Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel Level 3 GCE

Centre Number | Candidate Number

Tuesday 21 May 2019

Afternoon (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.

Turn over ▶

P56698A

©2019 Pearson Education Ltd.

1/1/1/1/1/1/1/1/

P 5 6 6 9 8 A 0 1 2 8

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 Starch is an important component of the human diet.

The main sources of starch are plants such as maize and potatoes.

(a) (i) Starch is composed of amylose and amylopectin.

Which of the following terms is the correct description of amylose?

(1)

☒ **A** disaccharide

☒ **B** monosaccharide

☒ **C** polysaccharide

☒ **D** trisaccharide

(ii) Starch can be broken down by a

(1)

☒ **A** condensation reaction involving ester bonds

☒ **B** condensation reaction involving glycosidic bonds

☒ **C** hydrolysis reaction involving ester bonds

☒ **D** hydrolysis reaction involving glycosidic bonds

(iii) Give **one** structural difference between amylose and amylopectin.

(1)

.....

.....

.....

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

(b) Explain how the structures of amylopectin and glycogen make them suitable for storing energy.

(3)

(Total for Question 1 = 6 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

2 Different compounds have been given different sweetness values by comparing them with the sweetness of sucrose.

The table shows some of these compounds and their sweetness values.

Name	Type of compound	Sweetness value / a.u.
Maltose	Disaccharide	0.39
Glucose	Monosaccharide	0.77
Sucrose	Disaccharide	1.00
Sucralose	Modified disaccharide	600.00
Thaumatin	Protein	2000.00

(a) (i) Lactose is found in milk. The sweetness value of lactose is 0.16.

Calculate the ratio of the sweetness value of sucrose to lactose.

(2)

Answer .....

(ii) Which of the following describes lactose?

(1)

☒ **A** disaccharide

☒ **B** modified disaccharide

☒ **C** monosaccharide

☒ **D** protein

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(b) The incidence of obesity is increasing in some populations.

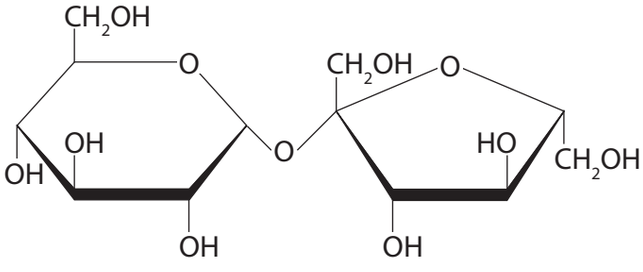
High levels of sugars, such as fructose, in processed food could be contributing to this increase.

Explain why high levels of sugars in a person's diet could lead to obesity.

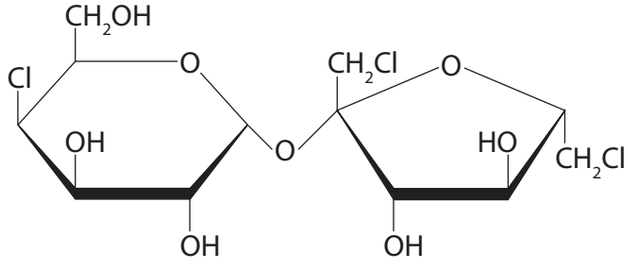
(3)

(c) Sucralose is a disaccharide that has been modified from sucrose.
The enzyme sucrase is used to break down sucrose into glucose and fructose.
Sucralose cannot be broken down by this enzyme.

The diagram shows the structures of sucrose and sucralose.



Sucrose



Sucralose

Explain why sucralose cannot be broken down by sucrase.

(2)

(Total for Question 2 = 8 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

3 Haemoglobin is a protein made of four polypeptide chains.

There are two identical chains each consisting of 141 amino acids. The other two identical chains each consist of 146 amino acids.

(a) Which of the following is the minimum number of nucleotides present in the mRNA coding for haemoglobin?

(1)

☒ **A** 287

☒ **B** 574

☒ **C** 861

☒ **D** 6862

(b) Sickle cell anaemia is a genetic disorder caused by a mutated allele for haemoglobin.

This causes one amino acid to be changed in one type of polypeptide chain in the haemoglobin protein. This affects the function of the red blood cells.

(i) An allele is a version of a gene.

State what is meant by the term gene.

(1)

.....

.....

(ii) Two parents who are both heterozygous for the mutated allele are expecting a child.

Use a genetic diagram to determine the probability of this child being homozygous for the mutated allele.

(2)

Answer .....

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

(iii) Explain how a change of one amino acid could lead to a change in the structure and properties of the haemoglobin protein.

(4)

(Total for Question 3 = 8 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

4 Some human babies are fed on breast milk.

The composition of breast milk changes throughout a feed. The milk at the start of a feed differs from the milk at the end of a feed.

The table shows how the nutrient proportions of breast milk change throughout a feed.

Stage of feeding	Mass of nutrient / g per 100 cm^3 of milk		
	Carbohydrate	Lipid	Protein
Start	6.6	1.8	0.6
End	6.5	7.5	0.6

(a) Calculate the percentage change in lipid during this feed.

(2)

Answer ..... %

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(b) Milk at the start of a feed does not contain any vitamin C. Milk at the end of a feed can contain 10 mg of vitamin C per 100 cm^3 of milk.

Milk samples were taken at different times during the course of one feed.

Devise a method to measure how the concentration of vitamin C changes during the course of a feed.

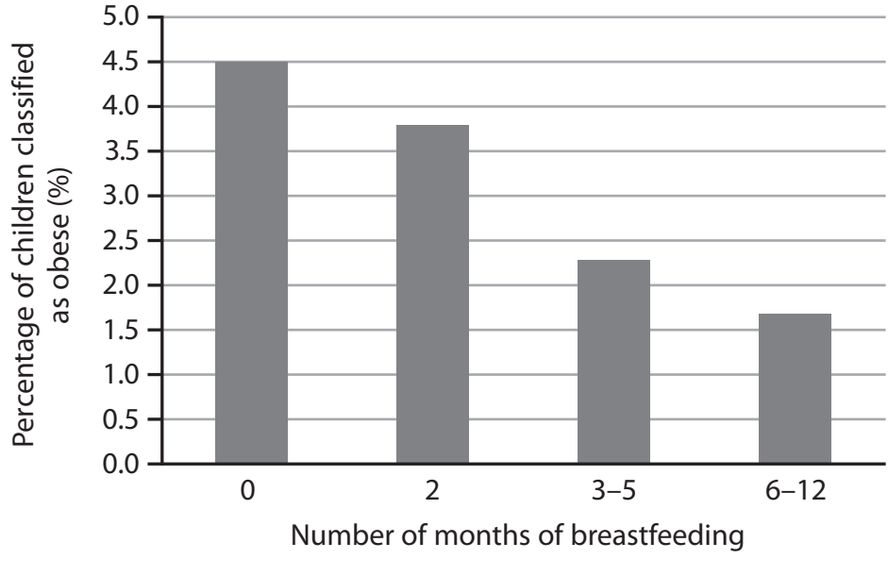
(4)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(c) The development of childhood obesity is affected by many factors.

Breastfeeding can affect the development of childhood obesity.

The graph shows the relationship between obesity in six-year-old children and the number of months that they were breastfed as babies.



(i) Describe the relationship between the number of months of breastfeeding and childhood obesity.

(2)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(ii) A six-year-old child can be classified as obese based on their body mass index (BMI) being over 19 kg m^{-2}.

BMI is calculated using the following formula.

$$\text{Body mass index (BMI)} = \frac{\text{body mass}}{\text{height}^2}$$

A six-year-old child is 115 cm tall with a BMI of 20.

Calculate the mass of this child to one decimal place.

(2)

Answer .....

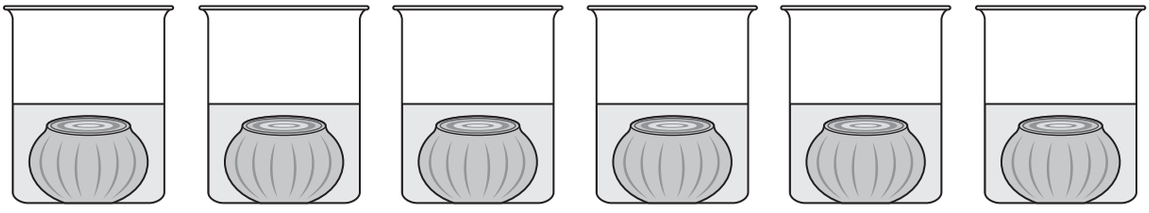
(Total for Question 4 = 10 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

5 Pickling is a technique used to preserve food. Onions can be pickled by immersing them in a solution of sodium chloride.

A student investigated the effects of changing the concentration of sodium chloride solution on the mass of onion tissue. Small onions were peeled, had their tops and bottoms cut off and were weighed. The onions were then placed into covered beakers containing different concentrations of sodium chloride solution.

Six beakers were set up as shown in the diagram.



0% sodium chloride solution | 2.5% sodium chloride solution | 5% sodium chloride solution | 10% sodium chloride solution | 15% sodium chloride solution | 20% sodium chloride solution

The beakers were left for two days. The onions were removed, blotted dry and reweighed. The investigation was repeated two more times.

The mean percentage change in mass was calculated.

The results of the investigation are shown in the table.

Sodium chloride solution (%)	Percentage change in mass (%)				SD
	1	2	3	Mean	
0.0	7.3	7.1	7.9	7.4	0.4
2.5	3.2	4.7	5.8	4.6	
5.0	–1.3	–0.9	–1.2	–1.1	0.2
10.0	0.6	–0.8	–1.9	–0.7	1.3
15.0	–2.1	–1.8	–2.9	–2.3	0.6
20.0	–2.2	–2.4	–1.9	–2.2	0.3

(a) (i) Explain **one** way in which this investigation could be improved.

(2)

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(ii) Standard deviation can be calculated using the formula shown.

$$S = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

Calculate the standard deviation for the 2.5% sodium chloride solution.

(2)

Answer .....

(iii) Deduce the effect of increasing the concentration of sodium chloride on the change in mass of the onion tissue.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(b) A method for pickling red onions is to immerse them in wine vinegar. This vinegar contains ethanoic acid. The vinegar causes anthocyanin pigments to leave the onion cells, entering the solution.

Explain why pickling in vinegar would result in anthocyanin pigments leaving the onion cells.

(3)

(Total for Question 5 = 10 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

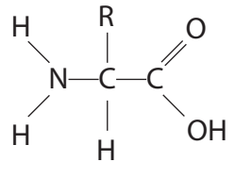
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

BLANK PAGE

6 Proteins can be used as a source of energy. This involves the removal of the amine group.

(a) (i) Draw a circle around the amine group on the diagram of an amino acid.

(1)



(ii) The R group differs between the amino acids. The R group may contain elements that are not found in a carbohydrate.

Name one of these elements.

(1)

.....

(b) Glycoproteins and phospholipids are molecules found in the cell surface membrane.

(i) Give **one** function of the glycoproteins found in the cell surface membrane.

(1)

.....

.....

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(ii) A cell surface membrane is partially permeable.

The phospholipid bilayer is important in controlling the movement of molecules through the membrane.

Explain how the structure of a phospholipid molecule contributes to the partial permeability of a cell surface membrane.

(3)

(c) Endocytosis and exocytosis are processes that move large molecules into a cell or out of a cell.

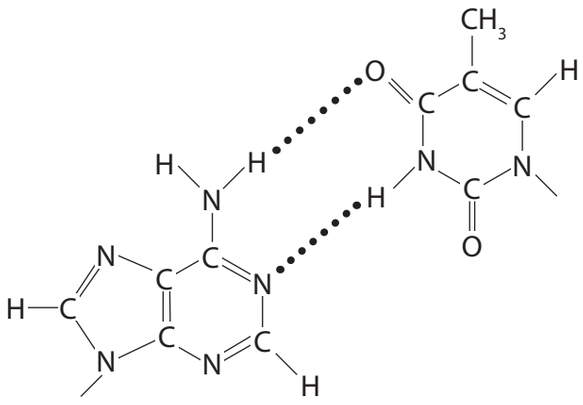
Compare and contrast the processes of endocytosis and exocytosis.

(3)

(Total for Question 6 = 9 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

7 The diagram shows part of a DNA molecule.



(a) (i) Which part of the DNA molecule is shown?

(1)

☒ **A** deoxyribose molecule

☒ **B** one mononucleotide

☒ **C** two complementary organic bases

☒ **D** two mononucleotides

(ii) Which type of bond holds the strands of DNA together?

(1)

☒ **A** disulfide

☒ **B** glycosidic

☒ **C** hydrogen

☒ **D** peptide

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(iii) Analysis of a sample of DNA found that 35% of the nucleotides contained thymine.

Determine the percentage of guanine in the same sample of DNA.

(1)

Answer ..... %

(b) One function of DNA is to act as a template for the synthesis of messenger RNA (mRNA) during transcription.

(i) Describe how mRNA is synthesised at a template strand of DNA.

(2)

.....

.....

.....

.....

(ii) Describe the differences between the structure of DNA and the structure of RNA.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(c) The synthesis of mRNA occurs in a process called transcription.

Compare and contrast the process of transcription with the process of DNA replication.

(4)

(Total for Question 7 = 12 marks)

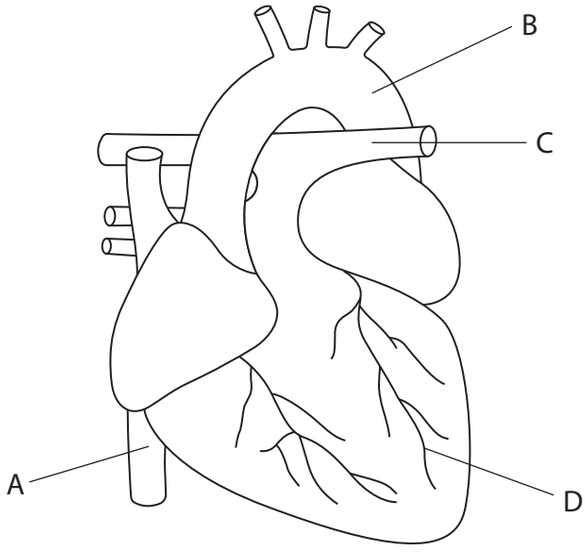
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

BLANK PAGE

8 Cardiovascular disease can occur in blood vessels in organs such as the brain and the heart.

The diagram shows a human heart.



(a) (i) Which is the correct label for a coronary artery?

(1)

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

(ii) Which is the correct label for the blood vessel carrying deoxygenated blood under the lowest pressure?

(1)

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

(iii) State the type of blood vessel that has no collagen in its wall.

(1)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(b) An ischaemic stroke occurs when a blood vessel in the brain is blocked by a blood clot.

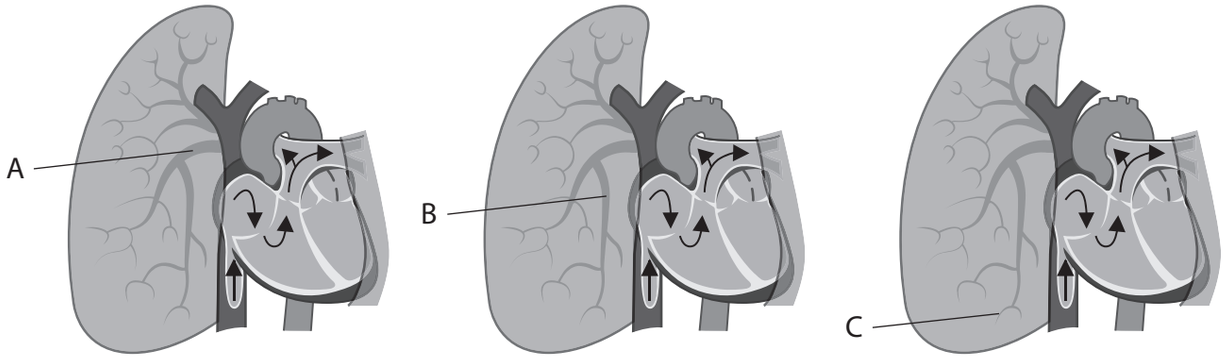
Explain how a blood clot could form in a blood vessel.

(4)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(c) The location of a blood clot in the body can affect the oxygenation of the blood as well as the supply of oxygen to respiring tissues.

The diagrams show the location of three separate blood clots in arteries in the right lung.



© BSIP/Contributor/Getty images

The table shows the effect of the location of the blood clot on the percentage oxygen saturation of the blood leaving the right lung.

Location of blood clot	Blood oxygen saturation leaving the right lung (%)
A	84
B	92
C	98

(i) State why statin medication would not be an effective treatment for a blood clot in these arteries.

(1)

.....

.....

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

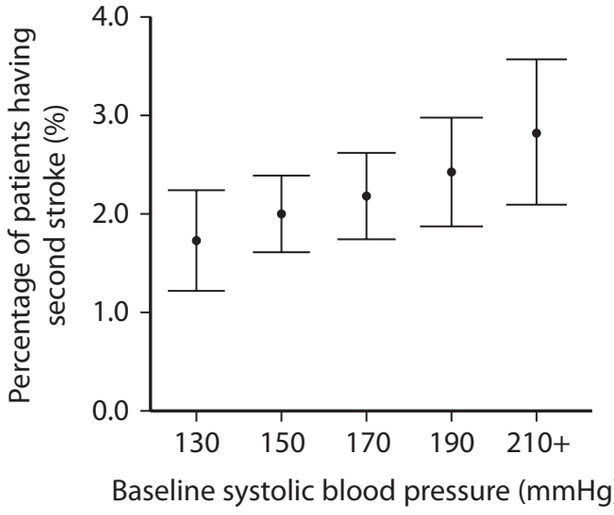
(ii) Explain why the location of the blood clot would affect the oxygen saturation of the blood leaving the right lung.

(3)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

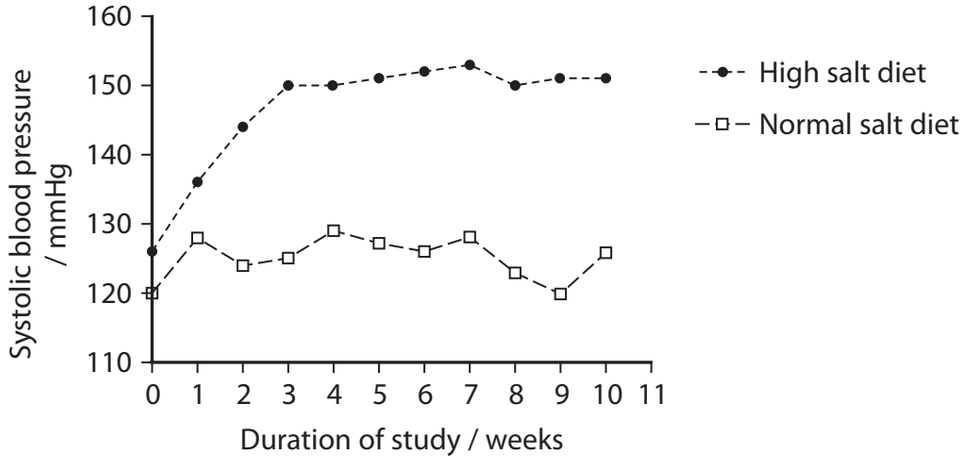
*(d) Graph A shows a correlation between systolic blood pressure and the percentage of stroke patients having a second ischaemic stroke within a few months.

Graph A



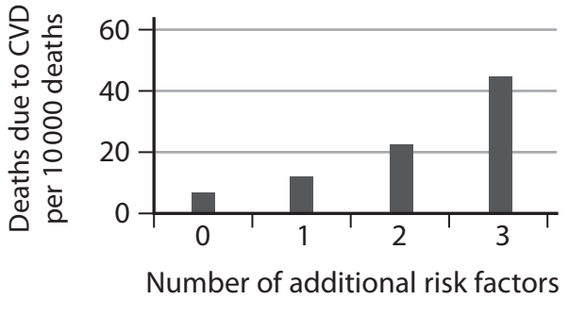
Graph B shows the effect of a high salt diet on systolic blood pressure.

Graph B



Graph C shows the effect of additional risk factors on the number of deaths due to cardiovascular disease (CVD).

Graph C



DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Men who smoke have an increased risk of having an ischaemic stroke.

Analyse the data to discuss what advice could be given to a smoker, who has had one ischaemic stroke, to reduce his risk of having another stroke.

(6)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

(Total for Question 8 = 17 marks)

TOTAL FOR PAPER = 80 MARKS

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA