**Edexcel International GCSE**

Centre Number          Candidate Number

# Human Biology

**Unit: 4HB0**
**Paper: 02**

Wednesday 9 May 2012 – Morning
**Time: 1 hour**

Paper Reference
**4HB0/02**

**You must have:**
Candidates may use a 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.

## Information

- The total mark for this paper is 60.
- 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.
- Keep an eye on the time.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

**Answer ALL questions.**

1  (a)  The diagram shows a neurone.
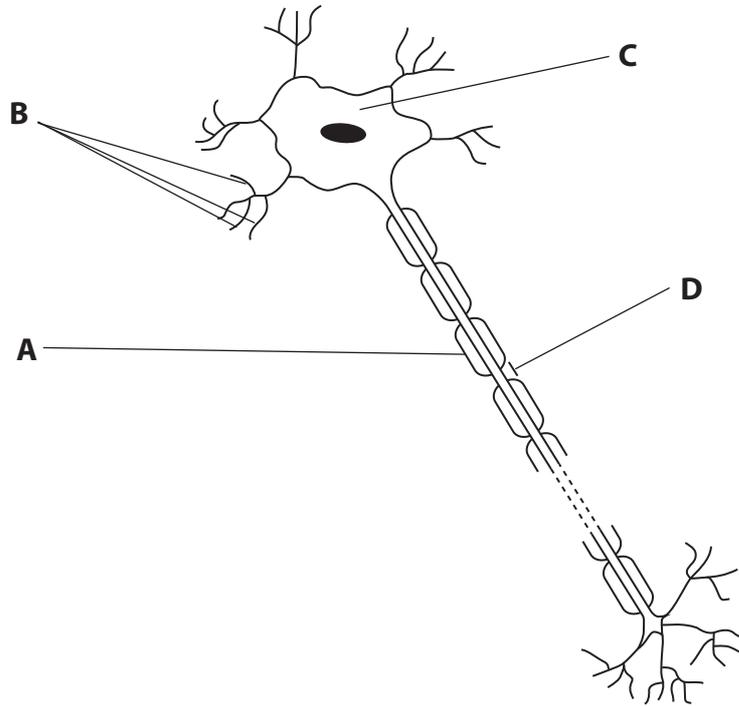


(i)  Name the structures labelled **A**, **B**, **C** and **D**.

(4)

A .........................................................................................................................................................................................................

B .........................................................................................................................................................................................................

C .........................................................................................................................................................................................................

D .........................................................................................................................................................................................................

(ii)  Name the **type** of neurone shown in the diagram.

(1)

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(iii) Draw an arrow on the diagram to show the direction in which the nerve impulse will travel.

(1)

(iv) Name **two** other types of neurone that are found in a reflex arc.

(2)

1 ...........................................................................................................................................................................................

2 ...........................................................................................................................................................................................

(b) State **two** features of a reflex action.

(2)

1 ...........................................................................................................................................................................................

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2 ...........................................................................................................................................................................................

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**(Total for Question 1 = 10 marks)**

**2** (a) *Salmonella* bacteria cause food poisoning. The symptoms include diarrhoea and sickness. There is usually an interval of several hours between eating food infected with *Salmonella* and the appearance of the symptoms.

(i) Suggest why there is a time interval before the symptoms appear.

(2)

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(ii) Suggest what causes the symptoms of food poisoning by *Salmonella*.

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(b) Before starting work in a restaurant, workers are instructed in basic food hygiene.

Explain how each of the following procedures reduces the risk of food poisoning by *Salmonella*.

(i) Wash hands before handling food

(2)

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(ii) Store food in a refrigerator

(2)

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(iii) Store raw meat at the bottom of the refrigerator

(2)

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**(Total for Question 2 = 10 marks)**

**3** A scientist wanted to estimate the number of bacteria in 1 cm$^3$ of fresh milk.

A 1 cm$^3$ sample of the fresh milk was diluted by a factor of 100, by adding it to 99 cm$^3$ of water.

A sterile pipette was used to transfer 0.5 cm$^3$ of this dilution to a sterile Petri dish containing nutrient agar.

The lid of the dish was replaced, fastened down with sticky tape and the dish was gently rotated several times.

The same procedure was repeated with four other samples of the diluted milk.

The dishes were placed in an incubator at 25°C for 48 hours.

The diagram below shows the appearance of the dishes at the end of 48 hours.

**Dish 1**          **Dish 2**          **Dish 3**

small discrete
colonies of
bacteria

**Dish 4**          **Dish 5**

merging of
bacterial
colonies
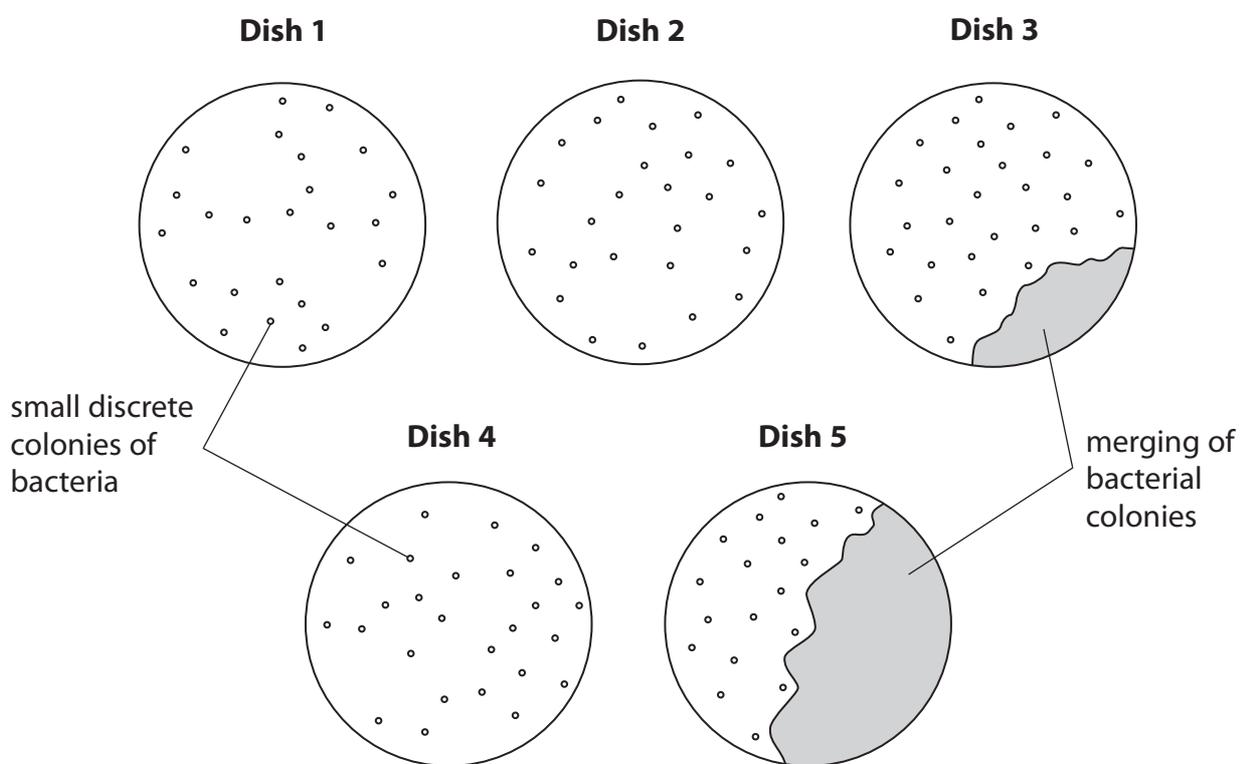
(a) (i)   Describe how the colonies of bacteria develop.

(2)

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(ii) Explain why a **sterile** pipette was used to transfer the diluted milk in this experiment.

(2)

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(iii) State why the dishes were 'gently rotated' after the diluted milk had been transferred to them.

(1)

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(iv) State why the lids of the dishes were 'fastened down with sticky tape'.

(1)

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(v) Suggest why it was necessary to dilute the milk before transferring it to the dishes.

(1)

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(b) (i)   How many colonies were present in dishes 1, 2 and 4?

(3)

**Dish 1** ...................................................................................................................................................................

**Dish 2** ...................................................................................................................................................................

**Dish 4** ...................................................................................................................................................................

(ii)  Use the results from (b)(i) to estimate the number of bacteria present in 1 cm$^3$ of fresh (undiluted) milk.  Show your working.

(3)

Answer ........................................................................

(iii) Explain why dishes 3 and 5 were not suitable for use in the calculation in (b)(ii).

(2)

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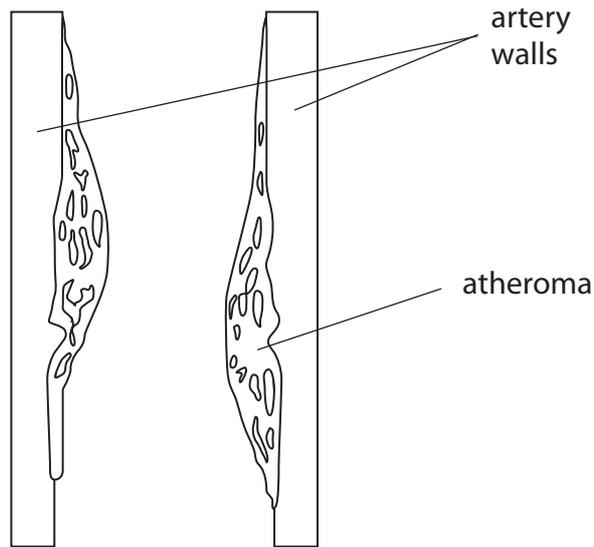
**(Total for Question 3 = 15 marks)**

**4** The diagram shows a section of a coronary artery affected by an atheroma.



artery walls

atheroma

(a) State the function of the coronary arteries.

(1)

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(b) (i) Name the molecule that forms an atheroma.

(1)

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(ii) Name **two** risk factors which may lead to the formation of an atheroma.

(2)

1 ............................................................................................................................................................................

2 ............................................................................................................................................................................

(iii) An atheroma increases the risk of a blood clot forming in the coronary artery.

Describe the effects of a blood clot forming in the coronary artery.

(3)

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**(Total for Question 4 = 7 marks)**

**5** (a) An experiment was carried out into the effect of pH on the activity of a digestive enzyme.

The graph shows the results of the experiment.
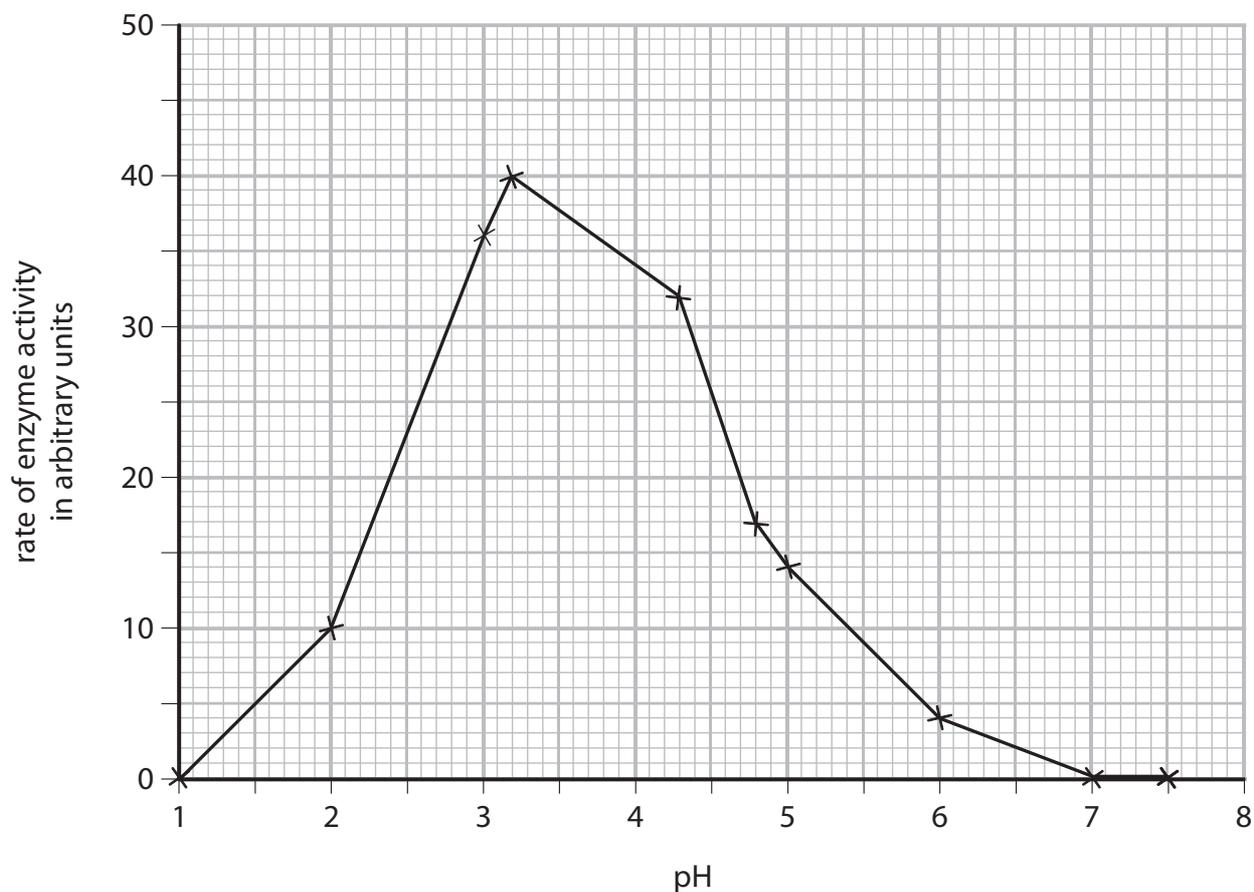


(i) The student who carried out the experiment concluded that pH 3.2 was the optimum pH for the enzyme.

Explain why this conclusion is **not** likely to be correct.

(3)

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(ii) Suggest, with a reason, where this digestive enzyme may be found in the alimentary canal.

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(b) Explain why the enzyme becomes inactive at pH 7.

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**(Total for Question 5 = 8 marks)**

**6** (a) The ABO blood groups are controlled by the inheritance of three alleles: $I^A$, $I^B$ and $I^O$.

A woman who is heterozygous for blood group A has a child who is blood group O. She claims that the father of the child is blood group AB.

(i) State the genotype of the mother and of the child.

(1)

Mother ...................................................................................................................................................................................................................

Child ......................................................................................................................................................................................................................

(ii) Explain why it is **not** possible for a man who is blood group AB to be the father of this child.

(3)

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(b) Using a suitable genetic diagram, show how it **would** be possible for a man with blood group B to be the father.

(4)

(c) Explain why it is important that blood from the correct group is given to someone needing a blood transfusion.

(2)

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**(Total for Question 6 = 10 marks)**

**TOTAL FOR PAPER = 60 MARKS**

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