Write your name here

Surname	Other names

Edexcel GCE

Centre Number	Candidate Number

Biology

Advanced Subsidiary
Unit 1: Lifestyle, Transport, Genes and Health

Tuesday 21 May 2013 – Afternoon
Time: 1 hour 30 minutes

Paper Reference
6BI01/01R

You do not need any other materials.

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.*

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.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*
- Candidates may use a calculator.

Advice

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

Turn over ▶

P43325A

1/1/1/1/1/

P 4 3 3 2 5 A 0 1 2 4

PEARSON

Answer ALL questions.

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 Blood clots can form if the lining of an artery becomes damaged.

(a) For each of the statements below, put a cross ☒ in the box that corresponds to the correct statement about the blood clotting process.

(i) A platelet

(1)

☒ **A** is a protein that forms an insoluble mesh to trap red blood cells

☒ **B** is an enzyme that converts prothrombin into thrombin

☒ **C** is a cell fragment that releases thromboplastin

☒ **D** is a cell fragment that releases fibrinogen

(ii) Thrombin is

(1)

☒ **A** an enzyme that changes fibrinogen into fibrin

☒ **B** an enzyme that changes fibrin into fibrinogen

☒ **C** an insoluble protein that forms a mesh to trap red blood cells

☒ **D** a protein that sticks to collagen in damaged walls of arteries

(iii) Fibrinogen is

(1)

☒ **A** an insoluble protein that forms a mesh to trap red blood cells

☒ **B** a soluble plasma protein

☒ **C** an enzyme that converts prothrombin into thrombin

☒ **D** a clotting factor released by platelets

(b) A stroke can be caused by cardiovascular disease (CVD) affecting arteries leading to the brain. Callum's family has a history of strokes.

(i) Explain why a blood clot in an artery leading to the brain could cause a stroke.

(3)

(ii) Suggest **two** lifestyle changes Callum could make to reduce his risk of suffering a stroke in later life.

(2)

1 .....

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2 .....

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(Total for Question 1 = 8 marks)

2 The fluid mosaic model has been developed from the knowledge of the structure and properties of cell membranes. It can explain how molecules can enter and leave a cell.

(a) Describe the structure of a cell membrane. (You may use a labelled diagram to support your answer).

(5)

(b) Suggest **two** properties of molecules that enable them to enter a cell by diffusion.

(2)

1 .....

2 .....

(c) Facilitated diffusion and active transport are two ways in which molecules are transported across cell membranes.

Describe **one** similarity and **one** difference between facilitated diffusion and active transport.

(i) Similarity

(1)

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(ii) Difference

(1)

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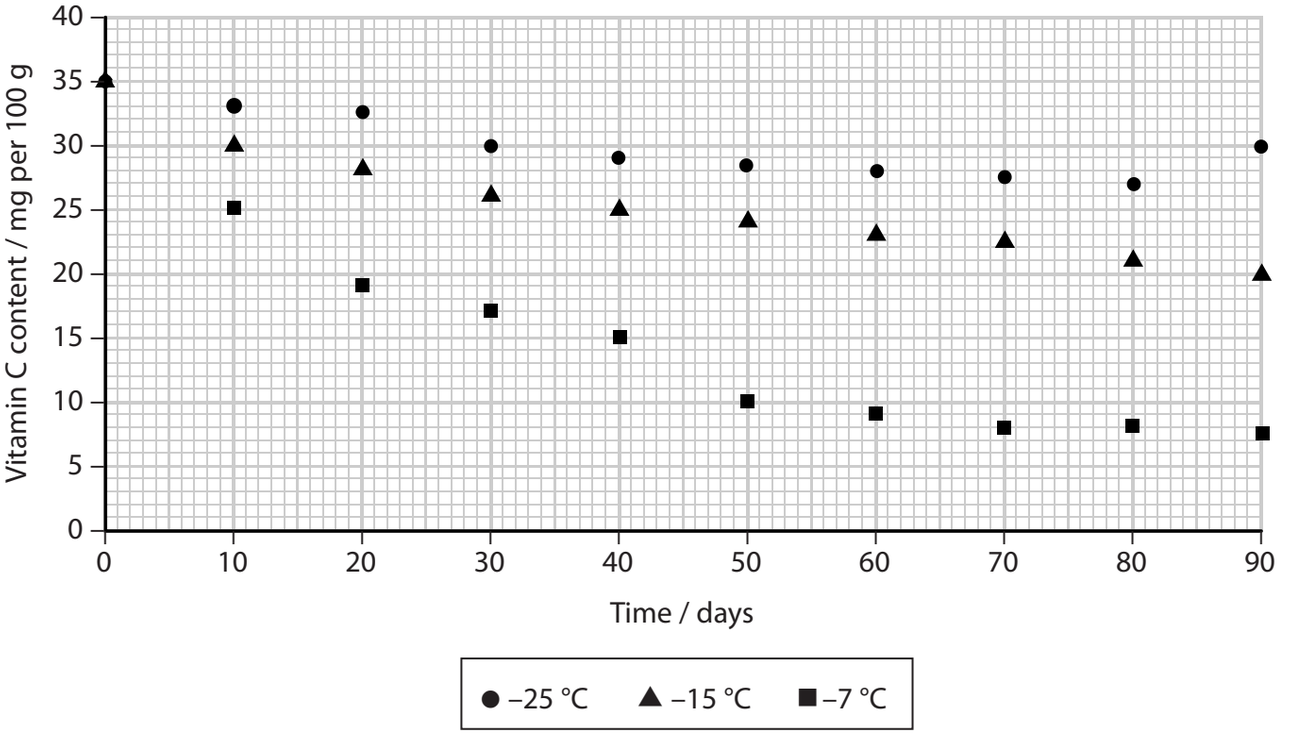
(Total for Question 2 = 9 marks)

3 Broccoli is a green vegetable. A food company investigated the effect of storage temperature on the vitamin C content of frozen broccoli.

The broccoli was harvested and frozen on the same day. The storage temperatures used were: –7°C, –15°C and –25°C.

The vitamin C content of samples of broccoli were measured at harvest and every 10 days during storage.

The graph below shows the results of this investigation.



(a) Using the information from the graph, describe the effect of storage temperature on the vitamin C content of frozen broccoli.

(3)

(b) (i) Identify **one** anomalous result from the graph.

(1)

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(ii) Suggest the action the investigators could take, having identified this anomalous result.

(1)

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(c) (i) State **one** variable that needs to be controlled in this investigation.

(1)

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(ii) Suggest the effect of not controlling this variable on the results.

(1)

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(d) (i) Name the chemical that can be used to measure the vitamin C content of samples of broccoli.

(1)

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(ii) Describe how this chemical can be used to measure the vitamin C content of samples of broccoli.

(3)

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(Total for Question 3 = 11 marks)

4 Cystic fibrosis is a genetic disorder caused by mutations in the CFTR gene. One aim of somatic gene therapy is to overcome the effects of defective genes.

(a) (i) Describe the difference between somatic gene therapy and germ line gene therapy.

(2)

*(ii) Suggest how somatic gene therapy could enable cells lining the lungs to function normally in people with cystic fibrosis.

(4)

(b) Rhythmical tapping of the chest wall during physiotherapy can relieve the symptoms of cystic fibrosis in the lungs.

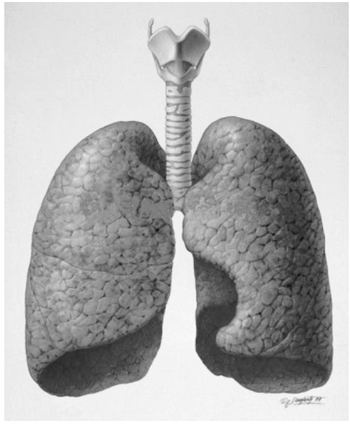
Suggest an explanation for this.

(2)

(Total for Question 4 = 8 marks)

5 Many animals have specialised organs for gas exchange and transport.

*(a) The diagram below shows the lungs of a mammal.

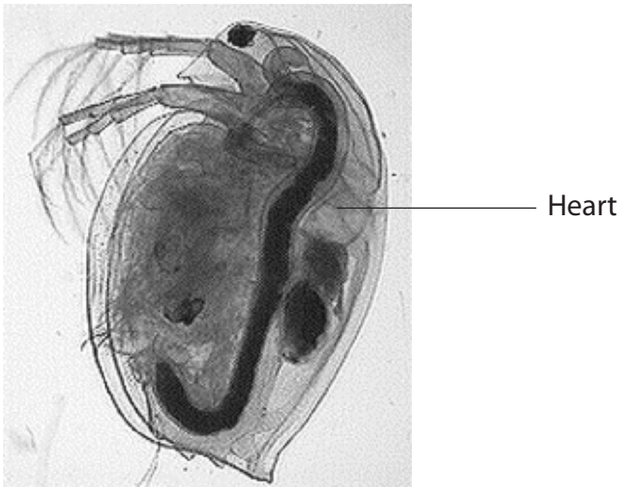


Describe and explain how the lungs of a mammal are adapted for rapid gas exchange.

(5)

(b) *Daphnia* have a circulatory system with a heart that pumps blood into cavities surrounding their organs.

The photograph below shows the location of the heart in a *Daphnia*.



Magnification ×25

(i) Suggest how the heart of a *Daphnia* enables organs to carry out effective gas exchange.

(2)

(ii) In mammals, blood passes through the heart twice for each circulation of the body.

Suggest how this type of circulation enables mammals to carry out effective gas exchange.

(3)

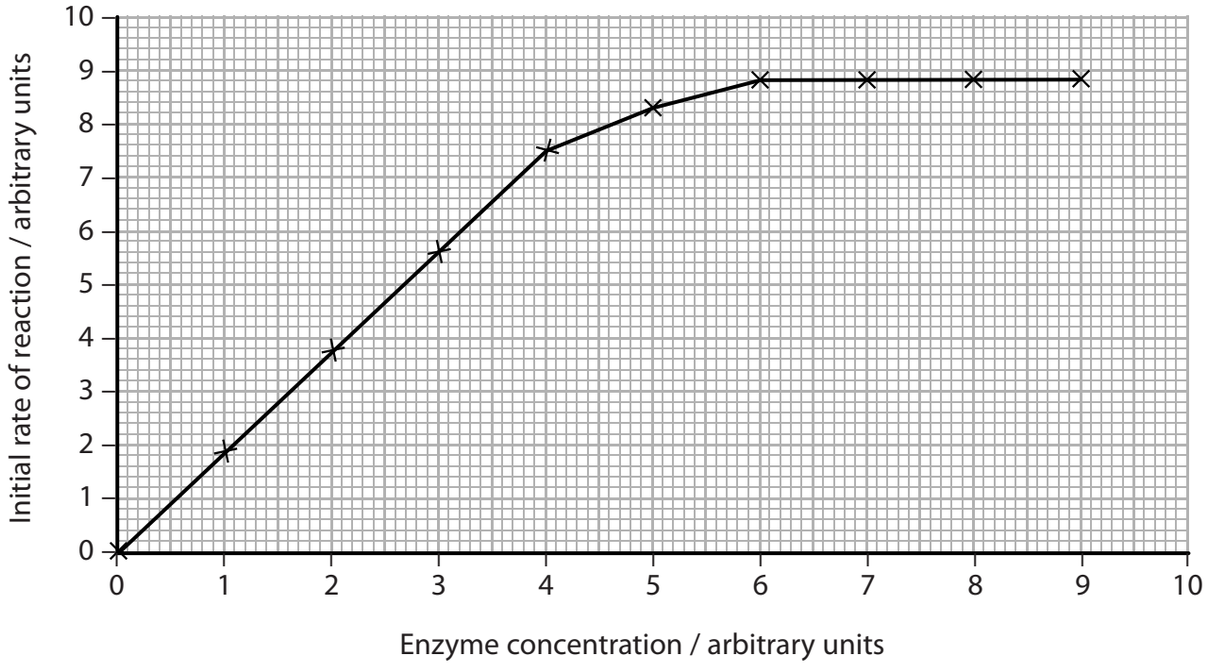
(Total for Question 5 = 10 marks)

6 Enzymes are biological catalysts made of protein.

(a) Proteins are chains of amino acids. In the space below draw the structure of **one** amino acid.

(3)

(b) The graph below shows the effect of changing the enzyme concentration on the initial rate of a reaction.



(i) Explain the effect of changing enzyme concentration on the initial rate of reaction.

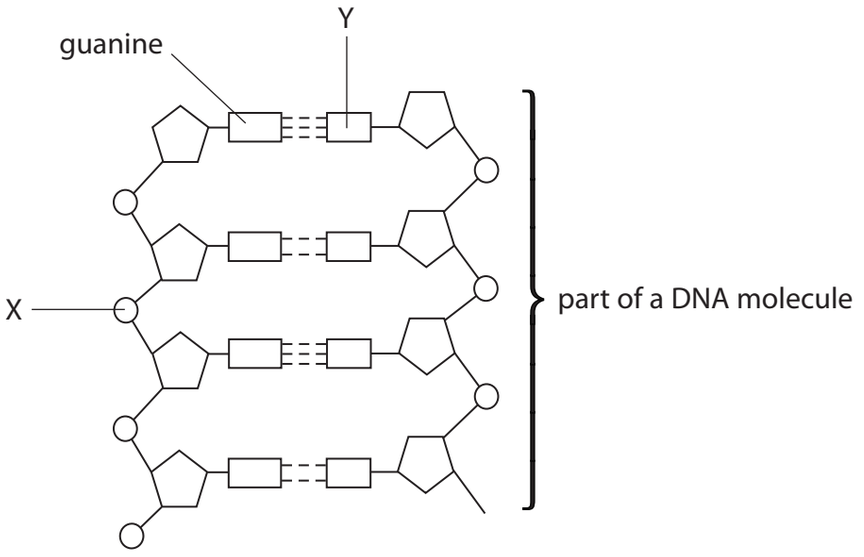
(3)

(ii) Describe an experiment that could be carried out to investigate the effect of enzyme concentration on the initial rate of reaction.

(4)

(Total for Question 6 = 10 marks)

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



(i) Place a cross ☒ in the box next to the molecule represented by the letter X

(1)

☒ **A** Deoxyribose

☒ **B** Phosphate

☒ **C** Ribose

☒ **D** Uracil

(ii) Place a cross ☒ in the box next to the molecule represented by the letter Y

(1)

☒ **A** Adenine

☒ **B** Cytosine

☒ **C** Thymine

☒ **D** Uracil

(iii) Place a cross ☒ in the box next to the name of the bonds holding the two strands of DNA together.

(1)

☒ **A** Ester bonds

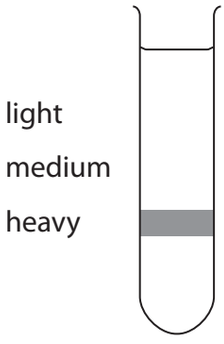
☒ **B** Glycosidic bonds

☒ **C** Hydrogen bonds

☒ **D** Peptide bonds

(b) A culture of bacteria had its DNA labelled with the heavy isotope of nitrogen (^{15}N).

The diagram below shows the position of the DNA band in the centrifuge tube when the DNA was labelled with the heavy isotope of nitrogen, ^{15}N.

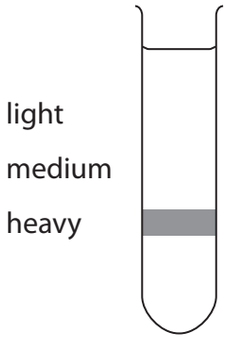


The bacterial culture was then allowed to reproduce using nucleotides containing the normal isotope of nitrogen (^{14}N).

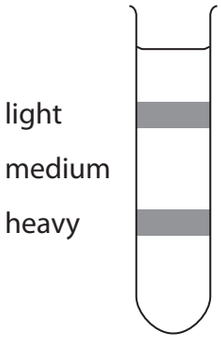
(i) Place a cross ☒ in the box below next to the tube showing the correct pattern of DNA after the bacteria have divided once.

(1)

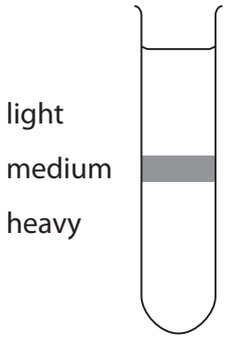
A ☒



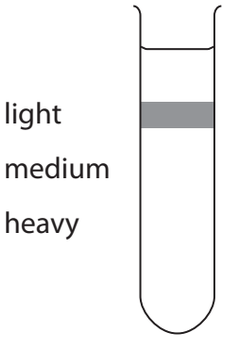
B ☒



C ☒



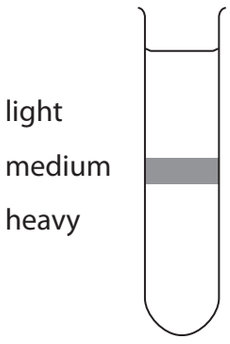
D ☒



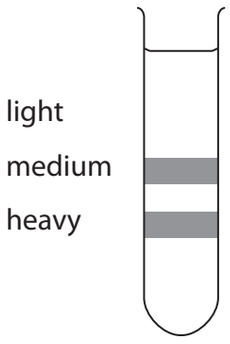
(ii) Place a cross ☒ in the box below next to the tube showing the correct pattern of DNA after the bacteria have divided twice.

(1)

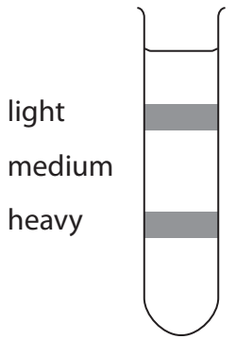
A ☒



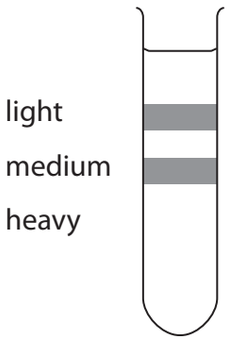
B ☒



C ☒



D ☒



(c) Name the place in a eukaryotic cell where messenger RNA will be synthesised.

(1)

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(d) Achondroplasia is an inherited condition that results in restricted growth in humans. This condition is caused by a dominant allele (A).

Fetuses which are homozygous for the allele for achondroplasia are rarely born alive.

Two parents who both have achondroplasia would like to have children. They are concerned about the risk of their child inheriting two dominant alleles and dying before birth.

(i) Describe **one** advantage and **one** disadvantage to these parents of genetic screening of their fetus.

(2)

Advantage: .....

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Disadvantage: .....

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(ii) In the space below, draw a suitable genetic diagram to show the probability of a child from these parents growing up without achondroplasia.

(4)

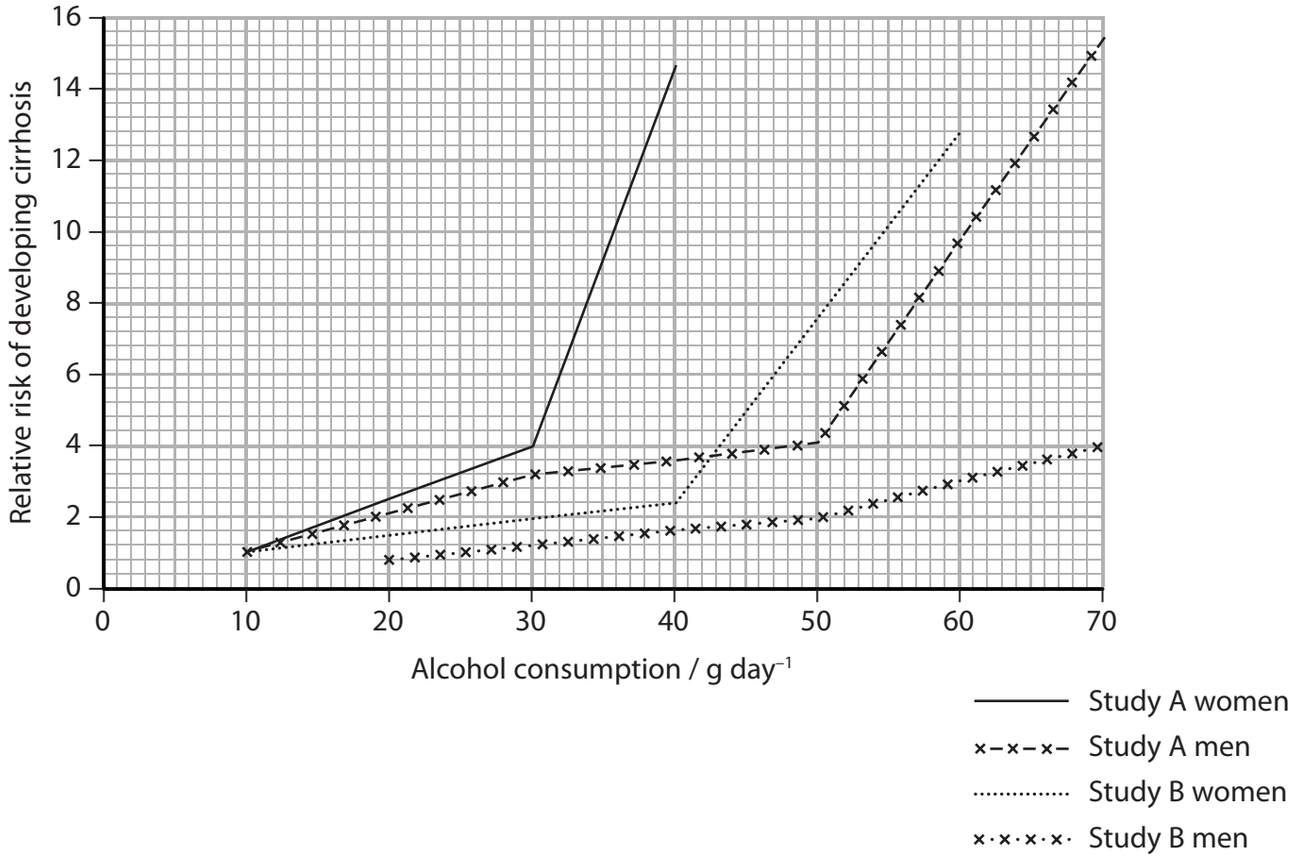
probability.....

(Total for Question 7 = 12 marks)

8 Cirrhosis is a disease of the liver that is associated with alcohol abuse.

Two studies, study A and study B, were carried out to determine the relative risk of developing cirrhosis in relation to the mass of alcohol consumed each day by men and women.

The graph below shows the results of these two studies.



(a) (i) Describe the relationship between alcohol consumption and the relative risk of developing cirrhosis in **women from Study B**.

(3)

(ii) Using the information in the graph, compare the results for **men and women in Study A**.

(2)

(iii) Comment on the reliability of the data shown in the graph.

(2)

(b) The liver is an important organ in the control of blood cholesterol levels.

The table below shows the mean concentration of some types of lipid in the blood of people with and without cirrhosis of the liver.

Type of lipid	Mean concentration of lipid in blood / mg dm^{-3}	
	People with cirrhosis	People without cirrhosis
Triglyceride	109	92
LDL cholesterol	131	103
HDL cholesterol	48	49

Using information in the table, explain why people suffering from cirrhosis may also be more at risk of developing cardiovascular disease (CVD).

(3)

(c) Lipases are enzymes that are involved in the breakdown of lipids, such as triglycerides.

Name **two** products formed from the breakdown of triglycerides by lipases.

(2)

1 .....

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2 .....

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(Total for Question 8 = 12 marks)

TOTAL FOR PAPER = 80 MARKS

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