

Centre No.					
Candidate No.					

Paper Reference (complete below)					
				/	

Surname	Initial(s)
Signature	

Examiner's use only

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Team Leader's use only

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Paper Reference(s)

**7040/02**

# London Examinations GCE

## Biology

### Ordinary Level

#### Paper 2

Tuesday 28 May 2002 – Afternoon

Time: 1 hour 30 minutes

Materials required for examination  
Nil

Items included with question papers  
Nil

Question Number	Leave Blank
1	
2	
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7	
8	
9	
10	
11	
Total	

### Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname and initials, the paper reference (7040/02) and your 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 eleven questions. There are no blank pages.

### Advice to Candidates

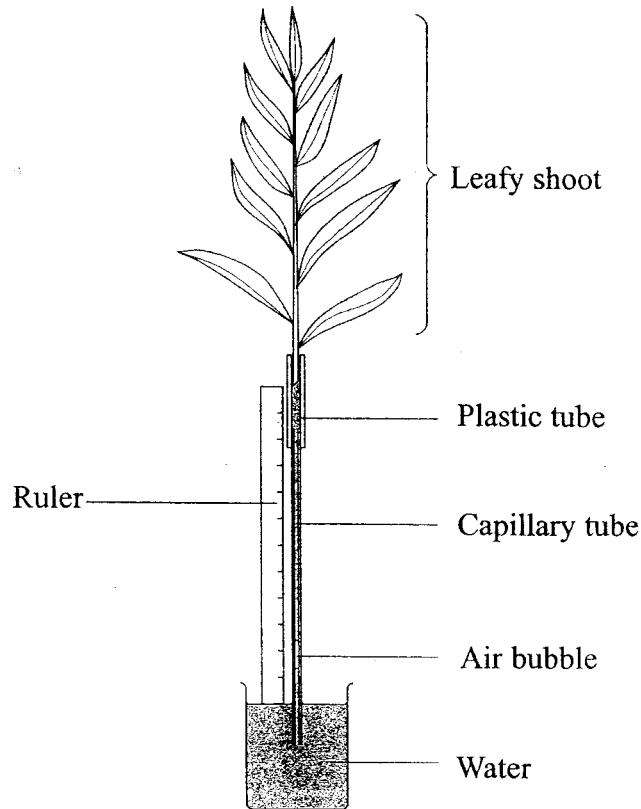
Write your answers neatly and in good English.  
In calculations, show **all** the steps in your working.

*Turn over*

Answer ALL questions in the spaces provided.

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blank

1. The diagram below shows the apparatus used by a student to measure water uptake by a leafy shoot.  
The rate of water uptake by the leafy shoot in different conditions was compared by measuring the distance moved by the air bubble in one minute.



- (a) (i) What name is given to this type of apparatus?

..... (1)

- (ii) Name the process by which water is lost from the leaves of a plant.

..... (1)

- (b) Give **two** precautions you should take when setting up this apparatus.

1.....  
.....

2.....  
.....

(2)

- (c) The student measured the distance moved by the bubble in one minute, with the shoot in different conditions. The results are given in the table below.

*Leave blank*

Conditions	Distance moved by bubble in mm
Normal conditions	20
Increased temperature	24
Increased humidity	15
Increased air speed	25

Compared with normal conditions, these results show a 20% increase in water loss when the **temperature** was increased.

Calculate the percentage change in water loss (increase or decrease), compared with normal conditions, when the **humidity** was increased. Show your working.

Answer .....  
(3)

- (d) Explain why the rate of water loss increased as the air speed increased.

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(3)

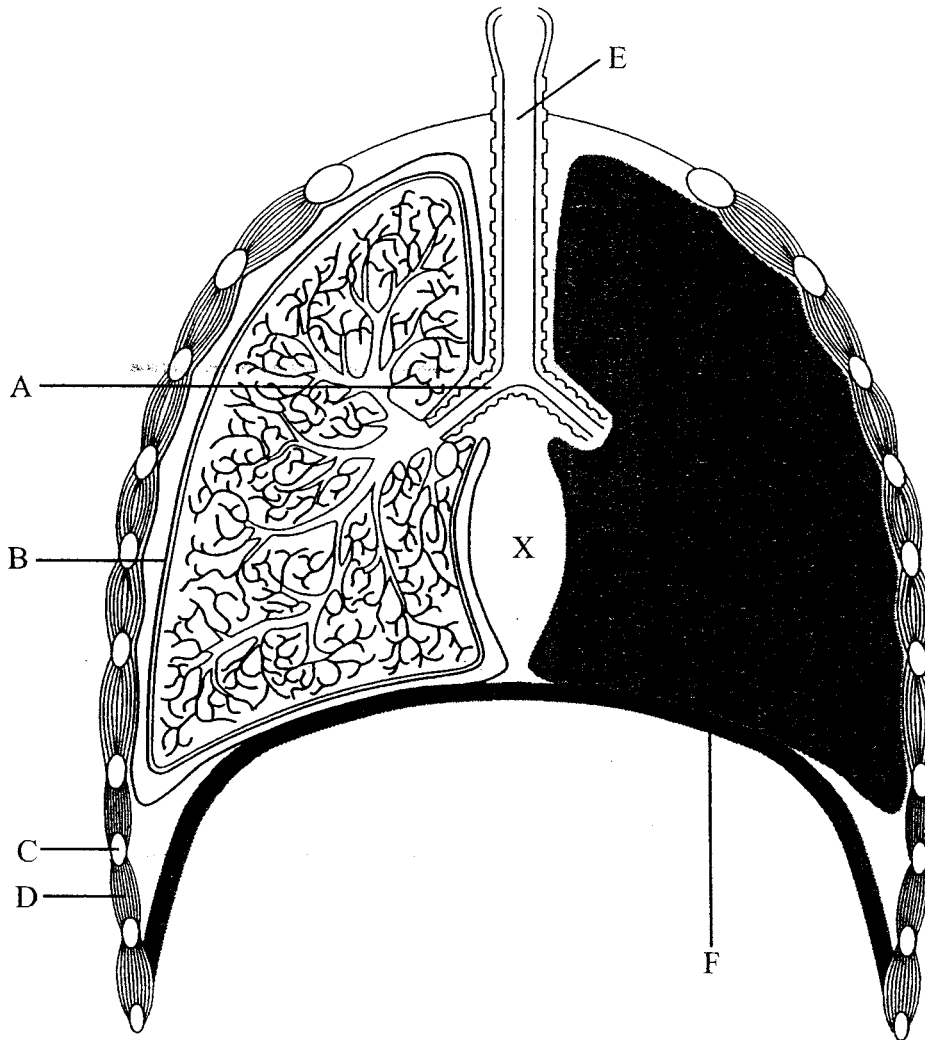
Q1

(Total 10 marks)

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2. The diagram below shows a section through the human thorax.

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

A .....

B .....

(2)

(ii) Name the organ found in position X.

.....

(1)

(b) The movements of certain structures allow breathing in and out to take place.

(i) From the diagram, select the letters of **two** structures involved in these movements.

.....

(2)

(ii) Describe how these movements allow breathing in (inhalation) to take place.

*Leave  
blank*

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**(4)**

(c) (i) What is the function of the mucus produced in the lungs?

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**(1)**

(ii) Smoking tobacco damages the delicate cells that line the breathing tubes. Explain how this would affect the functioning of the lungs.

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**(2)**

**(Total 12 marks)**

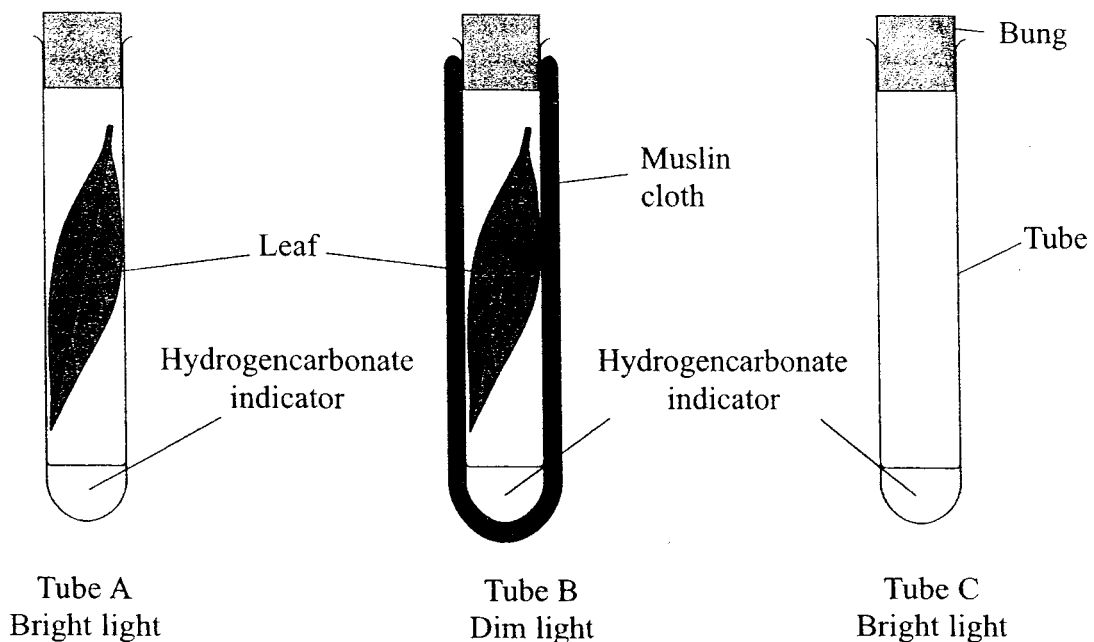
**Q2**

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3. Hydrogencarbonate indicator can be used to detect changes in carbon dioxide concentration in the air. In normal air, hydrogencarbonate indicator is red. Changes in the concentration of carbon dioxide cause changes in the colour of the hydrogencarbonate indicator, as shown in the table below.

Concentration of carbon dioxide	Colour of hydrogencarbonate indicator
High level of carbon dioxide	Yellow
Slightly increased level of carbon dioxide	Orange
Carbon dioxide level in normal air	Red
Slightly decreased level of carbon dioxide	Dark red
Low level of carbon dioxide	Purple

A student wanted to investigate how gas exchange in a green leaf is affected by different conditions. She placed some hydrogencarbonate indicator in each of three tubes, A, B and C. She then chose two leaves of the same size from a plant. She placed one leaf in tube A and the second leaf in tube B, as shown in the diagram below. Tube B was wrapped in muslin cloth, which allowed only some of the light to reach the leaf. Tube C had no leaf. All three tubes were then placed in good light conditions for one hour. After one hour, the student recorded the colour of the hydrogencarbonate indicator.



Leave blank

(a) The table below shows some of the results.

Tube	Colour of indicator at start	Colour of indicator after one hour	Change in level of carbon dioxide
A	Red	Purple	
B	Red		Slight decrease
C	Red	Red	

(i) Complete the table to show how the levels of carbon dioxide changed in tubes A and C.

(2)

(ii) What colour would the student have observed in tube B?

.....  
(1)

(iii) Name the process occurring in tubes A and B which led to their results.

.....  
(1)

(b) Explain why tube C was included in the experiment.

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(2)

(c) The student then left the test tubes in the dark overnight in the classroom and examined them the next morning. She observed the following colours in the tubes.

Tube	Colour of indicator in the morning
A	Yellow
B	Yellow
C	Red

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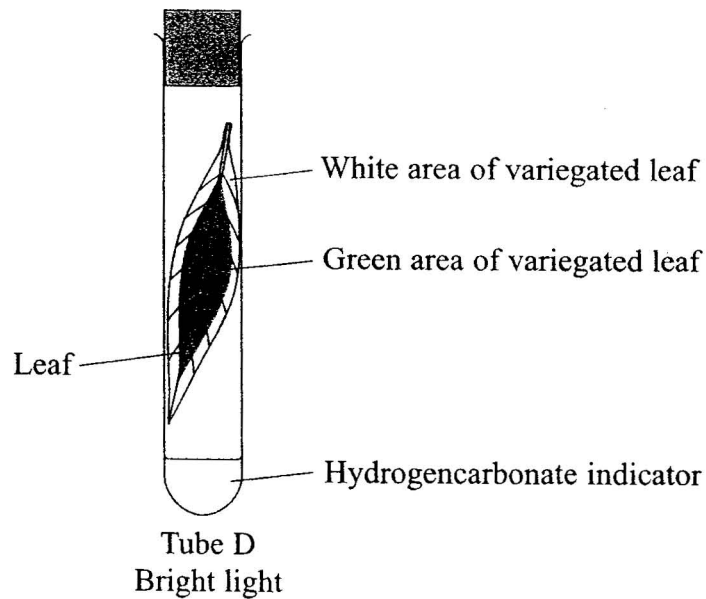
(i) Name the process occurring in tubes A and B which led to these results.

.....  
(1)

(ii) Explain why the indicator in tubes A and B changed colour.

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

(d) The student then set up a fourth tube (tube D) using a variegated leaf of the same size as that used in tube A. Other conditions were the same (see diagram below).



What colour would you expect in the indicator after one hour? Give a reason for your answer.

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(2)

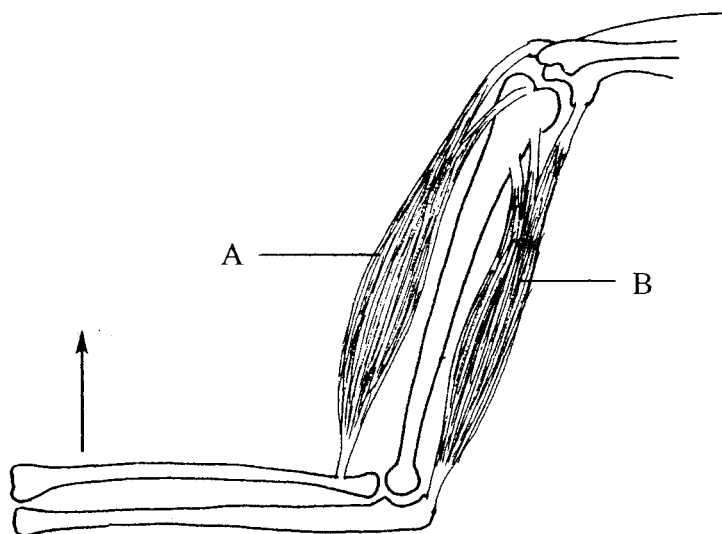
Q3

(Total 11 marks)



4. The diagram below shows the human elbow joint.

*Leave blank*



(a) (i) Name the muscles labelled A and B.

A .....

B .....

(2)

(ii) Give the letter of the muscle which contracts to move the arm in the direction of the arrow.

.....

(1)

(b) What term describes a pair of muscles that contract producing opposite effects?

.....

(1)

(c) (i) Humans have an endoskeleton. Give **one** function, other than movement, of a skeleton.

.....

(1)

(ii) Insects have an exoskeleton. Give **two** ways that this exoskeleton differs from an endoskeleton.

1.....

.....

2.....

.....

(2)

Q4

(Total 7 marks)

5. The data in the table below come from the boxes of four breakfast cereals sold in the UK.

*Leave blank*

Name	Breakfast cereal			
	'Frosties'	'Rice Krispies'	'Coco pops'	'Nesquik'
Energy kJ per 100 g	1600	1600	1600	1670
Protein g per 100 g	5	6	5	5
Carbohydrate g per 100 g	88	85	85	84
of which sugar	38	10	40	38
of which starch	50	75	45	46
Fat g per 100 g	0.5	1.0	2.5	4.4
Fibre g per 100 g	2	1.5	2.5	2.4

(a) Which cereal contains most energy?

..... (1)

(b) All of the cereals contain approximately the same amount of carbohydrate but some contain more sugar and some more starch.

(i) State **two** ways that starch molecules differ from sugar molecules.

1. ....  
 .....

2. ....  
 .....

(2)

(ii) After the breakfast cereal has been eaten, the carbohydrate is absorbed by the body. From which cereal is the carbohydrate likely to be absorbed most slowly? Explain your answer.

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

(3)

(c) Each of the cereals contains a similar amount of protein. Describe how you would test a sample of a cereal for protein and give the result you would expect.

*Leave blank*

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.....

(2)

Q5

(Total 8 marks)

6. (a) A rat is a mammal. Give **three** structures found in a rat which are characteristic of mammals.

1. ....  
2. ....  
3. ....

(3)

(b) Rats are found in almost all countries of the world. Describe ways in which large numbers of rats could have harmful effects on a farming community.

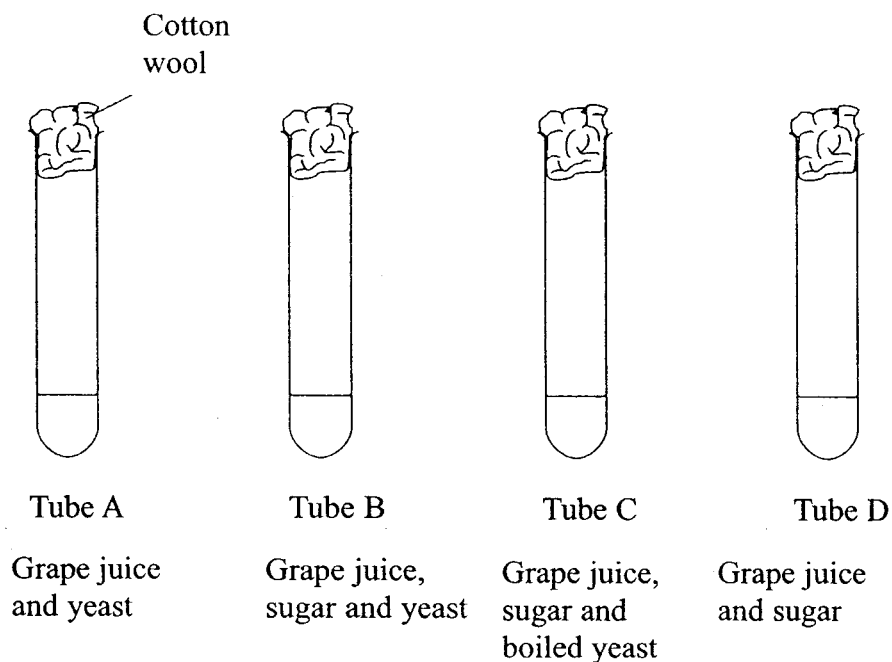
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(3)

Q6

(Total 6 marks)

7. A student set up an experiment to investigate anaerobic respiration in yeast. Four test tubes (A, B, C and D) were set up as shown in the diagram below, using sterile test tubes and fresh grape juice. Other contents are as shown in the diagram. The student then left the test tubes in a warm place.



- (a) State the **two** products formed when yeast carries out anaerobic respiration.

1.....

2.....

(2)

- (b) (i) After two days some bubbles were seen in tubes A and B and the clear grape juice started to turn cloudy. Explain these observations.

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(3)

(ii) In which tube, A or B, would you expect the bubbles to be produced more quickly? Explain your answer.

*Leave blank*

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(2)

(c) After two days, tube C (which contains grape juice, sugar and boiled yeast,) showed no changes. Explain this result.

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(2)

(d) After five days the student noticed that bubbles were being produced in tube D. Suggest an explanation for this observation.

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(2)

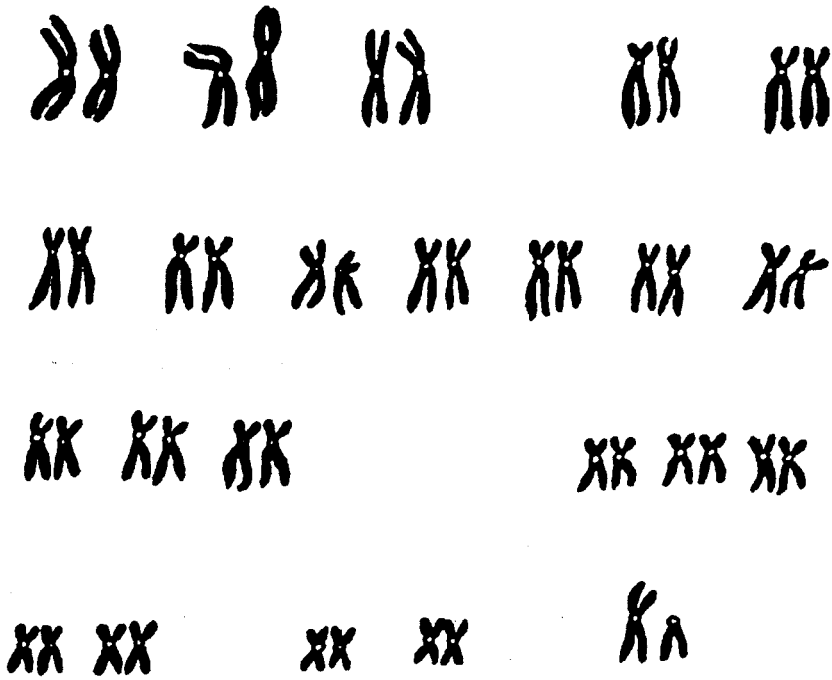
Q7

**(Total 11 marks)**

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8. The diagram below shows the chromosomes from a human white blood cell.

Leave  
blank



(a) (i) Where in the white blood cell are the chromosomes found?

.....  
(1)

(ii) How many chromosomes are shown in the diagram?

.....  
(1)

(iii) Are these chromosomes from a male or from a female? Explain your answer.

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

(b) (i) Some cells divide and produce identical cells during growth. Name this type of cell division.

*Leave blank*

.....

(1)

(ii) Other cells divide to produce gametes (sex cells). Give **one** way that this type of cell division differs from cell division during growth.

.....

(1)

(iii) Name the **two** organs in the mammal where gamete production takes place.

1. ....

2. ....

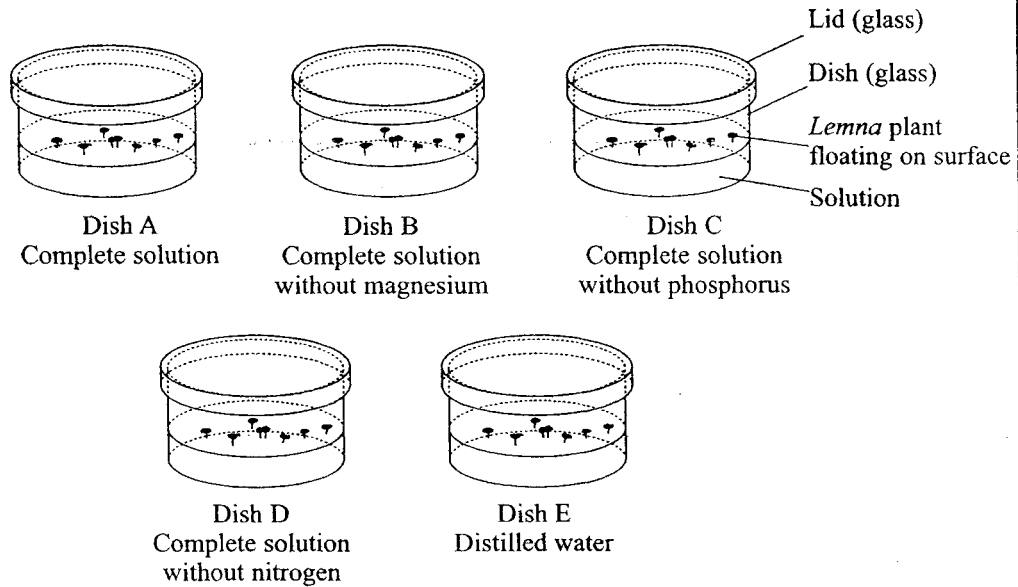
(2)

Q8

(Total 8 marks)

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9. *Lemna* (also known as duckweed) is a small floating plant which grows in fresh water. An experiment was set up to investigate the role of mineral ions in the growth of *Lemna*. Five dishes (labelled A to E) were set up as shown in the diagram below. Each dish contained the same number of *Lemna* plants but in a different solution. Dish A contained 'complete solution', which included all the mineral ions required by *Lemna* for normal growth. Dishes B, C and D each lacked a different mineral ion. Dish E contained distilled water, which has no mineral ions.



The dishes were placed by a window in the classroom and observed over a period of three weeks. Growth of the *Lemna* plants was estimated from the changes in leaf size and number of leaves.

- (a) Compared with dish A, *Lemna* plants in dish B showed less growth and their leaves turned yellow. Suggest an explanation for this result.

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.....  
.....

(2)

- (b) Compared with dish A, *Lemna* plants in dish D remained small and no new leaves were formed. Suggest an explanation for this result.

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



(c) In this experiment, why is comparison made with dish A rather than dish E?

.....  
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(1)

(d) Suggest a method you could use to estimate the leaf area of all the *Lemna* plants in dish A.

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(2)

(Total 7 marks)

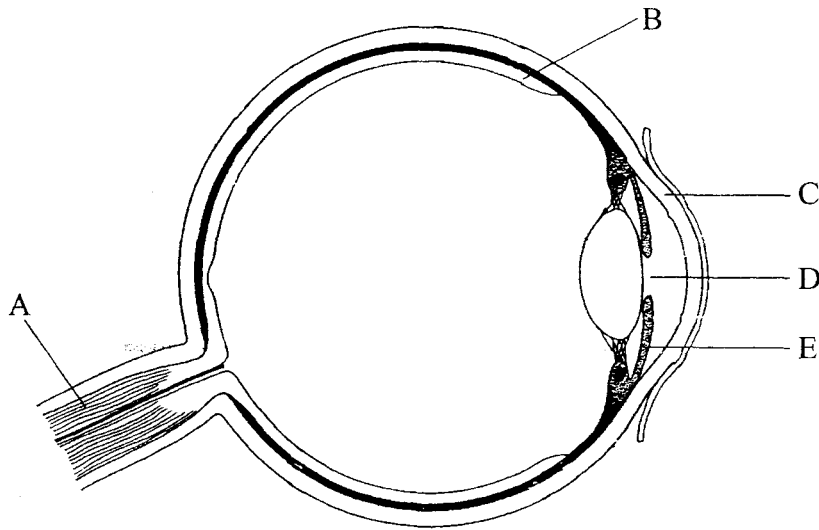
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Q9

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10. The diagram below shows a section through the human eye.

*Leave blank*



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

A .....

B .....

C .....

D .....

(4)

(b) What changes occur in parts D and E as a person moves from a dark room into bright light?

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.....

(2)

(c) Describe the changes that take place in the eye as it focuses on a near object after looking at a distant object.

*Leave blank*

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(4)

(d) Humans have two eyes on the front of their head.

(i) Suggest why many animals have most of their sense organs on the head.

.....  
.....

(1)

(ii) Give **one** advantage of having the eyes on the front of the head.

.....  
.....

(1)

(iii) Give **one** advantage of having two eyes.

.....  
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(1)

Q10

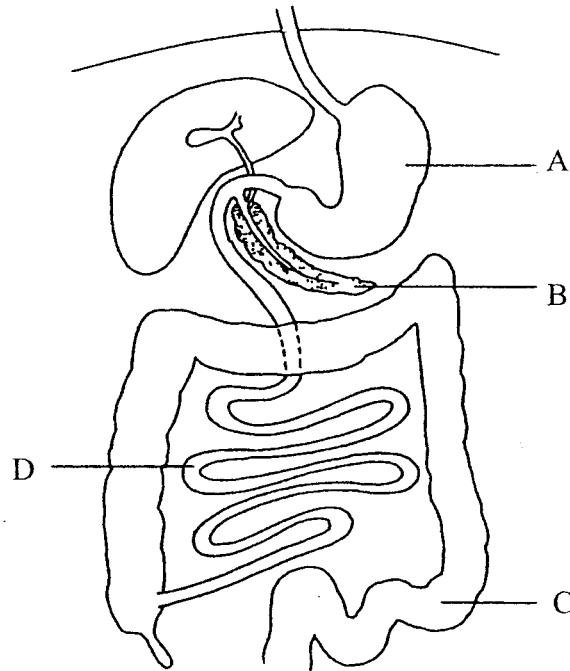
(Total 13 marks)

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**PLEASE TURN OVER FOR QUESTION 11**

11. The diagram below shows the structure of the human gut.

Leave  
blank



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

A.....  
B.....  
C..... (3)

(b) Name **two** processes carried out in structure D.

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

(c) Humans require fibre in their diet. State **one** function of fibre in the diet.

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

(d) Name the process by which food is moved through the gut.

..... (1)

Q11

(Total 7 marks)

TOTAL FOR PAPER: 100 MARKS

END