Organisation part 11

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Name: _____

Class: _____

Date: _____

Time: **68 minutes**

Marks: **68 marks**

Comments:

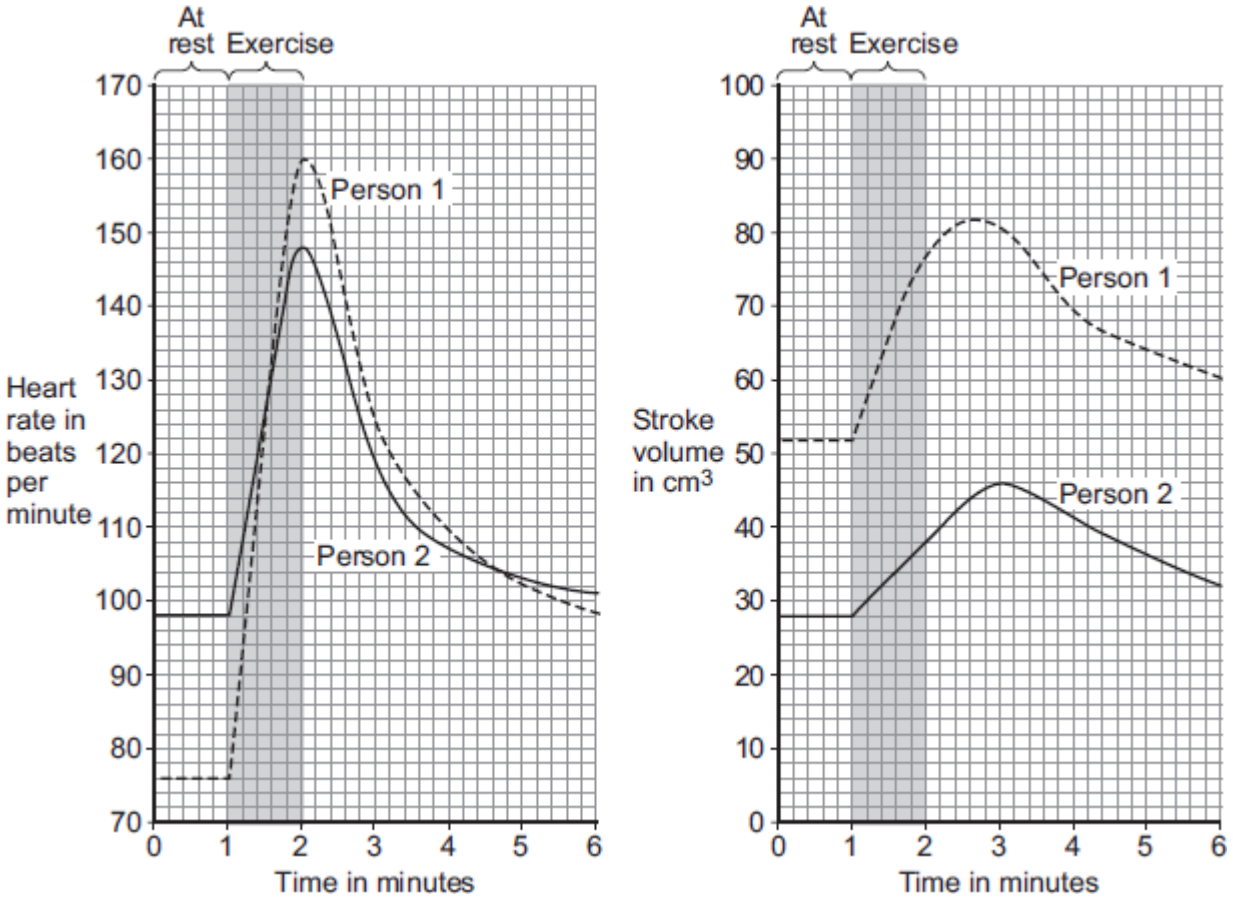
Q1.

During exercise, the heart beats faster and with greater force.

The 'heart rate' is the number of times the heart beats each minute.The volume of blood that travels out of the heart each time the heart beats is called the 'stroke volume'.

In an investigation, **Person 1** and **Person 2** ran as fast as they could for 1 minute. Scientists measured the heart rates and stroke volumes of **Person 1** and **Person 2** at rest, during the exercise and after the exercise.

The graph below shows the scientists' results.



(a) The 'cardiac output' is the volume of blood sent from the heart to the muscles each minute.

Cardiac output = Heart rate × Stroke volume

At the end of the exercise, **Person 1**'s cardiac output = 160 × 77 = 12 320 cm^3 per minute.

Use information from the figure above to complete the following calculation of **Person 2**'s cardiac output at the end of the exercise.

At the end of the exercise:

Person 2's heart rate = _____ beats per minute

Person 2's stroke volume = _____ cm^3

Person 2's cardiac output = _____ cm^3 per minute

(3)

(b) **Person 2** had a much lower cardiac output than **Person 1.**

(i) Use information from the figure above to suggest the **main** reason for the lower cardiac output of **Person 2**.

_____

_____

(1)

(ii) **Person 1** was able to run much faster than **Person 2**.

Use information from the figure above and your own knowledge to explain why.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

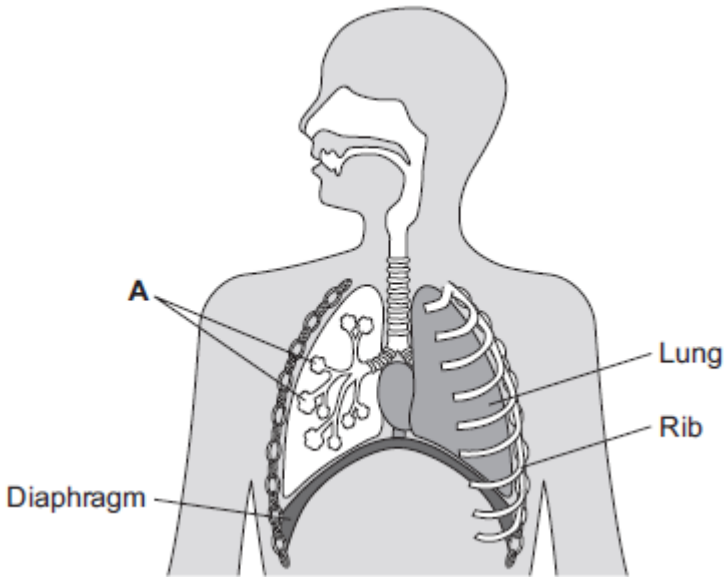
(5)

(Total 9 marks)

Q2.

Our lungs help us to breathe.

The image below shows the human breathing system.



(a) (i) Name part **A**.

_____

(1)

(ii) Give **one** function of the ribs.

_____

(1)

(b) (i) Use the correct answer from the box to complete the sentence.

active transport	**diffusion**	**osmosis**

Oxygen moves from the air inside the lungs into the blood by the process of _____ .

(1)

(ii) Use the correct answer from the box to complete the sentence.

arteries	**capillaries**	**veins**

Oxygen moves from the lungs into the blood through the walls of the _____ .

(1)

(iii) Inside the lungs, oxygen is absorbed from the air into the blood.

Give **two** adaptations of the lungs that help the rapid absorption of oxygen into the blood.

1. _____

_____

2. _____

_____

(2)

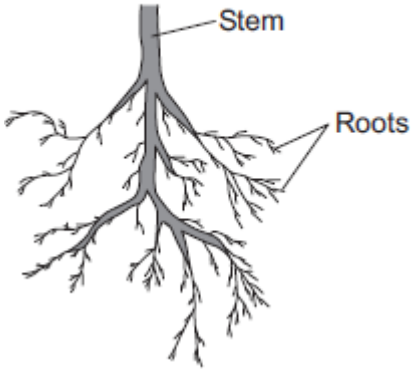
(Total 6 marks)

Q3.

Plants need different substances to survive.

Figure 1 shows the roots of a plant.

Figure 1



(a) (i) Mineral ions are absorbed through the roots.

Name **one** other substance absorbed through the roots.

_____

(1)

(ii) The plant in **Figure 1** has a higher concentration of mineral ions in the cells of its roots than the concentration of mineral ions in the soil.

Which **two** statements correctly describe the absorption of mineral ions into the plant's roots?

Tick (✓) **two** boxes.

The mineral ions are absorbed by active transport. ☐

The mineral ions are absorbed by diffusion. ☐

The mineral ions are absorbed down the concentration gradient. ☐

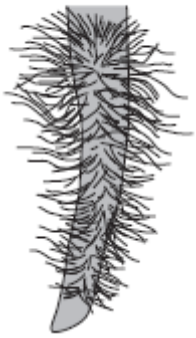
The absorption of mineral ions needs energy. ☐

(2)

(iii) The plant in **Figure 1** has roots adapted for absorption.

Figure 2 shows a magnified part of a root from **Figure 1.**

Figure 2



Describe how the root in **Figure 2** is adapted for absorption.

_____

_____

_____

_____

(2)

(b) The leaves of plants have stomata.

What is the function of the stomata?

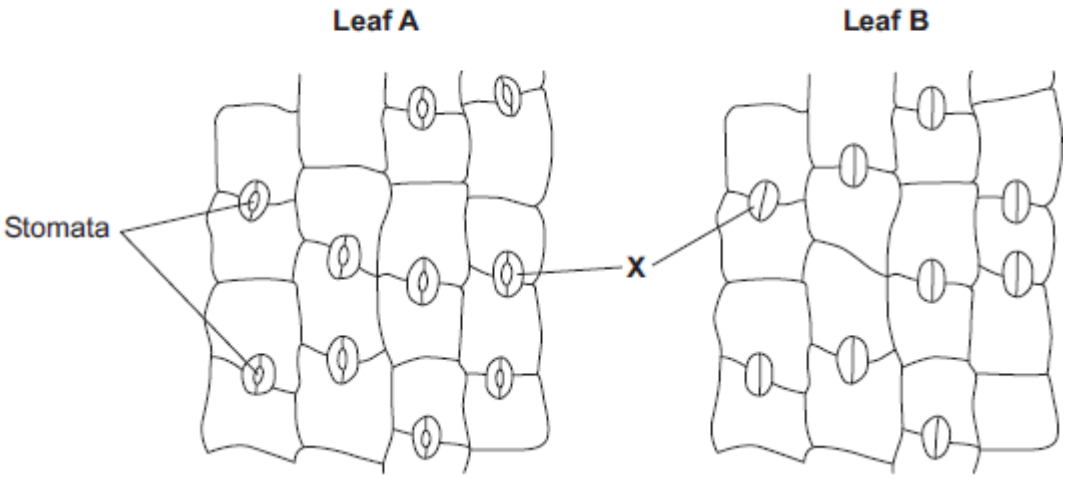
_____

_____

(1)

(c) **Figure 3** shows the underside of two leaves, **A** and **B**, taken from a plant in a man's house.

Figure 3



(i) In **Figure 3**, the cells labelled **X** control the size of the stomata.

What is the name of the cells labelled **X**?

Tick (✓) **one** box.

Guard cells ☐

Phloem cells ☐

Xylem cells ☐

(1)

(ii) Describe how the appearance of the stomata in leaf **B** is different from the appearance of the stomata in leaf **A**.

_____

_____

(1)

(iii) The man forgets to water the plant.

What might happen to the plant in the next few days if the stomata stay the same as shown in leaf **A** in **Figure 3**?

_____

_____

(1)

(Total 9 marks)

Q4.

The circulatory system transports substances such as glucose and oxygen around the body.

(a) Name **two** other substances that the circulatory system transports around the body.

1. _____

2. _____

(2)

(b) (i) Blood is a tissue. Blood contains red blood cells and white blood cells.

Name **two** other components of blood.

1. _____

2. _____

(2)

(ii) The heart is part of the circulatory system.

What type of tissue is the wall of the heart made of?

_____

(1)

(c) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Every year, many patients need to have heart valve replacements.

The table gives information about two types of heart valve.

Living human heart valve	Cow tissue heart valve
• It has been used for transplants for more than 12 years. • It can take many years to find a suitable human donor. • It is transplanted during an operation after a donor has been found. • During the operation, the patient's chest is opened and the old valve is removed before the new valve is transplanted.	• It has been used since 2011. • It is made from the artery tissue of a cow. • It is attached to a stent and inserted inside the existing faulty valve. • A doctor inserts the stent into a blood vessel in the leg and pushes it through the blood vessel to the heart.

A patient needs a heart valve replacement. A doctor recommends the use of a cow tissue heart valve.

Give the advantages and disadvantages of using a cow tissue heart valve compared with using a living human heart valve.

Use information from the table and your own knowledge in your answer.

(6)

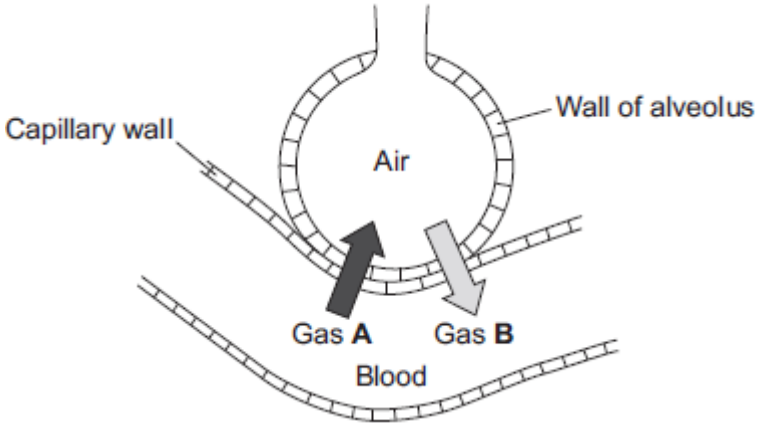
(Total 11 marks)

Q5.

Gas exchange takes place in the lungs.

The diagram shows an alveolus next to a blood capillary in a lung.

The arrows show the movement of two gases, **A** and **B**.



(a) (i) Draw a ring around the correct answer to complete the sentence.

Gases **A** and **B** move by

diffusion.
osmosis.
respiration.

(1)

(ii) Gas **A** moves from the blood to the air in the lungs.

Gas **A** is then breathed out.

Name Gas **A**.

_____

(1)

(iii) Which cells in the blood carry Gas **B**?

Draw a ring around the correct answer.

platelets **red blood cells** **white blood cells**

(1)

(b) The average number of alveoli in each human lung is 280 million.

The average surface area of 1 million alveoli is 0.25 m^2.

Calculate the total surface area of a human lung.

_____

Answer _____ m^2

(2)

(c) An athlete trains to run a marathon. The surface area of each of the athlete's lungs has increased to 80 m^2.

Give **one** way in which this increase will help the athlete.

_____

_____

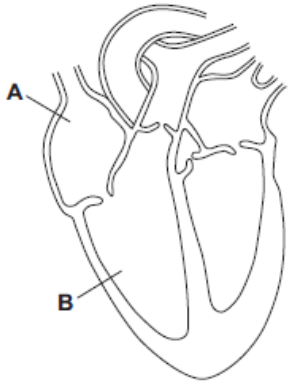
(1)

(Total 6 marks)

Q6.

Diagram 1 shows a section through the heart.

Diagram 1



(a) Use words from the box to name the structures labelled **A** and **B** on **Diagram 1**.

aorta	**atrium**	**pulmonary artery**	**ventricle**

A _____

B _____

(2)

(b) The tissue in the wall of the heart contracts.

(i) What type of tissue is this?

Tick (✓) **one** box.

muscular ☐

glandular ☐

epithelial ☐

(1)

(ii) What does the heart do when this tissue contracts?

_____

_____

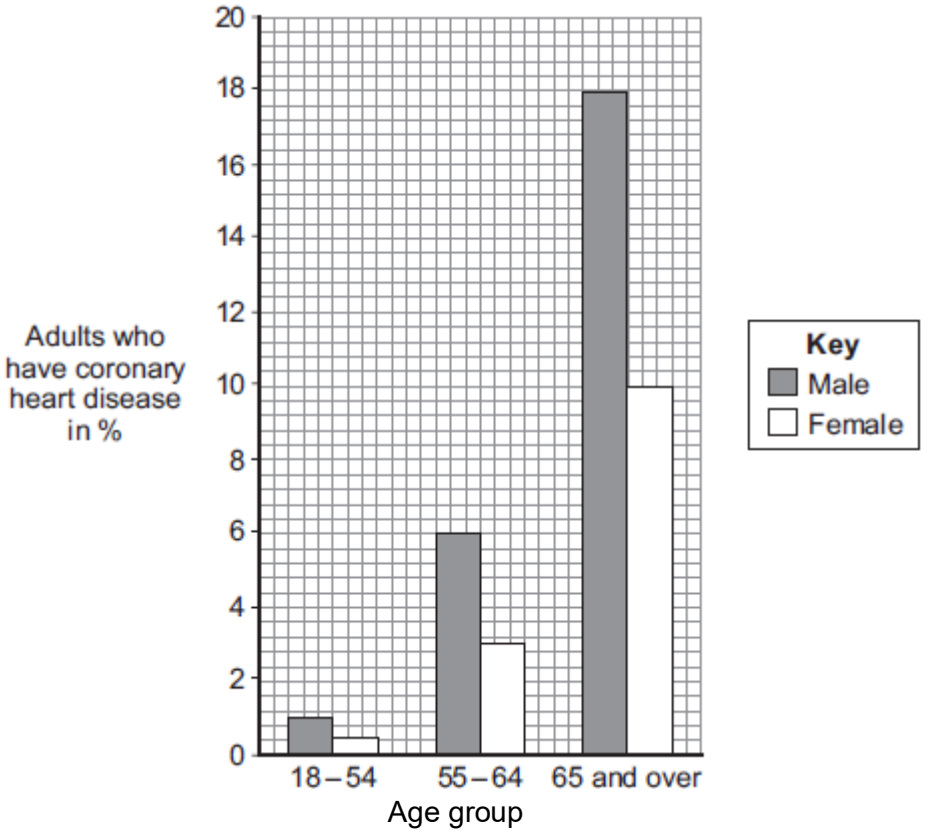
(1)

(c) Draw arrows on **Diagram 2** to complete the route taken by deoxygenated blood through the heart.

Diagram 2

(2)

(d) The graph shows the percentage (%) of adults in the UK who have coronary heart disease.



(i) Look at the graph.

Which group of people is **most** at risk of having coronary heart disease in the UK?

_____

(2)

(ii) Explain what happens to the heart in coronary heart disease.

_____

_____

_____

_____

_____

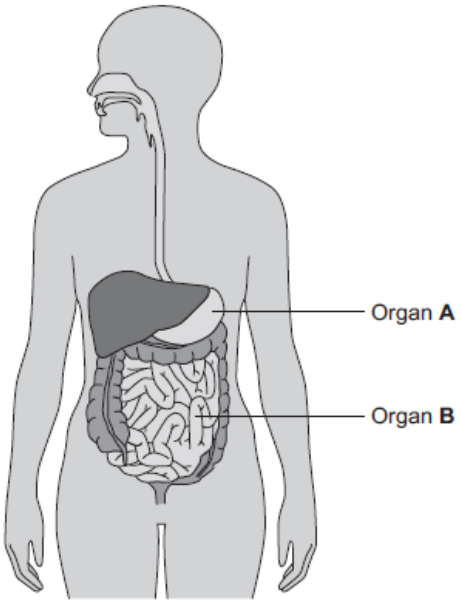
_____

(3)

(Total 11 marks)

Q7.

The diagram below shows the human digestive system.



(a) (i) What is Organ **A**?

Draw a ring around the correct answer.

gall bladder **liver** **stomach**

(1)

(ii) What is Organ **B**?

Draw a ring around the correct answer.

large intestine **pancreas** **small intestine**

(1)

(b) Digestive enzymes are made by different organs in the digestive system.

Complete the table below putting a tick (✓) or cross (✕) in the boxes.

The first row has been done for you.

		Organ producing enzyme			
		salivary glands	**stomach**	**pancreas**	**small intestine**
Enzyme	**amylase**	✓	✕	✓	✓
	lipase				
	protease				

(2)

(c) The stomach also makes hydrochloric acid.

How does the acid help digestion?

_____

_____

(1)

(d) Draw **one** line from each digestive enzyme to the correct breakdown product.

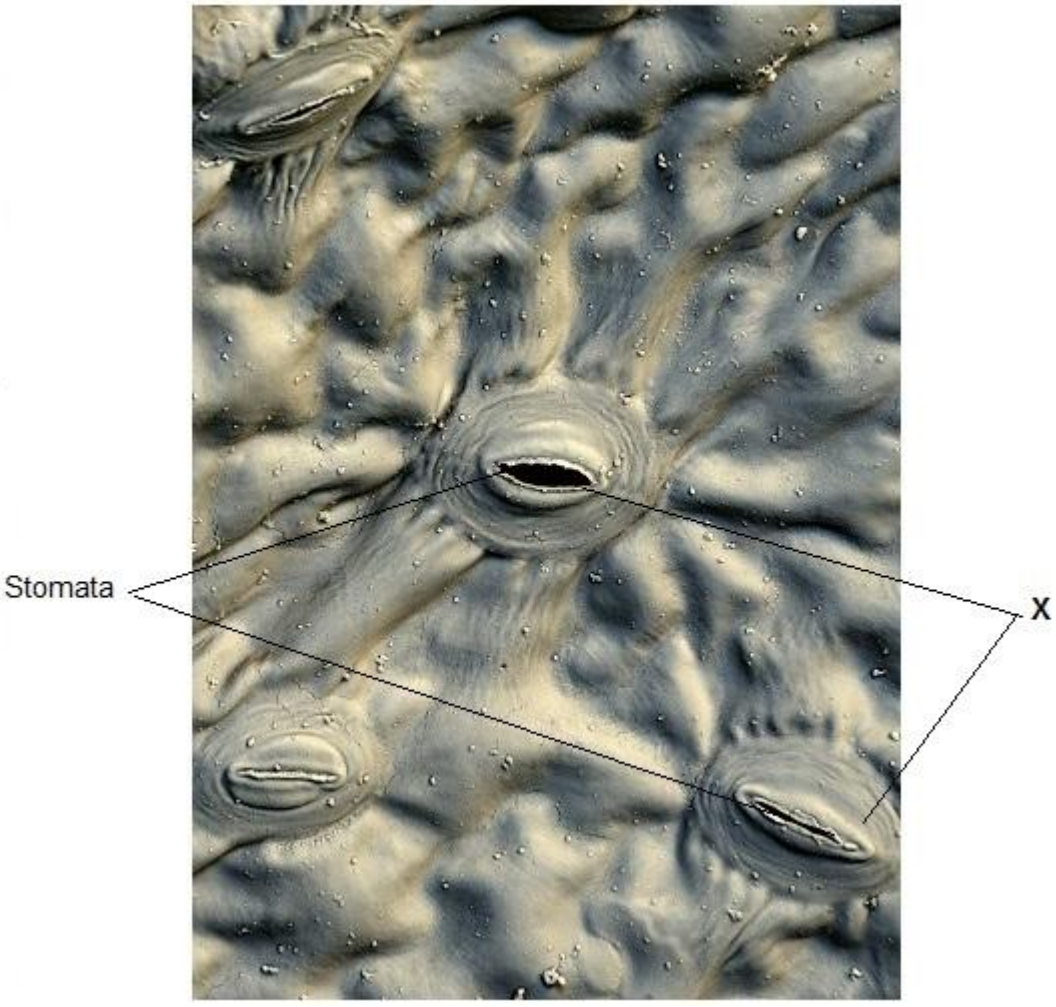
Digestive enzyme	**Breakdown products**
Amylase breaks down starch into……	**amino acids.**
Lipase breaks down fats into…	**bases.**
Protease breaks down proteins into…	**fatty acids and glycerol.**
	sugars.

(3)

(Total 8 marks)

Q8.

The image below shows some cells on the lower surface of a leaf.



(a) What are the cells labelled **X** called?

Draw a ring around the correct answer.

guard cells **palisade cells** **mesophyll cells**

(1)

(b) Water loss by evaporation from leaves is called **transpiration**.

A student set up an experiment to investigate water loss from leaves.

The student:

- took two leaves, **A** and **B**, from a plant
- put Vaseline (grease) on both sides of **Leaf B**; did nothing to **Leaf A**
- wrote down the mass of each leaf
- attached the leaves onto a string as shown in the diagram below.

Leaf A
(no treatment)

Leaf B
(both surfaces covered in Vaseline)

- left the leaves for 48 hours
- wrote down the mass of each leaf again
- calculated the percentage (%) change in mass for each leaf.

(i) Give **one** variable that the student controlled in this investigation.

_____

_____

(1)

(ii) The mass of **Leaf A** was 1.60 g at the start of the investigation. After 48 hours it was 1.28 g.

Calculate the % decrease in mass over 48 hours.

_____

_____

% decrease = _____

(2)

(c) Vaseline blocks the stomata.

The % change in mass of **Leaf B** was less than **Leaf A** after 48 hours.
Explain why.

_____

_____

_____

(1)

(d) Give **three** environmental conditions that would increase transpiration.

1. _____

2. _____

3 _____

(3)

(Total 8 marks)

Q1.

(a) 5624

allow 2 marks *for:*

- *correct HR = 148* ***and*** *correct SV = 38 plus wrong answer / no answer*

or

- *only one value correct* ***and*** *ecf for answer*

allow 1 mark *for:*

- *incorrect values* ***and*** *ecf for answer*

or

- *only one value correct*

3

(b) (i) **Person 2** has low(er) stroke volume / SV / described

eg ***Person 2*** *pumps out smaller volume each beat*

do ***not*** *allow* ***Person 2*** *has lower heart rate*

1

(ii) **Person 1** sends <u>more blood</u> (to muscles / body / lungs)

1

(which) supplies (more) oxygen

1

(and) supplies (more) glucose

1

(faster rate of) respiration **or** transfers (more) energy for use

ignore aerobic / anaerobic

allow (more) energy release

allow aerobic respiration transfers / releases more energy (than anaerobic)

do ***not*** *allow makes (more) energy*

1

removes (more) CO2 / lactic acid / heat

allow less oxygen debt

or less lactic acid made
or (more) muscle contraction / less muscle fatigue

if no other mark awarded,

allow person 1 is fitter (than person 2) for max 1 mark

1

[9]

Q2.

(a) (i) alveoli / alveolus

allow air sacs

allow phonetic spelling

1

(ii) any **one** from:
- protection (of lungs / heart)
- help you breathe / inflate lungs.

1

(b) (i) diffusion

1

(ii) capillaries

1

(iii) any **two** from:
- (have many) alveoli

allow air sacs
- large surface / area
- thin (exchange) surface **or** short diffusion pathway

accept only one / two cell(s) thick
- good blood supply / many capillaries

allow (kept) ventilated or maintained concentration gradient.

2

[6]

Q3.

(a) (i) water / H_2O

accept oxygen

allow H_2O

*do **not** allow H^2O or H2O*

1

(ii) the mineral ions are absorbed by active transport

1

the absorption of mineral ions needs energy

1

(iii) have (many root) <u>hairs</u>

1

(which) give a large surface area (for absorption)

1

(b) carbon dioxide in
or
oxygen out
or

control water loss

accept gas exchange

ignore gases in and out

ignore gain / lose water

1

(c) (i) guard cells

1

(ii) (stomata are) closed

allow there is no gap / space

1

(iii) plant will wilt / droop

ignore die

1

[9]

Q4.

(a) any **two** from:

- carbon dioxide / CO_2
- urea
- protein
- water / H_2O
- hormones / insulin.

ignore food / waste / alcohol / drugs / enzymes

ignore glucose and oxygen

*allow **two** correct hormones for 2 marks*

*allow **two** correct food components for 2 marks*

allow antibodies

allow antitoxins

2

(b) (i) plasma

1

platelets

1

(ii) (cardiac) muscle

allow muscular

1

(c) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking Guidance and apply a 'best-fit' approach to the marking.

0 marks
No relevant content

Level 1 (1−2 marks)
There is a description of at least one advantage of the cow tissue valve
or
a description of at least one disadvantage of the cow tissue valve.

Level 2 (3−4 marks)
There is a description of at least one advantage of the cow tissue valve
and
at least one disadvantage of the cow tissue valve.

Level 3 (5−6 marks)
There is a description of the advantages and disadvantages of the cow tissue valve

or
a description of several advantages of the cow tissue valve and at least one disadvantage.

Examples of the points made in the response

Advantages of cow tissue valve:

- abundant supply of cows
- so shorter waiting time

ignore can take many years to find a suitable human donor

- no need for tissue typing
- quicker operation
- less invasive **or** shorter recovery time
- cheaper operation costs
- less operation / anaesthetic risks.

Disadvantages of cow tissue valve:

- made from cow so possible objections on religious grounds

ignore ethical arguments

- new procedure so could be unknown risks

allow possible transfer of disease from cow

- risks of using a stent eg. blood clots, stent breaking or valve tearing
- not proven as a long term treatment
- may be rejected

ignore information copied directly from the table without value added.

6

[11]

Q5.

(a) (i) diffusion

1

(ii) carbon dioxide

accept CO_2 / CO2

*do **not** accept CO^2*

1

(iii) red blood cells

1

(b) 70

if no / incorrect answer then

70 000 000

or

*280 x 0.25 gains **1** mark*

ignore doubling the answer

2

(c) allows more gas / oxygen / CO_2 (exchange)

*do **not** accept air*

1

[6]

Q6.

(a) A - atrium

ignore references to right / left

1

B - ventricle

1

(b) (i) muscular

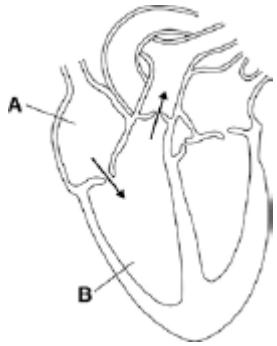
1

(ii) push blood

accept pump / force

1

(c)



arrows approx as indicated

1

arrow(s) showing flow from A to B
from B out / up / to artery

1

(d) (i) male

1

65 and over

1

(ii) fatty deposits / material in (coronary) arteries

allow correct points made about heart attacks

1

narrows / blocks / reduces flow

1

decreases oxygen supply (to heart muscle)

1

[11]

Q7.

(a) (i) stomach

1

(ii) small intestine

1

(b)

	salivary glands	stomach	pancreas	small intestine
amylase	✓	×	✓	✓
lipase	×	×	✓	✓
protease	×	✓	✓	✓

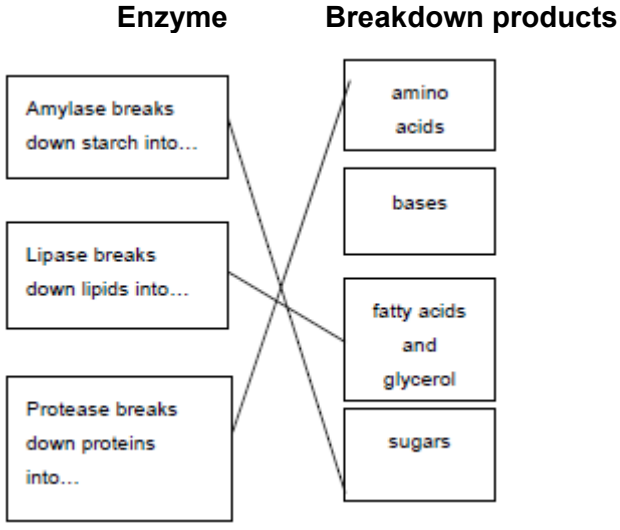
__1__ mark per correct row
or
if no correct row max __1__ mark for any one correct column

2

(c) enzyme / protease / pepsin most effective in acid conditions / low pH
accept optimum / correct pH
do not accept ref to incorrectly named enzymes
ignore killing bacteria
ignore acid breaks down food

1

(d)



3

[8]

Q8.

(a) guard cells

1

(b) (i) any **one** from:

- species / plant
- length of time

ignore temperature and size of leaves

1

(ii) 20

*correct answer = **2** marks*

accept $\frac{1.6 - 1.28}{1.6} \times 100$

or $\frac{0.32}{1.6} \times 100$

*for **1** mark*

2

(c) less water loss / transpiration / evaporation

1

(d) hot

1

ignore bright / sunny conditions

dry / low humidity

1

wind(y)

1

[8]