Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International Advanced Level

Monday 12 October 2026

Afternoon (Time: 1 hour 30 minutes)

Paper reference **WBI11/01**

Biology

International Advanced Subsidiary/Advanced Level
UNIT 1: Molecules, Diet, Transport and Health

You must have:
Scientific calculator, ruler, HB pencil

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- In questions marked with an **asterisk** (*), marks will be awarded for your ability to structure your answer logically, showing how the points you make are related or follow on from each other where appropriate.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

©2026 Pearson Education Ltd.
Z:1/1/1/1/1/1/1/1/1/1

Turn over ▶

Pearson

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 Carbohydrates, lipids and proteins are three types of molecules found in living organisms.

(a) Starch is a carbohydrate.

(i) Which of the following statements are correct for starch?

1. Used as an energy store in both plants and animals.
2. Composed of glucose molecules joined by glycosidic bonds.
3. Contains branched amylopectin molecules and helical amylose molecules.

(1)

☒ **A** 1 only

☒ **B** 2 only

☒ **C** 1 and 2 only

☒ **D** 2 and 3 only

(ii) The formula for glucose is $C_6H_{12}O_6$.

Which is the formula for maltose?

(1)

☒ **A** $C_{12}H_{22}O_{10}$

☒ **B** $C_{12}H_{22}O_{11}$

☒ **C** $C_{12}H_{23}O_{10}$

☒ **D** $C_{12}H_{23}O_{11}$

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(b) Triglycerides are lipids.

(i) Which of the following statements are correct for triglycerides?

1. Composed of hydrogen and carbon atoms only.
2. Consist of one glycerol molecule joined to three fatty acid molecules.
3. The bond between a fatty acid and the glycerol is a hydrogen bond.

(1)

☒ **A** 1 only

☒ **B** 2 only

☒ **C** 1 and 2 only

☒ **D** 2 and 3 only

(ii) Which row of the table is correct for saturated and unsaturated fatty acids?

(1)

	Saturated fatty acids	Unsaturated fatty acids
☒ **A**	Have carbon–carbon double bonds	Have a higher carbon : hydrogen ratio than a saturated fatty acid
☒ **B**	Have carbon–carbon double bonds	Have a lower carbon : hydrogen ratio than a saturated fatty acid
☒ **C**	Have a higher carbon : hydrogen ratio than an unsaturated fatty acid	Have carbon–carbon double bonds
☒ **D**	Have a lower carbon : hydrogen ratio than an unsaturated fatty acid	Have carbon–carbon double bonds

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(c) (i) Proteins contain peptide bonds.

Where in the protein are these peptide bonds formed?

(1)

- ☒ **A** Between two R groups
- ☒ **B** Between an R group and a carboxyl group
- ☒ **C** Between an R group and an amino group
- ☒ **D** Between a carboxyl group and an amino group

(ii) Enzymes are proteins.

Which of the following statements about enzymes are correct?

1. Composed of hydrogen, carbon and oxygen atoms only.
2. Lower the activation energy of a reaction.
3. Only catalyse reactions inside cells.

(1)

- ☒ **A** 1 only
- ☒ **B** 2 only
- ☒ **C** 1 and 2 only
- ☒ **D** 2 and 3 only

(Total for Question 1 = 6 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

2 When a cell divides, it must synthesise both DNA and RNA.

(a) Both of these molecules are made of mononucleotides.

(i) Compare and contrast the structure of DNA mononucleotides with that of RNA mononucleotides.

(3)

(ii) Describe how DNA mononucleotides are used in DNA replication.

(3)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(iii) Which row of the table is correct for the synthesis of messenger RNA (mRNA)?

(1)

	Name of the process	Name of the DNA strand used as the template
☒ **A**	transcription	antisense
☒ **B**	transcription	sense
☒ **C**	translation	antisense
☒ **D**	translation	sense

(b) Mutations occur during DNA replication.

(i) State the meaning of the term **gene mutation**.

(1)

.....

.....

.....

(ii) Name **two** types of gene mutation.

(1)

1 .....

2 .....

(Total for Question 2 = 9 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

3 Obesity increases the risk of health problems.

(a) Obesity can be measured using body mass index (BMI) and waist-to-hip ratio.

A person who is 173 cm tall, has a body mass of 99.8 kg, a waist circumference of 103 cm and a hip circumference of 119 cm.

(i) Calculate the BMI of this person.

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

Use the formula:

$$\text{BMI} = \frac{\text{body mass in kg}}{(\text{height in m})^2}$$

(2)

Answer .....

(ii) Which is the waist-to-hip ratio for this person?

(1)

☒ **A** 0.86 : 1

☒ **B** 0.87 : 1

☒ **C** 1.15 : 1

☒ **D** 1.16 : 1

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(iii) Suggest why a person can have a BMI that indicates they are overweight and a waist-to-hip ratio that is healthy.

(2)

(b) Physical activity has health benefits.

Ahead of the 1964 Tokyo Olympics, scientists recommended that a person should walk 10 000 steps a day.

In 2025, another group of scientists suggested that aiming to walk 7 000 steps a day would be a more realistic goal.

(i) A person walks 1 000 steps in a day doing typical daily activities.

A person can walk 4 000 steps in 40 minutes.

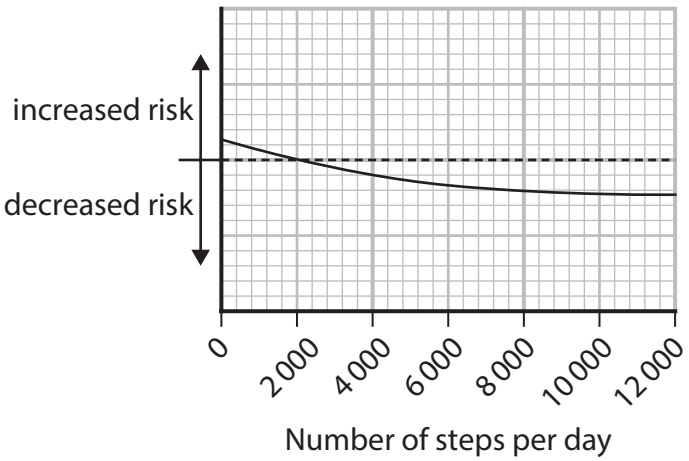
Determine why walking 7 000 steps a day instead of 10 000 steps a day may be more realistic for some people.

(2)

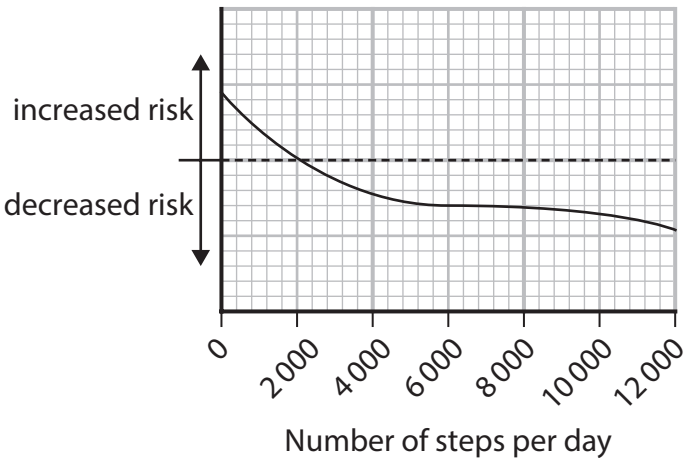
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(ii) The graphs show the effect of the number of steps per day on some aspects of health.

Incidence of CVD:



Death from cancer:



DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Explain why these scientists could justify that walking **fewer** steps could be just as beneficial to health as walking 10 000 steps a day.

Use the information in the graphs to support your answer.

(3)

(Total for Question 3 = 10 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

4 (a) Osmosis involves the movement of free water molecules down a water potential gradient.

(i) State what is meant by **free water molecules**.

(1)

.....

.....

.....

(ii) State what is meant by **water potential gradient**.

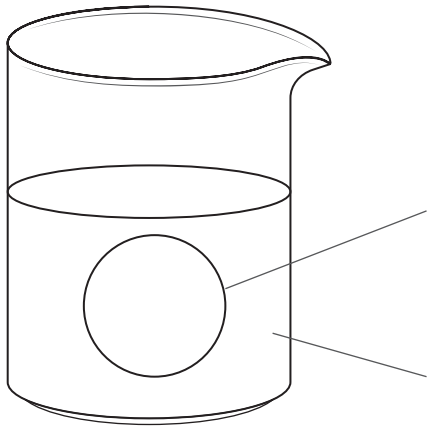
(1)

.....

.....

.....

(b) Some sugars are able to pass through artificial membranes. The diagram shows an artificial membrane sac containing a solution of sugars in a beaker containing a different solution of sugars.



The table shows the concentration of each type of sugar in the sac and in the beaker at the start of an experiment.

Type of sugar	Concentration of sugar / g dm^{-3}	
	In sac	In beaker
sucrose	500	200
glucose	300	100
fructose	100	600

The membrane of the sac allows glucose and fructose to pass through but not sucrose.

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(i) Explain why glucose and fructose can pass through this membrane and not sucrose.

(2)

(ii) Explain what would happen to the **concentration** of these sugars in the sac and in the beaker after a few hours.

(4)

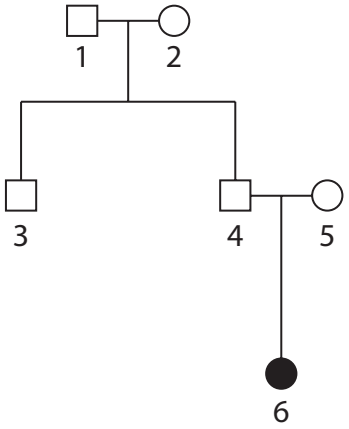
(Total for Question 4 = 8 marks)

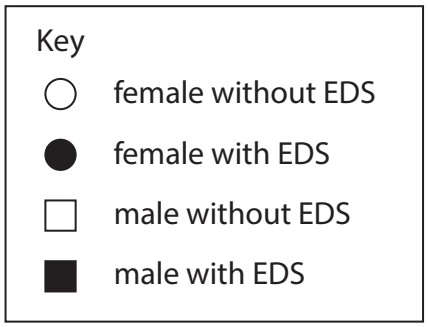
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

5 Ehlers–Danlos syndromes (EDS) are a group of genetic disorders affecting connective tissue.

Some of these disorders show the same pattern of inheritance as cystic fibrosis.

(a) The pedigree diagram shows some individuals, numbered 1 to 6, in one family.





(i) Explain why individual 6 has EDS when none of the other members of this family have the condition.

(3)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(ii) Individuals 4 and 5 could choose prenatal genetic screening if they decided to have a second child.

Explain **two** implications of prenatal genetic screening, **one** for individuals 4 and 5 and **one** for individual 3.

(2)

Implication for individuals 4 and 5

Implication for individual 3

(b) Some types of EDS, including vascular EDS, result in weaker collagen.

(i) Explain how the structure of collagen gives this protein strength.

(2)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(ii) Vascular EDS results in an increased risk of arteries bursting.

Suggest why vascular EDS increases this risk.

(2)

.....

.....

.....

.....

.....

.....

(Total for Question 5 = 9 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

6 The photograph shows Chinese ground orchid, a plant native to China, Japan, Korea and Myanmar.



(Source: © Kateryna Kon/Shutterstock)

Parts of this plant have been used in Chinese herbal medicine for many years.

A new polysaccharide, BSP, has been isolated from this plant.

BSP may help in the management of diabetes.

(a) BSP is made from the sugars: mannose, glucose and galactose.

These sugars are in the ratio of 3.2 mannose : 5.4 glucose : 1.0 galactose.

Explain what this ratio indicates about the composition of BSP.

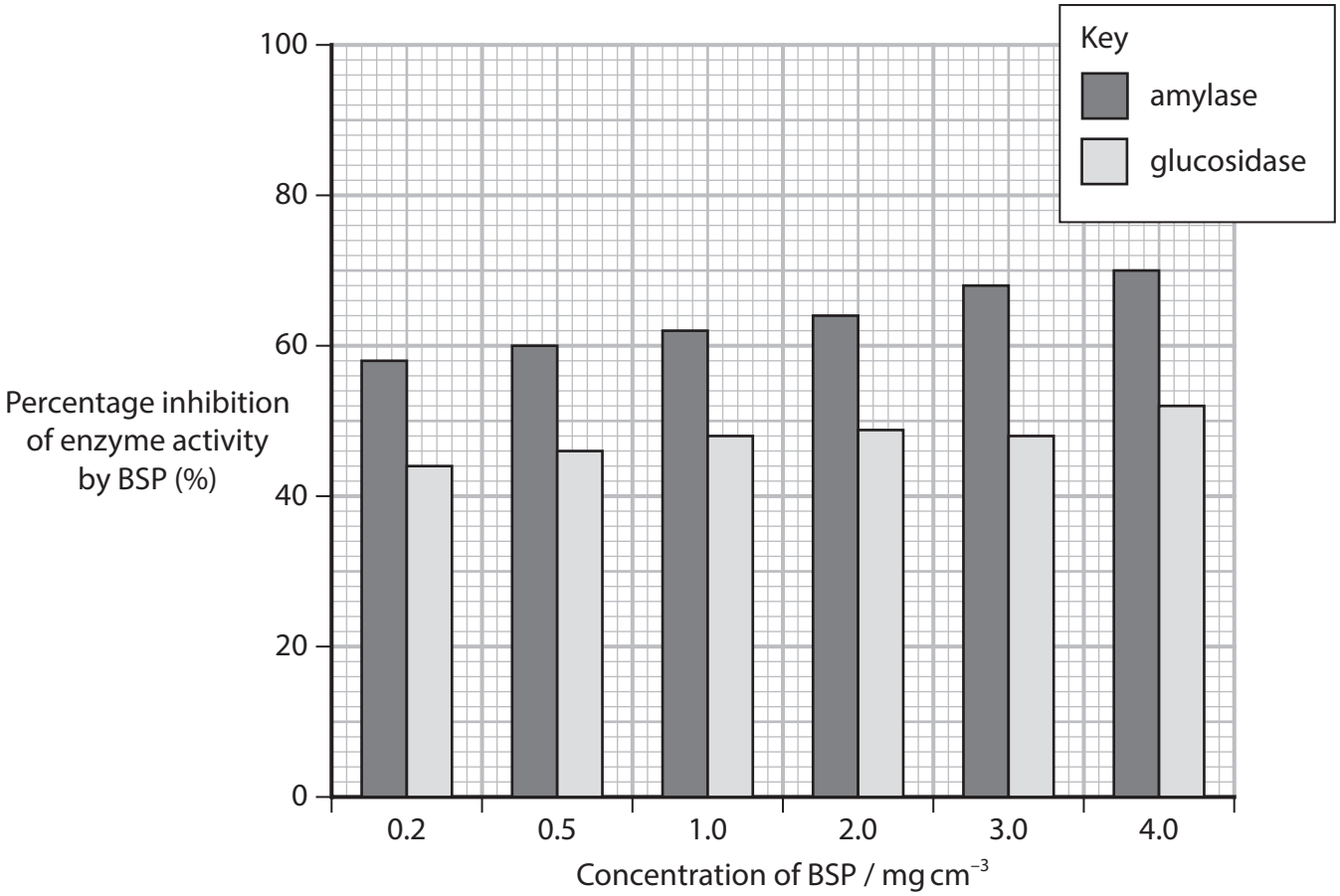
(3)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(b) A person with diabetes is unable to control their blood glucose levels.

Starch in the diet is broken down into glucose by the enzymes amylase and glucosidase.

The graph shows the effect of concentration of BSP on amylase and glucosidase activity.



DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(i) Describe **two** conclusions that can be made about the effect of BSP on these two enzymes.

(2)

1 .....

.....

.....

2 .....

.....

.....

(ii) Suggest why the polysaccharide BSP affects the activity of these enzymes.

(2)

.....

.....

.....

.....

.....

.....

(iii) Suggest why BSP may help people with diabetes control their blood glucose levels.

(2)

.....

.....

.....

.....

.....

.....

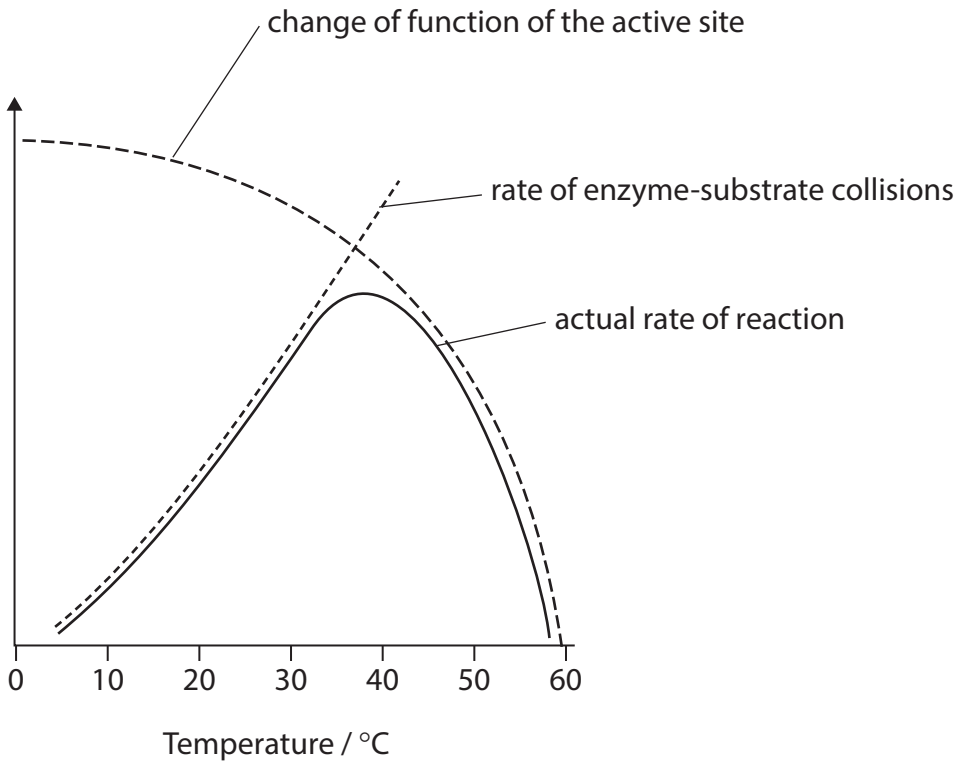
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(c) Human enzymes have an optimum temperature of 37 °C.

The graph shows the activity of a human enzyme at different temperatures.



Explain why the actual rate of reaction is determined by the rate of enzyme-substrate collisions and the change in function of the active site.

(3)

(Total for Question 6 = 12 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

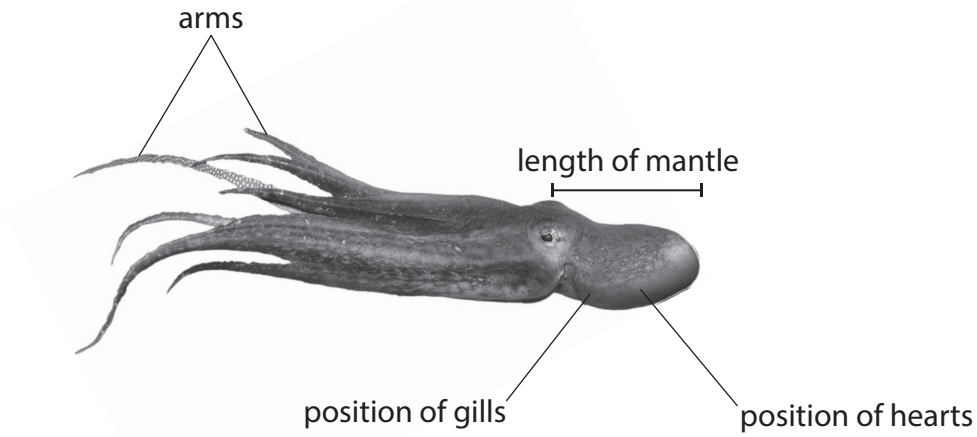
DO NOT WRITE IN THIS AREA

BLANK PAGE

7 The common octopus is an animal that is found in many seas and oceans around the world.

This octopus has gills that provide a gas exchange surface.

The photograph shows this octopus swimming.



(Source: © blickwinkel/Alamy)

(a) The length of the mantle of the octopus shown in the photograph is 12.5 cm.

(i) Calculate the magnification of this photograph.

(1)

Answer .....

(ii) Explain how the **mean** length of the arms of this octopus could be estimated from the photograph.

(2)

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(b) Haemocyanin is a molecule that transports oxygen in the blood of an octopus.

The oxygen-carrying capacity of haemocyanin is lower than human haemoglobin.

Octopus will often crawl along the seabed rather than swim.

The table shows some information about haemocyanin.

Complete the table for human haemoglobin.

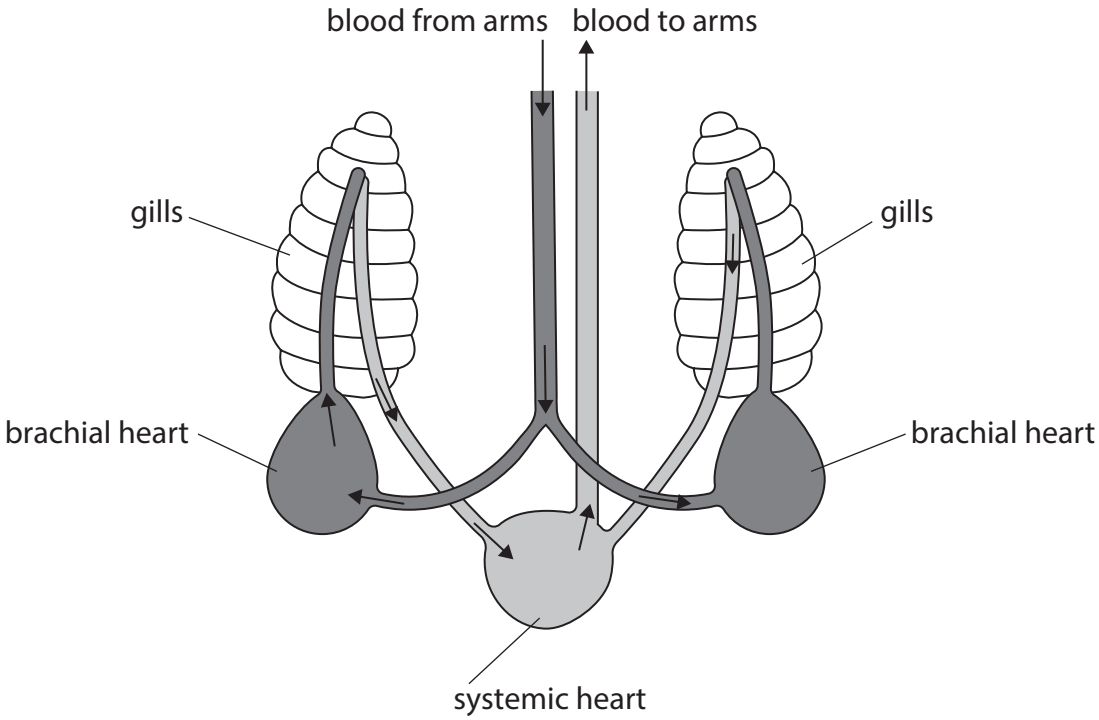
(4)

Octopus haemocyanin	Human haemoglobin
1 Found in blood plasma	
2 Consists of many protein subunits	
3 One subunit binds two copper ions	
4 Two copper ions bind one oxygen molecule	

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

*(c) An octopus has three hearts: two brachial hearts and one systemic heart.

The diagram shows the flow of blood through the gills and the three hearts of an octopus.



DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Explain the roles of the gills, the circulatory system and the three hearts in maintaining the levels of gases in the tissues of the octopus.

Use the information in the question to support your answer.

(6)

(Total for Question 7 = 13 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

8 Garlic is a species of plant that is native to central and south Asia and parts of Mediterranean Europe.

The photograph shows a garlic bulb, the part of the plant that is used in cooking.



(Source: © Oleksandr Perepelytsia/Alamy)

(a) China is the country that exports the most garlic.

In 2024, China exported 29.1% more garlic than in 2023.

In 2024, China exported 2.62 million tonnes of garlic.

Calculate the mass of garlic exported by China in 2023.

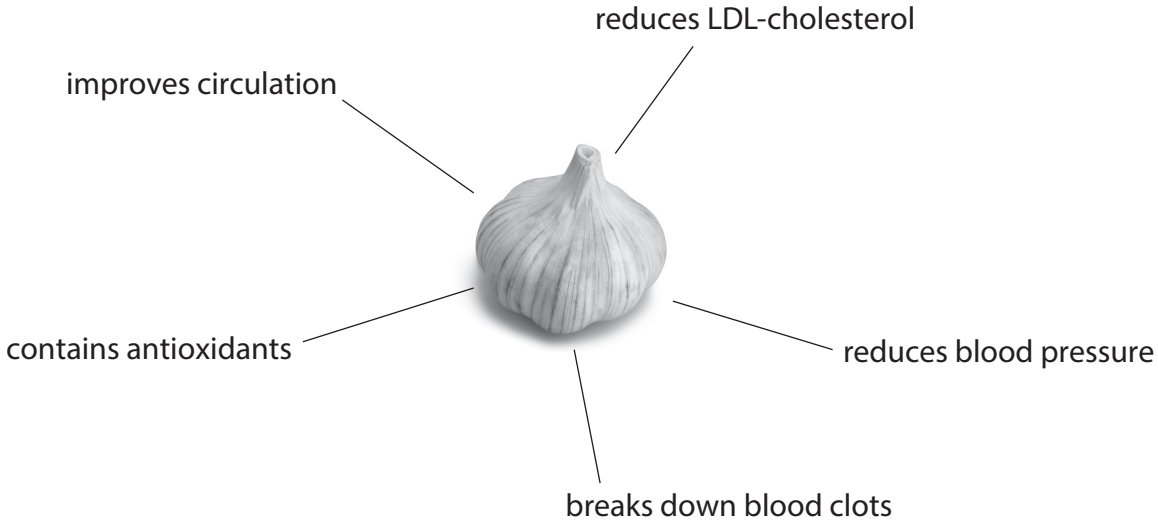
(2)

Answer .....

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(b) Some studies have shown that eating garlic may help to reduce the risk of cardiovascular disease (CVD).

The diagram shows some of the possible health benefits of eating garlic.



Explain how eating garlic may help to reduce the risk of CVD.

(5)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

*(c) The antioxidant properties of stored garlic and the ability of stored garlic to lower blood pressure have been investigated.

One investigation tested the antioxidant properties of stored garlic, fresh garlic and vitamin C, a known antioxidant.

The table shows the results of this investigation.

Antioxidant	Mean antioxidant activity ± SD / a.u.
Vitamin C	19.5 ± 0.3
Stored garlic	19.0 ± 0.1
Fresh garlic	12.0 ± 0.7

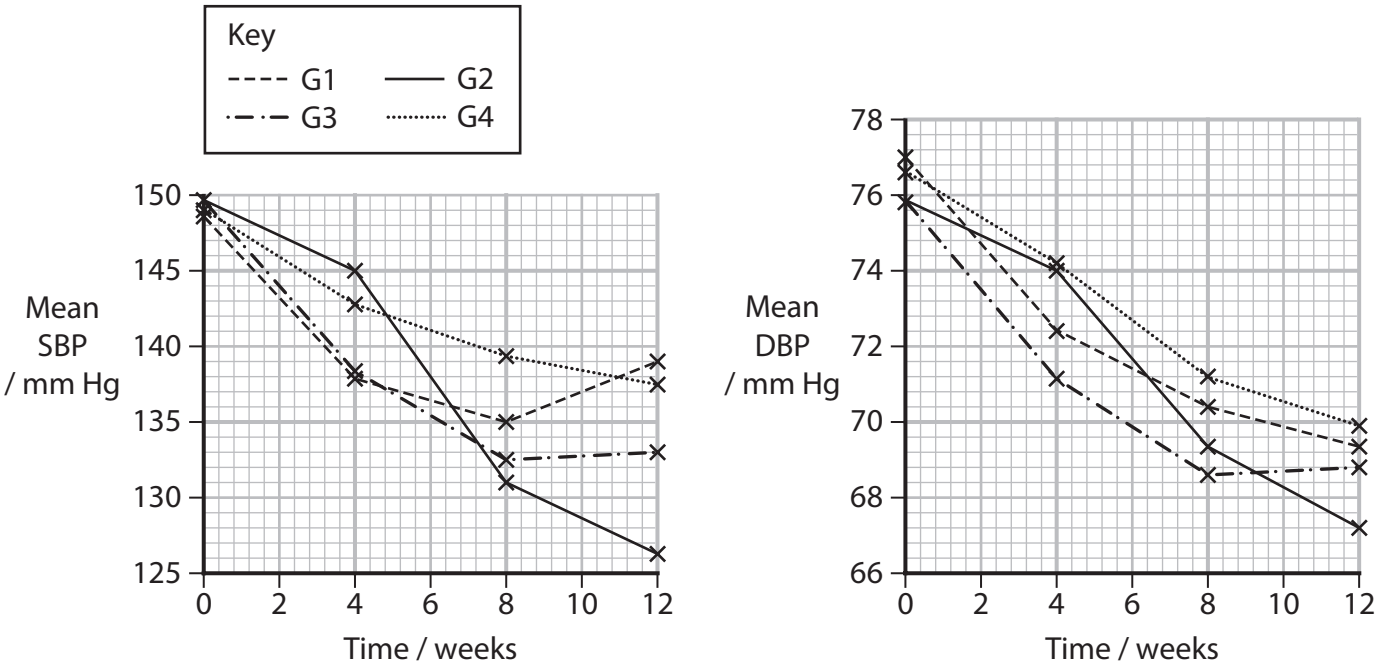
The effect of stored garlic on lowering high blood pressure was also investigated.

The volunteers in the investigation were all Australian men or women with a mean age of 70 ± 12 years, with high blood pressure.

The volunteers were randomly divided into four groups:

- G1 had one stored garlic capsule per day
- G2 had two stored garlic capsules per day
- G3 had four stored garlic capsules per day
- G4 had one control capsule (placebo) per day.

The graphs show the mean systolic blood pressure (SBP) and mean diastolic blood pressure (DBP) of these four groups.



DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Discuss the conclusions that can be made from this data about:

- the antioxidant properties of stored garlic
- the effect of stored garlic on lowering SBP
- the effect of stored garlic on lowering DBP.

(6)

(Total for Question 8 = 13 marks)

TOTAL FOR PAPER = 80 MARKS

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

BLANK PAGE

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

BLANK PAGE

BLANK PAGE

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA