Write your name here

Surname	Other names

Pearson Edexcel
International
Advanced Level

Centre Number | | | | | |

Candidate Number | | | | |

Biology

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

Wednesday 8 January 2014 – Morning
Time: 1 hour 30 minutes

Paper Reference
WBI01/01

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 ▶

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P 4 2 9 1 0 A 0 1 2 8

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 All living organisms rely on biological molecules such as polysaccharides and polynucleotides.

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

(i) The name of the bonds that join monosaccharides together in a polysaccharide is

(1)

☒ **A** Ester

☒ **B** Glycosidic

☒ **C** Hydrogen

☒ **D** Peptide

(ii) The name of the bonds that join two complementary strands of nucleotides together in DNA is

(1)

☒ **A** Glycosidic

☒ **B** Hydrogen

☒ **C** Ionic

☒ **D** Peptide

(iii) The name of the base that is found in RNA but not DNA is

(1)

☒ **A** Adenine

☒ **B** Guanine

☒ **C** Thymine

☒ **D** Uracil

(iv) If 30% of the DNA in a cell consists of guanine, it will also contain

(1)

☒ **A** 20% adenine

☒ **B** 30% adenine

☒ **C** 20% cytosine

☒ **D** 30% thymine

(b) Explain why water is an effective molecule for transporting other molecules around living organisms.

(3)

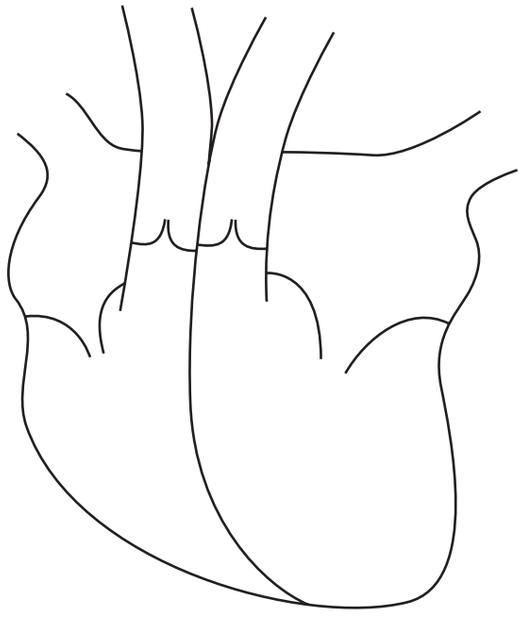
(Total for Question 1 = 7 marks)

2 A mammalian heart has four chambers and valves that control the direction of blood flow.

(a) The diagram below shows a section through a mammalian heart.

Add **arrows** to the diagram to show the direction of blood flow during one complete cardiac cycle.

(2)



(b) The table below shows changes in the volume of blood in the left ventricle during one second. The volume is expressed as a percentage of the maximum volume of blood the ventricle can hold.

Time / s	Volume of blood as a percentage of the maximum (%)
0.0	70
0.1	100
0.2	70
0.3	30
0.4	0
0.5	35
0.6	60
0.7	70
0.8	70
0.9	100
1.0	70

(i) Using the information in the table, state the length of one cardiac cycle.

(1)

..... seconds

(ii) Using the information in the table, explain what happened to the semilunar valves between 0.4 and 0.5 seconds.

(2)

.....

.....

.....

.....

(iii) The maximum volume of blood in the left ventricle is 50 cm^3.

Calculate the volume of blood in the left ventricle at 0.6 seconds.

Show your working.

(2)

Volume of blood: ..... cm^3

(c) Sandra told her doctor that she often felt breathless and lacked energy. Her doctor listened to her chest with a stethoscope. The doctor heard a sound characteristic of a faulty atrioventricular valve.

Suggest why a faulty atrioventricular valve could lead to Sandra's symptoms of breathlessness and lack of energy.

(3)

(Total for Question 2 = 10 marks)

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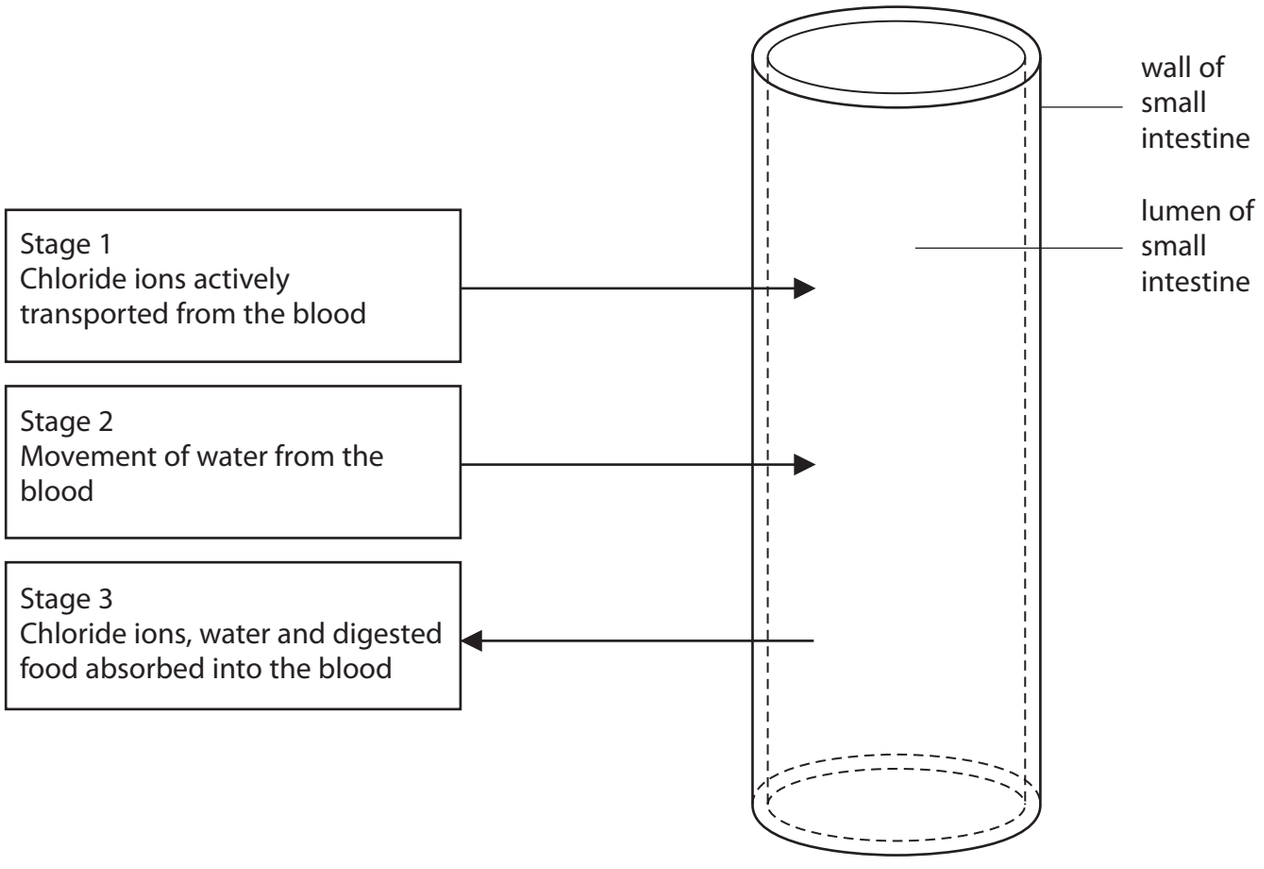
3 Cholera is a disease caused by the bacterium *Vibrio cholerae*.

This bacterium produces a toxin (choleragen) that binds to the cell surface membranes of the cells lining the intestine. This stimulates an increase in the active transport of chloride ions into the lumen of the intestine.

This results in diarrhoea and the loss of large volumes of fluid from the body.

(a) The diagram below shows the movement of chloride ions, water and digested food through the wall of the small intestine during digestion in a healthy person.



(i) Explain why ATP is needed for the active transport of chloride ions into the lumen of the small intestine.

(2)

(ii) Using the information given in the question, suggest why a person with cholera loses large volumes of fluid as diarrhoea.

(4)

(iii) Some of the chloride ions are reabsorbed into the blood by facilitated diffusion.

Compare the processes of facilitated diffusion and active transport.

(2)

(b) One way of treating diarrhoea is to use a food-based oral rehydration therapy that contains a lot of starch and water.

Suggest why this therapy is effective in the treatment of cholera.

(4)

(Total for Question 3 = 12 marks)

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4 The photograph below shows a pair of human lungs.

Magnification × 0.25

(a) Read through the following passage then write on the dotted lines the most appropriate word or words to complete the passage.

Smoking may result in the lung condition called emphysema. Emphysema is caused by damage to the ..... in the lungs, resulting in a smaller ..... for gas exchange.

Air is trapped in the lungs, reducing the concentration gradients of gases.

As a result, less ..... is absorbed into the blood by the process of ..... .

(4)

(b) The circulatory system is vital for efficient gas exchange in mammals.

Explain how the circulatory system in mammals enables efficient gas exchange.

(5)

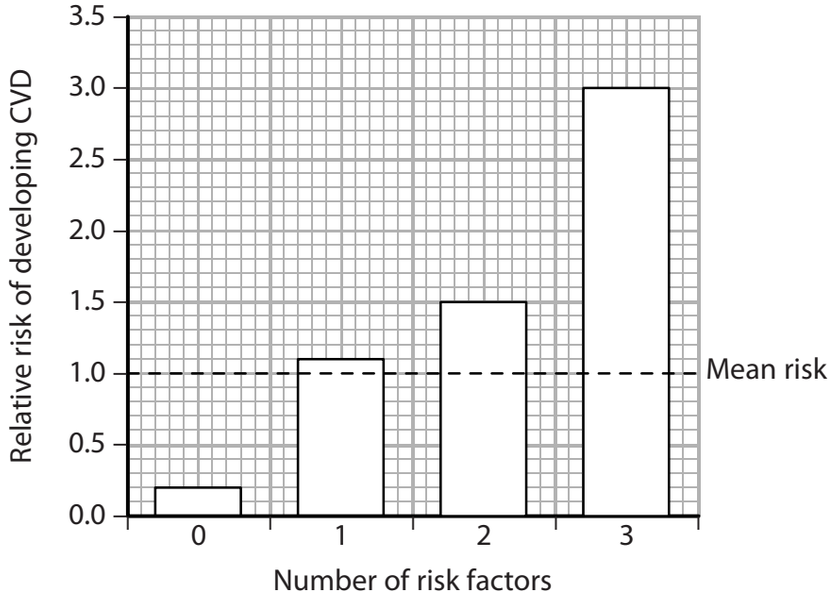
(Total for Question 4 = 9 marks)

5 Asim has been warned by his doctor that he is at an increased risk of cardiovascular disease (CVD) because of his current high-fat diet and low activity levels.

*(a) Explain why the combination of a high-fat diet and low activity levels may lead to CVD.

(5)

(b) The bar chart below shows how the number of risk factors affects the risk of developing CVD.



(i) Using the information in the bar chart, describe the relationship between the number of risk factors and the risk of developing CVD.

(2)

(ii) Suggest **one** change in diet, other than reducing saturated fats, which could help reduce the risk of developing CVD.

(1)

(c) Statins can be used to treat CVD.

Give **one** risk associated with the use of statins.

(1)

(d) Diuretics are antihypertensive drugs used to treat some people with CVD. They cause an increase in fluid loss from the body by stimulating urine production.

Suggest how diuretics can help reduce the risk of CVD.

(2)

(Total for Question 5 = 11 marks)

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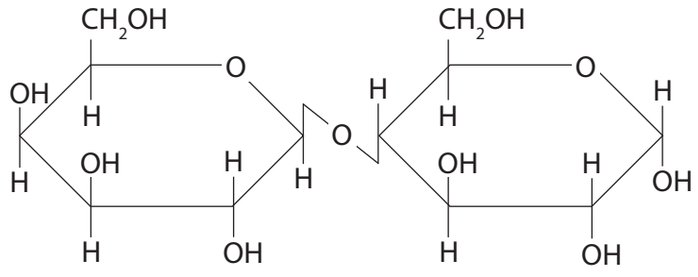
6 The genetic disorder galactosaemia means 'galactose in the blood'.

(a) Galactose is a monosaccharide found in lactose. The structure of lactose is shown in the diagram below.



Galactose Glucose

In the space below draw the products of the hydrolysis of lactose.

(2)

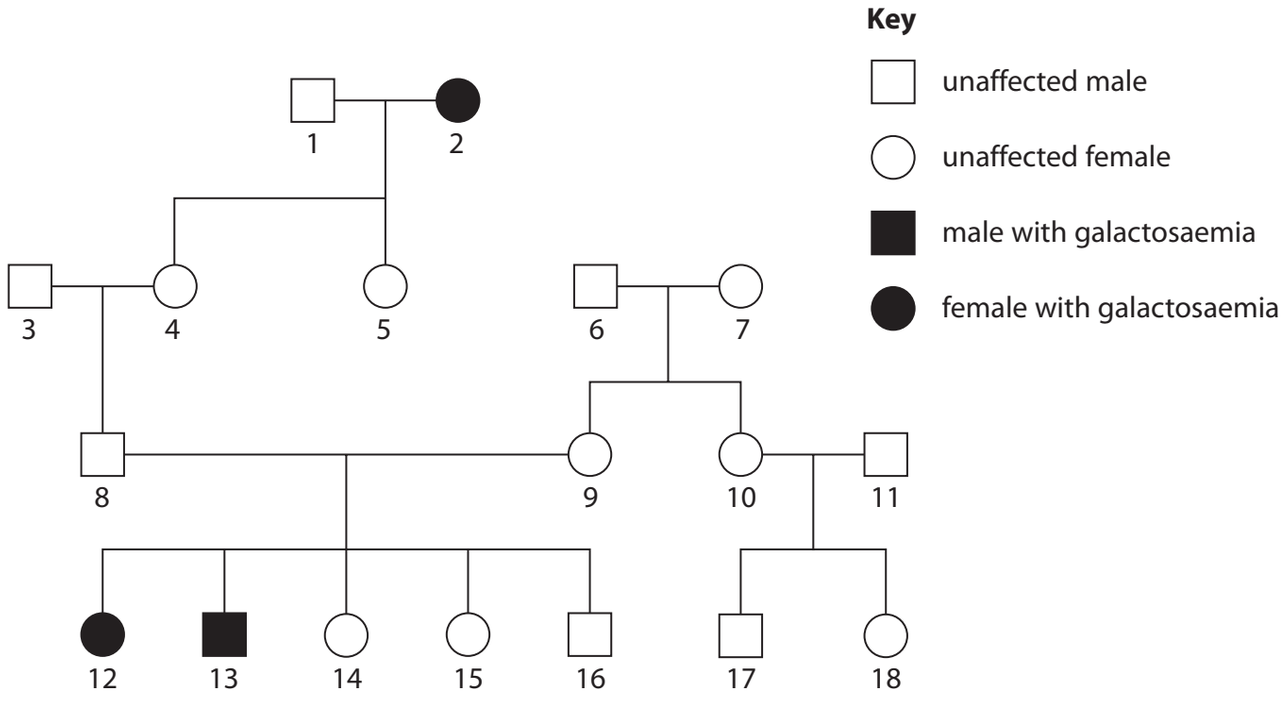
*(b) Galactose is broken down by an enzyme called Gal-1-PUT. In some types of galactosaemia, this enzyme does not function properly.

Explain why a mutation in the gene coding for the enzyme Gal-1-PUT could lead to the inability to break down galactose.

(4)

(c) Galactosaemia is caused by a recessive allele.

The pedigree diagram below shows part of a family in which galactosaemia is an inherited condition.



(i) Explain how this pedigree diagram indicates that galactosaemia is caused by a recessive allele.

(2)

(ii) Using a suitable genetic diagram, calculate the probability that the **next** child of parents 8 and 9 will have galactosaemia.

(3)

probability .....

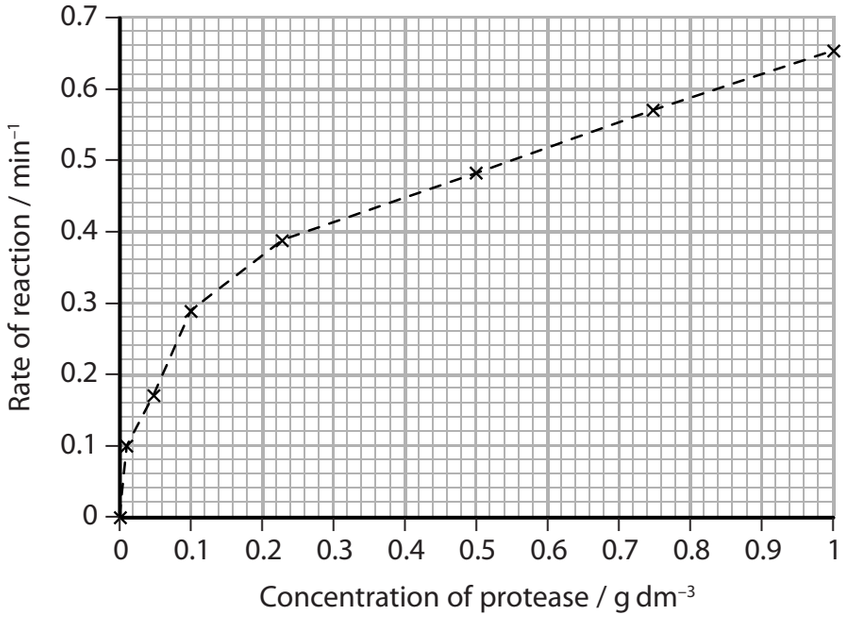
(Total for Question 6 = 11 marks)

7 (a) Blood stains are often difficult to remove from clothes. The protein haemoglobin causes coloured stains. When blood dries on cloth material, the protein binds to the material fibres.

Biological washing powders contain proteases which are enzymes that hydrolyse proteins.

Simone investigated the effect of changing the concentration of a protease on the time it took to remove large blood stains from pieces of cloth.

The graph below shows the results of her investigation.



(i) Using information in the graph, describe the effect of changing protease concentration on the rate of reaction.

(2)

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(ii) Name the type of molecule produced from the complete digestion of a protein.

(1)

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(iii) Suggest how Simone carried out this investigation to produce valid and reliable results.

(5)

(b) Stains on clothes often include lipids. Biological washing powders contain detergents and may also include lipase, which hydrolyses lipids.

Detergents break up the lipids into smaller lipid droplets in the water.

(i) Suggest why the detergents help to increase the rate of hydrolysis of the lipids by lipase.

(2)

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(ii) Name **two** products of hydrolysis of the lipids.

(2)

1 .....

2 .....

(Total for Question 7 = 12 marks)

8 Cystic fibrosis is a recessive genetic disorder caused by one of a number of genetic variations.

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

(i) Someone with cystic fibrosis will have a

(1)

☒ **A** heterozygous genotype

☒ **B** homozygous genotype

☒ **C** heterozygous phenotype

☒ **D** homozygous phenotype

(ii) Cystic fibrosis is often caused by a mutation affecting the

(1)

☒ **A** CFTR enzyme

☒ **B** CFTR carrier protein

☒ **C** CFTR channel protein

☒ **D** CFTR glycolipid

(iii) During pregnancy, parents who are carriers of alleles for cystic fibrosis can test a fetus for this disorder by using

(1)

☒ **A** chorionic villus sampling

☒ **B** gene therapy

☒ **C** in-vitro fertilisation

☒ **D** preimplantation genetic diagnosis

(iv) The use of somatic gene therapy for treating cystic fibrosis involves

(1)

☒ **A** introducing a copy of a normal allele into an adult cell using a vector

☒ **B** introducing a copy of a normal allele into an egg cell using a virus

☒ **C** replacing a faulty gene in an adult cell using a virus

☒ **D** replacing a faulty gene in an egg cell using a vector

(b) Give **two** ethical or social issues related to the use of genetic screening for genetic disorders.

(2)

1 .....

.....

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2 .....

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(c) Suggest why women with cystic fibrosis may find it difficult to become pregnant.

(2)

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(Total for Question 8 = 8 marks)

TOTAL FOR PAPER = 80 MARKS

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