Write your name here

Surname	Other names

Pearson Edexcel Level 3 GCE

Centre Number	Candidate Number

Biology A (Salters Nuffield)

Advanced Subsidiary

Paper 1: Lifestyle, Transport, Genes and Health

Thursday 24 May 2018 – Afternoon
Time: 1 hour 30 minutes

Paper Reference
8BN0/01

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.*
- 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.

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.*

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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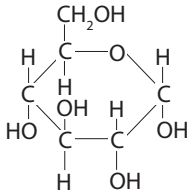
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Answer ALL questions.

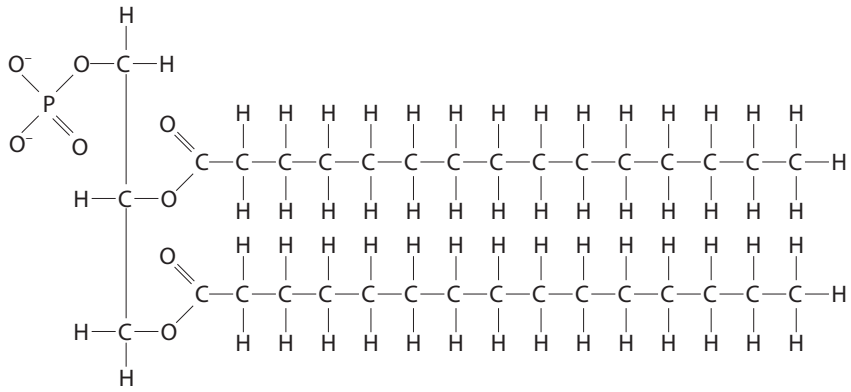
Write your answers in the spaces provided.

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 ☒.

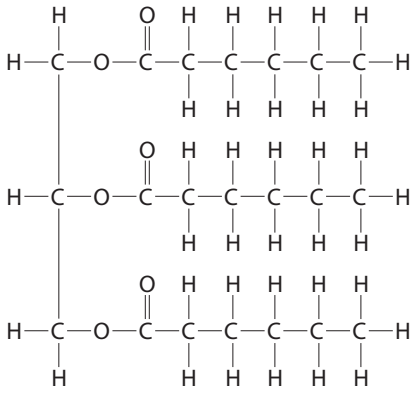
1 The diagram shows four molecules that can be found in living organisms.



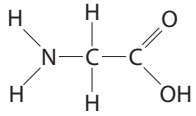
A



B



C



D

(a) (i) How many of these molecules contain three elements only?

(1)

☒ **A** one

☒ **B** two

☒ **C** three

☒ **D** four

(ii) State how an unsaturated lipid differs from molecule **C**.

(1)

.....

.....

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(iii) Which of these molecules is transported by tRNA?

(1)

☒ **A**

☒ **B**

☒ **C**

☒ **D**

(iv) Which of these molecules could be joined to another molecule of the same type by a peptide bond?

(1)

☒ **A**

☒ **B**

☒ **C**

☒ **D**

(v) Which of these molecules is a component of maltose?

(1)

☒ **A**

☒ **B**

☒ **C**

☒ **D**

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(b) Diffusion and active transport are mechanisms by which molecules can enter cells.

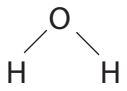
Compare and contrast these two mechanisms.

(3)

(Total for Question 1 = 8 marks)

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2 Water is a polar molecule. The diagram shows a molecule of water.



(a) Complete the diagram to show the dipole nature of this water molecule.

(2)

(b) Name the type of reaction in which a molecule of water is involved in the breaking of a bond in another molecule.

(1)

(c) Explain how the properties of water make it an ideal transport medium.

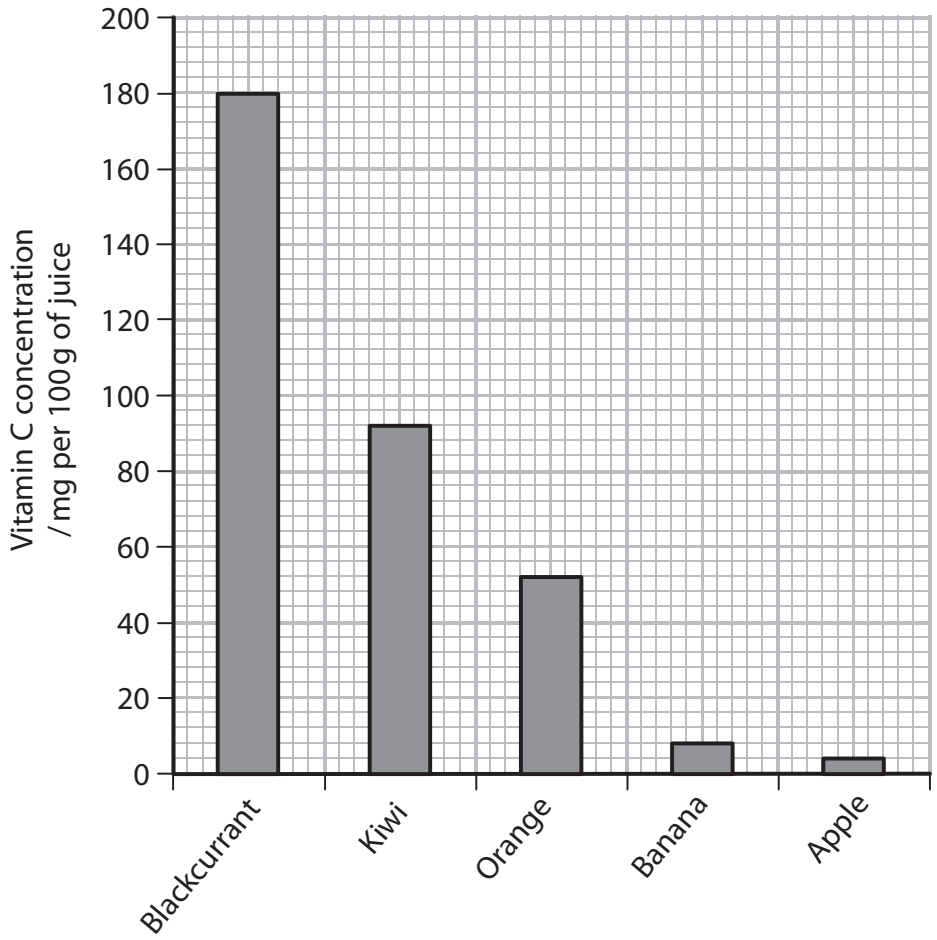
(3)

(Total for Question 2 = 6 marks)

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3 Fruit juices contain various concentrations of vitamin C.

The graph shows the vitamin C concentration of five fruit juices.



(a) Calculate the mass of orange juice required to provide the same mass of vitamin C that is in 100 g of blackcurrant juice.

(2)

Answer ..... g

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(b) Devise an investigation that can be used to collect these data.

(5)

(Total for Question 3 = 7 marks)

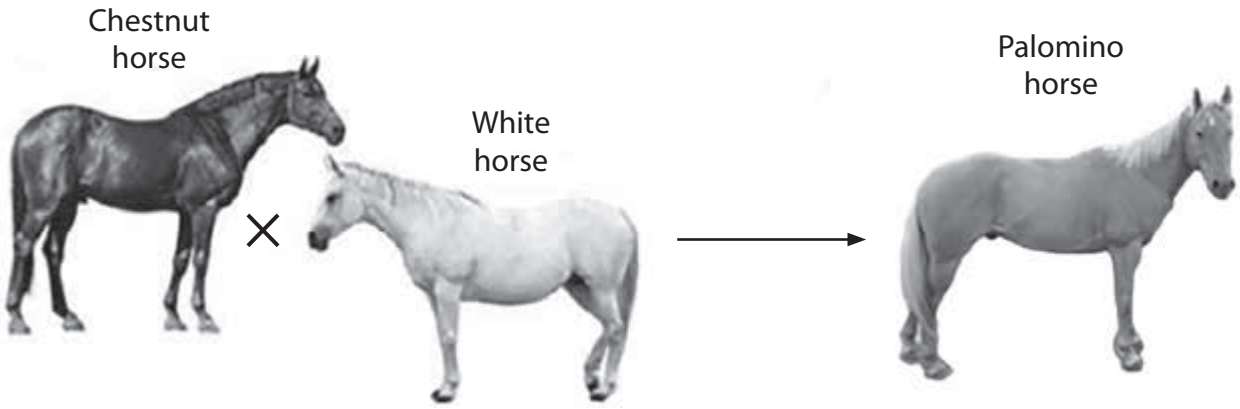
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4 The phenotype of organisms is affected by genotype.

(a) Chestnut horses are homozygous for the allele H^C. White horses are homozygous for the allele H^W.

If a chestnut horse is mated with a white horse, the offspring will be palomino.

Palomino horses have coats with a colour intermediate between chestnut and white.



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

(2)

(ii) Explain why the offspring have the palomino coat colour.

(3)

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(b) Achondroplasia is a genetic condition that causes dwarfism in humans.

Genetic screening can be used to identify achondroplasia in embryos.

Individuals that are heterozygous for achondroplasia have shortened limbs.

Individuals homozygous for achondroplasia will not usually survive for more than one year.

(i) Deduce if achondroplasia is caused by a dominant or recessive allele.

(1)

.....

(ii) Use a genetic diagram to determine the probability that a child of parents with achondroplasia will be homozygous for this condition.

(3)

Answer .....

(iii) An embryo, created by IVF, can be screened before it is placed in the mother's uterus.

Name this type of genetic screening.

(1)

.....

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(iv) Explain **one** ethical issue relating to the use of prenatal genetic screening.

(2)

(Total for Question 4 = 12 marks)

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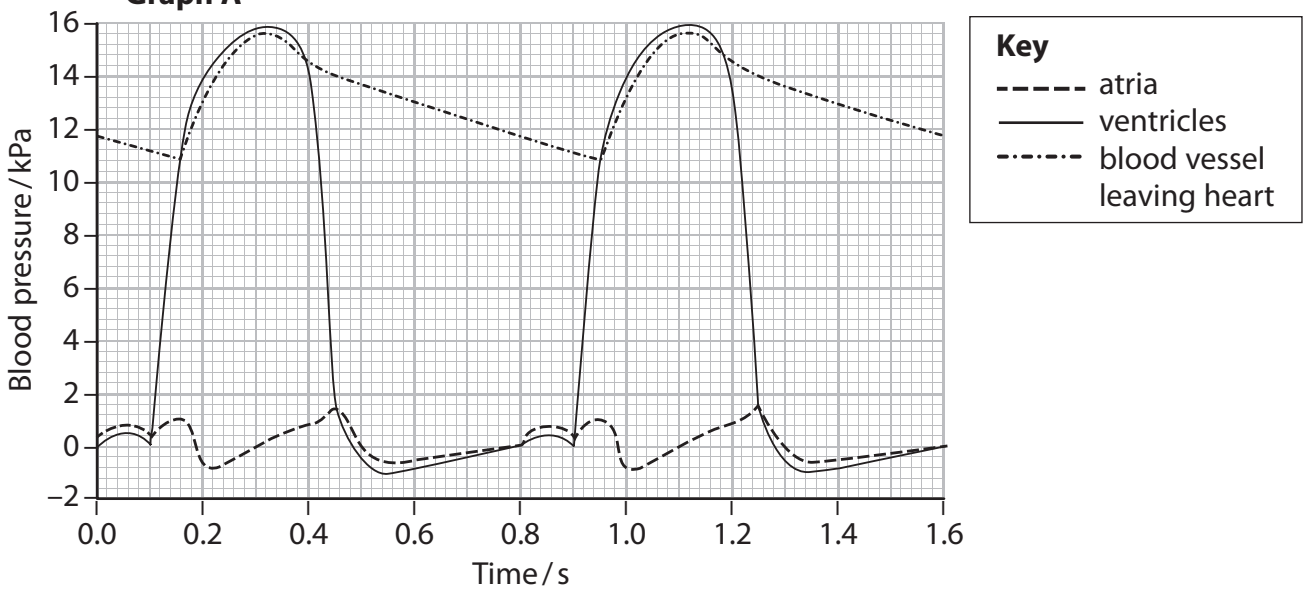
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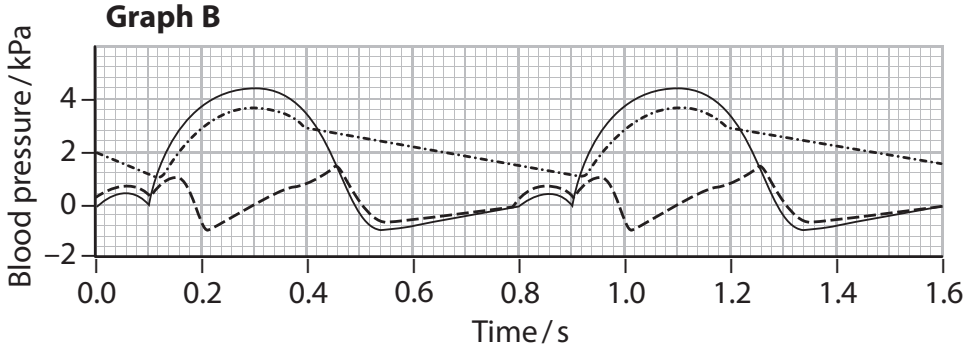
5 The pressure of the blood passing through the heart can vary.

Graph A shows the changes in blood pressure in one side of the heart. Graph B shows the changes in blood pressure in the other side of the heart over the same time period.

Graph A



Graph B



(a) (i) Calculate the heart rate.

(2)

Answer .....

(ii) Increased heart rate is often associated with high blood pressure.

Which of the following will reduce blood pressure?

(1)

☒ **A** anticoagulants

☒ **B** antihypertensives

☒ **C** cholesterol

☒ **D** platelet inhibitors

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(b) (i) Explain which side of the human heart is represented by graph B.

(2)

(ii) In graph A, which blood vessel carries the blood leaving the heart?

(1)

- ☒ **A** aorta
- ☒ **B** pulmonary artery
- ☒ **C** pulmonary vein
- ☒ **D** vena cava

(iii) In graph A, the blood pressure inside the ventricle changes between 0.0 and 0.45 seconds.

Explain how these changes in blood pressure occur in this part of the cardiac cycle.

(4)

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(c) Explain how the structure of the walls of the blood vessels carrying blood away from the heart in graph A and graph B are different.

(3)

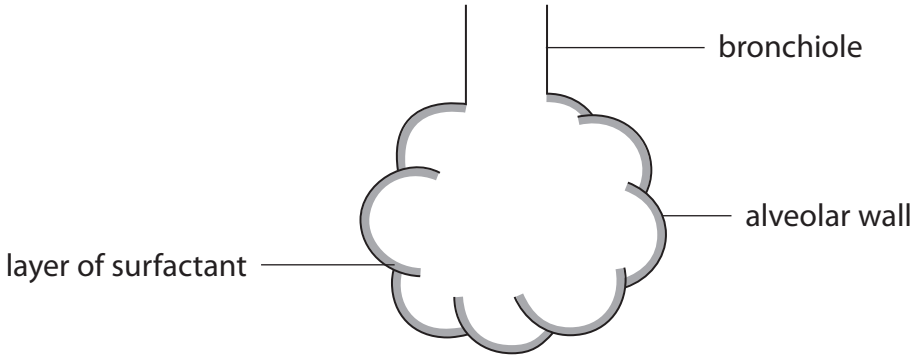
(Total for Question 5 = 13 marks)

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6 Cells in the walls of the alveoli secrete a fluid.

This fluid, containing proteins and lipoproteins, acts as a surfactant.

The layer of surfactant, shown in the diagram, prevents the alveoli collapsing.



Alveolar cells undergoing protein synthesis were investigated.

Cells containing amino acids labelled with a fluorescent marker were monitored for 30 minutes.

The percentage of fluorescence inside and outside the cells was measured.

The results are shown in the table.

Time / min	Fluorescence (%)	
	Inside the cells	Outside the cells
0	100	0
5	87	13
10	80	20
15	68	32
20	56	44
25	47	53
30	38	62

(a) During which period of time did the fluorescence inside the cells decrease at the fastest rate?

(1)

☒ **A** 0 to 5 minutes

☒ **B** 0 to 10 minutes

☒ **C** 10 to 15 minutes

☒ **D** 10 to 20 minutes

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(b) The percentage of fluorescence inside and outside these alveolar cells changed.

Explain why these changes occurred.

(4)

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(c) Explain how these labelled amino acids would be incorporated into a surfactant protein.

(4)

(Total for Question 6 = 9 marks)

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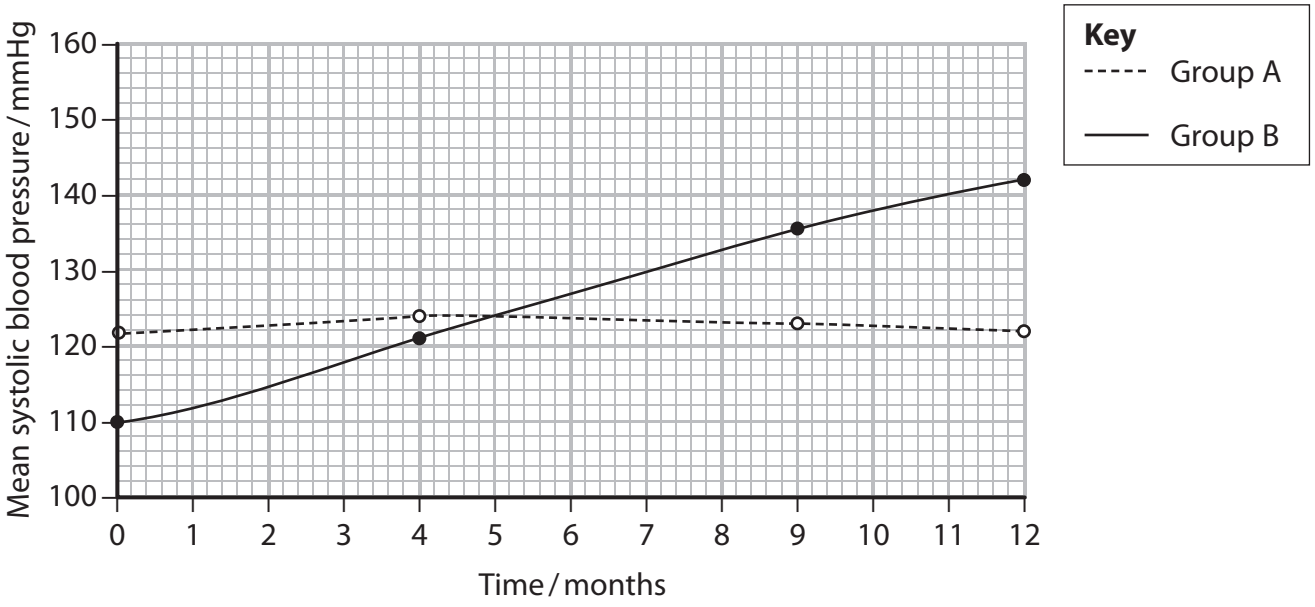
7 The effect of salt in the diet on blood pressure was investigated.

This investigation involved 15 males and 5 females, all between 20 and 30 years old. They were split into two groups, A and B, each of 10 people.

Group A had a diet containing 3 g of salt per day. Group B had a diet containing 9 g of salt per day.

The systolic blood pressures, measured in mmHg, were recorded during one year.

The results are shown in the graph.



(a) (i) Determine the effects of salt in the diet on systolic blood pressure in this investigation.

(3)

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(ii) Explain the effect that a diet high in salt could have on a person's risk of developing cardiovascular disease.

(5)

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(b) Explain how the validity of this investigation could be improved.

(3)

(c) A variety of drugs can be used to reduce blood pressure. These drugs may cause side effects in some people.

State **two** possible side effects of taking drugs to reduce blood pressure.

(2)

(Total for Question 7 = 13 marks)

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8 Mutations in genetic material such as DNA often result in the formation of new alleles.

(a) DNA consists of mononucleotides joined together by bonds between

(1)

☒ **A** deoxyribose and a phosphate group

☒ **B** ribose and a phosphate group

☒ **C** two pentose sugars

☒ **D** two phosphate groups

(b) More than 1500 mutations have been found for the gene that codes for the production of the CFTR channel protein.

Some of these mutations cause cystic fibrosis by affecting the production or functioning of the CFTR channel protein.

If the functioning of the CFTR channel protein is impaired, thicker mucus is produced in the lungs.

Explain why thicker mucus is produced if the functioning of the CFTR channel protein is impaired.

(2)

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(c) In 2013, in the UK, a sample of 10 500 people with cystic fibrosis was studied.

The numbers of people with the three most common mutations of the CFTR gene are shown in the table.

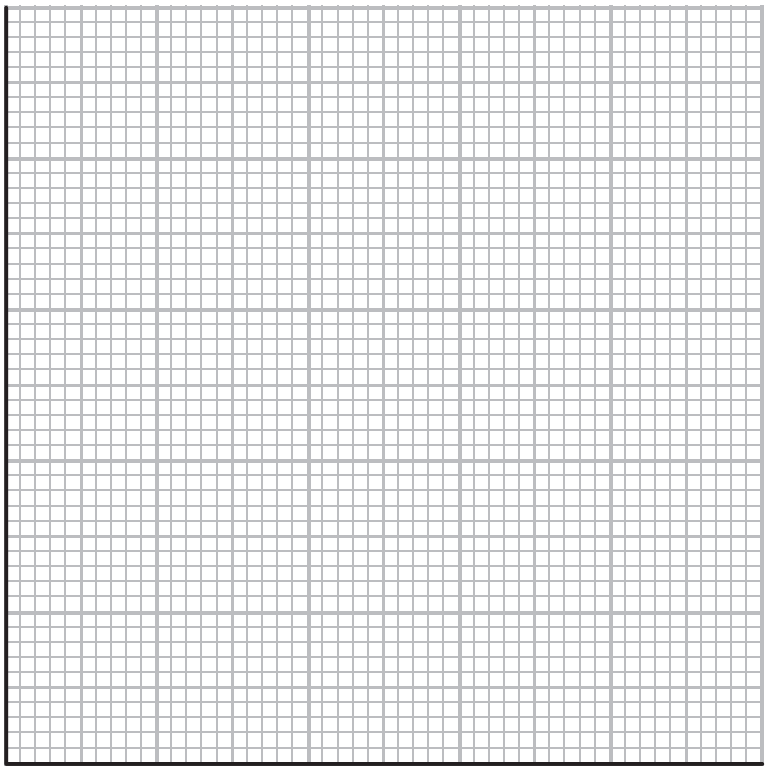
Mutation	Number of people with the mutation	Percentage of people with the mutation (%)
F508del	9030	
G542X	525	
G551D	420	

(i) Complete the table to show the percentage of people with each mutation.

(1)

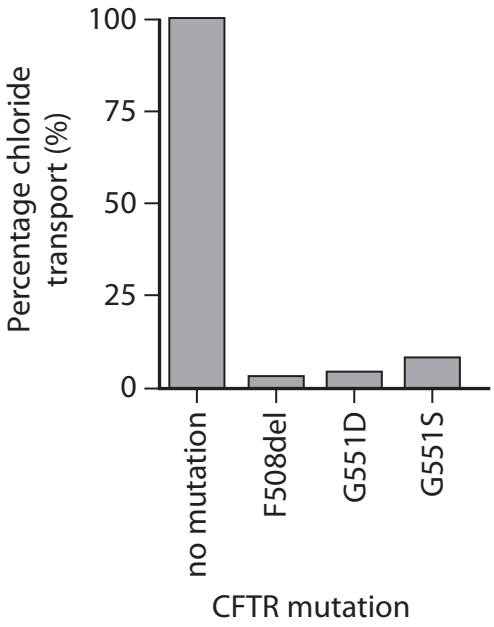
(ii) Plot a suitable graph to show the percentage of people with these mutations.

(2)



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*(d) The graph gives information about chloride transport in the human respiratory system with the normal allele for the CFTR protein and with the three mutated CFTR alleles.



The table gives information about the CFTR protein produced by cystic fibrosis (CF) sufferers with mutated alleles.

Mutation	Estimated percentage of CF sufferers who have one or more alleles with this mutation	Problem with CFTR protein channel
F508del	90	Reduced quantity / no CFTR protein
G551D	4	Reduced function
G551S	<1	Reduced function

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Assess the effect that these mutations have on the human respiratory system.

(6)

(Total for Question 8 = 12 marks)

TOTAL FOR PAPER = 80 MARKS

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