Name | Reg. No | Class

MAYFLOWER SECONDARY SCHOOL

4EX

BIOLOGY

6093/02

Paper 2 Theory [80 Marks]

PRELIMINARY EXAMINATION

September 2019

1 hour 45 minutes

Additional Materials:
Approved calculator

Instruction to Candidates

Do not start reading the questions until you are told to do so.

Write your name, class, and index number on all the work you hand in.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams, graphs or rough working.

Do not use paper clips, highlighters, glue or correction fluid.

Section A

Answer **all** questions.

Write your answers in the spaces provided on the Question Paper.

Section B

Answer **all** questions. The last question is in the form of either/or.

Write your answers in the spaces provided on the Question Paper.

Electronic calculators may be used.

You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

FOR EXAMINER'S USE		
Paper		Marks
Paper 1 (MCQ)		/ 40
Paper 2		
A		/ 50
B	6	/ 10
	7	/ 10
	8	/ 10
Total		/ 120

This question paper consists of **18** printed pages.

Setter: Mr Timothy Ng

Vetter: Mrs Marie Huang

[Turn Over

Section A

Answer **all** questions in this section.
Write your answers in the spaces provided.

1 **Fig. 1** shows the leaves of the same plant during a drought. **Fig. 1.1a** shows the plant before it was watered and **Fig. 1.1b** shows the plant after it was watered daily for one week.

before watering

Fig. 1.1a

after watering

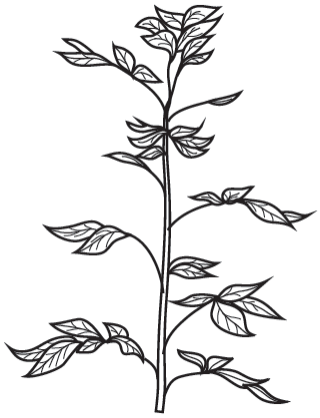

Fig. 1.1b

(a) **(i)** Define the term *transpiration.*

……

…… [1]

(ii) Describe and explain two factors that would affect the rate of transpiration of the plant in **Fig. 1.1a** during a drought.

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…… [4]

(iii) Suggest how wilting helps the plant to survive during a drought when water is in short supply.

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…… [2]

(b) Name one process that takes place in **Fig. 1.1b** only during the day.

……..... [1]

(c) **Fig. 1.2** shows the uptake and loss of oxygen by a leaf during a 24-hour period.

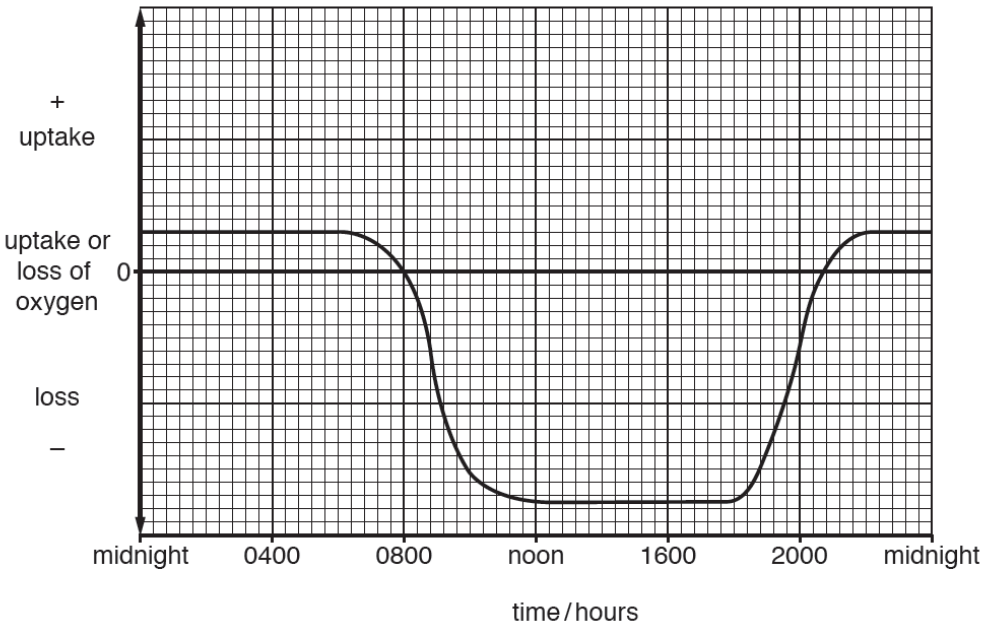

Fig. 1.2

Explain the processes taking place in the leaf between 1800 hours and 2000 hours.

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……..... [2]

[Total marks = 10]

[Turn Over

2 **Fig. 2.1** below shows the changes in oxygen uptake and pH of the muscles of an athlete during a race.

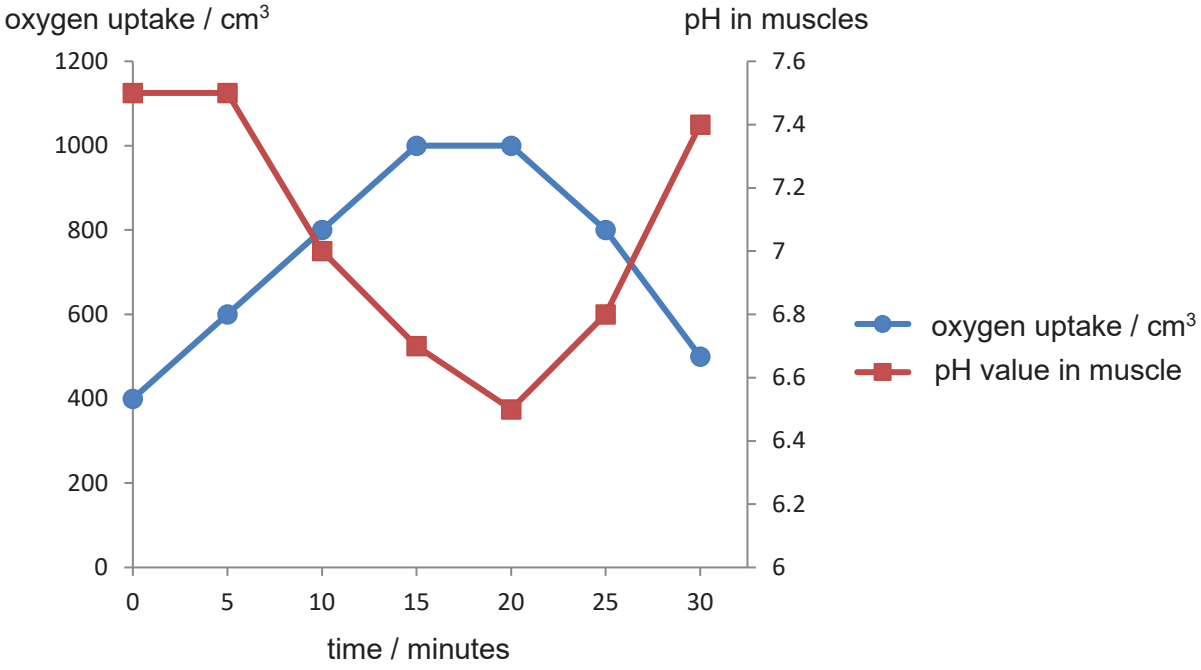

Fig. 2.1

(a) With reference to **Fig. 2.1**,

(i) state the time that the athlete begins to incur an oxygen debt.

……minutes [1]

(ii) deduce the process that caused the changes in pH in his muscles.

…… [1]

(iii) explain how the oxygen debt results in the changes in pH in his muscles.

……

……

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……

……

…… [3]

(b) The increase in oxygen demand by the athlete was due to an increase in aerobic respiration in his muscles.

State the word equation for aerobic respiration.

…….... [1]

(c) **Fig. 2.2** shows a section of an alveolus.

Fig. 2.2

(i) With reference to **Fig. 2.2**, describe **two** ways that the structure of the alveoli is adapted to its function in gaseous exchange.

……

……

……

…… [2]

(ii) Describe the possible harmful effects of smoking cigarettes on the alveoli.

……

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…… [2]

[Total marks = 10]

[Turn Over

3 **Fig. 3.1** below shows a cross section of the heart from a person suffering from a heart defect known as “hole in the heart”.

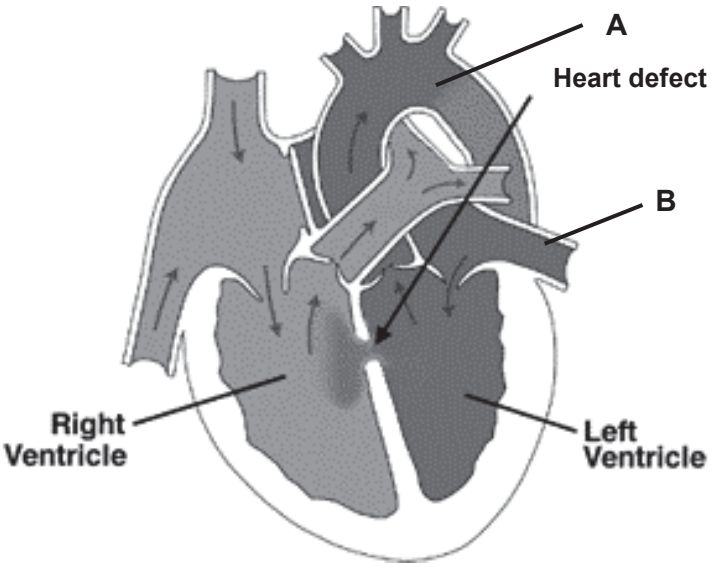

Fig. 3.1

(a) **(i)** Identify the blood vessels labelled **A** and **B** in **Fig. 3.1**.

A: ……

B: …… [2]

(ii) Describe how the heart works to generate a heartbeat.

……

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…… [4]

(iii) Predict how the heart defect will affect the lifestyle of this person.

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…… [2]

(b) **Fig. 3.2** shows pressure changes in the left side of the heart and aorta over time. The total length of a cardiac cycle is 0.8 seconds. Points 1, 2, 3 and 4 indicate when the atrio-ventricular valves and semilunar valves are either open or close.

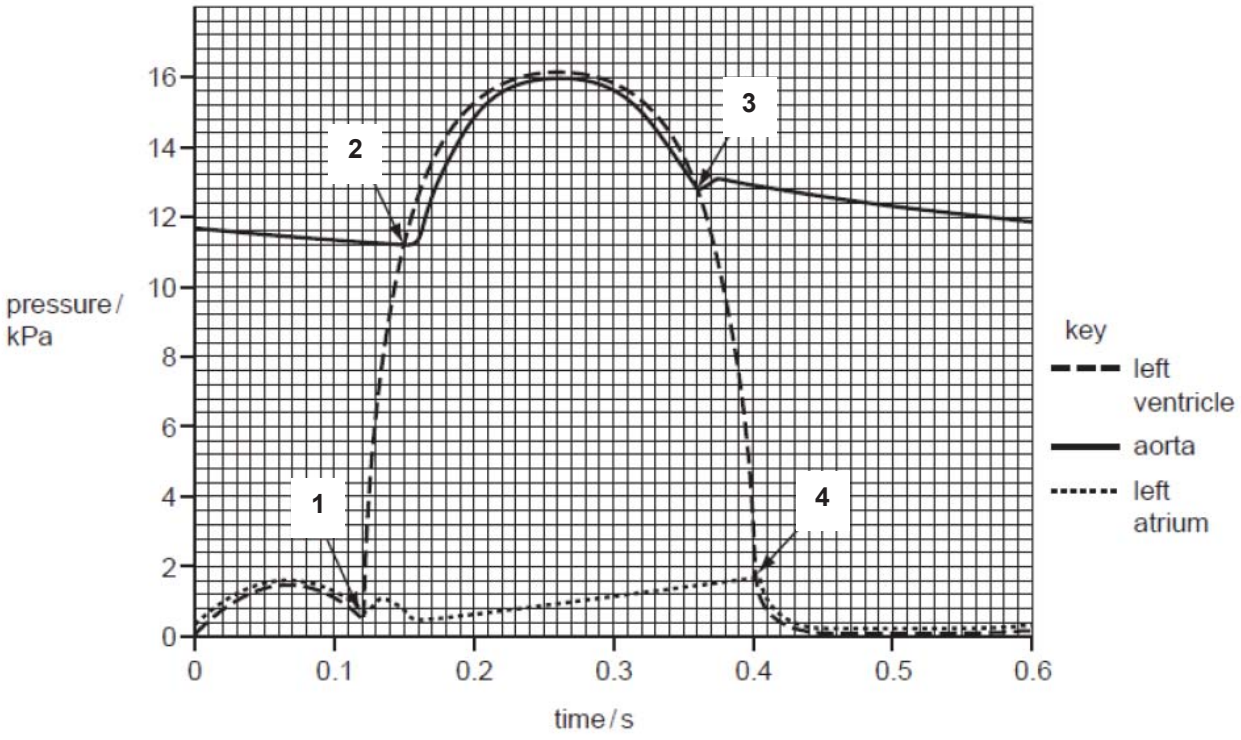

Fig. 3.2

(i) **Circle** on **Fig. 3.2**, the area(s) of the graph where the atrio-ventricular valves and the semi-lunar valves are both closed at the same time during the cardiac cycle shown. [1]

(ii) Calculate how many times the heart described in **Fig 3.2** will beat in **one** minute.

Number of heart beats per minute = …… [1]

[Turn Over

(c) **Fig. 3.3** shows the transverse section of two types of blood vessels found in the human circulatory system.

X **Y**

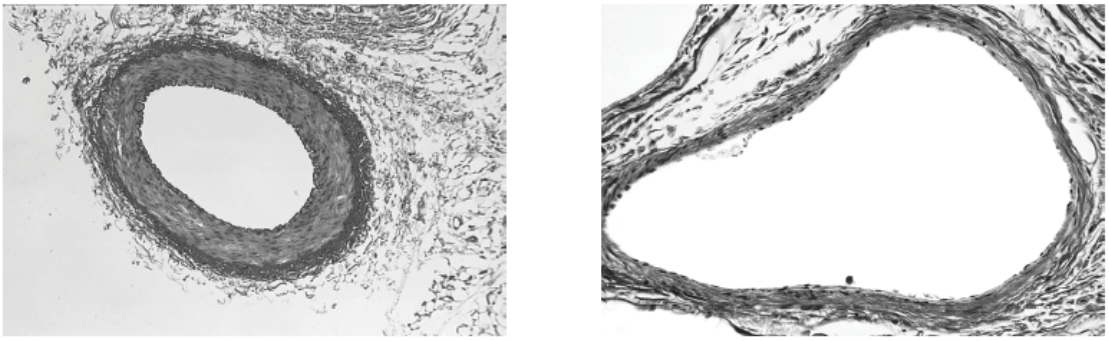

Fig. 3.3

(i) Identify blood vessel **Y**.

…… [1]

(ii) Describe the differences in the structures **X** and **Y** as shown in **Fig. 3.3**.

……

…… [1]

[Total marks = 12]

4 **Fig. 4** shows the model of how a kidney nephron function.

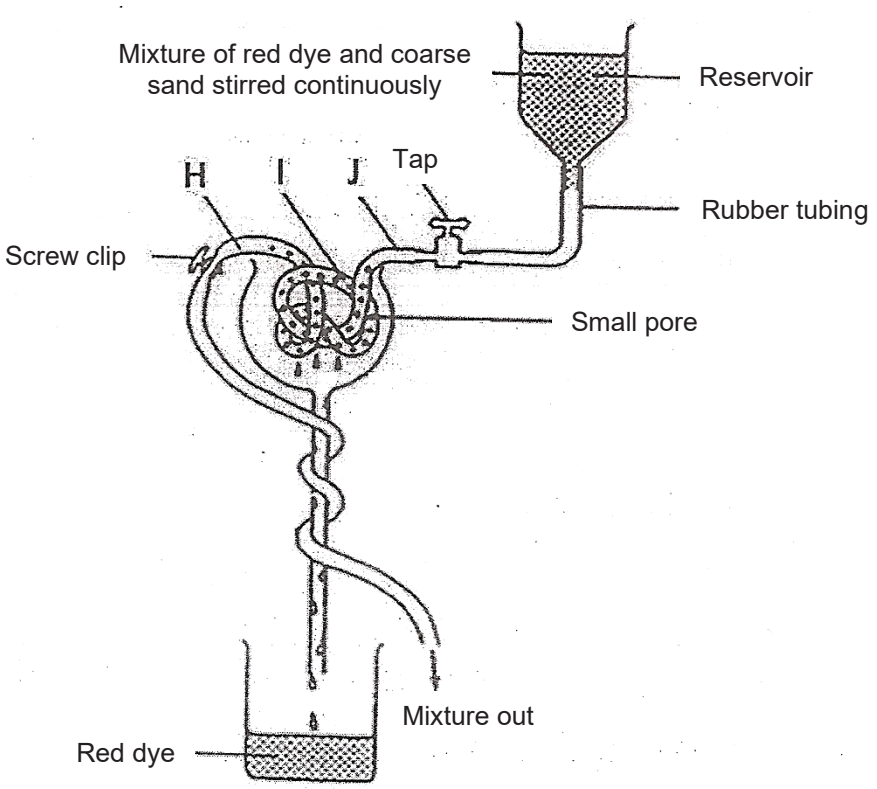

Fig. 4

(a) Identify the labelled structures **H**, **I** and **J**.

H: ……

I: ……

J: …… [2]

(b) Name one cell type or organic compound in the mammalian body that is represented by the coarse sand in the mixture.

…….... [1]

(c) Part **I** is involved in two key processes in the excretion of urea from the body.

(i) Define the term *excretion*.

……

…… [1]

(ii) State the key process that part **I** is involved in during excretion.

…… [1]

[Turn Over

(d) The reabsorption of water in the kidneys is controlled by a hormone produced by an endocrine gland.

Name this hormone and state its role in the kidneys during excretion.

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……... [2]

(e) Describe two differences between the nervous system and the hormonal system.

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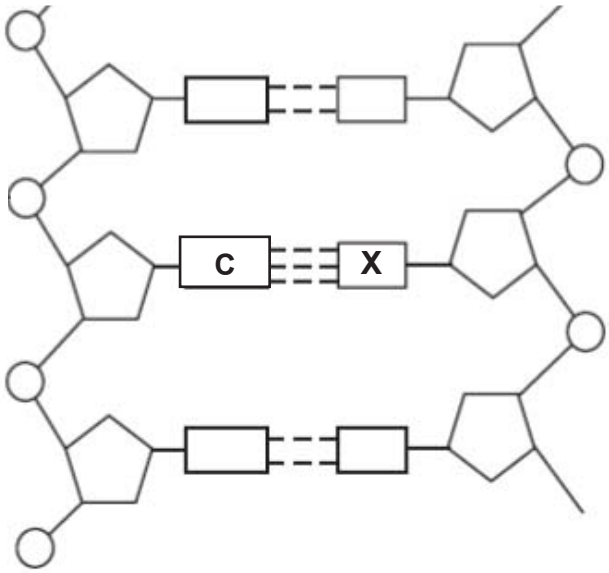
……... [2]

[Total marks = 9]

5 **(a) Fig. 5.1** below shows a section of DNA.



Key:
C = Cytosine

Fig. 5.1

(i) On **Fig. 5.1**, **circle** one nucleotide. [1]

(ii) Identify base **X**.

…… [1]

(iii) Outline the relationship between DNA, genes and chromosomes.

……

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…… [2]

(f) A person with diabetes may be treated with insulin produced by genetically modified bacteria.

Outline how such genetically modified bacteria may be produced and used to manufacture human insulin on a commercial scale.

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……... [5]

[Total marks = 9]

- - - - - End of Section A - - - - -

[Turn Over

Section B

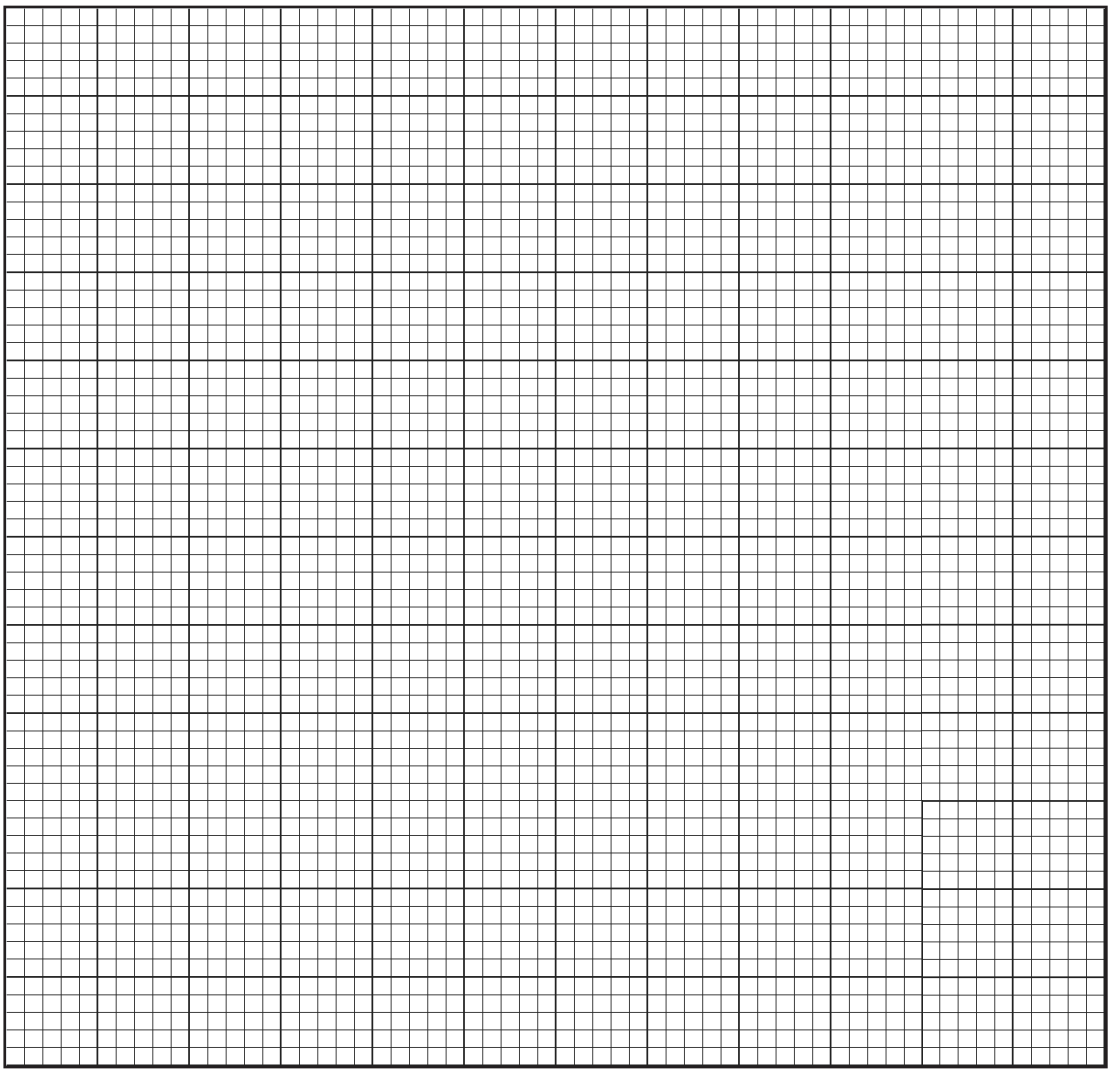
Answer **three** questions.

Question **8** is in the form of an **Either / Or** question. Only one part should be answered.

6 The table below shows the distribution in blood group among a population of 1000 people living in a small town in Alaska.

Blood Group	Number of people
A	410
AB	30
B	90
O	470

(a) With reference to the data above, draw a histogram to represent the data. [3]



(b) Identify and explain the type of variation that is shown by the blood group.

……

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…… [2]

(c) Blood group of individuals are inherited from their family members. **Fig. 5.1** shows a family tree.

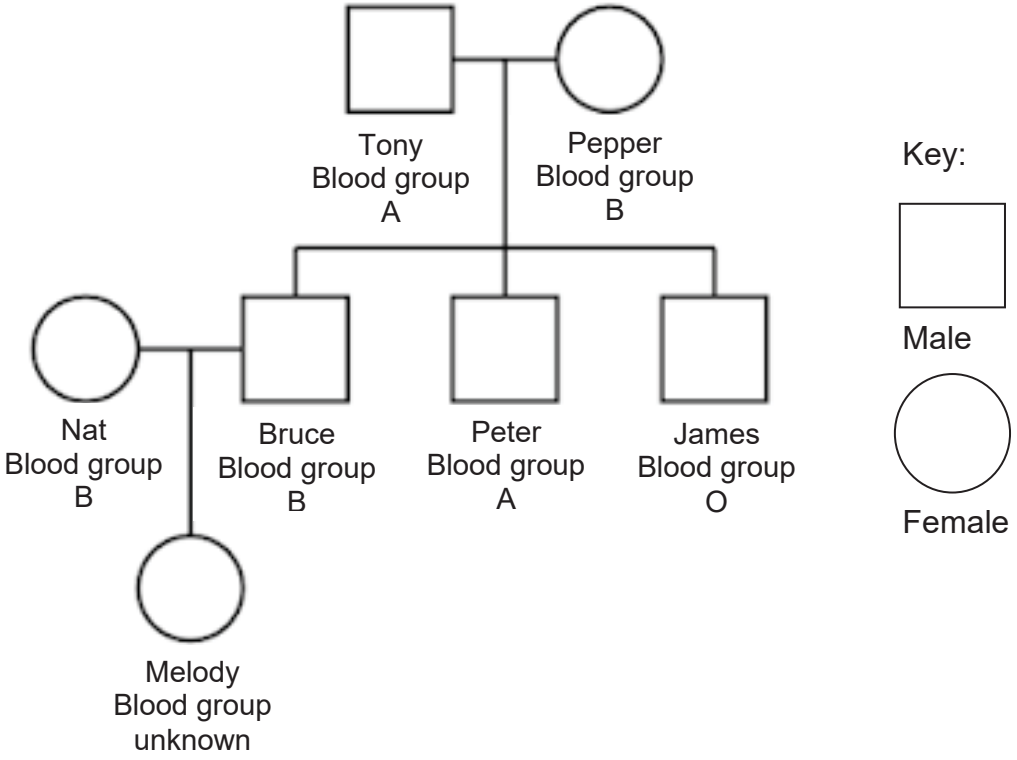

Fig. 5.1

(i) Using a genetic diagram, determine the probability that Tony and Pepper can have a child with blood group AB.

Probability = …… [4]

[Turn Over

(ii) Deduce using **Fig. 5.1** the possible blood group(s) that Melody could have.

..... [1]

[Total marks = 10]

7 The diagram below shows a food web of a community of organisms.

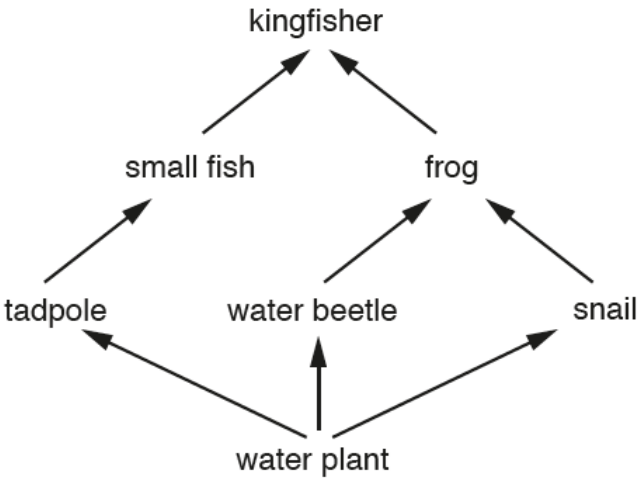

Fig. 7

(a) Referring to the food web in **Fig. 7**,

(i) Draw a pyramid of biomass for a food chain that consists of at least **four** trophic levels.

[2]

(ii) complete the table by writing the correct number of organisms for each statement about the food web. The first number has been written for you.

statement	number
the number of producers	**1**
the number of consumers	
the number of food chains	

[1]

(b) The oceans and forests help in the cycling of carbon in our ecosystem. Define the term carbon sink and describe the importance of the oceans as a carbon sink.

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……..... [3]

(c) Scientists observing the kingfishers did a blood test on them and discovered high levels of the pesticide, DDT accumulating in their bodies. They noticed that the kingfishers frequently preyed along the rivers near a farming community.

Explain how the excessive use of DDT by the farmers affects the survival of the kingfishers.

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……..... [4]

[Total marks = 10]

[Turn Over

8 Either

(a) Distinguish between asexual reproduction and sexual reproduction in flowering plants.

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(b) **Fig. 8.1** below shows the flower of a plant.

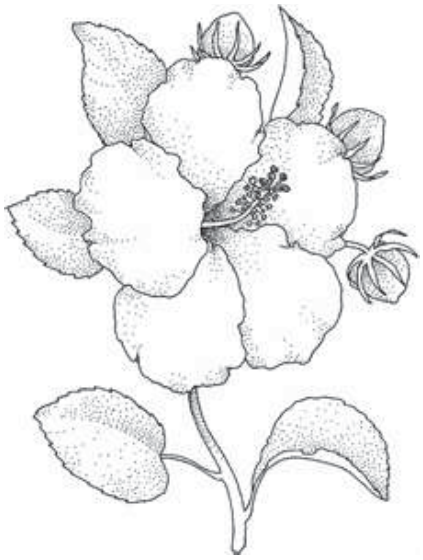

Fig. 8.1

Describe and explain two adaptations observed in **Fig. 8.1** that facilitate pollination of this flower.

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……... [2]

(c) Describe the processes that takes place in a flower from **Fig. 8** after it is successfully pollinated.

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……..

……... [4]

[Total marks = 10]

8 Or

(a) Describe the levels of hormone oestrogen and progesterone and its effect in the menstrual cycle.

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……... [5]

[Turn Over

(b) **Fig. 8.2** shows a section of a mother's uterus.

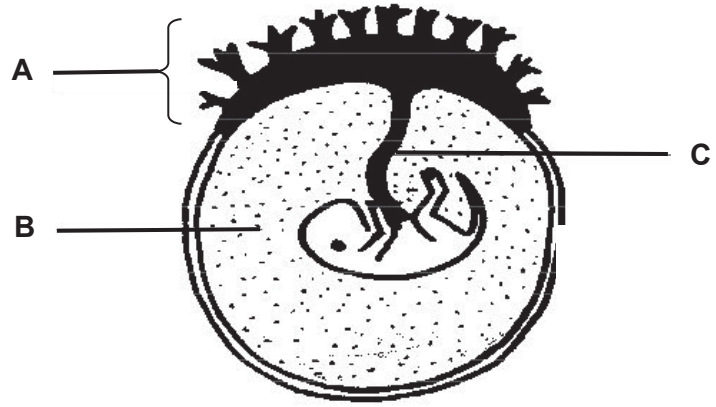

Fig. 8.2

With reference to structures **A**, **B** and **C**, describe how they help to support the growth and development of the foetus during pregnancy.

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……..... [5]

[Total marks = 10]

- - - - - End of Section B - - - - -
- - - - - End of Paper - - - - -