Write your name here

Surname	Other names

Edexcel
International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Human Biology

Unit: 4HB0
Paper: 02

Monday 14 January 2013 – Afternoon
Time: 1 hour

Paper Reference
4HB0/02

You must have:
Ruler
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.

Turn over ▶

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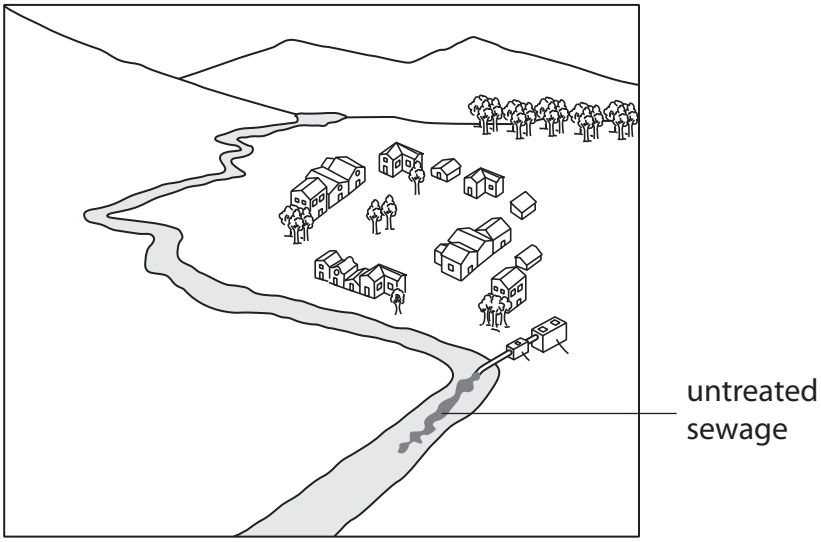
P 4 1 5 4 0 A 0 1 1 6

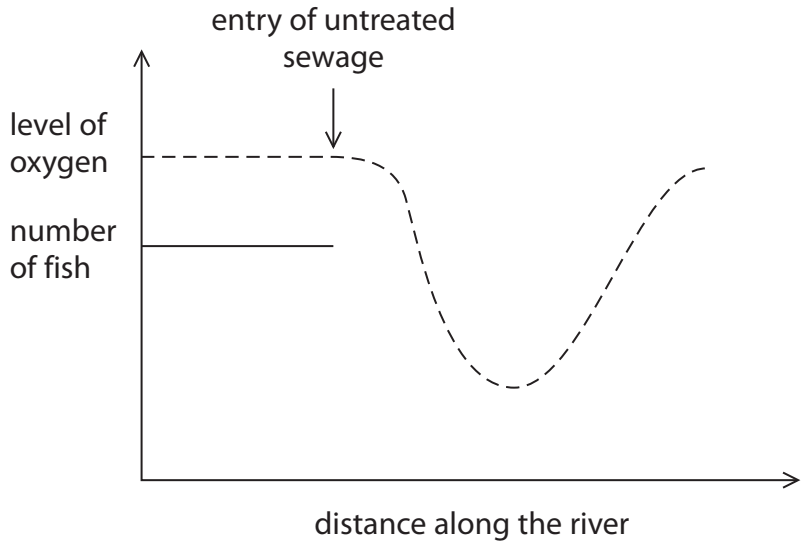
PEARSON

Answer ALL questions.

1 The diagram shows where untreated sewage from a village enters a river.



The graph shows changes to the level of oxygen in this river. It also shows the number of fish up to the point where untreated sewage enters the river.



(a) (i) Describe how the level of oxygen changes in the river after the entry of untreated sewage.

(1)

.....

.....

(ii) Explain the changes in the level of oxygen after the entry of untreated sewage.

(3)

(b) Continue the line on the graph to show what will happen to the number of fish in the river after the entry of untreated sewage.

(2)

(c) Untreated sewage may contain pathogens. The list shows some of the diseases caused by pathogens.

gonorrhoea **tuberculosis** **typhoid**

(i) Circle the name of the disease which may arise from drinking water that is contaminated by sewage.

(1)

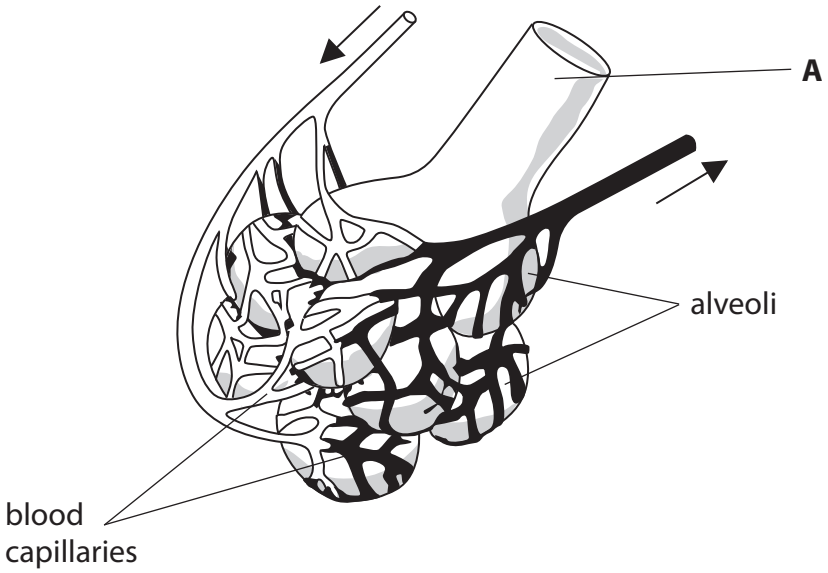
(ii) The pathogens that cause these diseases all belong to the same group.

Name this group.

(1)

(Total for Question 1 = 8 marks)

2 The diagram shows part of the respiratory system.



(a) Name structure **A**.

(1)

.....

(b) The arrows on the diagram show the direction of blood flow.

(i) Name the organ that supplies blood to the alveoli.

(1)

.....

(ii) Name the blood vessel that takes blood away from the alveoli.

(1)

.....

(c) A gas moves from the alveoli into the blood capillaries.

(i) Name the process by which the gas moves.

(1)

.....

(ii) The gas is used in respiration.

Complete the balanced chemical symbol equation for aerobic respiration.

(3)

..... + ... ⟶ 6 CO_2 + ... + energy

(d) Apart from having a large surface area, describe how the alveoli are adapted for gas exchange.

(2)

.....

.....

.....

.....

.....

(e) Name the condition that arises if the walls of the alveoli break down.

(1)

.....

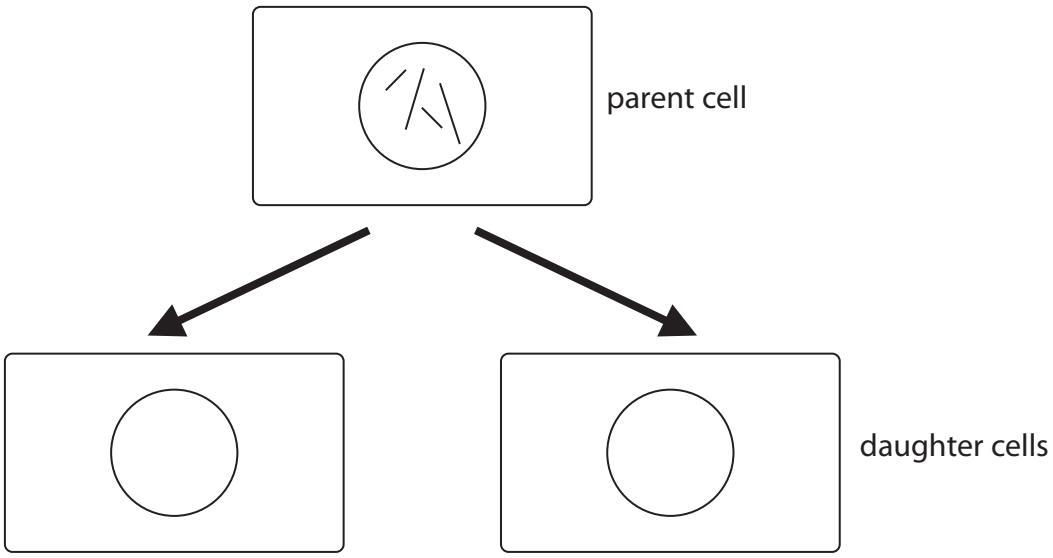
(Total for Question 2 = 10 marks)

3 Cells can divide by a process called mitosis.

(a) The diagram shows the chromosomes in a parent cell before mitosis takes place.

(i) Complete the diagram to show the chromosomes in each daughter cell.

(2)



(ii) What is the diploid number of the parent cell in the diagram?

(1)

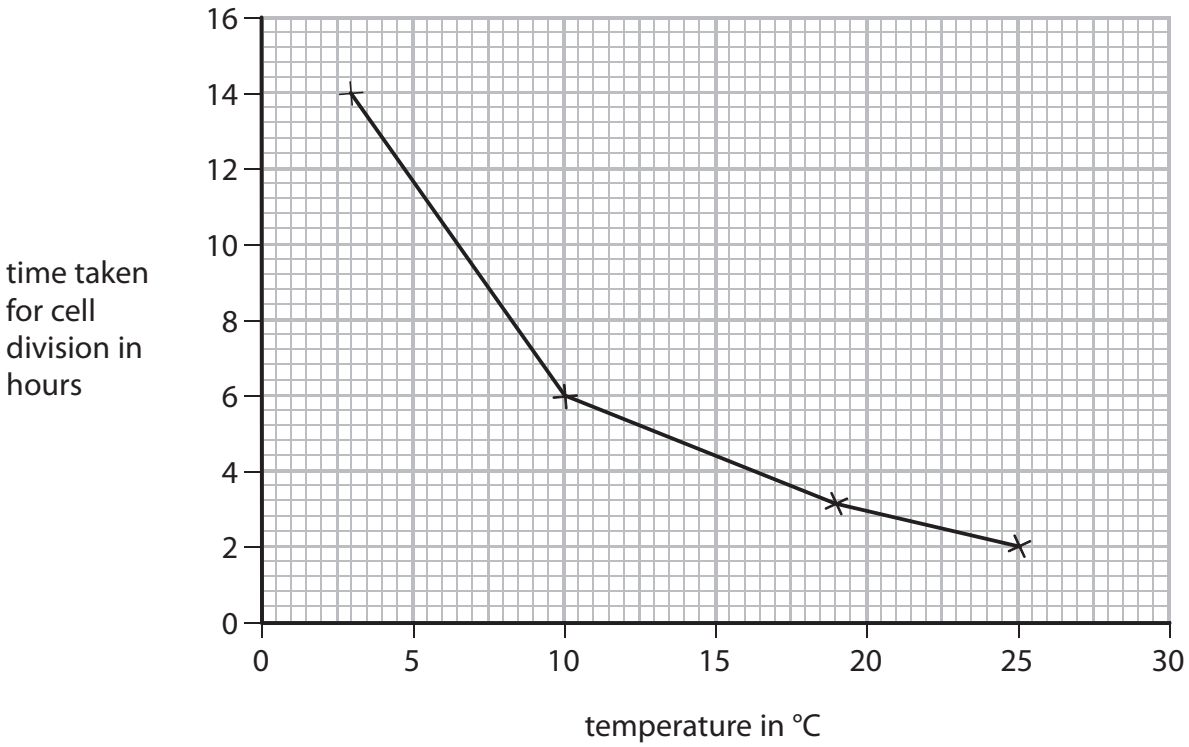
.....

(iii) What is the diploid number of a human skin cell?

(1)

.....

(b) The graph shows the time taken for cells to divide by mitosis at different temperatures.



(i) Describe the effect of temperature on the time taken for cells to divide.

(2)

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.....

.....

(ii) Starting with one cell at 25 °C, calculate how many cells there would be

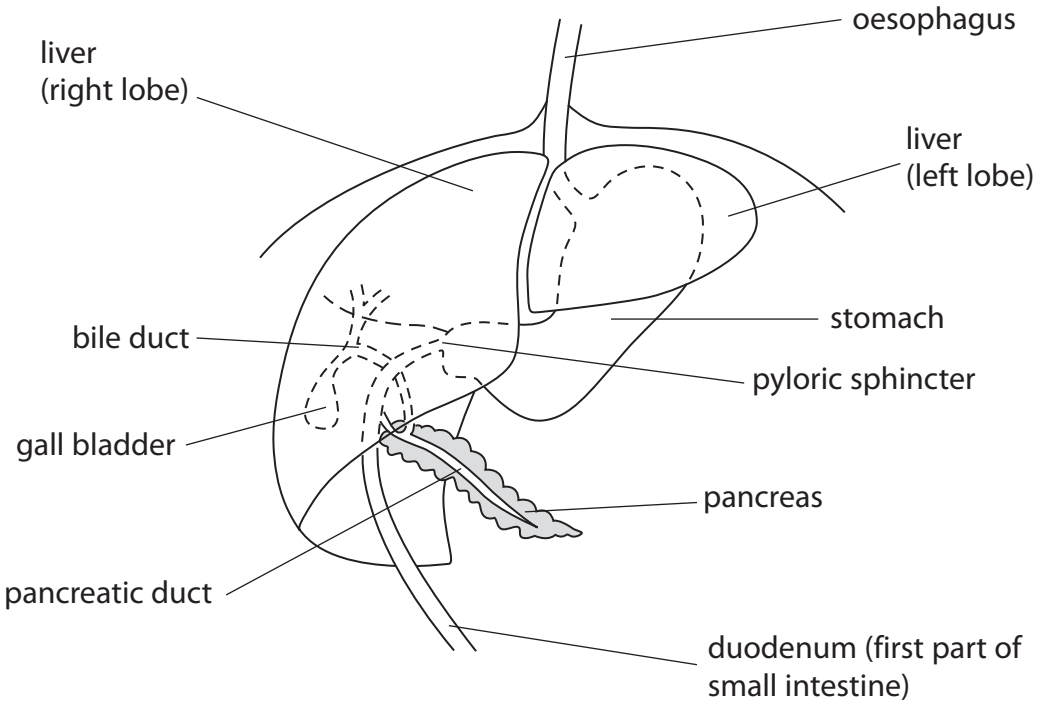
(2)

after 2 hours .....

after 8 hours .....

(Total for Question 3 = 8 marks)

4 The diagram shows part of the human digestive system.



(a) Describe the role of the oesophagus.

(2)

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.....

.....

(b) Name the type of food that is first digested chemically in the stomach.

(1)

.....

(c) Complete the passage by writing a suitable word or words on each dotted line.

(3)

Bile is made in the ..... and stored in the ..... .

One of its roles is to ..... lipids.

(d) The pancreas produces enzymes that digest all the major food groups.

The table shows some major food groups, the enzymes involved and the end products of digestion.

Complete the table.

(3)

Major food group	Enzymes involved	End product of digestion
carbohydrate		maltose
proteins	protease	
	lipase	glycerol and fatty acids

(e) Describe the role of the duodenum (first part of small intestine) in digestion.

(2)

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.....

(Total for Question 4 = 11 marks)

5 The following passage is from a report written by a health correspondent in East Africa.

Use information from the passage to help you answer questions a, b and c.

> ## Pit Latrines: A Public Health Concern in Africa
>
> The design and maintenance of pit latrines have critical implications for hygiene and sanitation. Some pit latrines in primary and secondary schools in the rural areas of Uganda and in other parts of Africa are covered with sprayed urine, faeces, flies, and recently hatched larvae. Such conditions are not only due to a lack of cleaning. Poorly built latrines can lead to an increase in flies, which lay eggs in faeces, spreading disease. If the base of a latrine facility is unstable or loosely fixed onto the surface, the cement flooring will crack, making the environment increasingly favourable for hookworm transmission and larvae. In addition, if the hole is not made large enough, urine will splash onto the floor and walls, making it attractive to flies, bacteria and fungi.

Source: *Pit Latrines: A Public Health Concern in Africa*, Ashley Leech, ARCHIVE, 12 August 2010

(a) Identify **three** organisms in pit latrines that cause disease.

(1)

.....

.....

(b) Name **two** diseases that may arise from poorly constructed pit latrines.

(2)

.....

.....

(c) Use information from the passage to help you explain how the spread of disease in a pit latrine may be reduced.

(4)

(d) Modern sewage treatment helps reduce the spread of disease from untreated faeces.

Explain the role of aerobic bacteria in the treatment of sewage.

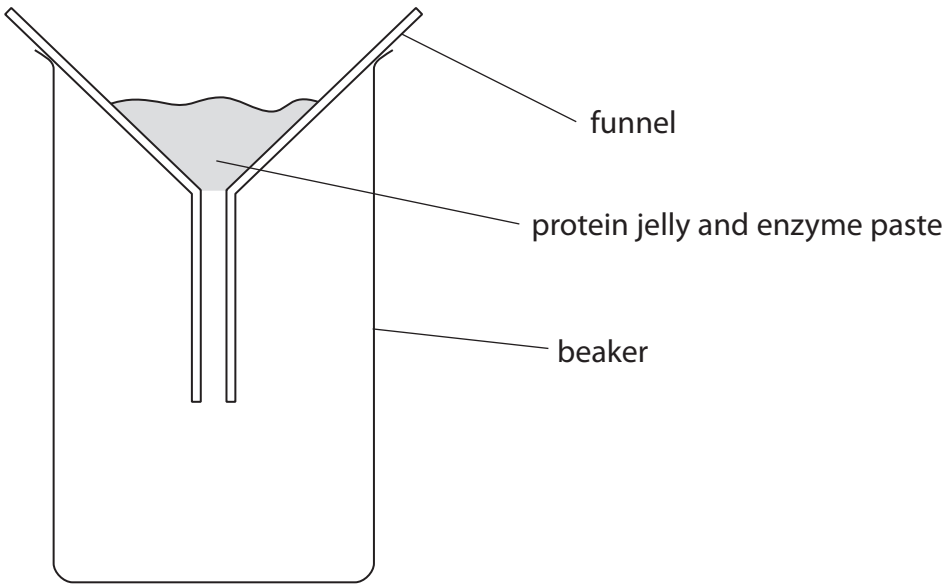
(2)

(Total for Question 5 = 9 marks)

6 A student carried out an experiment to find out if the concentration of a protease enzyme affected the time taken to digest protein. He used a protein jelly, which became liquid as the enzyme digested the protein.

- He carried out five separate tests.
- He used the same mass of protein jelly for each test.
- He used a different concentration of enzyme solution for each test.

For each test, he mixed the protein jelly and the enzyme solution together to make a paste, and then poured the paste into a funnel.



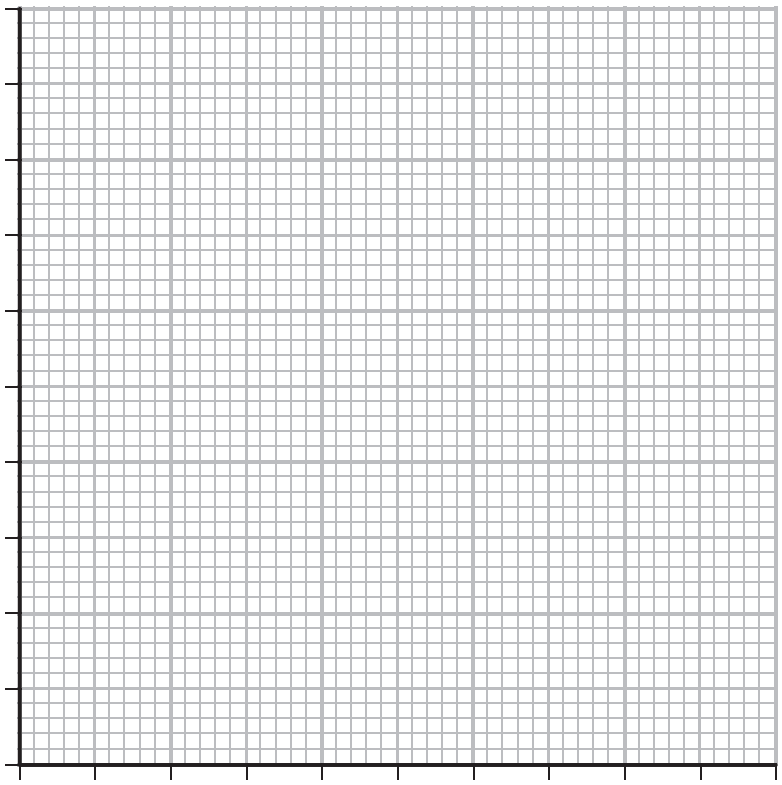
For each test, the student measured the time taken for the paste to flow out of the funnel and into the beaker.

The table shows his results

Test	Concentration of enzyme solution (%)	Time for paste to flow out in seconds
1	0.00	32
2	0.25	29
3	0.50	25
4	0.75	19
5	1.00	11

(a) Plot a line graph on the grid to show the time taken for the paste to flow out at each enzyme concentration. Use a ruler to join the points.

(5)



(b) (i) Describe the pattern shown by the results.

(2)

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(ii) Explain why the time taken for the paste to flow out is affected by the enzyme concentration.

(3)

(c) Name **two** factors, other than temperature and mass of protein jelly, that the student needed to keep constant for the experiment to be valid.

(2)

(d) Explain how the student might check how reliable the experiment had been.

(2)

(Total for Question 6 = 14 marks)

TOTAL FOR PAPER = 60 MARKS

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