



Rewarding Learning

General Certificate of Secondary Education  
2024

Centre Number				

Candidate Number			

# Biology

## Unit 3 Practical Skills

### Booklet A

### Higher Tier

### [GBL33]



\*GBL33\*

#### TIME

2 hours.

#### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Answer **all** questions.

#### INFORMATION FOR CANDIDATES

The total mark for this paper is **30**.

Task 1 is a practical exercise worth 15 marks.

Task 2 is a practical exercise worth 15 marks.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Follow all health and safety instructions.

You may use a ruler and calculator if required.

**The apparatus and materials required to complete each task are provided.**

**You will not have access to notes or textbooks to assist you.**

For Examiner's use only	
Question Number	Marks
<b>Task 1</b>	
1	
<b>Task 2</b>	
1	
<b>Total Marks</b>	

## **Task 1: Investigating if the green pigment in a leaf is needed for photosynthesis.**

You **must** wear eye protection when carrying out this task.

A variegated plant was destarched.

The plant was then placed in bright light for at least 24 hours.

### **Instructions:**

1. Remove one of the variegated leaves from the plant.
2. Place a 250 cm<sup>3</sup> beaker on a heatproof mat on your bench and carefully half fill the beaker with hot water from the kettle.
3. Use forceps to place the leaf into the beaker of hot water for one minute.
4. Use forceps to remove the leaf from the hot water.
5. Use forceps to gently place the leaf into the ethanol in the boiling tube. Take care not to damage the leaf.
6. Immediately place the boiling tube containing the leaf and ethanol into the beaker of hot water and leave until the ethanol boils and the green pigment has been removed from the leaf.
7. Use forceps or a stirring rod to carefully remove the leaf from the boiling tube and dip it into the beaker of hot water for approximately 10 seconds.
8. Place the leaf in a Petri dish or on a white tile, making sure the leaf is spread out fully. Take care not to damage the leaf.
9. Cover the leaf with iodine solution.

For the remainder of Task 1 you must work alone.

Examiner Only

Marks Remark

Question 1

(a) (i) Describe how the variegated plant was destarched.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

(ii) Explain why it was necessary to do this **before** carrying out the investigation.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [1]

(b) **After testing** with iodine solution, give the colour of the area of the leaf which was

- green at the start of the investigation.

\_\_\_\_\_

- white at the start of the investigation.

\_\_\_\_\_ [2]

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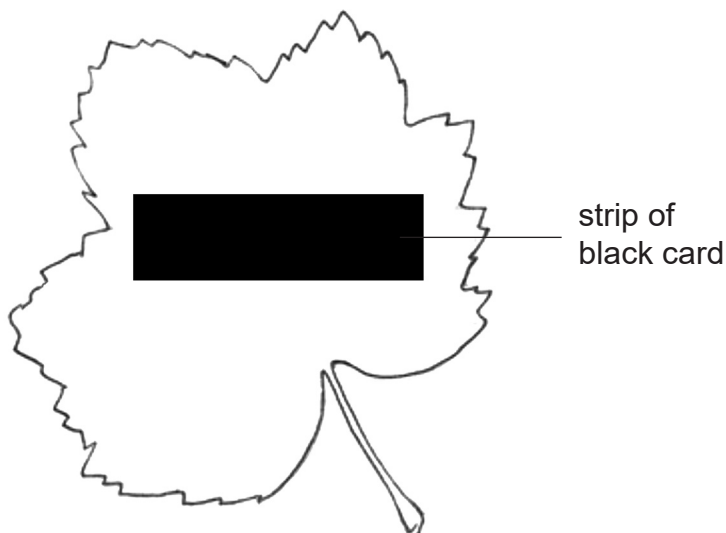
Another student used a leaf from another plant to investigate a different factor needed for photosynthesis.

He destarched the plant.

He then placed a strip of black card over one of the leaves and left the plant in bright light for at least 24 hours.

After this time, the student removed the strip of black card and tested the leaf for starch using iodine solution.

The diagram shows the leaf with the strip of black card.



Source: Chief Examiner

**(g)** Explain why there was no colour change in the iodine solution in the area of the leaf under the strip of black card.

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[2]

Examiner Only

Marks Remark

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**(Questions continue overleaf)**

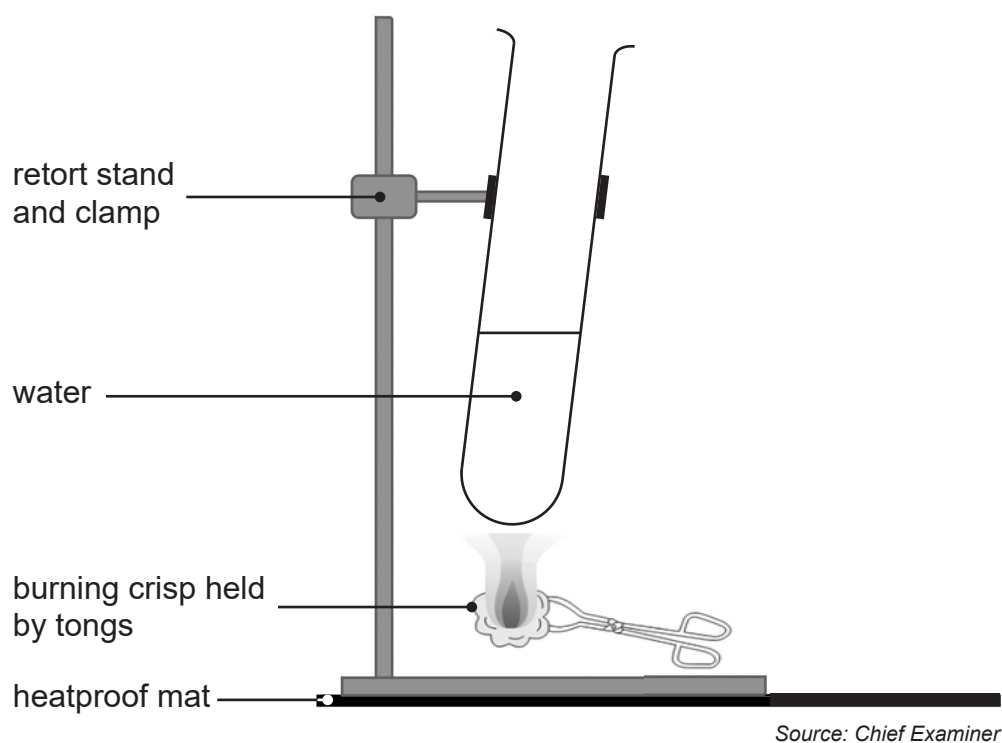
## Task 2: Estimating the energy content of crisps.

You **must** wear eye protection when carrying out this task.

### Instructions:

1. Set up the apparatus as shown in the diagram.

Take care not to break the glass when clamping the boiling tube.



2. Use the measuring cylinder (or syringe) to add 20 cm<sup>3</sup> of water to the boiling tube.
3. Stir the water in the boiling tube using the stirring rod.
4. Use the thermometer to measure the temperature of the water **at the start** and record this in **Table 1** on the next page.
5. Weigh your crisp and record its mass, **to one decimal place**, in the **box under Table 1** on the next page.
6. Light the Bunsen burner.
7. Use tongs to hold the crisp in the Bunsen flame until it starts to burn.



8. Immediately move the burning crisp under the boiling tube and hold it there until the crisp is completely burnt. If the crisp goes out, relight it in the Bunsen flame and quickly put it back under the boiling tube.
9. When the crisp is completely burnt, stir the water in the boiling tube using the stirring rod.
10. Use the thermometer to measure the temperature of the water and record this in **Table 1**.

**Table 1**

	Temperature /
At the start	
When the crisp is completely burnt	
Increase	

Mass of crisp = \_\_\_\_\_ g

**For the remainder of Task 2 you must work alone.**

**Question 1**

**(a)** Complete **Table 1** by:

- adding suitable units to the column heading.
- calculating the increase in temperature of the water. [2]

**(b)** Suggest why it was important to stir the water in **steps 3** and **9** before recording the temperature.

\_\_\_\_\_

\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

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- (c) Another student repeated the investigation and obtained an increase in temperature of 26 °C for a crisp of mass 1.2 g.

The energy content of a crisp can be calculated using the following equation.

$\text{Energy content} = \frac{\text{volume of water}}{\text{/J}} \times \frac{\text{increase in temperature}}{\text{/cm}^3} \times 4.2 \frac{\text{J}}{\text{/}^\circ\text{C}}$
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- (i) Calculate the energy content of this student's crisp.

Show your working.

\_\_\_\_\_ J [2]

- (ii) Calculate the energy content per gram of the student's crisp.

Show your working.

\_\_\_\_\_ Jg<sup>-1</sup> [2]

Examiner Only

Marks	Remark

The investigation was repeated with three other types of crisp and the energy content per gram was calculated for each crisp.

Table 2 shows the results.

Table 2

Type of crisp	Energy content of crisp / Jg <sup>-1</sup>
Beetroot	2650
Parsnip	3250
Potato	2050

(d) Suggest why it was necessary to calculate the energy content per gram of each type of crisp.

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[2]

(e) Suggest **one** reason why the results for the energy content of each of these crisps may be lower than the value given on each crisp packet.

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[1]

Examiner Only	
Marks	Remark

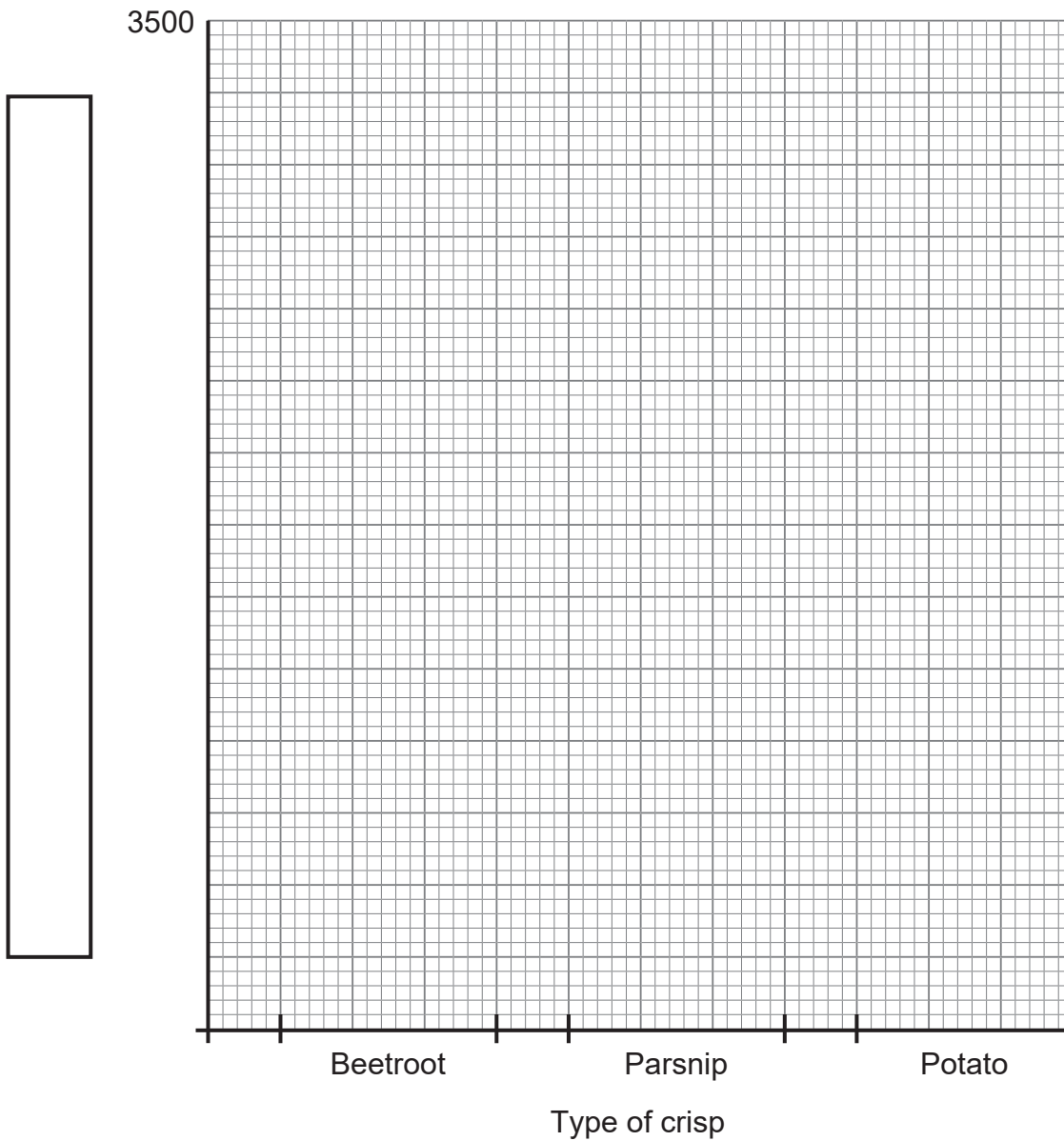
On the grid, use the results from **Table 2** to draw a bar chart of the energy content of the three types of crisp.

Examiner Only	
Marks	Remark

(f) Complete the scale given for the y-axis. [1]

(g) In the box provided, label the y-axis and include appropriate units. [2]

(h) Plot the bars accurately. [2]



**THIS IS THE END OF THE QUESTION PAPER**





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