

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**BIOLOGY**

Paper 6 Alternative to Practical

**0610/06**

May/June 2006

Candidates answer on the Question Paper.  
No Additional Materials are required

**1 hour**Candidate  
Name
Centre  
Number

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Candidate  
Number

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**READ THESE INSTRUCTIONS FIRST**

Write Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use a pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

DO **NOT** WRITE IN THE BARCODE.

DO **NOT** WRITE IN THE GREY AREAS BETWEEN THE PAGES.

Answer **all** questions.

The number of marks is given in brackets [ ] at the end of each question or part question.

| For Examiner's Use |  |
|--------------------|--|
| 1                  |  |
| 2                  |  |
| 3                  |  |
| <b>Total</b>       |  |

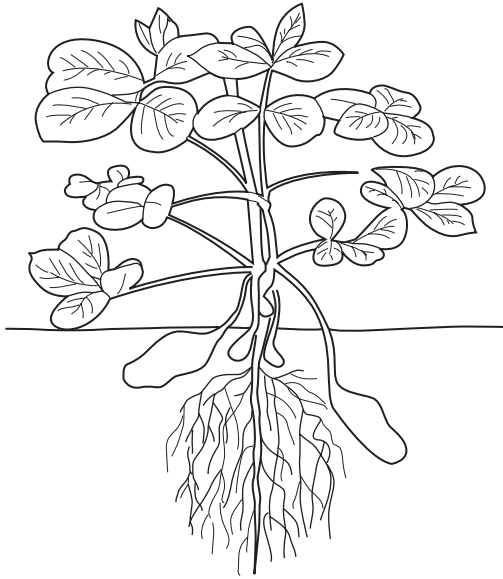
This document consists of **12** printed pages.



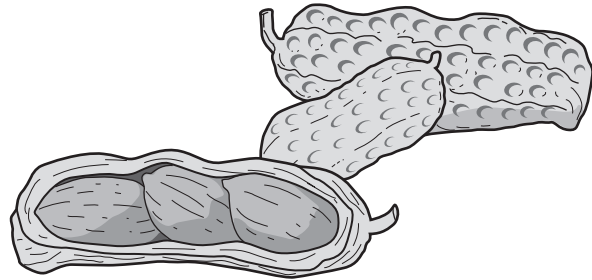
1 Fig.1.1 shows a diagram of a groundnut plant, *Arachis hypogaea*.

The flower stalks grow downwards so that the fruits develop below the soil surface.

Fig. 1.2 shows the mature fruits, one of which has been cut open.



**Fig. 1.1**



**Fig. 1.2**

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(a) (i) Make a large, labelled drawing of the open fruit and its contents.

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[5]

(ii) Measure the length of your drawing. ....

Measure the length of the same structure in Fig. 1.2. ....

Calculate the magnification of your drawing.

Show your working.

Magnification ..... [3]

(b) A student investigated the energy content of a seed.

A seed was weighed and its mass recorded in Table 1.1. The seed was firmly attached to the end of a mounted needle. A large test tube containing 20 cm<sup>3</sup> of water was held in a clamp stand, with a thermometer and a stirrer. The apparatus is shown in Fig. 1.3.

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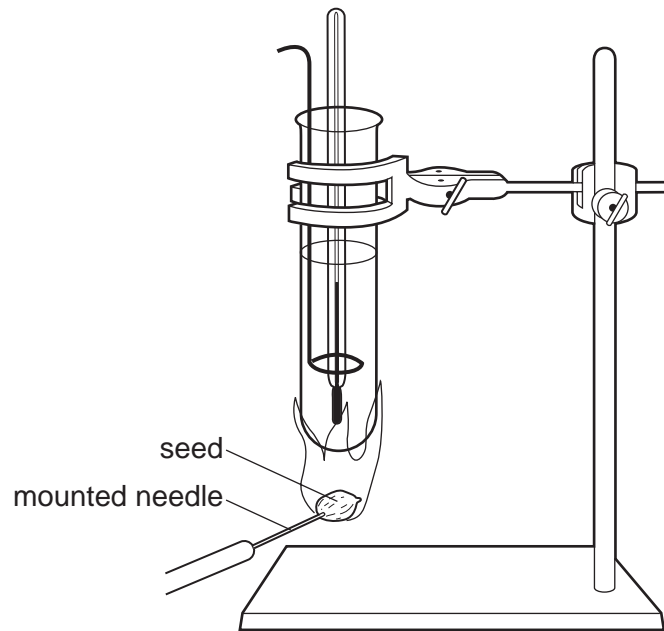


Fig. 1.3

- The temperature of the water at the start was recorded in Table 1.1.
- The seed was set alight by placing it in a flame for a few seconds.
- The burning seed was held under the test tube until the seed was completely burnt.
- The water was stirred immediately. The highest temperature of the water was recorded in Table 1.1.

5

(i) Complete Table 1.1 by calculating the rise in temperature.

[1]

Table 1.1

| mass of seed / g | volume of water / cm <sup>3</sup> | temperature at the start / °C | highest temperature / °C | rise in temperature / °C |
|------------------|-----------------------------------|-------------------------------|--------------------------|--------------------------|
| 0.5              | 20                                | 29                            | 79                       | .....                    |

The energy contained in the seed can be calculated using the formula below.

$$\text{energy} = \frac{\text{volume of water} \times \text{rise in temperature} \times 4.2}{\text{mass of seed} \times 1000}$$

(ii) Using the formula calculate the energy content of the seed.

Show your working.

Energy content ..... kJg<sup>-1</sup>

[2]

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The same method was used to find the energy content of some food substances. The results are shown in Table 1.2.

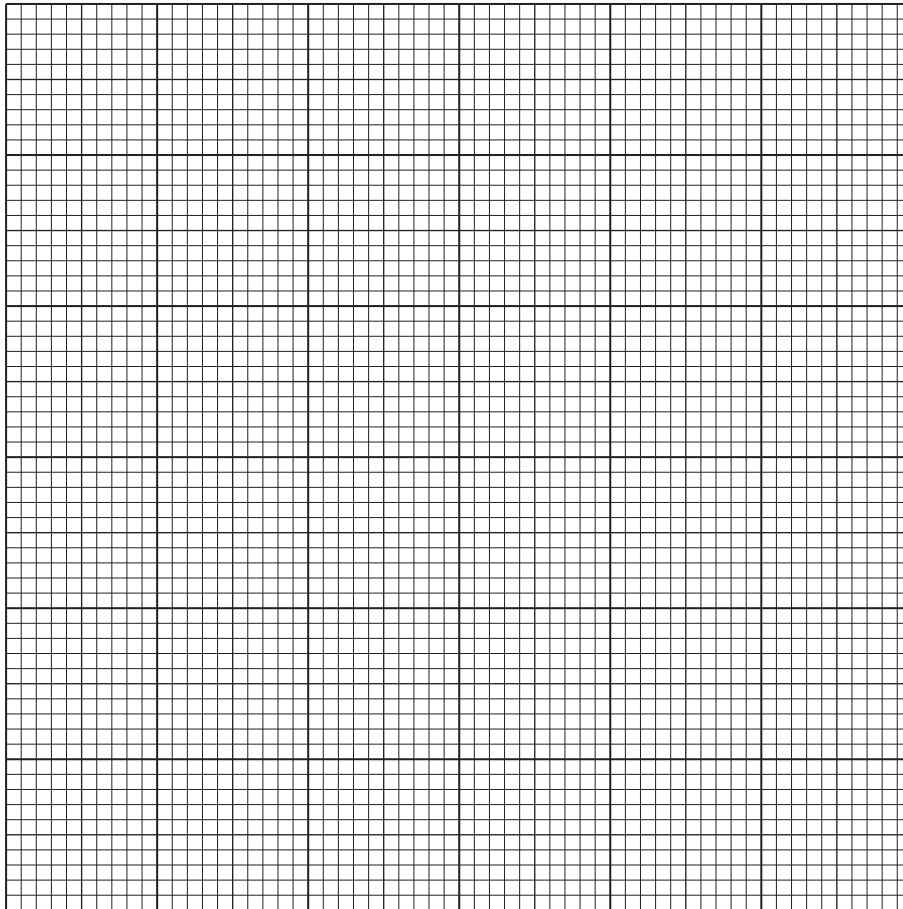
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**Table 1.2**

| food substance | mass of food burnt /g | starting temperature / °C | final temperature / °C | rise in temperature / °C | energy content /kJg <sup>-1</sup> |
|----------------|-----------------------|---------------------------|------------------------|--------------------------|-----------------------------------|
| starch         | 0.62                  | 31                        | 65                     | 34                       | 4.61                              |
| sugar          | 0.54                  | 30                        | 59                     | 29                       | 4.51                              |
| fat            | 0.56                  | 30                        | 90                     | 60                       | 9.00                              |
| protein        | 0.40                  | 31                        | 52                     | 21                       | 4.41                              |

(iii) On the grid below, plot a suitable graph to compare the energy content per gram of the four different food substances **and** the seed from (b)(ii).

For  
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Use



(vi) Use this information to suggest the main food substance present in the seed. [4]

..... [1]

(c) Describe how you would test for the presence of reducing sugars in a seed.  
.....

.....  
..... [3]

[Total : 19 marks]

- 2 Fig. 2.1 shows a young bean seedling which had been grown in the dark and then placed horizontally on the surface of some damp soil.

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The seedling was kept well watered and exposed to the light for 2 days.  
Fig. 2.2 shows the seedling after 2 days.

Fig. 2.1

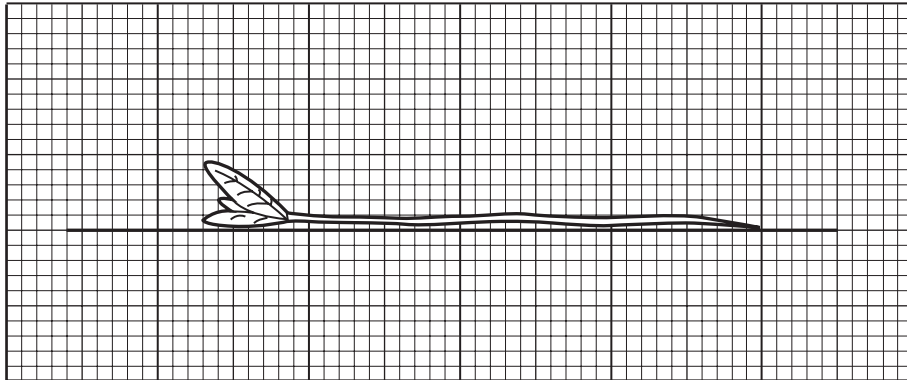
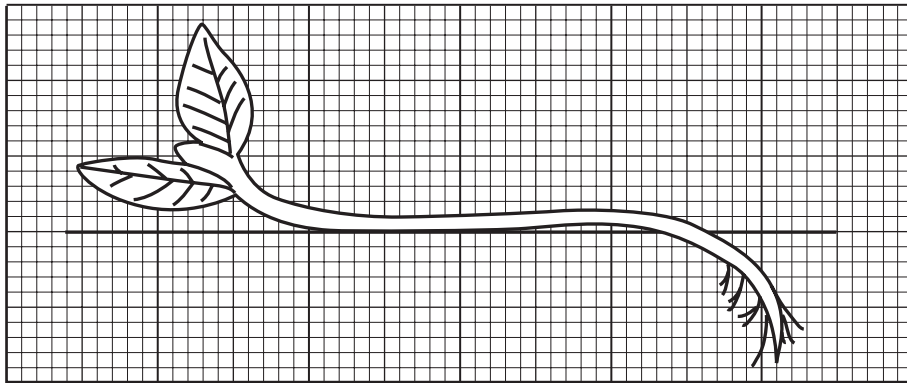


Fig. 2.2



- (a) Describe the changes in appearance of the shoot and the root of the seedling after 2 days.

(i) shoot .....

.....

..... [2]

(ii) root .....

.....

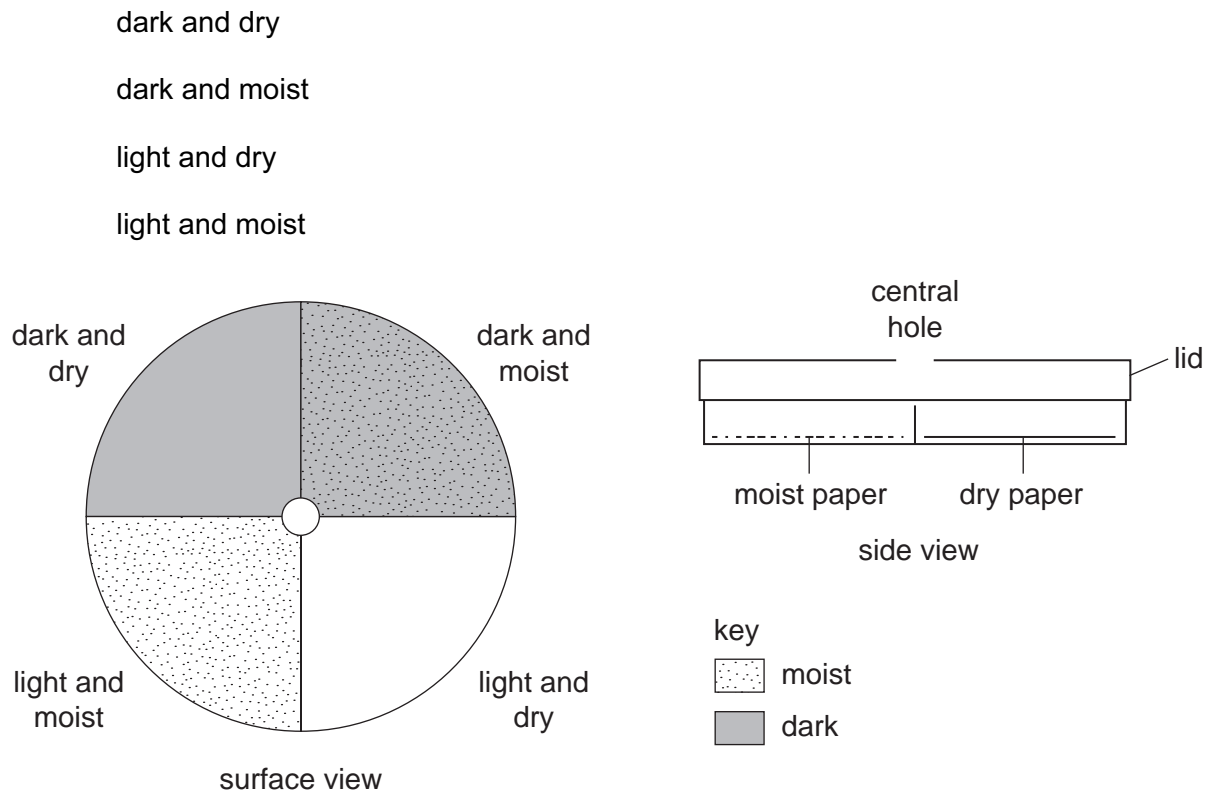
..... [2]





3 Fig 3.1 shows a choice chamber.

- This apparatus can be used to study the behaviour of small invertebrates, such as woodlice, in different conditions.
- 60 woodlice were introduced through the central hole.
- The four sections of the choice chamber had different conditions as shown in Fig. 3.1.



**Fig. 3.1**

- The choice chamber was left undisturbed for 10 minutes.
- The numbers of woodlice in each section were counted.
- The numbers were recorded in Table 3.1.
- These woodlice were released into their natural environment.
- The investigation was repeated with three more samples of woodlice.

(a) (i)

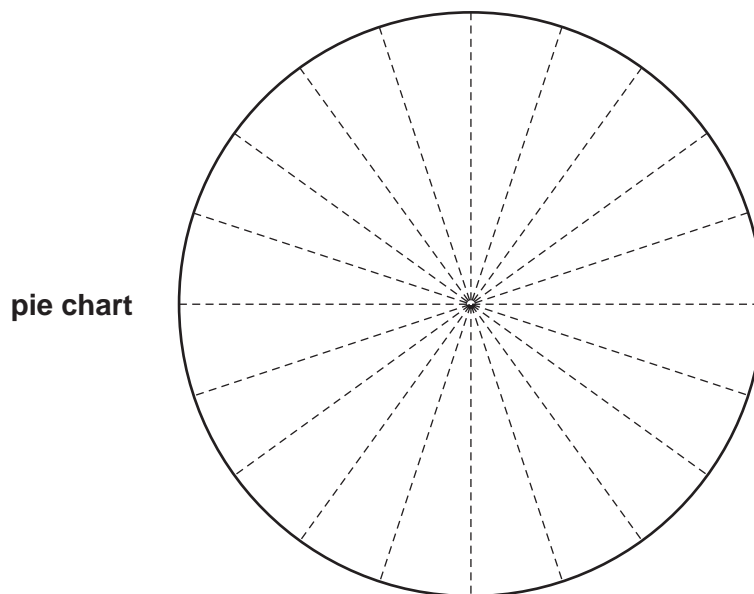
Table 3.1

| sample of woodlice | dark and dry | dark and moist | light and dry | light and moist |
|--------------------|--------------|----------------|---------------|-----------------|
| 1st                | 8            | 47             | 1             | 4               |
| 2nd                | 4            | 56             | 0             | 0               |
| 3rd                | 5            | 52             | 1             | 2               |
| 4th                | 7            | 49             | 2             | 2               |
| total              | .....        | 204            | .....         | 8               |
| average            | .....        | 51             | .....         | 2               |

Complete Table 3.1. The calculations for the moist sections have been completed for you.

[2]

(ii) Plot the average number of woodlice in each condition on the **pie chart** below.



[3]

(b) (i) State which conditions the woodlice prefer.

..... [1]

(ii) Suggest how this behaviour might help the woodlice to survive in their natural habitat.

.....  
.....  
..... [2]

(c) Suggest how you could improve this investigation to make the results more reliable.

.....  
.....  
.....  
.....  
..... [3]

[Total 11]

*Copyright Acknowledgements:*

Question 1      Fig. 1.1 © S. Harrison; *Oxford Book of Food Plants*; Oxford University Press; 1969. By permission of Oxford University Press.  
Question 1      Fig. 1.2 © A. King; *Agriculture: An Introduction for Southern Africa*; Cambridge University Press; 1985.

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