Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

7040/02

Examiner's use only

Team Leader's use only

London Examinations GCE

Biology

Ordinary Level

Paper 2

Tuesday 24 May 2005 – Afternoon

Time: 1 hour 30 minutes

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	

Materials required for examination
Nil

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
Answer ALL questions in the spaces provided in this book.

Information for Candidates

Calculators may be used.
The total mark for this paper is 100.
The mark allocation is indicated at the end of each question.
Marks for parts of questions are shown in round brackets: e.g. **(2)**.
This paper has ten questions. Blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.
In calculations, show **all** the steps in your working.

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edexcel INTERNATIONAL

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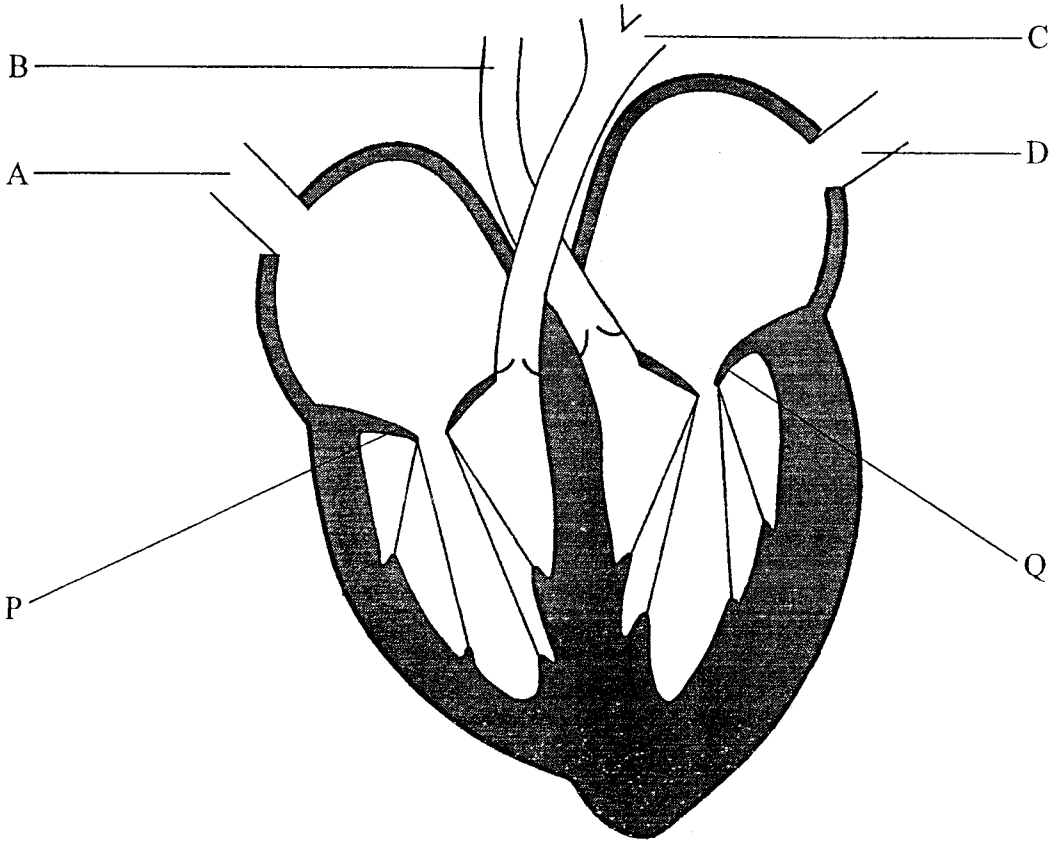
Answer ALL questions in the spaces provided.

1. The diagram below shows the structure of the human heart and some of its major blood vessels.



(a) Name the blood vessels labelled A, B, C and D.

A .....

B .....

C .....

D .....

(4)

Leave blank

(b) The atria form the upper chambers of the heart and are separated from the ventricles by specialised structures, labelled P and Q on the diagram.

(i) Name structure P.

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(1)

(ii) Describe the function of structure P and explain how it works.

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(3)

(c) Describe **one** way that the structure of the left ventricle differs from the right ventricle.

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(1)

(d) Give **two** ways in which the blood in the left ventricle differs from the blood in the right ventricle.

1 .....

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2 .....

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(2)

Q1

(Total 11 marks)

Leave blank

2. (a) Explain what is meant by the term **heterozygous**.

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(2)

(b) Certain varieties of cattle can exist in three colours: 'red', white and 'roan'. When a red bull is mated with a white cow the calves have a mixture of red and white hairs, giving them an overall colour called roan. These roan calves are different in colour from both parents.

(i) State the type of dominance shown by colour in these cattle.

.....

(1)

(ii) Using the symbols C^R for the allele for red hair, and C^W for the allele for white hair, state the genotypes of the red bull and the white cow.

Red bull ..... White cow .....

(2)

(iii) Give the genotypes of the gametes produced by each parent.

Gametes from red bull .....

Gametes from white cow .....

(2)

(iv) Give the genotype of the offspring from a cross between a red bull and a white cow.

.....

(1)

Leave blank

(c) By means of a genetic diagram, show the results of a cross between a roan bull and a roan cow. Your diagram should show the genotypes of the parents, the gametes they produce and the genotypes and phenotypes of all the possible offspring.

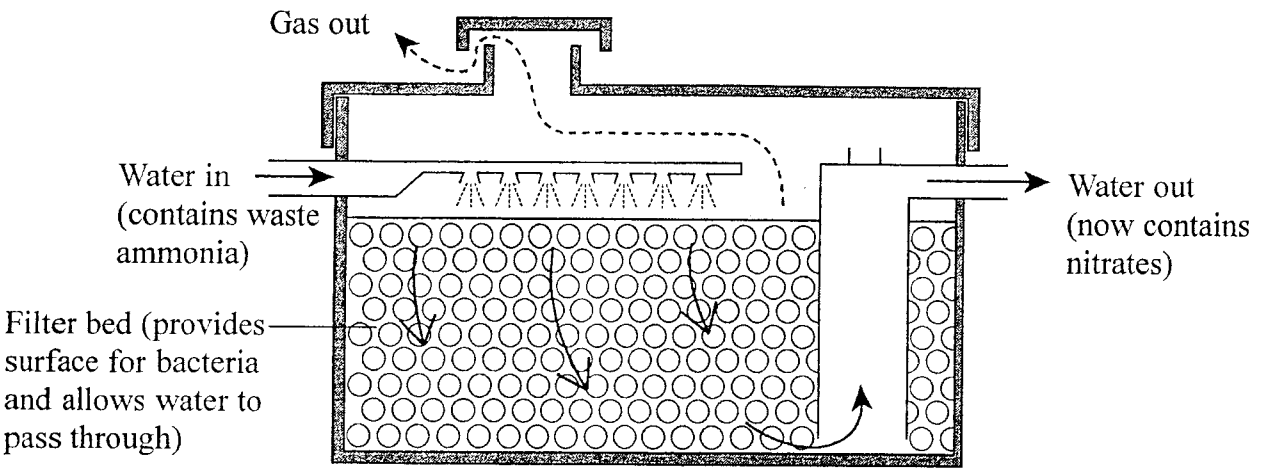
(4)

Q2

(Total 12 marks)

Leave blank

3. Fish excrete a waste product called ammonia. Ammonia is toxic. To prevent a build up of ammonia in a fishpond a 'filter' can be used to convert the ammonia into harmless substances. The diagram below shows a filter.



(Adapted from Biological Sciences Review, 2003.)

Water in the pond circulates through the filter. The filter contains different bacteria that are involved with the nitrogen cycle.

(a) Name the food molecule in fish that would break down to form ammonia.

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(1)

(b) Using your knowledge of the nitrogen cycle, describe how bacteria would convert ammonia to nitrate.

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(3)

(c) Certain bacteria in the filter convert nitrate to a gas.

(i) Name this gas.

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(1)

(ii) Name the type of bacteria that produce the gas.

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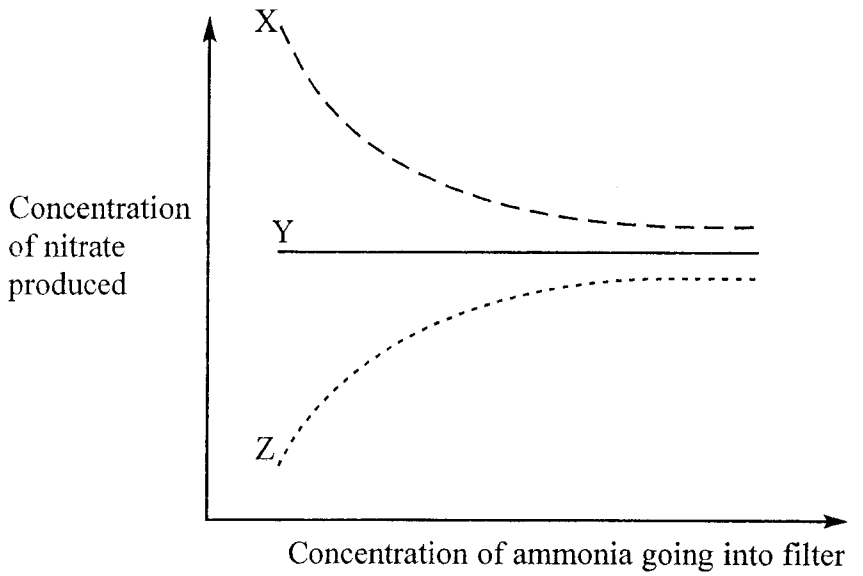
(1)

Leave blank

(d) Which of the lines (X, Y or Z) on the graph below correctly shows the relationship between the concentration of ammonia going into the filter and the concentration of nitrate produced? Give a reason for your answer.



Letter .....

Reason .....

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(2)

Q3

(Total 8 marks)

Leave blank

4. (a) Hormones are chemicals released by endocrine glands. They are transported in the blood to target cells or organs where they produce an effect.

Use this information and your own knowledge to complete the table below.

Endocrine gland	Hormone	Target (cells or organs)	Effect
	Insulin		
Adrenal		Muscle	Converts glycogen to glucose

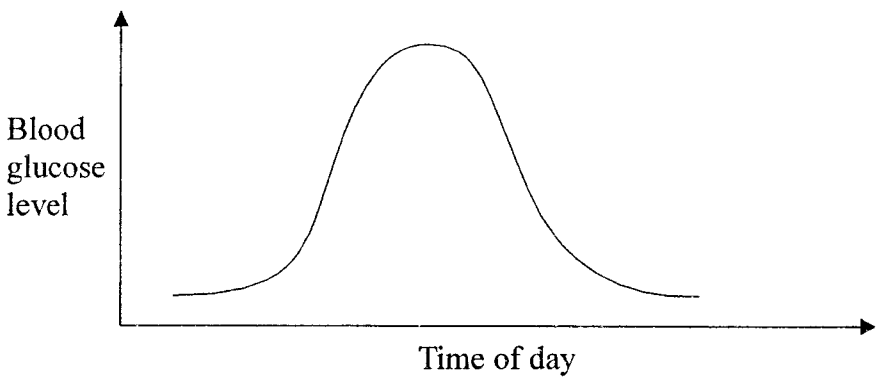
(4)

(b) In the table below, tick the box that gives the correct description for glycogen.

Description	Tick
Monosaccharide	
Disaccharide	
Polysaccharide	

(1)

(c) The graph below shows changes in the blood glucose level of a person during part of a day.



(i) Suggest **two** reasons for the increase in blood glucose level shown in the graph.

1 .....

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2 .....

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(2)

Leave blank

(ii) Suggest **two** reasons for the decrease in blood glucose level shown in the graph.

1 .....

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2 .....

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(2) Q4

(Total 9 marks)

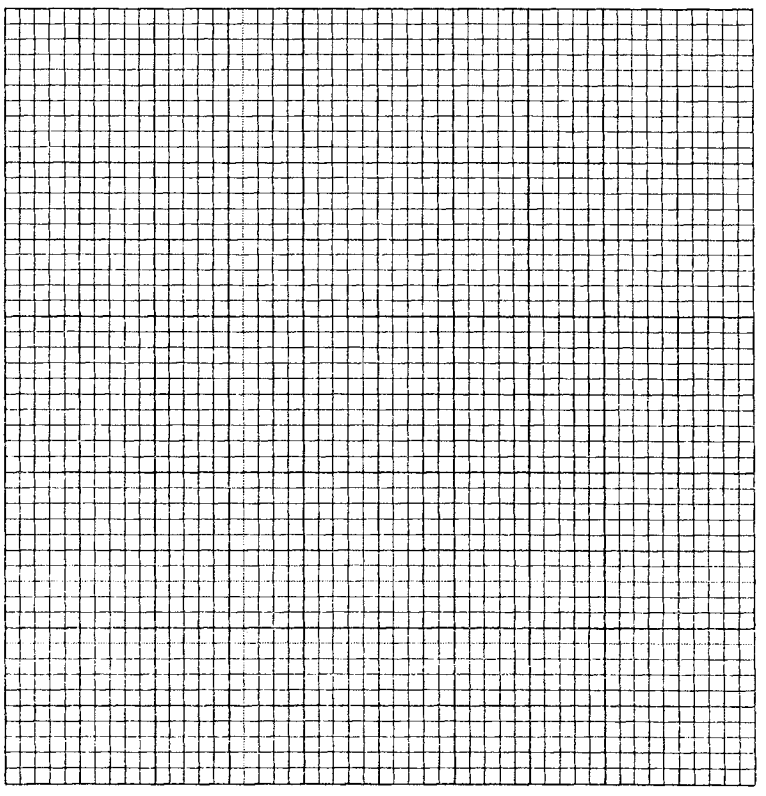
Leave blank

5. Some students wanted to investigate how fast leaves decomposed in soil. The students took two bags, A and B, and placed 2 kg (2000 g) of leaves into each bag. The bags were made of nylon netting each with different sized holes. In bag A the holes were 7.0 × 7.0 mm, and in bag B the holes were 0.5 × 0.5 mm.

The students buried the bags in the soil. Every two months the students dug up the bags, weighed them, and then buried them in the soil again. From the loss in mass they calculated the percentage loss in mass of the leaves in the bags. Their results are shown in the table below.

Time in months	Percentage loss in mass of the leaves	
	Bag A	Bag B
0	0	0
2	20	8
4	70	15
6	85	25
8	88	28
10	90	30

(a) Use the grid below to plot a line graph of the data for bag A and the data for bag B on the same grid. Use a ruler to join the points.



(6)

Leave blank

(b) (i) After six months, the mass of leaves in bag B was 1500 g. Write down a formula to show how you would calculate the percentage loss in mass of the leaves.

(2)

(ii) After 10 months, calculate the mass of leaves that remained in bag A. Show your working.

Answer ..... g

(2)

(c) Suggest why the size of holes in bag A allowed leaves to disappear faster than leaves in bag B.

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(2)

(d) Suggest **two** factors that should be kept the same to allow the students to make a fair comparison between the rate of leaf decomposition in bag A and in bag B.

1 .....

2 .....

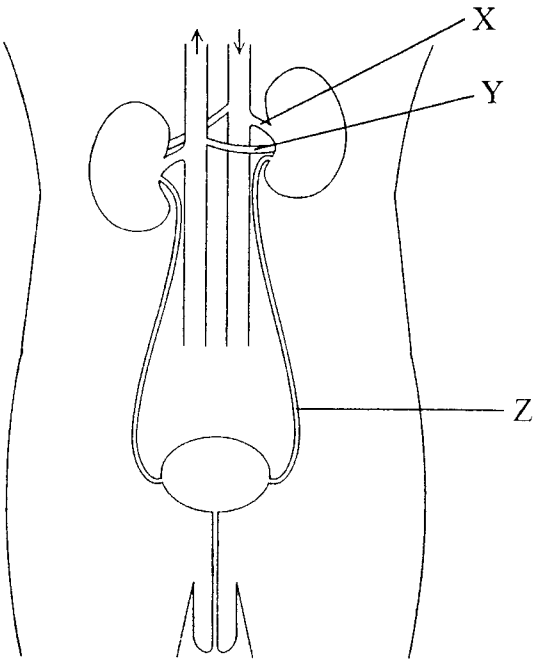
(2)

Q5

(Total 14 marks)

Leave blank

6. The diagram below shows the human urinary system and some blood vessels. The arrows show the direction of blood flow.



(a) Name the blood vessels X and Y, and tube Z.

X .....

Y .....

Z .....

(3)

(b) The bladder contains urine. Name the **three** major constituents of urine.

1 .....

2 .....

3 .....

(3)

(c) Describe the test you would use to find out if urine contained protein.

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(2)

Q6

(Total 8 marks)

Leave blank

7. Loss of water from a leaf surface can be affected by changes in the environmental conditions surrounding the plant.

(a) What is the name given to water loss from leaves?

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(1)

(b) (i) Complete the table below to show how changing certain environmental conditions affects the rate of water loss from a leafy shoot.

Change in environmental condition	Effect on water loss
Increased wind speed	Increased water loss
Reduced humidity	
Increased temperature	
Reduced light intensity	

(3)

(ii) Explain why increased wind speed increases water loss.

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(3)

(c) Some plants have many small hairs on the surfaces of their leaves. Suggest what effect these would have on the rate of water loss and explain your answer.

Effect .....

Explanation .....

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(3)

(Total 10 marks)

Q7

Leave blank

8. A student thought that different sized animals would lose heat at different rates. She set up an experiment to investigate the effects of body size on heat loss using glass beakers as model animals.

She took three different sized glass beakers and filled them with water from a hot tap. She put a thermometer in each beaker and recorded the temperatures every 3 minutes for 15 minutes. The table below shows her results.

Time in minutes	Temperature of water in °C		
	Large beaker (500 cm^3)	Medium beaker (250 cm^3)	Small beaker (125 cm^3)
0	65	66	65
3	62	61	58
6	55	53	51
9	48	42	40
12	41	33	30
15	33	26	22

(a) Compare the changes in temperature in the three beakers.

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(3)

Leave blank

(b) Suggest a reason for the difference in heat loss from the small beaker compared with that from the large beaker.

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(2)

(c) Another student wanted to extend the experiment to include the effects of different skin coverings on the results. He stuck animal fur to the outside of the three beakers before filling them with hot water.

Suggest what effect this might have on the results for the medium beaker and explain your answer.

Effect .....

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Explanation .....

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(3)

Q8

(Total 8 marks)

Leave blank

9. Plants produce substances that can alter their growth. These are known as plant growth substances (plant hormones).

(a) Name **one** plant growth substance (plant hormone).

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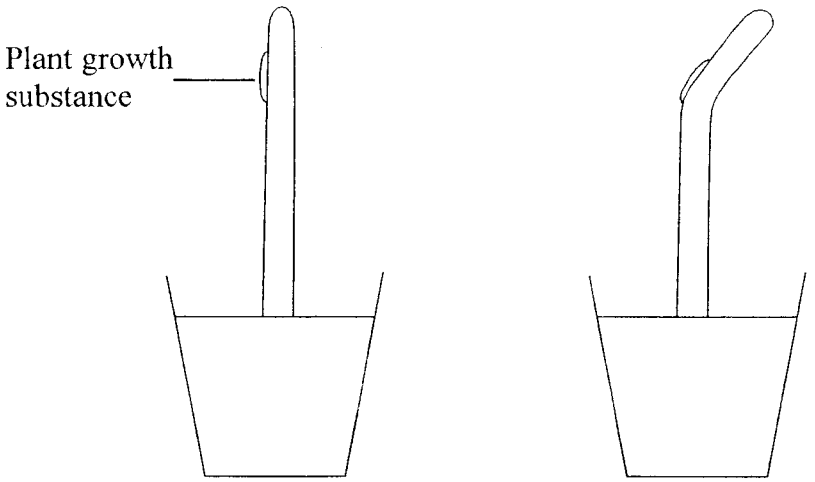
(1)

(b) A plant growth substance was applied to one side of a growing wheat shoot (coleoptile). The diagram below shows the wheat shoot at the start and 24 hours later.



(i) Explain the response of the wheat shoot.

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(2)

(ii) Plants also respond to light. Describe the response of a wheat shoot to light coming from one side and explain the response in terms of plant growth substances.

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(4)

(Total 7 marks)

Q9

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