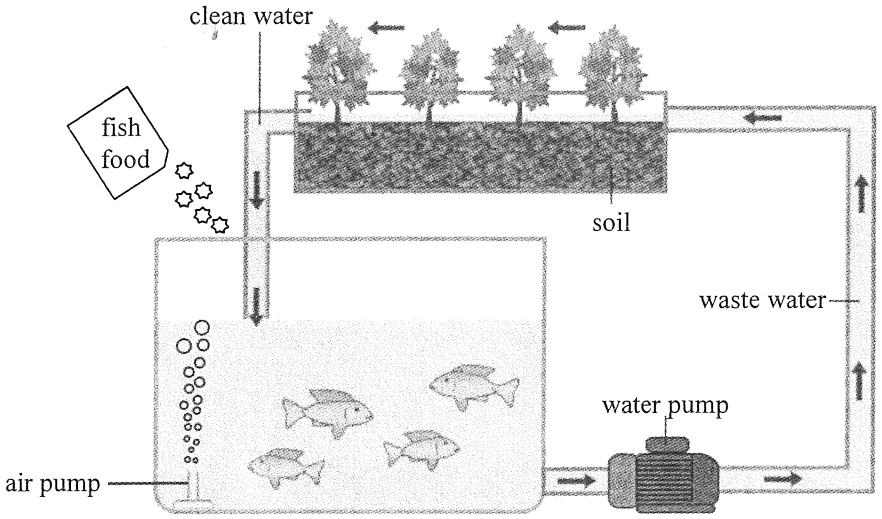
6. The diagram below shows a mini-ecosystem in which waste water from a fish tank is used as a source of nutrients for plant growth by making use of the interaction among fish, microorganisms and plants. Adding fertilisers and periodic change of water are not necessary. This is an eco-friendly way to grow vegetables and raise fish for human consumption.



(a) Ammonia, a toxic substance, is the major waste product excreted by fish. Ammonia in waste water from the fish tank can be converted to nitrate, which is required by plants for growth.

(i) Name the bacteria involved in the conversion. (1 mark)

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(ii) Describe how plants can obtain nitrate from waste water and make use of it for protein synthesis in their leaves. (3 marks)

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Please stick the barcode label here.

(b) The air pump performs some important functions in this system. Describe these functions.
(2 marks)

(1) .....

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(2) .....

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(c) If double the amount of fish food is added accidentally, some fish will die a few days later. Based on your knowledge of the cycling of materials, suggest an explanation for this phenomenon.
(4 marks)

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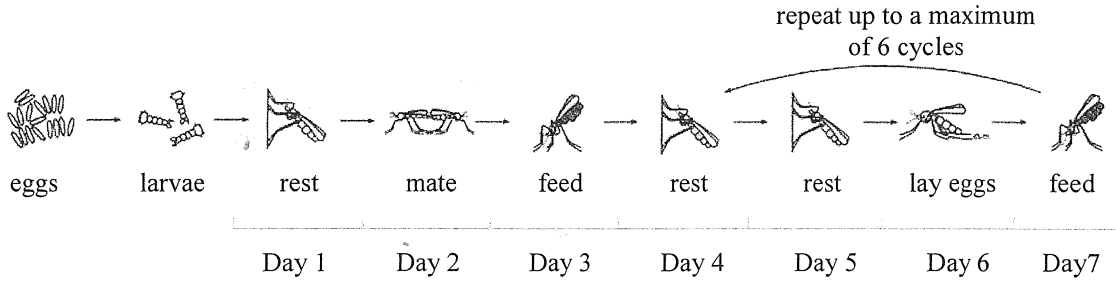
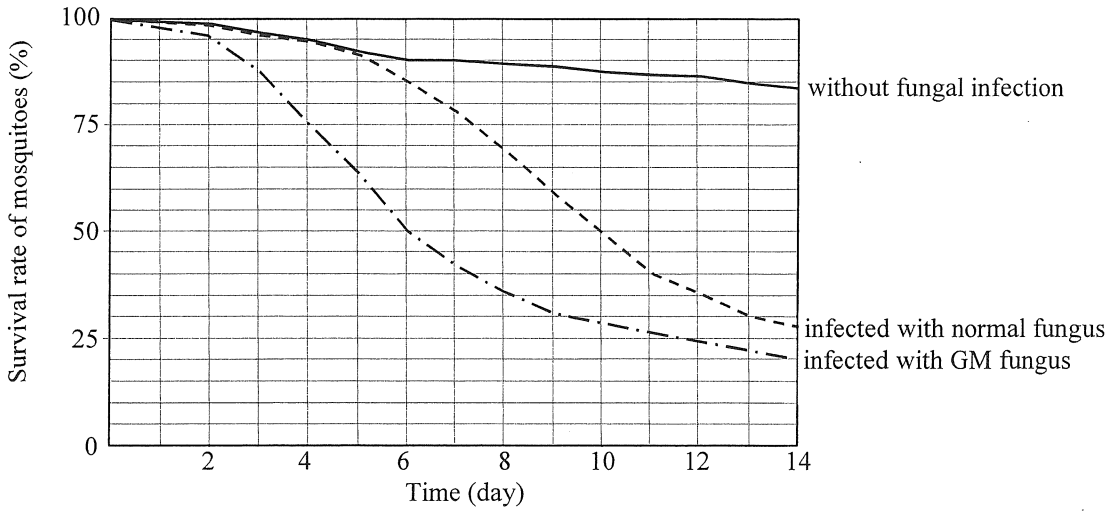
7. The diagram below shows the life cycle of mosquitoes:



(a) Give ***one*** example of a mosquito-borne disease. (1 mark)

(b) The Food and Environmental Hygiene Department introduced a fungal species to control the mosquito population in Hong Kong. Mosquitoes will die in a few days if they are infected with the fungus. What is the ecological relationship between mosquitoes and this fungal species? (1 mark)

(c) To make this fungal species more deadly to mosquitoes, researchers produced a genetically-modified (GM) fungus which can produce a toxin in the mosquitoes. The effectiveness of this biological control was examined by measuring the survival rate of adult mosquitoes over 14 days. The results are shown below:



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(i) Using the data from the graph, complete the following table. (1 mark)

	Without fungal infection	Infected with normal fungus	Infected with GM fungus
Survival rate on Day 6 (%)			

(ii) The GM fungus but not the normal fungus was able to 'wipe out' the mosquito population after several generations. With reference to the mosquito's life cycle and the answer in (c) (i), explain this phenomenon. (3 marks)

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8. Some people suffer from sneezing and coughing when there are cats nearby. These unwanted immune responses, known as allergies, are caused by a protein X secreted by cats' salivary and sebaceous glands. When cats lick their body surface, this protein X is spread to their hair. Protein X can accumulate in their living environment over time.

(a) Recent research shows that the amount of free protein X on cats' hair can be reduced by adding antibodies against protein X (anti-X) to cat food.

(i) Why can anti-X reduce the amount of free protein X on cats' hair? (1 mark)

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(ii) There are no proteases in the saliva of cats. Explain why this is important for the success of this method of reducing free protein X. (1 mark)

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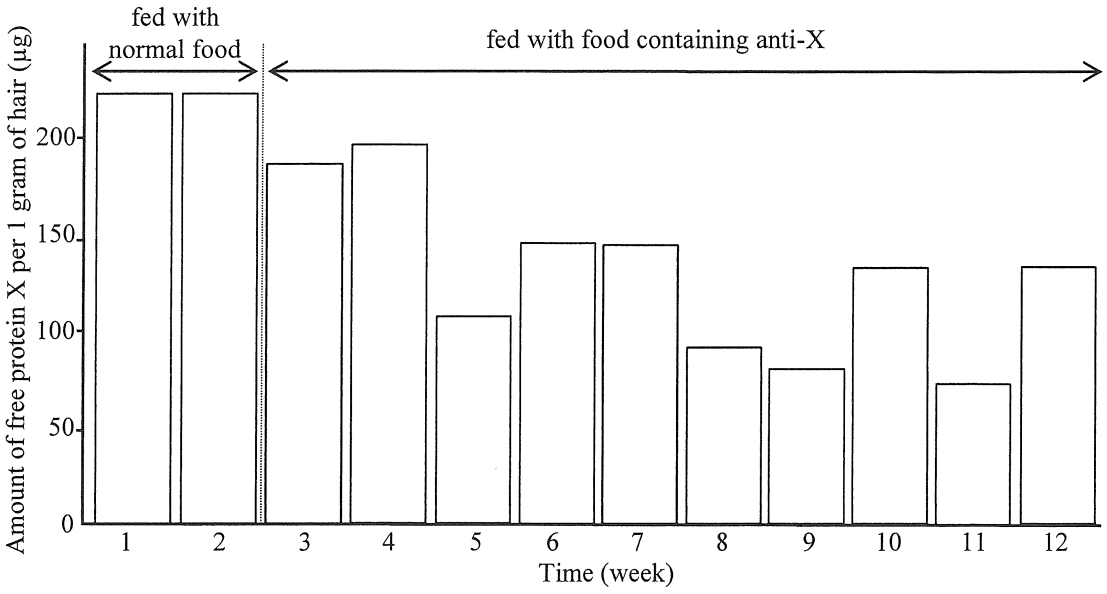
(b) In the research, a group of domestic cats were fed with normal cat food for 2 weeks, followed by cat food containing anti-X for 10 weeks. The amount of free protein X found on their hair during the research is shown in the bar chart below:



(i) Research team member A thought anti-X was effective in reducing the amount of free protein X on cats' hair while team member B thought anti-X was not effective. Based on the bar chart, give ***one*** reason to support team member A and ***another*** reason to support team member B. (2 marks)

Supporting reason for team member A:

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Supporting reason for team member B:

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(ii) How would you modify the research to confirm whether anti-X in cat food is effective in reducing the amount of free protein X on cats' hair? (2 marks)

(c) Based on the information in the introductory paragraph of this question, suggest *two* limitations of this approach to reducing allergies caused by cats. (2 marks)

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9. The following DNA sequence shows the coding strand of part of a gene found in insect species A:

… ATG GTC GTA TAC GCT ACC CTG TCG ATG CTA GCT AGC …

(a) Which of the following correctly shows the sequence of the mRNA corresponding to the underlined sequence of this coding strand? Put a '✓' in the appropriate box to indicate your choice. (1 mark)

☐ AUG GUC GUA UAC GCU ACC

☐ UAC CAG CAU AUG CGA UGG

(b) Using the following codon table, write the amino acid sequence of the protein translated from the mRNA in (a). (2 marks)

First base of the codon	Second base of the codon: U	Second base of the codon: C	Second base of the codon: A	Second base of the codon: G	Third base of the codon
U	Phe	Ser	Tyr	Cys	U
					C
	Leu		STOP	STOP	A
				Trp	G
C	Leu	Pro	His	Arg	U
					C
			Gln		A
					G
A	Ile	Thr	Asn	Ser	U
					C
	Met		Lys	Arg	A
					G
G	Val	Ala	Asp	Gly	U
					C
			Glu		A
					G

(c) It was found that the gene has two alleles. The difference between the two alleles in the underlined sequence is highlighted below:

allele1: … ATG GTC GTA TA**C** GCT ACC …

allele 2: … ATG GTC GTA TA**G** GCT ACC …
(mutated)

(i) What kind of mutation is this? (1 mark)

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(ii) With reference to the codon table, describe how this mutation affects the protein translated from this gene. (3 marks)

(iii) Individuals from insect species A exist in two forms, green bodied and brown bodied. Individuals with a green body have only allele 1. Some of those with a brown body have both allele 1 and allele 2 while others have only allele 2.

If the body colour of insect species A was only caused by the mutation of this gene, which allele (1 or 2) would be recessive? Explain your answer. (3 marks)
(Note: Marks will not be awarded for genetic diagrams.)

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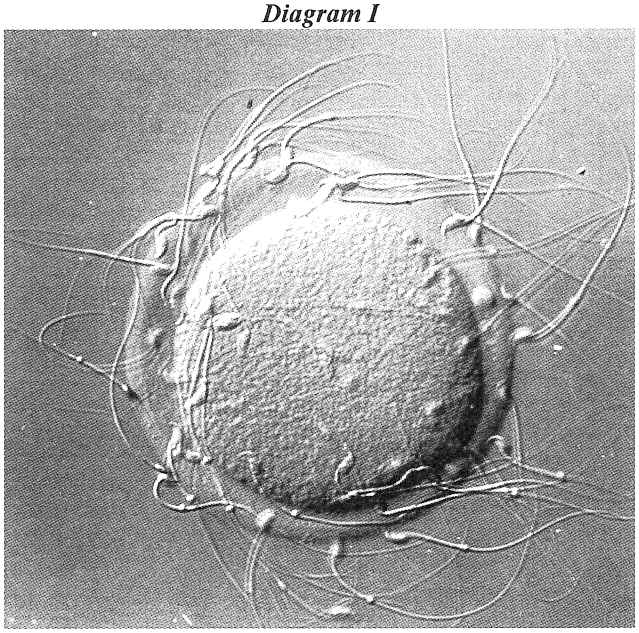
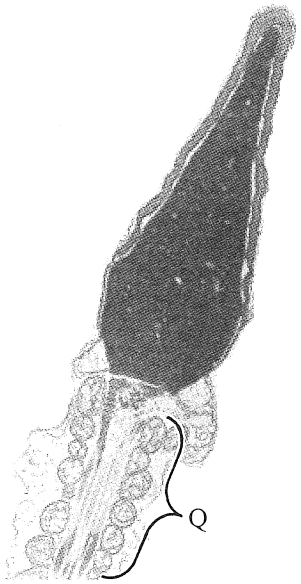
10. Diagram I shows a photomicrograph of human sperm and a human ovum during fertilisation while Diagram II shows an electron micrograph of an enlarged view of human sperm.

Diagram I



(700X)

Diagram II



(30 000X)

(a) Under normal circumstances, in which structure of the female reproductive system does the process shown in Diagram I take place? (1 mark)

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(b) With reference to Diagram II, what is the significance of organelles Q to the sperm's function? (1 mark)

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(c) (i) Explain the significance of the chromosome number of the sperm and ovum to sexual reproduction. (2 marks)

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(ii) Briefly describe how identical twins may arise after fertilisation. (2 marks)

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

11. Our body systems are highly specialised at various levels of organisation to facilitate the functioning of each system. Discuss how the adaptive features of the human blood and circulatory system facilitate the transport of oxygen. Your discussion should cover adaptive features at cellular, tissue and organ levels. (11 marks)

(Note: Details of the different types of blood vessels are not required.)

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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.