Geylang Methodist School (Secondary)
Preliminary Examination 2024

SCIENCE (CHEMISTRY, BIOLOGY) **5088/01**

Paper 1 Multiple Choice **Sec 4 Express**

1 hour

Additional Materials: Multiple Choice Answer Sheet **15 August 2024**

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, index number and class on the Answer Sheet in the spaces provided.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers, **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separatel Answer Sheet.

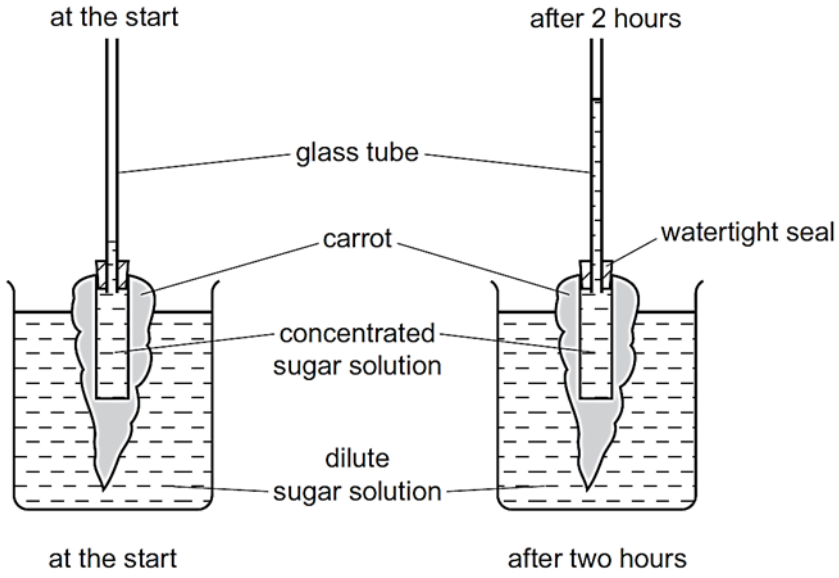
Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough work should be done in this booklet.

A copy of the Data Sheet is printed on page 17.
A copy of the Periodic Table is printed on page 18.

The use of an approved scientific calculator is expected, where appropriate.

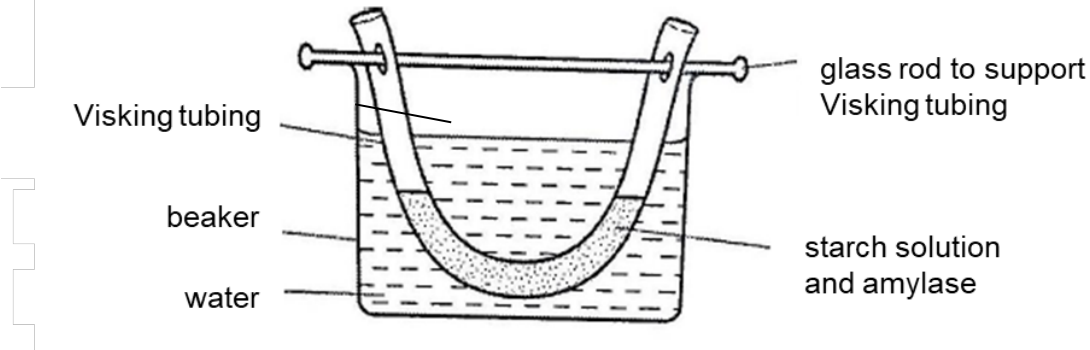
21 The diagram shows the movement of a concentrated sugar solution up a glass tube. The glass tube is connected to a hollowed-out carrot.



Why does the sugar solution in the glass tube rise?

A Sugar molecules moved across the carrot tissue into the beaker.
B Sugar molecules moved across the carrot tissue into the glass tube.
C Water molecules moved across the carrot tissue into the beaker.
D Water molecules moved across the carrot tissue into the glass tube.

22 An experiment was carried out to investigate digestion and absorption in the alimentary canal. The diagram shows the apparatus used. The Visking tubing is partially permeable.



After one hour, samples of water in the beaker are tested with Benedict's solution and iodine solution respectively.

Which row shows the correct results?

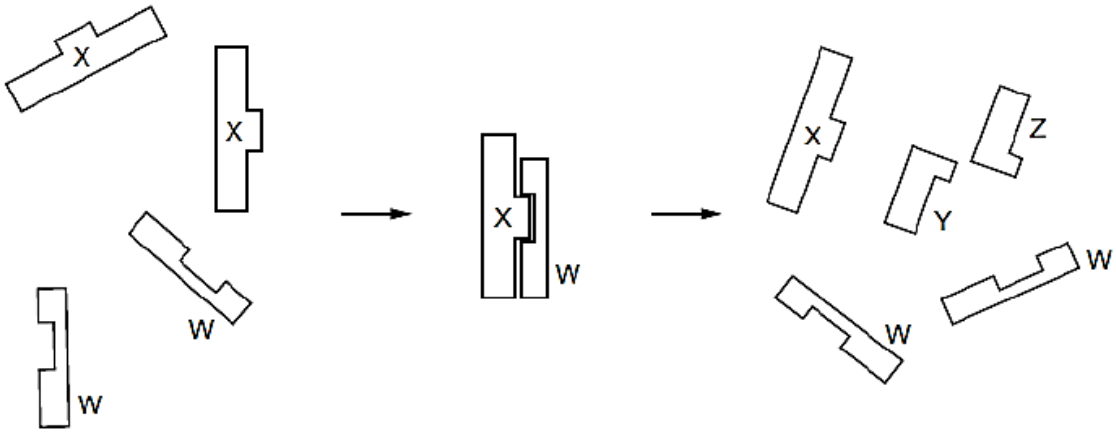
	Benedict's solution	iodine solution
A	blue	blue-black
B	blue	yellowish-brown
C	brick red precipitate formed	blue-black
D	brick red precipitate formed	yellowish-brown

23 A student tested four samples of food, **A**, **B**, **C** and **D**, for the presence of nutrients. One of the food samples, egg white, was found to test positive for protein but tested negative for fats.

Which of the food samples, shown in the results below is egg white?

	observation	
	biuret test	emulsion test
A	blue	clear
B	blue	milky emulsion
C	purple	clear
D	purple	milky emulsion

24 The diagram illustrates the 'lock and key' hypothesis of enzyme action.



Which of the following shows the enzyme, product and substrate?

	enzyme	product	substrate
A	W	X	Y and Z
B	W	Y and Z	X
C	X	W	Y and Z
D	X	Y and Z	W

25 The diagram represents the digestion of a type of nutrient S.

Which of the following shows the correct identity of S, T and U?

	S	T	U
A	maltose	maltase	glucose
B	polypeptide	protease	amino acid
C	protein	protease	polypeptide
D	starch	amylase	maltose

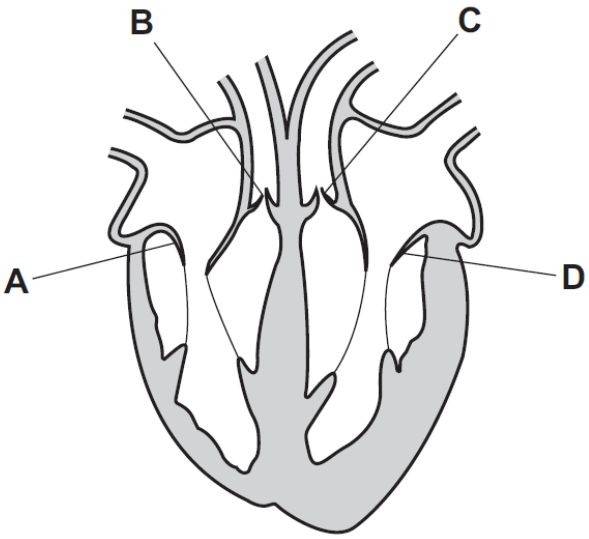
26 Which of the following comparisons about the blood contents in the hepatic vein and hepatic portal vein after a meal is/are correct?

	hepatic vein	hepatic portal vein
1	more oxygen	less oxygen
2	more urea	less urea
3	less carbon dioxide	more carbon dioxide
4	less waste products	more waste products
5	less glucose	more glucose

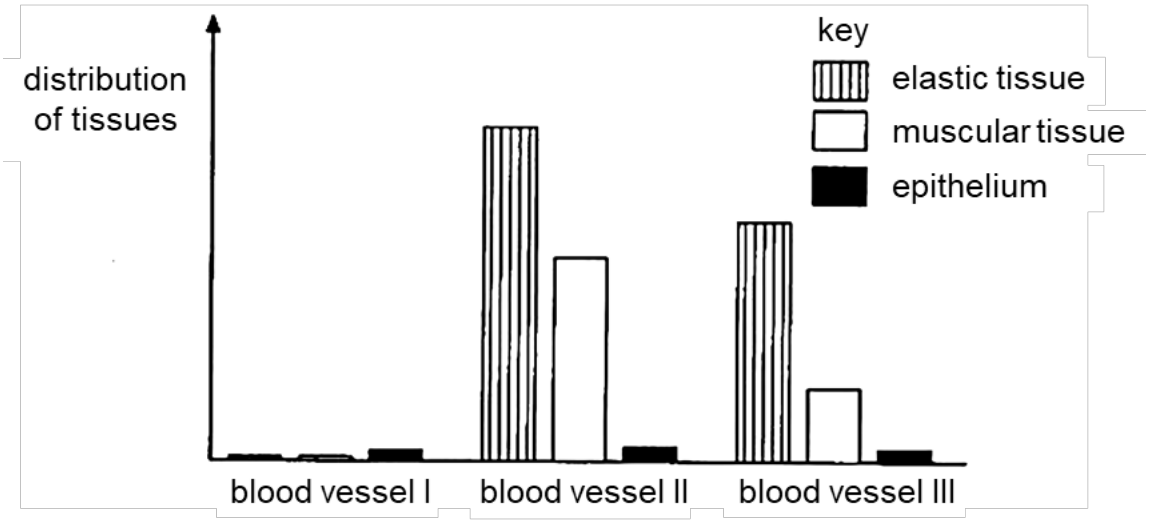
A 1 and 5
B 2 and 5
C 2 and 4
D 1, 3 and 4

27 The diagram shows a section through the heart.

During ventricular contraction, which valve must be closed to ensure that blood will flow to all body parts?



28 The bar chart shows the distribution of tissues in three main types of blood vessels in the human body.



Which row correctly identifies blood vessels I, II, III?

	blood vessel I	blood vessel II	blood vessel III
A	artery	vein	capillary
B	artery	capillary	vein
C	capillary	vein	artery
D	capillary	artery	vein

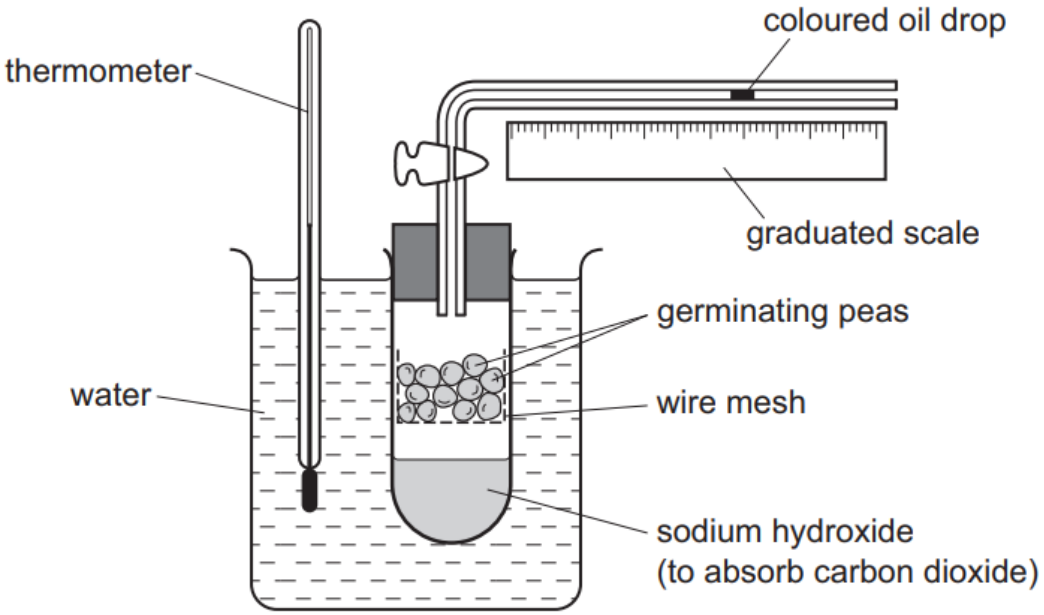
29 Which of the following lifestyle habits is most strongly associated with an increased risk of coronary heart disease?

A adequate sleep
B balanced diet
C regular exercise
D smoking

30 Which row is correct for anaerobic respiration of glucose in human muscle?

	carbon dioxide produced	lactic acid produced	water produced	energy yield
A	✓	✓	✗	low
B	✓	✗	✓	high
C	✗	✓	✗	low
D	✗	✗	✓	high

31 The diagram shows apparatus used to investigate respiration.



Which change will be seen and what is the explanation?

	change	explanation
A	oil drop moves right	peas release carbon dioxide
B	oil drop does not move	oxygen is used up as fast as carbon dioxide is released
C	oil drop does not move	carbon dioxide is absorbed
D	oil drop moves left	oxygen is used up by the peas

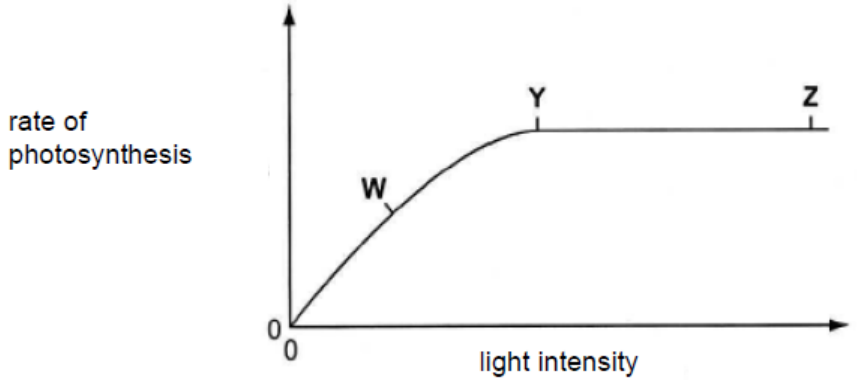
32 Which is an effective treatment for pneumococcal disease?

A antibiotics
B anti-viral drugs
C quarantine
D vaccine

33 An investigation was carried out on the effect of light intensity on the rate of photosynthesis.

Throughout the experiment, all other factors affecting photosynthesis were kept constant.

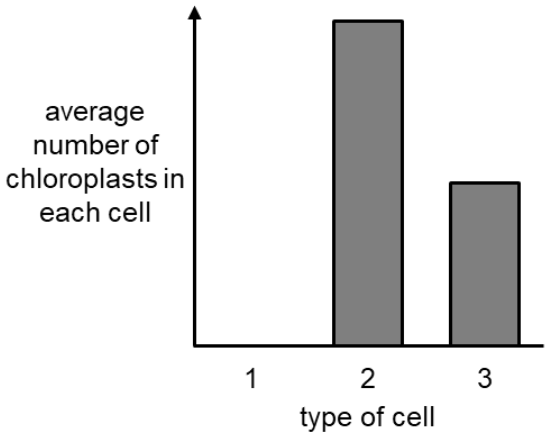
The results are shown on the graph.



What do these results show?

A Light does not limit the rate of photosynthesis.
B Light limits the rate of photosynthesis at point **W**.
C Light limits the rate of photosynthesis at point **Y**.
D Light limits the rate of photosynthesis at point **Z**.

34 The bar chart shows the average number of chloroplasts in each of three different types of leaf cell.

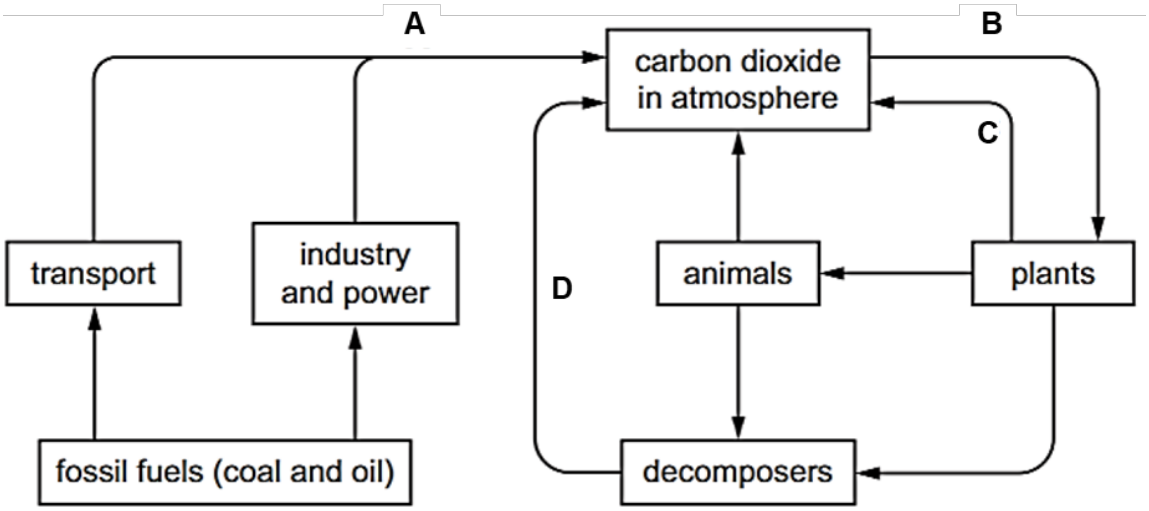


What are three types of cells?

	1	2	3
A	epidermal cell	palisade mesophyll cell	spongy mesophyll cell
B	palisade mesophyll cell	spongy mesophyll cell	epidermal cell
C	spongy mesophyll cell	epidermal cell	palisade mesophyll cell
D	spongy mesophyll cell	palisade mesophyll cell	epidermal cell

35 The diagram shows part of the carbon cycle.

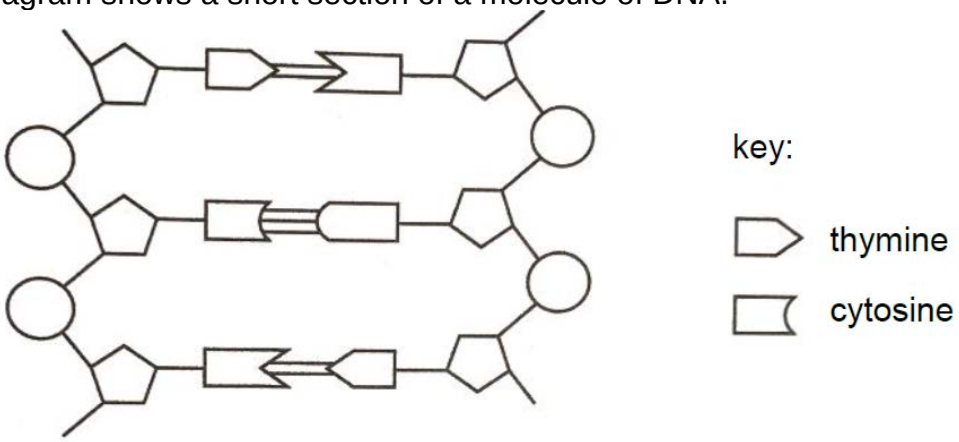
Which process represents photosynthesis?



36 What is one major consequence of deforestation on the global climate?

A decreased atmospheric carbon dioxide
B increased atmospheric oxygen
C increased greenhouse gas emissions
D increased rainfall

37 The diagram shows a short section of a molecule of DNA.



Which row identifies the shapes used in this diagram?

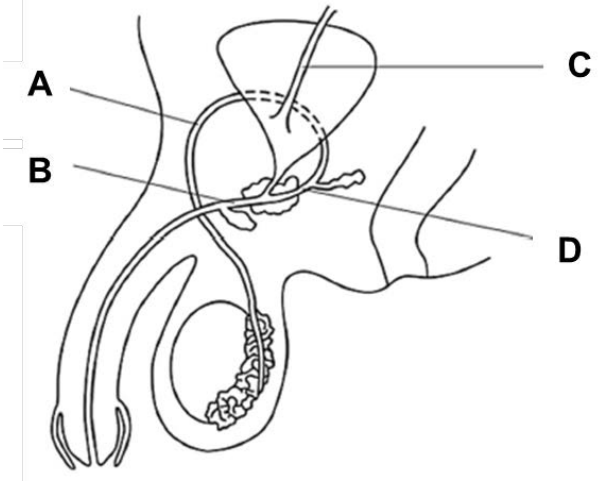
	shape			
	○	⬠	⬎	▭
A	phosphate	sugar	adenine	guanine
B	phosphate	sugar	guanine	adenine
C	sugar	phosphate	adenine	guanine
D	sugar	phosphate	guanine	adenine

38 A gene is a unique sequence of ___(i)___ that directs the ___(ii)___ .

	(i)	(ii)
A	amino acids	functions of a specific protein
B	nucleotides	synthesis of a specific polypeptide
C	DNA	synthesis of new DNA strands
D	chromatin	function of a nucleotide

39 The diagram shows the reproductive system of a human male.

Which tube carries both sperms and urine?



40 How do condoms reduce the risk of HIV infection?

A They prevent semen from coming into contact with the vagina wall.
B They prevent sperm from entering the vagina.
C They prevent the formation of seminal fluid.
D They prevent virus particles crossing the placenta.

End-of-Paper

Geylang Methodist School (Secondary)
Preliminary Examination 2024

Candidate Name			
Class		Index Number	

SCIENCE (CHEMISTRY, BIOLOGY) 5088/04

Paper 4 Biology **Sec 4 Express**

Candidates answer on the Question Paper. **1 hour 15 minutes**

No Additional Materials are required.

7 August 2024

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.
You may use an HB pencil for any diagrams or graphs.
Write in dark blue or black pen.
Do not use staples, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.
You may lose marks if you do not show your working or if you do not use appropriate units.

Section A
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

Section B
Answer **one** question.
Write your answers in the spaces provided on the question paper.

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

For Markers' Use	
Section A	**55**
Section B	**10**
TOTAL	**65**

This question paper consists of **18** printed pages and **2** blank pages.

[Turn over

Section A

Answer **all** questions in the spaces provided.

1 Fig. 1.1. shows some muscle cells.

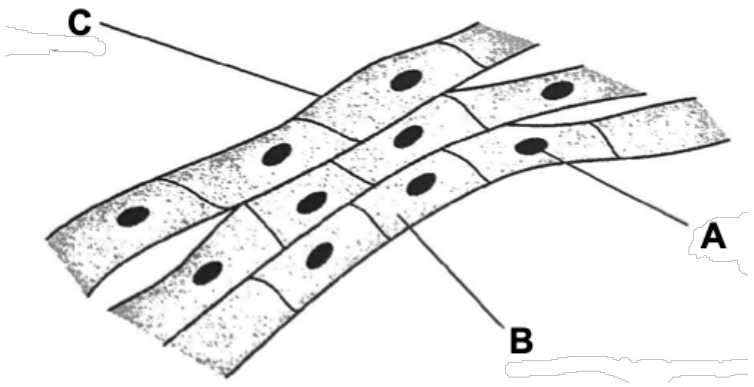


Fig. 1.1

(a) Name structures **A** and **B**.

A …… **B** …… [2]

(b) State the function of structure **C**.

……

……
[1]

(c) Compare and contrast the structure of a muscle cell and a root hair cell.

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[2]

(d) Name **one** organelle in a muscle cell not shown in Fig. 1.1 and explain how this organelle helps the muscle cell in carrying out muscular contractions.

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[2]

[Total: 7]

2 Lactose is found in cows' milk. Some people do not have the enzyme to digest lactose.

Fig 2.1 shows a flow diagram for the production of lactose-free milk.

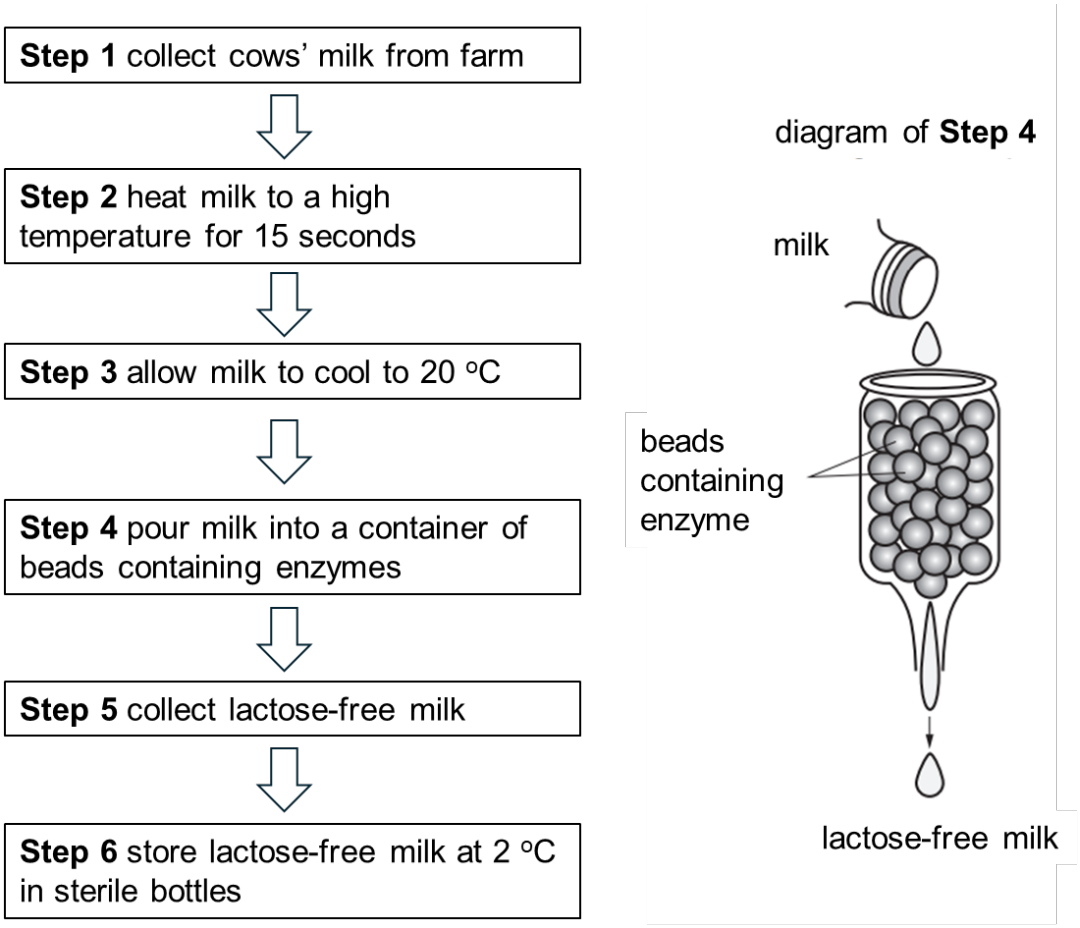

Fig 2.1

(a) Explain how heating the milk in **step 2** in Fig. 2.1 ensures the hygienic preparation of lactose-free milk.

……

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[1]

(b) Explain why the milk must be cooled in **step 3** before it makes contact with the enzymes.

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[2]

(c) Suggest the name of the enzyme used to make lactose-free milk in **step 4**.

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[1]

(d) State **one** characteristic of enzymes which is not shown in Fig. 2.1.

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[1]

[Total: 5]

3 **(a)** Fig. 3.1 is a diagram of the digestive system.

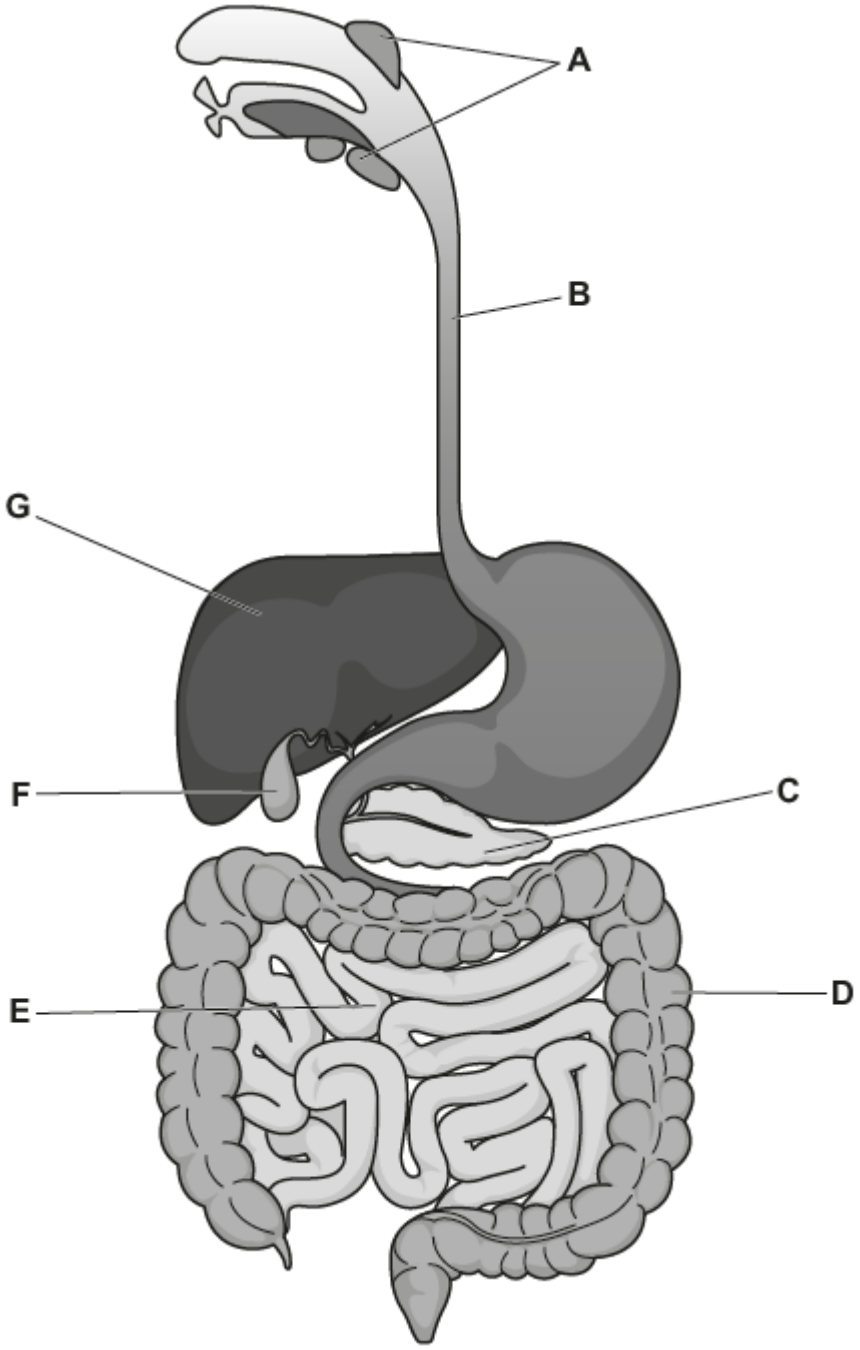

Fig. 3.1

(i) State the letter from Fig. 3.1 that represents:

where salivary amylase is produced .....

where insulin is produced .....

where bile is produced .....

where protease acts ..... [2]

(ii) State **one** function of the hydrochloric acid in the stomach.

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……
[1]

(b) Glucose is one of the products of digestion.

Describe the formation of glucose from starch in the human digestive system, naming the enzymes involved.

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[3]

(c) Explain why a person suffering from type 2 diabetes mellitus is advised to eat food that contains less starch.

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[2]

[Total: 8]

4 Fig. 4.1 shows an alveolus and a nearby capillary in a human lung.

Fig. 4.1

(a) On Fig. 4.1, draw arrows to indicate the flow of oxygen and carbon dioxide between the alveolus and the capillary.

Label your arrows clearly. [2]

(b) Describe and explain an adaptation of the alveolus that enables it to carry out its function efficiently.

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[2]

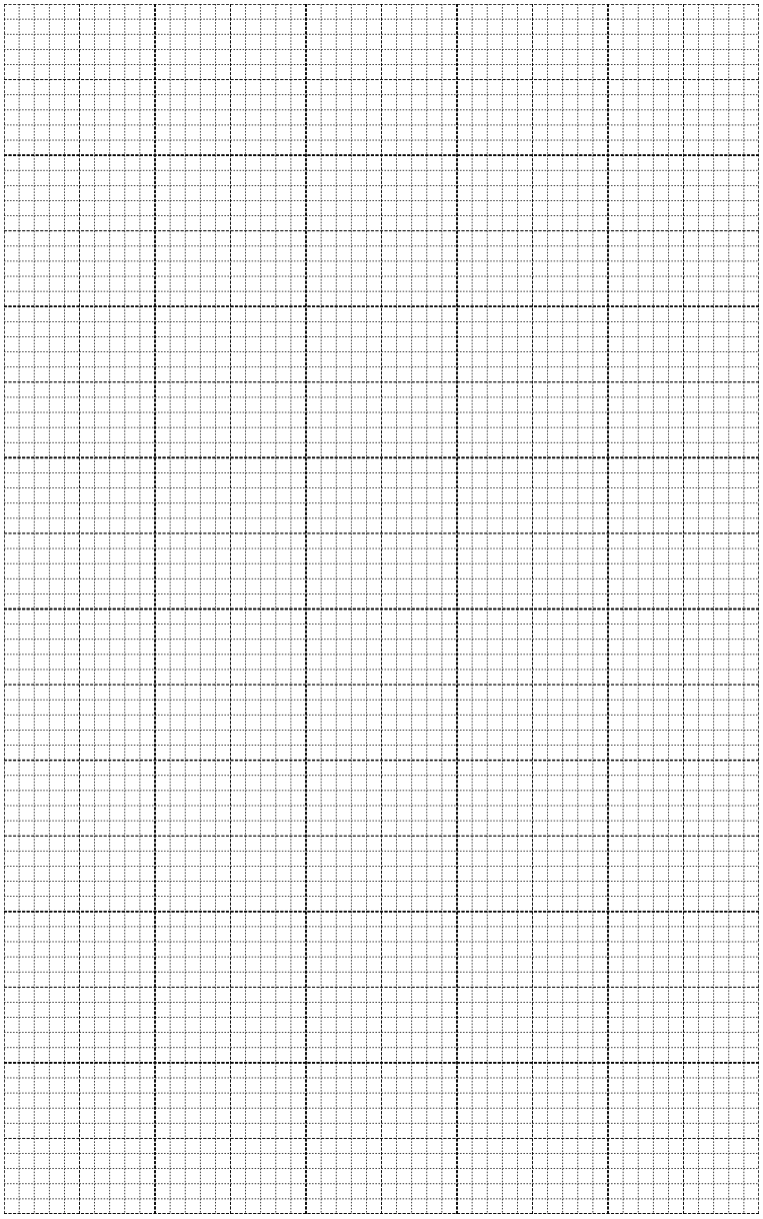
[Total: 4]

5 Table 5.1 shows data collected from an experiment carried out to investigate how varying the diameter of the stomata and the wind speed can affect the rate of transpiration from a leaf of a plant at a constant temperature of 27 ºC.

Table 5.1

diameter of stomata / μm	rate of transpiration / g per m^2 per hour	
	in still air	in wind
0	0	0
4	1.0	3.6
8	1.8	5.8
12	2.3	6.9
16	2.5	7.5
20	2.5	7.6

(a) Plot a graph of the rate of transpiration against the diameter of stomata in still air and in the presence of wind on the grid below. [4]



(b) Use your graph to predict the rate of transpiration in still air when the stomata have a width of 10 μm.

…… g per m^2 per hour [1]

(c) Using the information from the graph, describe the relationship between the width of stomata and the rate of transpiration in still air.

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[2]

(d) Describe and explain why the rate of transpiration in wind differs from the rate in still air.

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[3]

(e) Name **one other** factor that will affect the rate of transpiration from the leaf of a plant.

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[1]

[Total: 11]

6 Fig. 6.1 shows a pyramid of numbers for a food chain.

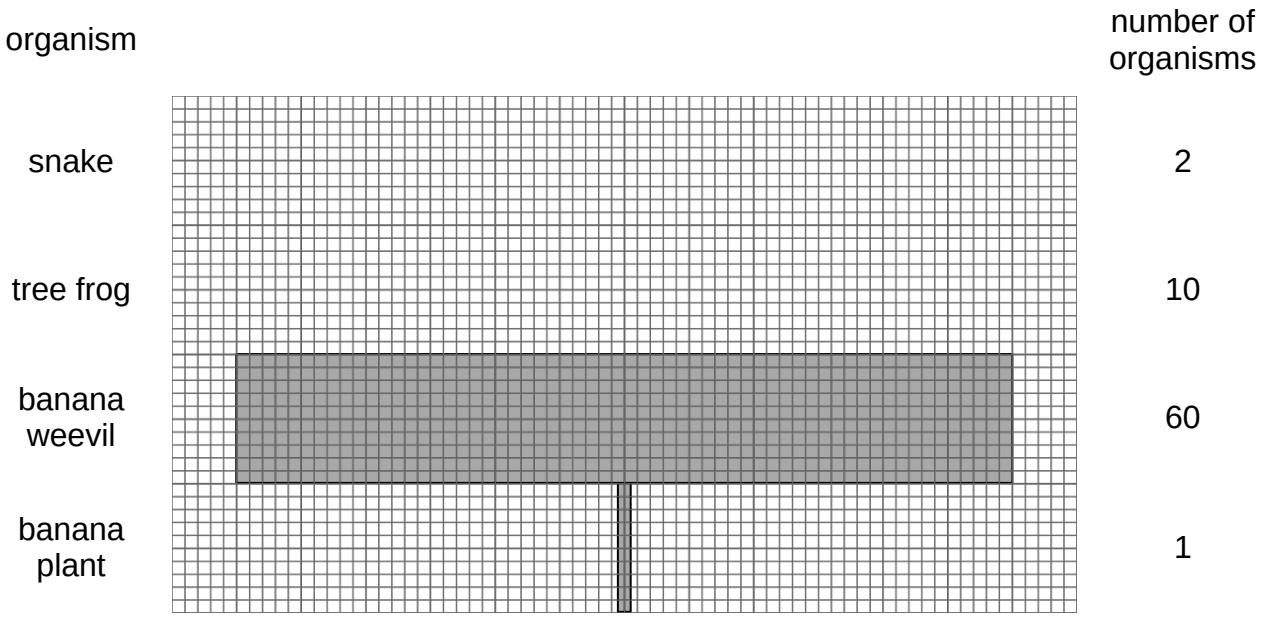

Fig. 6.1

(a) Use the information in Fig. 6.1 to complete the pyramid of numbers. [1]

(b) Write the food chain for the pyramid of numbers shown in Fig. 6.1

……

[1]

(c) Identify the number of trophic levels in Fig. 6.1.

……

[1]

(d) Sketch the pyramid of biomass for the food chain in **(b)**.

[1]

[Total: 4]

7 Fig. 7.1 shows the female reproductive system in humans.

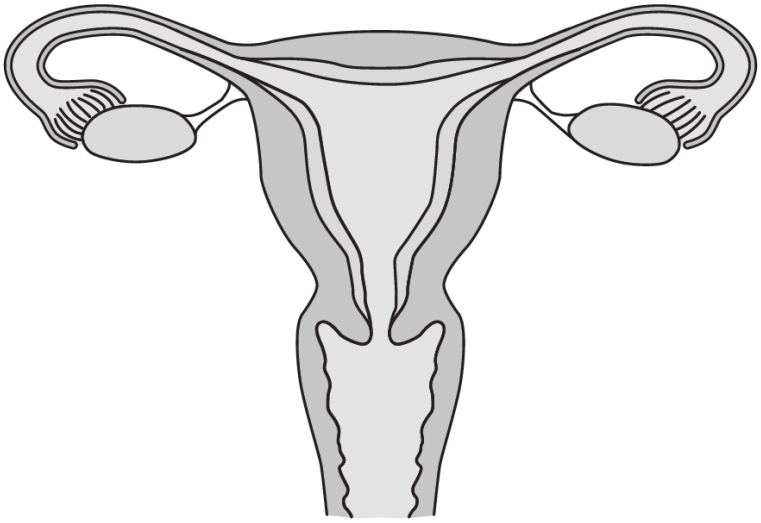

Fig. 7.1

(a) On Fig. 7.1,

(i) Draw a line and label it with the letter '**F**' to show where fertilisation occurs. [1]

(ii) Draw a line and label it with the letter '**Z**' to show where implantation of the embryo is at. [1]

(b) Fig. 7.2 shows the changes in the thickness of the uterus lining during a menstrual cycle.

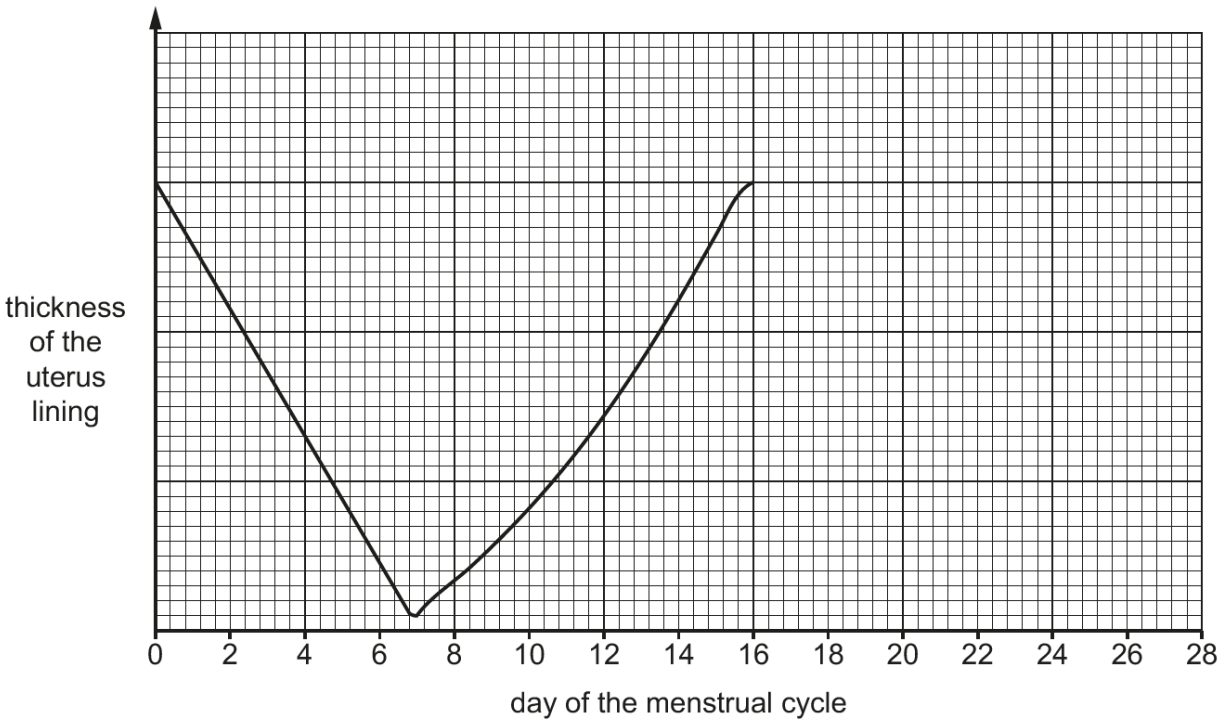

Fig. 7.2

(i) With reference to Fig. 7.2, state the number of days during which the uterus lining is shed.

……
[1]

(ii) Complete the graph in Fig. 7.2 to show the thickness of the uterus lining between day 16 and 28. [1]

(iii) Explain your answer in **(b)(ii)** with reference to a named hormone.

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[2]

[Total: 6]

8 Sickle cell anaemia is a condition where haemoglobin molecules have lowered oxygen-binding capacity (sickle cell haemoglobin).

The allele for normal haemoglobin production is dominant and is represented by **H**.

The allele for sickle cell haemoglobin production is recessive and is represented by **h**.

(a) State the type of mutation that results in sickle cell anaemia.

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[1]

(b) Suggest why an individual who has sickle cell anaemia should not exercise vigorously.

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……

……
[2]

(c) Two individuals with the genotypes Hh and hh would like to start a family.

(i) Complete the Punnett square to show the parental gametes and the possible genotypes of the offspring.

		parental gametes	
parental gametes			

[2]

(ii) Using your answer to (c)**(i)**, state the percentage of the offspring having sickle cell anaemia.

……
[1]

(iii) The two individuals have four children. None of them has sickle cell anaemia.

Suggest a reason why.

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[1]

(d) In 2014, a study was carried out in Uganda to investigate the relationship between having the sickle cell allele and being affected by malaria.

People who get malaria are typically sick with high fevers, shaking chills and flu-like illness. It can be fatal.

Table 8.1 shows the percentage of three different groups of individuals (normal, carriers of sickle cell allele and those with sickle cell anaemia) having malaria.

Table 8.1

		percentage of individuals / %	
	genotype	malaria	no malaria
normal	**HH**	78	22
carriers of sickle cell allele	**Hh**	51	49
sickle cell anaemia	**hh**	33	67

With reference to Table 8.1, describe the relationship between having the sickle cell allele and being affected with malaria.

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[2]

(e) The type of variation shown by the sickle cell anaemia is discontinuous.

State another example of discontinuous variation in humans.

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[1]

[Total: 10]

End of Section A

Section B

Answer **one** question from this section.

9 Red blood cells are specialised cells that transport oxygen.

(a) Some students investigated the effect of immersing red blood cells in different concentrations of salt solution.

They measured the diameters of samples of red blood cells and calculated the mean.

They then immersed each red blood cell sample in a different concentration of salt solution.

After two minutes they measured and calculated the mean of the samples again.

Table 9.1 shows the results.

Table 9.1

percentage concentration of the salt solution	mean initial diameter of the red blood cells / μm	mean diameter of the red blood cells after two minutes / μm
0.4	7.5	cells burst
0.8	7.5	8.2
0.9	7.5	7.5
1.8	7.5	6.0

(i) Name the process that causes the change in the red blood cells.

……
[1]

(ii) Calculate the percentage increase in the mean diameter of red blood cells that were immersed in the 0.8% salt solution.

Give your answer to **two** significant figures.

…… % [1]

(iii) Explain the results for the red blood cells that were immersed in the 1.8% salt solution.

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[2]

(iv) State why there was no change in the mean diameter of the red blood cells immersed in the 0.9% salt solution.

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[1]

(v) Describe and explain the difference in results if the red blood cells were replaced with plant cells in the 0.4% salt solution.

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[3]

(b) Describe and explain **two** ways that the red blood cell is adapted for its function.

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[2]

[Total: 10]

10 **(a)** Table 10.1 shows the components of blood of a healthy person and an infected person.

Table 10.1

blood component	percentage in blood / %	
	healthy person	infected person
blood plasma	55	55
red blood cells	43	40
white blood cells	1	3
platelets	1	1

With reference to Table 10.1, describe the difference in the white blood cells in a healthy person and an infected person.

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[2]

(b) Describe the functions of the two types of white blood cells.

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[3]

(c) Sepsis is a life-threatening condition that happens when the body's immune system has an extreme response to an infection, causing organ dysfunction. Bacterial infections are one of the most common causes of sepsis. A person can die from septic shock when the bacteria count becomes too high.

Describe and explain how antibiotics can be used to treat sepsis.

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[3]

(d) Suggest **two** methods to reduce the spread of infectious diseases.

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[2]

[Total: 10]

End of Paper

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For Answer please email :

LAPOOPOO555@GMAIL.COM

to share with you.