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Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel International GCSE (9–1)

Centre Number | | | | | |

Candidate Number | | | | |

Thursday 9 May 2019

Morning (Time: 1 hour 45 minutes) | Paper Reference **4HB1/02**

Human Biology

Unit: 4HB1

Paper: 02

You must have:
Ruler
Calculator

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.*
- Show all the steps in any calculations and state the units.
- 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 ☒.

Information

- The total mark for this paper is 90.
- 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.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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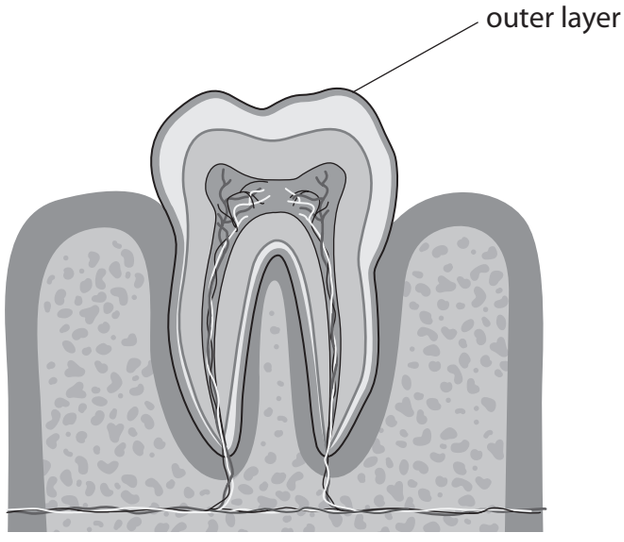
Answer ALL questions.

1 (a) The diagram shows a section through one type of tooth.



(i) State the name of this type of tooth.

(1)

.....

(ii) Which substance forms the outer layer of the tooth?

(1)

☒ **A** bone

☒ **B** dentine

☒ **C** enamel

☒ **D** pulp

(iii) Explain why this type of tooth is more likely to decay than other types of teeth.

(3)

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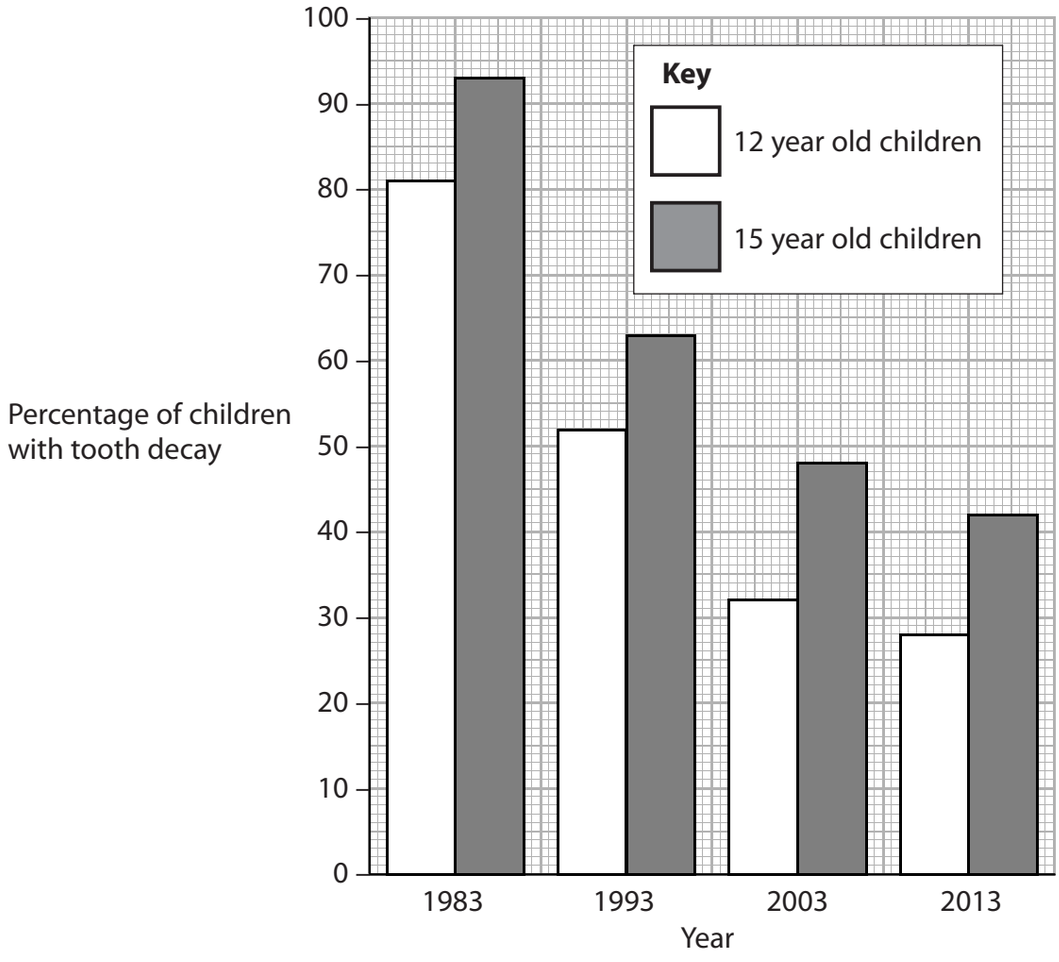
(b) The bar chart shows the percentage of children with tooth decay.

It gives this information for 12 and 15 year old children over a period of 30 years.



(i) Give two conclusions that can be made from the data in the bar chart.

(2)

1 .....

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2 .....

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(ii) Suggest a reason for the change in the percentage of children with tooth decay over the 30 year period.

(1)

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(Total for Question 1 = 8 marks)

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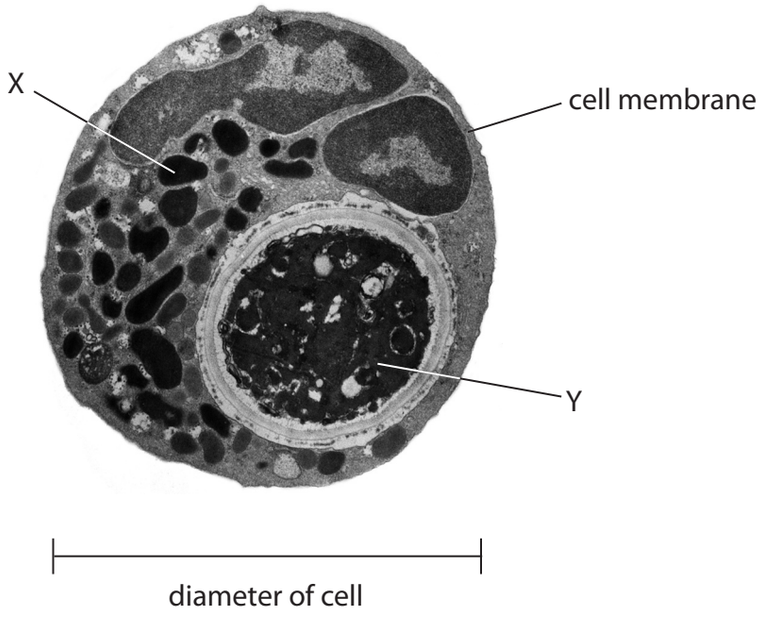
2 (a) The image is an electron micrograph of a human body cell.



(Source: © Science History Images/Alamy)

(i) The table gives information about parts of the human body cell.

Complete the table by giving the missing information.

(2)

Part	Name of part	Function
X		release energy from glucose
Y	nucleus	

(ii) Electron microscopes and light microscopes can both be used to view body cells.

Which of these is an advantage of using an electron microscope?

(1)

☒ **A** more cell structures can be seen with greater resolution

☒ **B** more cell structures can be seen with less resolution

☒ **C** fewer cell structures can be seen with greater resolution

☒ **D** fewer cell structures can be seen with less resolution

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(iii) The actual diameter of this human body cell before magnification is 0.05 mm.

Use information from the image to calculate the magnification of the cell.

(3)

magnification = ...

(b) Body cells produce carbon dioxide.

Describe how carbon dioxide passes from a body cell into the blood.

(2)

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(Total for Question 2 = 8 marks)

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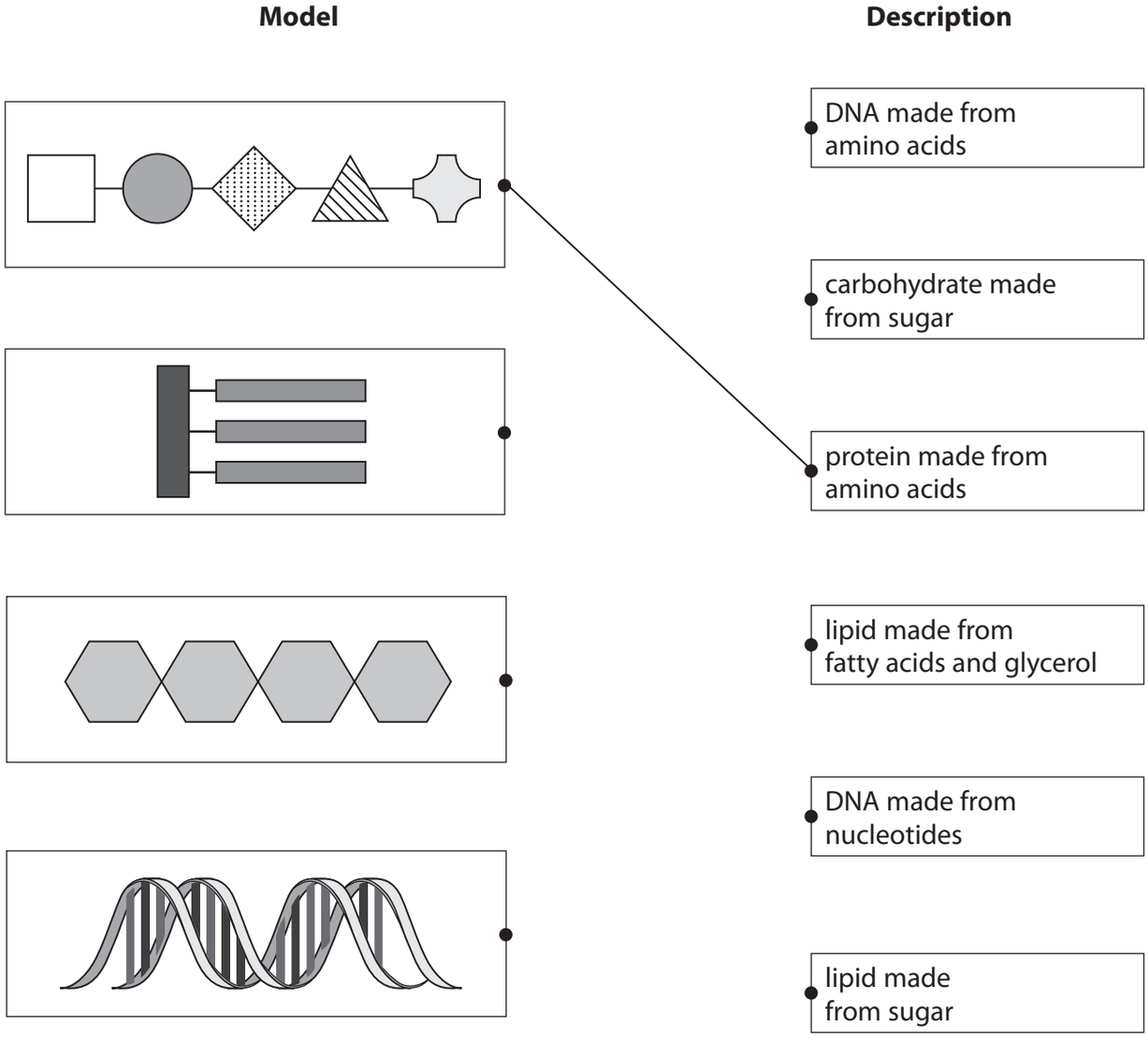
3 (a) The diagram shows models of four biological molecules.

Draw a straight line from each model to its correct description.

One has been done for you.

(3)



(b) Which body organ produces enzymes that break down protein?

(1)

☒ **A** gall bladder

☒ **B** large intestine

☒ **C** mouth

☒ **D** stomach

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(c) A student uses this method to test different substances for protein.

- grind solid substances into small pieces
- place substances into separate test tubes
- add a few drops of Biuret reagent to each substance
- record the colour change for each substance

The table shows the student's results.

Substance	Colour after Biuret test
milk	purple
pasta	blue
lemon juice	blue
cheese	purple
distilled water	purple

(i) In the student's test, how many of the substances give a positive result for protein?

(1)

.....

(ii) The result for distilled water is incorrect.

Suggest one mistake the student could have made to get this incorrect result.

(1)

.....

.....

(d) The table shows an incomplete risk assessment for the Biuret test.

Complete the table by describing how to reduce the risk of each hazard.

(2)

Hazard	Reducing risk
stools – trip hazard	keep stools under bench
broken glass – cuts	
Biuret reagent – irritant	

(Total for Question 3 = 8 marks)

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4 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

In 1916, an American doctor, Joseph Goldberger, noticed symptoms of a mystery disease that were common among his patients. These symptoms included headaches, swollen tongues, skin rashes, upset stomachs and mental illness. In one American state, North Carolina, 40% of the 30 000 people living in this area died from this mystery disease.

Goldberger investigated whether the symptoms of the mystery disease were caused by pathogens. His investigation involved injecting himself with the blood from one patient, eating the skin rash of another and swallowing fluid taken from the intestines of a third. Goldberger did not get the disease, although he did suffer from nausea and diarrhoea.

Goldberger concluded that the symptoms shown by the patients were not caused by an infectious disease. He decided that they were more likely to be caused by the poor diet of the patients.

(a) Calculate the number of people in North Carolina who died from this mystery disease (lines 4 to 5).

(2)

number of deaths = ...

(b) State the meaning of the term pathogens (line 7).

(1)

.....

.....

(c) The people were suffering from a deficiency disease called pellagra, which is caused by a lack of vitamin B in the diet.

State why deficiency diseases such as pellagra are not infectious diseases.

(1)

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(d) Describe a method that Goldberger could use to show that the symptoms of his patients were caused by a lack of vitamin B in their diet.

(3)

(e) Scurvy is another deficiency disease.

Scurvy affects the production of a protein called collagen.

Collagen is a component of many body tissues including cartilage.

Explain why a person with scurvy often experiences pain when walking.

(2)

(Total for Question 4 = 9 marks)

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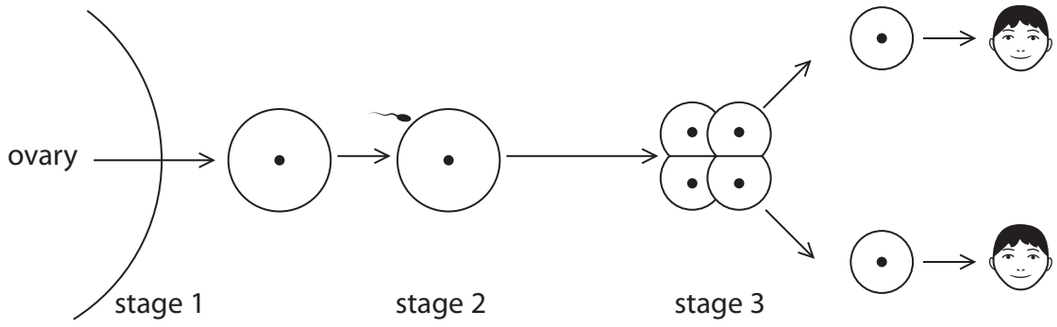
5 (a) The diagram shows how genetically identical twins are produced.



(i) Name the process that occurs at stage 1.

(1)

.....

(ii) Name the process that occurs at stage 2.

(1)

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(iii) Use information from the diagram to explain how genetically identical twins are formed.

(2)

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(b) (i) In-vitro fertilisation (IVF) increases the chance of producing twins.

Which hormones are given to a female at the start of IVF treatment?

(1)

- ☒ **A** FSH and LH
- ☒ **B** LH and oestrogen
- ☒ **C** oestrogen and progesterone
- ☒ **D** progesterone and FSH

(ii) Describe the procedures in IVF after hormone treatment.

(4)

(Total for Question 5 = 9 marks)

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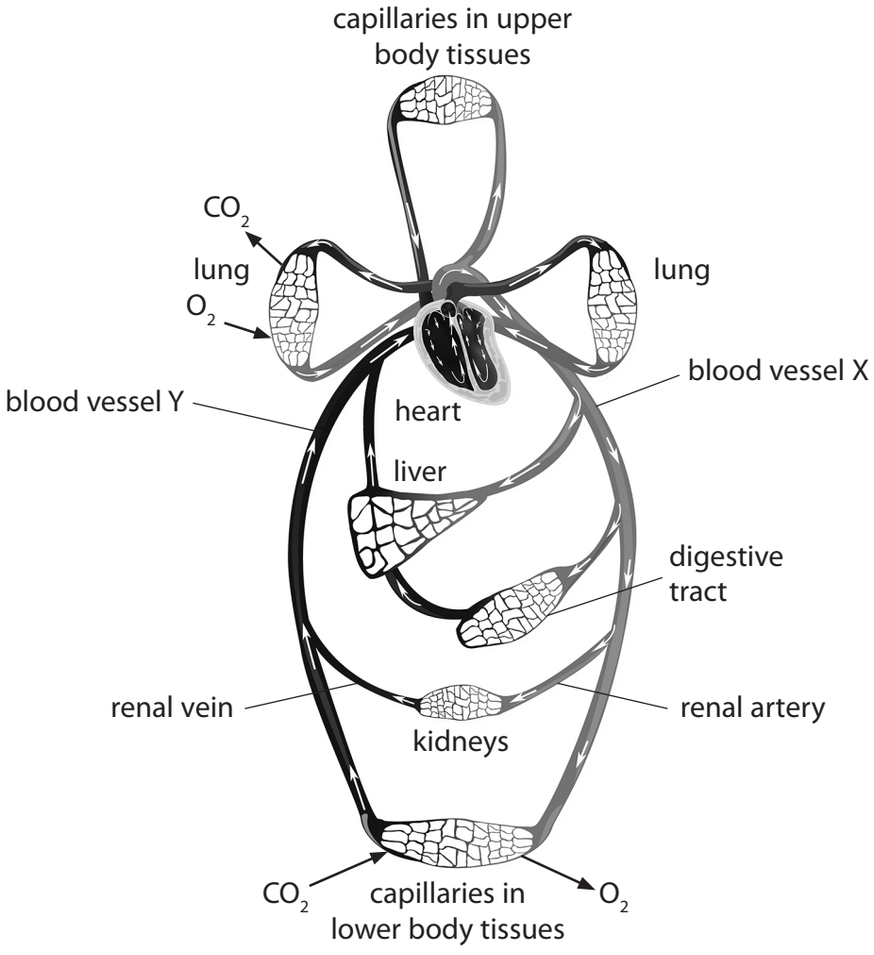
6 The diagram shows the human circulatory system.



(Source: © Designua/Shutterstock)

(a) (i) What is the name of blood vessel X?

(1)

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

(ii) What is the name of blood vessel Y?

(1)

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

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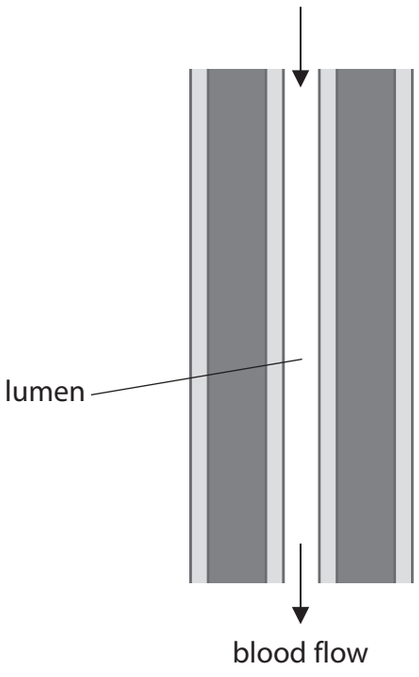
(iii) The diagram shows a longitudinal section through blood vessel X.

Draw a diagram to show a longitudinal section through blood vessel Y.

(3)

blood vessel X



blood vessel Y

(iv) Explain the differences in the structures of blood vessel X and blood vessel Y.

(3)

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(b) Explain two adaptations of capillaries that increase the rate of diffusion of substances into body tissues.

(4)

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2 .....

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(Total for Question 6 = 12 marks)

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7 The volume of alcohol in alcoholic drinks can be measured in units.

One unit is equivalent to 10 cm^3 of pure alcohol.

The diagram shows a bottle of wine with 14% alcohol content and a glass containing 250 cm^3 of this wine.





250 cm^3 glass of Ruby Red wine

(a) Calculate the number of units of alcohol in the glass of wine.

(2)

number of units = ...

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(b) It is illegal for a person to drive a motor vehicle if they have more than the legal limit of alcohol in their bloodstream.

It takes one hour for the body to process one unit of alcohol so that there is no alcohol left in the bloodstream.

(i) A person drinks three units of alcohol. This puts her at the legal limit.

Calculate the time it would take before a person can legally drive after drinking four glasses of Ruby Red wine.

(2)

time = ... hours

(ii) Suggest why it is illegal for people to drive a motor vehicle with more than the legal limit of alcohol in their bloodstream.

(2)

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(c) Drinking a lot of alcohol over a long period of time can cause a condition called cirrhosis.

This condition prevents the cells of the liver from functioning normally.

Explain the effect of cirrhosis on the digestion of food molecules.

(5)

(Total for Question 7 = 11 marks)

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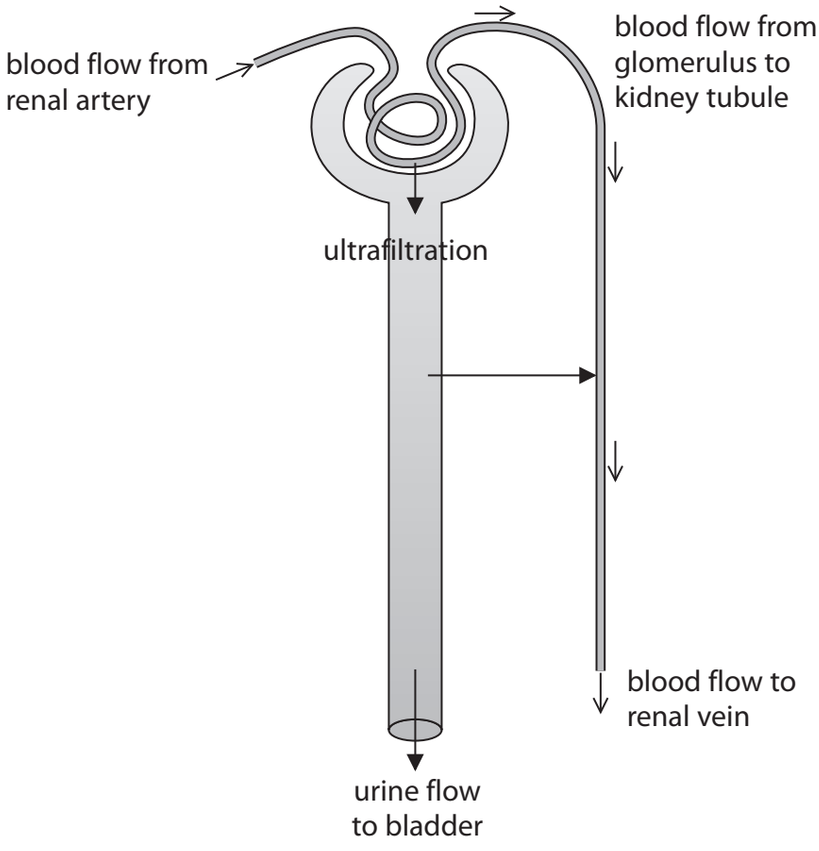
8 (a) The diagram shows part of a nephron in the human excretory system.



(Source: adapted from © Alila Medical Images/Alamy)

(i) Explain how ultrafiltration occurs in the Bowman's capsule.

(2)

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(ii) Explain the differences in the composition of the blood flowing through the renal artery and through the renal vein.

(4)

(b) The quantity of salt in the diet affects the concentration of urine produced.

An investigation is set up to test this statement.

This is the method used.

- ten people are each given a different food
- each food contains a different quantity of salt
- the volume of urine produced by each person is recorded each hour for six hours after eating the food

(i) State the independent variable in this investigation.

(1)

(ii) Explain why this investigation is unlikely to produce valid results.

(2)

(iii) State one change to the method that would make the results more valid.

(1)

(Total for Question 8 = 10 marks)

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9 Aspirin is a painkiller, but can also be prescribed to people who are at risk of having a stroke or a heart attack.

Aspirin dissolves blood clots and is also an enzyme inhibitor, which reduces the risk of more blood clots forming in blood vessels.

(a) (i) Describe how a blood clot forms in a blood vessel.

(3)

(ii) Explain how a blood clot in the coronary artery increases the risk of a heart attack.

(3)

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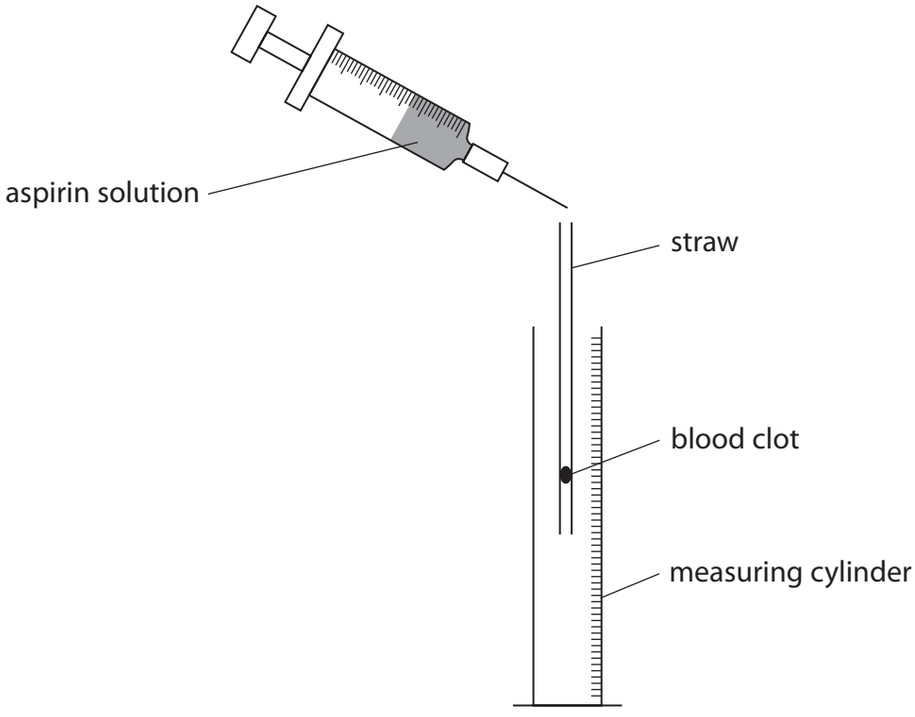
(b) A student uses this apparatus to investigate the effect of aspirin on the rate of blood flow through blood vessels.



The student uses this method.

- dissolve one aspirin tablet in water
- use a syringe to pass the aspirin solution through a straw containing a blood clot
- record the total volume of aspirin solution in the measuring cylinder every five minutes

The student repeats the method with solutions formed from two aspirin tablets and then from three aspirin tablets.

(i) Give a control variable for this investigation.

(1)

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(ii) Describe a suitable control test for this investigation.

(1)

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The table shows the student's results.

Time in minutes	Total volume of aspirin solution in the measuring cylinder in cm^3		
	1 aspirin tablet	2 aspirin tablets	3 aspirin tablets
5	0	0	0
10	0	0	0
15	0	0	1
20	0	1	2
25	1	1	3
30	1	2	4
35	2	4	6
40	5	7	9
45	10	12	16
50	17	19	22
55	25	27	31
60	35	37	39

(iii) Explain the pattern shown by the results.

(3)

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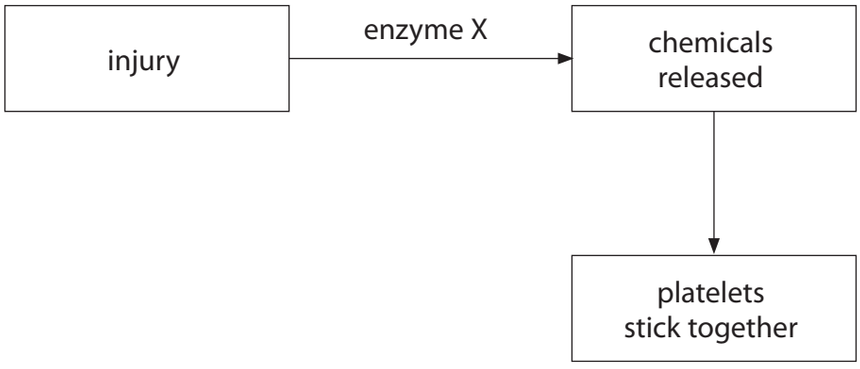
(c) The diagram shows a pathway involved in blood clotting.



Aspirin is an inhibitor of enzyme X.

Explain how the inhibition of enzyme X reduces the formation of blood clots.

(4)

(Total for Question 9 = 15 marks)

TOTAL FOR PAPER = 90 MARKS

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