Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International Advanced Level

Tuesday 5 May 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.*
- Calculators may be used.
- 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.*
- 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.

Turn over ▶

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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 (a) Read through the following description of osmosis.

Complete the description by writing the most appropriate word or words on the dotted lines.

(4)

Osmosis is the movement of ..... water molecules

through a ..... cell membrane,

..... a water potential gradient.

The water potential gradient is affected by the .....

of solutes dissolved in the cytoplasm.

(b) The water potential of a plant tissue can be calculated using the equation:

water potential = osmotic potential + turgor pressure

Calculate the water potential of a plant tissue with a turgor pressure of 150 kPa and an osmotic potential of –398 kPa.

(1)

Answer ..... kPa

(Total for Question 1 = 5 marks)

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2 The photograph shows fruit from a papaya plant.



(Source: © funkyfood London - Paul Williams / Alamy Stock Photo)

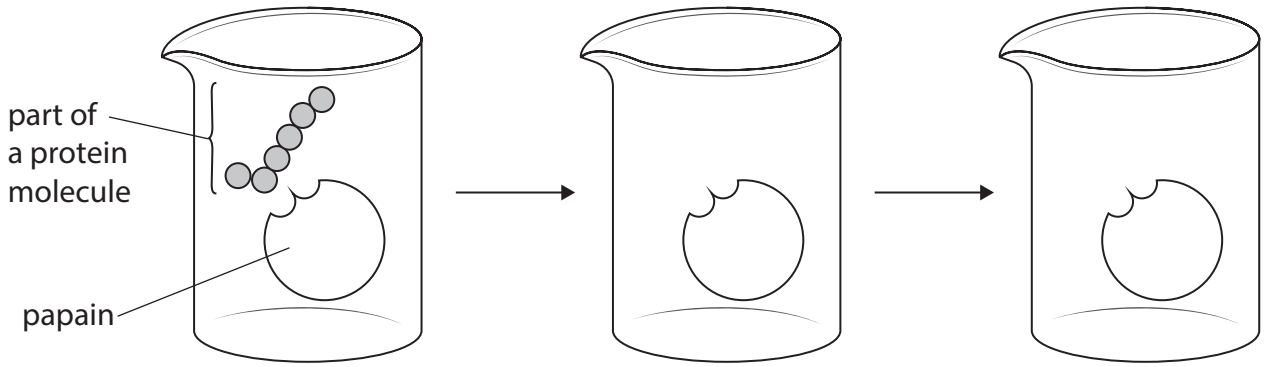
This fruit contains an enzyme called papain.

Papain breaks down proteins into peptides and amino acids.

(a) Name the type of reaction that breaks down protein into peptides and amino acids.

(1)

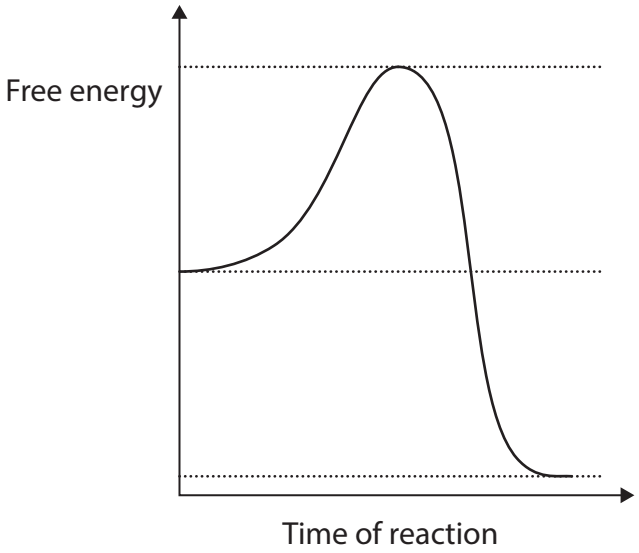
(b) The diagram shows a papain molecule and part of a protein molecule in a beaker.



Complete the diagram to show the two stages in the breakdown of this protein to produce a peptide and **one** amino acid.

(2)

(c) The graph shows the free energy change when protein in a solution with no papain present breaks down into its products.



Complete the graph to show the free energy change when papain is present in the protein solution.

(2)

(Total for Question 2 = 5 marks)

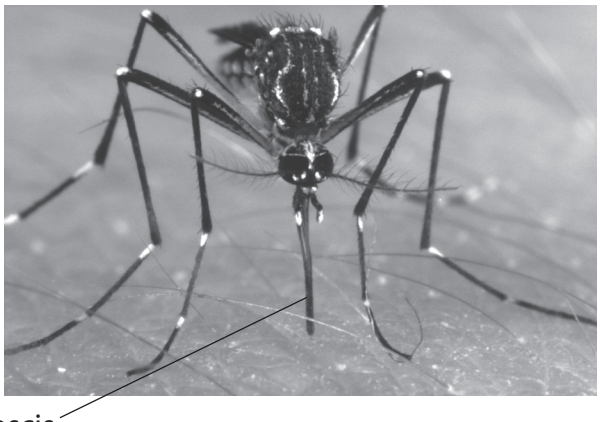
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3 Some species of mosquitoes feed on human blood.

A feeding mosquito pushes its proboscis through the skin into a blood vessel.

The photograph shows a mosquito feeding on human blood.



(Source: © Nigel Cattlin / Alamy Stock Photo)

(a) A capillary is a type of blood vessel.

Give **two** structural features of a capillary.

(2)

1 .....

.....

.....

2 .....

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(b) When a mosquito inserts its proboscis into a capillary, the blood clotting process starts.

(i) Suggest how a mosquito inserting its proboscis triggers the start of the blood clotting process.

(1)

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(ii) Describe the role of **one named** enzyme in the blood clotting process.

(2)

Name of enzyme

.....

Role of this enzyme

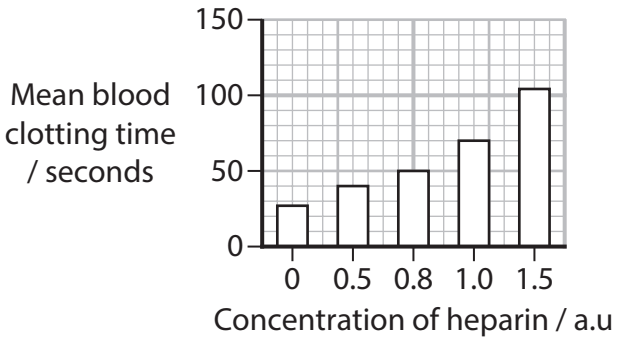
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(c) The saliva of a mosquito contains heparin.

The graph shows the effect of heparin on mean blood clotting time.



(i) Suggest how this data could have been collected.

(3)

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(ii) Suggest how heparin helps the mosquito to feed on human blood.

Use the information in the graph to support your answer.

(2)

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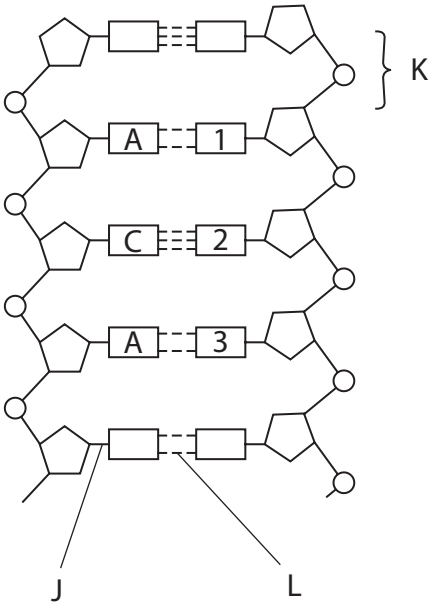
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(Total for Question 3 = 10 marks)

4 The genetic code is determined by the sequence of bases along a strand of DNA.

(a) The diagram shows part of a DNA molecule.



(i) Which row of the table shows the bases 1, 2 and 3?

(1)

		Base 1	Base 2	Base 3
☒	**A**	G	T	G
☒	**B**	T	U	T
☒	**C**	T	G	T
☒	**D**	U	G	U

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(ii) Which row of the table shows the bonds J, K and L?

(1)

		Bond J	Bond K	Bond L
☒	**A**	covalent	phosphodiester	hydrogen
☒	**B**	covalent	ionic	phosphodiester
☒	**C**	hydrogen	phosphodiester	covalent
☒	**D**	hydrogen	ionic	phosphodiester

(b) The table shows the genetic codes for two amino acids, leucine and serine.

Amino acid	Genetic codes
leucine	UUA UUG CUU CUC CUA CUG
serine	UCA UCC UCG UCU AGC AGU

The nature of the genetic code can be described as a triplet that is non-overlapping and degenerate.

(i) State the meaning of **triplet code**.

Use information from the table to illustrate your answer.

(2)

(ii) State the meaning of **non-overlapping**.

Use an example from the table to illustrate your answer.

(2)

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(iii) Describe **two** differences shown in the degenerate codes for leucine and serine.

(2)

1 .....

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2 .....

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(Total for Question 4 = 8 marks)

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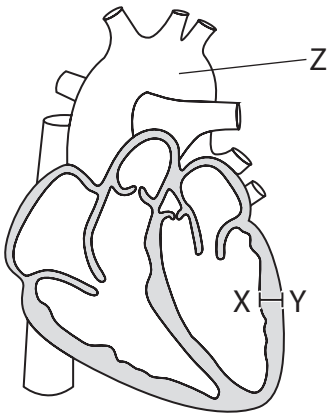
5 Cardiomyopathy (CM) is a disease that affects the heart muscle.

CM is a type of heart disease that can result in sudden death.

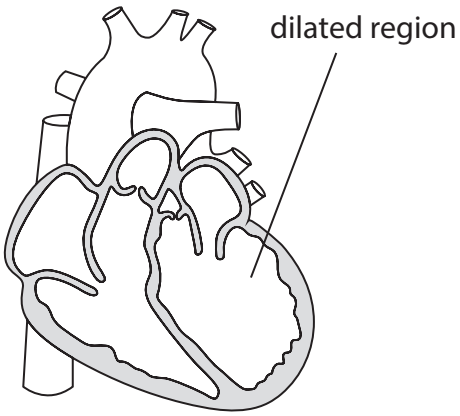
There are many types of CM including dilated cardiomyopathy (DCM) and hypertrophic cardiomyopathy (HCM).

(a) The diagrams show a healthy heart, a heart with DCM and a heart with HCM.

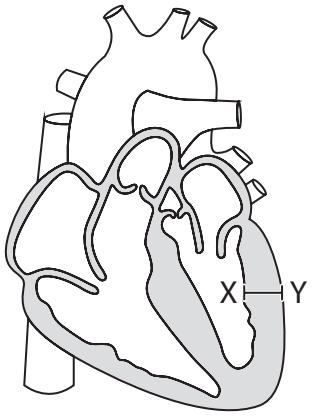
The diagrams are all drawn to the same scale.



Healthy heart



Dilated cardiomyopathy (DCM)



Hypertrophic cardiomyopathy (HCM)

(i) Which is the blood vessel labelled Z?

(1)

- ☒ **A** aorta
- ☒ **B** pulmonary artery
- ☒ **C** pulmonary vein
- ☒ **D** vena cava

(ii) Which is the dilated region of the heart with DCM?

(1)

- ☒ **A** left atrium
- ☒ **B** left ventricle
- ☒ **C** right atrium
- ☒ **D** right ventricle

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(iii) How many times thicker is the wall between the points X and Y in the heart with HCM compared with the healthy heart?

(1)

- ☒ **A** 0.6
- ☒ **B** 1.7
- ☒ **C** 8.4
- ☒ **D** 23

(iv) In HCM, the walls of the heart can become less elastic.

Explain how the **volume** of blood taken into the heart and pumped out is affected by the walls of the heart becoming less elastic.

Use the information in the diagram to support your answer.

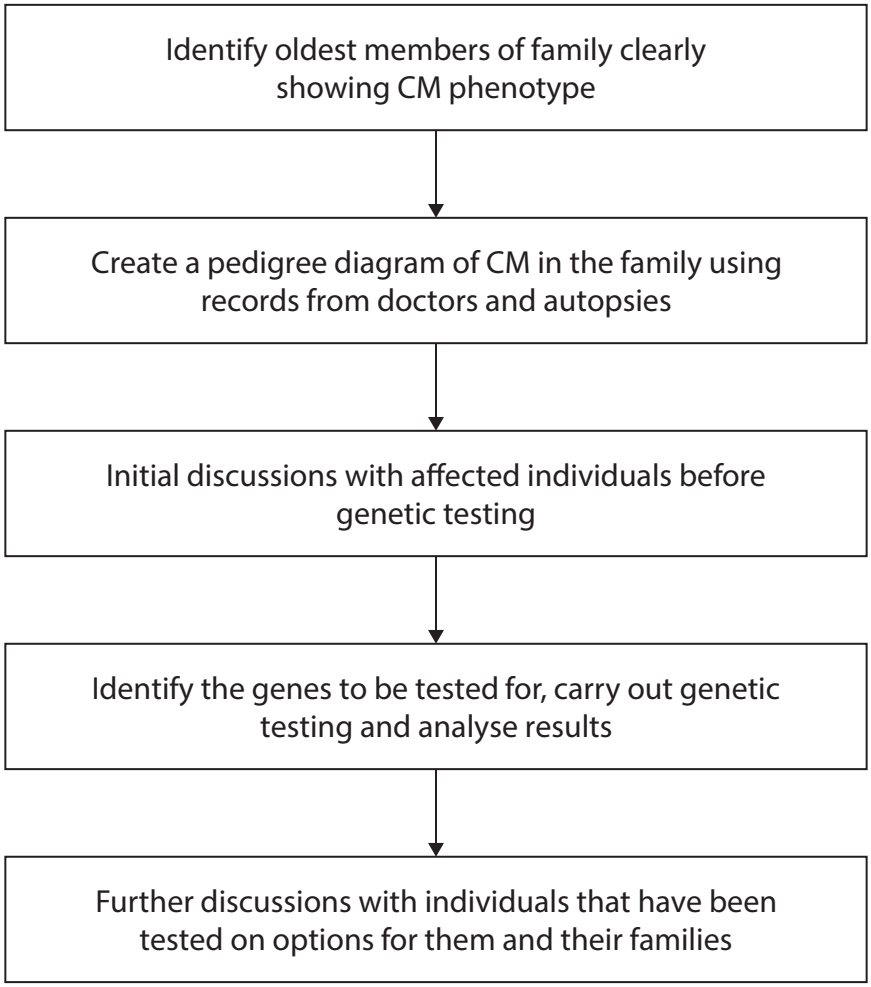
(3)

*(b) Some types of CM are inherited.

Gene mutations are responsible for the different types of inherited CM.

Genetic screening can be used to identify individuals with a particular type of CM.

The flow chart shows the steps in one strategy that can be used to screen individuals and their families for CM.



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Explain the significance of each step shown in this flow chart.

(6)

(Total for Question 5 = 12 marks)

6 The proportion of the different types of phospholipids in a cell membrane determines its structure and properties.

(a) The length of the fatty acid chain can vary in different types of phospholipids.

State **one other** way that the structure of phospholipids can differ from each other.

(1)

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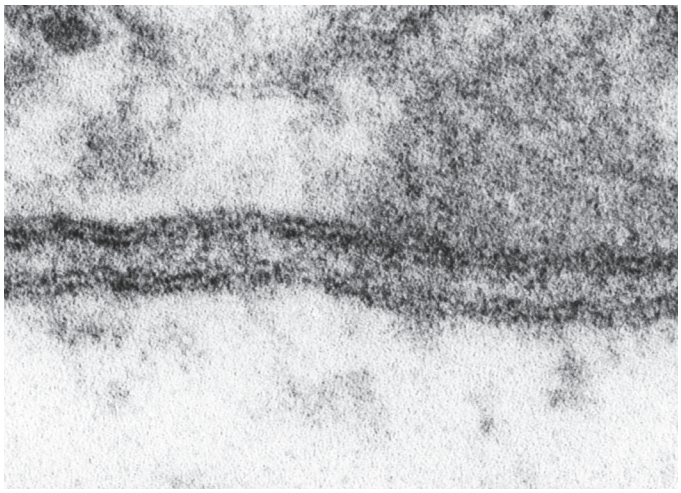
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(b) The width of a cell membrane is determined by the phospholipids in the cell membrane.

The photograph shows part of the cell membranes of two adjacent cells of the same type.

intercellular space {  } cell membrane
} cell membrane

(Source: © DENNIS KUNKEL MICROSCOPY / SCIENCE PHOTO LIBRARY)

The width of the cell membrane of each of these cells is 7 nm.

Calculate the **mean** width of the intercellular space between these two cells.

Explain how you arrived at your answer.

(3)

Answer ..... nm

Explanation

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(c) The table shows the percentage of different types of lipids in the cell membranes of red blood cells and liver cells.

Type of lipid	Percentage of each type of lipid in the cell membrane (%)	
	Red blood cells	Liver cells
PC	20	18
PE	18	12
PS	7	7
PL	3	3
SM	18	12
Cholesterol	20	19
Others	14	29

Compare and contrast the lipid content in the cell membranes of red blood cells with that of the cell membranes of liver cells.

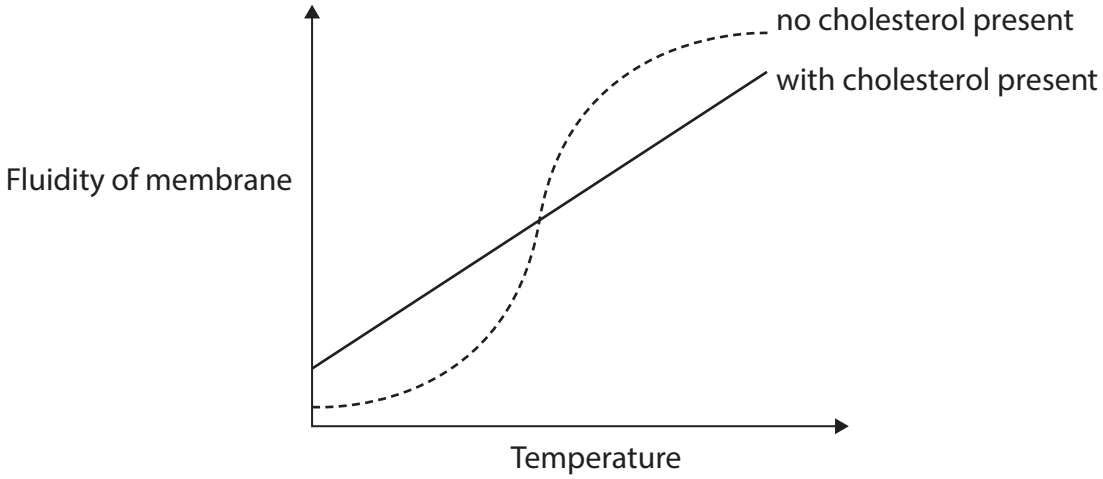
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(d) The cholesterol content of a cell membrane and temperature affect the fluidity of the membrane.

The graph shows the effect of temperature on the fluidity of two types of cell membrane.



Describe the effect of temperature on the fluidity of these **two** types of membrane.

(3)

(Total for Question 6 = 10 marks)

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7 High blood pressure can increase the risk of cardiovascular disease (CVD).

(a) Explain how high blood pressure can result in CVD.

(3)

*(b) Pregnancy can cause high blood pressure in the mother. This can be harmful to both the fetus and the mother.

A study compared the effectiveness of three antihypertensive drugs: drug L, drug M and drug N.

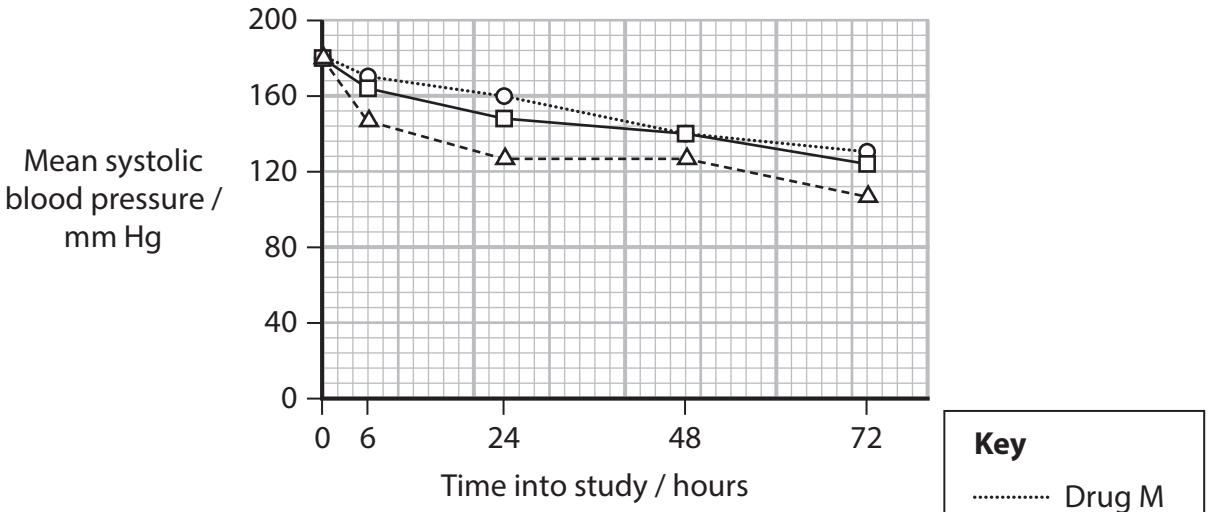
Three groups of 20 pregnant women were each given one of the antihypertensive drugs and their blood pressures were measured for 72 hours.

The side effects of each drug were also recorded.

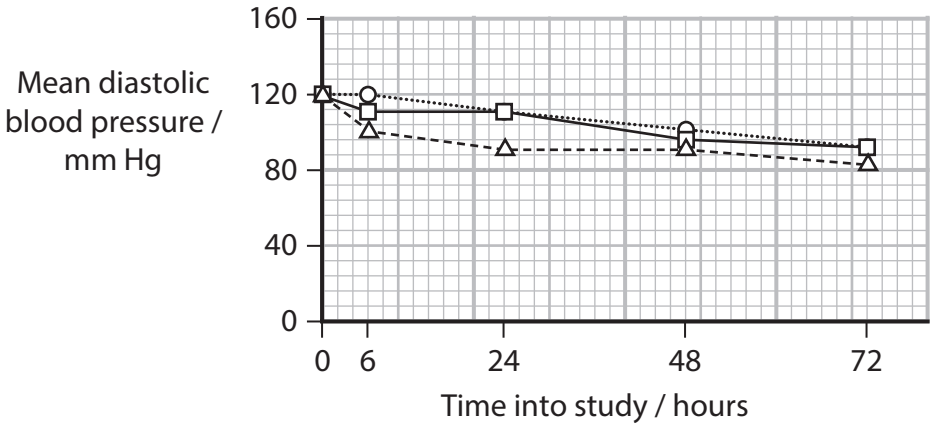
The women were all between 20 and 38 weeks pregnant and had a minimum systolic blood pressure of 140 mm Hg and a minimum diastolic blood pressure of 90 mm Hg.

The graphs show the results of this study.

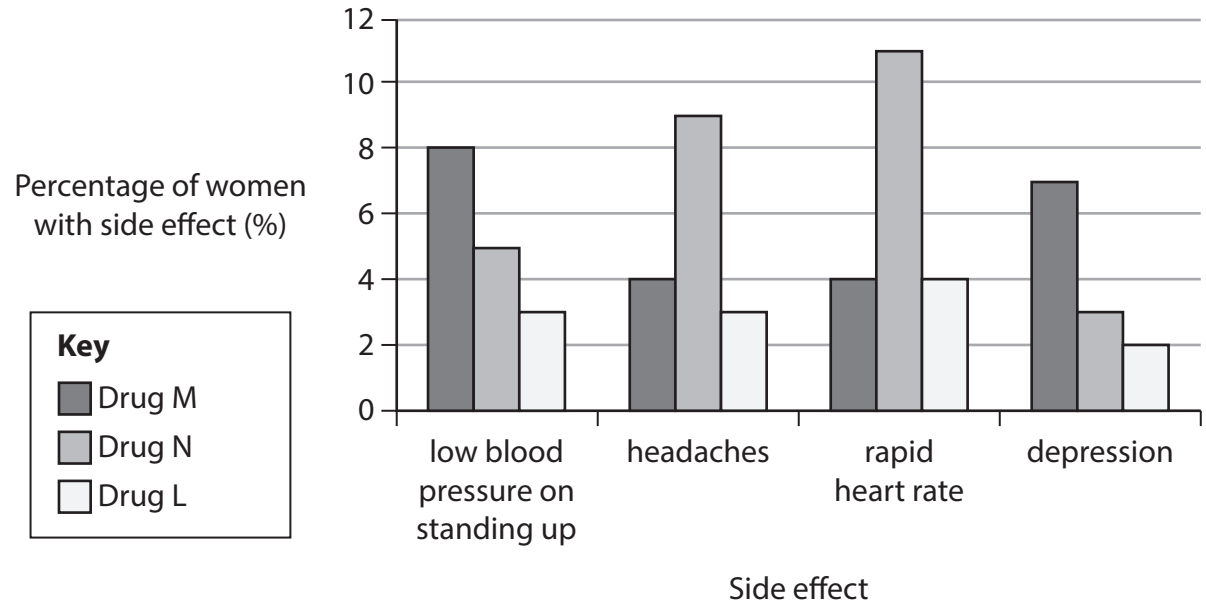
Graph 1: Mean **systolic** blood pressure



Graph 2: Mean **diastolic** blood pressure



Graph 3: Side effects



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Evaluate the effectiveness of these three drugs for treating high blood pressure caused by pregnancy.

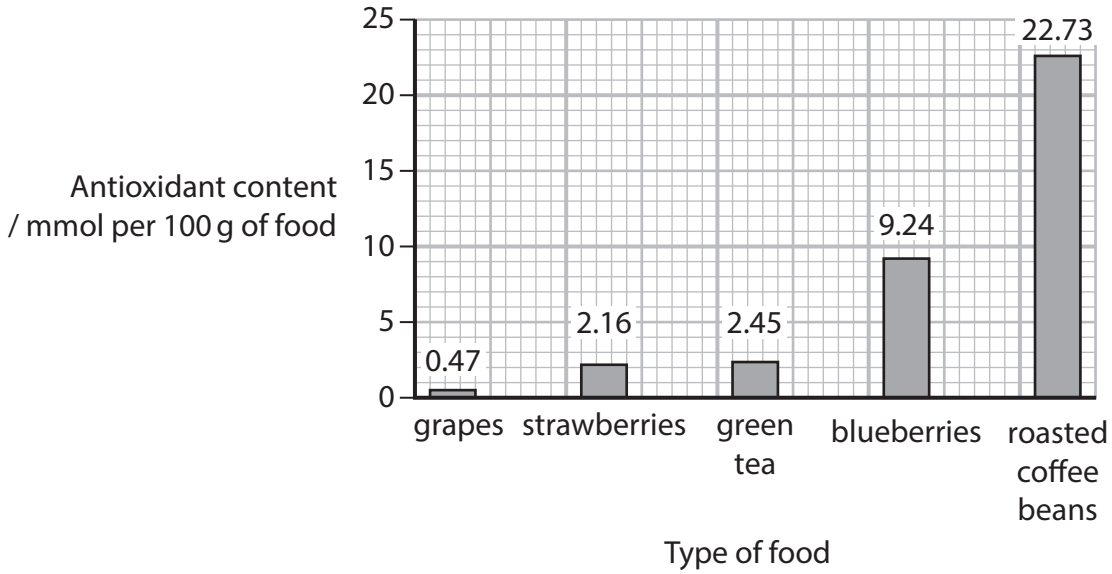
Comment on the design of this study in your evaluation.

(6)

(c) Antioxidants reduce the risk of CVD.

Antioxidants occur naturally in many types of food.

The graph shows the antioxidant content of some types of food.



(i) Which is the ratio of the antioxidant content of strawberries to blueberries?

(1)

- ☒ **A** 0.23 : 1
- ☒ **B** 0.24 : 1
- ☒ **C** 1 : 0.23
- ☒ **D** 1 : 0.24

(ii) One mug of coffee uses 15 g of coffee beans.

Which is the number of mugs of coffee that needs to be drunk to consume 22.73 mmol of antioxidants?

(1)

- ☒ **A** 6.6
- ☒ **B** 6.7
- ☒ **C** 151.3
- ☒ **D** 151.4

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(iii) Explain why the data presented in this graph can be misleading.

Use values from the graph to support your answer.

(2)

(iv) Tea can be drunk with milk.

Some studies have indicated that adding milk reduces the activity of the antioxidants in tea.

Some scientists have suggested that the concentration of antioxidants absorbed into the blood will not be affected by milk in the tea.

Suggest **one** reason for each of these ideas.

(2)

Adding milk reduces antioxidant activity in tea

Absorption of antioxidants into the blood will not be affected by milk in the tea

(Total for Question 7 = 15 marks)

8 Congenital lactase deficiency (CLD) is a rare type of lactose intolerance.

(a) This type of lactose intolerance is most common in Finland.

It is estimated that 1 in 60 000 babies are born with CLD.

The table shows the number of live births in Finland in four years.

Year	Number of live births
2020	46 463
2021	49 594
2022	44 951
2023	43 383

Estimate the number of babies born with CLD in this time period.

(2)

Answer .....

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(b) This type of lactose intolerance is a recessive inherited disorder.

Determine the probability that a child of two heterozygous parents for CLD will also be **heterozygous**.

(4)

Genotypes of parents

Parent 1 .....

Parent 2 .....

Genetic diagram:

Probability that child will be heterozygous for CLD .....

(c) Several mutations can result in a person having CLD.

One mutation produces a lactase enzyme that has a shorter polypeptide. This shortened lactase cannot digest lactose.

(i) When lactose molecules are digested, glucose molecules are formed.

Which other molecules are products of lactose digestion?

(1)

☒ **A** fructose molecules only

☒ **B** fructose and water molecules

☒ **C** galactose molecules only

☒ **D** galactose and water molecules

(ii) Explain how this mutation results in a shorter lactase polypeptide and why it does not digest lactose.

(5)

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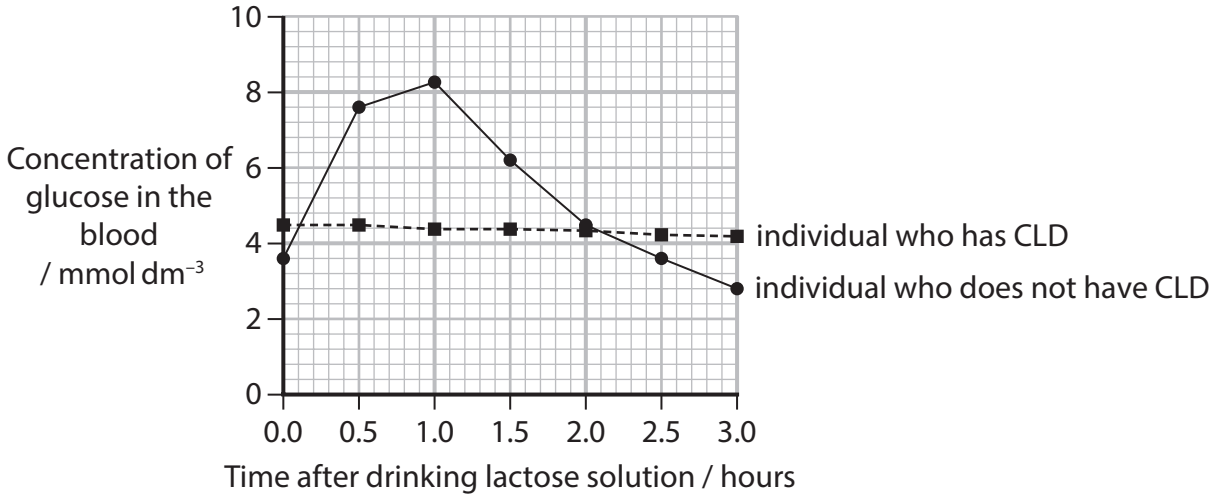
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(d) A blood test can be used as part of a diagnosis for CLD.

In this test, an individual is given a lactose solution to drink.

Blood is removed at intervals and tested for the presence of glucose.

The graph shows the results of this test for an individual who has CLD and an individual who does not have CLD.



Explain the concentration of glucose in the blood for each of these individuals.

(3)

(Total for Question 8 = 15 marks)

TOTAL FOR PAPER = 80 MARKS

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