| Surname | Centre Number | Candidate Number |
|---|---|---|
| Other Names | | 0 |

# GCSE

3430U10-1

S19-3430U10-1

**FRIDAY, 7 JUNE 2019 – AFTERNOON**

## SCIENCE (Double Award)

## Unit 1: BIOLOGY 1
### FOUNDATION TIER

1 hour 15 minutes

| For Examiner's use only | | |
|---|---|---|
| **Question** | **Maximum Mark** | **Mark Awarded** |
| **1.** | **12** | |
| **2.** | **11** | |
| **3.** | **6** | |
| **4.** | **8** | |
| **5.** | **8** | |
| **6.** | **6** | |
| **7.** | **9** | |
| **Total** | **60** | |

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**ADDITIONAL MATERIALS**

In addition to this paper you may require a calculator and a ruler.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen. Do not use gel pen. Do not use correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page at the back of the booklet, taking care to number the question(s) correctly.

**INFORMATION FOR CANDIDATES**

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

Question **4***(b)*(ii) is a quality of extended response (QER) question where your writing skills will be assessed.

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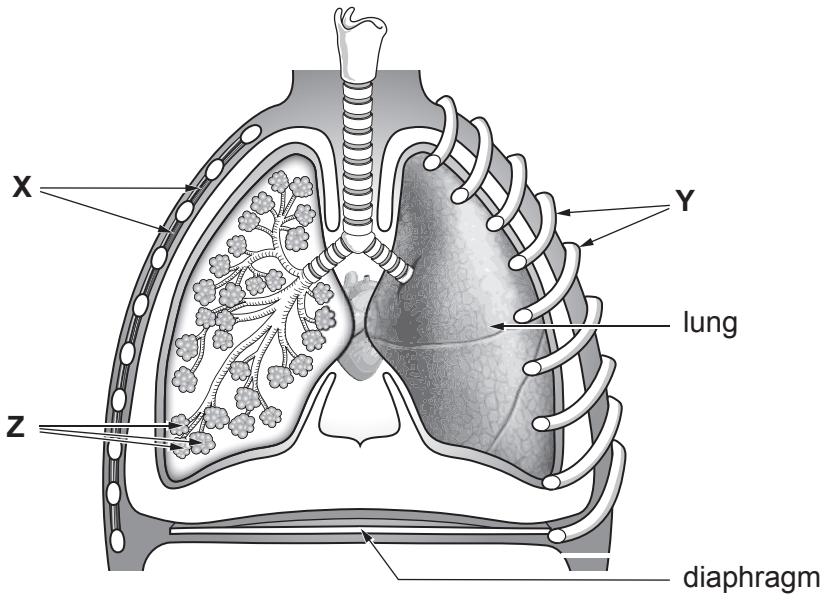
*Answer* **all** *questions.*

**1.** *(a)* The diagram shows the human thorax after breathing in.




(i) State the name of the structures labelled:

**X** ..... [1]

**Y** ..... [1]

(ii) The structures labelled **Z** are the sites of gas exchange.
State the name of the structures labelled **Z**. [1]

.....

(iii) Complete the following sentences by choosing the correct words from the list. [2]

**decreases** **contracts** **relaxes** **increases**

When we breathe **out**, the diaphragm ..... and becomes dome shaped. As a result, pressure in the thorax ..... , so air is forced out of the lungs.



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(iv) Choose the letter (**A-C**) that shows the pathway of air from the lungs when we breathe **out**. [1]

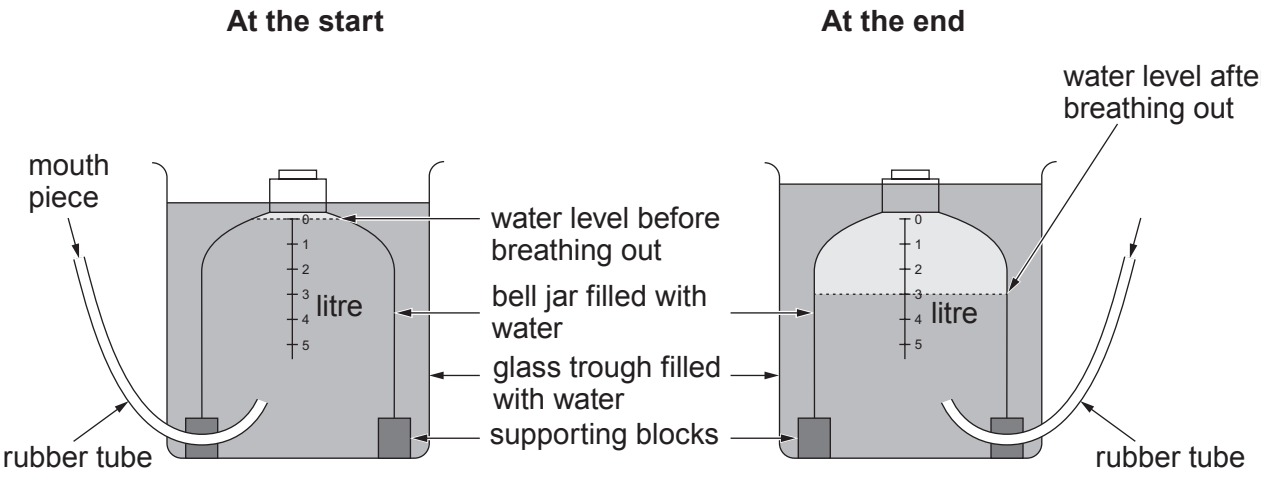
**A** trachea ⟶ bronchus ⟶ bronchiole

**B** bronchus ⟶ trachea ⟶ bronchiole

**C** bronchiole ⟶ bronchus ⟶ trachea

Answer letter = .....

*(b)* The maximum volume of air that can be breathed out in one breath is called the vital capacity. The diagram shows apparatus that Lowri used to measure her vital capacity.




Describe how Lowri used the apparatus above to measure her vital capacity. [2]

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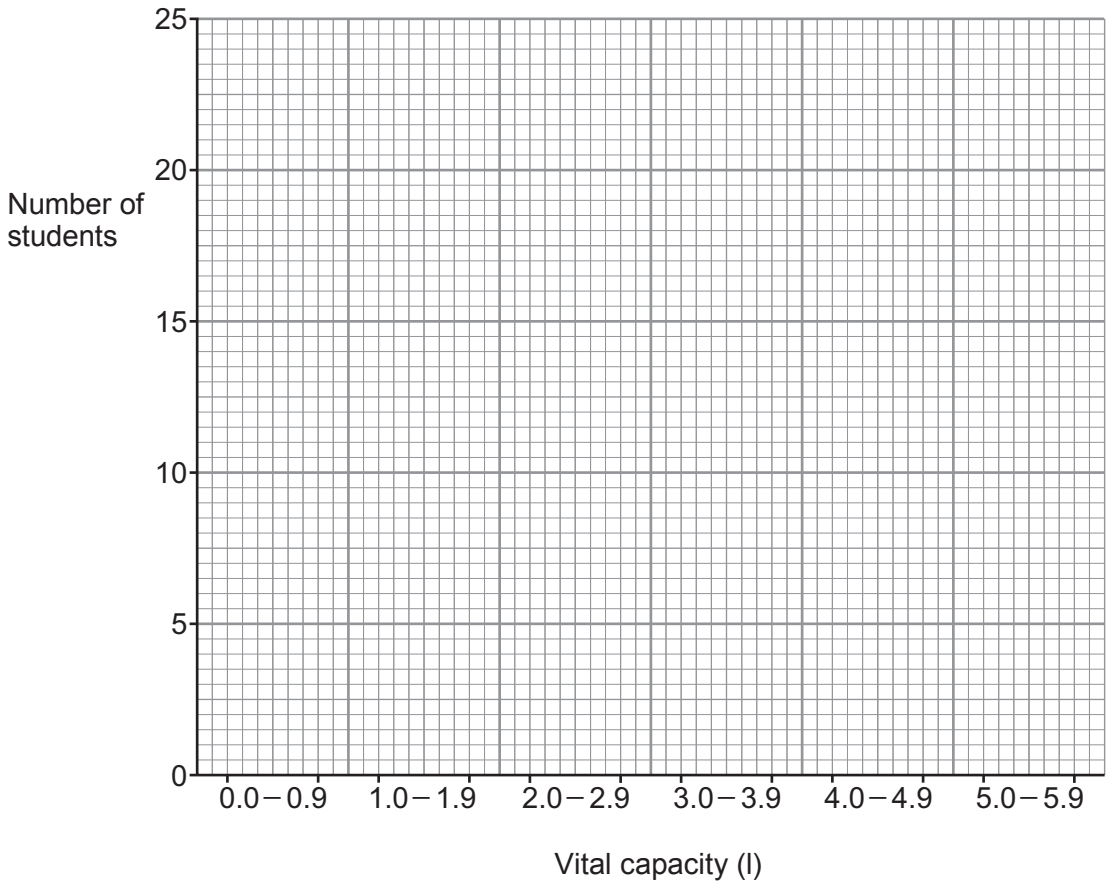
*(c)* The table shows the vital capacities of some students in a school. The vital capacities were measured to the nearest 0.1 litre.

| Vital capacity (l) | Number of students |
|---|---|
| 0 - 0.9 | 5 |
| 1.0 - 1.9 | 9 |
| 2.0 - 2.9 | 20 |
| 3.0 - 3.9 | 8 |
| 4.0 - 4.9 | 23 |
| 5.0 - 5.9 | 7 |

(i) Use a ruler to draw a bar chart of the results on the grid. [2]



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(ii) Suggest **two** possible reasons to account for the variation in vital capacity. [2]

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**Turn over.**

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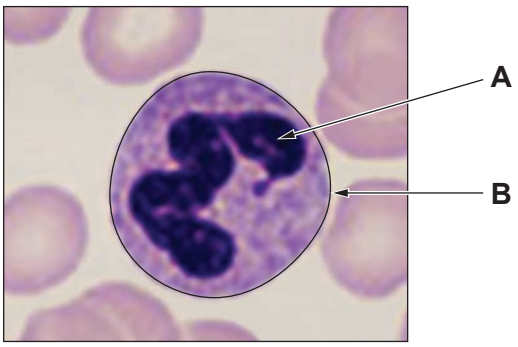
**2.** *(a)* The photograph shows one labelled blood cell from the circulatory system.




(i) Complete the table by stating the name and function of structures **A** and **B**. [4]

| Structure | Name | Function |
|---|---|---|
| **A** | ..... | ..... ..... |
| **B** | ..... | ..... ..... |

(ii) The cell contains many mitochondria. State the function of mitochondria. [1]

.....

*(b)* Complete the table below by using words **from the list** to identify an **organ**, and a **cell** from the **human circulatory system**. [1]

**heart** **lung** **palisade** **trachea** **phagocyte**

| Organ system | Organ | Tissue | Cell |
|---|---|---|---|
| circulatory | ..... | muscle | ..... |



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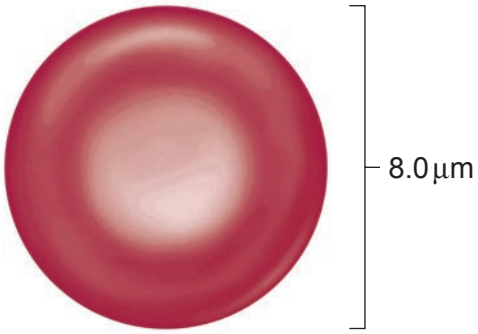
*(c)* The diagram below shows a red blood cell.




(i) I. Complete the following calculation. [1]

diameter of red blood cell = 8.0 µm

radius (r) = 4.0 µm

Radius$^2$ = ..... µm

II. Use your answer to part I. and the formula 3.14 × radius$^2$, to calculate the surface area of one side of a red blood cell to the **nearest whole number**. [1]

Surface area of one side of red blood cell = ..... µm$^2$

(ii) Red blood cells have a large surface area.
State the function of red blood cells and suggest how a large surface area helps red blood cells to be more efficient. [2]

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(iii) Red blood cells are specialised cells.
Give the meaning of the term *specialised cell*. [1]

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11

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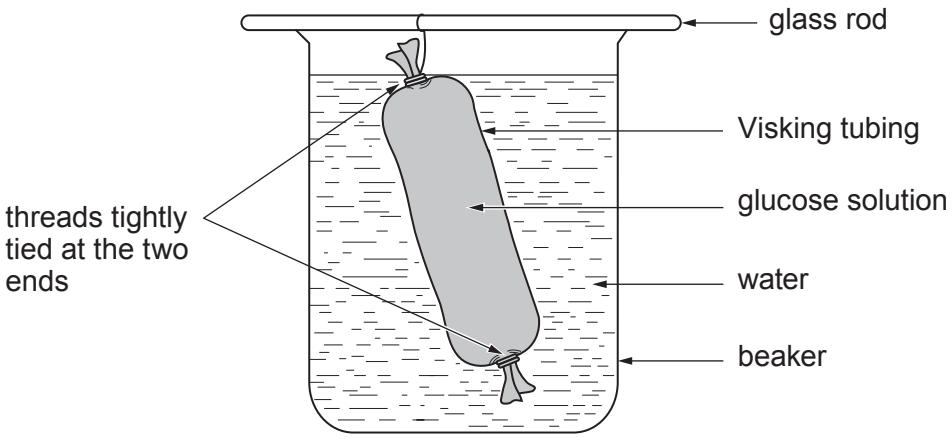
**3.** Visking tubing has small pores (holes) in its membrane. Students investigated the movement of molecules through membranes using Visking tubing.
The students set up the apparatus shown below.




They took samples of water from the beaker at the start and at 15 minutes.

They tested the samples for the presence of glucose using Benedict's reagent.
The results are shown in the table.

| Test | Observations | |
|---|---|---|
| | at the start | at 15 minutes |
| Benedict's reagent | blue | brick red |

*(a)* From the table:

(i) State the conclusion that can be made from the Benedict's test observation **at the start**. [1]

.....

(ii) Explain the observations at 15 minutes for the Benedict's test. [2]

.....

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*(b)* During the investigation, a number of processes occurred.
Use the information opposite to complete the following table by writing **true** or **false** against **each** statement. One has been done for you. [3]

| Statement | **True** or **false** |
|---|---|
| The water in the beaker became a solution. | ..... |
| The concentration of the glucose solution in the tubing increased. | ..... |
| Osmosis occurred. | true |
| Water molecules passed through the membrane. | ..... |
| The number of water molecules in the tubing increased. | ..... |

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**4.** Lichens can be used as indicators of the level of air pollution.

There are three types of lichen – bushy, leafy and crusty.
The photograph shows the three types of lichen.

bushy leafy crusty

The table below shows how the presence (✓) or absence (x) of each type of lichen in an area allows an assessment to be made of the level of air pollution.

| Type of lichen | No pollution | Low pollution | Moderate pollution | High pollution |
|---|---|---|---|---|
| bushy | ✓ | x | x | x |
| leafy | ✓ | ✓ | x | x |
| crusty | ✓ | ✓ | ✓ | x |

*(a)* Sharon examined several trees in her school grounds. She used the photograph above to identify each type of lichen she found. She found only leafy and crusty lichens.

State the level of air pollution indicated by Sharon's findings. [1]

.....



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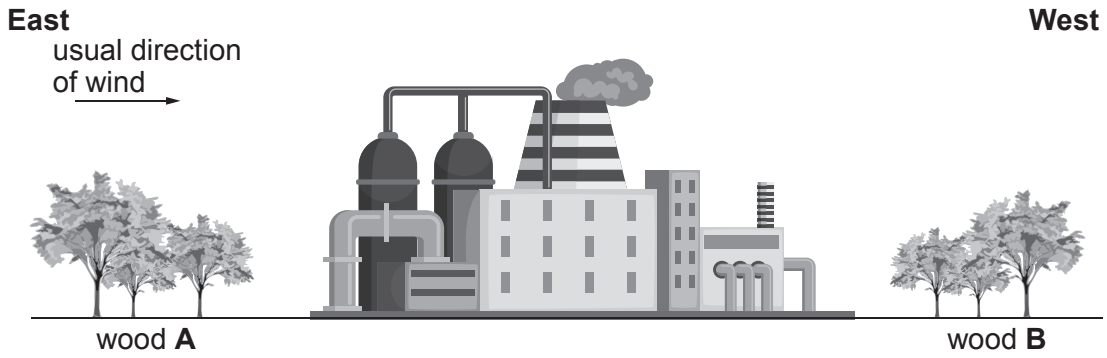
*(b)* The drawing shows two woods, **A** and **B**, separated by a factory.




Sharon investigated air pollution in the woods. She made the following hypothesis:
*'Air pollution is higher in wood **B** than in wood **A**'.*

(i) State the evidence in the drawing that Sharon used to make her hypothesis. [1]

.....

(ii) Using lichens on trees as indicators, design an investigation to test the hypothesis:
*'Air pollution is higher in wood **B** than in wood **A**'.*
Explain how you would use the results to support **or** disprove the hypothesis.
[6 QER]

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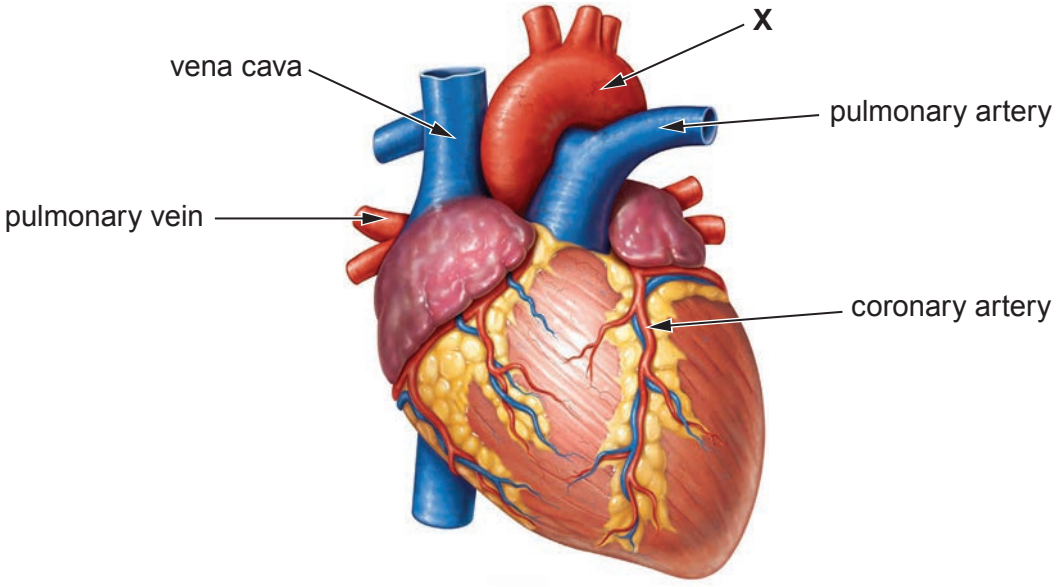
**5.** *(a)* The diagram shows the human heart.




(i) Blood vessel **X** is an artery carrying oxygenated blood from the heart at high pressure.
State the name of blood vessel **X**. [1]

.....

(ii) State the function of the coronary artery. [1]

.....

*(b)* Don investigated the effect of increasing intensity of exercise on the heart rate of three boys in his class, Dylan, Dewi and Dougie. His method is shown below.

1. He asked them to walk.
2. He counted their heart rate for one minute.
3. He repeated the method for jogging and then sprinting.

The results are shown in the table.

| | Heart rate (beats/minute) | | |
|---|---|---|---|
| | walking | jogging | sprinting |
| Dylan | 74 | 84 | 96 |
| Dewi | 82 | 88 | 98 |
| Dougie | 80 | 89 | 98 |
| Mean | 79 | 87 | 97 |



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(i) From the table:

I. State the relationship between increasing intensity of exercise and heart rate. [1]

.....

II. Explain the importance of the relationship for respiring muscle tissue. [2]

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(ii) Suggest **two** ways Don could improve his experimental method in order to make a **fair** comparison between the three boys. [2]

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(iii) Suggest **one** way that Don could develop his investigation to make his results more representative of the whole population of Wales. [1]

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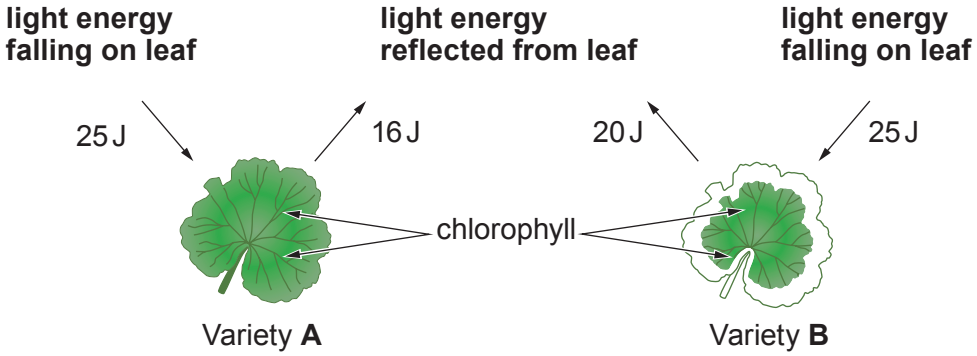
**6.** *(a)* Write the word equation for photosynthesis. [2]

.....

*(b)* The diagram shows leaves from two varieties of geranium **A** and **B** of the genus *Pelargonium*. Light energy falling on the two leaves and the light energy reflected from each leaf, during a period of one hour is also shown.




% light energy reflected

Variety **A** = 64%

Variety **B** = ..... %

Calculate the percentage of light energy falling on leaf **B** that is reflected.
**Write your answer in the diagram.** [2]

*Space for working.*



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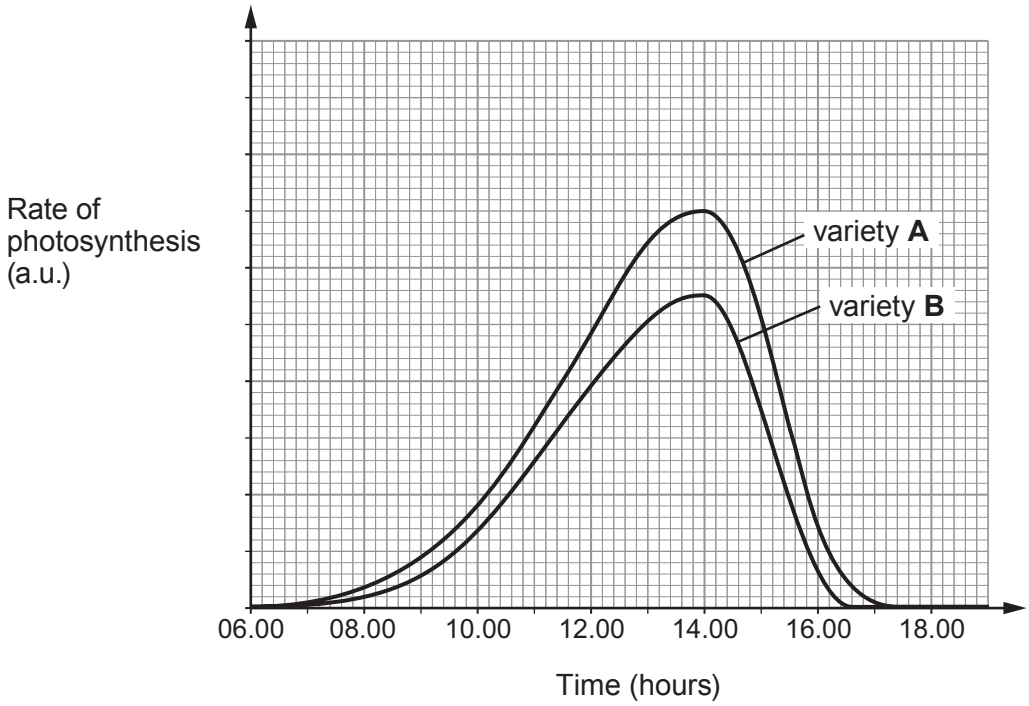
*(c)* The graph shows the rate of photosynthesis in the two plants between 06.00 hours and 18.00 hours.




Use the diagram opposite and the graph above to explain why the mass of variety **A** is likely to increase at a faster rate than the mass of variety **B**. [2]

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**7.** *(a)* (i) State the products of protein digestion. [1]

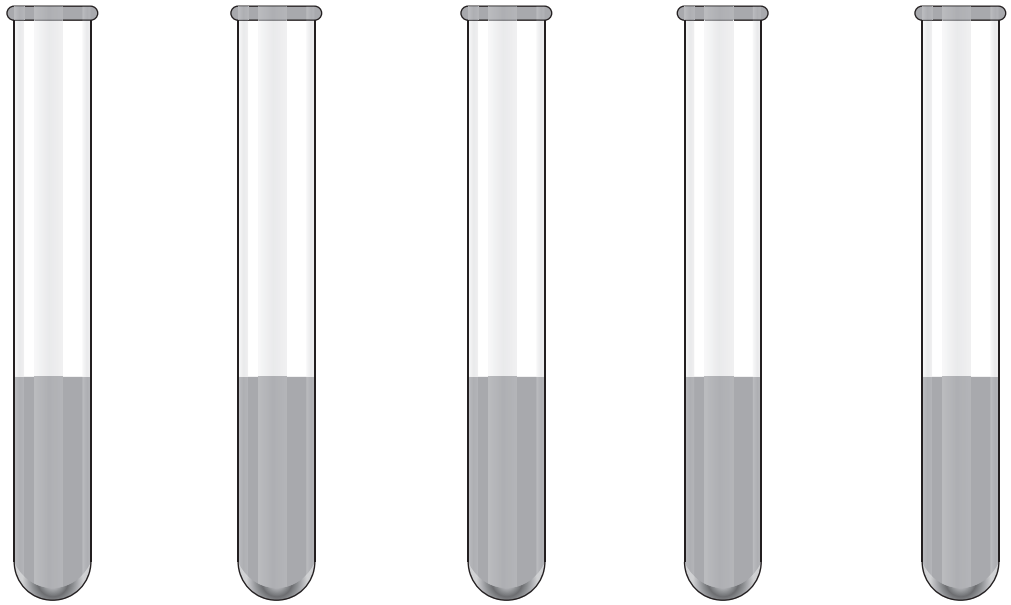
.....

(ii) State the part of the digestive system that absorbs digested food molecules. [1]

.....

*(b)* Protein digestion starts in the stomach.

Students investigated protein digestion. They set up five tubes **A** to **E**, as shown below.



**Tube** **A** **B** **C** **D** **E**

| Tube **A** | Tube **B** | Tube **C** | Tube **D** | Tube **E** |
|---|---|---|---|---|
| 5 $cm^3$ of 1% protein | 5 $cm^3$ of 1% protein | 5 $cm^3$ of 1% protein | 5 $cm^3$ of 1% protein | 5 $cm^3$ of 1% protein |
| 5 $cm^3$ of 0.1% protease | 15 $cm^3$ liquid from the stomach | 5 $cm^3$ of 0.1% protease | 15 $cm^3$ distilled water | 15 $cm^3$ distilled water |
| 10 $cm^3$ distilled water | | 10 $cm^3$ distilled water | | |
| pH 2.0 | | pH 7.0 | pH 2.0 | pH 7.0 |



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The students measured the percentage protein digested at one hour. The results are shown in the table.

| Tube | Percentage protein digested |
|---|---|
| **A** | 100 |
| **B** | 98 |
| **C** | 5 |
| **D** | 0 |
| **E** | 0 |

(i) Compare the results for tubes **A** and **D**. State the conclusion that can be made about the digestion of protein. [1]

.....

.....

(ii) State the conclusions that can be made about the contents of the liquid from the stomach in Tube **B**. [2]

.....

.....

.....

.....

(iii) All the 1% protein added to Tube **A** had been fully digested after one hour. State why the contents of Tube **A** would still test positive for protein. [1]

.....

.....

(iv) The students carried out a similar investigation, but instead of using 0.1% protease, they used 5 $cm^3$ of 0.1% lipase in both tubes **A** and **C**.
They found there had been no digestion of protein in either tube.
Use your knowledge of enzyme structure and function to explain the results that the students obtained. [2]

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(v) State **one** further variable that should be controlled during this investigation. [1]

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**END OF PAPER**

9



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| Question number | Additional page, if required. Write the question number(s) in the left-hand margin. |
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