

Paper Reference(s) 4HB1/02  
Pearson Edexcel International GCSE (9–1)

Human Biology  
UNIT: 4HB1  
PAPER: 02

Total Marks
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Wednesday 14 June 2023 – Morning

Time: 1 hour 45 minutes

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

**YOU MUST HAVE**

**Calculator, ruler**

**YOU WILL BE GIVEN**

**Diagram Booklet**

**INSTRUCTIONS**

**If pencil is used for diagrams / sketches / graphs it must be dark (HB or B).**

**Answer ALL questions.**

**Answer the questions in the spaces provided in this Question Paper or in the separate Diagram Booklet – there may be more space than you need.**

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

**Turn over**

## **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.**

**There may be spare copies of some diagrams.**

## **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.**

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**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 The words below list structures that may be found in the human body.**

**epididymis**

**oviduct**

**prostate**

**testis**

**uterus**

**ureter**

**urethra**

**vagina**

**vulva**

**Look at the table for Question 1 in the Diagram Booklet. Complete the table using words from the list to give the missing information.**

**(6 marks)**

**(Total for Question 1 = 6 marks)**

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**2 Look at the table for Question 2 in the Diagram Booklet. It gives the nutritional information for a pot of yoghurt.**

**(a) Calculate the mass of protein in one pot of yoghurt.**

**Give your answer to  
two significant figures.  
(3 marks)**

**mass of protein = \_\_\_\_\_g**

**(continued on the next page)**

**2 continued.**

**(b) Describe how the yoghurt could be tested to show that protein is present.  
(3 marks)**

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**(continued on the next page)**

**Turn over**

**2 continued.**

- (c) A pot of yoghurt provides 16% of a person's daily requirement of calcium.**

**Calculate how many pots of yoghurt a person would need to eat to obtain their daily requirement of calcium.  
(2 marks)**

**number of pots = \_\_\_\_\_**

**(continued on the next page)**

**2 continued.**

**(d) Explain why yoghurt is good for bone development.  
(5 marks)**

**Answer space continues on the next 2 pages.**

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**Turn over**

**2(d) continued.**

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**Turn over**

**2(d) continued.**

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**(Total for Question 2 = 13 marks)**

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**3 Read the passage for Question 3 in the Diagram Booklet. Use the information in the passage and your own knowledge to answer the questions that follow.**

**(a) Suggest why diabetes is described as a condition rather than a disease. (line 1)  
(2 marks)**

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**(continued on the next page)**

**3 continued.**

- (b) (i) Estimate how many people in the United Kingdom have diabetes without knowing that they have it.  
(lines 3 to 6)  
(3 marks)**

**number of people =**

**\_\_\_\_\_ million**

**(continued on the next page)**

**Turn over**

**3(b) continued.**

- (ii) Estimate how many people in the United Kingdom have Type 1 diabetes. (lines 8 to 10)  
(2 marks)**

**number of people =**

**\_\_\_\_\_ million**

**(continued on the next page)**

**3 continued.**

**(c) (i) People with diabetes are at risk of high blood sugar levels.**

**State the name of the main sugar carried in blood. (line 7)  
(1 mark)**

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**(continued on the next page)**

**Turn over**

**3(c) continued.**

- (ii) Suggest why some people with diabetes may develop problems with their eyesight and hearing.  
(lines 14 to 18)  
(2 marks)**

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**(continued on the next page)**

**Turn over**

**3(c) continued.**

**(iii) Explain why passing more  
urine is a symptom of diabetes.  
(lines 19 and 20)  
(3 marks)**

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**(Total for Question 3 = 13 marks)**

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**Turn over**

- 4 (a) (i) Complete the word equation for one type of respiration.  
(2 marks)

oxygen + \_\_\_\_\_ →

\_\_\_\_\_ + \_\_\_\_\_

- (ii) State the type of respiration shown by the equation.  
(1 mark)

\_\_\_\_\_

\_\_\_\_\_

(continued on the next page)

**4(a) continued.**

**(iii) In which part of the cell does this type of respiration occur?  
(1 mark)**

☐ **A endoplasmic reticulum**

☐ **B mitochondrion**

☐ **C nucleus**

☐ **D ribosome**

**(iv) Name the molecule used to transfer energy in a cell.  
(1 mark)**

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**(continued on the next page)**

**Turn over**

**4 continued.**

**(b) An investigation was carried out to see how a person's metabolic rate (MR) and the external temperature change at different times in one year.**

**Look at the graph for Question 4(b) in the Diagram Booklet. It shows the results of the investigation for one person.**

**(continued on the next page)**

**4(b) continued.**

- (i) Describe how the investigation could be made more reliable.  
(2 marks)**

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**(continued on the next page)**

**4(b) continued.**

- (ii) Determine the difference between the maximum metabolic rate and minimum metabolic rate.  
(2 marks)**

**difference = \_\_\_\_\_ kJ per day**

**(continued on the next page)**

**Turn over**

**4(b) continued.**

**(iii) Explain why the metabolic rate changes throughout the year.  
(5 marks)**

**Answer space continues on the next  
2 pages.**

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**Turn over**

4(b)(iii) continued.

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**4(b)(iii) continued.**

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**(iv) Suggest how the metabolic rate  
could be measured.  
(1 mark)**

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**(Total for Question 4 = 15 marks)**

**Turn over**

- 5 (a) A red blood cell travelling from the liver to the kidney passes through six different arteries and veins.**

**Look at the chart for Question 5(a) in the Diagram Booklet. Complete the flow chart by naming these blood vessels in order. The first one has been done for you.**

**(5 marks)**

**(continued on the next page)**

**5 continued.**

**(b) A student investigates the effect of time spent exercising on pulse rate.**

**Look at the graph for Question 5(b) in the Diagram Booklet. It shows the student's results.**

**(i) Explain the change in pulse rate recorded by the student.  
(4 marks)**

**Answer space continues on the next page.**

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**Turn over**

**5(b)(i) continued.**

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

**(continued on the next page)**

**Turn over**

**5(b) continued.**

**(ii) Describe how the student could  
carry out the investigation.  
(6 marks)**

**Answer space continues on the next  
2 pages.**

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**Turn over**

5(b)(ii) continued.

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**5(b)(ii) continued.**

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**(Total for Question 5 = 15 marks)**

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- 6 Sickle cell anaemia is an inherited condition. It is caused by a mutation of the gene that controls the production of haemoglobin.**

**This condition is caused by a recessive allele.**

- (a) (i) Explain how a mutation can cause a condition such as sickle cell anaemia.  
(4 marks)**

**Answer space continues on the next page.**

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**Turn over**

**6(a)(i) continued.**

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**(continued on the next page)**

**6(a) continued.**

- (ii) Look at the diagram for Question 6(a)(ii) in the Diagram Booklet. In low oxygen concentrations the red blood cells of someone with sickle cell anaemia become like the cell shown in the diagram.**

**Explain why a person who has the sickle cell condition often feels tired.**

**(5 marks)**

**Answer space continues on the next page.**

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**Turn over**

6(a)(ii) continued.

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**6 continued.**

**(b) A woman, heterozygous for sickle cell anaemia, and a man of unknown genotype for sickle cell anaemia have a child. The child is born with sickle cell anaemia.**

**Explain the possible genotypes of the man.**

**Use H to represent the allele for unaffected haemoglobin and h to represent the allele for sickle haemoglobin.  
(4 marks)**

**Answer space continues on the next page.**

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**Turn over**

**6(b) continued.**

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**(Total for Question 6 = 13 marks)**

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**7 Look at the diagram for Question 7 in the Diagram Booklet. It shows a section through a tooth.**

**(a) (i) Name the parts of the tooth labelled X, Y and Z.  
(3 marks)**

**X** \_\_\_\_\_

\_\_\_\_\_

**Y** \_\_\_\_\_

\_\_\_\_\_

**Z** \_\_\_\_\_

\_\_\_\_\_

**(continued on the next page)**

**Turn over**

**7(a) continued.**

**(ii) Explain where decay in the tooth  
is most likely to occur.  
(3 marks)**

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**Turn over**

**7 continued.**

**(b) Explain the role of bacteria in the process of tooth decay.  
(4 marks)**

**Answer space continues on the next page.**

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**Turn over**

**7(b) continued.**

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**(continued on the next page)**

**7 continued.**

**(c) Babies are usually born without teeth. The teeth develop many months after birth.**

**Explain why the teeth do not develop until many months after birth.  
(3 marks)**

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**7 continued.**

**(d) Dentists recommend using a mouthwash morning and night to reduce dental decay.**

**One type of mouthwash contains alcohol and sodium fluoride.**

**Explain how this mouthwash could help to reduce dental decay.  
(2 marks)**

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**(Total for Question 7 = 15 marks)**

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**TOTAL FOR PAPER = 90 MARKS  
END OF PAPER**