

Characteristics and Classification of Living Organisms

Question Paper 3

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Characteristics and Classification of Living Organisms
Sub-Topic	
Paper Type	Alternative to Practical
Booklet	Question Paper 3

Time Allowed: 59 minutes

Score: /49

Percentage: /100

1 Birds have feathers to cover their bodies.

Fig. 2.1 shows two types of feather, **A** and **B**.



Fig. 2.1

(a) (i) Make a labelled outline drawing of feather **A**.

(ii) Suggest a function of feather **A**.

.....
..... [1]

(iii) Suggest a function of feather **B** and explain how it is adapted for this function.

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

Fig. 2.2 shows feather **B** placed upon a grid. You will use this to help you to estimate the surface area of feather **B**.



Fig. 2.2

(b) (i) Measure the size of one of the grid squares. Use this to calculate the surface area of feather **B**.

Show your working.

area of feather **B**cm² [3]

- (ii) Describe a more accurate method that you could use to find the actual surface area of feather **B**.

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..... [2]

[Total: 12]

2 Fig. 2.1 shows a honey bee, *Apis mellifera*.

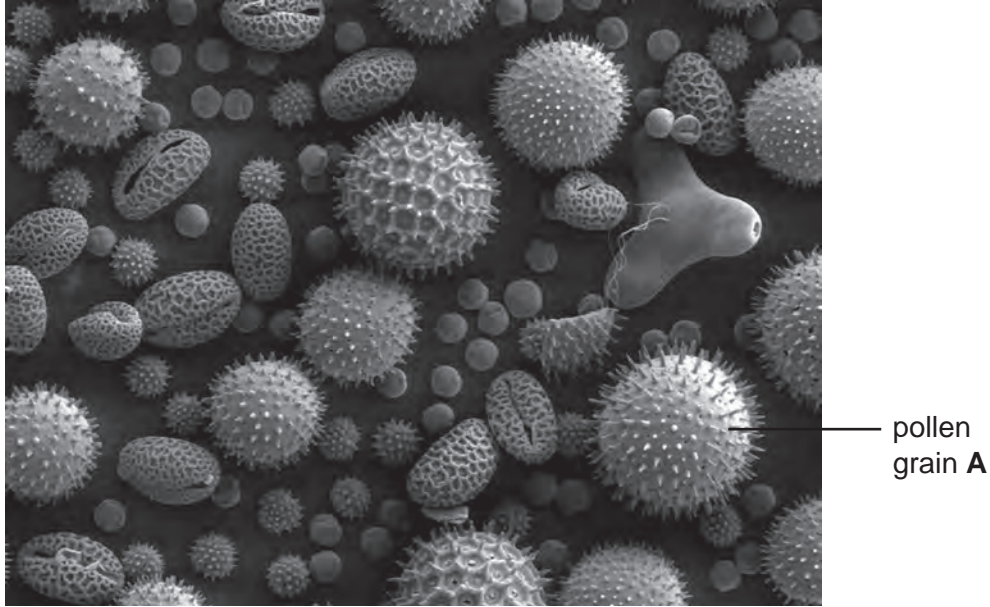


Fig. 2.1

(a) Make a labelled drawing of the back leg of the honey bee shown in Fig. 2.1.

Honey bees are important in pollination when they gather nectar from flowers. The nectar is used for making honey. Honey contains pollen grains which identify the flowers that the nectar was gathered from.

Fig. 2.2 shows some pollen grains in a sample of honey as seen with a microscope.



× 500

Fig. 2.2

(b) (i) Measure the diameter of pollen grain A. Draw a line on Fig. 2.2 to show where you have made your measurement.

diameter of pollen grain A in Fig. 2.2 mm [1]

(ii) Calculate the actual diameter of pollen grain A. Show your working.

actual diameter of pollen grain A mm [2]

(c) Describe how you could safely test a sample of honey for starch and reducing sugar:

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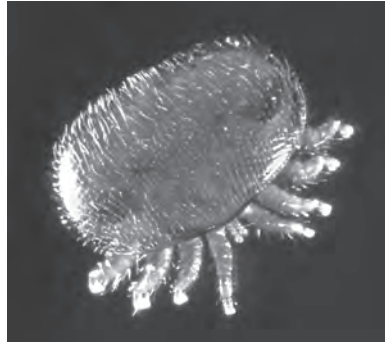
.....

..... [4]

Honey production has been affected by parasites found on both the adult and larval stages of honey bees.

One of the latest pests has been identified as a blood sucking parasite, *Varroa destructor*.

Fig. 2.3 shows the external appearance of this parasite.



× 60

Fig. 2.3

(d) (i) *Varroa* is a parasite. Using the information above, suggest the meaning of the term parasite.

.....

.....

..... [2]

(ii) Name the arthropod groups to which the honey bee, *Apis mellifera*, and the parasite, *Varroa destructor*, belong. For each organism, give one feature which leads to your identification.

organism	arthropod group	feature
honey bee (<i>Apis mellifera</i>)
parasite (<i>Varroa destructor</i>)

[4]

[Total : 18]

3 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.

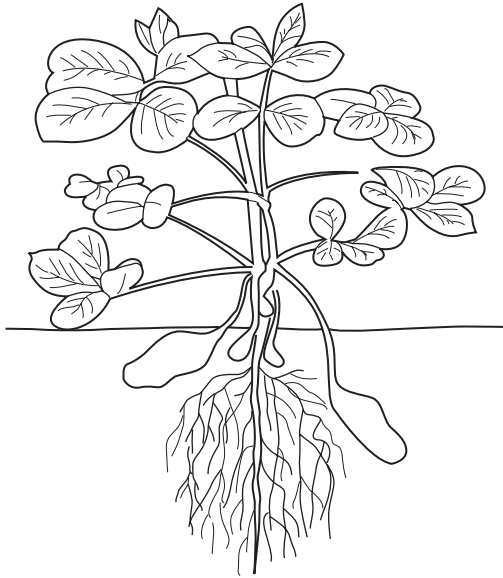


Fig. 1.1

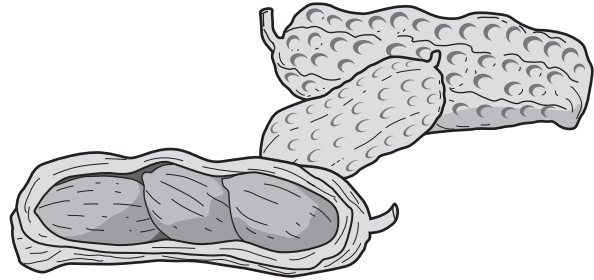


Fig. 1.2

(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.

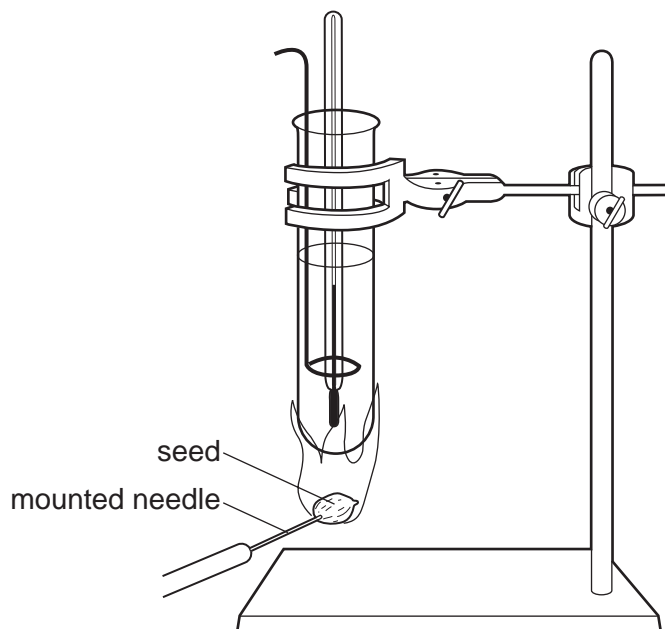


Fig. 1.3

- 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. [1]

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.

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

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

Show your working.

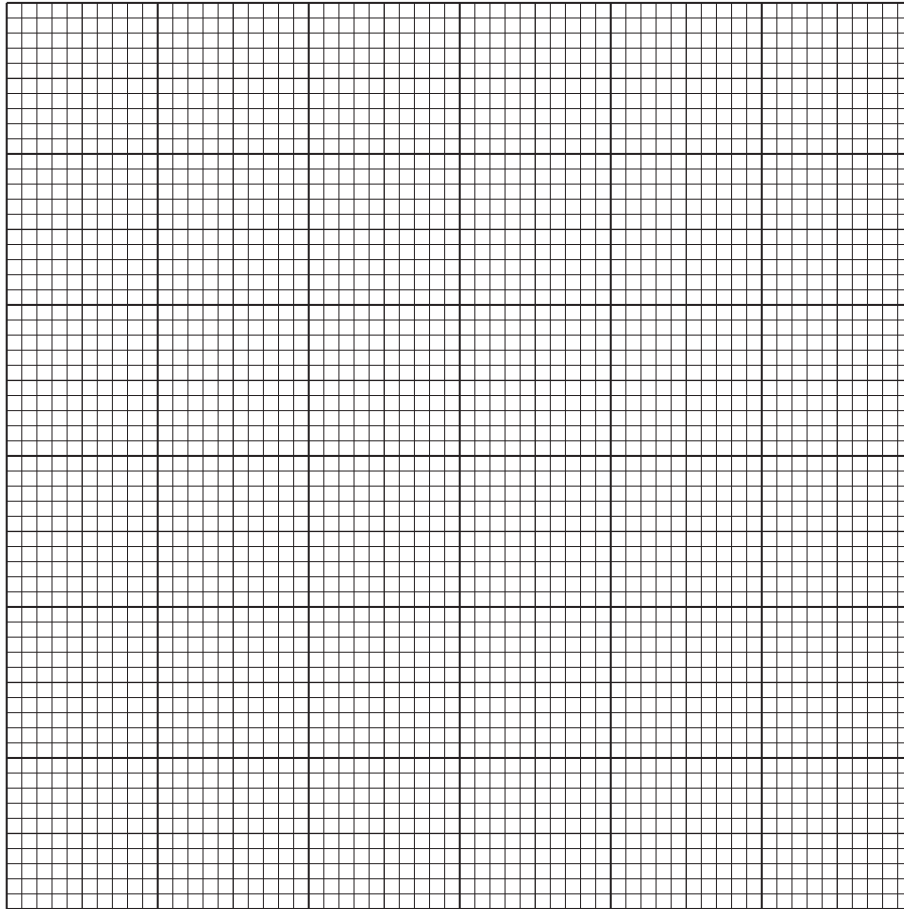
Energy content kJg⁻¹ [2]

The same method was used to find the energy content of some food substances. The 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 /kJg ⁻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 gram of the four different food substances **and** the seed from (b)(ii).



(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]