

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

Paper Reference(s)

7040/02

London Examinations GCE

Biology

Ordinary Level

Paper 2

Thursday 20 January 2005 – Morning

Time: 1 hour 30 minutes

Examiner's use only

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Team Leader's use only

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

Materials required for examination Items included with question papers
Nil 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 10 questions.

Advice to Candidates

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

Turn over

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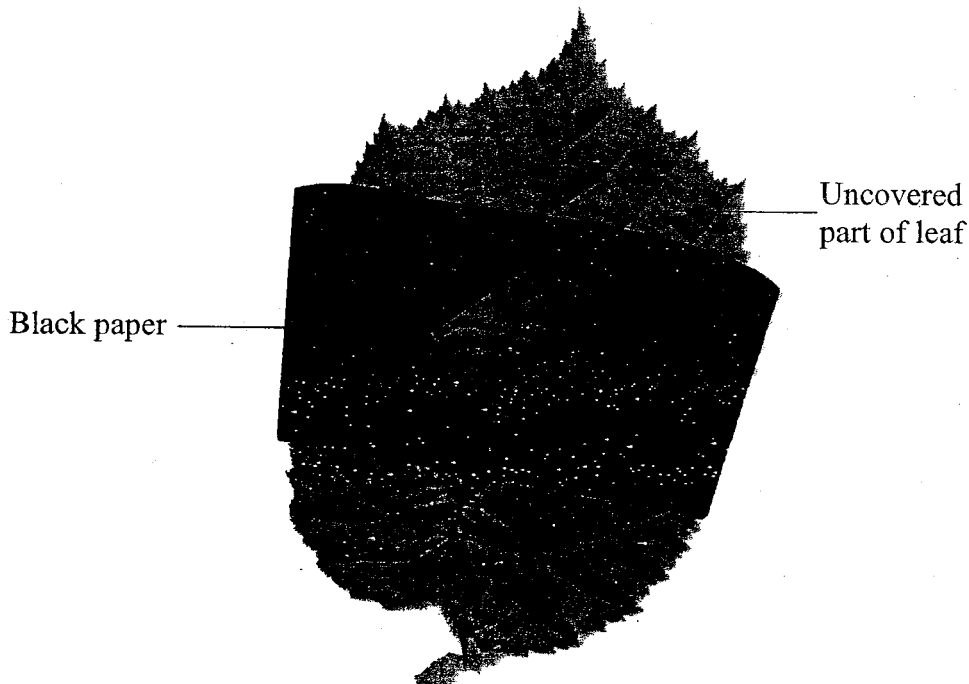
Answer ALL questions in the spaces provided.

1. (a) Give the balanced chemical equation for photosynthesis.

.....
(3)

(b) A biology teacher wanted to show that light was required for photosynthesis. She set up the following experiment for her class.

She took a potted plant in good condition and placed it in a dark cupboard for two days. She then covered part of a large leaf with black paper. This had a diamond pattern cut in it as shown in the diagram below.



She left the plant by a window in the light for four hours. She then tested the leaf for starch to see if photosynthesis had taken place.

(i) Explain why she placed the plant in the dark for two days.

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(3)

(ii) Describe how she would carry out a starch test on the leaf.

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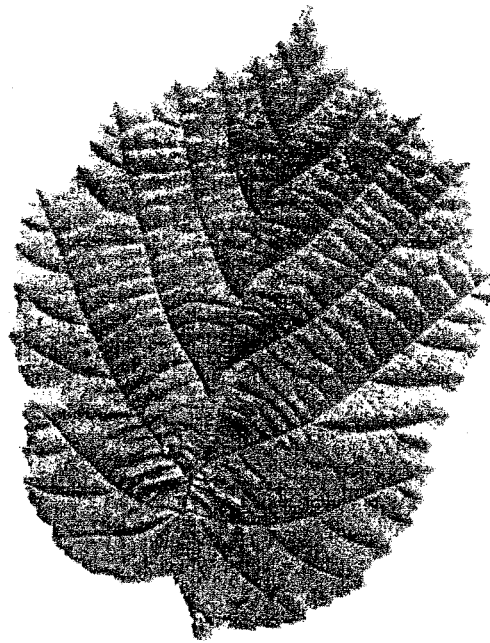
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(4)

(iii) Complete the diagram below to show its appearance after the teacher had done the starch test on it. Add labels to show the colours that she would see.



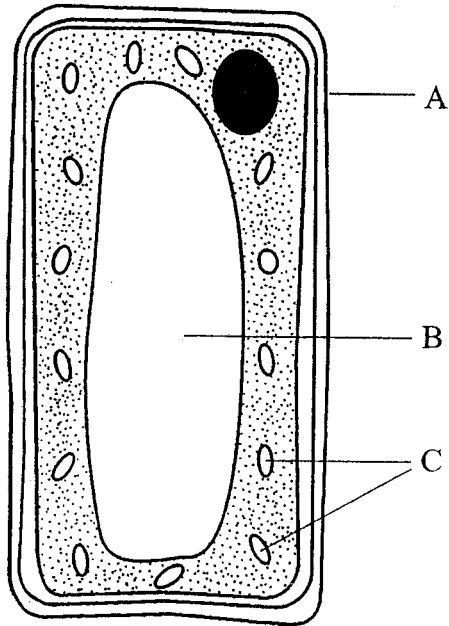
(2)

(Total 12 marks)

Q1

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2. The diagram below shows the main features found in a plant cell.



(a) (i) Name the parts labelled A, B, and C.

A

B

C

(3)

(ii) This cell is then placed in a concentrated sugar solution. Draw a diagram next to the diagram above to show the appearance of this cell in the sugar solution.

(3)

(b) State **two** ways in which the structure of a plant cell differs from that of an animal cell.

1

2

(2)

(c) Describe and explain the changes that would take place in an animal cell, such as a red blood cell, when it is placed in distilled water.

.....

.....

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.....

.....

(3)

(Total 11 marks)

Q2

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3. Complete each sentence below by putting the correct number in the empty box. The first one has been done for you.

(a) The number of chromosomes in a human zygote is

(b) The number of wings on a dipteran insect is

(c) The number of different elements found in a carbohydrate is

(d) The number of blood vessels entering and leaving the kidney is

(e) The surface area to volume ratio of an organism with a surface area of 24 cm^2 and a volume of 8 cm^3 is

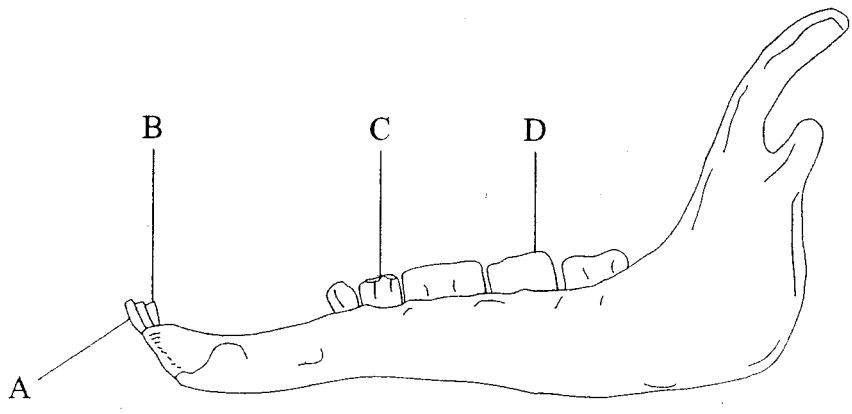
(f) The number of different phenotypes in the offspring of a homozygous recessive backcross with a heterozygous parent is

(g) The percentage of energy transferred from a trophic level of 10 000 kJ to a trophic level with 500 kJ is

(Total 6 marks)

Q3

4. The diagram below shows the lower jaw and teeth of a sheep.



(a) Four different types of teeth have been labelled A, B, C and D. Complete the table below to give the correct name of each type of tooth.

Letter	Type of tooth
A	
B	
C	
D	

(4)

(b) The carbohydrate in the cell walls of plant cells is digested in the sheep's gut by microorganisms. The glucose produced by this digestion is then absorbed into the blood.

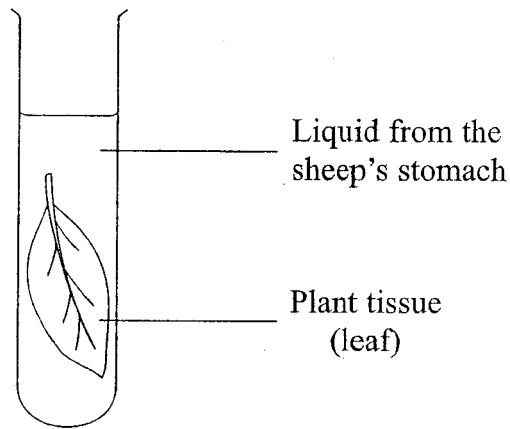
(i) Name the carbohydrate found in plant cell walls.

..... (1)

(ii) What term describes the feeding relationship between the sheep and the microorganisms in its gut?

..... (1)

- (c) A teacher carried out an investigation into the effect of temperature on the rate of digestion of the cell wall. He added the liquid from a sheep's stomach to test tubes, each containing 5 g of plant tissue. The liquid contained no glucose at the start. The diagram below shows one of the test tubes.



He kept the test tubes at a range of temperatures. He took samples of the liquid from each test tube at different times and tested them for glucose. He recorded the time taken for glucose to appear at each temperature.

- (i) Describe the test used to show the presence of glucose.

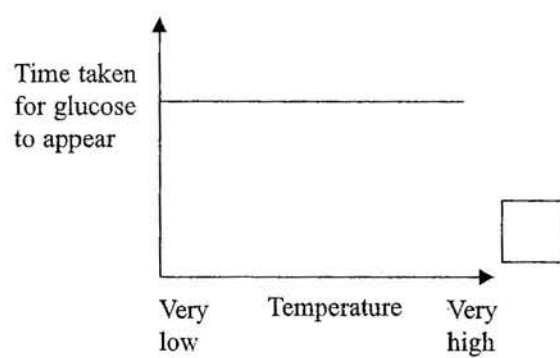
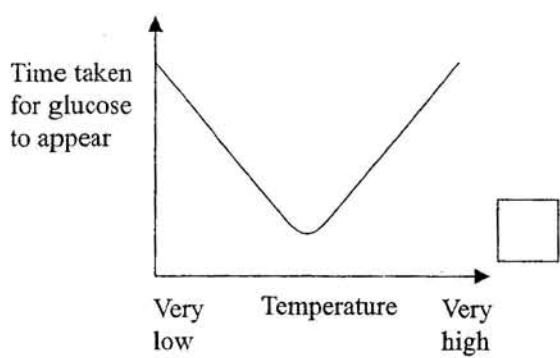
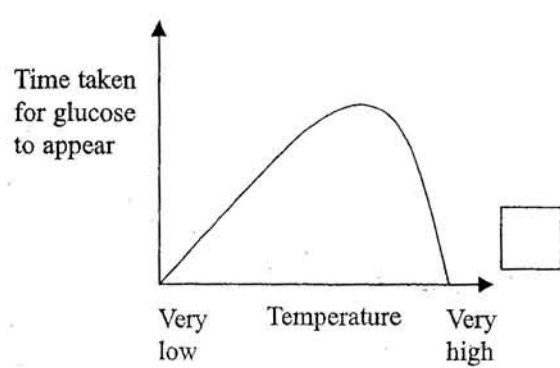
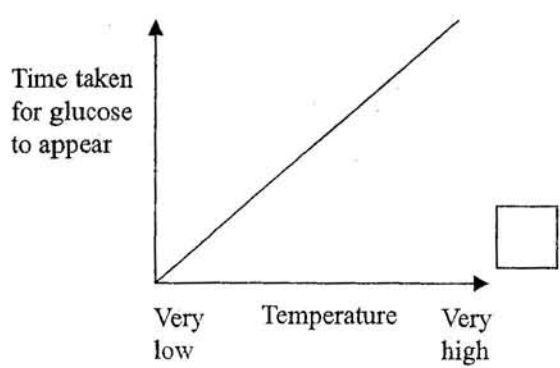
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.....
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(2)

- (ii) In the space below, draw and label a diagram to show the control test tube that should be used at each of the temperatures.

(2)

(iii) Tick the box by the graph that shows the correct relationship between the time taken for glucose to appear and the temperature the tubes were kept at.



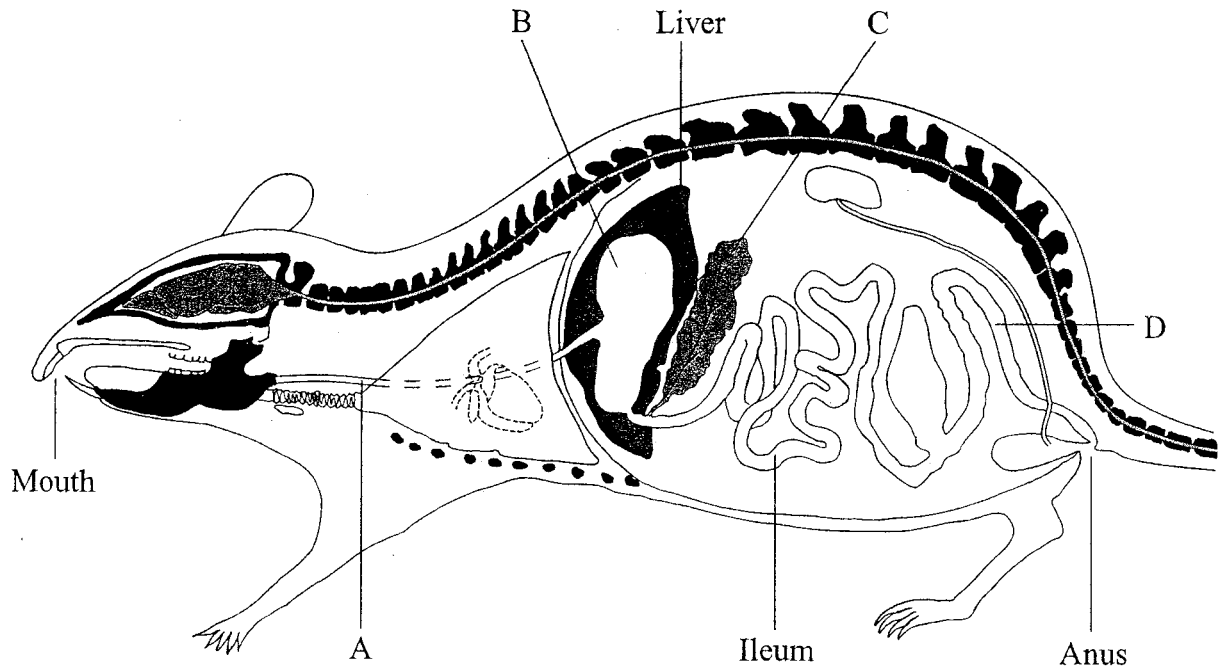
(1)

(Total 11 marks)

Q4

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5. The diagram below shows the digestive system of a rat.



(a) (i) Name the parts labelled A, B, C and D.

- A
- B
- C
- D

(4)

(ii) Describe how food is moved along part A.

-
-
-

(2)

- (b) Rats are pests. Warfarin is a poison that can be used to kill rats. However, some rats are not killed and are described as 'warfarin resistant'.

Warfarin resistance is controlled by a single gene that has two alleles, **R** and **r**. **R** is the allele for resistance and is dominant, and **r** is the recessive allele.

A pure bred (homozygous) warfarin resistant male rat was mated with a pure bred (homozygous) female rat not resistant to warfarin. All the offspring were warfarin resistant.

- (i) State the genotype of the male parent.

..... (1)

- (ii) State the genotype of the female parent.

..... (1)

- (iii) State the genotype of the offspring.

..... (1)

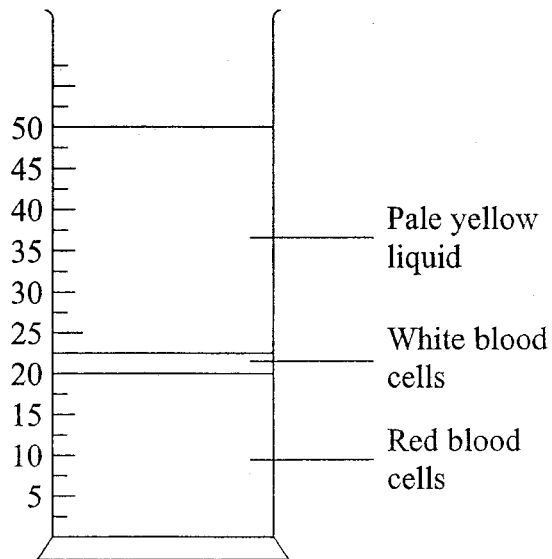
- (iv) Use a genetic diagram to show the genotypes of the parents, gametes and offspring when two heterozygous rats mate together.

(3)

(Total 12 marks)

Q5

6. A sample of blood was left in a measuring cylinder to separate into its main parts. The diagram below shows the result.



(a) (i) Name the pale yellow liquid.

..... (1)

(ii) Calculate the percentage of the blood sample that is made up of the pale yellow liquid. Show your working.

Answer (2)

(iii) Name **two** substances that you would expect to find in the pale yellow liquid.

1

2

(2)

(b) (i) Another sample of blood was taken from a person whose diet lacked iron. Suggest how the percentage of red blood cells in the sample would differ and explain your answer.

.....
.....
.....

(2)

(ii) Give **two** ways in which red blood cells are adapted to carry out their function.

1

.....

2

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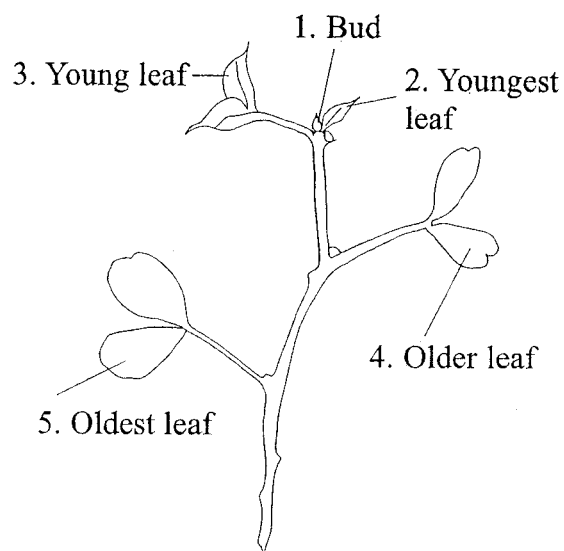
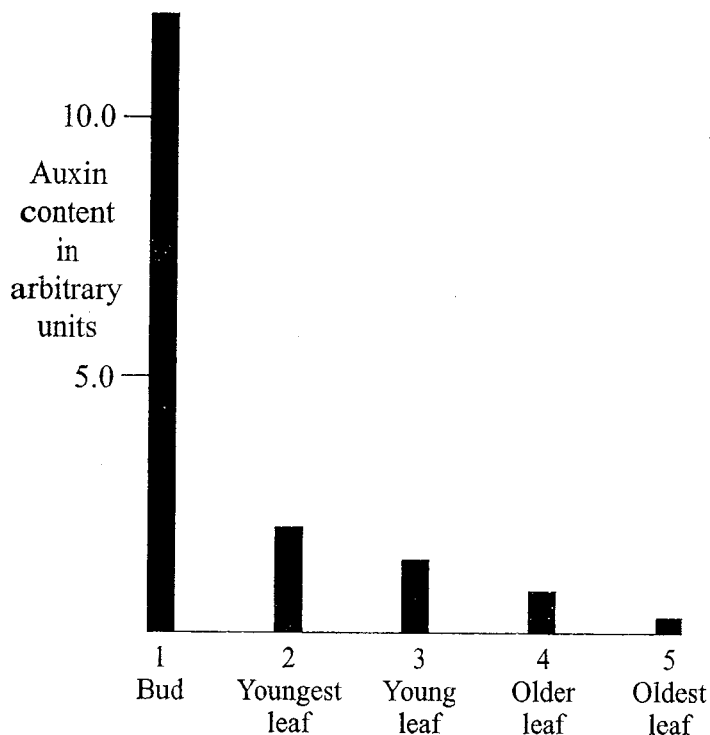
(2)

(Total 9 marks)

Q6



7. The graph below shows the concentration of the plant growth substance auxin, found at five locations in a broad bean plant. The numbers 1 to 5 on the drawing of the plant represent five different stages of development of the plant.



(a) Describe how the concentration of auxin varies in the plant.

.....

.....

.....

.....

.....

(3)

(b) What does this pattern of distribution suggest about the function of auxin in a bud?

.....

.....

.....

(2)

(c) Humans produce chemicals known as hormones and these can produce changes in the body.

(i) One hormone that affects the body is **adrenaline**. Name the gland that releases this hormone.

.....
(1)

(ii) Give **two** effects of adrenaline in the body.

1
.....
2
.....
(2)

(Total 8 marks)

Q7

8. The photograph below shows African dung beetles and dung.



(a) Use the photograph above to help you name **two** features that let you know a dung beetle is an insect.

1

2

(2)

(b) Dung beetles find dung (animal faeces) and roll it into small balls. They then bury these dung balls in tunnels that they make in the soil. The tunnels contain air and spread between the roots of plants. The dung beetles eat the dung and they also lay their eggs in it.

(i) Suggest how burying the dung helps the dung beetle to survive.

.....
.....
.....

(2)

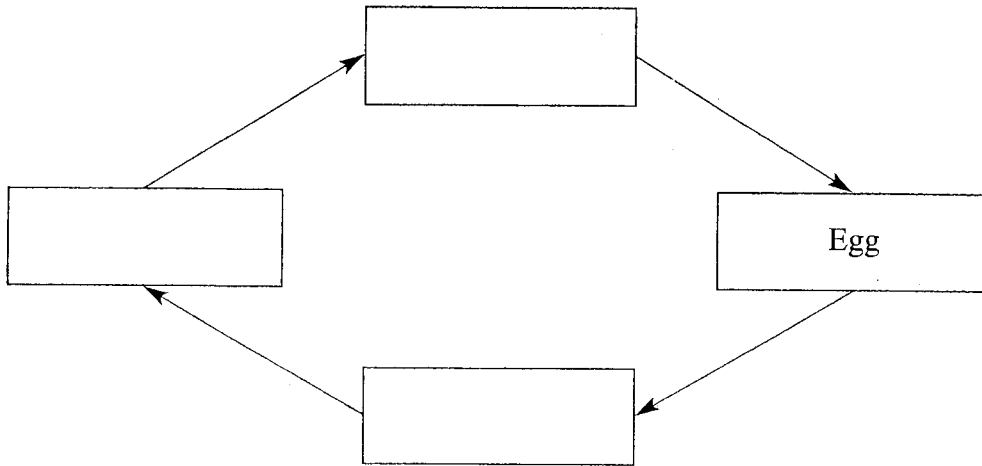
(ii) Suggest how the tunnels made by the dung beetle help plants to absorb minerals.

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(3)

Leave blank

(iii) Complete the diagram below to show the life cycle of the dung beetle.



(3)

Q8

(Total 10 marks)

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9. The osprey is a bird of prey, found in North America.

The food chain below shows some of the feeding relationships of the osprey.

Phytoplankton → Zooplankton → Minnow → Needle Fish → Osprey

(a) (i) From this food chain identify the following.

The producer

The secondary consumer (2)

(ii) A herbivore

A carnivore (2)

(b) (i) What happens to the number of organisms at each trophic level as the energy is transferred along this food chain?

.....
 (1)

(ii) Explain why the numbers change.

.....

 (2)

(c) The insecticide DDT was used extensively in America up to 1972. DDT is absorbed by the phytoplankton and is then passed along this food chain. The table below gives the concentration of DDT at each trophic level.

Organism	Concentration of DDT in parts per million
Phytoplankton	0.000003
Zooplankton	0.04
Minnow	0.5
Needle fish	2
Osprey	25

(i) Describe the relationship between the concentration of DDT and the trophic levels in the food chain.

.....
.....
(1)

(ii) Suggest an explanation for the differences in concentration of DDT at these trophic levels.

.....
.....
.....
(2)

(d) (i) Instead of using chemical insecticides biological control can be used.

Explain what is meant by **biological control** and give **one** example of its use.

.....
.....
.....
(2)

(ii) Give **two** advantages of using biological control rather than chemical insecticides.

1

.....

2

.....
(2)

(Total 14 marks)

Q9

TURN OVER FOR QUESTION 10

10. The table below lists some biological processes. Complete the table to show the substance linked with each process. One has been done for you.

Process	Substance linked with the process
Development of healthy bones	
Transpiration	
Ability to see in dim light	
Cutting DNA in genetic engineering	
Joining DNA in genetic engineering	Ligase
Gas produced during decomposition	
Conversion of glycogen to glucose	
Cause of eutrophication	

(Total 7 marks)

Q10

TOTAL FOR PAPER: 100 MARKS

END

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