Surname	StemUp Model Solution	Centre Number	Candidate Number
First name(s)			2

GCE AS

B400U20-1

S24-B400U20-1

THURSDAY, 23 MAY 2024 – MORNING

BIOLOGY – AS component 2
Biodiversity and Physiology of Body Systems

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**14**	
2.	**14**	
3.	**9**	
4.	**15**	
5.	**14**	
6.	**9**	
Total	**75**	

B400U201
01

ADDITIONAL MATERIALS

A calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

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

You may use a pencil for graphs and diagrams only.

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(s) 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.

The assessment of quality of extended response (QER) will take place in question **6**.

The quality of written communication will affect the awarding of marks.

JUN24B400U20101

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

Answer **all** questions.

1. Coral reefs are extremely biodiverse ecosystems.

(a) Damselfish (family *Pomacentridae*) are common on coral reefs. Often, several species with different body shapes and colour patterns inhabit a single reef.

Image 1.1 shows five species of damselfish that live on one coral reef.

Image 1.1



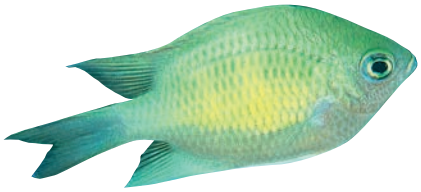
A. *Chromis viridis*



B. *Dascyllus aruanus*



C. *Pomacentrus amboinensis*



D. *Amblyglyphidodon curacao*



E. *Dascyllus reticulatus*

(i) Use information from **Image 1.1** and letters **A–E** to state which species are most closely related and explain your answer. [1]

B and E (Dascyllus aruanus and Dascyllus reticulatus), because they are in the same genus, Dascyllus.

(ii) Many related species of damselfish live close together within the same reef. Explain why they are classified as separate species. [1]

They are unable to interbreed to produce fertile offspring; only members of the same species can interbreed to produce fertile offspring.

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

Damselfish diversity on a coral reef was investigated using the following method.

In daylight hours during one day:

- Capture the damselfish within a measured sample area using nets.
- Count all the individuals of each species.
- Release them in the same place they were captured.

The number of each species (n) is shown in **Table 1.2**.

Table 1.2

Damselfish species	n	n–1	$n(n$–1)
Chromis viridis	63	62	3906
Dascyllus aruanus	38	37	1406
Pomacentrus amboinensis	34	33	1122
Amblyglyphidodon curacao	47	46	2162
Dascyllus reticulatus	23	22	506
N =	205	$\sum n(n$–1) =	9102
$N(N$–1) =	41820		

(iii) Calculate the diversity index of damselfish in this area of reef using **Table 1.2** and Simpson's Diversity Index equation. [3]

$$D = 1 - \frac{\sum n(n-1)}{N(N-1)}$$

Key:

N = total number of organisms present

n = number of each species

$\sum$ = sum of

$D = 1 - 9102 \div 41820$

$D = 1 - 0.2176$

$D = 0.782$

D = 0.782

B400U201 03

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

(iv) Suggest **two** possible sources of error in this method which may reduce confidence in the diversity value calculated for the whole reef. [2]

Not all fish in the area may have been captured, and some may have been inaccurately identified.

The measured area may not be representative of the whole reef; the method was not repeated at other times.

(b) The diversity of corals living within the reef was also investigated.

- A 250 m^2 area was sampled using 1 m^2 quadrats.
- 10 quadrats were placed at points selected randomly within the area.
- The percentage cover of five dominant species of coral within each quadrat was estimated and a mean calculated.

(i) The same scuba diver estimated the percentage cover in each quadrat. Give a reason why this was important for the accuracy of the method. [1]

Estimating percentage cover is subjective, so using the same person reduces variability (improves reliability) between quadrats.

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

The mean percentage cover was used to calculate the total area covered by each species within the measured 250 m^2.

Table 1.3 shows the area covered by five species of coral in 250 m^2 of reef.

Table 1.3

Coral species	Total area of coral within a 250 m^2 area of reef / m^2
Acropora spathulata	25
Acropora intermedia	21
Seriatopora hystrix	30
Pocillopora damicornis	42
Stylophora pistillata	36

(ii) The mean percentage cover for *Seriatopora hystrix* was calculated to be 12%. Calculate the total area occupied by *S. hystrix* within the 250 m^2 area of reef sampled. **Write your answer** in **Table 1.3**. [1]

Space for working

12% of 250 m^2 = 0.12 × 250 = 30 m^2

B400U201 05

© WJEC CBAC Ltd.

stemup.co.uk

(c) Many damselfish species live between the branches of coral, where they feed on algae and obtain protection from predatory fish. They also feed on suspended plankton away from the coral but never swim far beyond it.

Image 1.4 shows a population of *Chromis viridis* around a colony of coral.

Image 1.4



The spacing size between branches of host coral affects damselfish survival.

In an investigation:

- *S. hystrix* corals with the same diameter were monitored from the time of initial colonisation by a population of young *C. viridis*.
- Each coral was identified as having either large, medium or small branch spacing.
- The number of fish within each coral was counted every day for 30 days.
- The percentage of the initial population surviving after each day was calculated.

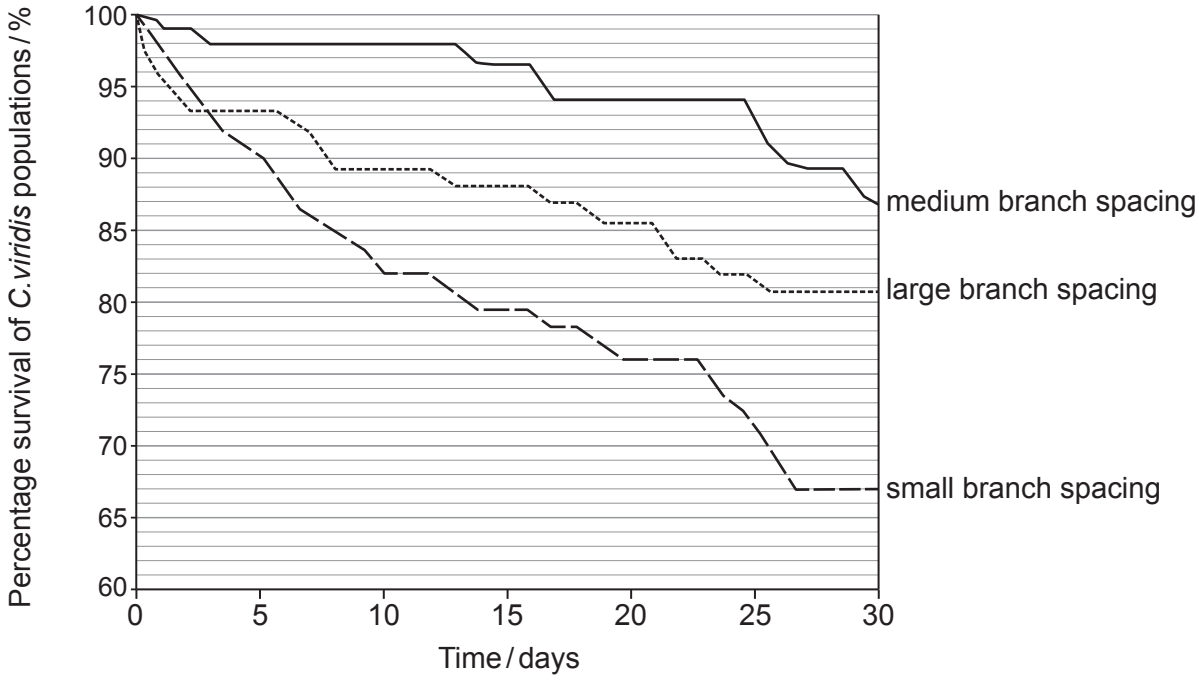
© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

Graph 1.5 shows percentage survival for *C. viridis* populations within three sizes of coral branch spacing.

Graph 1.5



(i) State why data in **Graph 1.5** is expressed as a percentage rather than number of fish surviving. [1]

The populations had different numbers of fish in each coral at the start, so numbers would not be comparable.

The DNA of *C. viridis* on this reef was found to have high numbers of polymorphic alleles that control growth.

(ii) Describe what is meant by the term 'polymorphic alleles'. [1]

Two or more (many) different alleles of the same gene (at the same locus).

B400U201 07

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

(iii) Some alleles that cause increased growth were present at lower frequencies in populations of *C. viridis* living within corals with small branch spacing.

Use the information given in part (c) to suggest how the biodiversity of these populations has been affected by natural selection and explain your answer. [3]

Natural selection has reduced the biodiversity (genetic diversity) of these populations. There is selection against larger fish, which are at a disadvantage: larger fish cannot hide between the small branch spaces, so they are more likely to be eaten by predators. There is also competition for space, as the spaces are too small for larger fish to survive, so fewer fish carrying growth alleles survive to breed and pass them on.

14

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

2. Polar bears (*Ursus maritimus*) and cows (*Bos taurus*) are mammals that need a great deal of protein and energy in order to grow their large mass of tissue.

Polar bears are carnivores that live in the Arctic Circle. Their prey includes seals, which provide a diet high in proteins and lipids.

Image 2.1 shows the skull of a polar bear.

Image 2.1



(a) Identify **two** features, visible in **Image 2.1**, that show adaptations to the polar bear's carnivorous diet. Explain how each is an adaptation for such a diet. [2]

Feature 1: Long, pointed canines for piercing and seizing prey.

Feature 2: Sharp, pointed incisors on upper and lower jaw for gripping and tearing muscle.

B400U201
09

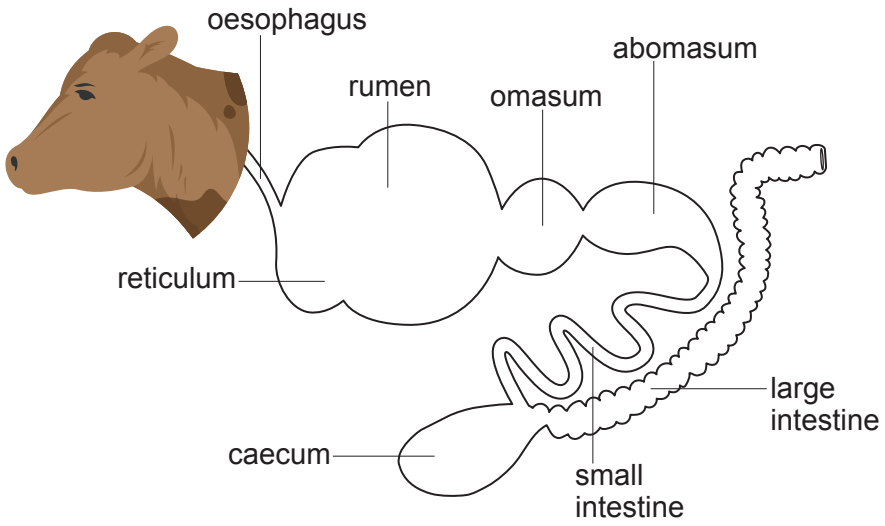
© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

(b) Cows are herbivores. Their diet is almost exclusively grass, which has a high cellulose content and very little protein. **Image 2.2** is a diagram of the digestive system of a cow.

Image 2.2



(i) The contents of the abomasum have a pH of 2 due to the secretion of hydrochloric acid. The abomasum has the same function as the stomach of polar bears (carnivores) and humans (omnivores).

Name **one** enzyme produced by the abomasum and explain **one** reason why the contents of the abomasum need to have a low pH. [2]

Pepsin (secreted as pepsinogen), a protease.

A low pH is needed to activate pepsinogen to pepsin and gives the optimum pH for pepsin; it also kills bacteria.

(ii) The rumen contains many types of micro-organism. An adult cow had a rumen capacity of $1.6 \times 10^4\,cm^3$ of fluid. In a sample of the rumen fluid, micro-organisms made up 3.6% of the volume. The proportion of micro-organisms that were bacteria was $10^{10}\,cm^{-3}$.
Calculate the number of bacteria present in the rumen of this individual. **Give your answer in standard form**. [3]

Volume of micro-organisms = $1.6 \times 10^4 \times 3.6 \div 100 = 576\ cm^3$

Number of bacteria = $576 \times 10^{10} = 5\ 760\ 000\ 000\ 000$

Number of bacteria = 5.76×10^{12}

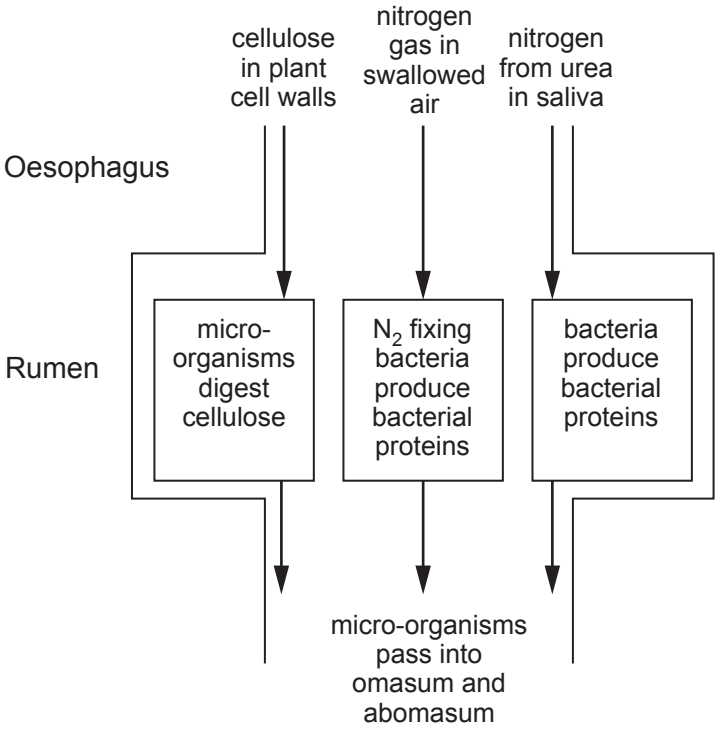
© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

Image 2.3 illustrates the function of some of the micro-organisms in the rumen.

Image 2.3



(iii) Using **Image 2.3** and your answer to (b)(ii), suggest how the cow obtains **sufficient** amino acids to produce its own proteins. [2]

Micro-organisms digest the cellulose cell walls, releasing plant protein. The bacteria multiply to produce very large numbers (a large biomass of bacterial protein); these pass to the abomasum where the cow digests the bacterial and plant protein to amino acids.

© WJEC CBAC Ltd.

Examiner only

The rumen contains single-celled protoctists that consume other micro-organisms or particles of plant matter swallowed by the cow.

Image 2.4 is a photograph of a rumen protoctist containing several food vacuoles. Following endocytosis, it carries out intracellular digestion.

Image 2.4



(iv) Describe the process of digestion inside the cell after the formation of the food vacuole. [2]

The food vacuole fuses with a lysosome. Lysosomal enzymes (e.g. proteases) hydrolyse large molecules such as proteins into small soluble molecules (amino acids), which are absorbed into the cytoplasm.

(c) Enzymes on the plasma membrane of epithelial cells in the small intestine hydrolyse tripeptides and dipeptides.

(i) Suggest **one** advantage of using membrane-bound enzymes at this stage of digestion. [1]

The enzymes are not lost in faeces and can be used more than once, so fewer enzyme molecules need to be produced.

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

(ii) Describe and explain how **one** structural feature of the small intestine increases the efficiency of protein digestion. [2]

The epithelial cells have many microvilli (and the wall has villi), which give a larger surface area, so there are more membrane-bound enzyme molecules and more digestion of peptides.

14

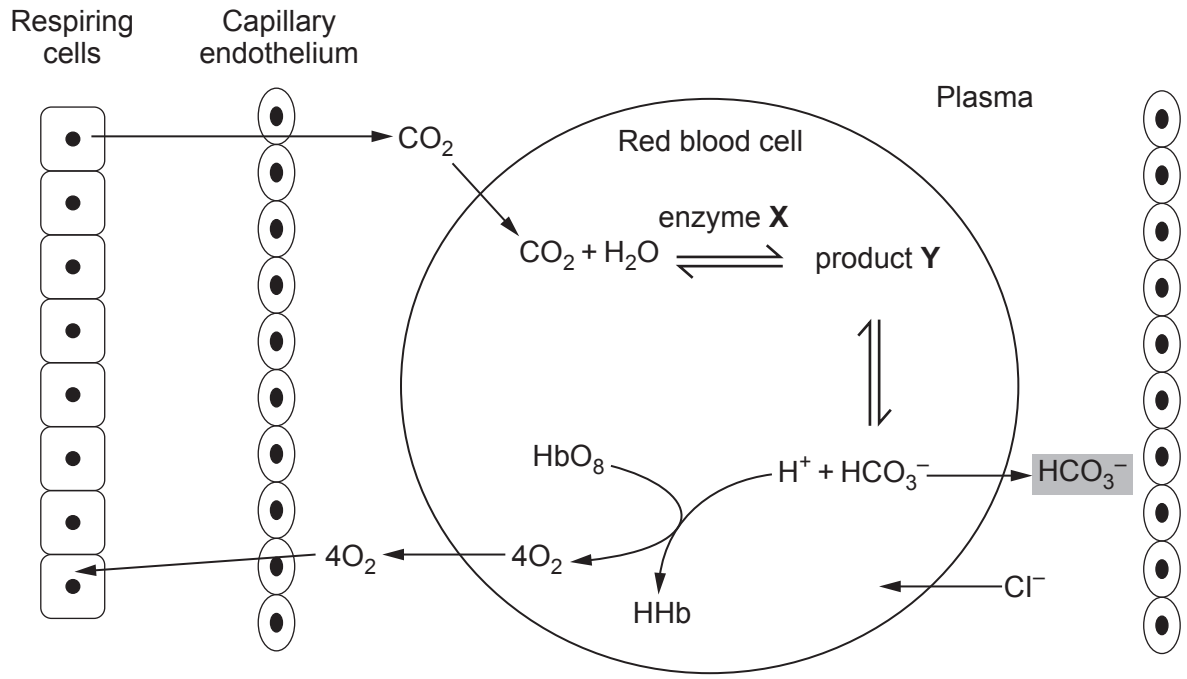
© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

3. (a) Most of the carbon dioxide produced by mammalian cells is transported in hydrogen carbonate ions (HCO_3^-) in blood plasma. The mechanism of HCO_3^- production is shown in **Image 3.1**.

Image 3.1



(i) Identify enzyme **X** and product **Y** in **Image 3.1**. [1]

Enzyme **X**: carbonic anhydrase

Product **Y**: carbonic acid (H_2CO_3)

(ii) Use **Image 3.1** to describe how haemoglobin prevents blood pH from becoming too low. [1]

Hydrogen ions (H^+) combine with haemoglobin to form haemoglobinic acid (HHb), acting as a buffer.

(iii) State the function of chloride ions (Cl^-), shown in **Image 3.1**. [1]

Cl^- moves into the red blood cell to balance the outflow of negative HCO_3^- ions (chloride shift), maintaining electrochemical balance.

(iv) State **one** way that carbon dioxide can be transported in the blood other than that described in **Image 3.1**. [1]

In solution (dissolved) in the plasma.

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

(b) In insects, carbon dioxide from muscles is exchanged into tracheoles that penetrate muscle cells. Spiracles open when partial pressure of CO_2 ($ppCO_2$) in tracheoles reaches a critical threshold and close when $ppCO_2$ falls below the critical threshold.

Insect body temperature changes with environmental temperature.

Scientists investigated the effect of body temperature on ventilation in *Rhodnius prolixus*, an insect that feeds by sucking blood from mammals. This is shown in **Image 3.2**.

Image 3.2



- Ten *R. prolixus* of the same age and body mass were obtained.
- One individual was selected randomly and placed into a 2 cm^3 tube.
- The temperature in the tube was maintained at 18°C for one hour before making recordings.
- Atmospheric air (at 18°C) flowed in through a valve and out through a gas analyser.
- The following information was recorded for 30 seconds:
    - Length of time spiracles were open.
    - Length of each ventilation cycle.
    - Volume of CO_2 released.

The experiment was repeated at 24 °C and 30 °C, using the same insect.

(i) State why the insect was left for one hour at the experimental temperature before recording data. Explain your answer. [2]

To equilibrate the insect's body temperature to the experimental temperature, as insect body temperature changes with the environment. This gives a constant baseline pattern of spiracle opening and closing at the start for comparison.

B400U201
15

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

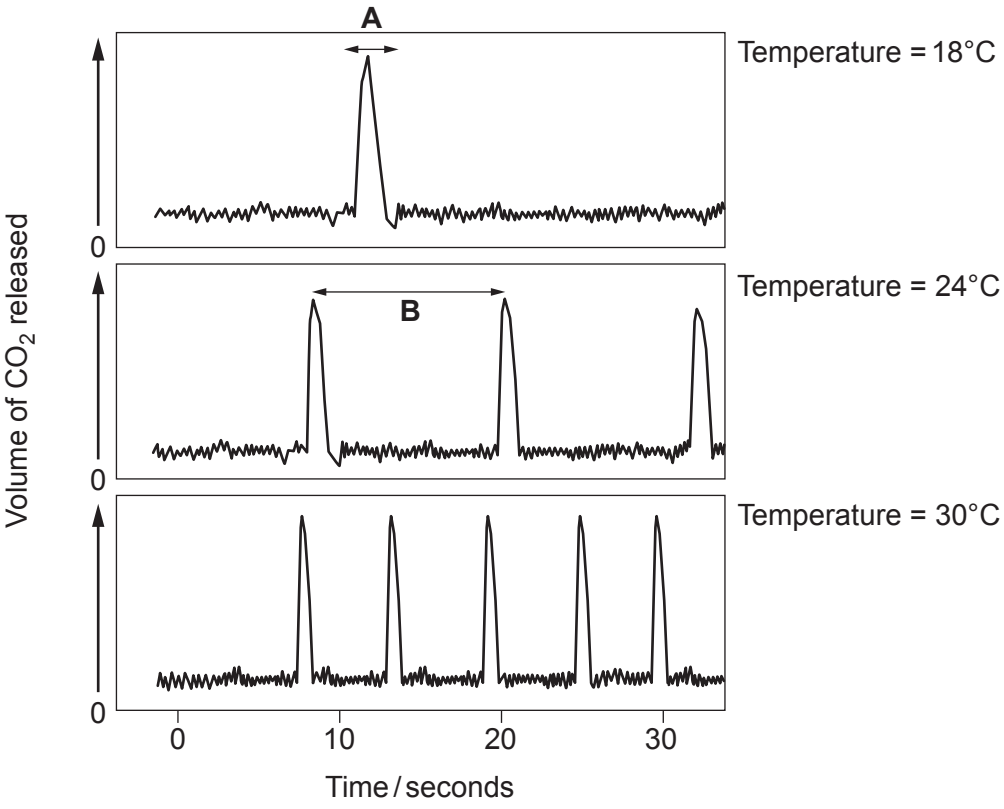
To prevent CO_2 production increasing as a result of feeding, insects were not fed for 24 hours prior to the experiment.

(ii) Suggest **one** reason why feeding might increase CO_2 production in these insects. [1]

Digestion of the blood meal would increase respiration (and provide food for respiration).

Image 3.3 shows recordings from the experiment.

Image 3.3



A – Length of time spiracle is open
B – Length of one ventilation cycle

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

(iii) With reference to the **partial pressure of carbon dioxide** in the tracheoles, explain the reason for the following trends observed in **Image 3.3**. [2]

Trend I: As temperature increases, length of the ventilation cycle decreases.

Respiration is faster at higher temperature, so the $ppCO_2$ in the tracheoles increases and reaches the critical threshold more quickly, so spiracles open more often.

Trend II: As temperature increases, length of time the spiracle is open decreases.

There is a higher $ppCO_2$ (and molecules have more kinetic energy), so CO_2 diffuses out more quickly and $ppCO_2$ falls below the threshold sooner.

9

© WJEC CBAC Ltd.

stemup.co.uk

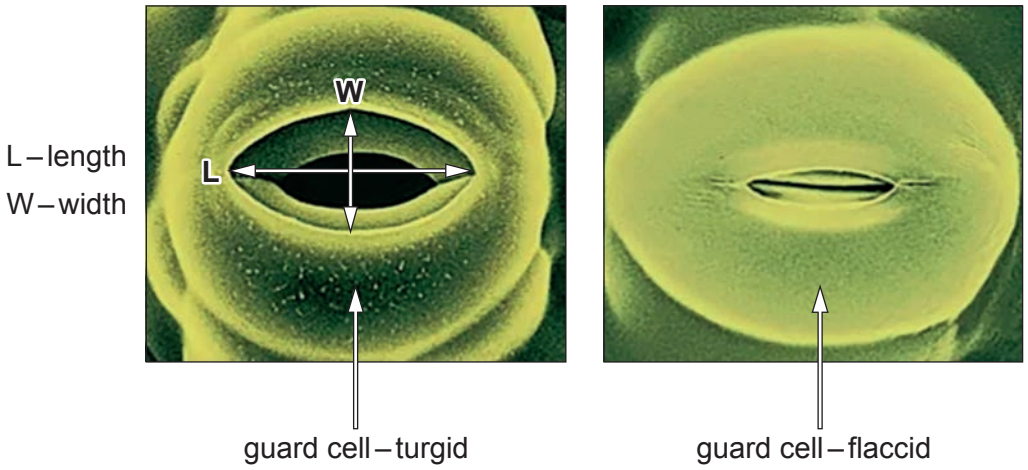
Examiner only

4. (a) The presence of stomata on leaves has helped plants to colonise terrestrial environments.

Images 4.1A and **4.1B** show electron photomicrographs of stomata on the same leaf at midday and midnight.

Image 4.1A Fully open — midday

Image 4.1B Fully closed — midnight



(i) Explain the advantage of closing stomata at night and why the plant is at a disadvantage if the stomata were to close at midday. [2]

At night there is no photosynthesis, so closing stomata reduces water vapour loss by transpiration.

At midday, closed stomata would reduce the intake of CO_2 for photosynthesis.

(ii) Guard cells in **Image 4.1A** are turgid. ATP is required for them to achieve this state. Describe the mechanism that enables guard cells to become turgid. [3]

ATP provides energy for active transport of potassium ions (K^+) into the guard cells. Malate ions are formed from stored starch. These lower the water potential of the guard cells, so water enters the guard cells by osmosis from neighbouring cells and they become turgid.

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

(b) (i) One way to measure the extent of stomatal opening is to calculate the aspect ratio.

$$\text{Aspect ratio (AR)} = \frac{\text{length of stomatal opening (L)}}{\text{width of stomatal opening(W)}}$$

The aspect ratio of an open stoma was found to be 1.75 : 1.
The length (L) was 63 µm.

Calculate the width of the stoma (W). [2]

$W = L \div AR = 63 \div 1.75$

$W = 36\ \mu m$

Width of stoma = ... 36 ..... µm

(ii) A student produced a scale drawing of the stoma and guard cells described in (b)(i) and drew a line to represent the length of the stoma (L). This line measured 31.5 mm.

Calculate the magnification of the drawing. [2]

$L = 63\ \mu m = 0.063\ mm\ (6.3 \times 10^{-2}\ mm)$

$Magnification = 31.5 \div 0.063 = 500$

Magnification = × ..... 500 .....

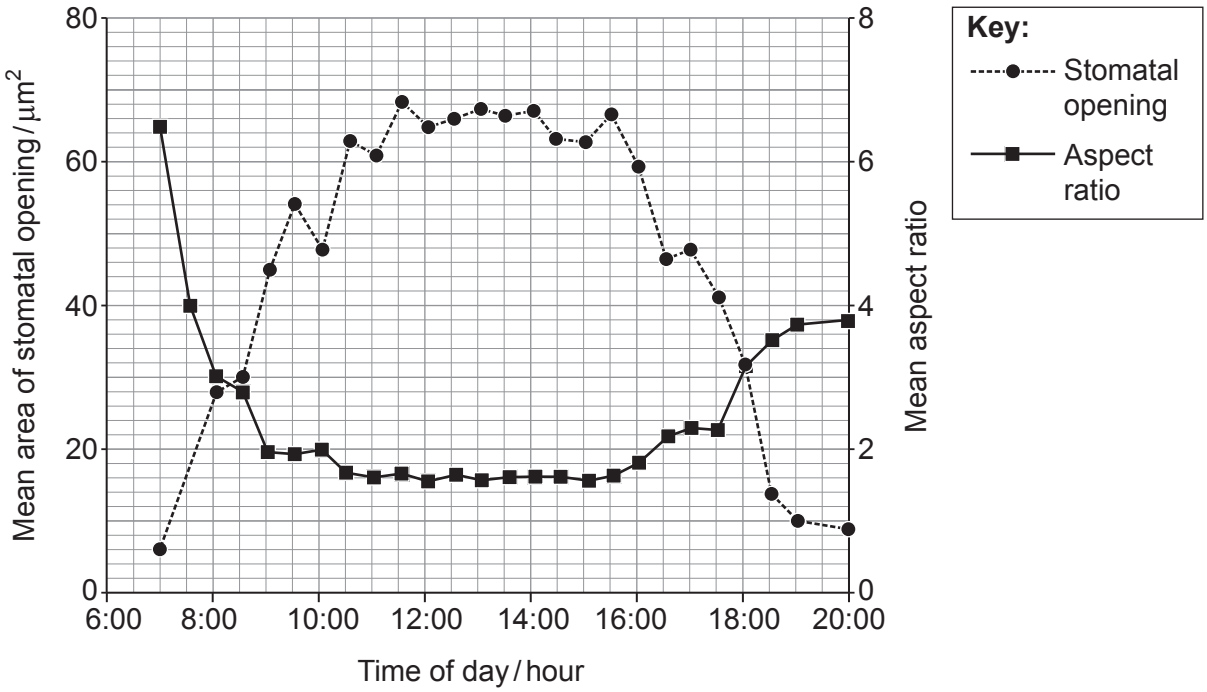
© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

Graph 4.2 shows the mean area of stomatal opening and the mean aspect ratio of stomata between 07:00 and 20:00 during a single day.

Graph 4.2



(iii) Suggest why calculating aspect ratio gives a more precise measurement of the extent to which stomata are open than measuring the width or length of the stoma. [1]

Different sized stomata can have the same aspect ratio, so it allows comparison of different sized stomata.

(iv) The lowest aspect ratio value in **Graph 4.2** is greater than 1. With reference to the shape of the stomata in **Image 4.1A**, suggest why a value of 1 is unlikely. [1]

An AR of 1 would mean a circular opening; the open stoma in 4.1A is oval, as its width is always less than its length.

© WJEC CBAC Ltd.

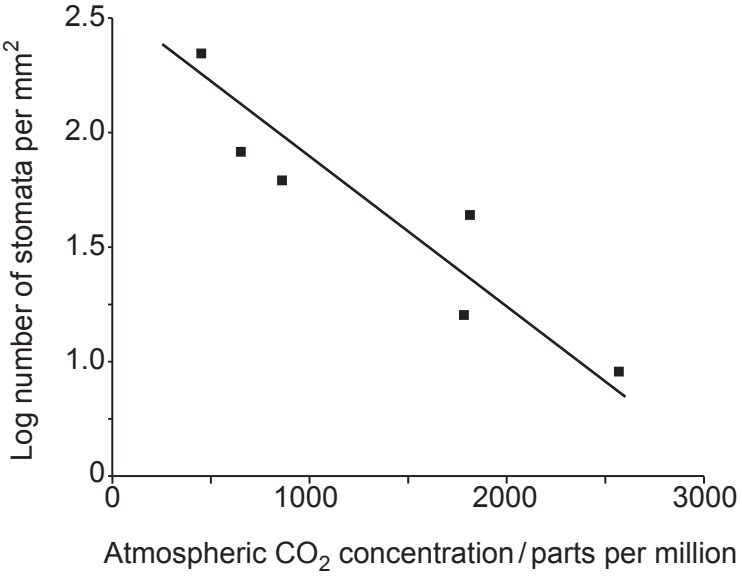
stemup.co.uk

Examiner only

(c) Atmospheric CO_2 concentration has varied during the course of plant evolution. Fossil records show that the density of stomata (number per unit area) has changed in many species over time.

Graph 4.3 shows the log number of stomata per mm^2 from fossilised leaves against atmospheric CO_2 concentrations.

Graph 4.3



(i) Use **Graph 4.3** to explain how plants living in lower atmospheric CO_2 concentrations were adapted for maximum CO_2 uptake. [2]

At lower CO_2 concentrations the log number of stomata per mm^2 is higher, so plants had an increased density of stomata, giving a greater surface area for diffusion of CO_2 into the leaf.

Scientists have recorded decreased rainfall in several forested areas of the world and suggest that increasing atmospheric CO_2 concentration is a potential cause.

(ii) If atmospheric CO_2 concentration continues to increase over time, predict the effect on the stomata of some plant species and suggest why it could cause a reduction in cloud formation and rainfall near forests. [2]

Plants will have fewer stomata per unit area (lower stomatal density), so less water vapour is released by transpiration, giving less water vapour in the air to form clouds and rain.

15

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

5. (a) Insects have open circulatory systems. Their body cavity (haemocoel) is filled with fluid that has direct contact with tissues and contains no haemoglobin.

(i) State **one** advantage and **one** disadvantage of an open circulatory system. [2]

Advantage: *The diffusion distance between the fluid and the cells is very short.*

Disadvantage: *Flow (transport) of the fluid is slow and at low pressure.*

In mammals, blood is transported in a closed, double circulatory system.

(ii) Describe what is meant by a 'double circulatory system'. [1]

Blood passes through the heart twice during each complete circulation of the body (pulmonary and systemic circuits).

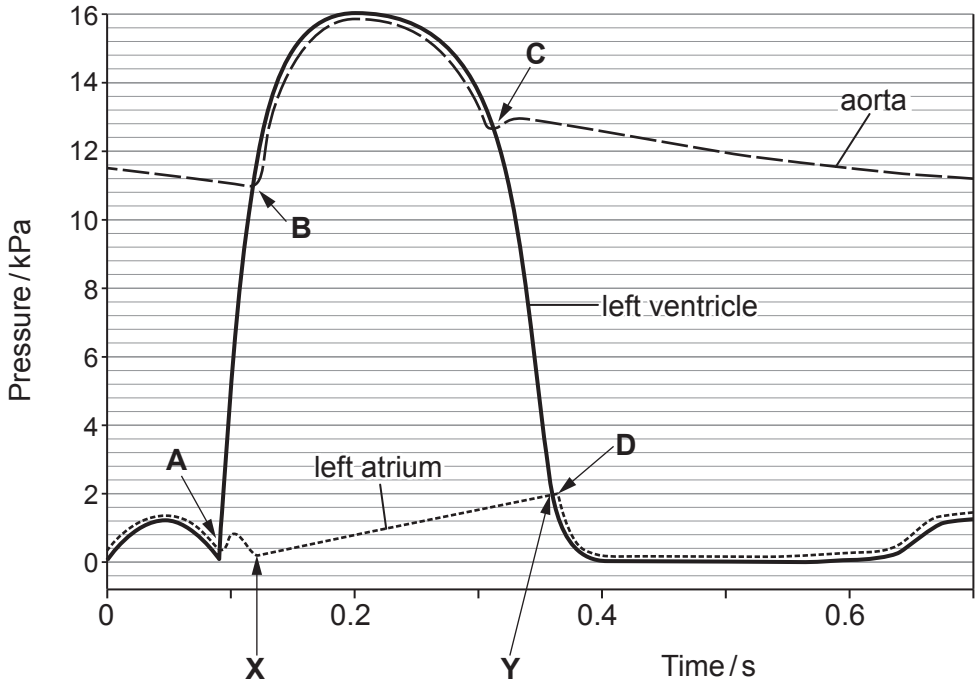
© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

(b) **Graph 5.1** shows pressure changes of the left side of the heart during one cardiac cycle.

Graph 5.1



(i) Use **one** of the letters **A** to **D** on **Graph 5.1** to identify when blood begins to leave the ventricle. Describe **one** piece of evidence from **Graph 5.1** that supports your answer. [2]

B. At B the ventricular pressure becomes higher than the aortic pressure, so the aortic valve opens and pressure begins to increase in the aorta.

(ii) Explain the increase in pressure within the left atrium between points **X** and **Y**. [1]

Blood is entering the left atrium from the pulmonary vein, so the atrium is filling with blood.

© WJEC CBAC Ltd.

stemup.co.uk

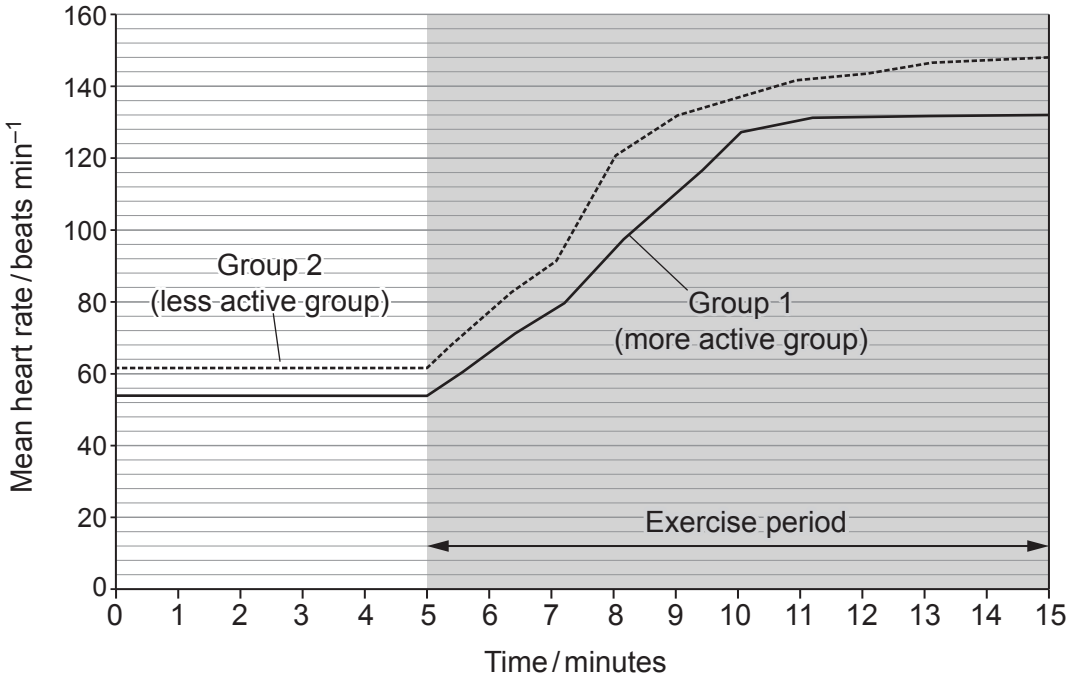
Examiner only

(c) Scientists investigated the effect of exercise on heart rate in adult males with no history of smoking or cardiovascular disease. Two groups of 50 individuals, aged 18–21, were studied.

Group 1 (more active group) participated in aerobic activity for more than one hour at least 3 times a week.
Group 2 (less active group) participated in aerobic activity for less than one hour each week.

Participants were selected randomly from a larger number of volunteers. The heart rate of each participant was monitored while running on a treadmill for 10 minutes.
The mean heart rate for each group is shown in **Graph 5.2**.

Graph 5.2



(i) Data from group 1 showed a large standard deviation (SD).
Describe what is meant by the term 'standard deviation' and explain how the criteria used to place individuals in group 1 could contribute to a large SD value. [2]

SD is a measure of how the data are spread around (vary from) the mean. Group 1 only had to do more than one hour 3 times a week, so the amount, type and intensity of aerobic activity (fitness level) varied widely.

(ii) State **one** feature of the method that increases reliability of the data. [1]

Large number of individuals (50) in each group, chosen randomly.

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

In addition to the mean maximum heart rate, the following measurements were taken:

- The stroke volume (mean maximum volume of blood leaving the left ventricle per beat).
- The cardiac output (mean maximum volume of blood leaving the left ventricle per minute).

The measurements for each group are shown in **Table 5.3**.

Table 5.3

Group	Mean maximum heart rate / beats min^{-1}	Mean stroke volume (maximum volume of blood leaving the left ventricle per beat) / dm^3	Mean cardiac output (maximum volume of blood leaving the left ventricle per minute) / $dm^3 min^{-1}$
1 (more active)	135	0.18	24.3
2 (less active)	150	0.13	19.5

(iii) Calculate the mean stroke volume for group 1.
Write your answer in **Table 5.3**. [2]

Space for working

stroke volume = cardiac output ÷ heart rate

= 24.3 ÷ 135 = 0.18 dm^3

(iv) Using your answer to (c)(iii) and the information in **Table 5.3**, explain how the heart achieves a higher cardiac output in individuals in group 1 (more active) than those of group 2 (less active). [2]

Group 1 has an increased stroke volume (0.18 dm^3 compared with 0.13 dm^3), so a larger volume of blood leaves the left ventricle into the aorta per beat because the left ventricle contracts with greater force (generates more pressure).

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

The blood pressure of all participants was recorded before and after the exercise period.

In each group, the mean systolic blood pressure increased from 120 mm Hg to 170 mm Hg during exercise but mean diastolic blood pressure remained at 82 mm Hg.

(v) Explain how **one** property of a tissue in the wall of arteries prevents an excessive fall in blood pressure during diastole. [1]

Elastic tissue in the artery wall recoils during diastole, maintaining pressure in the artery.

14

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

6. Sunflowers (*Helianthus annuus*) produce large flowers on long stems.

Image 6.1 shows a transverse section of a sunflower stem.

Image 6.2 shows a transverse section of a stem of *Potamogeton*, a hydrophytic plant that grows in freshwater ponds. Roots anchor the plant in the ground below water. A stem connects the roots to the leaves which float on the water surface where there is maximum light.

Image 6.1 – TS *Helianthus* stem

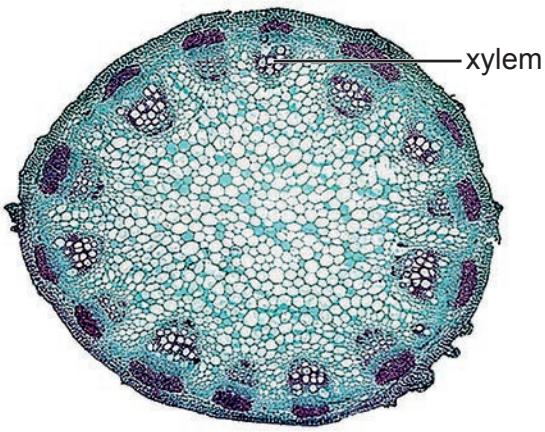
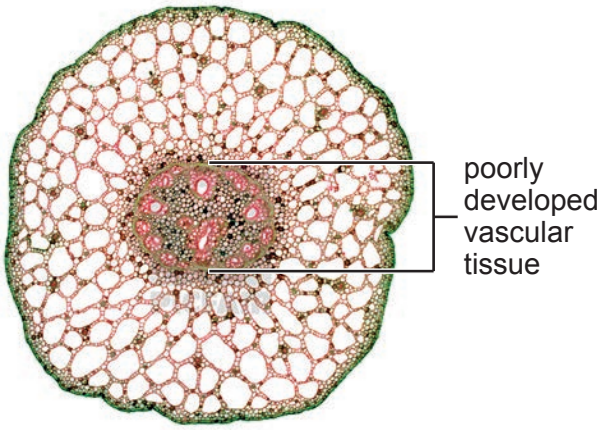


Image 6.2 – TS *Potamogeton* stem



Use **Image 6.1** to describe how the structure and position of xylem tissue contribute to its functions in a sunflower stem.

Use the information in **Images 6.1** and **6.2** together with your knowledge of hydrophytes to describe the differences between the stem structures of *Helianthus* and *Potamogeton*.

Explain how the stem structure of *Potamogeton* is adapted to its aquatic environment.

[9 QER]

In Helianthus the xylem (vascular tissue) is arranged in a ring of vascular bundles around the periphery of the stem, close to the epidermis. The xylem vessels are lignified, so they are strong and resist bending, and because there are many vessels arranged in a ring they provide rigidity, strength and support for the long stem and large flower. The xylem also transports water from the roots up to the leaves. Water moves up as a continuous column by cohesion between water molecules (hydrogen bonds), adhesion to the lignified xylem walls and capillarity.

Differences: in Potamogeton the vascular tissue is central, whereas in Helianthus it is on the periphery. In Potamogeton the vascular tissue (xylem)

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

is poorly developed, whereas in Helianthus it is well developed in many bundles.

Potamogeton has a single central bundle, but Helianthus has many bundles.

Potamogeton has large air spaces (aerenchyma) in the cortex, whereas Helianthus has no aerenchyma and its cells are tightly packed. Potamogeton has less lignification (fewer lignified tissues), whereas Helianthus has more lignin in the xylem and other tissues.

Adaptations of Potamogeton: the vascular tissue is central, which allows the stem to be flexible in the water and resist pulling by water currents without breaking.

The xylem is poorly developed because there is little need for water transport, as the leaves are on the water surface and surrounded by water. Very little lignin is needed for support because the stem is supported by the water and the leaves float on the surface. The aerenchyma (air spaces) in the cortex allows faster diffusion of O_2 and CO_2 to and from the leaves and roots, forms a reservoir of gases, and gives buoyancy so the leaves are held at the surface where there is maximum light for photosynthesis.

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

© WJEC CBAC Ltd.

stemup.co.uk

Examiner only

END OF PAPER

9

© WJEC CBAC Ltd.

stemup.co.uk

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

Examiner only

© WJEC CBAC Ltd.

stemup.co.uk

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

Examiner only

© WJEC CBAC Ltd.

stemup.co.uk