

Pearson Edexcel International Advanced Level

Tuesday 5 May 2026

Afternoon (Time: 1 hour 30 minutes)

Paper

reference

WBI11/01A

Biology

International Advanced Subsidiary/Advanced Level

UNIT 1: Molecules, Diet, Transport and Health

Question Paper

You must have: Answer Book (sent separately)

Scientific calculator, ruler, HB pencil

Do not return this question paper with the answer book.

Turn over ►

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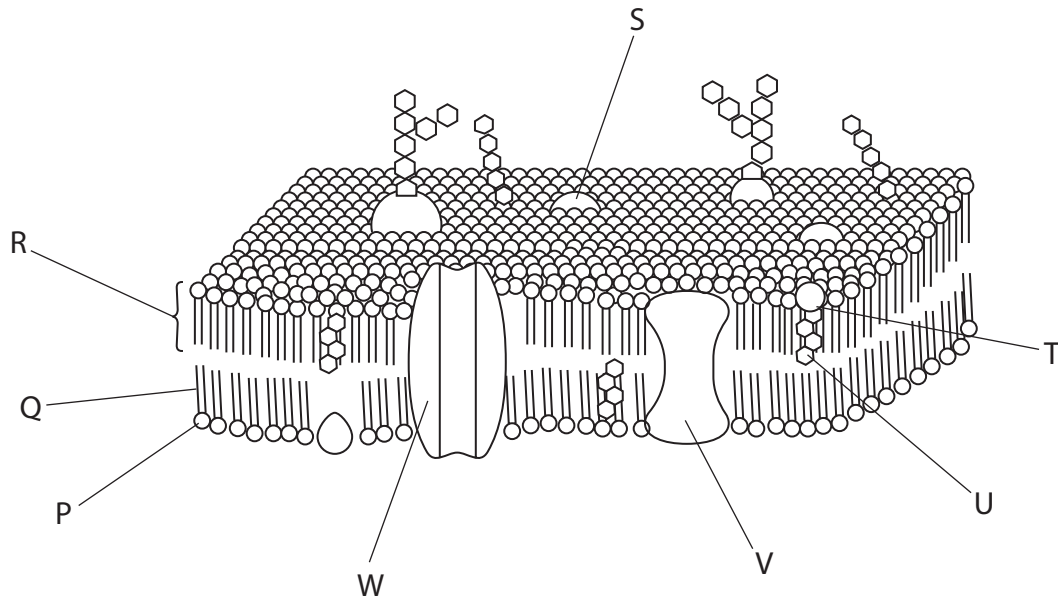

Pearson

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** The diagram shows some structures in part of a cell membrane.



- 1 (a) (i)** Which one of these pairs of structures is made of protein?

(1)

- A** P and V
- B** P and Q
- C** Q and W
- D** V and W

- 1 (a) (ii)** Which one of these pairs of structures is nonpolar (hydrophobic)?

(1)

- A** P and Q
- B** Q and U
- C** R and T
- D** U and W

1 (a) (iii) Which structure requires ATP to function?

(1)

A R

B T

C U

D V

1 (b) Explain how the properties of the cell membrane enable a cell to release extracellular enzymes by **exocytosis**.

(2)

(Total for Question 1 = 5 marks)

2 The process of protein synthesis occurs in two stages and involves:

- messenger RNA (mRNA)
- transfer RNA (tRNA)
- enzymes.

2 (a) Name the first stage that produces mRNA using DNA as a template and the second stage that involves tRNA.

(1)

2 (b) The diagram shows the sequence of bases on part of a DNA strand.

2 (b) (i) Complete the diagram to show the sequence of bases on the mRNA strand synthesised in the first stage of protein synthesis.

(1)

DNA strand

G	A	G	C	A	A	T	T	G
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mRNA

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2 (b) (ii) Describe the role of enzymes in the synthesis of mRNA using a **DNA molecule**.

(2)

2 (c) The second stage of protein synthesis involves mRNA and tRNA.

2 (c) (i) The table shows some information about the structures present in mRNA and tRNA.

Put one cross [×] in the appropriate box in each row, in the answer book, to show whether the structure is present in these molecules.

(2)

Structure	Present in molecules of			
	A mRNA only	B tRNA only	C both mRNA and tRNA	D neither mRNA nor tRNA
single polynucleotide				
phosphodiester bonds				

2 (c) (ii) Describe the role of tRNA in the second stage of protein synthesis.

(2)

(Total for Question 2 = 8 marks)

- 3 The photographs show two species of fish, a piranha and a clown fish.



(Source: © Nic Cleave Photography/
Shutterstock)

Piranha



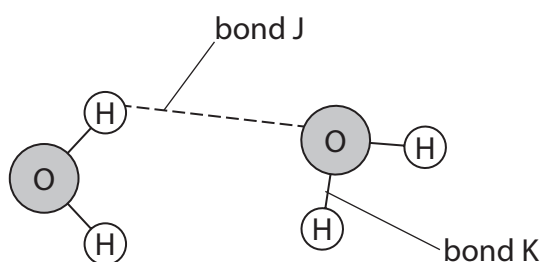
(Source: © WaterFrame/Alamy)

Clown fish

Piranha live in freshwater and clown fish live in salt water.

Both species of fish use oxygen dissolved in water.

- 3 (a) The diagram shows two water molecules.



- 3 (a) (i) Which row of the table shows the names of these two bonds?

(1)

	Bond J	Bond K
A	covalent	ester
B	covalent	hydrogen
C	hydrogen	covalent
D	hydrogen	ester

- 3 (a) (ii) Bond lengths are sometimes measured in Angstrom units ($\text{\AA}$).

$$1 \times 10^7 \text{\AA} = 1 \text{ millimetre (mm)}$$

$$1 \text{ mm} = 1 \times 10^6 \text{ nanometres (nm)}$$

The length of bond K is $0.958 \text{\AA}$.

Calculate the length of bond K in nm.

(1)

- 3 (b) Salt water is formed when sodium chloride (salt) dissolves in water.

- 3 (b) (i) Which row of the table describes the salt and the water?

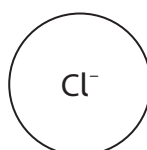
(1)

	Salt	Water
A	solute	solution
B	solute	solvent
C	solvent	solution
D	solvent	solute

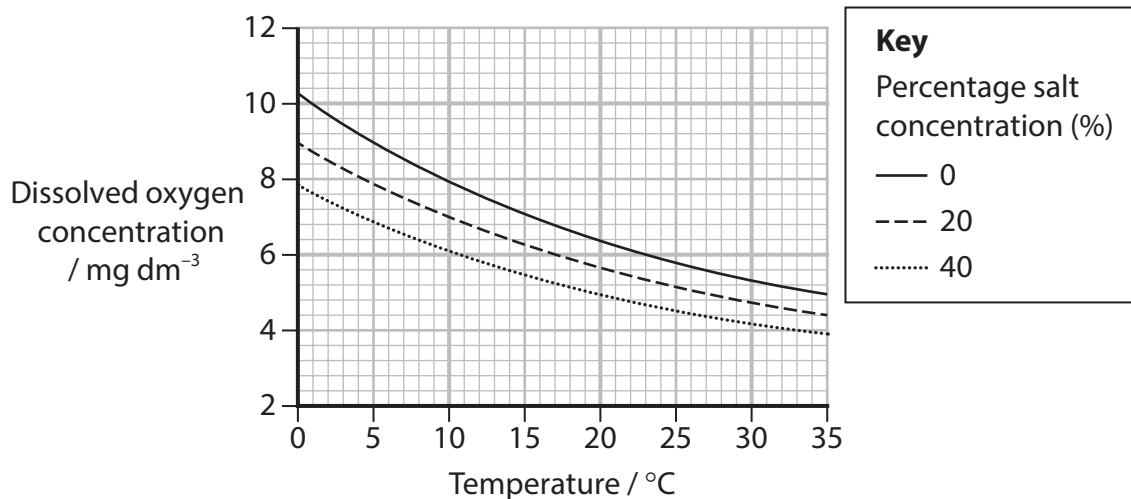
- 3 (b) (ii) The diagram shows a chloride ion (Cl^-).

Complete the diagram in the answer book to show how **one** water molecule would bond to this chloride ion.

(1)



- 3 (c) The graph shows the effects of temperature and salt concentration on the dissolved oxygen concentration in water.



- 3 (c) (i) Describe **two** conclusions about the effects of temperature and percentage salt concentration on the dissolved oxygen concentration. (2)

- 3 (c) (ii) Gills are the gas exchange surfaces of fish.

Fish obtain oxygen that is dissolved in the water flowing over their gills.

Explain why an increase in temperature can cause fish to die.

Use the information in the graph and your knowledge of gas exchange surfaces to support your answer.

(3)

(Total for Question 3 = 9 marks)

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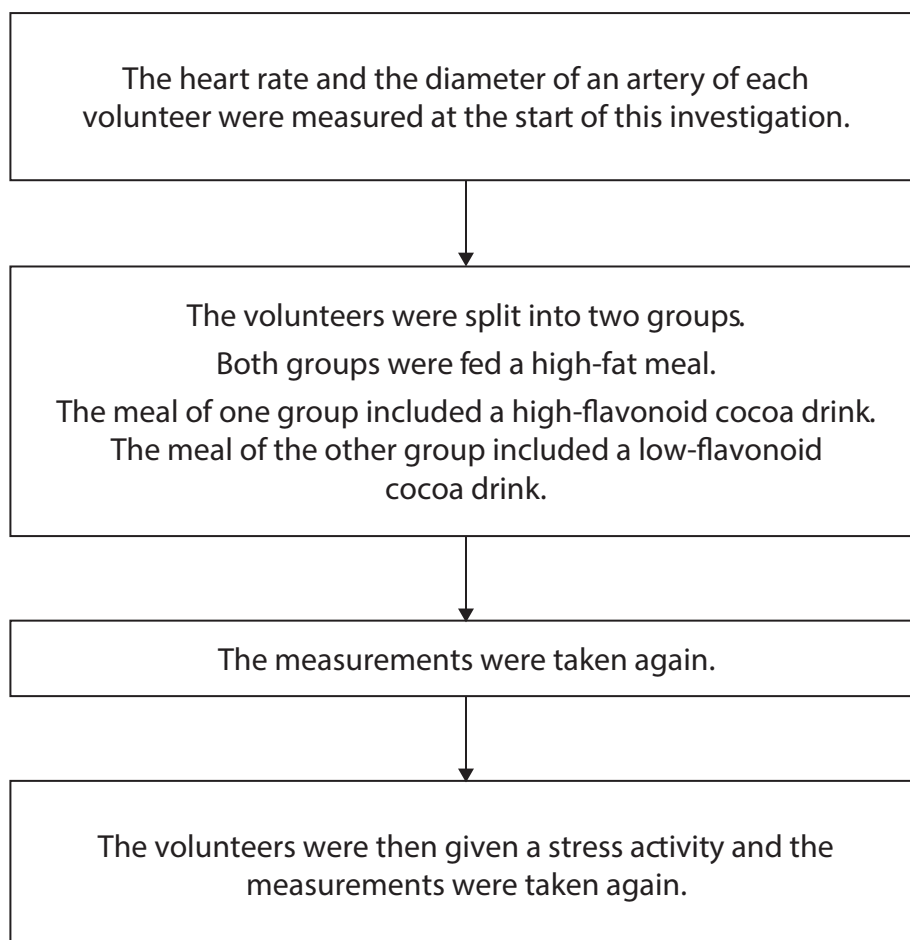
- 4 Stress can result in a person eating unhealthy food that can result in an increased risk of cardiovascular disease (CVD).

Flavonoids are molecules found in cocoa drinks.

The effect of cocoa drinks on reducing the effect of stress on heart rate was investigated.

The effect of cocoa drinks on endothelial function after eating an unhealthy, high-fat meal was also investigated.

The flowchart outlines the method used in this investigation.



- 4 (a) The high-flavonoid cocoa drink contained 695.00 mg of flavonoids, and the low-flavonoid cocoa drink contained 5.60 mg.

Calculate the percentage difference in the mass of flavonoids between these two drinks.

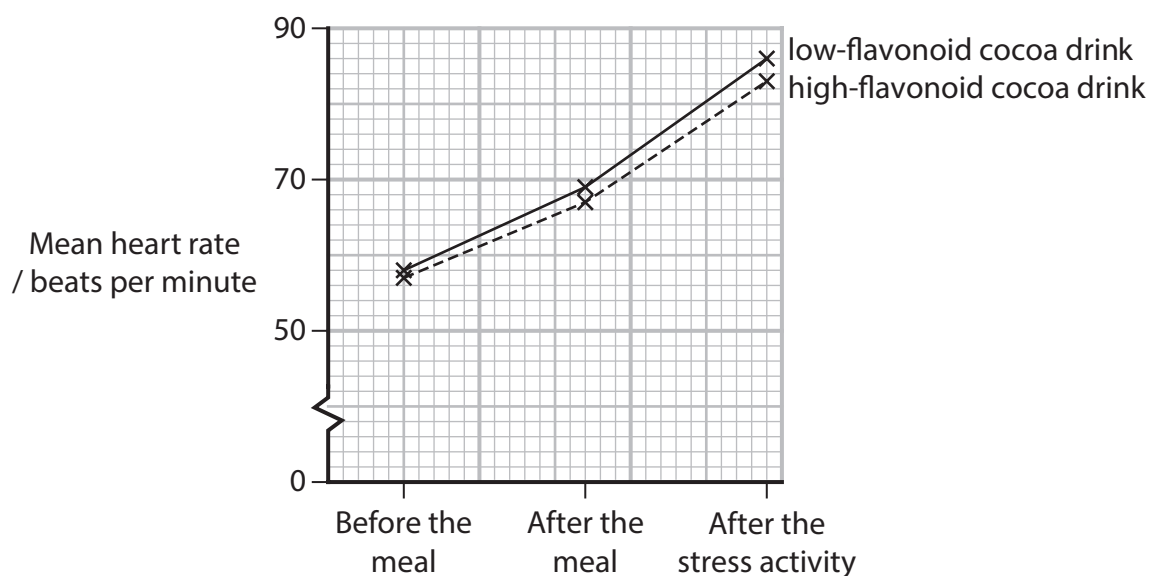
Use the formula:

$$\text{percentage difference} = \frac{\text{difference between the two values}}{\text{mean of the two values}} \times 100$$

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

(2)

- 4 (b) The graph shows the mean heart rate during this investigation.



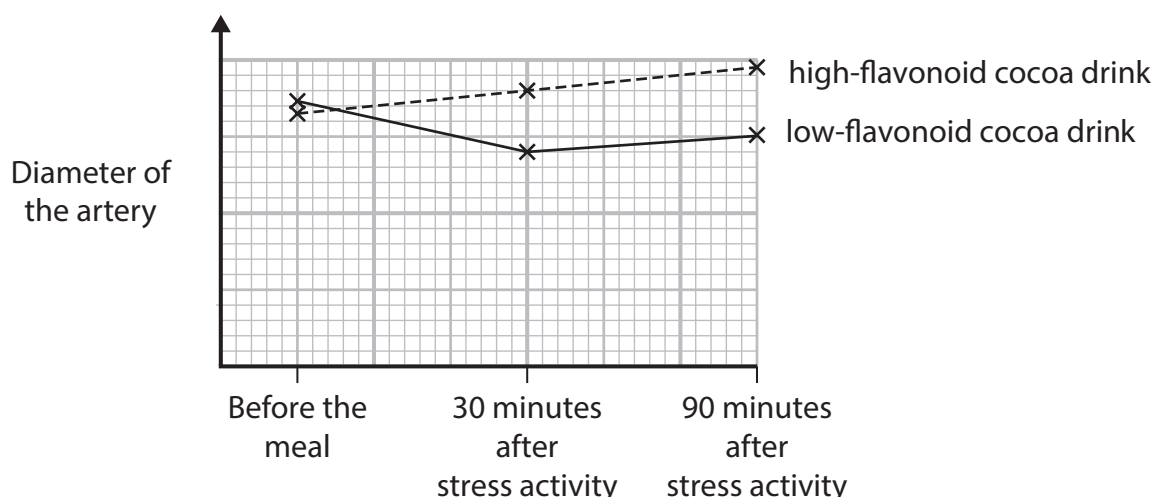
Describe **three** conclusions that can be made from the data shown in the graph.

(3)

- 4 (c) If the endothelial lining is damaged, the response to an increase in blood flow is reduced.

The graph shows the changes in the diameter of the artery during this investigation.

A **decrease** in the diameter of the artery indicates endothelial dysfunction.



Explain why including a high-flavonoid drink with a meal could help to reduce the risk of CVD due to stress and unhealthy meal choices.

Use the information in the graph and your own knowledge to support your answer.

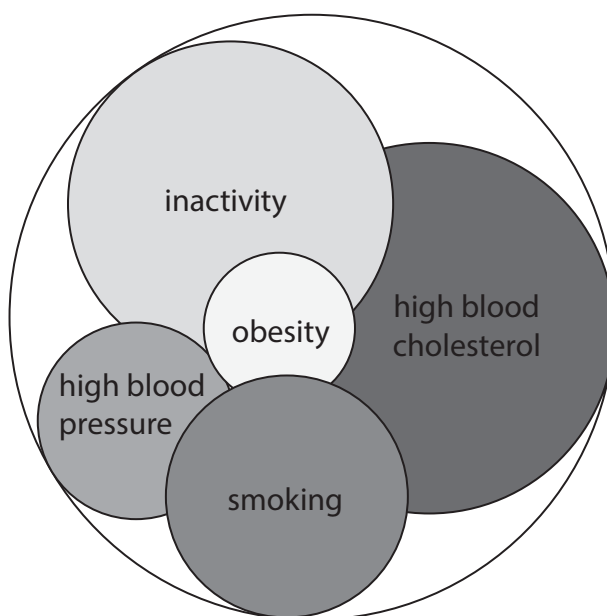
(4)

(Total for Question 4 = 9 marks)

- 5 The risk of developing coronary heart disease (CHD) is influenced by several factors.
- 5 (a) The diagram represents the contribution of five risk factors to the development of CHD.

The large circle represents **all** cases of CHD and has an area of $1600\pi \text{ mm}^2$.

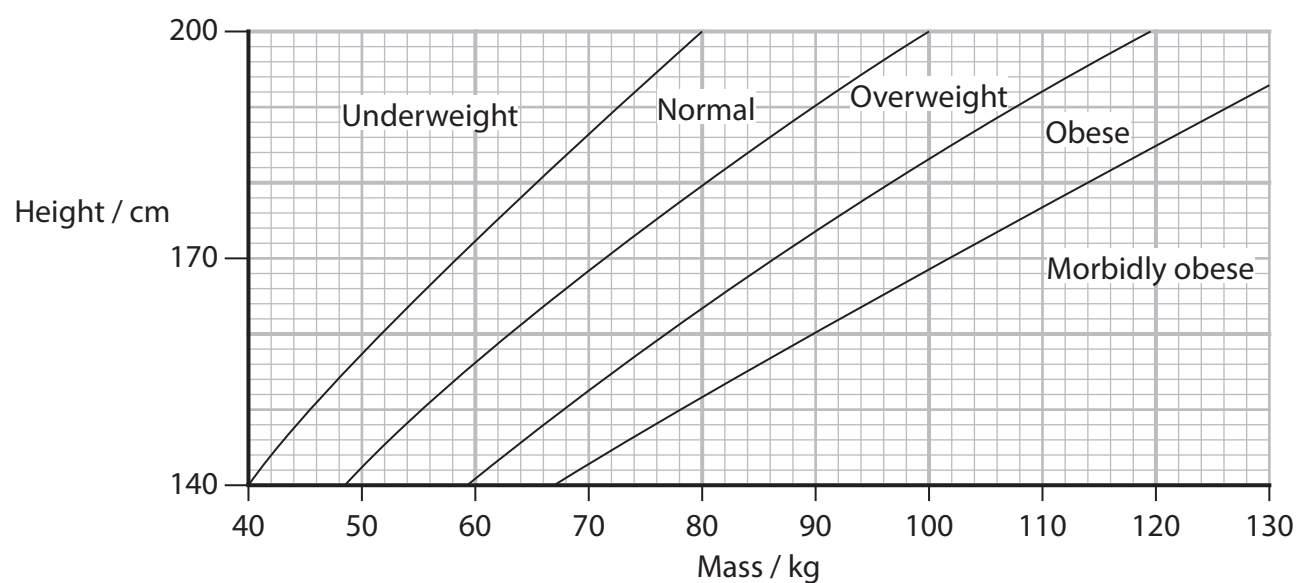
The area of each shaded circle is proportional to the number of cases resulting from each risk factor.



- 5 (a) (i) The diameter of the circle representing obesity is 20 mm.
Calculate the percentage of all cases of CHD resulting from obesity. (2)
- 5 (a) (ii) The area of CHD resulting from smoking is $256\pi \text{ mm}^2$
Calculate how many times more cases result from smoking than from obesity. (1)
- 5 (a) (iii) Explain how smoking increases the risk of developing CHD. (4)

5 (b) Body mass index (BMI) is an obesity indicator.

The chart can be used to work out an individual's BMI category.



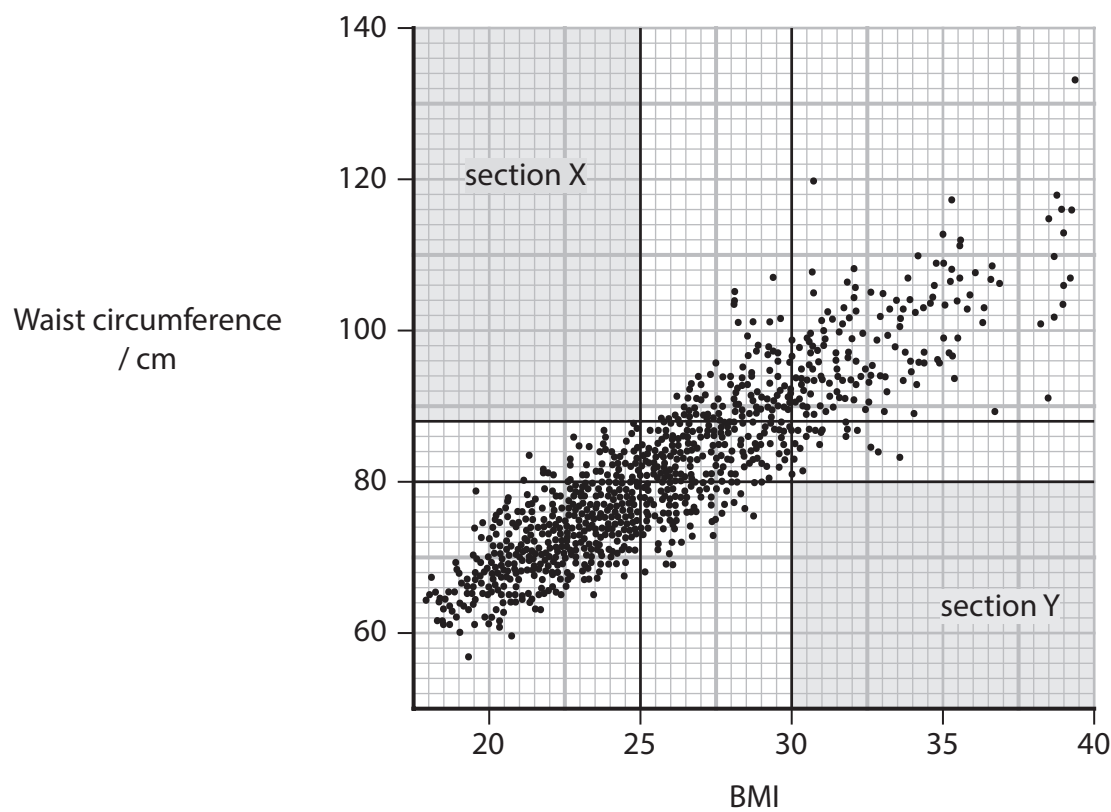
State the BMI category of an individual who has a mass of 73 kg and a height of 164 cm.

(1)

- 5 (c) Waist circumference is also an obesity indicator.

The graph shows the relationship between BMI and waist circumference.

Each black dot represents an individual.



- 5 (c) (i) State the relationship between BMI and waist circumference. (1)
- 5 (c) (ii) An individual with a BMI of ≥ 25 and < 30 is considered overweight.
Give the waist circumference of the individual who is overweight and has the least risk of CHD. (1)
- 5 (c) (iii) Suggest **one** reason why there are no black dots in the shaded parts of the graph labelled section X and section Y. (1)
- 5 (c) (iv) Explain why using waist circumference together with BMI gives a more accurate indication of the risk of developing CHD than using BMI only. (2)

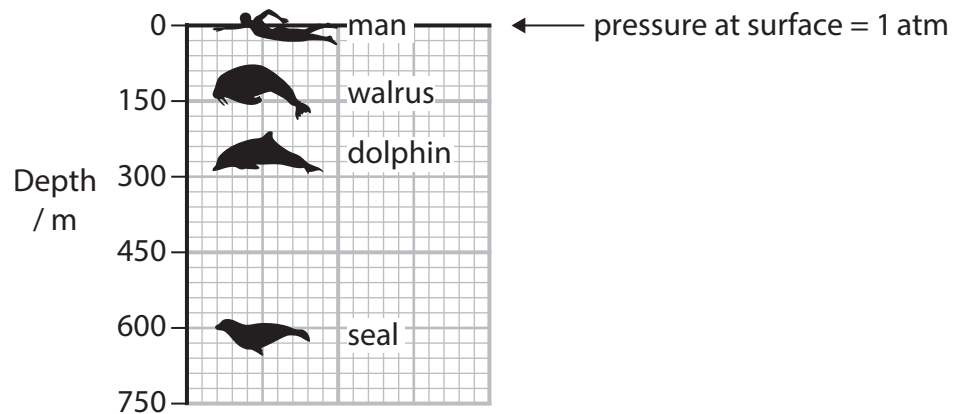
(Total for Question 5 = 13 marks)

6 Some animals that live in the water are adapted for diving.

6 (a) The pressure at the water surface is one atmosphere of pressure (atm).

For each 10 m an animal dives, the pressure on it increases by 1 atm of pressure.

The diagram shows the depths that three animals can dive to.



How many times greater is the pressure exerted on the walrus when it dives to 100 m than when it dives to 70 metres?

(1)

- A 1.25 times more
- B 1.38 times more
- C 1.43 times more
- D 1.57 times more

6 (b) Animals that dive need to store more oxygen than animals that do not dive.

Oxygen can be stored in muscle, in the blood and in the respiratory system.

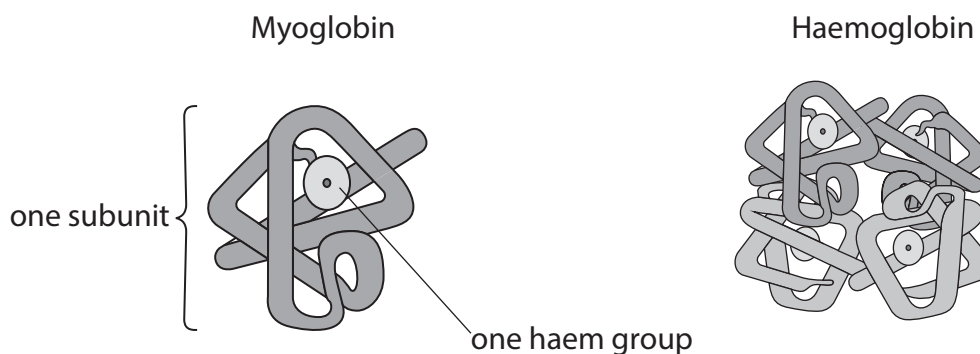
A dolphin stores 40% of its oxygen in muscle, 33% in blood and 27% in its respiratory system.

6 (b) (i) Calculate the ratio of oxygen stored in muscle : blood : respiratory system.

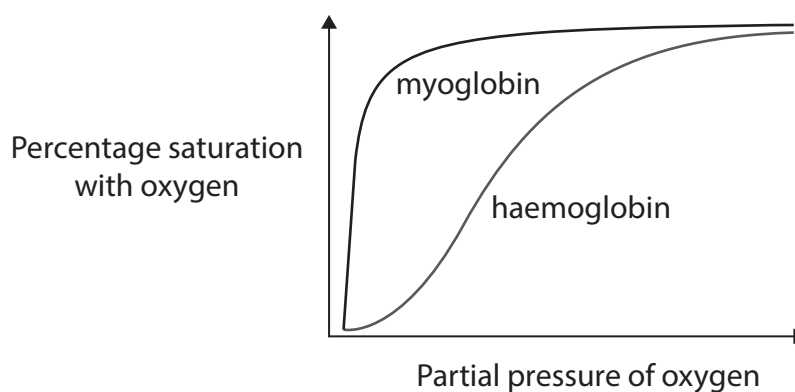
(1)

6 (b) (ii) Muscle stores oxygen attached to a molecule called myoglobin.

The diagrams show a molecule of myoglobin and a molecule of haemoglobin.



The graph shows the oxygen dissociation curves for myoglobin and haemoglobin.



Explain why the shapes of these oxygen dissociation curves are different.

Use the information in the diagrams and your own knowledge to support your answer.

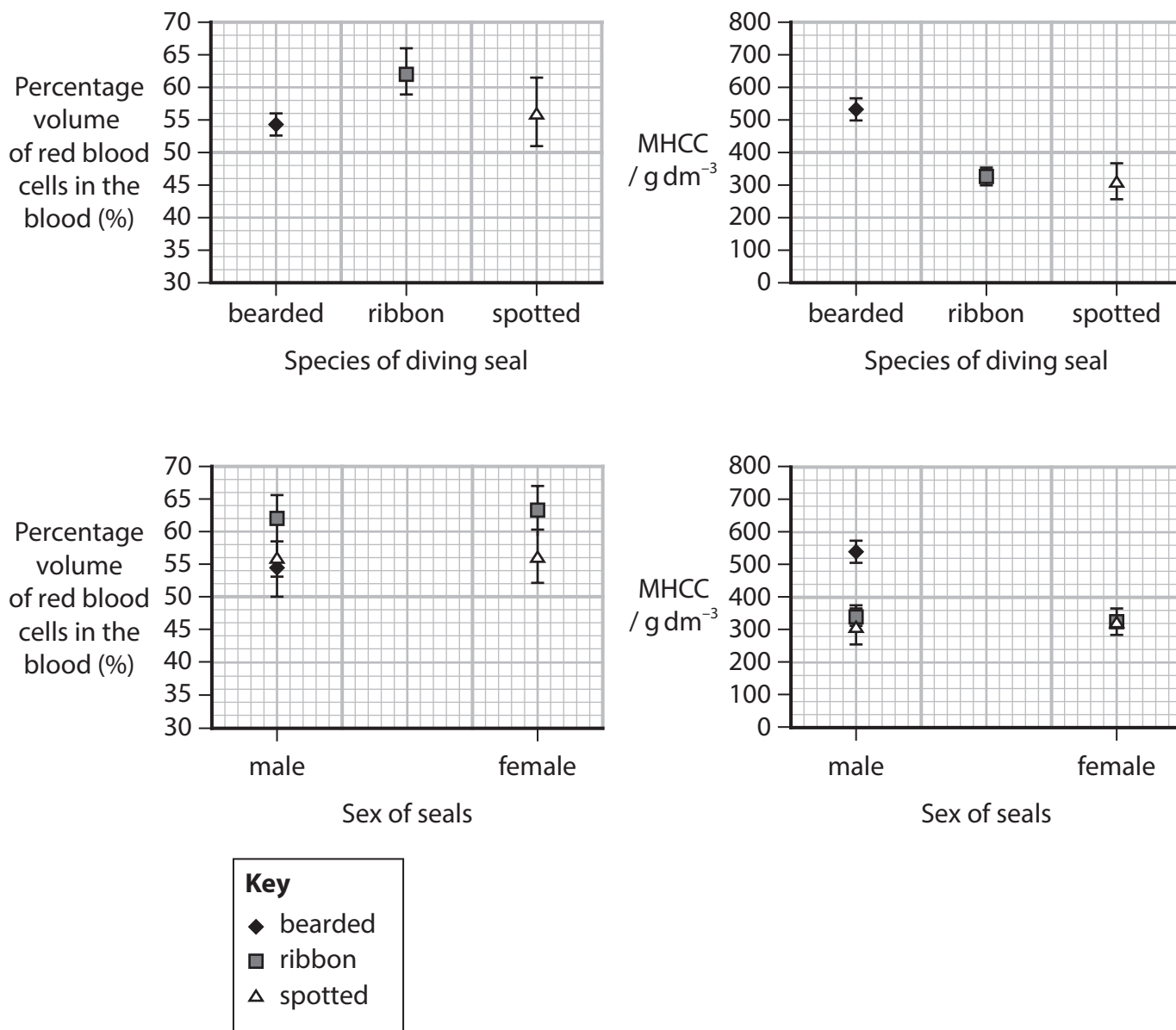
(3)

- *6 (c) Scientists studied the blood of three species of diving seal found in the Arctic Ocean.

The scientists took blood samples from 3 bearded seals, 31 ribbon seals and 29 spotted seals.

They determined the percentage volume of red blood cells in the blood and the mean haemoglobin concentration per red blood cell (MHCC).

The graphs show some of the results of this study.



In a human, the percentage volume of red blood cells ranges from 40% to 45% and the MHCC ranges from 320 g dm⁻³ to 360 g dm⁻³.

Explain the differences in the data for humans and these diving seals and comment on the extent to which valid conclusions can be drawn from this data.

(6)

(Total for Question 6 = 11 marks)

- 7 (a) The diagram shows a DNA molecule twisted into a double helix.

Each DNA molecule is made of two DNA strands.

Each strand is made from mononucleotides.



- 7 (a) (i) Name the three types of component that make up a **DNA** mononucleotide.

(2)

- 7 (a) (ii) Bonds hold the components of mononucleotides together and other bonds hold the mononucleotides together to form a double helix.

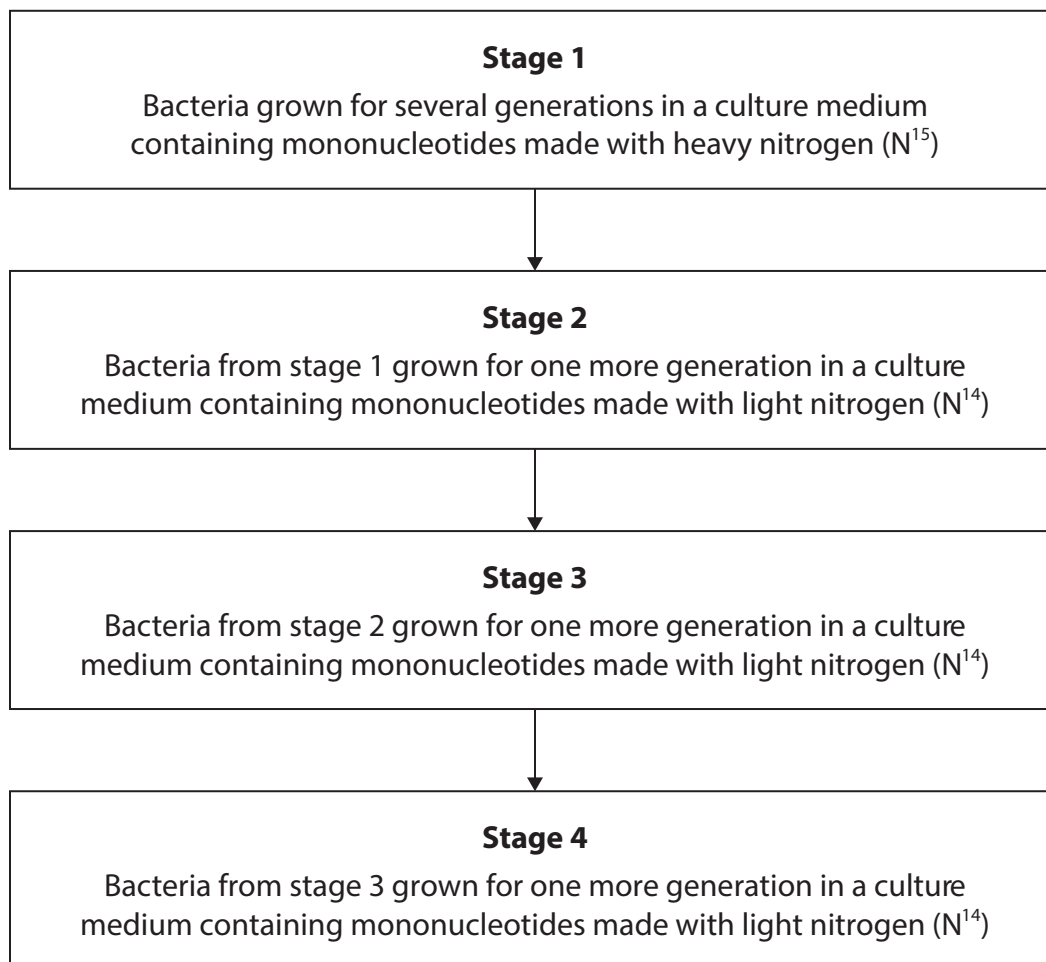
Describe the role of the different types of bonds in a DNA double helix.

(4)

- 7 (b) Meselson and Stahl provided data that supported the theory of the semi-conservative replication of DNA.

Meselson and Stahl used mononucleotides made with either heavy nitrogen (N^{15}) or light nitrogen (N^{14}) in their experiments.

The flowchart summarises part of one of their experiments.



After each stage, a sample of the culture was taken. Each sample was the same volume.

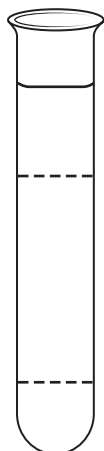
The DNA was removed from the bacteria and the DNA molecules separated on a density gradient in a tube.

Complete the diagram in the answer book to show:

- the change in location of the bands of DNA molecules in each sample for stages 2, 3 and 4
- the proportion of each type of DNA molecule at each location.

(6)

Location of band of DNA molecules made from only N¹⁵

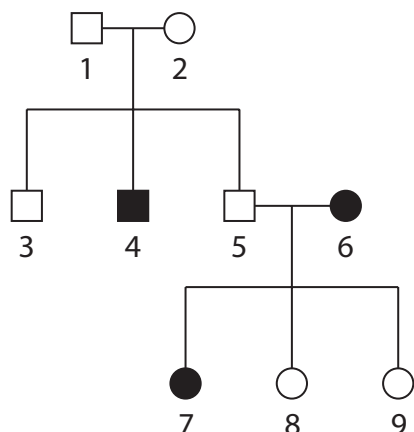
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(Total for Question 7 = 12 marks)

8 Phenylketonuria (PKU) is a genetic disorder.

8 (a) An individual with this disorder has a homozygous recessive genotype.

The pedigree diagram shows some individuals, numbered 1 to 9, in one family.



Key

- female without PKU
- female with PKU
- male without PKU
- male with PKU

8 (a) (i) Explain why individuals 1 and 2 are heterozygous for PKU.

(2)

8 (a) (ii) Determine the probability that the next child of individuals 5 and 6 will have PKU.

The genotype of individual 5 is Pp and the genotype of individual 6 is pp.

Use a genetic diagram to support your answer.

(2)

- 8 (b) Phenylalanine is an amino acid found in some foods.

When phenylalanine is consumed, it can be broken down into another amino acid called tyrosine.

Enzyme P catalyses this reaction.

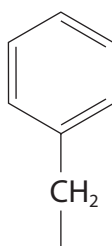
Individuals with PKU have a mutation in the gene coding for enzyme P.

Phenylalanine builds up, causing this disorder, and can also lead to a deficiency of tyrosine in the body.

- 8 (b) (i) Draw a diagram in the answer book to show the structure of the amino acid phenylalanine.

The R group for phenylalanine is:

(3)



- 8 (b) (ii) Explain how a mutation in the gene coding for enzyme P could result in a build up of phenylalanine in the body.

(4)

- 8 (b)(iii) Suggest **two** reasons why controlling diet can help an individual with PKU.

(2)

(Total for Question 8 = 13 marks)

TOTAL FOR PAPER = 80 MARKS



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 **WBI11/01A**

Biology

International Advanced Subsidiary/Advanced Level

UNIT 1: Molecules, Diet, Transport and Health

Answer Book

You must have:

Question paper (sent separately)

Scientific calculator, ruler, HB pencil

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **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 the question 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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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) (i)

(1)

☐ A

☐ B

☐ C

☐ D

1 (a) (ii)

(1)

☐ A

☐ B

☐ C

☐ D

1 (a) (iii)

(1)

☐ A

☐ B

☐ C

☐ D



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(2)

(Total for Question 1 = 5 marks)



2 (a)

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2 (b) (i)

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2 (b) (ii)

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2 (c) (i)

(2)

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2 (c) (ii)

(2)

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3 (a) (i)

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☐ A

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☐ C

☐ D

3 (a) (ii)

(1)

Answer



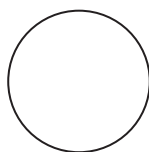
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(1)

- ☐ A
- ☐ B
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3 (b) (ii)

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3 (c) (i)

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3 (c) (ii)

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(Total for Question 3 = 9 marks)



4 (a)

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Answer

4 (b)

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4 (c)

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(Total for Question 4 = 9 marks)



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5 (a) (i)

(2)

Answer

5 (a) (ii)

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Answer



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5 (a) (iii)

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5 (b)

(1)

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5 (c) (i)

(1)

5 (c) (ii)

(1)

5 (c) (iii)

(1)

5 (c) (iv)

(2)

(Total for Question 5 = 13 marks)



6 (a)

(1)

- ☐ A
- ☐ B
- ☐ C
- ☐ D

6 (b) (i)

(1)

Answer : 1.0

6 (b) (ii)

(3)

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*6 (c)

(6)

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(Total for Question 6 = 11 marks)



7 (a) (i)

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7 (a) (ii)

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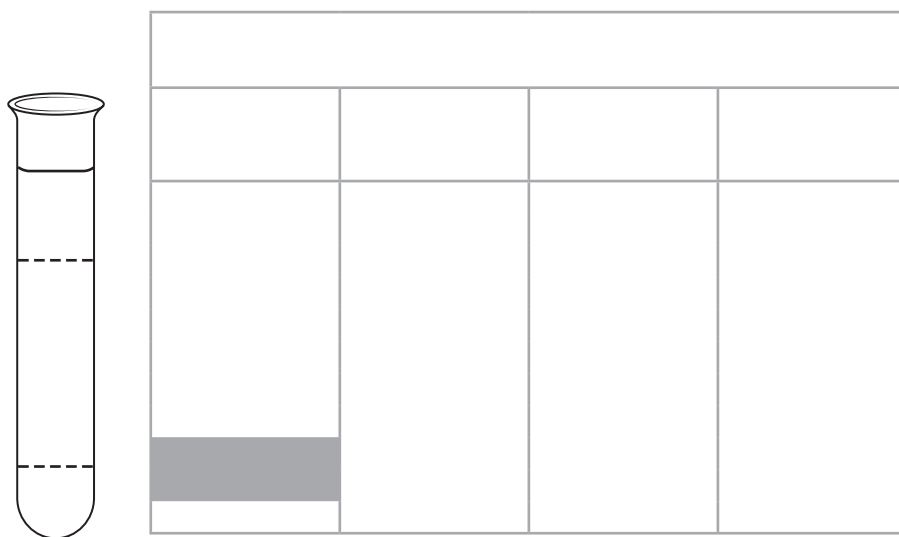
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7 (b)

(6)



(Total for Question 7 = 12 marks)



Question 8**8** (a) (i)

(2)

8 (a) (ii)

(2)

Answer

8 (b) (i)

(3)



8 (b) (ii)

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8 (b)(iii)

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(Total for Question 8 = 13 marks)

TOTAL FOR PAPER = 80 MARKS



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