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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

Tuesday 5 May 2020

Morning (Time: 1 hour 45 minutes) | Paper Reference **4HB1/01**

Human Biology

Unit: 4HB1

Paper: 01

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 steps in any calculations and state the units.

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 The table lists some features and regions of the human alimentary canal.

Tick (✓) one box in each row to show the region of the alimentary canal where each feature occurs.

(6)

	Region of alimentary canal			
Feature	**mouth**	**stomach**	**small intestine**	**large intestine**
starts protein digestion				
starts carbohydrate digestion				
has a pH of 2				
has villi				
absorbs most water				
connects with bile duct				

(Total for Question 1 = 6 marks)

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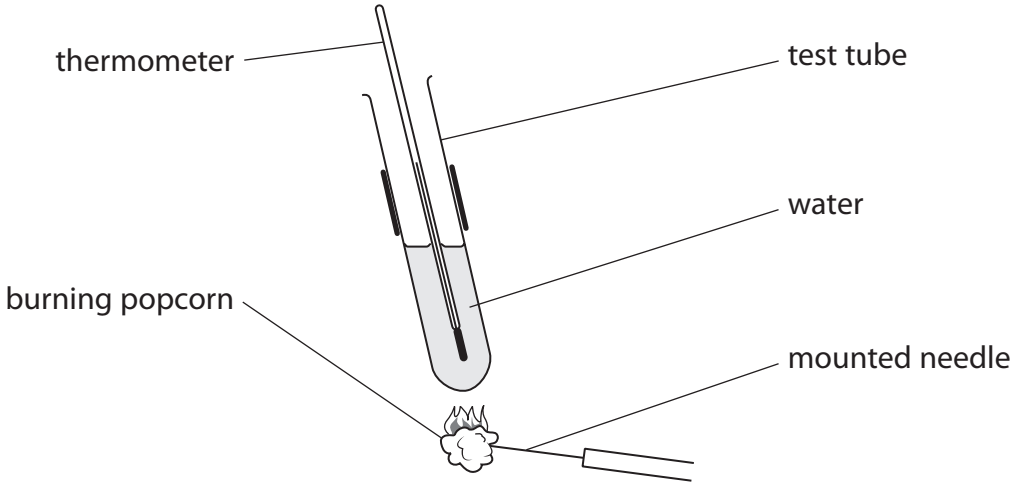
2 A student uses this apparatus to investigate the energy contained in popcorn.



This is the student's method.

- place 12 g of water in a test tube
- measure the initial temperature of the water
- place the popcorn on a mounted needle
- light the popcorn using a Bunsen flame
- place the burning popcorn under the test tube
- measure the maximum temperature of the water

(a) (i) State why the test tube should have thin glass walls.

(1)

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(ii) Explain one safety precaution that the student should take during the investigation.

(2)

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(b) The student uses this equation to calculate the energy released by the popcorn.

energy released = mass (g) × 4.2 × temperature rise (°C)

The initial temperature of the 12 g of water is 17 °C.

The maximum temperature of the water is 45 °C.

(i) Calculate the energy released when the student burns the popcorn.

Give your answer to 2 significant figures.

(3)

energy released = ... J

(ii) Explain why the calculated amount of energy released is not the same as the full amount of energy contained in the popcorn.

(3)

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(c) The student wants to compare the energy content of popcorn with the energy content of two other foods.

State four factors that the student should control to make sure the comparison is valid.

(4)

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(Total for Question 2 = 13 marks)

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3 There are many factors that affect the height of a human.

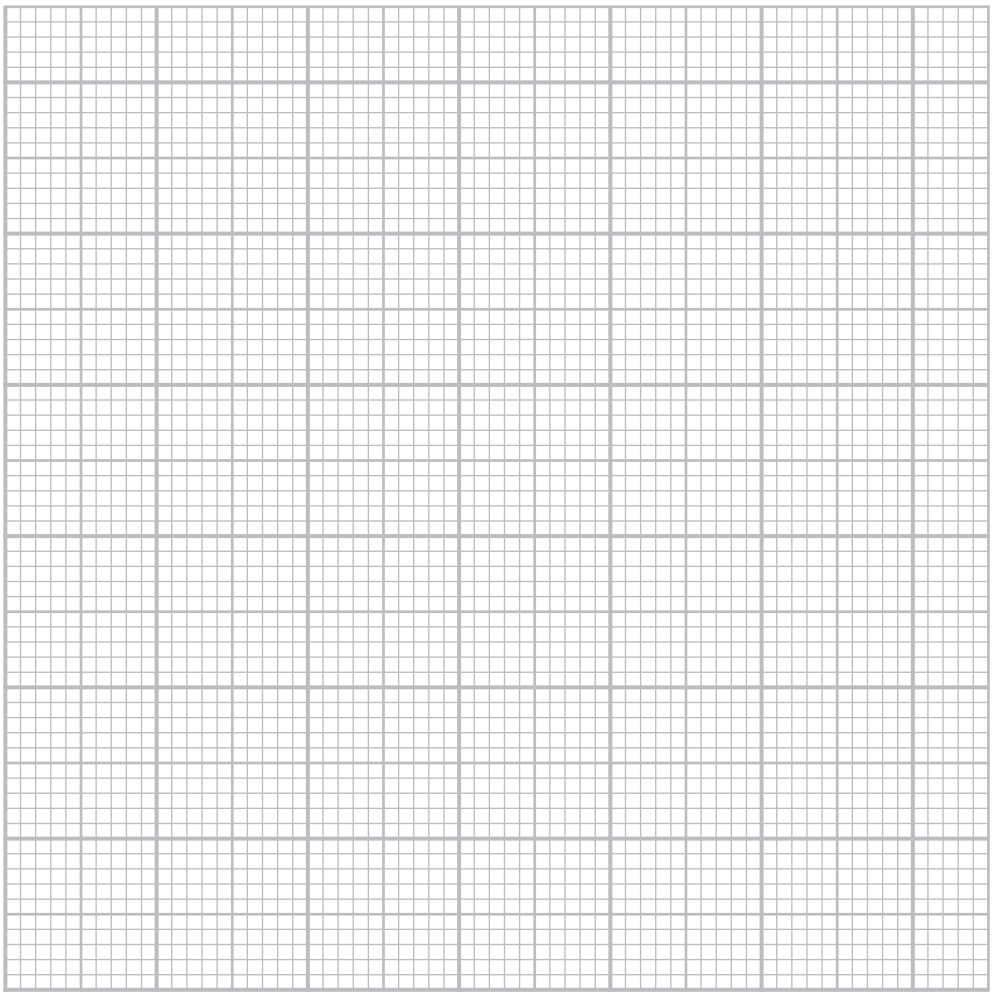
(a) The heights of a group of students are measured.

The table shows the results.

Height in cm	150–151	152–153	154–155	156–157	158–159	$>$ 160
Number of students	4	14	25	20	10	4

(i) Plot a bar chart of the results.

(5)



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(ii) Describe the trend shown in this bar chart.

(2)

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(b) State three factors that could affect the heights of the students.

(3)

1 .....

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2 .....

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3 .....

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(Total for Question 3 = 10 marks)

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4 There are four different blood groups, A, B, AB and O.

The antigens on the surface of red blood cells determine a person's blood group. There are two types of antigen, antigen A and antigen B.

(a) The table lists the four different blood groups.

Complete the table by giving the correct type of antigens for each blood group.

(2)

Blood group	A	B	AB	O
Antigen				

(b) If a person needs a blood transfusion, it is important that they receive a suitable blood group.

Explain the effects on a person who receives a blood group that is not suitable.

(3)

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(c) Explain which blood group or groups can be given to people with each of the other blood groups during a transfusion.

(4)

(d) The table shows the percentage of students with each type of blood group in a school.

Blood group	Percentage (%)
A	42
B	10
AB	4
O	44

There are 750 students in the school.

Calculate the number of students who can safely receive blood group B.

(3)

number of students = ...

(Total for Question 4 = 12 marks)

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5 This question is about the nervous system.

(a) Describe what is meant by a reflex action.

(3)

(b) Diagram 1 shows a reflex arc.

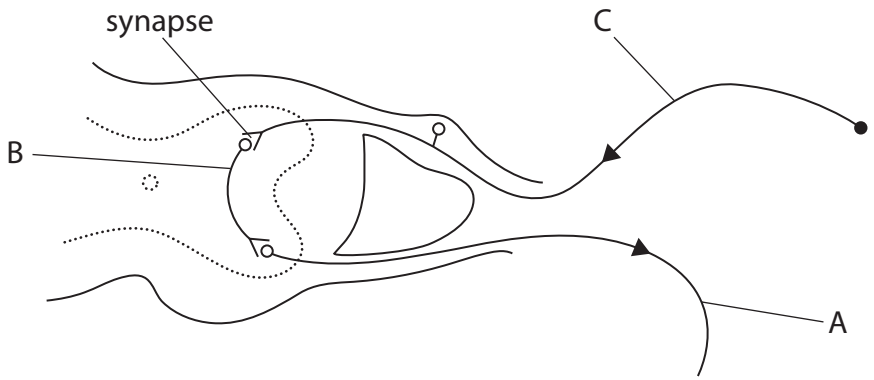

Diagram 1

Name the types of neurone labelled A, B and C.

(3)

A .....

B .....

C .....

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(c) Diagram 2 shows a neurone from a healthy brain and a neurone from the brain of someone with Alzheimer's disease.

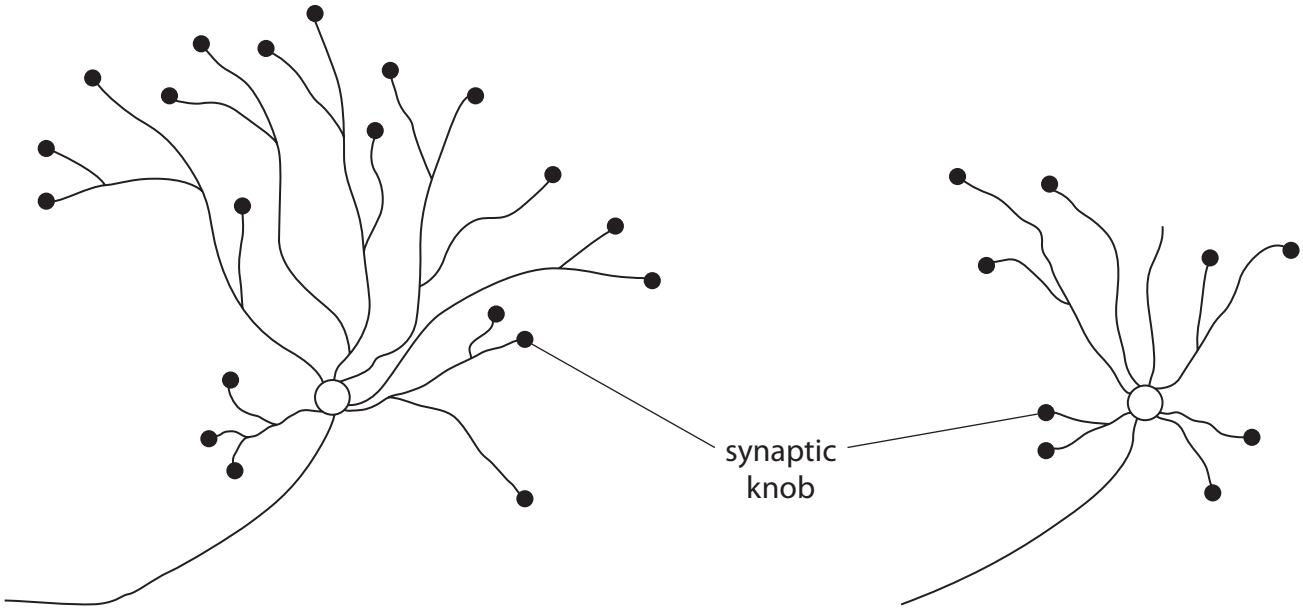

Diagram 2

(i) Give three differences between the two neurones.

(3)

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(ii) Acetylcholine is a neurotransmitter.

Explain the importance of acetylcholine in the functioning of the brain.

(3)

(iii) One symptom of Alzheimer's disease is that less acetylcholine is produced in the brain.

Explain why there is less acetylcholine produced in people with Alzheimer's disease.

Use information from diagram 2 to help your answer.

(3)

(Total for Question 5 = 15 marks)

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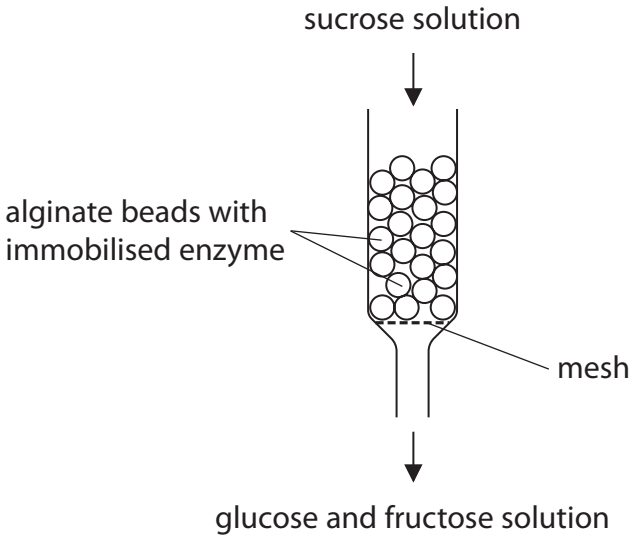
6 (a) The diagram shows how immobilised enzymes can be used to convert sucrose into glucose and fructose.



(i) Name the immobilised enzyme used in this process.

(1)

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(ii) One advantage of using immobilised enzymes is that they do not contaminate the products, glucose and fructose.

Explain how the products could be tested to show that they had not been contaminated by the enzyme.

(3)

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(iii) State two other advantages of using immobilised enzymes.

(2)

1 .....

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2 .....

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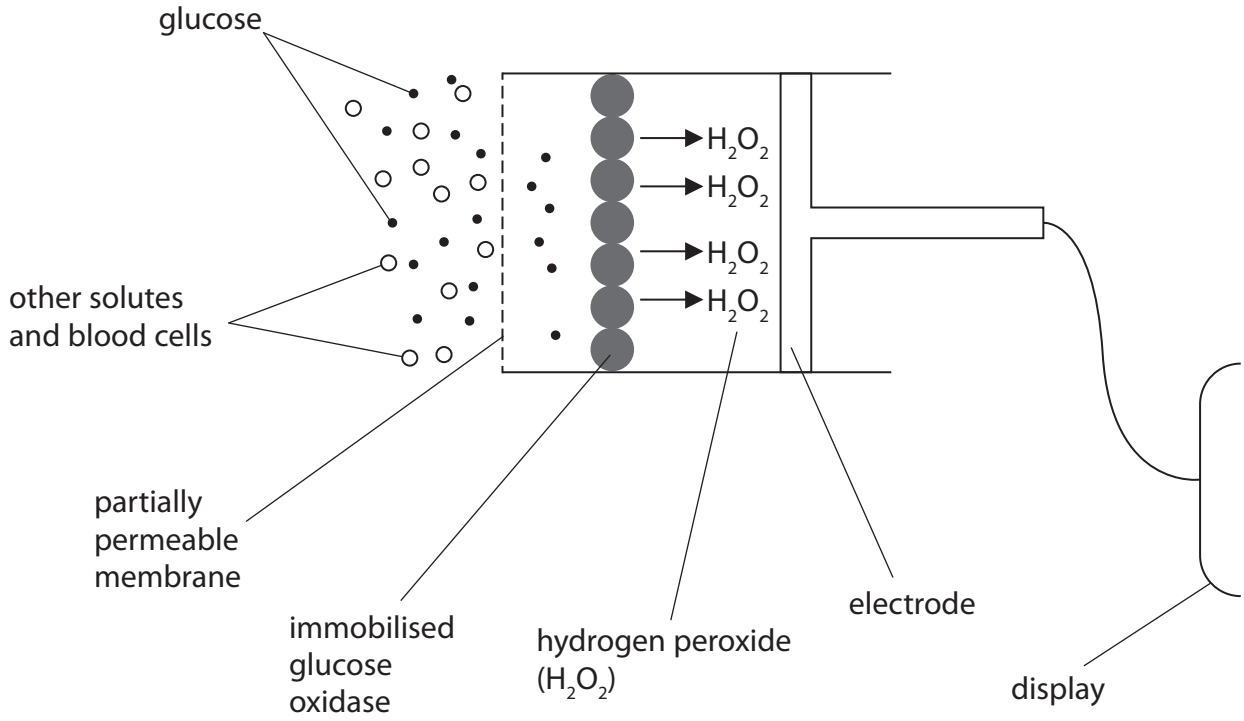
(b) Biosensors that contain immobilised enzymes can be used to measure the levels of glucose in blood.

The diagram shows this type of biosensor.



(i) Explain the function of the partially permeable membrane.

(2)

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(ii) Explain the function of the immobilised enzyme in the biosensor.

Use information from the diagram to help your answer.

(4)

(Total for Question 6 = 12 marks)

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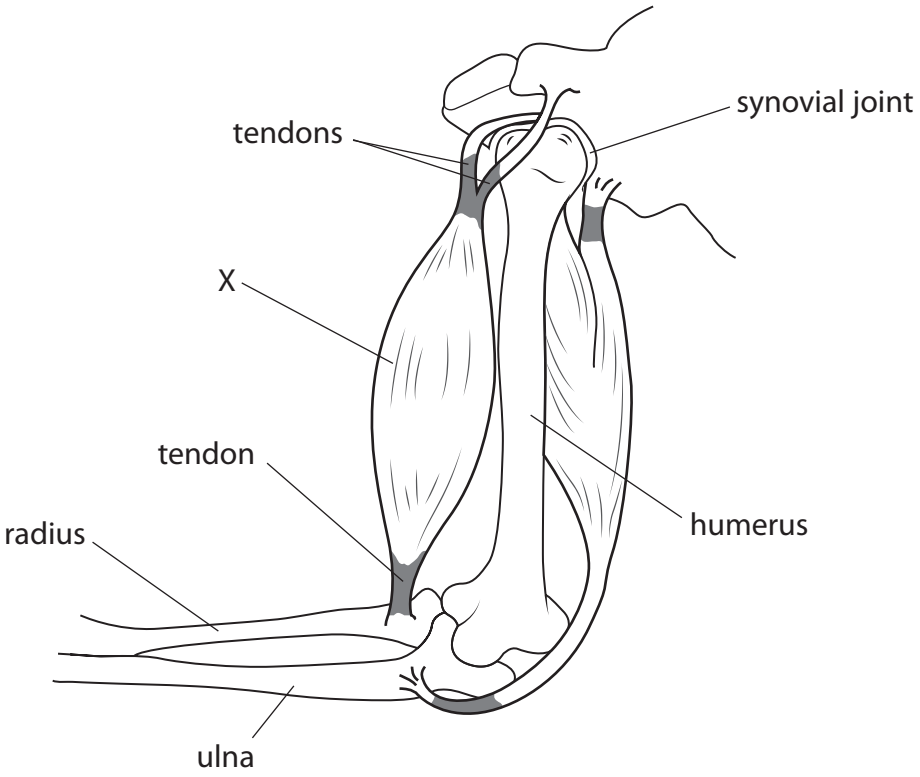
7 The diagram shows the bones of a human arm and the muscles that move the lower arm.



(a) (i) Muscle X needs energy to contract.

Name the process that supplies this energy.

(1)

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(ii) Muscle X contracts when the lower arm is raised further.

Describe the changes in shape of muscle X when the lower arm is raised further.

(2)

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(iii) Explain how the contraction of muscle X causes the lower arm to be raised.

(3)

(b) Draw a labelled diagram to show the internal structure of the synovial joint.

(6)

(Total for Question 7 = 12 marks)

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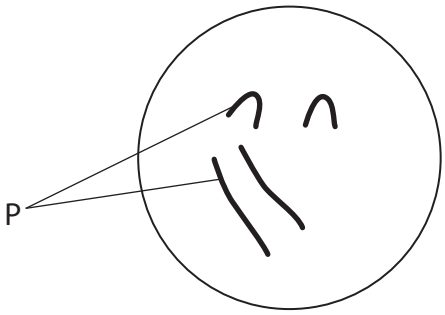
8 (a) The diagram shows the nucleus of a cell.



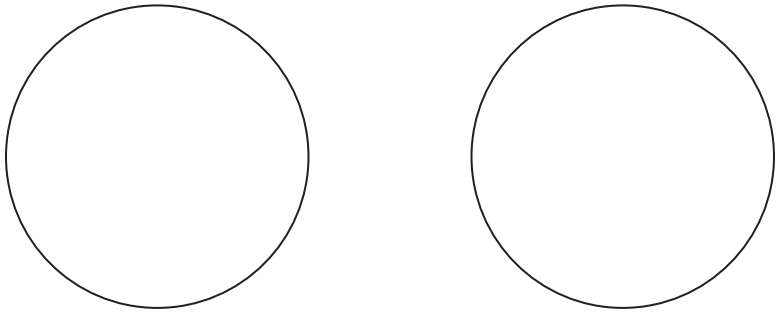
(i) Name the structures labelled P.

(1)

(ii) The cell divides by mitosis and two nuclei are produced.

Draw the appearance of the two nuclei.

(2)



(b) Before mitosis can occur, the DNA of the cell must replicate.

The table lists stages of DNA replication.

Write the numbers 1, 2, 3 and 4 in the boxes to show these stages in the correct order.

(1)

Stage	Number
complementary bases pair up	
DNA double helix unwinds	
strands separate	
two DNA helices form	

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(c) The DNA of the nucleus is analysed.

The table shows the results.

Base	X	adenine	Y	Z
Pecentage base in DNA (%)	30	20	30	20

(i) Identify base Z.

(1)

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(ii) Give the possible identities of base X.

(1)

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(d) Meiosis is another type of cell division.

Explain why meiosis is important in humans.

(4)

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(Total for Question 8 = 10 marks)

TOTAL FOR PAPER = 90 MARKS

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