Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE (9–1)

Wednesday 14 June 2023

Morning (Time: 1 hour 45 minutes)

Paper reference **4HB1/02**

Human Biology

UNIT: 4HB1
PAPER: 02

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **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.

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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 7 2 5 8 7 A 0 1 2 4

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 The box lists structures that may be found in the human body.

epididymis	oviduct	prostate	testis	
uterus	ureter	urethra	vagina	vulva

Complete the table using words from the box to give the missing information.

(6)

Description	Structure
produces sperm	
site of fertilisation	
site where sperm is deposited during intercourse	
place where zygote implants	
tube that carries sperm and urine	
produces the fluid part of semen	

(Total for Question 1 = 6 marks)

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2 The table gives the nutritional information for a pot of yoghurt.

	Mass per 100 g of yoghurt	Mass per 85 g pot
fat	2.7 g	2.3 g
carbohydrate	12.6 g	10.7 g
protein	6.1 g	
calcium	149 mg	127 mg
vitamin D	0.9 μg	0.8 μg

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

Give your answer to two significant figures.

(3)

mass of protein = ... g

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

(3)

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(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)

number of pots = ...

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

(5)

(Total for Question 2 = 13 marks)

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

Diabetes is a very common condition that affects approximately five million people in the United Kingdom. Of these five million people, one person in four has the condition but is not aware that they have it. As a result, many people are at risk of high blood sugar levels.

There are two types of diabetes, Type 1 and Type 2. Type 2 diabetes is the cause of 90% of all cases of diabetes. This type is the result of the body not producing enough insulin or the body not reacting to the insulin.

Diabetes can cause damage to blood vessels and affect the level of fluid in the body. Some people with the condition develop problems with their eyesight and hearing.

Perhaps the most common symptoms of diabetes are passing more urine, a feeling of tiredness and wounds taking longer to heal than normal.

A quick blood test can be taken to show whether someone has the condition. Early diagnosis is important as diabetes increases the risks of some complications such as strokes and heart disease.

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

(2)

.....

.....

.....

.....

(b) (i) Estimate how many people in the United Kingdom have diabetes without knowing that they have it. (lines 2 and 3)

(3)

number of people = ... million

(ii) Estimate how many people in the United Kingdom have Type 1 diabetes. (lines 5 and 6)

(2)

number of people = ... million

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

State the name of the main sugar carried in blood. (line 4)

(1)

(ii) Suggest why some people with diabetes may develop problems with their eyesight and hearing. (lines 8 to 10)

(2)

(iii) Explain why passing more urine is a symptom of diabetes. (line 11)

(3)

(Total for Question 3 = 13 marks)

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

(2)

oxygen + ... → ..... + ...

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

(1)

.....

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

(1)

- ☒ **A** endoplasmic reticulum
- ☒ **B** mitochondrion
- ☒ **C** nucleus
- ☒ **D** ribosome

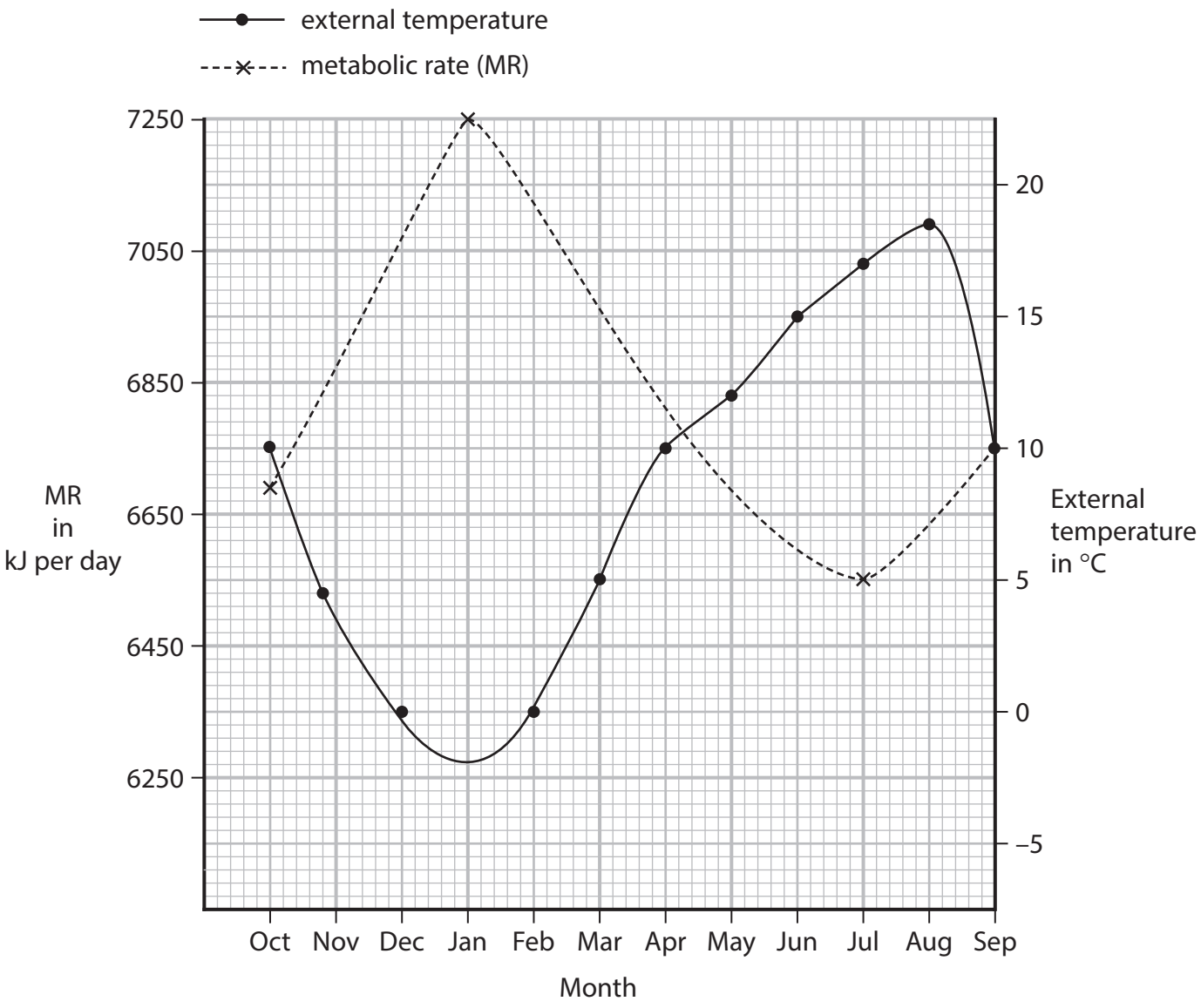
(iv) Name the molecule used to transfer energy in a cell.

(1)

.....

(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.

The graph shows the results of the investigation for one person.



(i) Describe how the investigation could be made more reliable.

(2)

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(ii) Determine the difference between the maximum metabolic rate and minimum metabolic rate.

(2)

difference = ... kJ per day

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

(5)

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

(1)

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(Total for Question 4 = 15 marks)

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

Complete the flow chart by naming these blood vessels in order. The first one has been done for you.

(5)

LIVER

↓

hepatic vein

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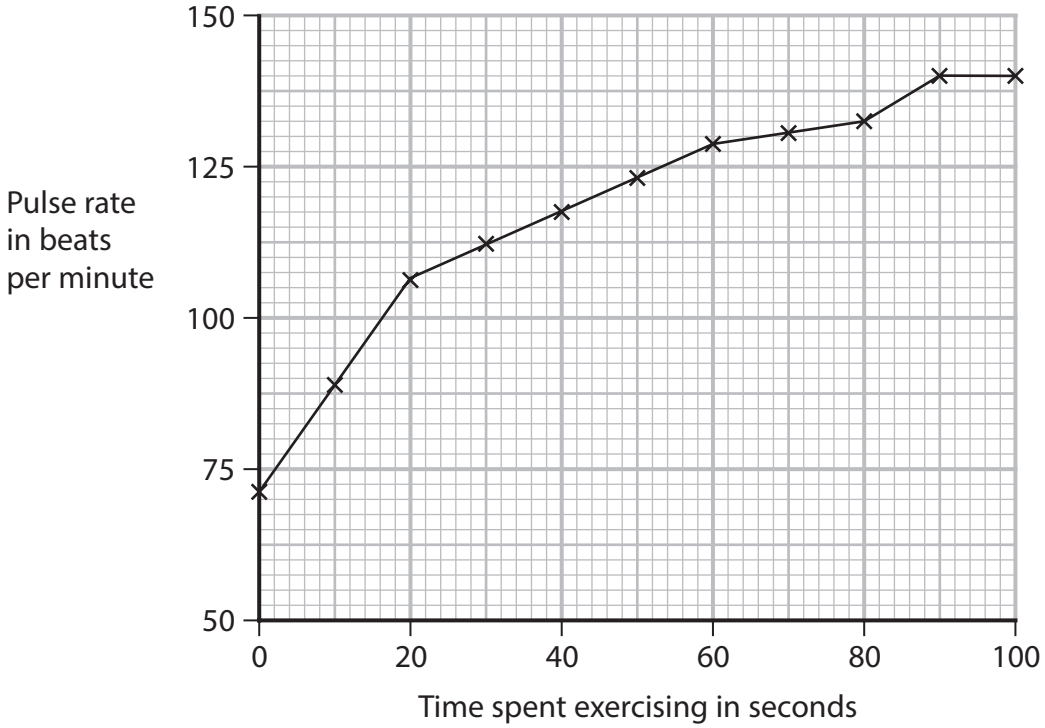
KIDNEY

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

The graph shows the student's results.



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

(4)

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

(6)

(Total for Question 5 = 15 marks)

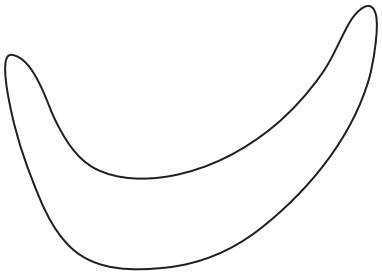
6 Sickle cell anaemia is an inherited condition. It is caused by a mutation of the gene that controls the production of haemoglobin.

This condition is caused by a recessive allele.

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

(4)

(ii) 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)

(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.

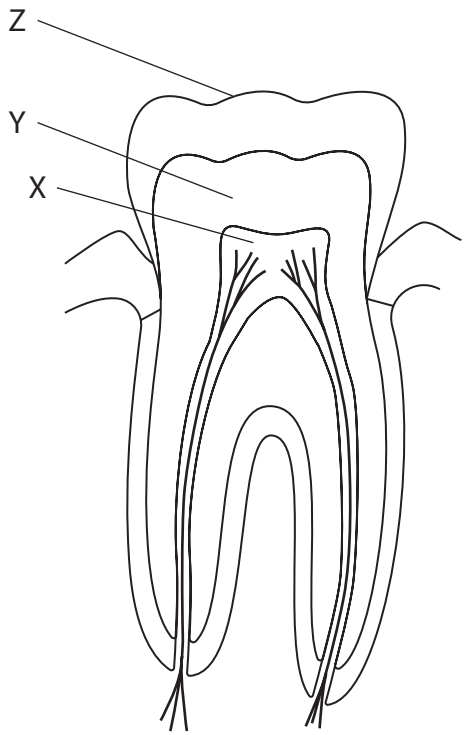
Explain the possible genotypes of the man.

Use H to represent the allele for unaffected haemoglobin and h to represent the allele for sickle haemoglobin.

(4)

(Total for Question 6 = 13 marks)

7 The diagram shows a section through a tooth.



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

(3)

X .....

Y .....

Z .....

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

(3)

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

(4)

(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)

(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)

(Total for Question 7 = 15 marks)

TOTAL FOR PAPER = 90 MARKS

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