Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel Level 3 GCE

Centre Number | Candidate Number

Time 1 hour 30 minutes

Paper reference **8BN0/01**

Biology A (Salters Nuffield)

Advanced Subsidiary

PAPER 1: Lifestyle, Transport, Genes and Health

You must have:
Calculator, HB pencil, ruler

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.
- Show your working in any calculation questions and include units in your answer where appropriate.
- Answer the questions in the spaces provided – *there may be more space than you need.*

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.*
- You may use a scientific calculator.
- In questions marked with an **asterisk** (*), marks will be awarded for your ability to structure your answer logically, showing how the points that 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.
- Good luck with your examination.

Turn over

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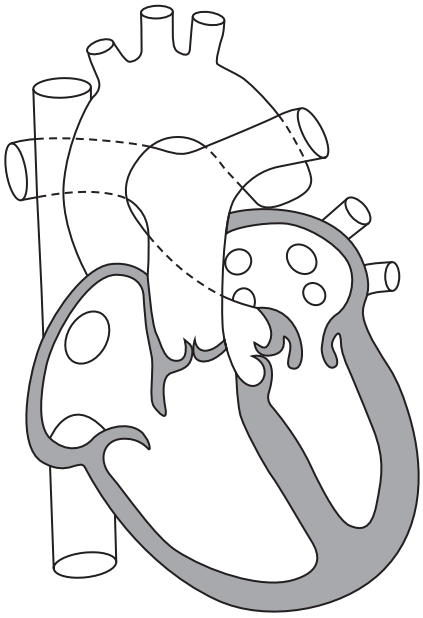
Answer ALL questions.

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 The diagram shows the internal structure of a human heart.



(a) (i) Draw arrows to show the route blood would take as it returns from the body, enters the heart and is then pumped to the lungs.

(2)

(ii) State which stage of the cardiac cycle is shown in the diagram.

(1)

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(b) Name the valves in this heart.

(2)

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(Total for Question 1 = 5 marks)

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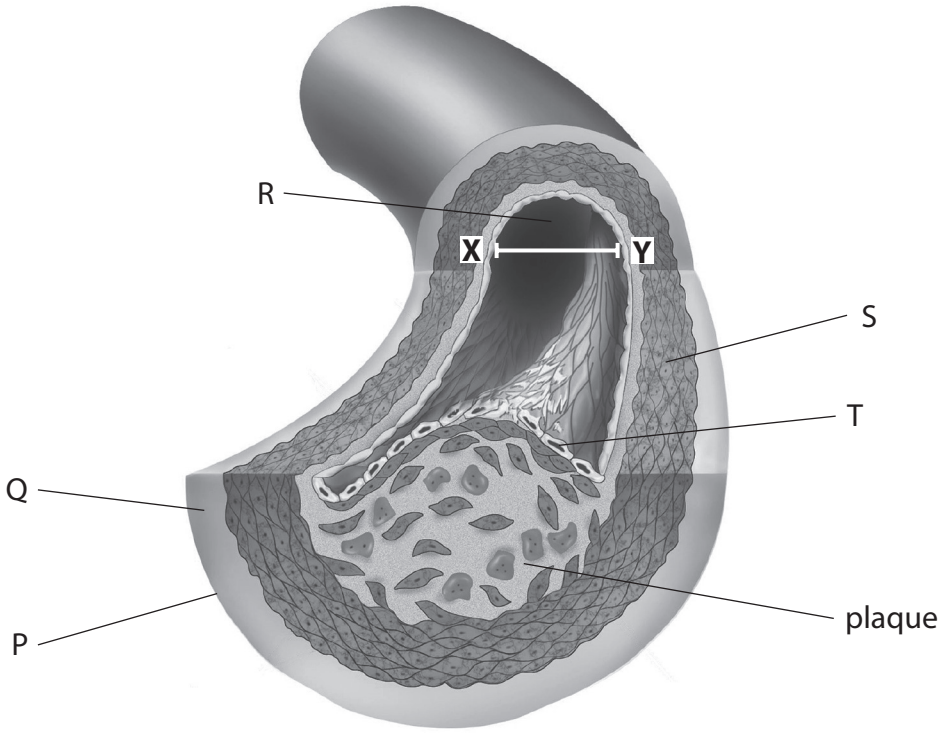
2 The diagram shows a blood vessel of a person with cardiovascular disease (CVD).



© Universal Images Group North America LLC/Alamy Stock Photo

(a) (i) Name the type of blood vessel shown in this diagram.

(1)

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(ii) Which labelled part of the blood vessel contains tissue that can contract to maintain blood pressure?

(1)

☒ **A** P

☒ **B** Q

☒ **C** S

☒ **D** T

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(iii) Which labelled parts of the blood vessel contain collagen?

(1)

☒ **A** Q

☒ **B** Q and T

☒ **C** Q, S and T

☒ **D** Q, R, S and T

(iv) Which of the following shows the cross-sectional area of the lumen of the blood vessel in the diagram?

Use the line XY to help you.

(1)

☒ **A** 2.01 cm^2

☒ **B** 2.51 cm^2

☒ **C** 5.03 cm^2

☒ **D** 8.04 cm^2

(b) Diet is one factor that affects the development of CVD.

Explain how the diet of a person could affect the development of CVD.

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(Total for Question 2 = 8 marks)

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3 Monosaccharides join to form disaccharides and polysaccharides.

(a) (i) State the type of reaction where two monosaccharides join to form a disaccharide molecule.

(1)

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(ii) Which of the following bonds joins two monosaccharides to form a disaccharide molecule?

(1)

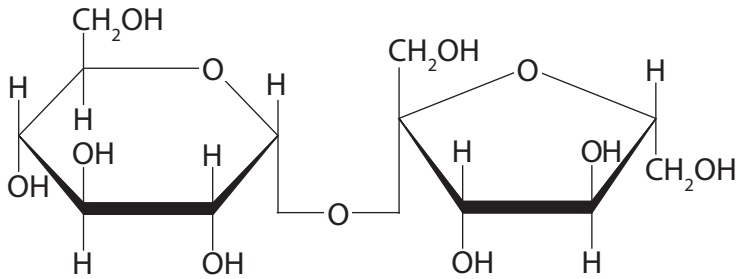
☒ **A** ester

☒ **B** glycosidic

☒ **C** hydrogen

☒ **D** peptide

(b) The diagram shows a molecule of sucrose.



(i) Draw the two monosaccharides that are produced when a molecule of sucrose is broken down.

(2)

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(ii) Name the two monosaccharides that are produced when sucrose is broken down.

(1)

1 .....

2 .....

(c) Compare and contrast the structure of a disaccharide with glycogen.

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(Total for Question 3 = 9 marks)

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4 Scientists studied how perception of risk differs from the actual risk.

People were asked to estimate their risk of developing cardiovascular disease (CVD) during their lifetime.

This gave their perceived risk.

The scientists used information gathered from questionnaires and various tests to calculate a predicted actual risk of developing CVD, for each person.

The table shows how the perceived risk given by each person was compared with the predicted actual risk calculated by the scientists.

Underestimation of lifetime risk for CVD	Correct estimation of lifetime risk for CVD	Overestimation of lifetime risk for CVD
Perceived risk < predicted actual risk	Perceived risk = predicted actual risk	Perceived risk > predicted actual risk

It was found that some people's perception of their lifetime risk of developing CVD was different from the predicted actual risk calculated by the scientists.

(a) Explain why the perception of the lifetime risk of developing CVD of some people was different from the predicted actual risk.

(4)

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(b) Explain how blood tests and obesity indicators can be used to collect data to predict the risk of developing CVD.

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(Total for Question 4 = 8 marks)

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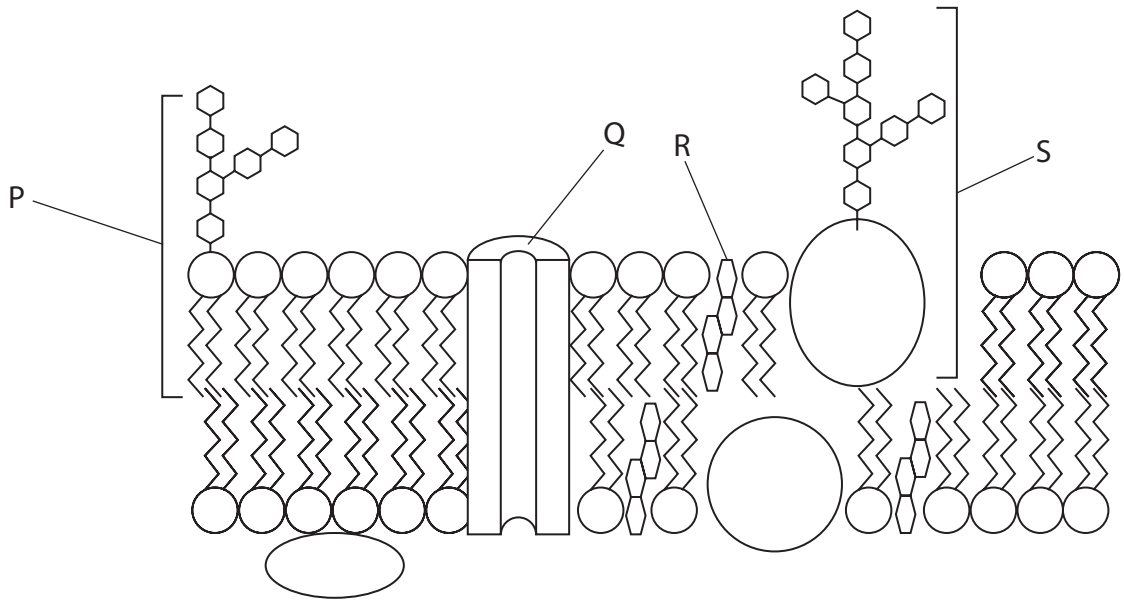
5 Blood type is an example of inherited variation.

Blood types A, B, AB and O are determined by a single gene.

Blood types are due to the presence or absence of antigens on the cell surface membranes of red blood cells.

These antigens are glycoproteins.

(a) The diagram shows the structure of a cell surface membrane.



(i) Which of these labels identifies a glycoprotein?

(1)

☒ **A** P

☒ **B** Q

☒ **C** R

☒ **D** S

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(ii) The alleles that produce blood type antigens A and B are codominant.

A person with the genotype $I^A I^B$ has blood type AB.

The allele producing blood type O is recessive.

A couple have been told that the probability of having a child with blood type AB is 0.25 and the probability of blood type O is 0.25.

Deduce the genotypes and phenotypes of the parents in the table, by using a genetic diagram.

(3)

Parent	Genotype	Phenotype
1		
2		

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(b) The production of the blood type antigens involves molecules of mRNA and tRNA.

(i) Which row in the table describes the structure of tRNA?

(1)

	Bases	Number of strands	Type of sugar
☒ **A**	A, C, G, U	1	deoxyribose
☒ **B**	A, C, G, U	1	ribose
☒ **C**	A, C, G, T	2	deoxyribose
☒ **D**	A, C, G, T	2	ribose

(ii) Mononucleotides all contain a base and a sugar as part of their structure.

Name the other component of all mononucleotides.

(1)

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(iii) The mononucleotides of mRNA are joined together by RNA polymerase.

Which part of the eukaryotic cell is the location for this process?

(1)

☒ **A** cytoplasm

☒ **B** mitochondrion

☒ **C** nucleus

☒ **D** rough endoplasmic reticulum

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(iv) Describe the role of the tRNA in the production of the protein part of a glycoprotein.

(2)

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(c) Antigens on the cell membranes of microbes can stimulate endocytosis and exocytosis in white blood cells.

These processes are involved in transport through a cell surface membrane.

Give two differences between endocytosis and exocytosis.

(2)

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(Total for Question 5 = 11 marks)

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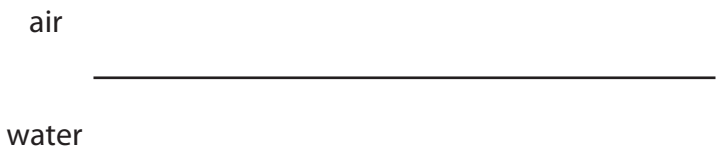
6 The fluid mosaic model of cell membranes was first proposed in 1972.

One piece of evidence that was used to support the idea of a phospholipid bilayer was the arrangement of phospholipid molecules on a surface between air and water.

(a) (i) Complete the diagram to show the arrangement of four phospholipid molecules at this surface.

(2)



(ii) Which of the molecules found in cell membranes have hydrophilic regions?

(1)

☒ **A** channel proteins only

☒ **B** only phospholipids and channel proteins

☒ **C** phospholipids, channel proteins and cholesterol

☒ **D** phospholipids only

(b) The vacuoles in beetroot cells contain molecules of betalain, a red pigment. Betalains are large polar molecules.
These molecules can leave beetroot cells if the vacuole membrane and the cell surface membrane are damaged.
Explain why betalain molecules cannot move through intact cell membranes.

(3)

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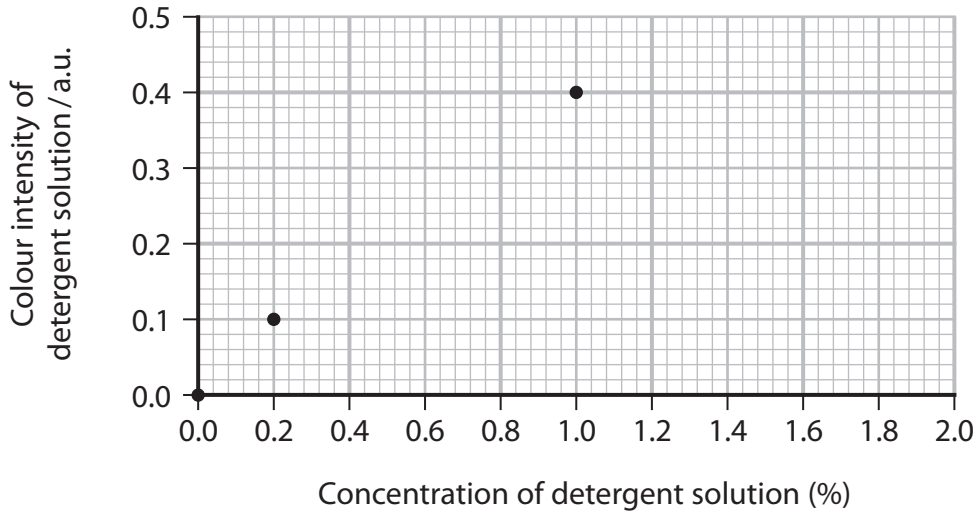
(c) Some chemicals affect the permeability of cell membranes.

The effect of detergent on the permeability of beetroot cell membranes was investigated.

Sections of beetroot were placed in test tubes containing detergent solution.

The colour of the detergent solution at the end of the investigation was measured.

The graph shows the results of this investigation.

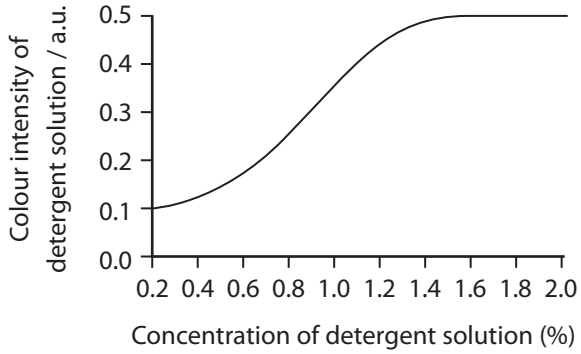


(i) The colour of the 0.5% detergent solution was 0.25 a.u.

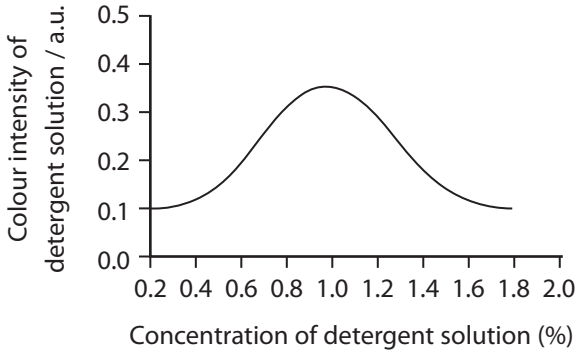
Plot this result on the graph.

(1)

*(ii) Two students made predictions about the effect of increasing the concentration of detergent.
The sketch graphs show the results they expected.



Graph A



Graph B

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Explain how to carry out an investigation to test these predictions.

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(Total for Question 6 = 13 marks)

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7 Starch changes the colour of iodine solution from yellow-brown to blue-black.

The enzyme amylase hydrolyses starch.

The initial rate of reaction of starch hydrolysis was investigated.

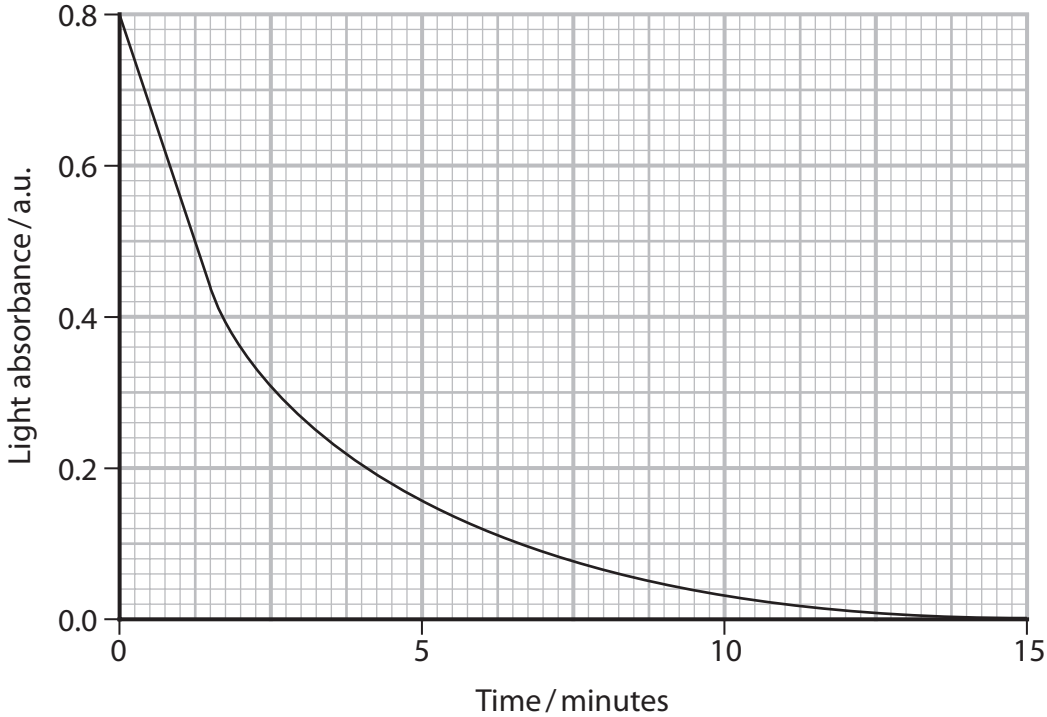
A test tube contained 25 cm^3 of starch suspension to which 1 cm^3 of 1% amylase solution was added.

A sample was immediately taken from this test tube and added to iodine solution.

The light absorbance of this mixture was measured.

This was repeated every 30 seconds during the investigation.

The results are shown in the graph.



(a) (i) Name a piece of apparatus that would be used to measure the light absorbance of this mixture.

(1)

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(ii) Calculate the initial rate of reaction for this experiment.

(3)

Answer.....

(iii) Draw a line on the graph to show the expected trend if a 5% amylase solution was used instead.

(1)

(b) Explain why the light absorbance of the mixture changed over time.

(3)

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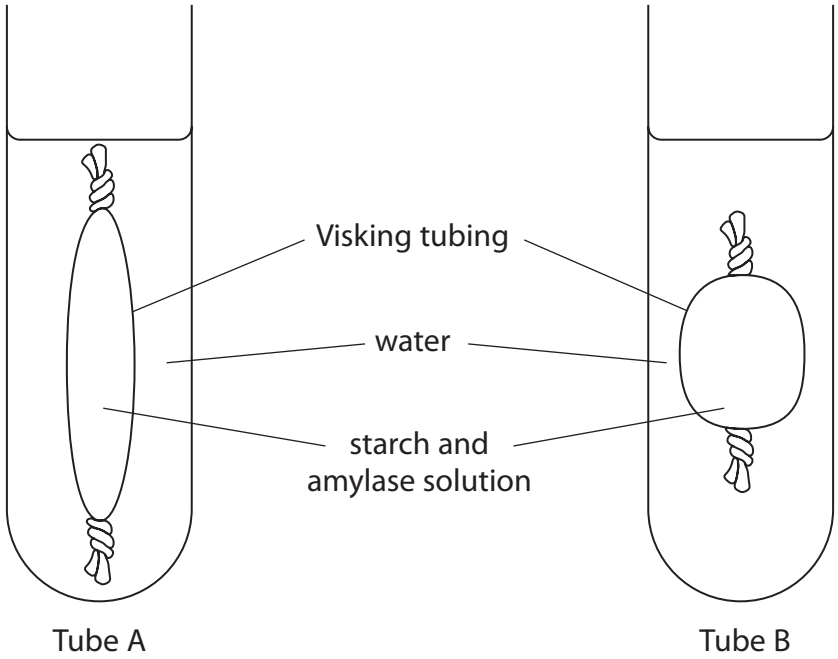
(c) A student placed the same volume of starch suspension into two bags made of Visking tubing.

Each bag had a different length and width. The thickness of the Visking tubing for each bag was the same.

The membrane of the Visking tubing is partially permeable.

The same volume and concentration of amylase solution was added to the starch suspension.

Each bag was sealed and placed into test tubes containing the same volume of water, as shown in the diagram.



The water was tested at regular intervals for the presence of maltose.

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Maltose was detected in the water in tube A before it was detected in the water in tube B.

Assess the factors that would cause maltose to be detected in tube A before tube B.

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(Total for Question 7 = 12 marks)

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8 The photograph shows a ghost shrimp that lives in fresh water.

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The effect of caffeine concentration on the heart rate of ghost shrimps was investigated.

A shrimp was placed in a caffeine solution and observed using a microscope.

The number of heartbeats in one minute was counted and the heart rate was recorded.

This was repeated for other concentrations of caffeine solution.

The investigation was repeated using two more ghost shrimps.

The table shows the results of this investigation.

Concentration of caffeine / mg cm^{-3}	Heart rate / beats min^{-1}		
	Shrimp 1	Shrimp 2	Shrimp 3
3	272	298	304
7	268	284	298
10	260	270	266
13	152	242	292

(a) (i) State and justify a suitable control for this investigation.

(2)

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(ii) Variables relating to the caffeine solution and the ghost shrimps should have been controlled.

State and justify **two** variables that should have been controlled in this investigation.

(4)

Variable relating to the caffeine solution .....

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Variable relating to the ghost shrimps .....

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(b) (i) Calculate the percentage change in the heart rate of shrimp 2 when the caffeine concentration of 10 mg cm^{-3} was replaced with 13 mg cm^{-3}.

Give your answer to one decimal place.

(2)

Answer ..... %

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(ii) Comment on the results of this investigation.

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(c) Explain one advantage of using ghost shrimps for this investigation.

(2)

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(Total for Question 8 = 14 marks)

TOTAL FOR PAPER = 80 MARKS

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