AQA GCSE BIOLOGY (HIGHER) · 8461

# BIOLOGY



EXAM QUESTION PACK

## 4.2.2 ANIMAL TISSUES, ORGANS AND ORGAN SYSTEMS (PACK 4)

| SCORE | PERCENTAGE |
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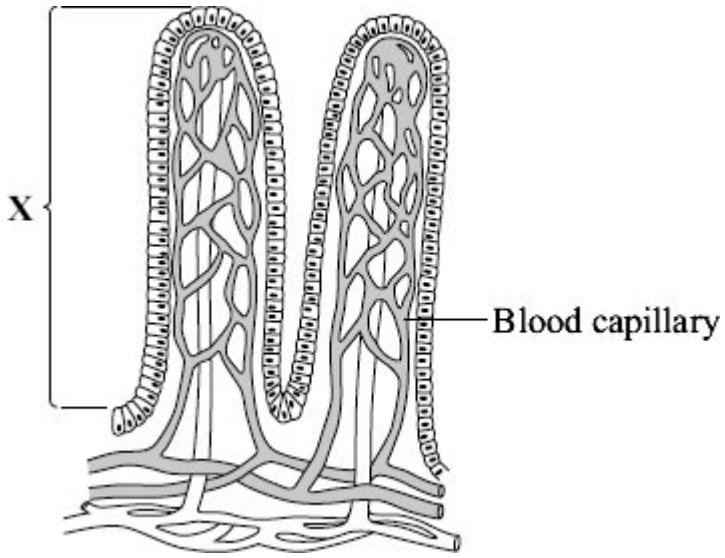
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## Q1.

The diagram shows part of the lining of the small intestine.




(a) (i) Name structure **X**.

Draw a ring around **one** answer.

**alveolus** **thorax** **villus**

**(1)**

(ii) Choose **three** ways in which structure **X** is adapted to help the absorption of soluble food.

Tick (✓) **three** boxes.

It is ventilated. ☐

Its outer surface is one cell thick. ☐

It has a large surface area. ☐

It contains a layer of muscle. ☐

It has a good blood supply. ☐

Its cells contain haemoglobin. ☐

**(3)**



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(b) Name the process by which soluble food enters the blood.

Draw a ring around **one** answer.

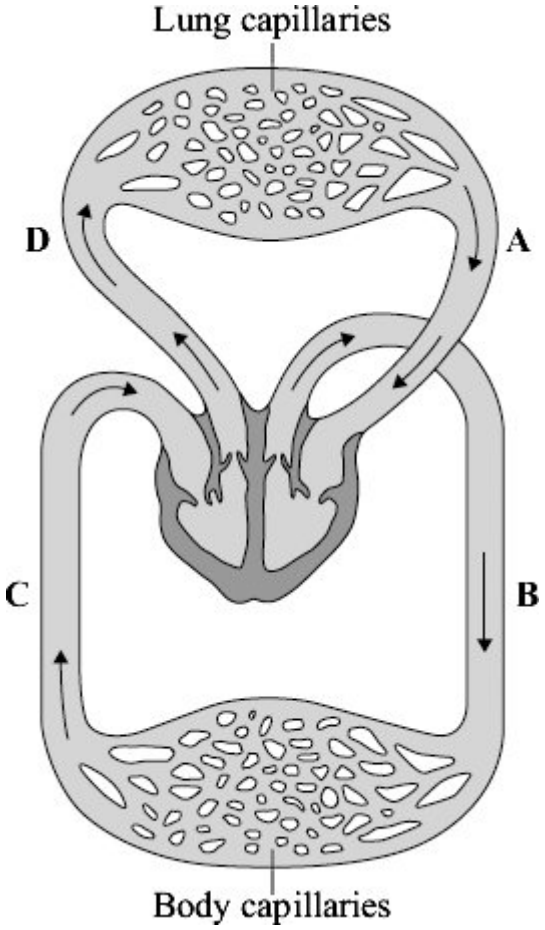
**diffusion** **fermentation** **transpiration**

**(1)**

**(Total 5 marks)**

## Q2.

The diagram shows the human circulation system.




(a) (i) Give the letter of **one** blood vessel that is an artery. ☐

**(1)**

(ii) Give the letter of **one** blood vessel that carries oxygenated blood. ☐

**(1)**

(b) During exercise, the heart rate increases.

Explain, as fully as you can, why this increase is necessary.

_____



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_____

_____

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_____

**(4)**

**(Total 6 marks)**

## Q3.

Diet and exercise affect health.

(a) Many people are obese (very overweight).

Obesity can lead to heart disease.

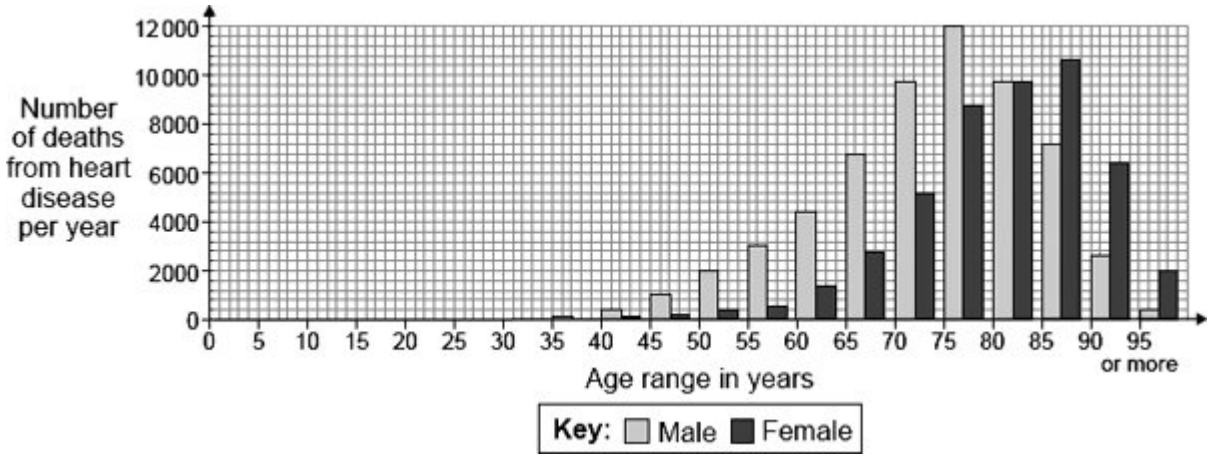
Other than heart disease, name **two** conditions which are linked to obesity.

1. _____

2. _____

**(2)**

(b) The graph shows the number of deaths from heart disease each year in the UK.




The pattern for deaths from heart disease in men is different from the pattern in women.

(i) Give **two** differences between the patterns for men and women.



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1. _____

_____

2. _____

_____

**(2)**

(ii) Suggest **two** reasons for the difference in the number of deaths from heart disease in men and women between the ages of 40 and 60.

1. _____

_____

2. _____

_____

**(2)**

(c) Scientists have developed drugs to reduce the concentration of cholesterol in the blood.

Give the **three** main stages in testing a new drug before it is sold to the public.

1. _____

_____

2. _____

_____

3. _____

_____

**(3)**

**(Total 9 marks)**

## Q4.

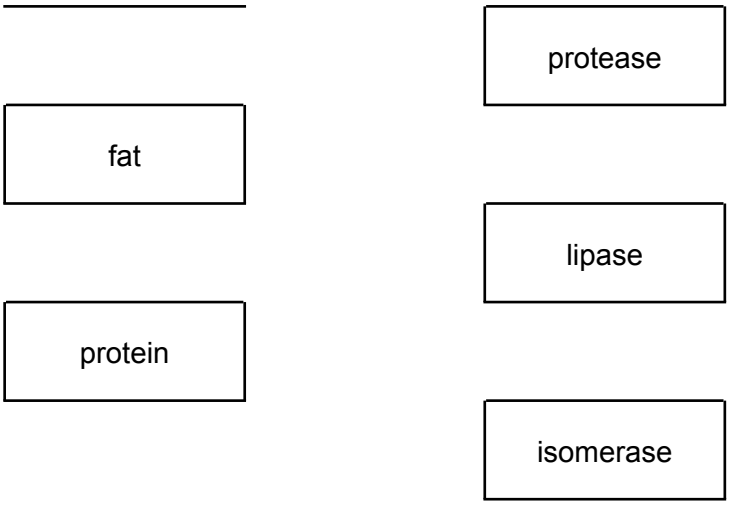
The body uses enzymes to digest (break down) large food molecules into smaller molecules.

(a) (i) Draw **one** line from **each** large food molecule to the enzyme that acts on it.

| **Large food molecule** | **Enzyme** |
|---|---|
| starch | amylase |



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**(3)**

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

Starch is broken down into

amino acids.

fatty acids and glycerol.

sugars.

Fat is broken down into

amino acids.

fatty acids and glycerol.

fructose.

Protein is broken down into

amino acids.

fructose.

sugars.

**(3)**

(b) Bile helps digestion.

Where is bile produced?

Draw a ring around **one** answer.

**liver** **mouth** **stomach**

**(1)**

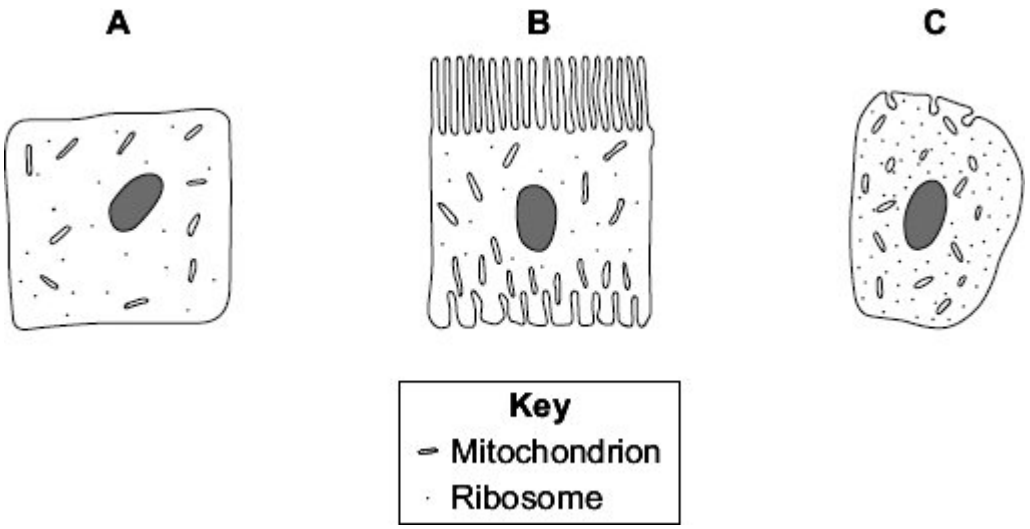
**(Total 7 marks)**

## Q5.

Diagrams **A**, **B** and **C** show cells from different parts of the human body, all drawn to the same scale.



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(a) Which cell, **A**, **B** or **C**, appears to have adaptations to increase diffusion into or out of the cell? ☐

Give **one** reason for your choice.

_____

_____

**(1)**

(b) (i) Cell **C** is found in the pancreas.

Name **one** useful substance produced by the pancreas.

_____

**(1)**

(ii) Use information from the diagram to explain how cell **C** is adapted for producing this substance.

_____

_____

_____

_____

**(2)**

**(Total 4 marks)**

## Q6.

Fresh milk is a mixture of compounds including fat, protein and about 5 % lactose sugar. Lactose must be digested by the enzyme lactase, before the products can be absorbed.

Lactase can be added to fresh milk to pre-digest the lactose. This makes 'lactose-free' milk, which is suitable for people who do not produce enough lactase of their own.



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A student investigated the effect of changing pH and temperature on the digestion of lactose in milk.

The results are shown in **Tables 1** and **2**.

**Table 1**
**Effect of pH**

| pH | Time taken to digest lactose in minutes |
|---|---|
| 4.0 | 20 |
| 5.0 | 18 |
| 6.0 | 13 |
| 7.0 | 7 |
| 8.0 | 5 |
| 9.0 | 6 |

**Table 2**
**Effect of temperature**

| Temperature in °C | Time taken to digest lactose in minutes |
|---|---|
| 30 | 20 |
| 35 | 14 |
| 40 | 11 |
| 45 | 6 |
| 50 | 12 |
| 55 | 23 |

(a) The label on a carton of lactose-free milk states:

'Lactase is normally produced in the stomach of mammals.'

The results in **Table 1** show that this statement is unlikely to be true.

Explain how.

_____

_____

_____

_____

**(2)**

(b) Explain as fully as you can the results shown in **Table 2**.

_____

_____

_____

_____

_____

_____

_____



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**(3)**

(c) Bile is produced in the liver and is released into the small intestine.

Explain how bile helps the digestion of milk.

_____

_____

_____

_____

**(2)**

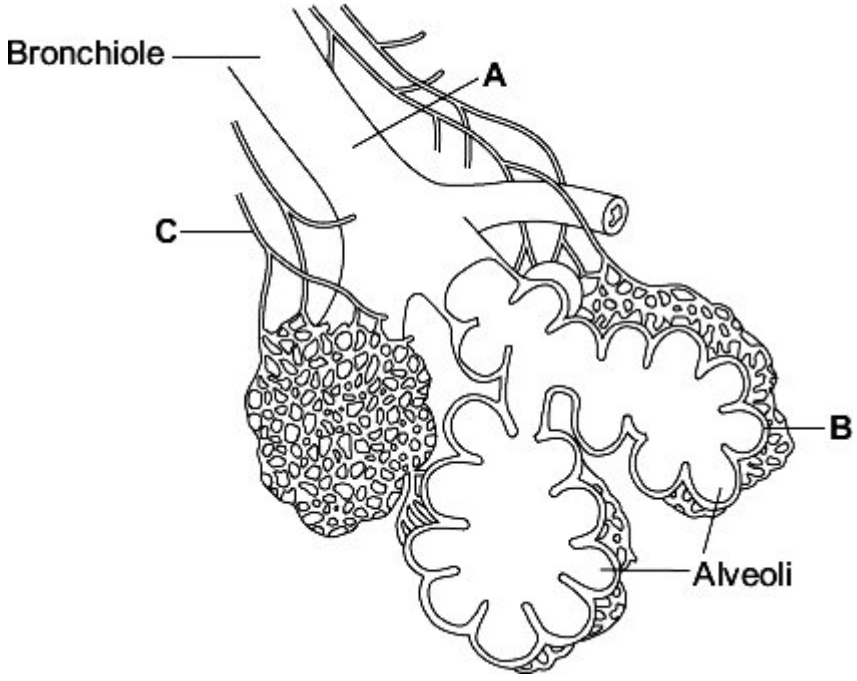
**(Total 7 marks)**

## Q7.

People with asthma sometimes find it difficult to breathe.

**Diagram 1** shows part of a human lung. Bronchioles are tubes that carry air to the alveoli.

**Diagram 1**




(a) Which letter, **A**, **B** or **C**, shows where oxygen enters the blood?

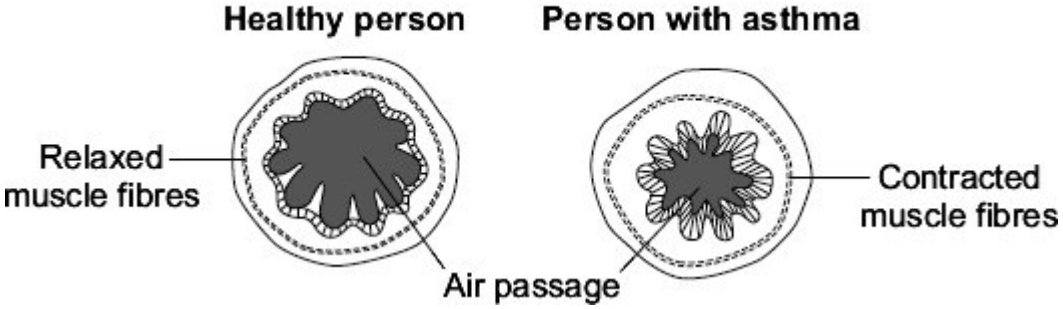
**(1)**

(b) **Diagram 2** shows a section through a bronchiole of a healthy person and of a person suffering from asthma.



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Diagram 2




The person with asthma may find it difficult to breathe.

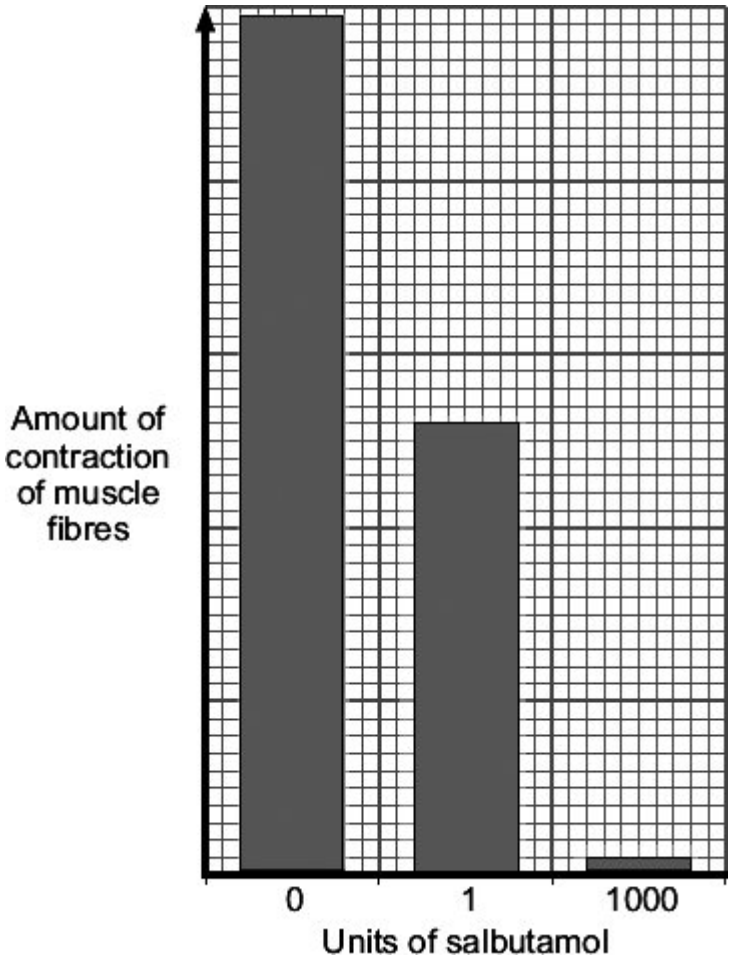
Use information from **Diagram 2** to give the reason for this.

_____

_____

**(1)**

(c) A person has asthma. The bar graph shows the effect of the drug salbutamol on the contraction of the muscle fibres in the wall of this person's bronchioles.




(i) Describe the effect of salbutamol on the person's muscle fibres.

_____

_____



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**(1)**

(ii) How does salbutamol help this person?

_____

_____

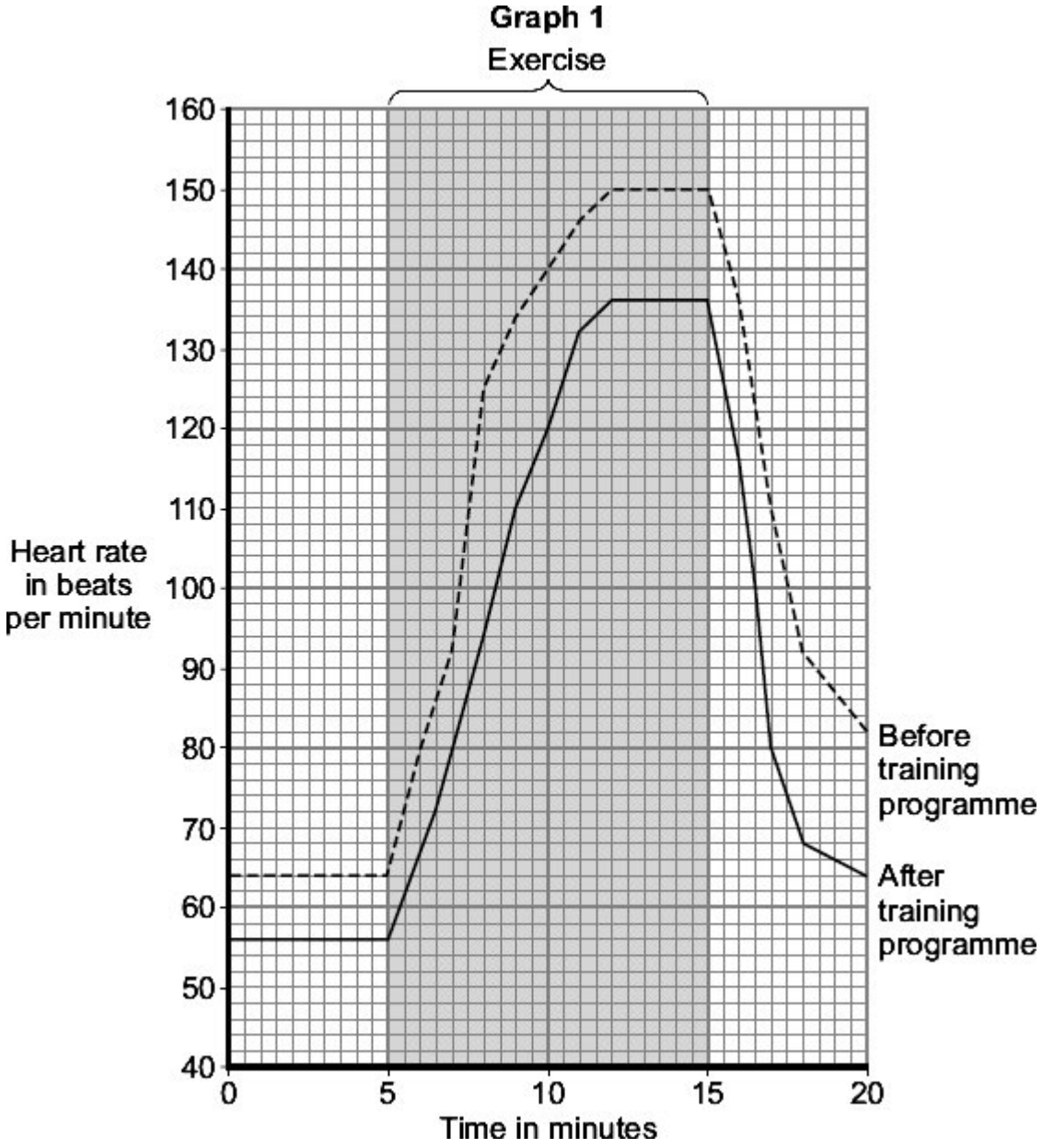
**(1)**

**(Total 4 marks)**

## Q8.

An athlete carried out a 6-month training programme.

**Graph 1** shows the effect of the same amount of exercise on his heart rate before and after the training programme.




(a) (i) Use **Graph 1** to find the heart rate of the **trained** athlete 5 minutes after the start of the exercise.



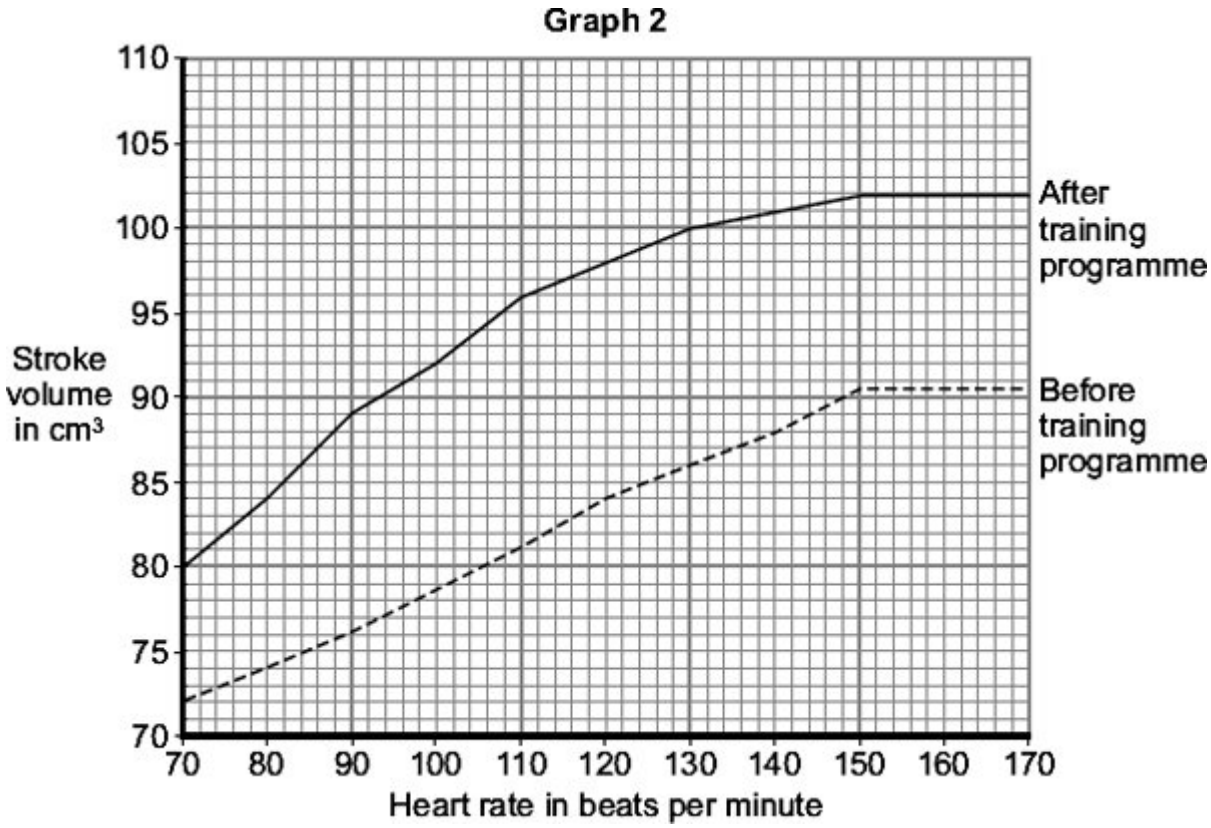
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Heart rate = _____ beats per minute

**(1)**

The stroke volume of the heart is the volume of blood pumped out of the left side of the heart in one heart beat.

**Graph 2** shows the relationship between the stroke volume and the heart rate before and after the athlete did the training programme.




(ii) The *cardiac output* is defined as

cardiac output = heart rate × stroke volume

Calculate the cardiac output of the **trained** athlete 5 minutes after the start of the exercise. Use your answer to part (a)(i), and information from **Graph 2**.

Show clearly how you work out your answer.

_____

_____

Cardiac output = _____ $cm^3$ blood per minute

**(2)**

(b) **Graph 1** shows that, for the same amount of exercise, the heart of the trained athlete was beating more slowly than it did before the training programme.

Use information from **Graph 2** to explain why.

_____



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_____

_____

_____

**(2)**

(c) An increased cardiac output will provide more oxygen and more glucose to the working muscles.

Explain how this helps the athlete during exercise.

_____

_____

_____

_____

_____

_____

_____

_____

**(4)**

**(Total 9 marks)**

## Q9.

A manufacturer of slimming foods is investigating the effectiveness of carbohydrases from different microorganisms.

Iodine solution is a pale golden brown, transparent solution. Starch reacts with iodine to form a dark blue mixture.

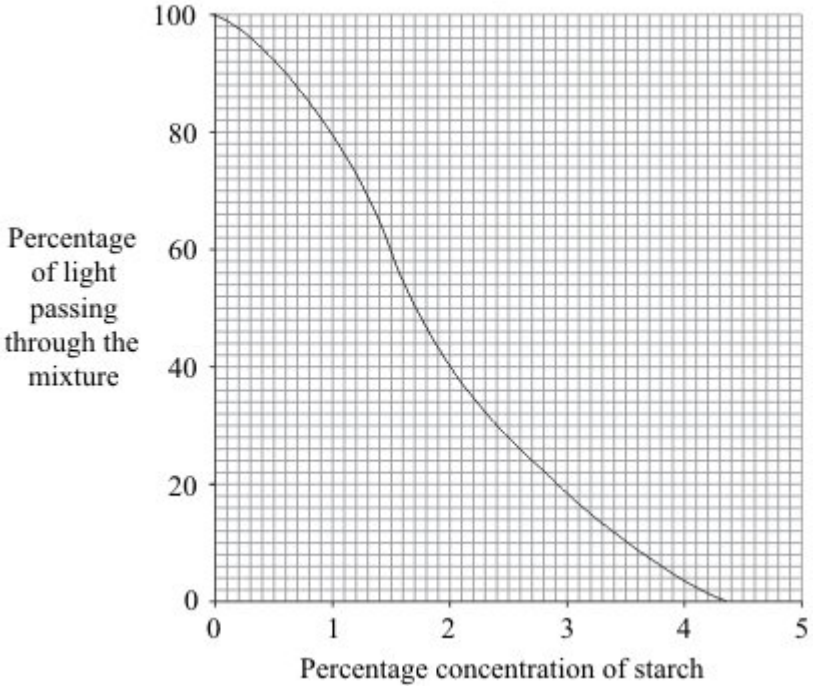
Known concentrations of starch are added to iodine solution. The mixture is placed in a colorimeter which measures the percentage of light passing through the mixture.

**Graph 1** shows the results.



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**Graph 1**




(a) Explain why less light passes through the mixture when the starch is more concentrated.

_____

_____

_____

**(1)**

(b) The manufacturer adds carbohydrase from each of three different microorganisms, **A**, **B** and **C**, to starch in flasks at 40 °C.

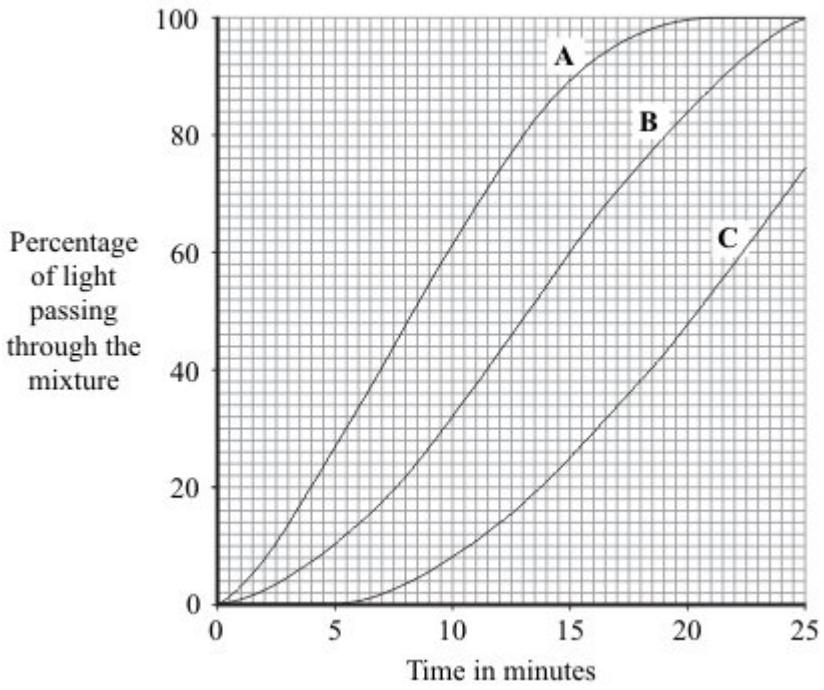
Every minute a sample of the mixture is added to iodine solution and placed in the colorimeter.

**Graph 2** shows these results.



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**Graph 2**




(i) When the concentration of starch reaches 2 %, digestion is considered to be sufficient for the next stage in the manufacture of the slimming food.

How long does this take for the most effective carbohydrase?

Show clearly how you work out your answer.

_____

_____

_____ minutes

**(2)**

(ii) Explain why the manufacturer carried out the investigation at 40 °C.

_____

_____

_____

_____

_____

**(2)**

(c) Carbohydrases convert starch into glucose. To complete the manufacture of the slimming food the glucose should be converted into fructose.

(i) Name the enzyme which would be used to convert glucose into fructose.

_____

**(1)**



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(ii) Explain why fructose, rather than glucose, is used in slimming foods.

_____

_____

_____

_____

_____

**(2)**

**(Total 8 marks)**

## Q10.

(a) Draw a ring around **one** word to answer each of the following questions.

(i) Which type of blood vessel carries blood out of the heart?

**artery** **capillary** **vein**

**(1)**

(ii) Which type of blood vessel allows substances to enter and leave the blood?

**artery** **capillary** **vein**

**(1)**

(b) Use words from the box to complete the sentences.

| | | |
|---|---|---|
| **alveoli** | **cell membrane** | **nucleus** |
| **plasma** | **red blood cells** | **villi** |

Oxygen enters the blood through the walls of the _____ .

Most of the oxygen transported by the blood is carried in the

_____ .

A red blood cell is different from other body cells because it does not have a

_____ .

**(3)**

**(Total 5 marks)**

## Q11.



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(a) The table shows the effect of exercise on the action of one person's heart.

| | **At rest** | **During exercise** |
|---|---|---|
| Heart rate in beats per minute | 72 | 165 |
| Volume of blood leaving the heart in each beat in $cm^3$ | 75 | 120 |
| Heart output in $cm^3$ per minute | 5400 | |

(i) Calculate the heart output for this person during exercise.

Show clearly how you work out your answer.

_____

_____

_____

_____

Answer = _____ $cm^3$ per minute

**(2)**

(ii) During exercise, more oxygen is carried to the working muscles.

Explain why this is helpful during exercise.

_____

_____

_____

_____

_____

**(2)**

(b) Give **two** other changes in the body that help to increase the amount of oxygen delivered to the working muscles during exercise.

1. _____

_____

2. _____

_____

**(2)**

**(Total 6 marks)**



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## Q12.

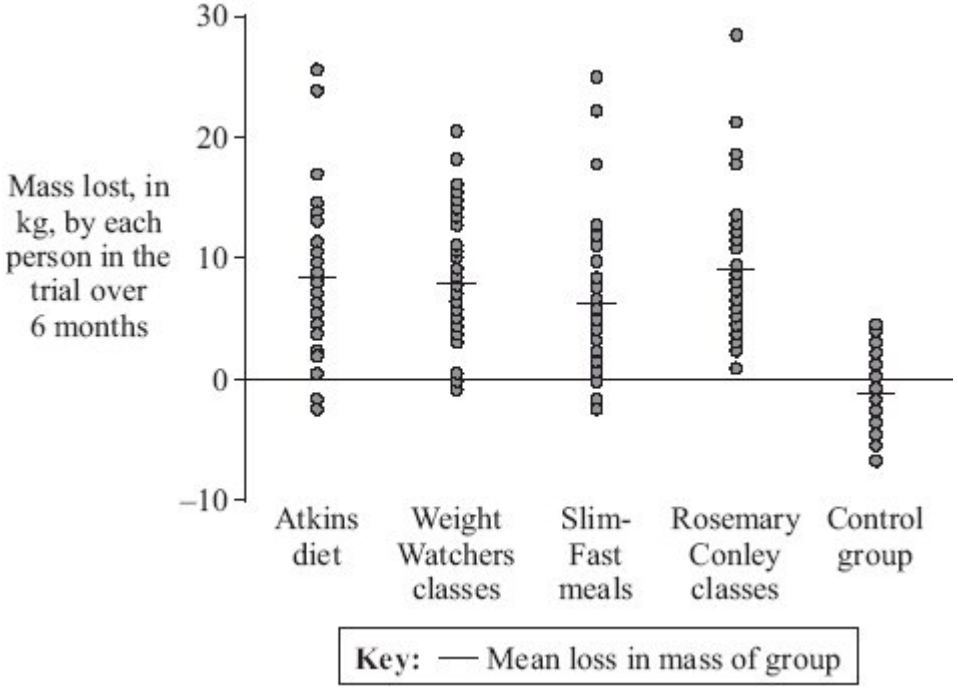
Many people who are overweight try slimming programmes.

A research study evaluated four different slimming programmes over 6 months.

Scientists selected a group of 40 people for each slimming programme and a control group.

Each of the five groups was matched for age, gender and mass.

The graph shows the results of the study.




Adapted from British Medical Journal, 2006, volume 332, pages 1309 –1314.

(a) Give **two** control variables that were used in this study.

1. _____

2. _____

**(2)**

(b) Give **two** conclusions that can be drawn from the results of this study.

1. _____

_____

2. _____

_____

**(2)**

(c) The costs of the four programmes were:

- Atkins book cost £3
- Rosemary Conley classes cost £140 for 6 months



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- Weight Watchers classes cost £170 for 6 months
- Twice-daily Slim-Fast meal replacements cost £240 for 6 months.

Use this information and the graph to answer this question.

Which is the most cost effective of the four programmes?

_____

Explain the reason for your answer.

_____

_____

_____

_____

**(2)**

(d) Some slimming programmes include daily exercise.

Explain how daily exercise helps a person to lose mass.

_____

_____

_____

_____

**(2)**

**(Total 8 marks)**

## Q13.

A manufacturer is trying to improve the quality of the biological detergent he produces.

Scientists at his company carried out the following experiments on enzymes:

- Samples of lipase were collected from five different types of bacterium, **A**, **B**, **C**, **D** and **E**.
- The samples were diluted to give the same concentration of lipase.
- Agar jelly containing a lipid was prepared in a dish. This forms a cloudy mixture which becomes clear when the lipid is digested.
- Five small holes were cut into the agar.
- Two drops of lipase solution from bacterium **A** was added to hole **A**.
- This process was repeated for each sample of lipase.

**Diagram 1** shows the appearance of the dish.

**Diagram 1**



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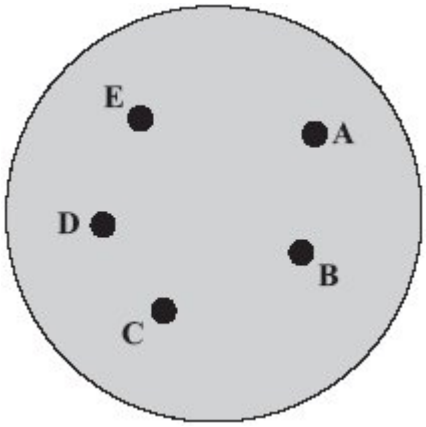
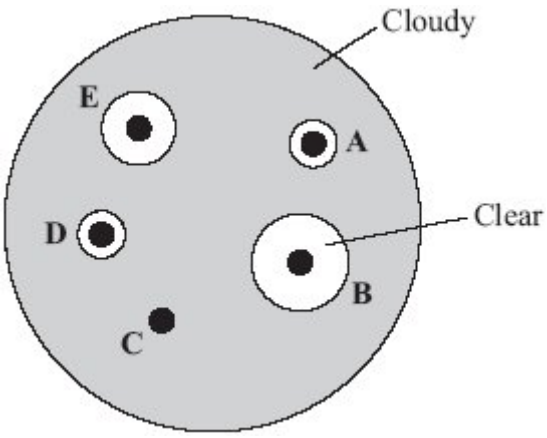



**Diagram 2** shows the appearance of the dish 24 hours later.

**Diagram 2**




(a) (i) Which type of bacterium, **A**, **B**, **C**, **D** or **E**, produced the most effective lipase in this investigation?

Write your answer, **A**, **B**, **C, D** or **E**, in the box. ☐

**(1)**

(ii) Explain your answer.

_____

_____

**(1)**

(b) The manufacturer plans to add the most effective lipase to the washing powders he produces.

Suggest **two** other factors he should investigate before deciding which lipase is the most effective.

1. _____

_____

2. _____



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_____

**(2)**

(c) Many biological detergents cannot be used at high temperatures.

Explain why.

_____

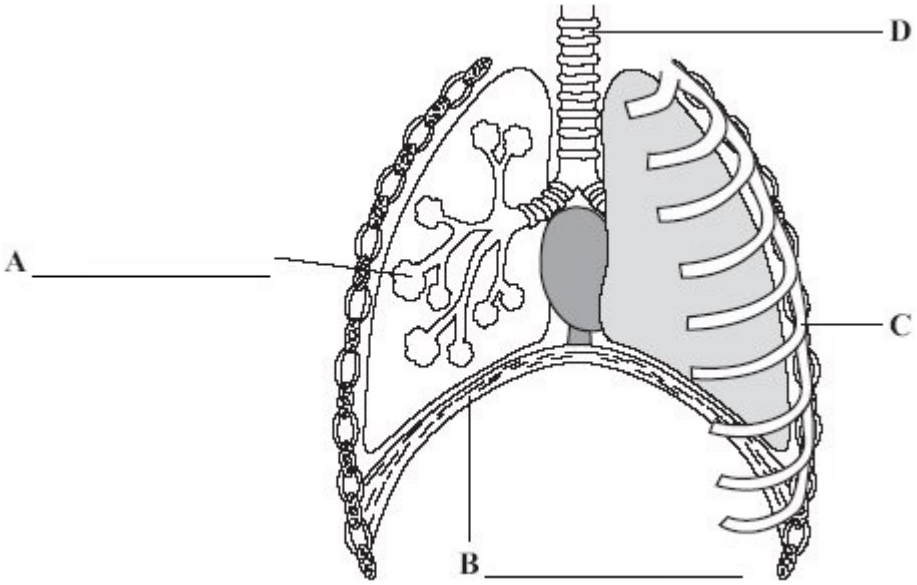
_____

**(1)**

**(Total 5 marks)**

## Q14.

The diagram shows the human breathing system.




(a) On the diagram, label structures **A** and **B**.

Choose your answers from the words in the box.

| | | | |
|---|---|---|---|
| **alveolus** | **capillary** | **diaphragm** | **rib** |

**(2)**

In the lungs, oxygen passes from the air into the blood.
Carbon dioxide passes from the blood into the air.

(b) Which letter, **A**, **B**, **C** or **D**, shows where oxygen enters the blood? ☐

**(1)**

(c) When oxygen enters the blood it combines with haemoglobin.

Draw a ring around the correct word or phrase to complete each sentence.

(i) Haemoglobin is found in the | plasma. |



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| |
|---|
| red blood cells. |
| white blood cells. |

**(1)**

(ii) Most of the carbon dioxide is carried by the

| |
|---|
| plasma. |
| red blood cells. |
| white blood cells. |

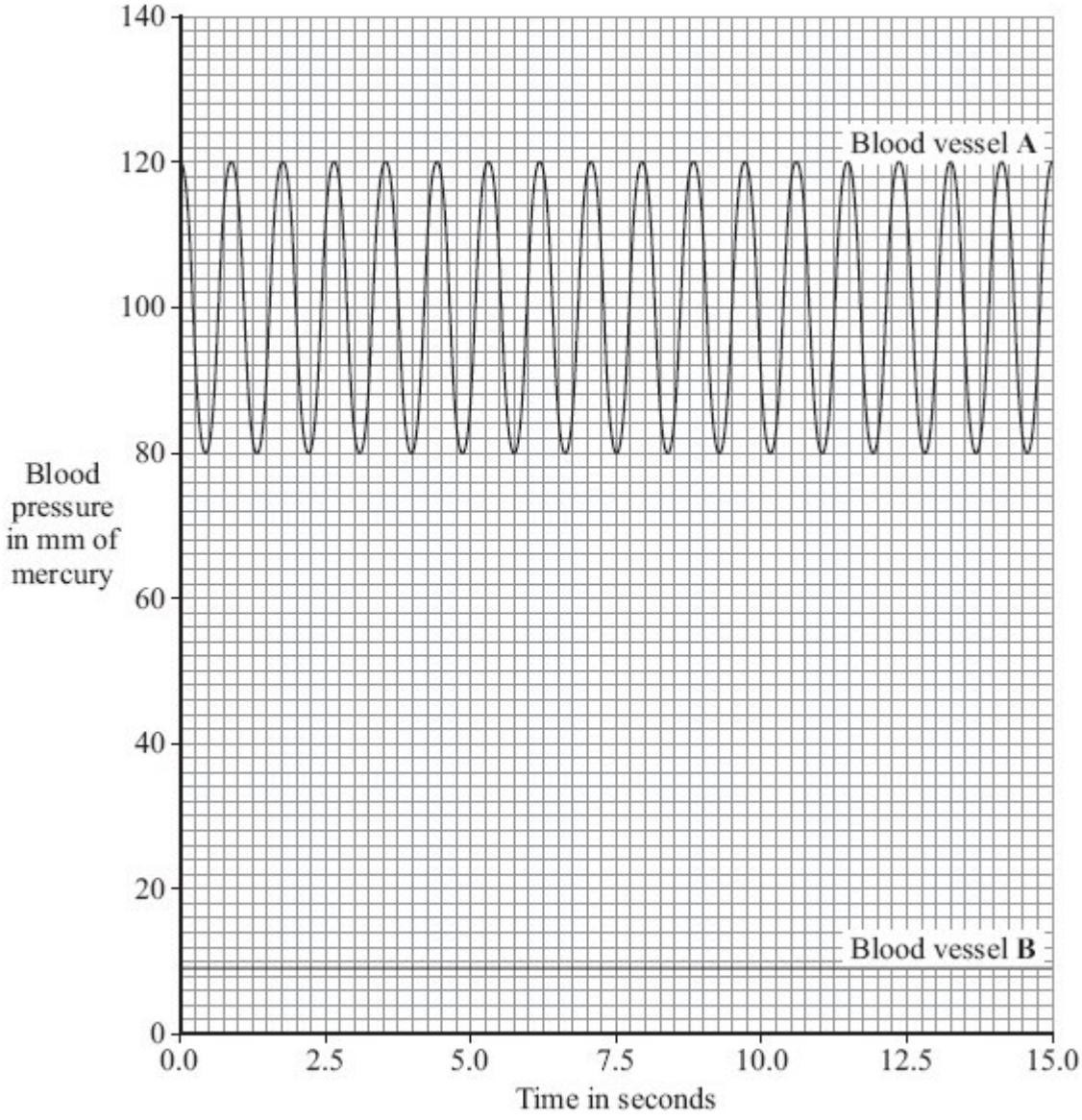
**(1)**

**(Total 5 marks)**

## Q15.

The heart pumps blood around the body. This causes blood to leave the heart at high pressure.

The graph shows blood pressure measurements for a person at rest.
The blood pressure was measured in an artery and in a vein.




(a) Which blood vessel, **A** or **B**, is the artery?



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Blood vessel _____

Give **two** reasons for your answer.

Reason 1 _____

_____

Reason 2 _____

_____

**(2)**

(b) Use information from the graph to answer these questions.

(i) How many times did the heart beat in 15 seconds? _____

**(1)**

(ii) Use your answer from part (b)(i) to calculate the person's heart rate per minute.

_____

_____

Heart rate = _____ beats per minute

**(1)**

(c) During exercise, the heart rate increases. This supplies useful substances to the muscles and removes waste materials from the muscles at a faster rate.

(i) Name **two** useful substances that must be supplied to the muscles at a faster rate during exercise.

1. _____

2. _____

**(2)**

(ii) Name **one** waste substance that must be removed from the muscles at a faster rate during exercise.

_____

**(1)**

**(Total 7 marks)**

## Q16.

Bile is produced in the liver, stored in the gall bladder, then released into the small intestine.

(a) Explain how bile affects the digestion of food in the small intestine.

_____

_____



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_____

_____

**(2)**

(b) Bile contains bile pigments and cholesterol.

If the diet contains too much cholesterol, some of it may form 'gallstones' in the bile.

These gallstones may prevent bile from moving out of the gall bladder into the small intestine.

Bilirubin is a yellow-brown bile pigment. This pigment is produced by the liver from haemoglobin released by broken-down red blood cells.

Suggest how gallstones may produce the following symptoms:

(i) very pale faeces

_____

_____

_____

_____

**(2)**

(ii) jaundice (a yellow tinge to the skin).

_____

_____

_____

_____

**(2)**

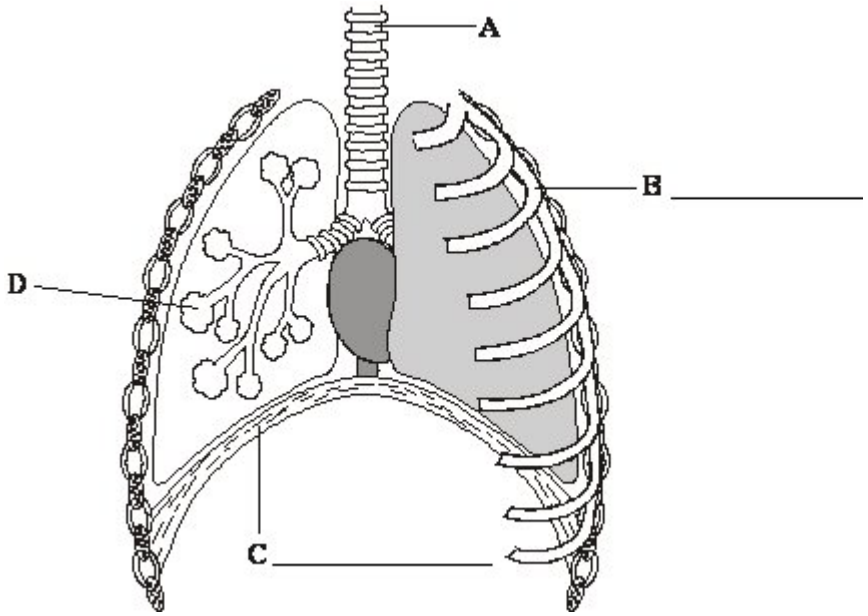
**(Total 6 marks)**

## Q17.

The diagram shows the human breathing system.



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(a) On the diagram, label structures **B** and **C**.

Choose your answers from the list in the box.

| | | | |
|---|---|---|---|
| **alveoli** | **diaphragm** | **rib** | **trachea** |

**(2)**

(b) (i) Which letter, **A**, **B**, **C** or **D**, shows the site of gas exchange? _____

**(1)**

(ii) Which **one** of the following gases has a higher concentration in exhaled air than in inhaled air?

Draw a circle around **one** answer.

**carbon dioxide** **nitrogen** **oxygen**

**(1)**

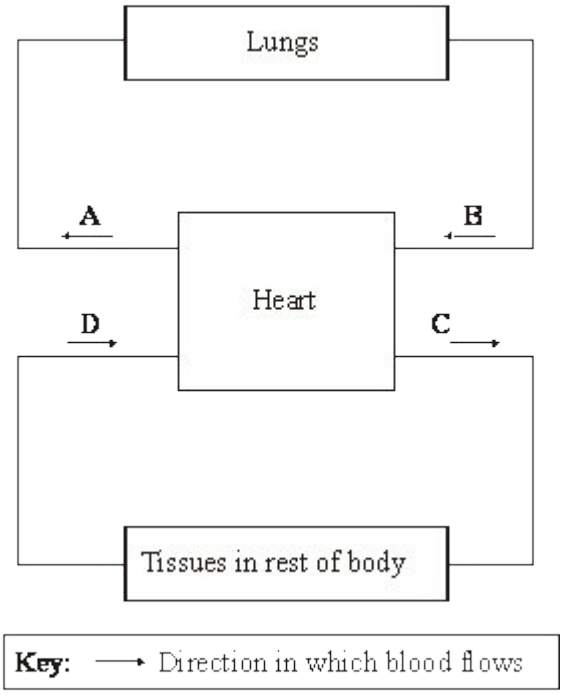
**(Total 4 marks)**

## Q18.

The diagram represents the human blood circulation system.



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(a) **A**, **B**, **C** and **D** are blood vessels.

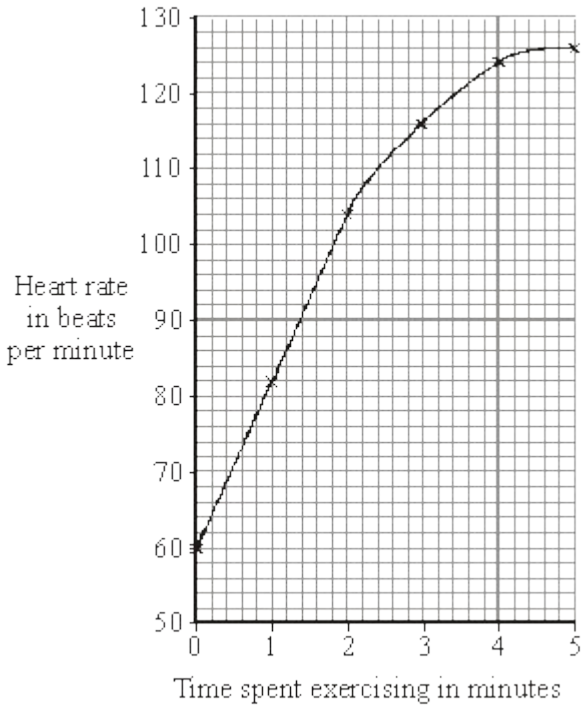
(i) Give the letter of **one** blood vessel that is an artery. _____

**(1)**

(ii) Give the letter of **one** blood vessel that is a vein. _____

**(1)**

(b) A student pedalled an exercise cycle at constant speed for 5 minutes. The student's heart rate was recorded at one-minute intervals during the exercise. The results are shown in the graph.




(i) What was the student's heart rate before the exercise began?



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_____ per minute

**(1)**

(ii) How long was it before the student's heart rate reached 124 beats per minute?

_____ minutes

**(1)**

(c) Which of the following parts of the blood carries most oxygen?

Draw a circle around **one** answer.

**plasma** **red blood cells** **white blood cells**

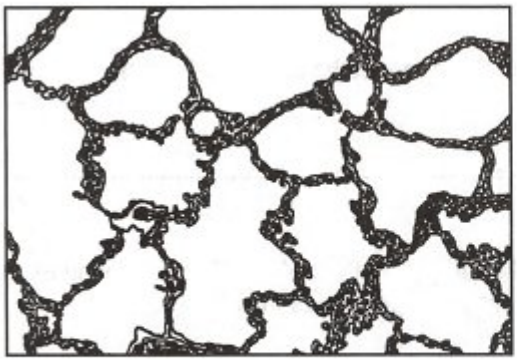
**(1)**

**(Total 5 marks)**

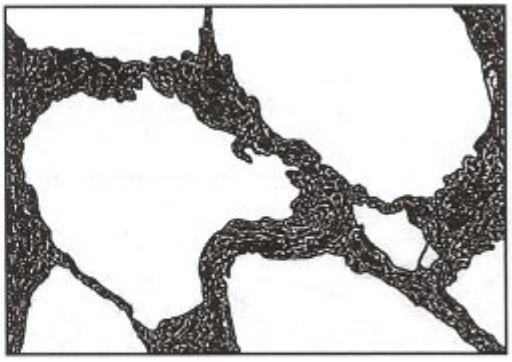
## Q19.

Emphysema is a lung disease.

(a) The drawings show sections through the lung of a healthy person and through the lung of a person with emphysema. The drawings are drawn to the same scale.



Section through the lung of a healthy person



Section through the lung of a person with emphysema

Use information from the drawings to answer the questions.

What effect does emphysema have on:

(i) the thickness of the surface used for gas exchange

_____

_____

**(1)**

(ii) the total area available for gas exchange?

_____

_____

**(1)**

(b) Two men did the same amount of exercise.
One man was in good health. The other man had emphysema.



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The results are shown in the table.

| | Man with good health | Man with emphysema |
|---|---|---|
| Oxygen entering blood in $dm^3$ per minute | 2.1 | 1.1 |
| Air flow into lungs in $dm^3$ per minute | 90.7 | 46.0 |

The man in good health was able to take more oxygen into his blood than the man with emphysema.

Calculate how much more oxygen was taken into the blood per minute by the man in good health. Show your working.

_____

_____

Answer = _____ $dm^3$ per minute

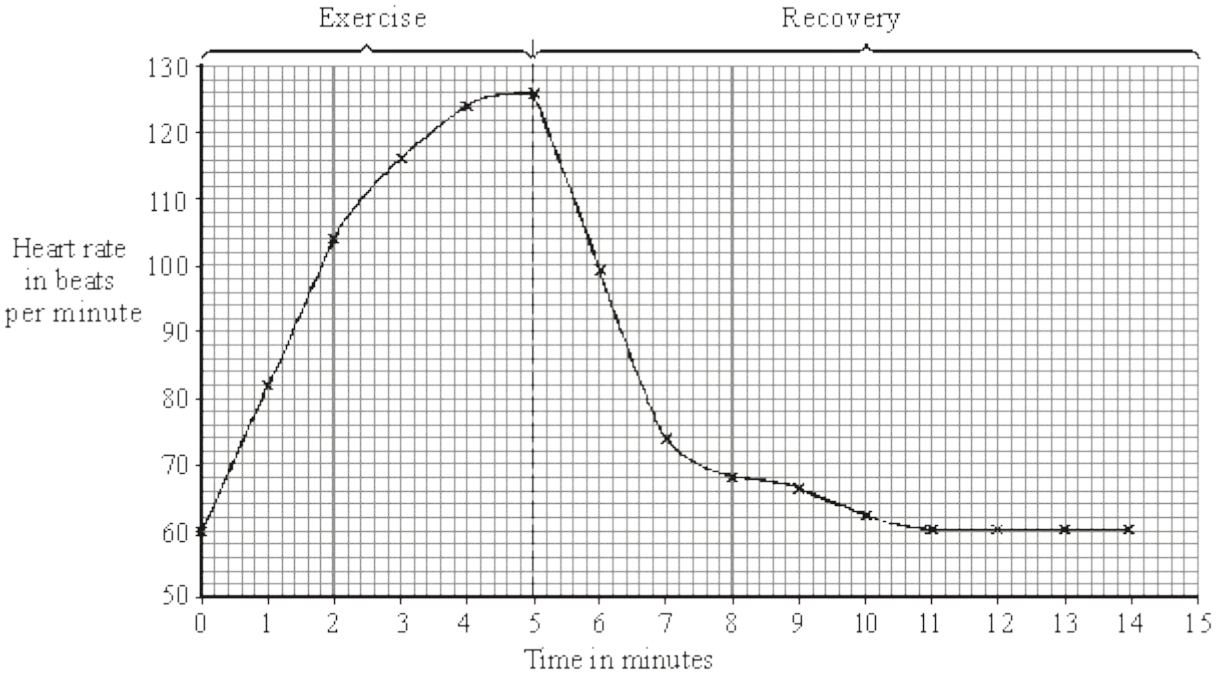
**(2)**

**(Total 4 marks)**

## Q20.

A student pedalled an exercise cycle at constant speed for 5 minutes. The student's heart rate was recorded at one-minute intervals during the exercise and also during recovery.

The results are shown in the graph.




(a) Describe, in as much detail as you can, the changes in heart rate between 0 and 14 minutes.

_____



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_____

_____

_____

_____

_____

_____

**(3)**

(b) How do arteries supplying the leg muscles alter the rate of blood flow through them during exercise?

_____

_____

**(1)**

(c) Explain how an increase in heart rate helped the student during exercise.

_____

_____

_____

_____

_____

_____

_____

_____

**(4)**

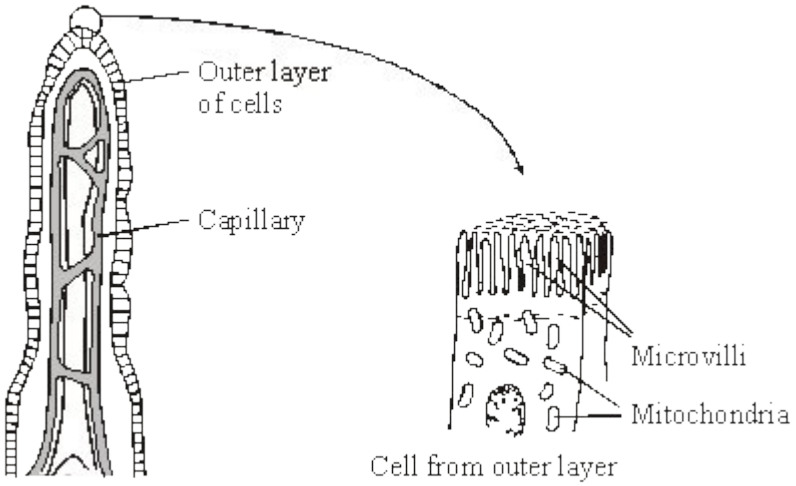
**(Total 8 marks)**

## Q21.

The small intestine is lined with millions of villi.
The diagram shows the structure of a villus.



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In the small intestine, some of the products of digestion are absorbed into the blood by *active transport*.

(a) Explain what is meant by *active transport*.

_____

_____

_____

_____

**(2)**

(b) How do microvilli and mitochondria help in the active transport of the products of digestion from the small intestine into the blood?

Microvilli _____

_____

Mitochondria _____

_____

**(2)**

**(Total 4 marks)**

## Q22.

A popular diet book claims that a low-carbohydrate diet results in quicker weight loss and a more healthy body than a low-fat diet.

Scientists carried out an investigation to see if this claim is true.

- They used 120 overweight volunteers divided into two equal groups.
- **Group 1** was given a diet containing less than 20 g of carbohydrate per day.
- **Group 2** was given a low-fat diet. This contained less than 30% of energy from fat and less than 300 mg of cholesterol per day.



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- Both groups were given the same exercise programmes and a weekly information meeting.
- Both groups were allowed only 2000 kilocalories per day.

The results after 24 weeks are shown in the table.

| | **Group 1 Low-carbohydrate diet** | **Group 2 Low-fat diet** |
|---|---|---|
| Proportion of volunteers who completed the trial | 76% | 57% |
| Mean change in body mass | −12.9% | −6.7% |
| Mean change in body fat mass | −9.4 kg | −4.8 kg |
| Mean change in blood HDL concentration | +55 mg per litre | −16 mg per litre |
| Mean change in blood LDL concentration | +16 mg per litre | −74 mg per litre |

(a) What was the independent variable in this investigation?

_____

**(1)**

(b) Give **one** variable that the scientists tried to control in this investigation.

_____

**(1)**

(c) Give **two** ways in which the method used by the scientists could have led to unreliable data.

1. _____

_____

2. _____

_____

**(2)**

(d) Does the data support the claim in the book?

Draw a ring around your answer. **Yes / No**

Give **two** reasons for your answer.

1. _____

_____



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2. _____

_____

**(2)**

**(Total 6 marks)**

## Q23.

Enzymes are used in biological detergents.

(a) Name the type of enzyme that digests stains containing fats.

_____

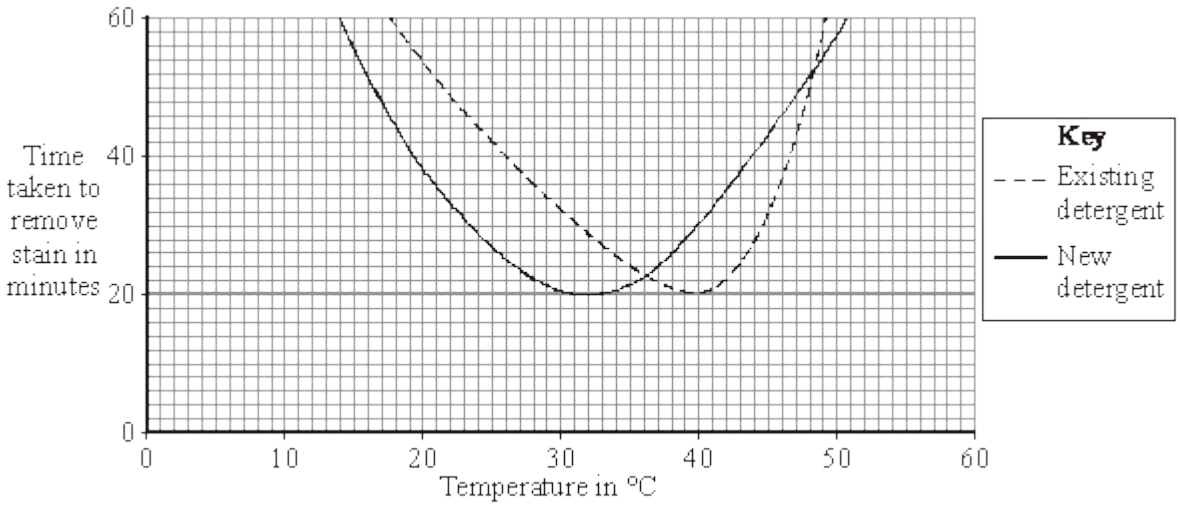
**(1)**

(b) A new detergent is marketed as being 'environmentally-friendly'.

Scientists compared the performance of this new detergent with an existing detergent.

They measured the time taken by the two detergents to remove a fat stain at different temperatures.

The graph shows their results.




(i) Describe the effect of increasing the temperature on the time taken by the existing detergent to remove the stain.

_____

_____

_____

_____

**(2)**

(ii) The new detergent works at a lower temperature than the existing one.

Is the new detergent likely to be more 'environmentally-friendly' than the existing detergent?



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Draw a ring around your answer. **Yes / No**

Explain the reason for your answer.

_____

_____

_____

_____

**(2)**

(c) Neither detergent works well at 60 °C.

Explain why.

_____

_____

_____

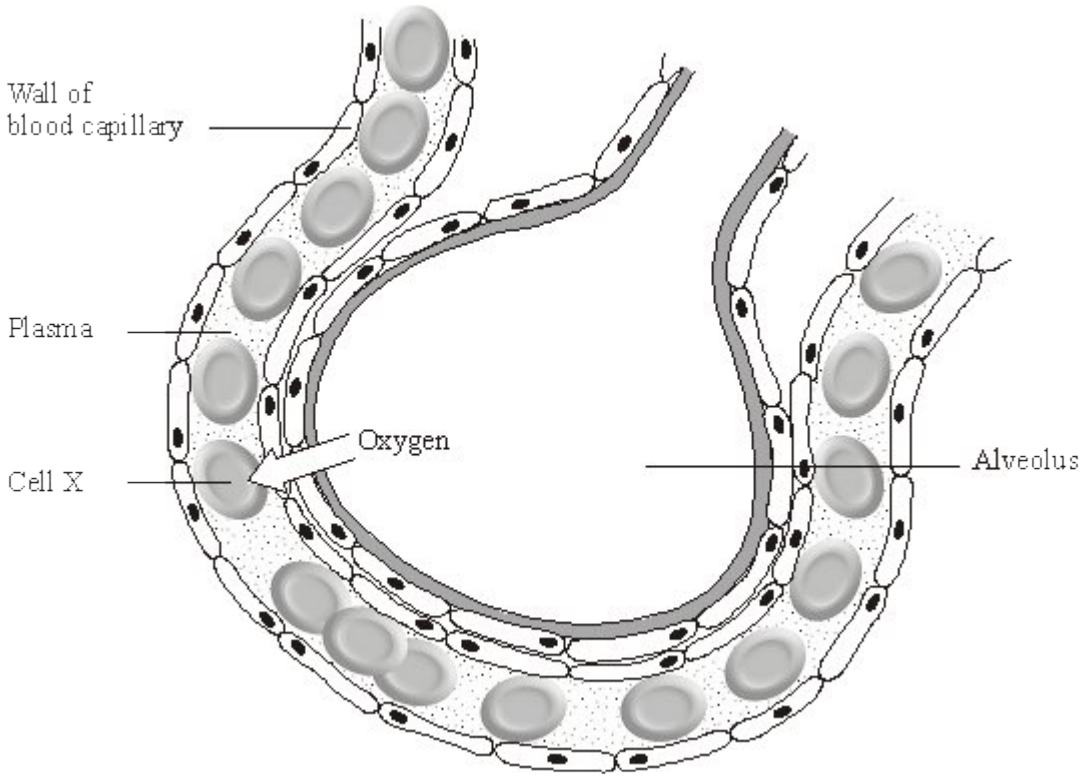
_____

**(2)**

**(Total 7 marks)**

## Q24.

The diagram shows a small part of a lung.






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(a) The arrow on the diagram shows the movement of oxygen from the air in the alveolus to cell **X.**

Complete the sentences by drawing a ring around the correct answer.

(i) Cell **X** is a

| |
|---|
| platelet |
| red cell |
| white cell |

**(1)**

(ii) Oxygen moves from the air in the alveolus into cell **X** by

| |
|---|
| diffusion |
| filtration |
| respiration |

**(1)**

(iii) The substance in cell **X** that combines with oxygen is called

| |
|---|
| glycogen |
| haemoglobin |
| lactic acid |

**(1)**

(iv) Cell **X** does **not** have

| |
|---|
| a cell membrane |
| cytoplasm |
| a nucleus |

**(1)**

(b) **On the diagram**, draw an arrow to show the movement of carbon dioxide during gas exchange.

**(1)**

**(Total 5 marks)**

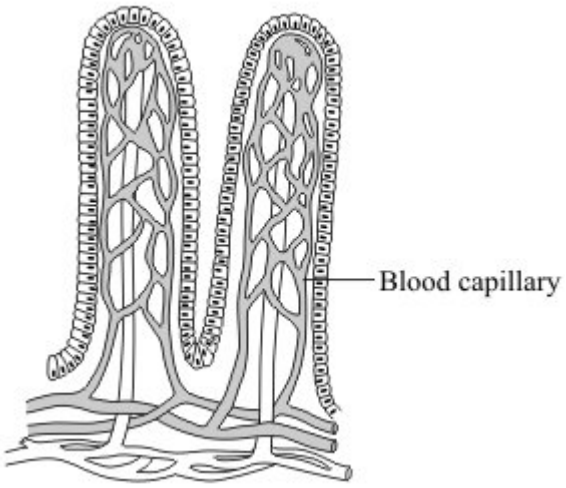
## Q25.

**Diagram 1** shows two villi in the small intestine of a healthy person.



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**Diagram 1**




(a) Describe **two** features of the villi which help the small intestine to function.

1. _____

_____

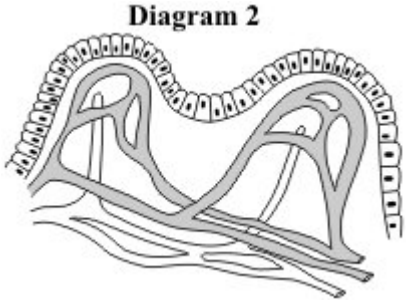
2. _____

_____

**(2)**

(b) **Diagram 2** shows two villi in the small intestine of a person with coeliac disease.

**Diagram 2**



(i) How do the villi of the person with coeliac disease differ from those of a healthy person?

_____

_____

**(1)**

(ii) Suggest how this difference might affect how well the small intestine functions.

_____

_____

**(1)**

**(Total 4 marks)**



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## Q26.

*Obesity* is a factor that affects Coronary Heart Disease (CHD).

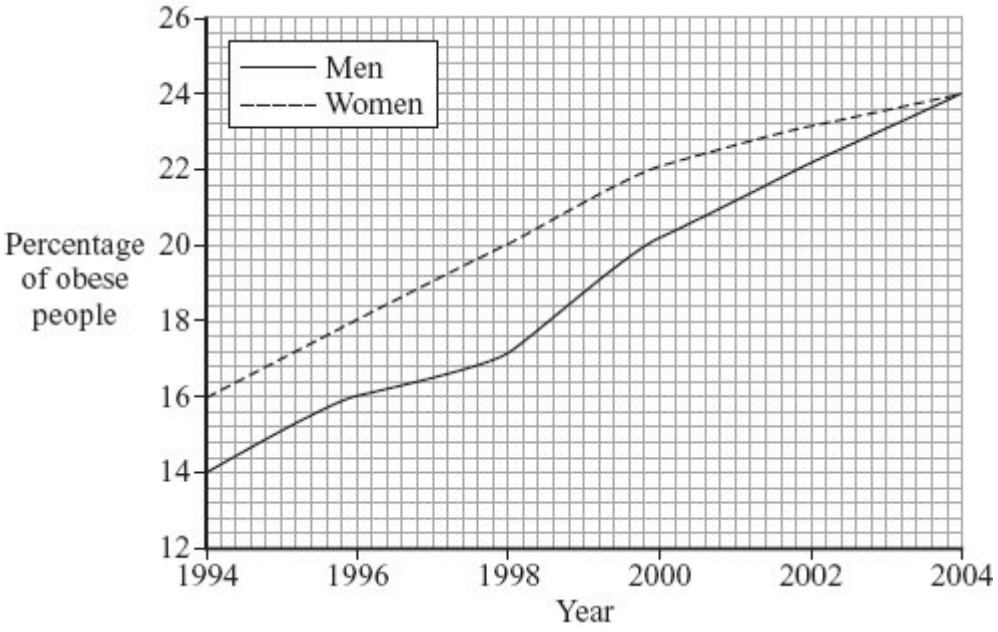
(a) What is meant by *obesity*?

_____

_____

**(1)**

(b) The graph shows how the percentages of obese men and women in the UK changed between 1994 and 2004.




(i) Describe how the percentage of obese women changed between 1994 and 2004.

_____

_____

_____

_____

**(2)**

(ii) The percentage of obese men changed between 1994 and 2004.

Suggest **two** reasons for this change.

1. _____

_____

2. _____

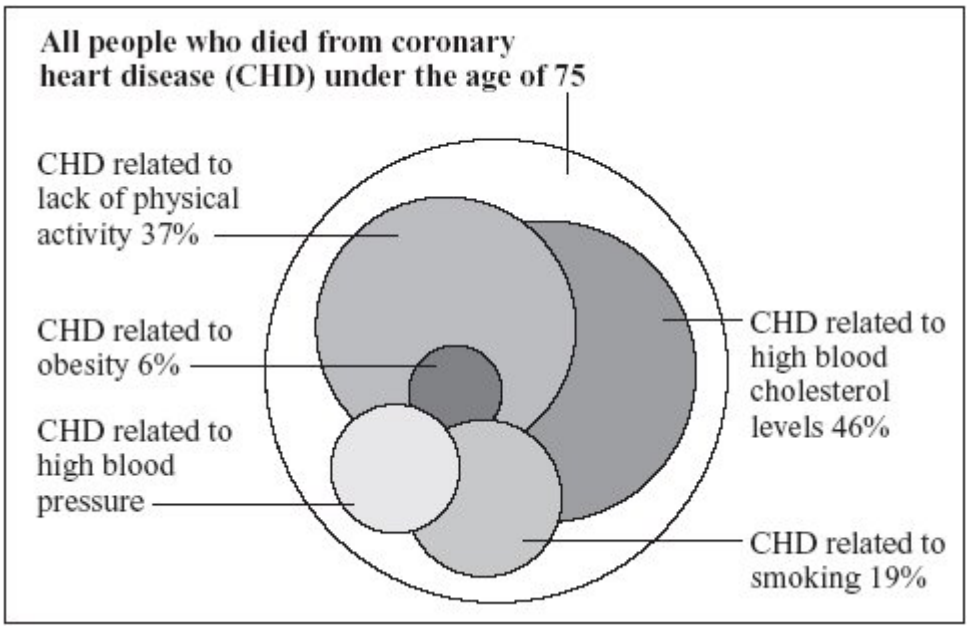
_____

**(2)**



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(c) The chart below is published by the British Heart Foundation. It shows how death from CHD is related to a number of different factors.




*copyright National Heart Forum*

Each factor is represented by a circle.

The bigger the circle, the more people are affected by the factor.

(i) What is the main factor causing death from CHD?

_____

**(1)**

(ii) Estimate the percentage of deaths from CHD related to high blood pressure.

_____ %

**(1)**

(iii) The data are shown as overlapping circles instead of a bar chart. The percentages of deaths related to the different factors add up to more than 100%.

What does this tell you about some of the people who died from CHD?

_____

_____

**(1)**

**(Total 8 marks)**

## Q27.

It is legal in the UK to use certain recreational drugs but illegal to use others.

(a) Tobacco is a legal drug. Pregnant women are strongly advised not to smoke.



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Explain how a fetus may be affected if the mother smokes tobacco.

_____

_____

_____

_____

**(2)**

(b) Illegal drugs are classified as Class **A**, **B** or **C**. Class **A** drugs are the most dangerous. The use of Class **A** drugs attracts the most serious punishments and fines.

- Cannabis is a Class **C** drug.
- These are some facts about cannabis.
- It is less addictive than amphetamines, tobacco or alcohol.
- It may cause mental illness.
- It does not seem to cause major social problems.
- It may be a 'gateway' drug to more harmful substances.
- It has a higher tar content than tobacco.
- It has an effect on the heart, similar to the effects of exercise.
- It can upset the control of blood pressure.

Use the above information to answer these questions.

(i) Give **two** reasons why many people think that cannabis should be classified as a Class **A** or Class **B** drug.

1. _____

_____

2. _____

_____

**(2)**

(ii) Give **two** reasons why many people think that cannabis should not be classified as an illegal drug.

1. _____

_____

2. _____

_____

**(2)**



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**(Total 6 marks)**

## Q28.

(a) We control many conditions inside our bodies.

Name **three** conditions which are controlled inside our bodies.

1. _____

2. _____

3. _____

**(3)**

(b) Hormones are used to control fertility in women.

Use words from the box to complete the sentences.

| | | | |
|---|---|---|---|
| **antibiotic** | **contraceptive drug** | **fertility drug** | **vaccine** |

A woman can prevent pregnancy by taking a _____

A woman can be helped to become pregnant by taking a _____

**(2)**

(c) Some drugs are addictive.

(i) Name **one** addictive drug.

_____

**(1)**

(ii) Explain why it is very difficult to give up using an addictive drug.

_____

_____

_____

_____

**(2)**

**(Total 8 marks)**

## Q29.

Complete the table to show which part of the blood carries out each function.

Choose your answers from the list.

**plasma** **platelet** **red blood cell** **white blood cell**

The first answer has been done for you.



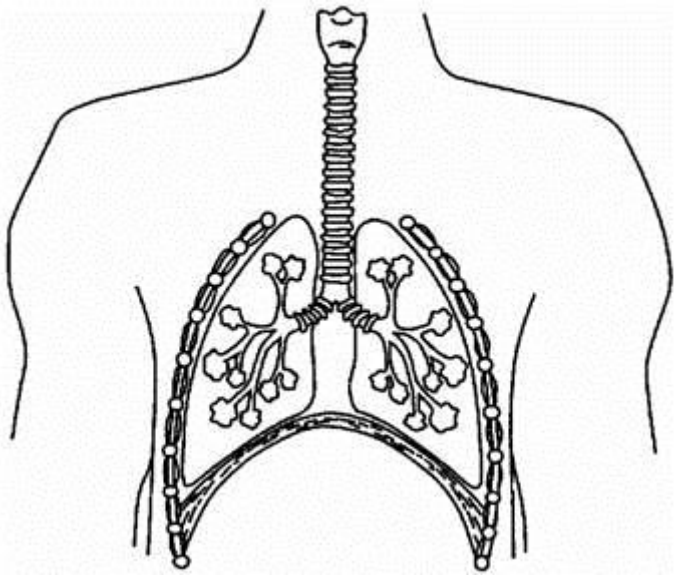
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| Function | Part of the blood |
|---|---|
| Transports most of the carbon dioxide | *plasma* |
| Transports most of the oxygen | |
| Helps blood to clot at a wound | |
| Defends the body against microorganisms | |
| Transports the products of digestion | |

**(Total 4 marks)**

## Q30.

The diagram shows the human breathing system.



(a) Place on the diagram:

(i) a letter **X** where oxygen enters the blood;

**(1)**

(ii) an arrow showing the direction the diaphragm moves when we breathe in.

**(1)**

(b) List the following structures in the order the air passes through them when we breathe in.

**alveoli** **bronchi** **bronchioles** **trachea**

1. _____

2. _____

3. _____

4. _____



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**(1)**

(c) By what process does oxygen enter the blood? Draw a ring around your answer.

**diffusion** **digestion** **osmosis** **respiration**

**(1)**

**(Total 4 marks)**

## Q31.

Bread contains starch, protein and fat.

(a) Complete each sentence by choosing the correct words from the box.

| | |
|---|---|
| **amino acids** | **protein** |
| **fat** | **starch** |
| **fatty acids** | **sugar** |

Amylase speeds up the digestion of _____ . The product of this digestion is _____ . Protease speeds up the digestion of _____ . The product of this digestion is _____ .

**(4)**

(b) Why do molecules of starch, protein and fat need to be digested?

_____

_____

**(2)**

(c) In which part of the digestive system does the digestion of starch begin? Draw a ring around your answer.

**large intestine** **mouth** **small intestine** **stomach**

**(1)**

(d) What do we call substances like amylase and protease which speed up chemical reactions?

_____

**(1)**

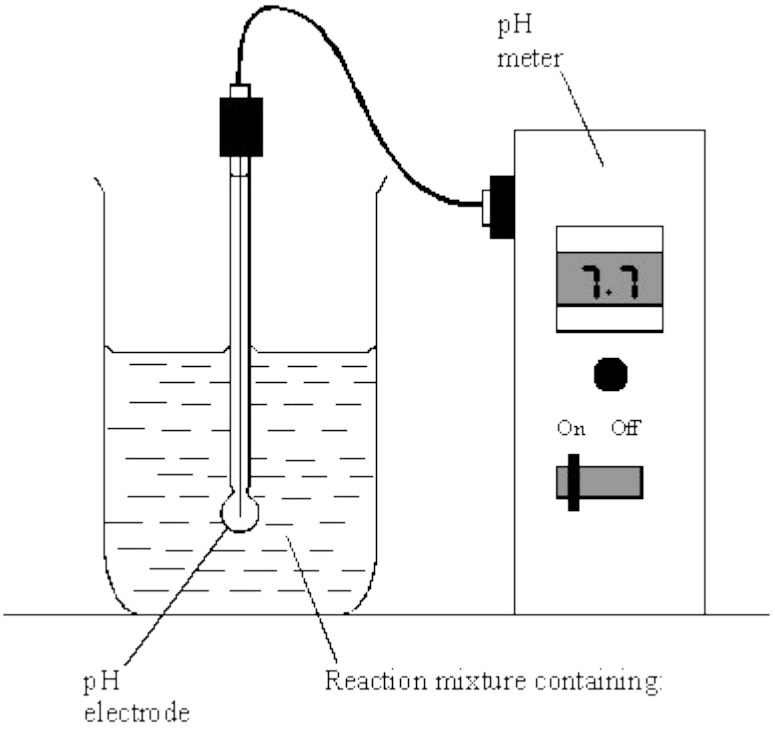
**(Total 8 marks)**

## Q32.

The diagram shows the apparatus used to investigate the digestion of milk fat by an enzyme. The reaction mixture contained milk, sodium carbonate solution (an alkali) and the enzyme. In Experiment **1**, bile was also added. In Experiment **2**, an equal volume of water replaced the bile. In each experiment, the pH was recorded at 2-minute intervals.



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| Either: | Experiment 1 | or: | Experiment 2 |
|---|---|---|---|
| | milk (contains fat)<br>sodium carbonate solution<br>bile<br>enzyme | | milk (contains fat)<br>sodium carbonate solution<br>water<br>enzyme |

The results of the two experiments are given in the table.

| Time in minutes | pH | |
|---|---|---|
| | Experiment 1: with bile | Experiment 2: no bile |
| 0 | 9.0 | 9.0 |
| 2 | 8.8 | 9.0 |
| 4 | 8.7 | 9.0 |
| 6 | 8.1 | 8.8 |
| 8 | 7.7 | 8.6 |
| 10 | 7.6 | 8.2 |

(a) Milk fat is a type of lipid. Give the name of an enzyme which catalyses the breakdown of lipids.

_____

**(1)**



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(b) What was produced in each experiment to cause the fall in pH?

_____

**(1)**

(c) (i) For Experiment **1**, calculate the average rate of fall in pH per minute, between 4 minutes and 8 minutes. Show clearly how you work out your final answer.

_____

_____

_____

_____ pH units per minute

**(2)**

(ii) Why was the fall in pH faster when bile was present?

_____

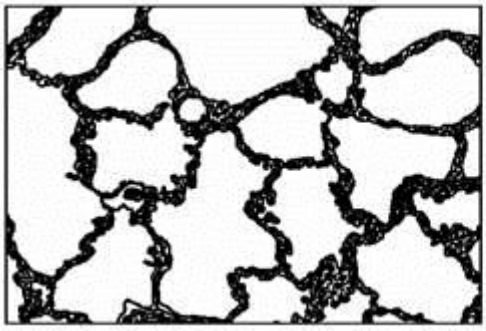
_____

**(1)**

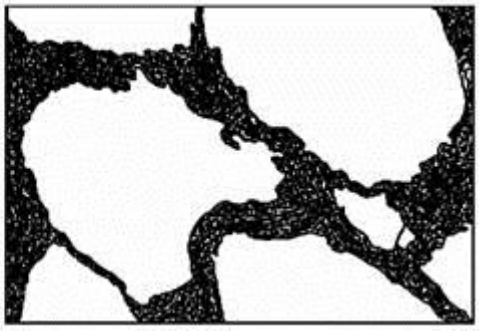
**(Total 5 marks)**

## Q33.

Emphysema is a disease of the lungs. People who smoke cigarettes are more likely to suffer from emphysema. The diagrams show lung tissue from a healthy person and lung tissue from a person with emphysema. The diagrams are drawn to the same scale.



Lung tissue from a healthy person



Lung tissue from a person with emphysema

Explain how emphysema reduces the amount of oxygen which diffuses into the blood

_____

_____

_____

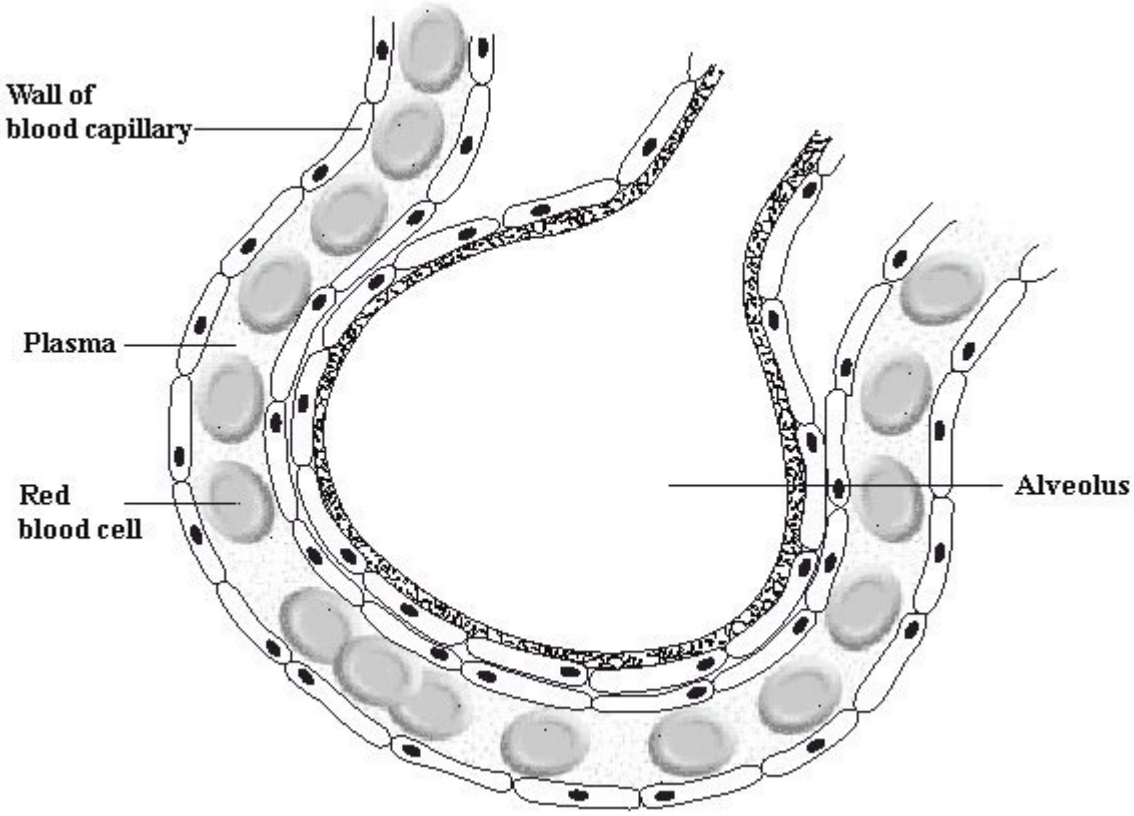
**(Total 2 marks)**

## Q34.

The diagram shows an alveolus and a blood capillary in the lung.



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(i) During gaseous exchange, oxygen and carbon dioxide are exchanged across the wall of the alveolus. **On the diagram**, carefully draw **two** arrows to show the paths taken by oxygen and by carbon dioxide during this process. **Label each arrow**.

**(3)**

(ii) Name the process by which oxygen moves across the wall of the alveolus.

_____

_____

**(1)**

(iii) Each lung contains about 350 million alveoli. How does this help gaseous exchange?

_____

_____

**(1)**

**(Total 5 marks)**

## Q35.

(a) (i) What name is given to an enzyme which catalyses the breakdown of protein?

_____

**(1)**



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(ii) What product is formed when protein is broken down by the enzyme?

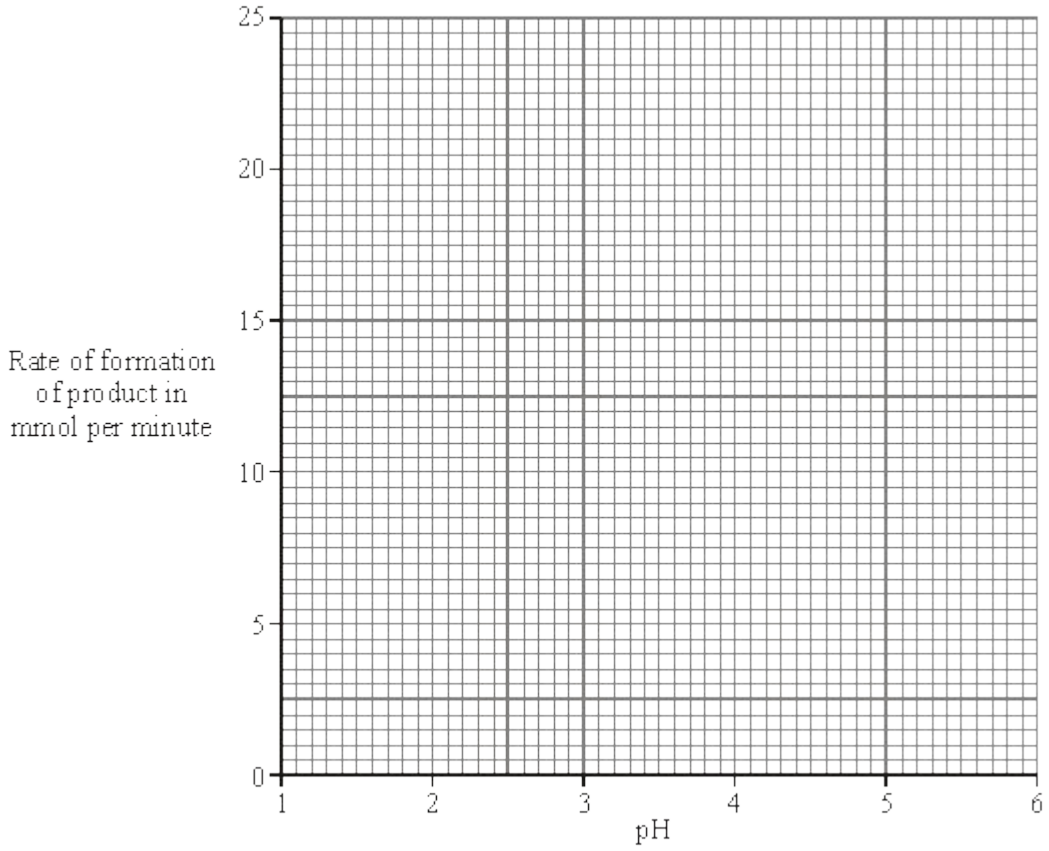
_____

**(1)**

The table shows the effect of pH on the activity of an enzyme which catalyses the breakdown of protein.

| **pH** | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 |
|---|---|---|---|---|---|
| **Rate of formation of product in mmol per minute** | 10.5 | 23.0 | 10.5 | 2.5 | 0.0 |

(b) Draw a graph of the data in the table.




**(3)**

(c) The enzyme is produced by the human digestive system.

(i) At what pH does this enzyme work best? _____

**(1)**

(ii) Suggest which part of the digestive system produces this enzyme.

_____

**(1)**

(d) Why is it necessary to break down proteins in the digestive system?



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_____

_____

_____

_____

_____

_____

**(3)**

**(Total 10 marks)**



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