

## Organisation part 9

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Name: \_\_\_\_\_

Class: \_\_\_\_\_

Date: \_\_\_\_\_

Time: **70 minutes**

Marks: **67 marks**

Comments:

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**Q1.**

Malignant tumours are called cancers.

- (a) Describe how a tumour can spread to different parts of the body.

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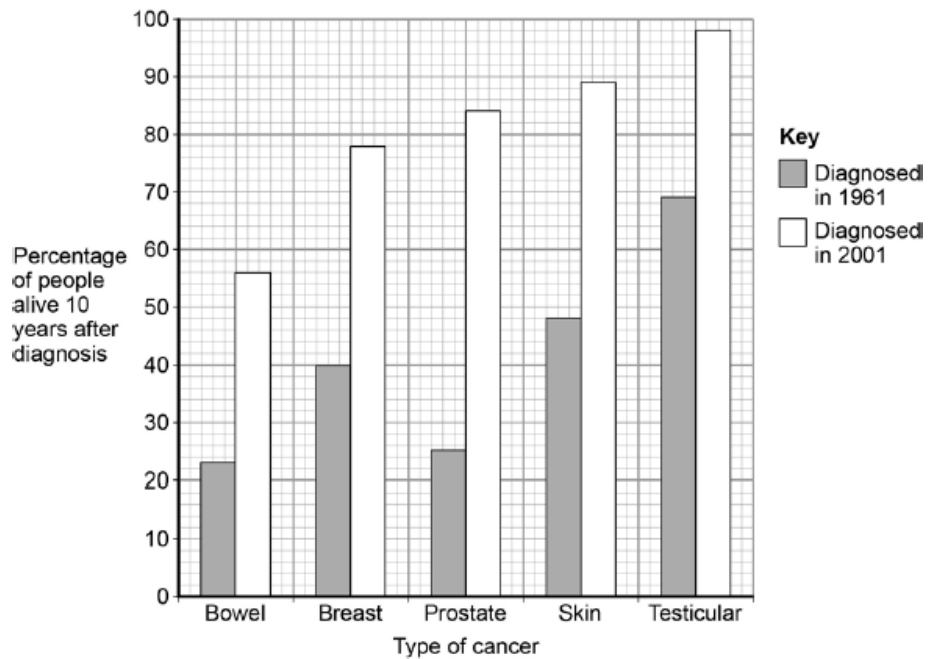
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(2)

- (b) Survival rates for people with cancer have improved a lot.

Some people who are alive 10 years after diagnosis are considered to be cured.

The figure below shows data for people diagnosed with cancer in 1961 and 2001.



Look at the data in the figure above for skin cancer.

Calculate the percentage increase in the survival rate of people diagnosed with skin cancer in 1961 compared to 2001.

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

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Survival rate increase = \_\_\_\_\_ %

(2)

(c) Look at the data in the figure above for bowel and prostate cancer.

Compare the survival rates for bowel and prostate cancer.

Suggest reasons for the comparisons you have made.

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(4)

(Total 8 marks)

**Q2.**

Amylase is an enzyme that digests starch.

A student investigated the effect of pH on the activity of amylase.

This is the method used.

1. Mix amylase solution and starch suspension in a boiling tube.
2. Put the boiling tube into a water bath at 25 °C.
3. Remove a drop of the mixture every 30 seconds and test it for the presence of starch.
4. Repeat the investigation at different pH values.

The table below shows the students' results.

pH	Time when no starch was detected in minutes
5.0	7.0
5.5	4.5
6.0	3.0
6.5	2.0
7.0	1.5
7.5	1.5
8.0	2.0

- (a) The student concluded pH 7.25 was the optimum pH for the amylase enzyme.

This is **not** a valid conclusion.

Suggest **two** reasons why.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

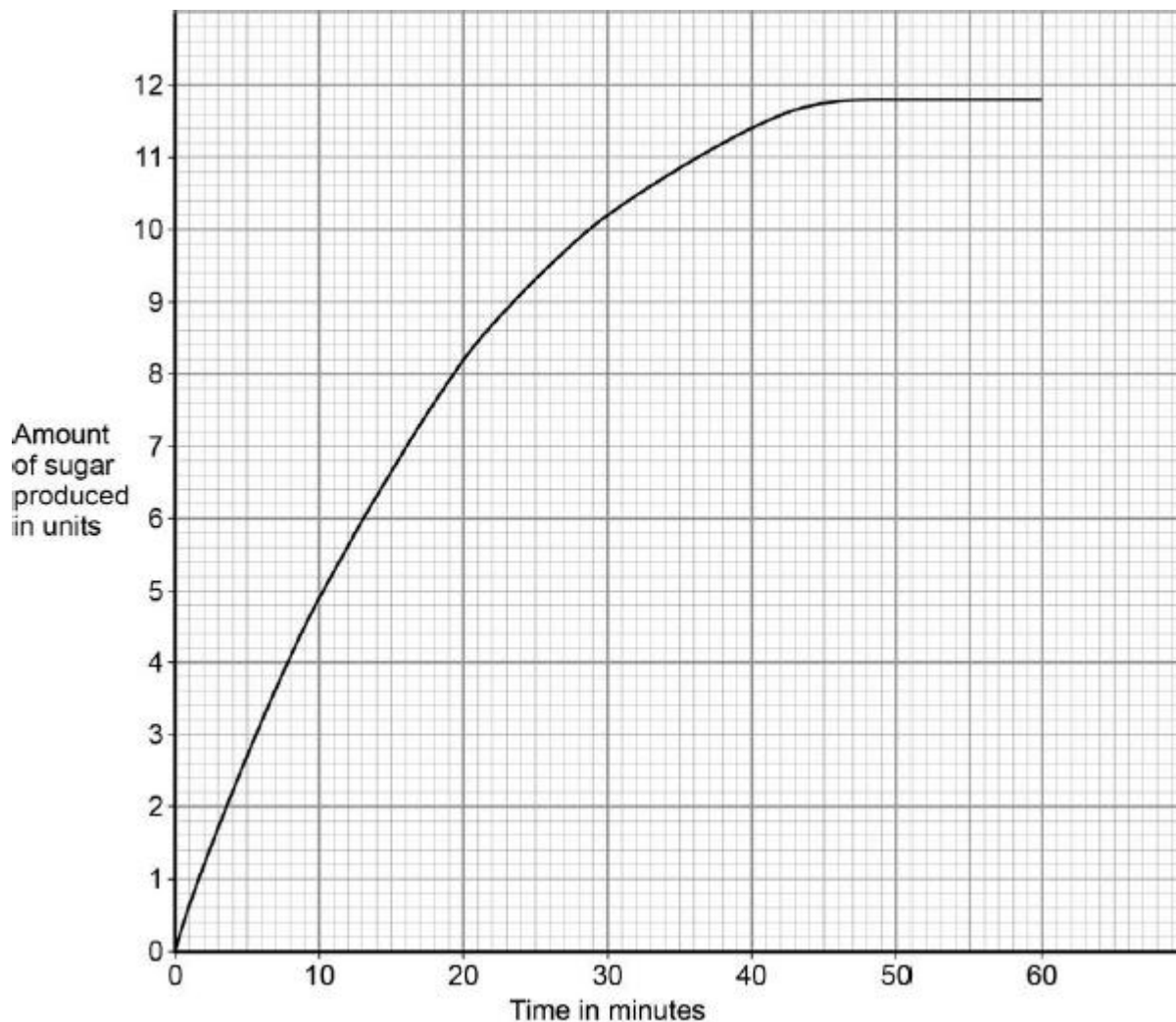
(2)

(b) The student did another investigation.

This is the method used.

1. Put amylase solution and starch suspension into a boiling tube.
2. Make the pH 7.25.
3. Put the boiling tube into a water bath at 25 °C.
4. Measure the amount of sugar produced every 30 seconds.

The results are shown in the figure below.



Calculate the mean rate of sugar produced per minute during the first 5 minutes.

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Mean rate = \_\_\_\_\_ units per minute

(2)

- (c) Iodine solution is added to a sample taken from the boiling tube after 10 minutes and 60 minutes.

Suggest what you would see in these samples.

After 10 minutes \_\_\_\_\_

\_\_\_\_\_

.After 60 minutes \_\_\_\_\_

\_\_\_\_\_

(2)

- (d) The scientist repeated the investigation at 37 °C.

Draw a line on the figure above to show the predicted results.

(2)

(Total 8 marks)

### Q3.

- (a) Blood is made up of four main components.

Red blood cells and white blood cells are two of these components.

Describe the functions of the **two** other components of blood.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2)

- (b) The heart is often described as a **double pump**.

Describe why.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(1)

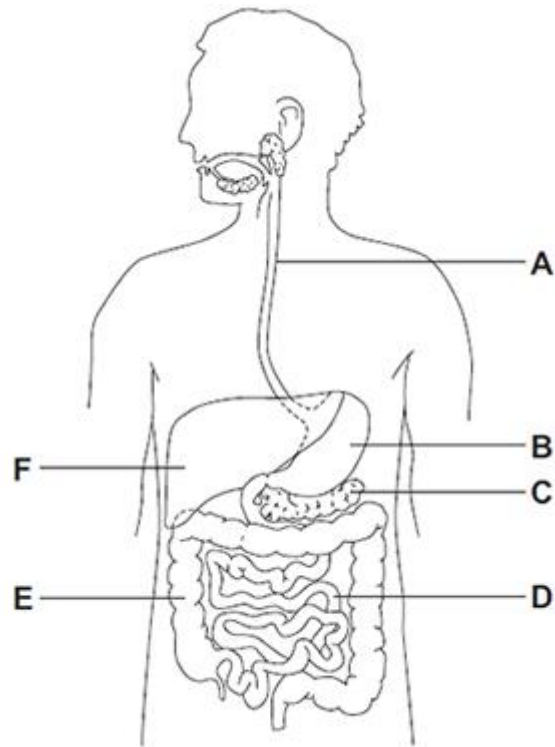


**Q4.**

The digestive system breaks down food into small molecules.

The small molecules can be absorbed into the blood.

The diagram below shows the human digestive system.



- (a) (i) Which letter, **A**, **B**, **C**, **D**, **E** or **F**, shows each of the following organs?

Write **one** letter in each box.

large intestine

small intestine

stomach

(3)

(ii) Different organs in the digestive system have different functions.

Draw **one** line from each function to the organ with that function.

Function	Organ
Digestion of fat	Large intestine
Absorption of water into the blood	Liver
Production of hydrochloric acid	Small intestine
	Stomach

(3)

(b) Glucose is absorbed into the blood in the small intestine.

Most of the glucose is absorbed by diffusion.

How does the glucose concentration in the blood compare to the glucose concentration in the small intestine?

Tick (✓) **one** box.

The concentration in the blood is higher.

The concentration in the blood is lower.

The concentration in the blood is the same.

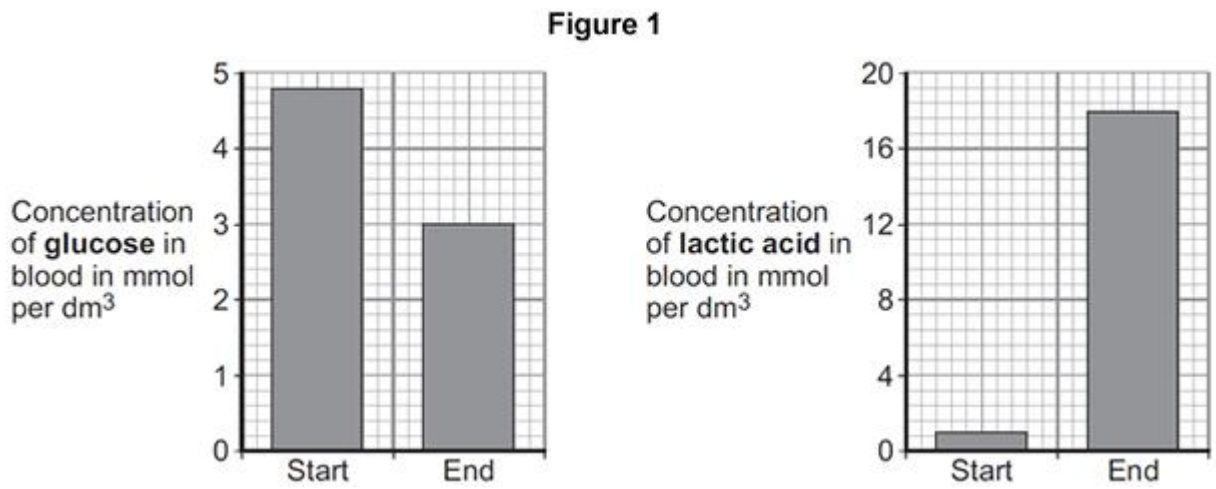
(1)

(Total 7 marks)

**Q5.**

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.



- (i) Lactic acid is made during anaerobic respiration.

What does anaerobic mean?

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(1)

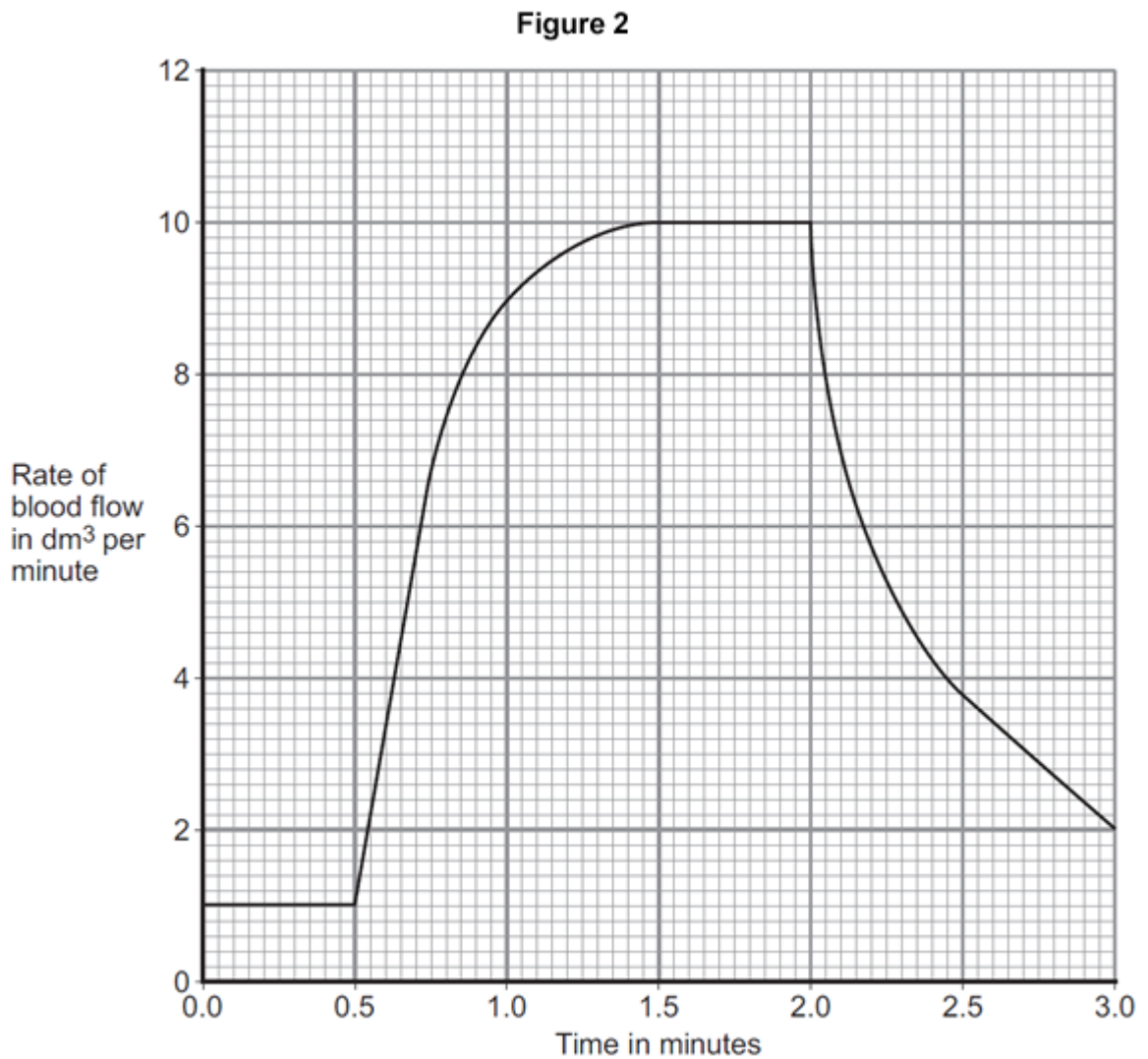
- (ii) Give evidence from **Figure 1** that the athlete respired anaerobically during the run.

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(1)

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



- (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.

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(2)



**Q6.**

Enzymes are made and used in all living organisms.

(a) What is an enzyme?

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(2)

(b) Many enzymes work inside cells.

In which part of a cell will most enzymes work?

Draw a ring around the correct answer.

**cell membrane**

**cytoplasm**

**nucleus**

(1)

(c) We can also use enzymes in industry.

Hydrogen peroxide is a chemical that can be used to preserve milk.

Adding a small amount of hydrogen peroxide to the milk kills the bacteria that cause decay. Hydrogen peroxide does not kill all disease-causing bacteria.

The enzyme catalase can be added later to break down the hydrogen peroxide to oxygen and water.

A different way of preserving the milk is by heating it in large machines to 138 °C for a few seconds.

Suggest **one** advantage and **one** disadvantage of using hydrogen peroxide and catalase to preserve milk instead of using heat treatment.

Advantage of hydrogen peroxide and catalase \_\_\_\_\_

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Disadvantage of hydrogen peroxide and catalase \_\_\_\_\_

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(2)

(Total 5 marks)

**Q7.**

The heart is part of the circulatory system.

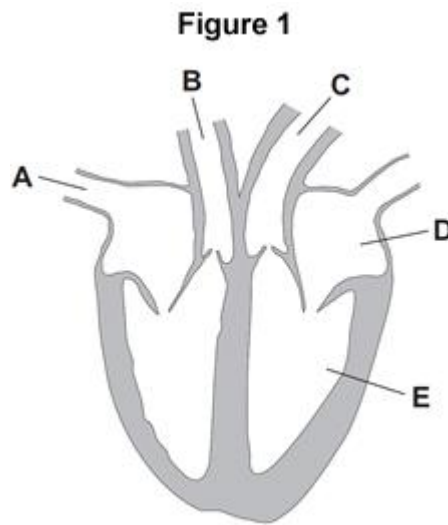
- (a) (i) Name **one** substance transported by the blood in the circulatory system.

\_\_\_\_\_ (1)

- (ii) What is the main type of tissue in the heart wall?

\_\_\_\_\_ (1)

- (b) **Figure 1** shows the human heart.



- (i) Which blood vessel, **A**, **B** or **C**, takes blood to the lungs?

(1)

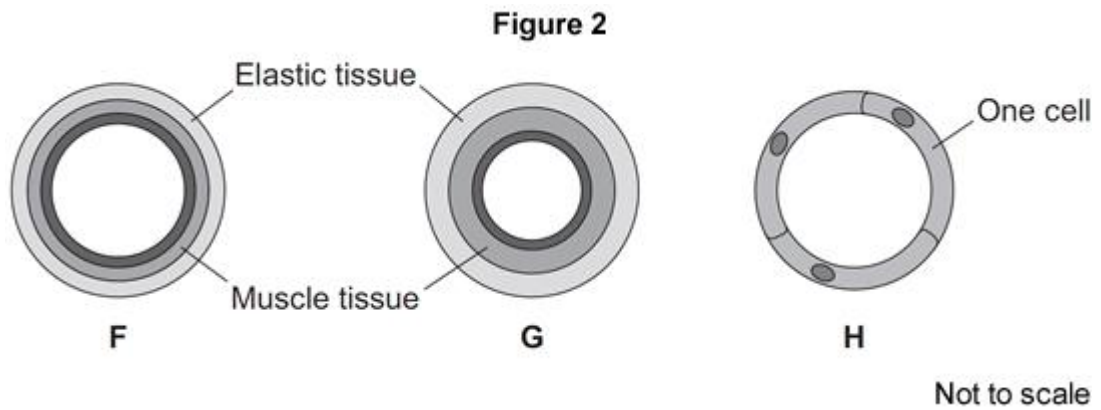
- (ii) Name parts **D** and **E** shown in **Figure 1**.

**D** \_\_\_\_\_

**E** \_\_\_\_\_

(2)

(c) **Figure 2** shows three types of blood vessel, **F**, **G** and **H**.



(i) What type of blood vessel is **F**?

Tick (✓) **one** box.

an artery

a capillary

a vein

(1)

(ii) A man needs to have a stent fitted to prevent a heart attack.

In which type of blood vessel would the stent be placed?

Tick (✓) **one** box.

an artery

a capillary

a vein

(1)

(iii) Explain how a stent helps to prevent a heart attack.

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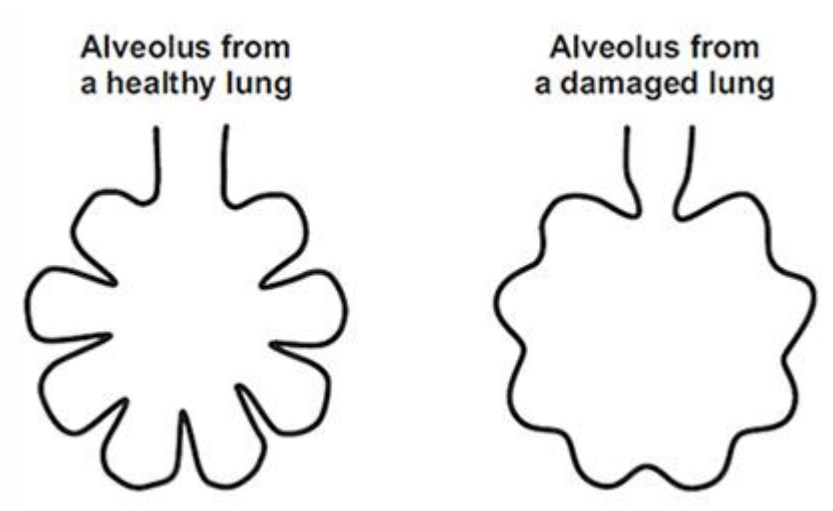
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(2)

(Total 9 marks)

**Q8.**

The diagram below shows an alveolus from a healthy lung and an alveolus from a damaged lung.



- (a) Which **one** of the following is a difference between the alveolus from the damaged lung and the alveolus from the healthy lung?

Tick (✓) **one** box.

The damaged alveolus has a smaller surface area.

The damaged alveolus has a shorter diffusion pathway.

The damaged alveolus has a better blood supply.

(1)

- (b) A person with damaged alveoli finds exercising difficult.

Which **one** of the following is the reason why the damaged alveoli will make exercising difficult?

Tick (✓) **one** box.

Less carbon dioxide is taken in.

Less energy is needed for exercise.

Less oxygen is taken in.

(1)

(Total 2 marks)

**Q9.**

Carbon dioxide enters a plant through stomata on the leaves.

- (a) Name the cells that control the size of the stomata.

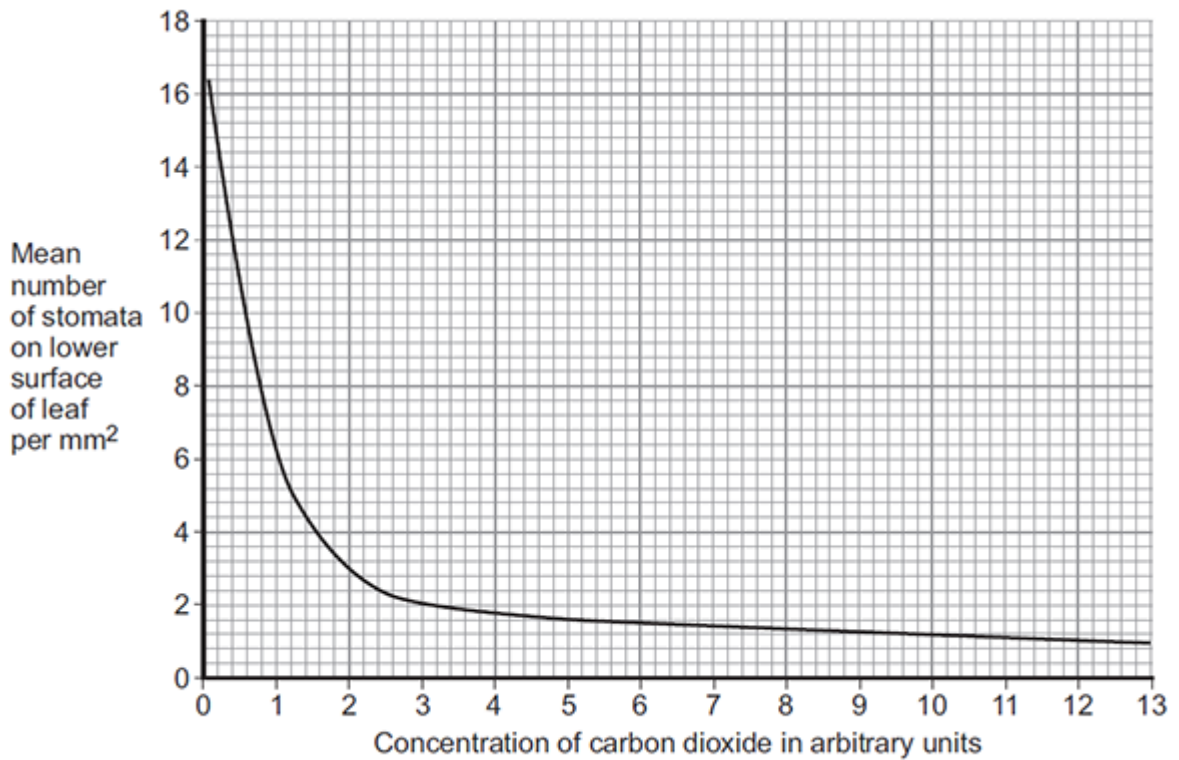
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(1)

- (b) Scientists grew tomato plants in air containing different concentrations of carbon dioxide.

The scientists recorded the number of stomata found on the lower surface of the leaves of plants grown at each carbon dioxide concentration.

The graph below shows the results.



- (i) Describe the relationship between the mean number of stomata per mm<sup>2</sup> and carbon dioxide concentration.

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(2)

(ii) Suggest a reason for the relationship you described in part **(b)(i)**.

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(1)

(c) (i) Suggest **one** disadvantage to a plant of having a large number of stomata per mm<sup>2</sup> on each leaf.

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(1)

(ii) Suggest **one** environmental condition where a large number of stomata per mm<sup>2</sup> on each leaf would be a disadvantage.

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(1)

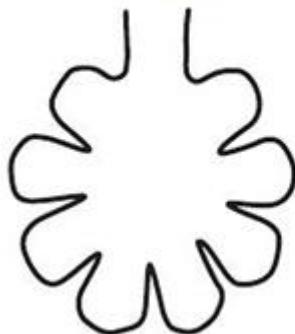
**(Total 6 marks)**

**Q10.**

Emphysema is a disease affecting the lungs. People with emphysema are often short of breath and find exercise difficult.

The diagram below shows an alveolus from a person without emphysema and an alveolus from a person with emphysema.

Alveolus from person without emphysema



Alveolus from person with emphysema



(a) Describe **one** difference between the alveolus from a person without emphysema and the alveolus from a person with emphysema.

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(1)

- (b) Explain how the difference you described in part (a) causes the person with emphysema to find exercise difficult.

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(3)

(Total 4 marks)

## Mark schemes

### Q1.

- (a) cells can break off  
*allow cells invade other tissues* 1
- travel in blood  
*accept travel in lymph (fluid)* 1
- (b)  $\frac{(89 - 48)}{48} \times 100 = 85.416\bar{6}$  1
- 85.4 (%)  
*allow 85.4 (%) with no working shown for 2 marks)* 1
- (c) any **two** from:
- similar survival rates for diagnosis in 1961
  - survival rate (for diagnosis in 2011) is 1.5 times greater for prostate cancer compared to bowel cancer
  - (survival rates) have improved for both cancers
  - (survival rate) for prostate cancer has improved more  
*accept survival rate for bowel cancer has increased 2.4 times **but** for prostate cancer 3.4 / 3.36 times* 2
- plus **two** from:
- earlier diagnosis
  - improved screening programmes
  - improved drugs
  - difference in level of aggression of cancers
  - difference in ease of removing tumours  
*reason must be correctly linked to comparison* 2

[8]

### Q2.

- (a) any **two** from:
- same result at pH 7 and 7.5  
**or**  
could be any pH between 7 and 7.5  
**or**  
not tested at pH 7.25  
**or**  
need to test at smaller pH intervals (between 7 and 7.5)
  - accuracy of result only to nearest 0.5 minutes
  - no repeats
  - difficult to determine end point (colour)

- 2
- (b) 2.7 / 5 1
- 0.54 (units per minute)
- allow 0.52 with no working shown for 2 marks*
- allow 1 mark for 0.52 or 0.56*
- (c) (after 10 minutes) solution goes black 1
- (after 60 minutes) solution stays the same
- or**
- does not go black
- or**
- goes slightly orange 1
- (d) steeper curve 1
- levels off at 11.8 units **and** before 45 minutes 1

[8]

**Q3.**

- (a) plasma transports proteins / dissolved substances / food (molecules) / urea / hormones
- or**
- blood cells are suspended in the plasma 1
- platelets are involved in blood clotting 1
- (b) the right side of the heart pumps blood to the lungs
- and**
- the left side of the heart pumps blood around (the rest of) the body 1
- (c) **Level 3 (5–6 marks):**  
A detailed and coherent evaluation is provided which considers a range of relevant points and comes to a conclusion consistent with the reasoning.
- Level 2 (3–4 marks):**  
An attempt to relate relevant points and come to a conclusion. The logic may be inconsistent at times but builds towards a coherent argument.
- Level 1 (1–2 marks):**  
Discrete relevant points made. The logic may be unclear and the conclusion, if present, may not be consistent with the reasoning.
- 0 marks:**  
No relevant content

**Indicative content**

**pros of statins:**

- decreases blood cholesterol
- slows down build-up of fatty material in arteries
- (so) blood can flow to heart muscle cells

**cons of statins:**

- drug has to be taken regularly **or** may forget to take drug
- drug will need to be taken long-term
- side-effects of taking the drug
- effects of drug will take time to happen

**pros of stents:**

- blocked artery is held open
- (so) blood can flow to heart muscle cells
- will remain in place / work for a long time
- rapid recovery time

**cons of stents:**

- risk of infection from procedure
- risk of surgery eg heart attack
- risk of thrombosis **or** blood clot

a justified conclusion

6

[9]

**Q4.**

(a) (i) large intestine = **E**

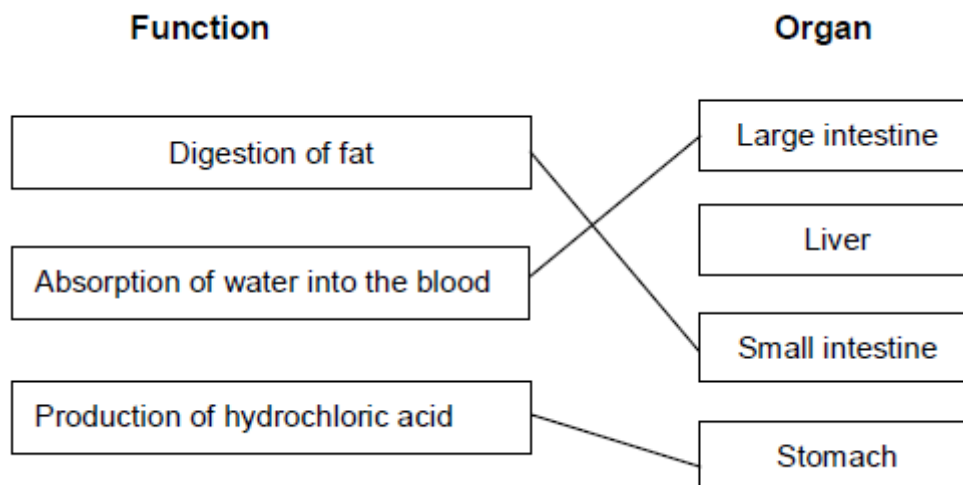
1

small intestine = **D**

1

stomach = **B**

1



(ii)

*extra lines cancel*

3

(b) The concentration in the blood is lower.

1

## Q5.

- (a) (i) without oxygen  
*allow not enough oxygen*  
*ignore air*  
*ignore production of CO<sub>2</sub>*  
*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<sup>3</sup> 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<sub>2</sub> / 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]

## Q6.

- (a) a catalyst / speeds up a reaction  
*ignore it is not used up* 1
- it is a protein **or** it is specific / described **or** it has an active site

*allow it only acts on one molecule*

1

(b) cytoplasm

1

(c) **Advantage:**

any **one** from:

- heat would denature proteins in milk
- heat alters texture or flavour of milk
- catalase / enzyme is specific **or** only affects hydrogen peroxide
- less energy / fuel / lower temperature used so less expensive **or** less pollution

1

**Disadvantage:**

any **one** from:

- (some pathogens may survive) causing illness
- catalase / enzyme left in milk **or** may cause allergies **or** may alter taste

1

[5]

### Q7.

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

- glucose
- oxygen
- carbon dioxide
- urea
- water

*allow hormones*

*allow named example of a product of digestion*

1

(ii) (cardiac) muscle

*allow muscular*

1

(b) (i) **B**

1

(ii) **D** atrium / atria

*ignore references to left or right*

1

**E** ventricle(s)

*ignore references to left or right*

1

(c) (i) a vein

1

(ii) an artery

1

(iii) keeps artery open / wider

*allow ecf from part cii*

1

(so) blood / oxygen can pass through (to the heart muscle)

1

[9]

**Q8.**

(a) The damaged alveolus has a smaller surface area.

1

(b) Less oxygen is taken in.

1

[2]

**Q9.**

(a) guard (cells)

*allow phonetic spelling*

1

(b) (i) as carbon dioxide (concentration) increases, the (mean) number of stomata decreases

*allow there is a negative correlation*

1

(there is a) rapid drop initially

*allow use of any number between 1.5 and 3.0 to indicate "initially"*

1

(ii) (there is) more carbon dioxide so plant doesn't need as many stomata (to obtain the amount needed)

**or**

(there is) less carbon dioxide so the plant needs more stomata (to obtain enough)

1

(c) (i) may lose too much water

*allow plant may wilt*

*ignore references to oxygen / carbon dioxide*

*plants lose a lot of water is insufficient*

*ignore flaccid*

1

(ii) any **one** from:

- hot
- dry
- windy

*ignore environments unqualified eg desert*

1

[6]

**Q10.**

(a) (healthy alveolus has a) larger surface area  
*allow larger SA:Volume ratio*  
*accept converse for alveoli from person with emphysema*  
*allow walls between alveoli disintegrate **or** fluid accumulation*  
*in alveoli*

1

(b) less oxygen into the blood / muscles  
*less only needed once*

1

(so) less respiration  
*ignore ref. to anaerobic respiration*

1

(and therefore) less energy is released (for exercise)  
*do **not** allow energy is produced / made*  
*do **not** allow energy **for** respiration*

1

[4]