The Morley Academy

2. Organisation Mastery Booklet

(Biology Paper 1)

Name : _____

Teacher : _____

Date Given : _____

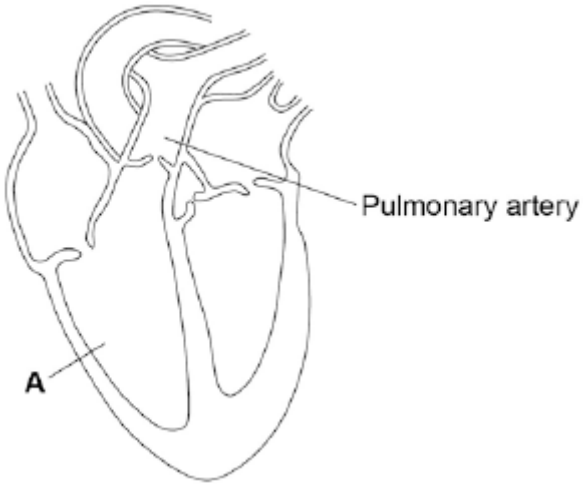
These booklets are a consolidation of your learning. They should be used in the following way - You should attempt the questions WITHOUT looking at the answers. Then mark your questions with **green pen** and add any missing marks you missed.

THIS WILL IMPROVE YOUR GRADES...!!

Q1.

Figure 1 shows a diagram of the human heart.

Figure 1



(a) What part of the heart is labelled **A**?

Tick **one** box.

Aorta ☐

Atrium ☐

Valve ☐

Ventricle ☐

(1)

(b) Where does the pulmonary artery take blood to?

Tick **one** box.

Brain ☐

Liver ☐

Lungs ☐

Stomach ☐

(1)

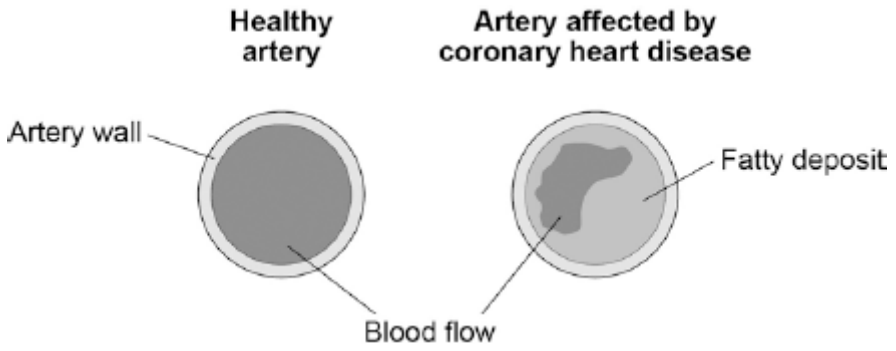
(c) Circle a valve on **Figure 1**.

(1)

(d) The coronary arteries supply blood to the heart.

Figure 2 shows two coronary arteries.

Figure 2



Describe **two** ways the healthy artery is different from the artery affected by coronary heart disease.

1. _____

_____

2. _____

_____

(2)

(e) What can be used to treat people with coronary heart disease?

Tick **two** boxes.

Antibiotics	☐
Hormones	☐
Statins	☐
Stent	☐
Vaccination	☐

(2)

(f) Suggest **two** risk factors for coronary heart disease.

1. _____

_____

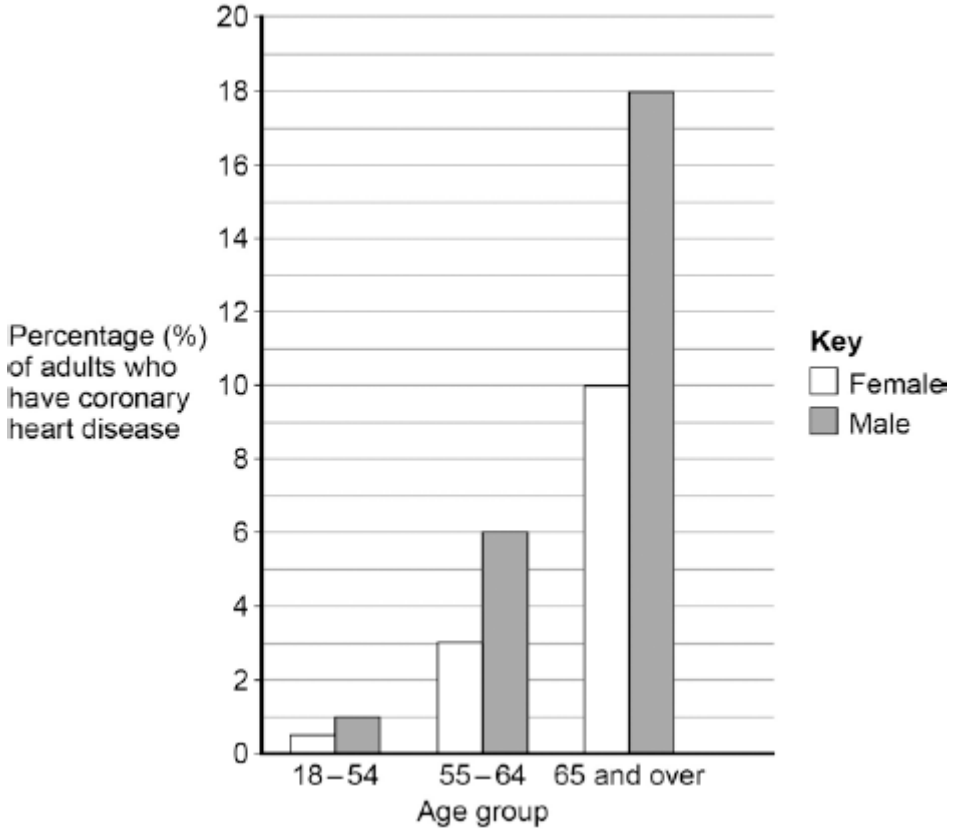
2. _____

_____

(2)

(g) **Figure 3** shows the percentages of adults in the UK who have coronary heart disease.

Figure 3



Calculate the difference in the percentage of male and female adults aged 65 and over who have coronary heart disease.

_____ %

(1)

(h) Which is the correct conclusion for the data in **Figure 3**?

Tick **one** box.

Children do **not** suffer from coronary heart disease ☐

More males suffer from coronary heart disease than females ☐

More younger people suffer from coronary heart disease than older people ☐

(1)

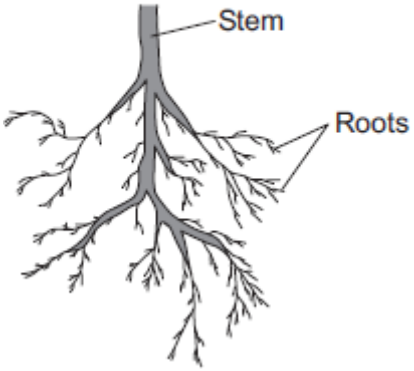
(Total 11 marks)

Q2.

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. ☐

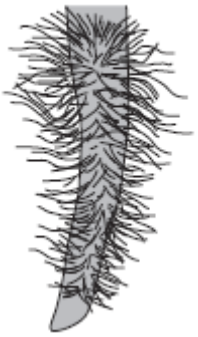
The absorption of mineral ions needs energy. ☐

(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?

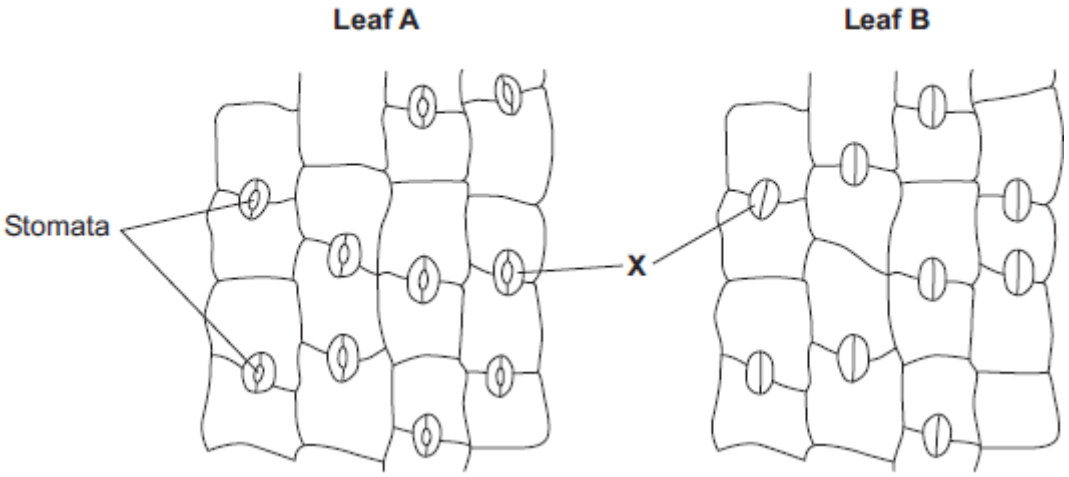
_____

_____

(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)

Q3.

(a) **List A** gives four structures in the human body.

List B gives the functions of some structures in the body.

Draw a straight line from each structure in **List A** to the correct function in **List B**.

List A – Structure	**List B – Function**
	Surround and protect the lungs
Alveoli	
	Filter the blood
Veins	
	Carry blood towards the heart
Villi	
	Absorb digested food
Ribs	
	Allow oxygen to enter the blood

(4)

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

In the lungs, oxygen enters the blood from the air by

- diffusion.
- filtration.
- respiration.

(1)

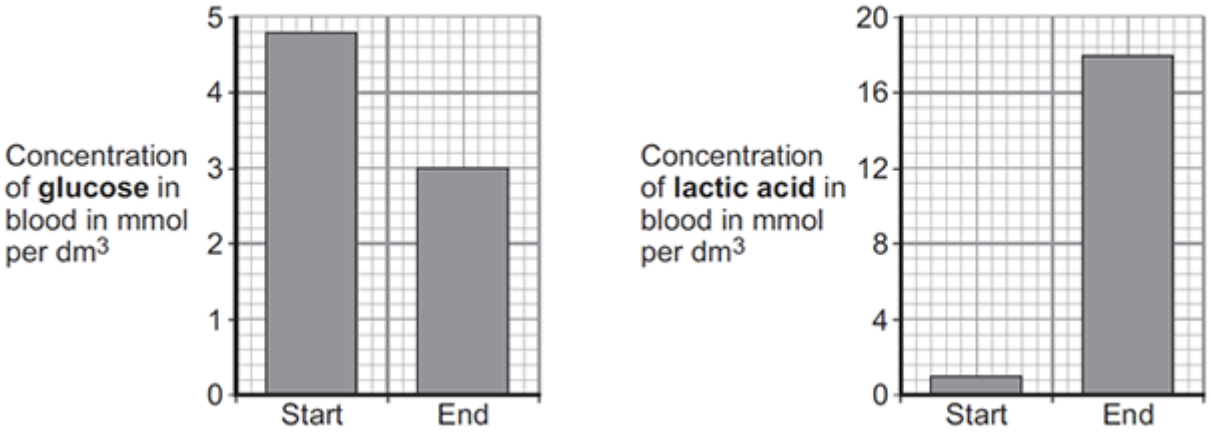
(Total 5 marks)

Q4.

An athlete ran as fast as he could until he was exhausted.

(a) **Figure 1** shows the concentrations of glucose and of lactic acid in the athlete's blood at the start and at the end of the run.

Figure 1



(i) Lactic acid is made during anaerobic respiration.

What does anaerobic mean?

_____

_____

(1)

(ii) Give evidence from **Figure 1** that the athlete respired anaerobically during the run.

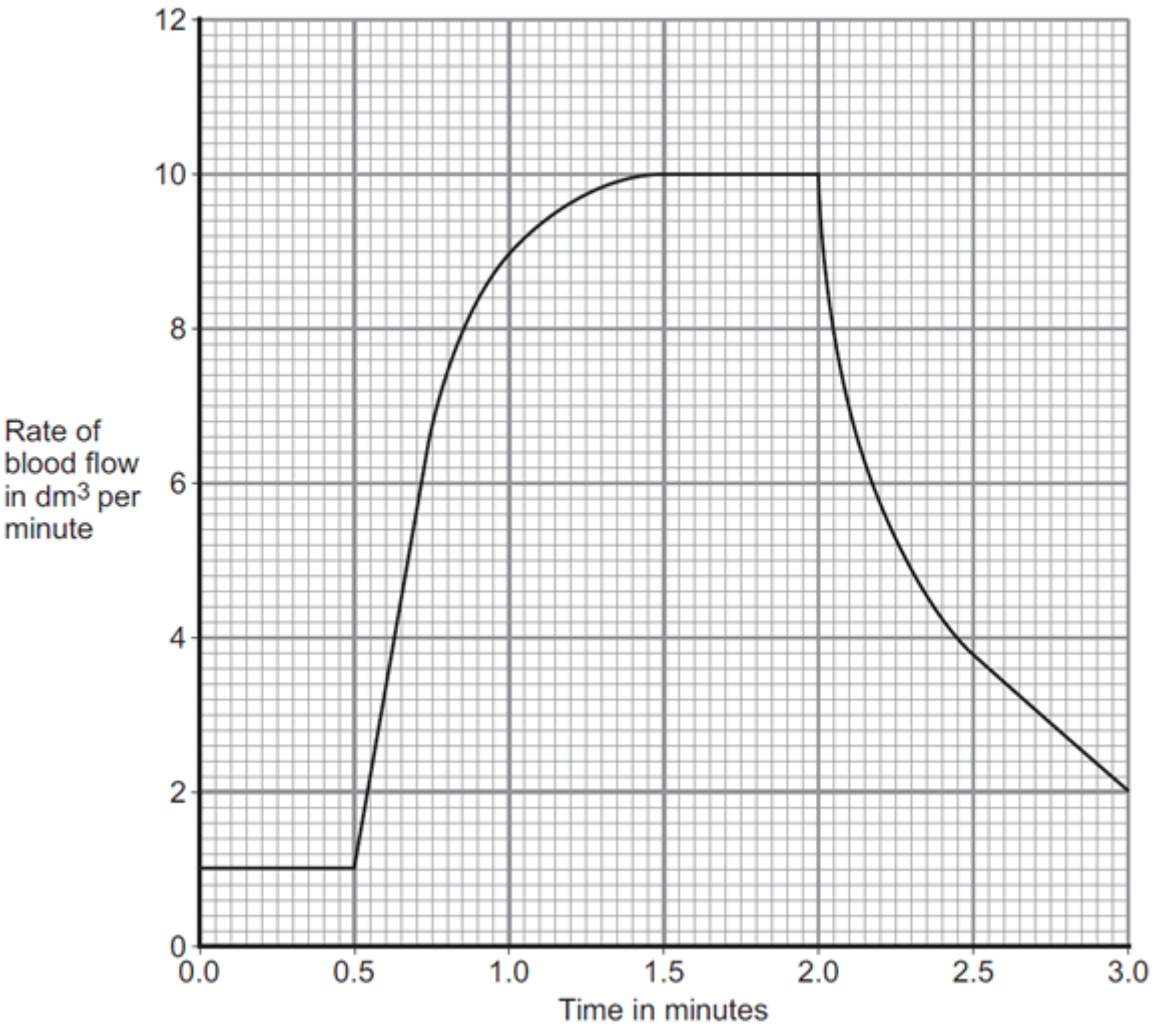
_____

_____

(1)

(b) **Figure 2** shows the effect of running on the rate of blood flow through the athlete's muscles.

Figure 2



(i) For how many minutes did the athlete run?

Time = _____ minutes

(1)

(ii) Describe what happens to the rate of blood flow through the athlete's muscles during the run.

Use data from **Figure 2** in your answer.

_____

_____

_____

_____

(2)

(iii) Explain how the change in blood flow to the athlete's muscles helps him to run.

_____

_____

_____

_____

_____

_____

_____

_____

_____

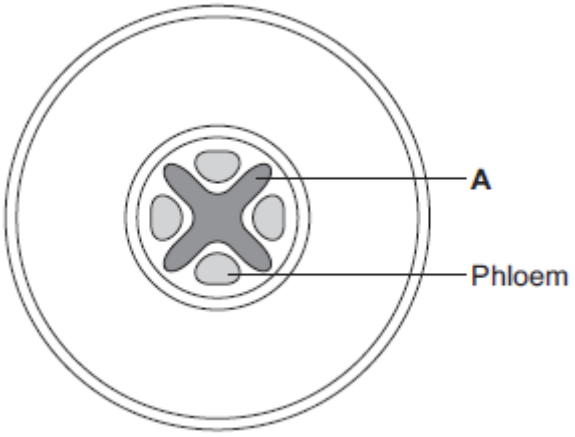
_____

(4)

(Total 9 marks)

Q5.

The diagram below shows a cross-section of a plant root. The transport tissues are labelled.



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

Draw a ring around the correct answer.

cuticle **epidermis** **xylem**

(1)

(ii) Name **two** substances transported by tissue **A**.

1. _____

2. _____

(2)

(b) Phloem is involved in a process called translocation.

(i) What is translocation?

_____

_____

_____

(1)

(ii) Explain why translocation is important to plants.

_____

_____

_____

_____

(2)

(c) Plants must use active transport to move some substances from the soil into root hair cells.

(i) Active transport needs energy.

Which part of the cell releases most of this energy?

Tick (✓) **one** box.

mitochondria ☐

nucleus ☐

ribosome ☐

(1)

(ii) Explain why active transport is necessary in root hair cells.

_____

_____

_____

_____

_____

_____

(2)

(Total 9 marks)

Q6.

(a) A food contains protein. Describe, in as much detail as you can, what happens to this protein after the food is swallowed.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(b) The table shows the activity of lipase on fat in three different conditions.

CONDITION	UNITS OF LIPASE ACTIVITY PER MINUTE
Lipase + acid solution	3.3
Lipase + weak alkaline solution	15.3
Lipase + bile	14.5

Explain, as fully as you can, the results shown in the table.

_____

_____

_____

_____

_____

_____

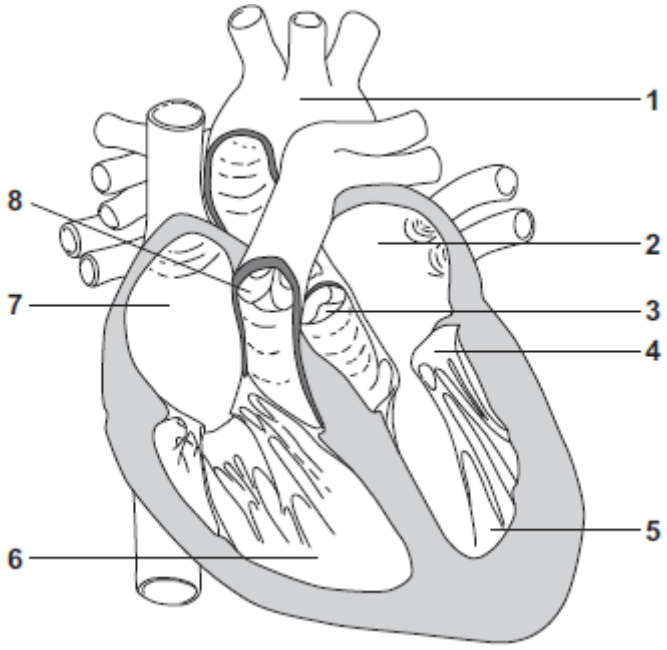
(3)

(Total 7 marks)

Q7.

The diagram in **Figure 1** shows a section through the human heart, seen from the front.

Figure 1



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

(i) The wall of the heart is made mostly of

epithelial
glandular
muscular

tissue.

(1)

(ii) The resting heart rate is controlled by the pacemaker.

The pacemaker is located at position

1.
6.
7.

(1)

(iii) If a person's heart rate is irregular, the person may be fitted with an artificial pacemaker.

The artificial pacemaker is

an electrical device.
a pump.
a valve.

(1)

(b) (i) Write a number, **2**, **5**, **6** or **7**, in **each** of the three boxes to answer this question.

Which chamber of the heart:

pumps oxygenated blood to the head and body ☐

receives deoxygenated blood from the head and body ☐

receives oxygenated blood from the lungs? ☐

(3)

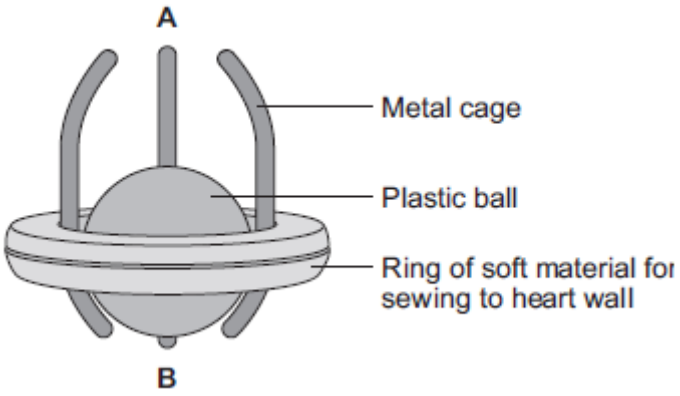
(ii) Give the number, **3**, 4 or **8**, of the valve that closes when the blood pressure in the aorta is greater than the blood pressure in the left ventricle.

Write the correct answer in the box. ☐

(1)

(c) The diagram in **Figure 2** shows one type of artificial heart valve. The plastic ball is in the closed position.

Figure 2



This type of artificial valve could be used to replace a faulty valve in the heart.

(i) What is the function of valves in the heart?

_____

_____

(1)

(ii) The artificial valve could be used to replace valve **4** shown in **Figure 1**.

The artificial valve opens to let blood through when the ball is moved towards **A**.

Which end of the valve, **A** or **B**, should point towards chamber **5**?

Explain your answer.

_____

_____

_____

_____

_____

_____

_____

(3)

(d) (i) The artificial heart valve may cause blood clots to form on its surface.

Describe what happens during blood clotting.

_____

_____

_____

_____

(2)

(ii) Read the information in the passage.

> Replacing a damaged heart valve can dramatically improve the blood circulation and the supply of oxygen to the body's tissues. The operation to replace a heart valve is a long one during which the patient's blood goes through a bypass machine.
> Sometimes the artificial valve can fail to work. If the surface of the valve becomes rough, small blood clots can form on its surface then break away and be carried around the body by the blood.

Evaluate the advantages and disadvantages of artificial heart valves.

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 17 marks)

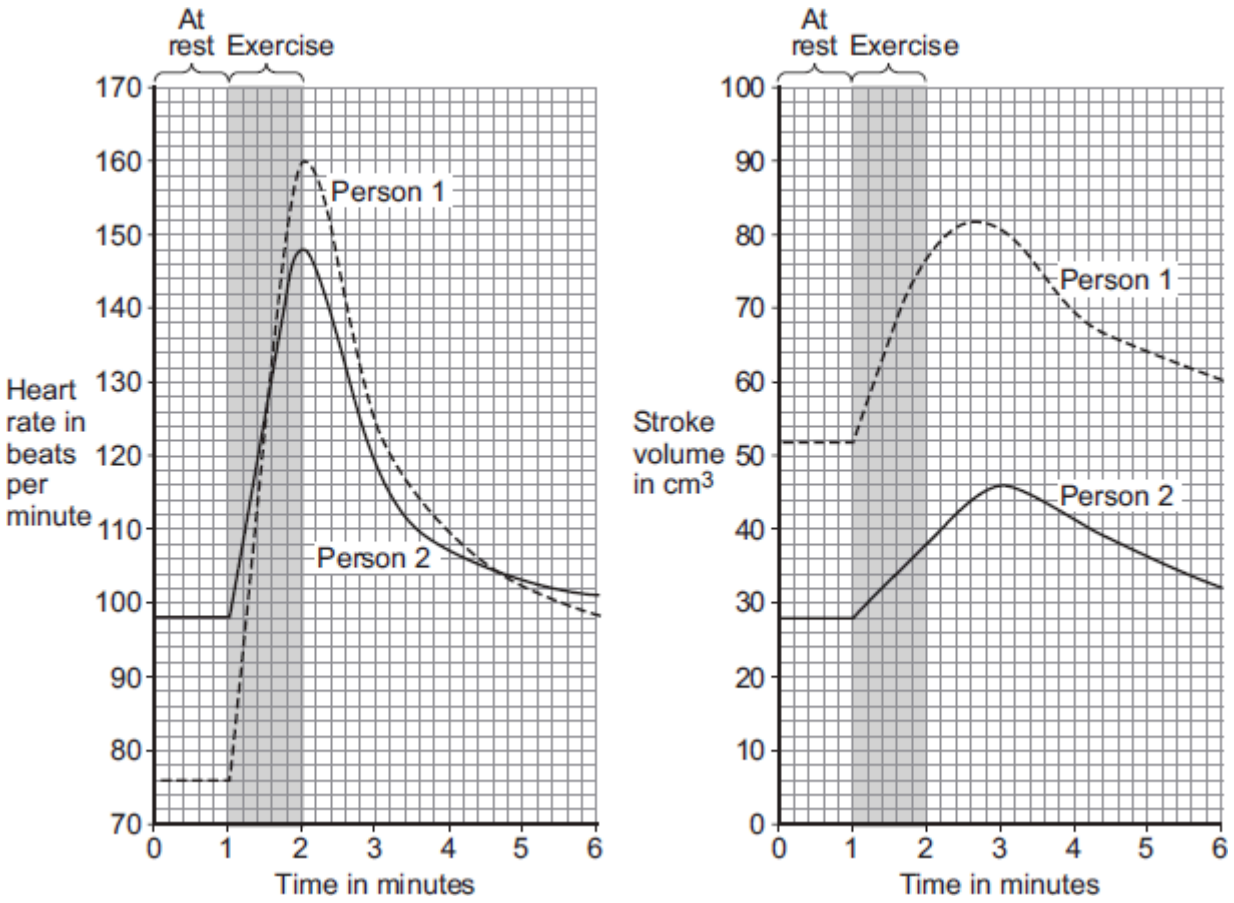
Q8.

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 **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 **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 **Figure above** and your own knowledge to explain why.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(5)

(Total 9 marks)

Q9.

(a) Complete the table to give one site where digestive substances are made.

Digestive substance	One site of production
bile	
amylase	
lipase	
protease	

(4)

(b) Describe **two** ways that the mouth can break down starchy foods.

_____

_____

_____

_____

(2)

(c) Describe how the liver helps to digest fats.

_____

_____

_____

(2)

(Total 8 marks)

Q10.

A group of pupils investigated the digestion of fat by the enzyme lipase.

(a) What **two** substances are produced when fats are digested?

Tick (✓) **two** box.

Glucose	☐
Fatty acids	☐
Glycerol	☐
Amino acids	☐

(2)

In the investigation:

- the pupils set up five test tubes
- each tube contained 1 cm^3 of fat and 10 cm^3 of lipase solution
- each tube was kept at a different temperature for 24 hours.

(b) (i) Give **one** control variable in this investigation.

_____

(1)

(ii) What was the independent variable being investigated?

_____

(1)

(c) The pH of the solution in each tube was tested at the beginning of the investigation and after 24 hours.

The results of the pupils' investigation are shown in the table.

Tube	Temperature in °C	pH at the beginning	pH after 24 hours
1	0	Neutral	Neutral
2	20	Neutral	'Weak' acid
3	40	Neutral	'Strong' acid
4	60	Neutral	'Weak' acid
5	80	Neutral	Neutral

One pupil said, "We might **not** have found the best temperature for the lipase to work".

What more could they do to find the best temperature?

_____

_____

_____

_____

(2)

(d) The pupils then placed **Tube 1** into a water-bath kept at 40 °C.
The tube was left in the water-bath for 24 hours.

(i) What pH would you expect the contents of the tube to be after the extra 24 hours?

Tick (✓) **one** box.

Neutral ☐

'Strong' acid ☐

'Weak' acid ☐

(1)

(ii) Give the reason for your answer.

_____

_____

(1)

(Total 8 marks)

Q11.

After a meal rich in carbohydrates, the concentration of glucose in the small intestine changes.

The table below shows the concentration of glucose at different distances along the small intestine.

Distance along the small intestine in cm	Concentration of glucose in mol dm^{-3}
100	50
300	500
500	250
700	0

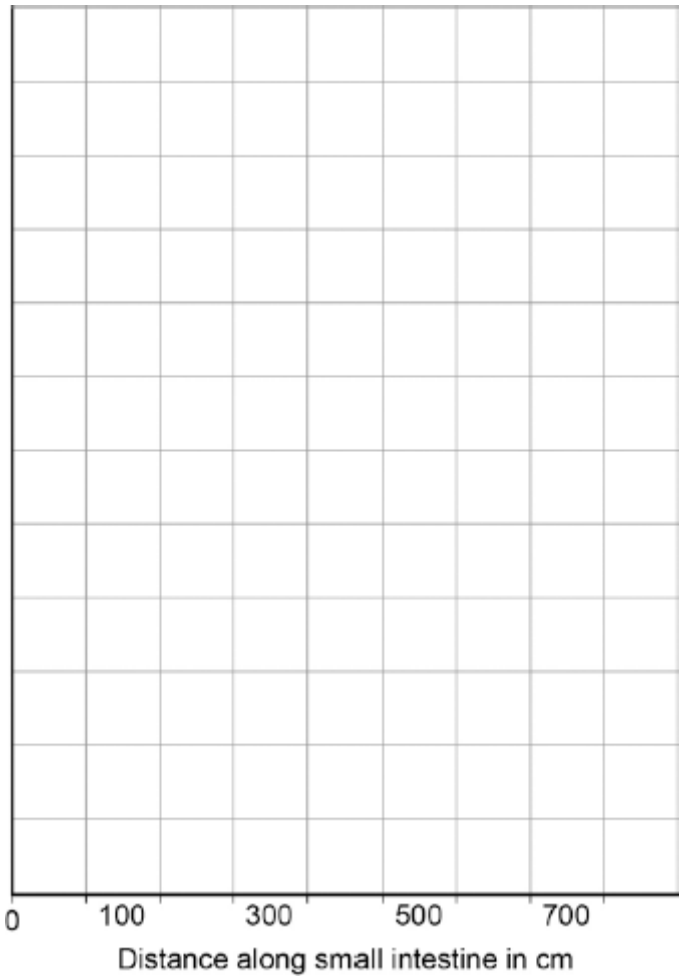
(a) At what distance along the small intestine is the glucose concentration highest?

_____ cm

(1)

(b) Use the data in the table to plot a bar chart on the graph below.

- Label the *y*-axis.
- Choose a suitable scale.



(4)

(c) Look at the graph on the previous page.

Describe how the concentration of glucose changes as distance increases along the small intestine.

_____

_____

_____

_____

(2)

(d) Explain why the concentration of glucose in the small intestine changes between 100 cm and 300 cm.

_____

_____

_____

_____

_____

_____

(2)

(e) Explain why the concentration of glucose in the small intestine changes between 300 cm and 700 cm.

_____

_____

_____

_____

_____

_____

_____

_____

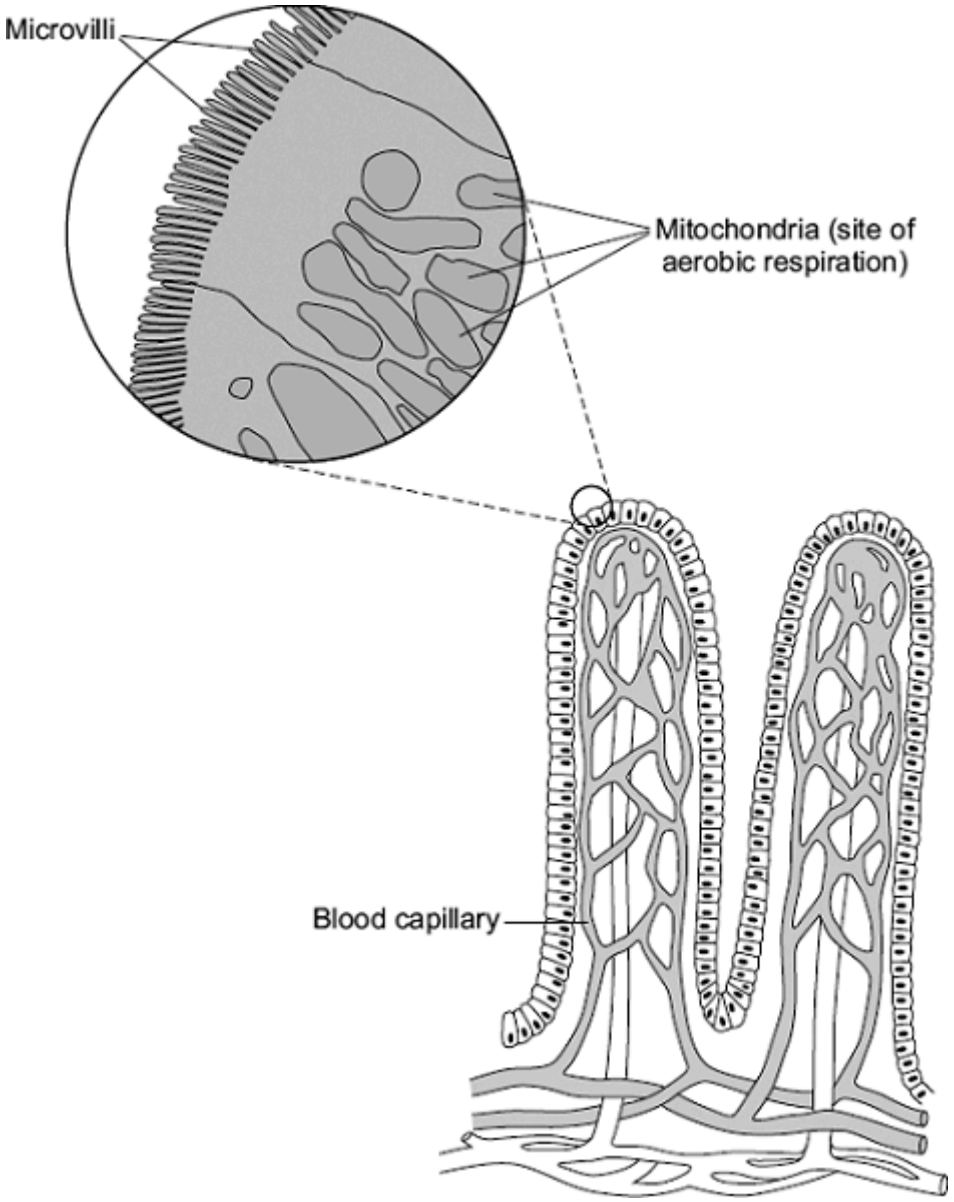
(3)

(Total 12 marks)

Q12.

The villi of the small intestine absorb the products of digestion.

The diagram shows two villi. It also shows parts of some of the surface cells of a villus, as seen with an electron microscope.



Describe and explain how the villi are adapted to maximise the rate of absorption of the products of digestion.

_____

(Total 5 marks)

Mark schemes

Q1.

(a) ventricle

1

(b) lungs

1

(c) valve circled on heart

1

(d) no fatty deposit

1

healthy artery is wider / bigger hole / has more blood flow

1

(e) statins

1

stent

1

(f) any **two** from:

- smoking
- high-fat diet
- lack of exercise

allow:

- *overweight / obese*
- *having high blood pressure*
- *having high cholesterol*

2

(g) 8 (%)

1

(h) more males have coronary heart disease than females

1

[11]

Q2.

(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

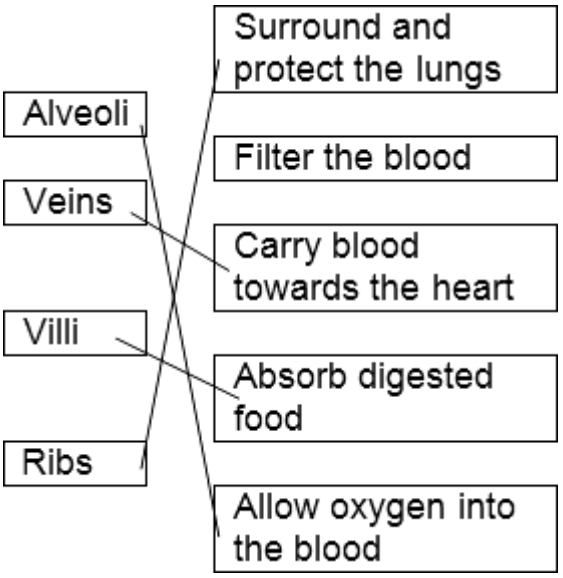
ignore die

1

[9]

Q3.

(a)



*4 correct = **4** marks*
*3 correct = **3** marks*
*2 correct = **2** marks*
*1 correct = **1** mark*
extra line from a structure cancels the mark

4

(b) diffusion

1

[5]

Q4.

(a) (i) without <u>oxygen</u>

allow not enough oxygen

ignore air

ignore production of CO_2

ignore energy

1

(ii) more / high / increased lactic acid (at end)

allow approximate figures (to show increase)

ignore reference to glucose

1

(b) (i) 1.5

allow only 1.5 / 1½ / one and a half

1

(ii) increases at first **and** levels off

ignore subsequent decrease

1

suitable use of numbers eg
rises to 10 / by 9 (dm^3 per min)
or
increases up to 1.5 (min) / levels off after 1.5 (min) (of x axis timescale)

allow answer in range 1.4 to 1.5

or
after the first minute (of the run)

1

(iii) supplies (more) oxygen

1

supplies (more) glucose

1

need 'more/faster' once only for full marks

*allow removes (more) CO_2 / lactic acid / heat as an alternative for either marking point one **or** two, **once** only*

for (more) respiration

1

releases (more) energy (for muscle contraction)

*do **not** allow energy production or for respiration*

1

[9]

Q5.

(a) (i) xylem

1

(ii) water

1

minerals / ions / named example(s)

ignore nutrients

1

(b) (i) movement of (dissolved) sugar

allow additional substances, eg amino acids / correct named sugar (allow sucrose / glucose)

allow nutrients / substances / food molecules if sufficiently qualified

ignore food alone

1

(ii) sugars are made in the leaves

1

so they need to be moved to other parts of the plant for respiration / growth / storage

1

(c) (i) mitochondria

1

(ii) for movement of minerals / ions

Do not accept 'water'

1

against their concentration gradient

1

[9]

Q6.

(a) digested / broken down / made soluble by protease enzyme
in stomach in small intestine / from stomach / from pancreas
into amino acids
amino acids / small molecules absorbed into blood

any four for 1 mark each

4

(b) *ideas that*
lipase / enzyme works best in alkaline / neutral conditions
acid denatures or inactivates enzyme / inhibits enzyme activity
bile emulsifies fat / bile produces larger surface area of fats / bile alkaline
for enzyme to work on / which increase activity of enzymes

any three for 1 mark each

3

[7]

Q7.

(a) (i) muscular

1

(ii) **7**

1

(iii) an electrical device

1

(b) (i) in sequence:

5

1

7

1

2

1

(ii) **3**

1

(c) (i) prevent backflow (of blood) / allow flow in only one direction / in the correct direction

1

(ii) **A**

*no mark, but max **2** marks if incorrect*

2 / atrium contracts / pressure in **2** increases

1

<u>blood</u> <u>pushes</u> ball (down / towards ventricle / towards **5**)

allow this point even if valve in wrong part of heart

1

(opens valve which) allows blood into **5** / ventricle

***or** converse points re closing the valve*

1

(d) (i) involvement of <u>platelets</u> / eg <u>platelets</u> 'trigger' clotting process / release enzyme(s) / release 'clotting factors'

1

fibrinogen to fibrin
or
meshwork formed (which traps blood cells)

1

(ii) any **four** from:

*to gain **4** marks candidates should include at least:*

***one** advantage and **one** disadvantage*

Advantages

(improved circulation / O_2 supply) provides:

- <u>more</u> cell respiration
- <u>more</u> energy released
- (more) active life / not so tired / more physical activity

Disadvantages

- danger of surgery / operation

- infection from surgery / operation
- valve may need replacing
- clots may form and block blood vessels

  may need to take anti-coagulants – eg warfarin
- clots may cause heart attacks / strokes

4

[17]

Q8.

(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) CO_2 / 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]

Q9.

(a) liver

1

mouth or salivary glands **or**
duodenum **or** small intestine **or**
pancreas

1

pancreas

*accept duodenum **or** ileum **or** small intestine*

*do **not** accept stomach*

1

stomach **or** duodenum **or** ileum **or**
small intestine **or** pancreas

1

(b) teeth breakdown food

accept chewing

1

amylase **or** saliva (breaks down starch)

1

(c) produces bile (salts)

1

emulsifies (fat) **or** produces droplets
or disperses fat)

1

[8]

Q10.

(a) fatty acids

1

glycerol

1

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

- (same) amount / $1cm^{3}$ fat
- (same) amount / $10cm^{3}$ lipase / enzyme
- (kept for) 24 hours **or** (same length of) time

1

(ii) temperature

allow heat / warmth

1

(c) (carry out experiments) using more temperatures / smaller intervals

ignore repeat unqualified

do not accept longer time

1

between 20 and 60 °C / around 40 °C

accept extra single temperature in range 20 °C – 60 °C but cannot be 20 °C, 40 °C or 60 °C

1

(d) (i) 'strong' acid

1

(ii) enzyme works / not destroyed / not denatured / not damaged

*do **not** accept enzyme not killed*

accept any indication that the fat is digested

accept same as tube 3 / tube at 40 °C

accept optimum temperature / at or near body temperature

1

[8]

Q11.

(a) 300

1

(b) suitable scale on *y*-axis

1

label *y*-axis

1

4 bars drawn correctly

*allow **1** mark for 3 correct bars*

2

(c) increases from 50 to 500

1

then decreases from 500 to 0

1

(d) carbohydrates broken down / digested into sugars

1

broken down by carbohydrase or amylase

1

(e) absorption of glucose

1

into blood

1

by active transport

allow diffusion

1

[12]

Q12.

D – *many* microvilli (1)
Ex – provide large surface area (1)

***five** points made*
*max **3** descriptions*
*max **3** explanations*

D – *many* capillaries / *good* blood supply (1)
Ex – maintain concentration / diffusion gradient **or** quickly removes food (1)

D – thin wall / one cell thick surface / capillaries near surface (1)

allow villi are thin
ignore villi are one cell thick

Ex – short distance for food to travel (1)

D – *many mitochondria (1)*
Ex – provide energy / ATP for active uptake / transport (1)

[5]