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

Candidate Number

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	
Total	

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.

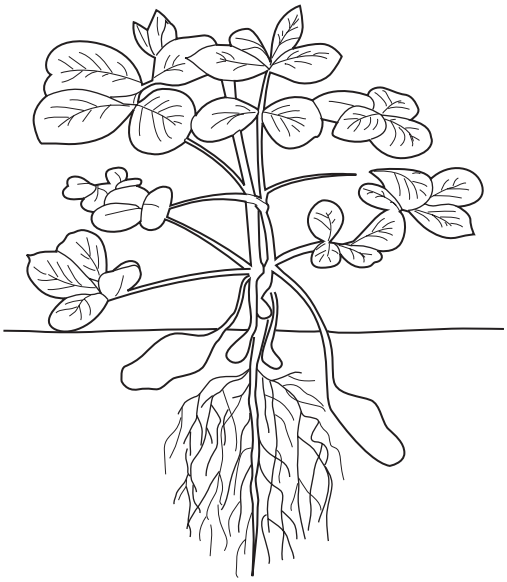


Fig. 1.1

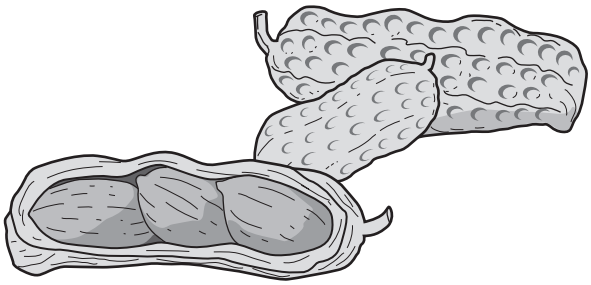


Fig. 1.2

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

[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 cm³ of water was held in a clamp stand, with a thermometer and a stirrer. The apparatus is shown in Fig. 1.3.

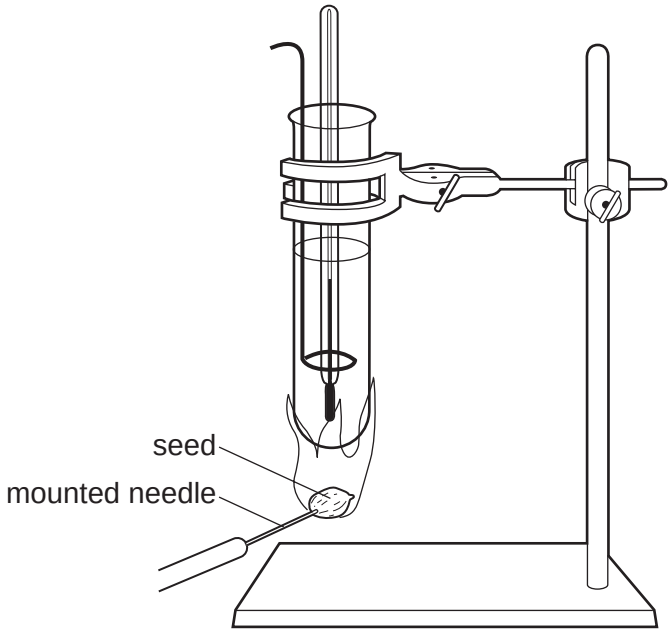


Fig. 1.3

- 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.

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

Table 1.1

mass of seed / g	volume of water / cm^3	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.

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

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

Show your working.

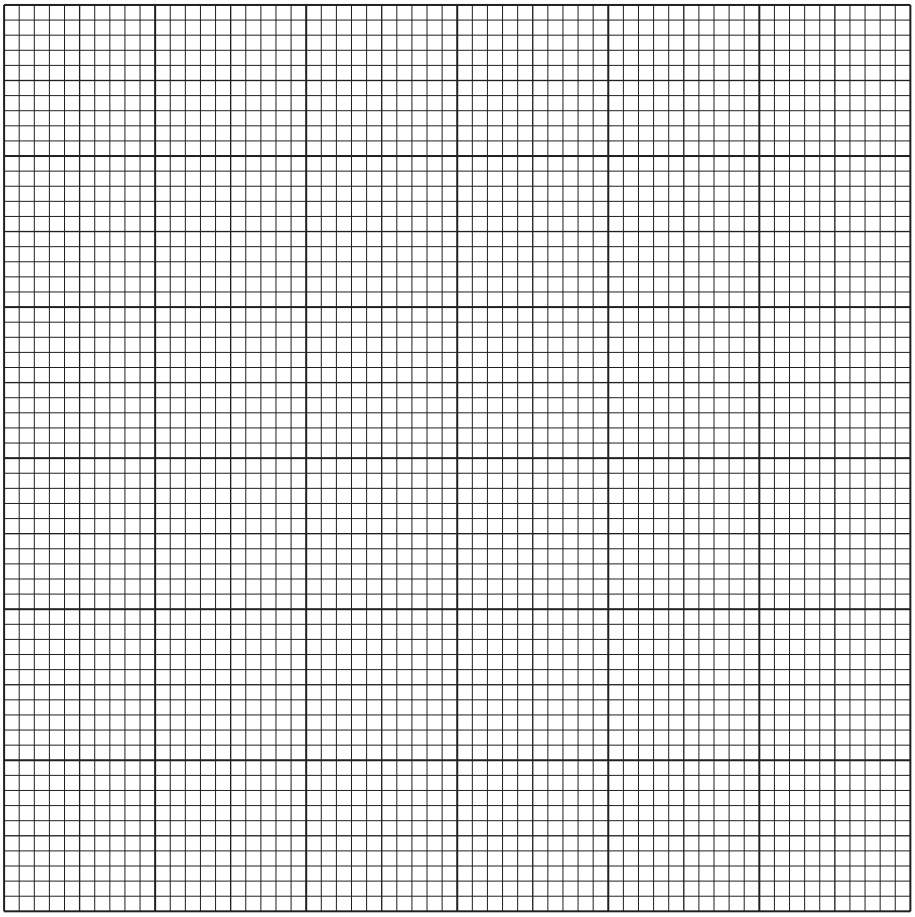
Energy content ..... $kJ\,g^{-1}$ [2]

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

Table 1.2

food substance	mass of food burnt / g	starting temperature / °C	final temperature / °C	rise in temperature / °C	energy content / kJ g^{-1}
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 g
the four different food substances **and** the seed from (b)(ii).



[4]

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

..... [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 horizontally on the surface of some damp soil.

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

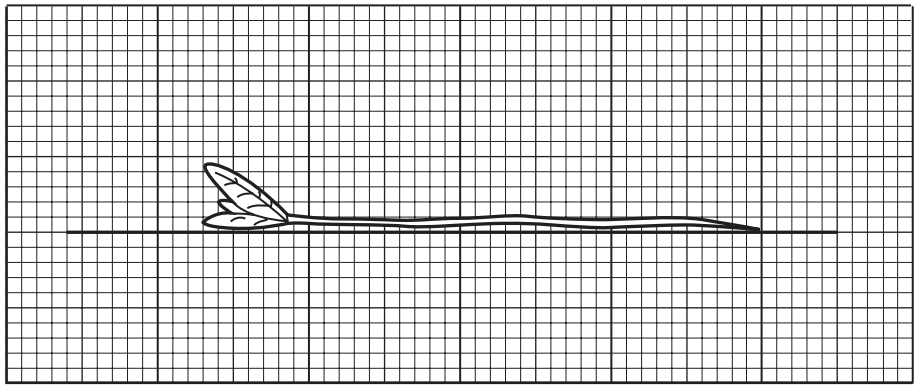
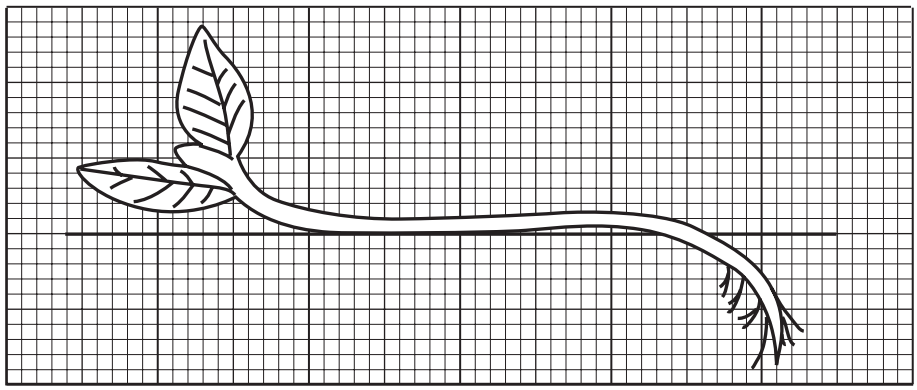


Fig. 2.2



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

(i) shoot .....

.....

..... [2]

(ii) root .....

.....

..... [2]

(b) Describe the processes involved in the changes of directional growth of the shoo
seedling.

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..... [6]

[Total : 10]

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.

  dark and dry

  dark and moist

  light and dry

  light and moist

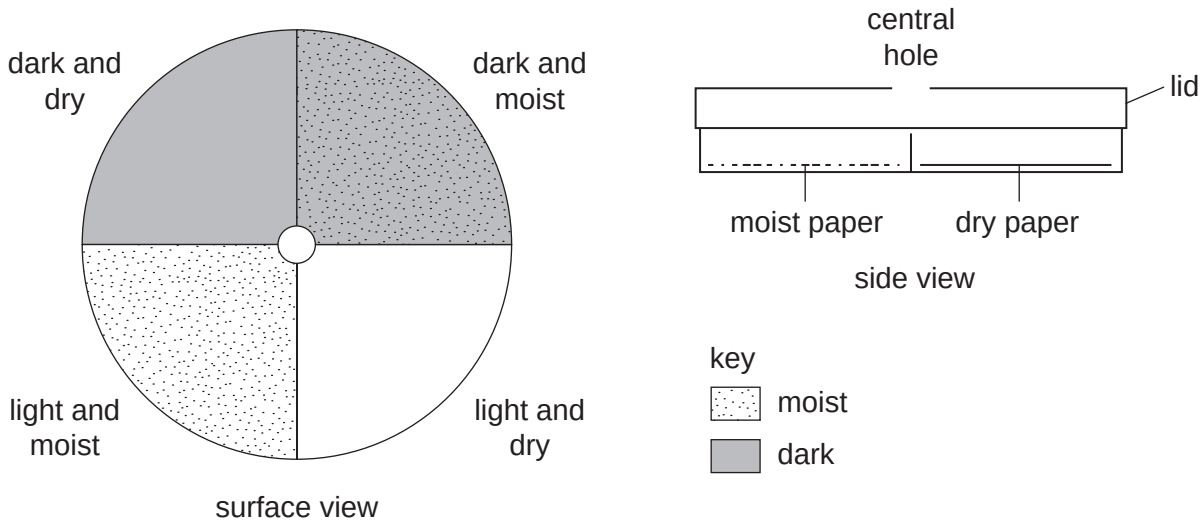


Fig. 3.1

- 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

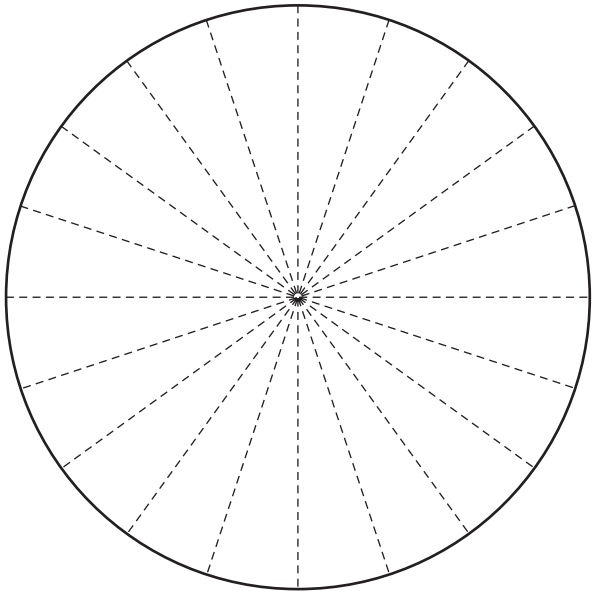
sample of woodlice	dark and dry	dark and moist	light and dry	light and moist
1st	8	47	1	4
2nd	4	56	0	0
3rd	5	52	1	2
4th	7	49	2	2
total	.....	204	.....	8
average	.....	51	.....	2

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.

pie chart



[3]

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

.... [

(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.

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....

....

.... [3]

[Total 11]