Write your name here

Surname	Other names

Pearson Edexcel
International Advanced Level

Centre Number | | | | | |

Candidate Number | | | | |

Biology

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

Sample Assessment Materials for first teaching September 2018

Time: 1 hour 30 minutes

Paper Reference **WBI11/01**

You must have:
Scientific calculator, ruler, HB pencil

Total Marks

Instructions

- Use **black** ink or **black** 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.*
- **Show all your working in calculations and include units where appropriate**.

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 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.

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 cell membrane is important in the control of which substances can enter and leave the cell.

(a) The cell membrane consists of a phospholipid bilayer.

(i) Why do phospholipids form a bilayer?

(1)

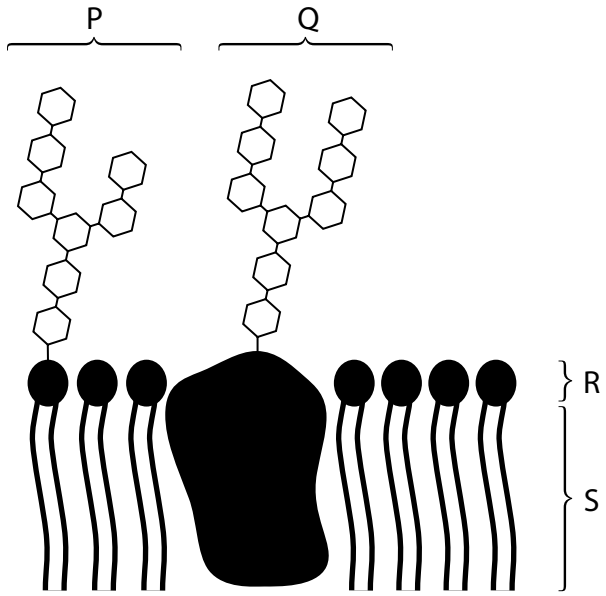
☐ **A** the hydrophobic heads dissolve in the aqueous (water) environment

☐ **B** the hydrophobic heads move away from the aqueous (water) environment

☐ **C** the hydrophobic tails dissolve in the aqueous (water) environment

☐ **D** the hydrophobic tails move away from the aqueous (water) environment

(ii) This diagram shows part of a cell membrane.



Which letter represents a membrane glycoprotein?

(1)

☐ **A** P

☐ **B** Q

☐ **C** R

☐ **D** S

(b) State what is meant by the term **osmosis**.

(1)

(c) Compare and contrast exocytosis and endocytosis.

(3)

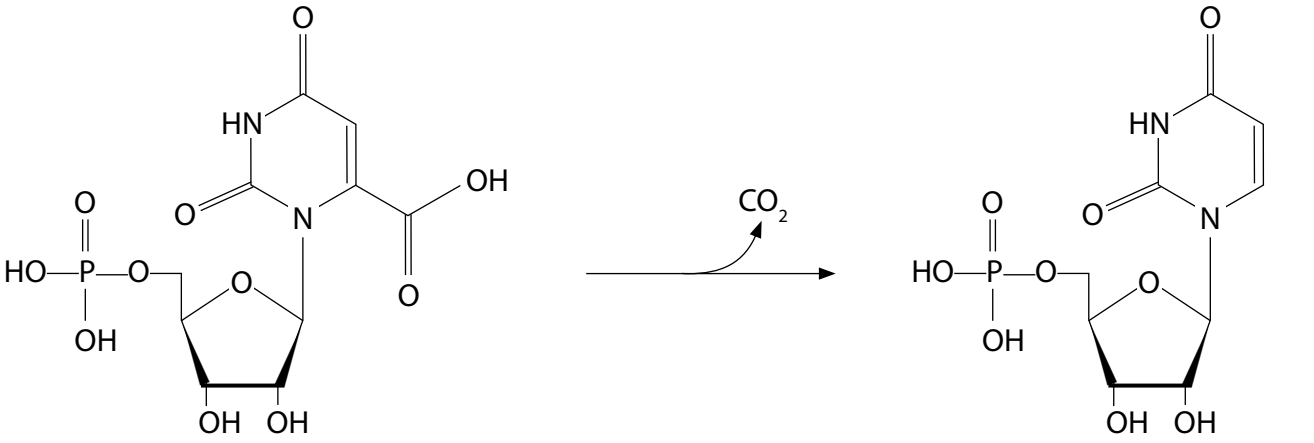
(d) Explain why oxygen molecules can pass directly through the cell membrane.

(3)

(Total for Question 1 = 9 marks)

2 The enzyme OMP decarboxylase is involved in the synthesis of the mononucleotide uridine monophosphate.

(a) The diagram shows the reaction catalysed by OMP decarboxylase.



orotidine monophosphate (OMP) uridine monophosphate

(i) Which sugar is present in uridine monophosphate?

(1)

- ☒ **A** deoxyribose
- ☒ **B** galactose
- ☒ **C** glucose
- ☒ **D** ribose

(ii) Draw a circle around the base in uridine monophosphate.

(1)

(iii) Suggest one way in which cells use uridine monophosphate.

(1)

.....

.....

.....

(b) The enzyme OMP decarboxylase increases the rate of carbon dioxide removal from orotidine monophosphate by 10^{17} times.

(i) State how OMP decarboxylase increases the rate of this reaction.

(2)

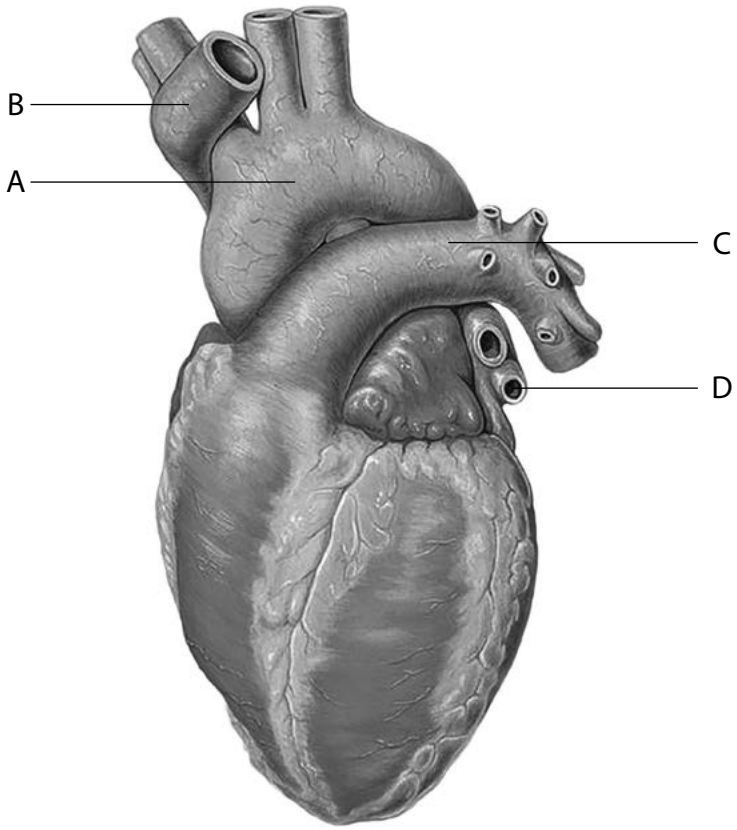
(ii) Explain why OMP decarboxylase catalyses this reaction only.

(3)

(Total for Question 2 = 8 marks)

3 Mammals have a heart that pumps blood through a network of blood vessels.

(a) The drawing shows a human heart.



Used under Creative Commons Attribution-ShareAlike License - Patrick J Lynch

(i) Which blood vessel takes blood from the heart to the body?

(1)

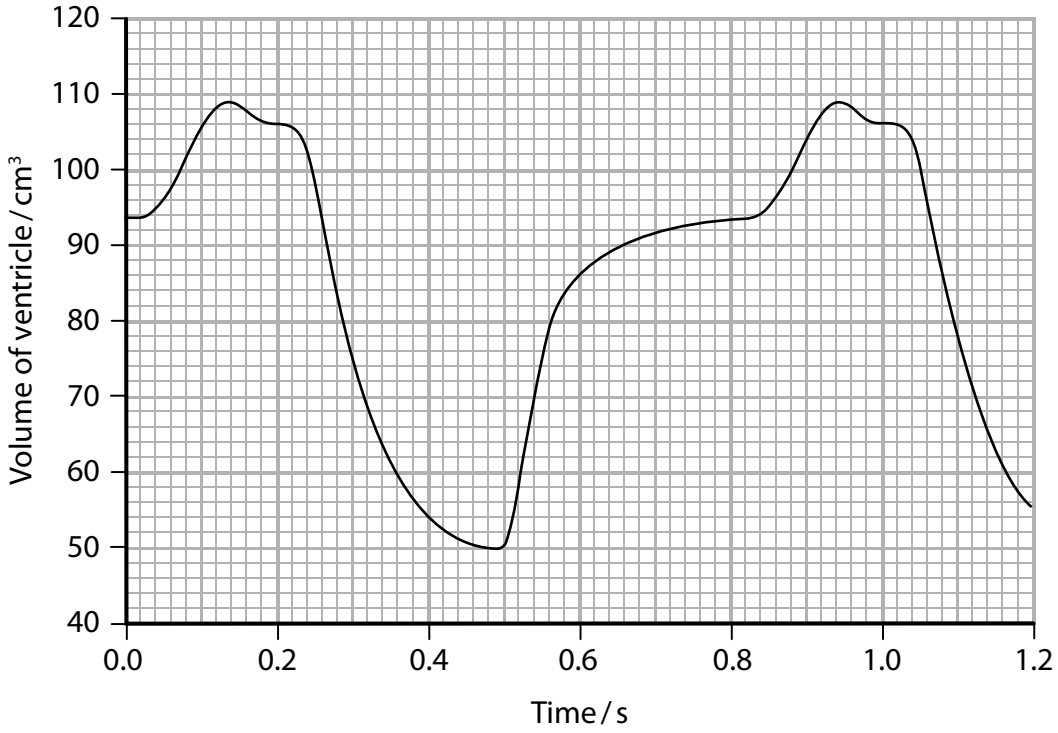
- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(ii) Which blood vessel has semilunar valves and contains blood with the highest concentration of carbon dioxide?

(1)

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(b) The graph shows the change in volume of the left ventricle during the cardiac cycle.



(i) When is this heart in ventricular systole?

(1)

- ☒ **A** at 0.1 seconds
- ☒ **B** at 0.4 seconds
- ☒ **C** at 0.6 seconds
- ☐ **D** at 0.8 seconds

(ii) Calculate the volume of blood in dm^3 that will be pumped out of this heart by the left ventricle each minute.

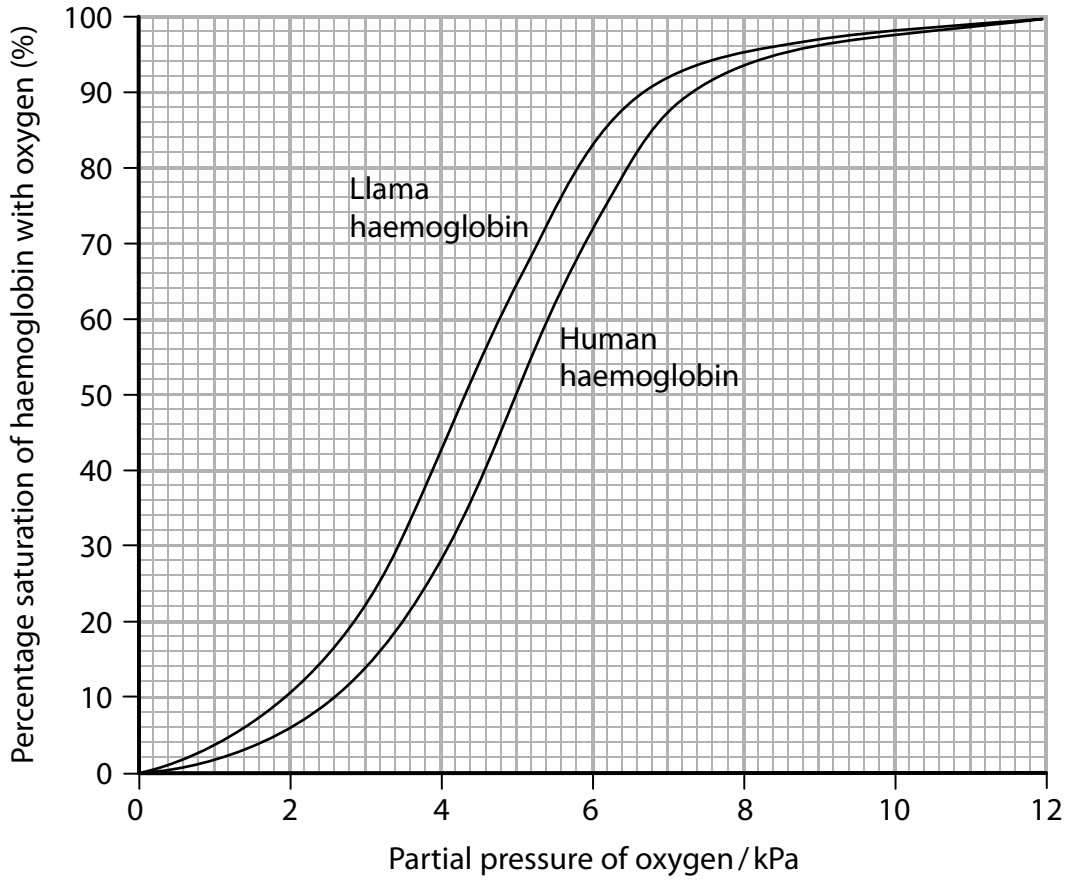
(3)

Answer ..... dm^3

(c) As altitude (height above sea level) increases, the partial pressure of oxygen in the air decreases.

Llamas are mammals that are adapted to living at high altitudes.

The graph shows the oxygen dissociation curves for llama haemoglobin and human haemoglobin.



Explain the differences between the dissociation curves. Use the information in the graph to support your answer.

(4)

(Total for Question 3 = 10 marks)

4 Lipids and carbohydrates can be used as energy storage molecules.

(a) Lactose is an important energy source in milk.

(i) What type of chemical reaction is involved in breaking a lactose molecule into two monosaccharides?

(1)

- ☒ **A** condensation
- ☒ **B** esterification
- ☒ **C** hydrogen bonding
- ☒ **D** hydrolysis

(ii) Milk contains 4.9 g of lactose per 100 g of milk.

Each gram of lactose provides 16 kJ of energy.

Calculate the energy available from the lactose in 200 g of milk.

(1)

Answer ..... kJ

(b) Carbohydrates used as energy storage molecules include glycogen and starch.

Compare and contrast the structures of glycogen and starch.

(4)

(c) (i) State one difference between the structure of a saturated lipid and an unsaturated lipid.

(1)

(ii) Describe how a triglyceride is synthesised.

(3)

(Total for Question 4 = 10 marks)

5 Red-green colour blindness is a common trait in humans.

(a) The gene for red-green colour blindness is located on the X chromosome.

State what is meant by the term **gene**.

(1)

(b) Describe how the two strands of DNA forming the double helix in a gene are held together.

(2)

(c) Explain why each codon for the DNA genetic code must contain at least three bases.

(3)

(d) A red-green colour blind father and an unaffected heterozygous mother had a child.

Determine the probability of this child being red-green colour blind.

Use a genetic diagram to support your answer.

(3)

Probability .....

(Total for Question 5 = 9 marks)

6 (a) Explain how human lungs are adapted for rapid gas exchange.

(3)

(b) Cystic fibrosis is an inherited condition which reduces gas exchange.

The most frequently observed CFTR allele associated with cystic fibrosis carries the ΔF508 mutation.

(i) State what is meant by the term **allele**.

(1)

(ii) The CFTR protein coded for by this mutation has one missing amino acid compared to the functioning protein.

Explain how this mutation results in a non-functioning CFTR protein.

(4)

(iii) Explain why people with cystic fibrosis may develop lung infections.

(4)

(Total for Question 6 = 12 marks)

7 Collagen is an insoluble, fibrous protein.

(a) Describe the roles of RNA in the synthesis of collagen.

(5)

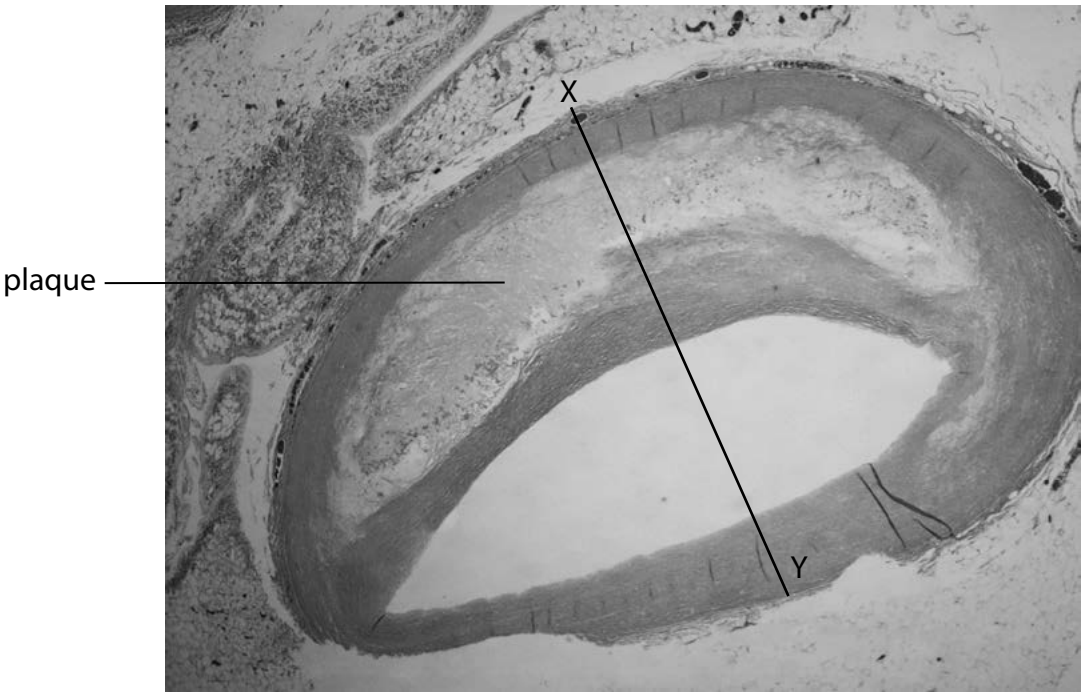
(b) Explain how the primary structure of collagen determines its properties.

(4)

(Total for Question 7 = 9 marks)

8 Many studies have linked the development of atherosclerosis with cardiovascular disease (CVD).

(a) The photograph shows a section through an artery with a plaque (atheroma) from a patient with atherosclerosis.



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Calculate the percentage increase in the thickness of the artery wall where the plaque is located.

Take your measurements along the line labelled X–Y.

(3)

Answer ..... %

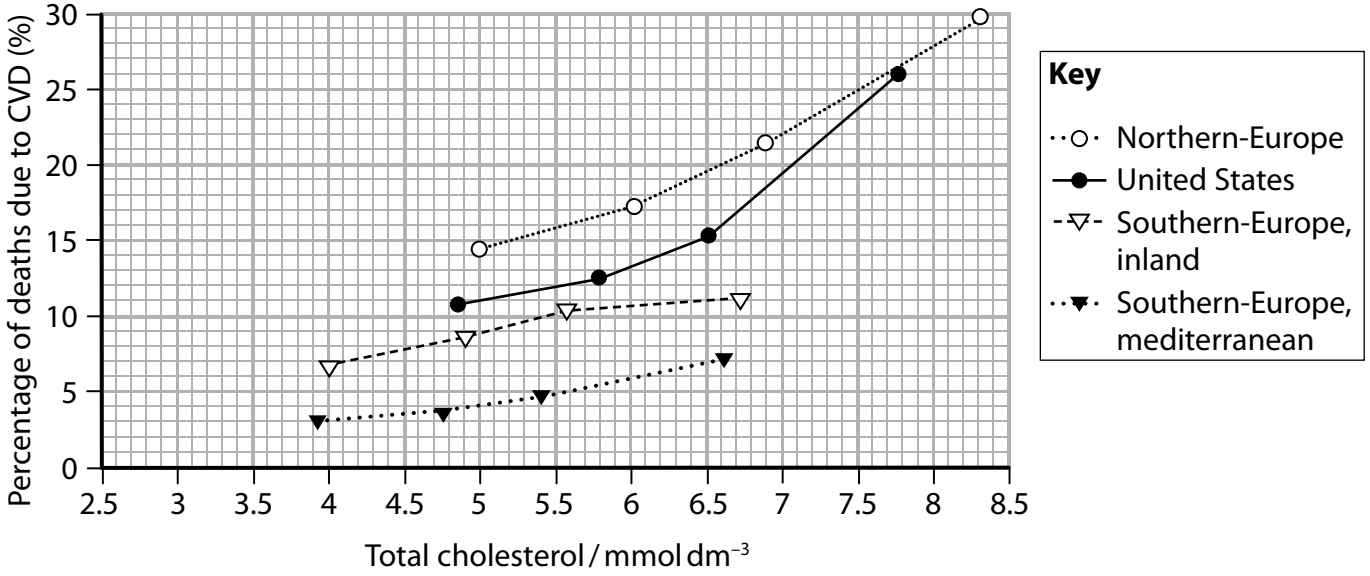
(b) Explain how atherosclerosis can result in damage to the heart muscle.

(4)

*(c) Cholesterol is transported in the blood as lipoproteins LDL and HDL.

In one study, the relationship between total blood cholesterol and the risk of death from CVD was investigated.

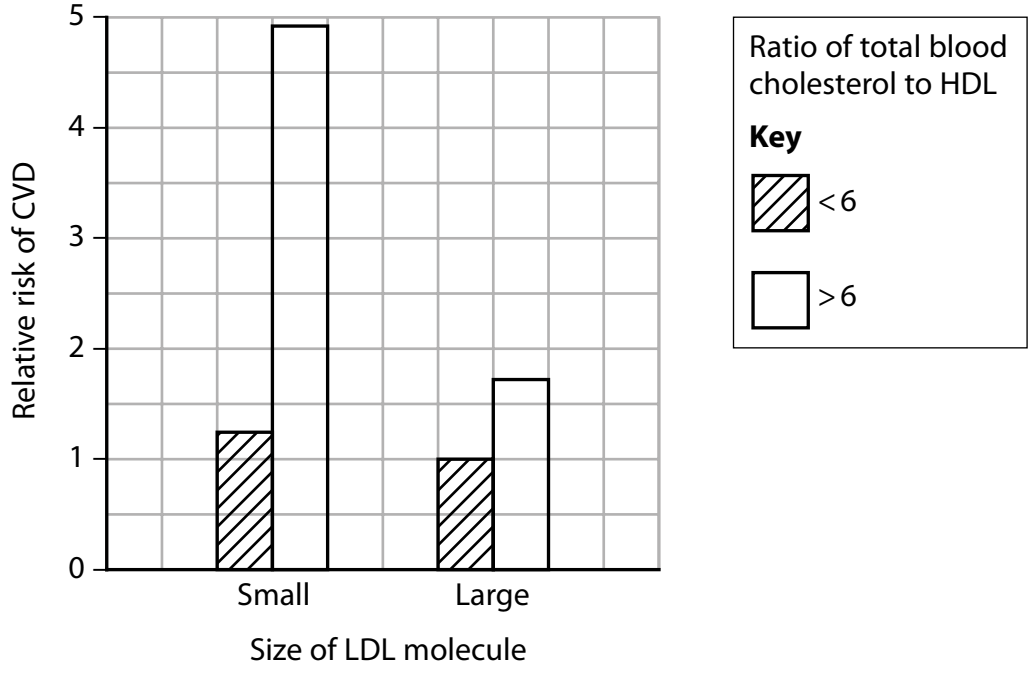
The results are shown in the graph.



Graph 1

In another study, the effect of the size of LDL and the ratio of total blood cholesterol to HDL on the relative risk of CVD was investigated.

The results are shown in the graph.



Graph 2

Assess the contribution of lipoproteins to the risk of developing CVD. Use the information in the graph to support your answer.

(6)

(Total for Question 8 = 13 marks)

TOTAL FOR PAPER = 80 MARKS

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