



General Certificate of Secondary Education
2025

Centre Number

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Candidate Number

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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.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete questions in black ink and use a dark HB pencil for drawings and graphs.

Do not write with a gel pen.

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.

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Task 1: Investigating the effect of temperature on the action of the enzyme amylase

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

Instructions:

1. Set up a water bath (250 cm³ beaker half-filled with water) at 30°C.
2. Label one boiling tube 'amylase' and another 'starch'.
3. Use a measuring cylinder or syringe to measure 5 cm³ of starch solution and place into the boiling tube labelled 'starch'.
4. Use a different measuring cylinder or syringe to measure 5 cm³ of amylase solution and place into the boiling tube labelled 'amylase'.
5. Leave both boiling tubes in the water bath for five minutes.
6. Place one drop of iodine solution into each of the wells of the spotting tile.
7. Pour the amylase solution into the boiling tube containing the starch solution.
8. Use a stirring rod to mix the sample and **immediately** start the stopwatch.
9. Immediately, use a dropper to add one drop of the starch-amylase mixture into the first well of the spotting tile. Replace any excess mixture in the dropper back into the boiling tube.
10. Repeat every minute until there is no colour change in the iodine solution.
11. In **Table 1**, record the time taken for **no colour change** in the iodine solution to take place.



Question 1

- (a) Ensure you have recorded the time taken for **no colour change** to take place in the iodine solution during your investigation.

Table 1

Temperature / °C	Time taken for no colour change in the iodine solution to take place / minutes
30	

[1]

For the remainder of Task 1 you must work alone.

- (b) Explain why the amylase and starch solutions were placed in a water bath for five minutes in **step 5**.

[1]



The investigation was repeated using a range of temperatures from 10 °C to 60 °C.

The time taken for no colour change to take place in the iodine solution was used to calculate the rate of reaction for each temperature.

Table 2 shows the results.

Table 2

Temperature / °C	Rate of reaction / arbitrary units
10	0
20	10
30	18
40	24
50	30
60	15



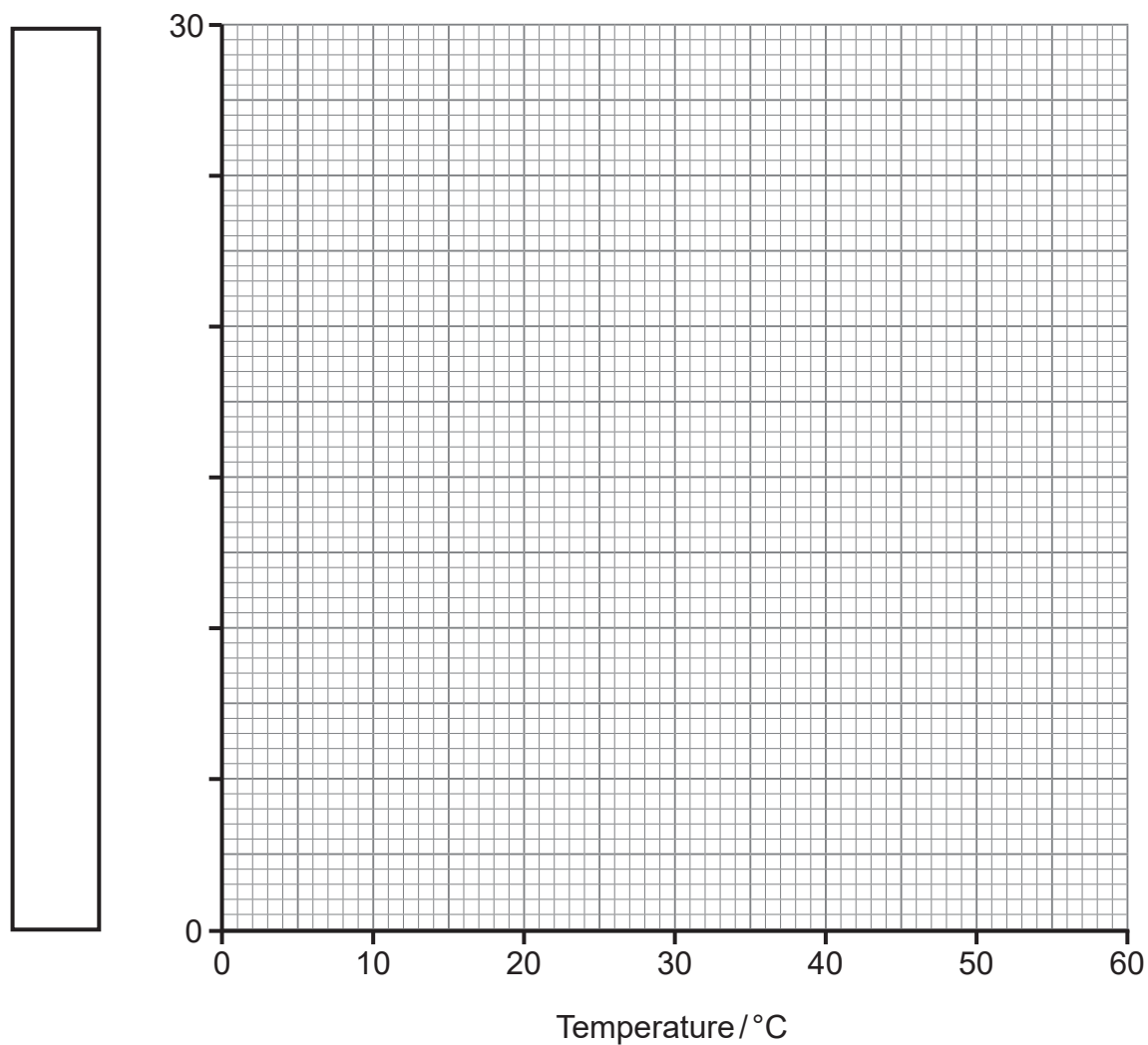
(c) On the grid, draw a line graph of the rate of reaction against temperature by:

(i) labelling the y-axis, including appropriate units, in the box provided. [2]

(ii) selecting the appropriate scale for the y-axis. [1]

(iii) plotting the points accurately. [2]

(iv) using a ruler to join the points. [1]



[Turn over



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(d) Use **data** from the graph to suggest how you can tell that the amylase used in this investigation is **not** human amylase.

[2]

(e) Use your knowledge of enzyme action to describe and explain the trend in the graph between 10 °C and 30 °C.

No data is required in your answer.

[3]

The rate of reaction decreased between 50 °C and 60 °C because the amylase was denaturing.

(f) Use your knowledge of enzyme action to explain how denaturing of the amylase causes the rate of reaction to decrease.

[2]

[Turn over



Task 2: Investigating respiration in yeast

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

Instructions:

1. Tie a knot in one end of the Visking tubing.
2. Use a syringe to place 10 cm^3 of the yeast suspension and 10 cm^3 of the glucose solution into the Visking tubing.
3. Carefully squeeze any air out of the Visking tubing and tie a knot at the **top** of the open end.
4. Gently turn the Visking tubing upside down to mix the contents.
5. Start the stopwatch. Do not turn off the stopwatch until all measurements have been recorded (after 10 minutes).
6. Hold the Visking tubing up vertically by one of the knots and roll the Visking tubing (and the knot) down until any gas produced by the yeast is trapped above the solution.
7. Use a ruler to measure the height (in mm) of this gas column, including any foam, from the surface of the solution.
8. Record this as the height for 0 minutes in **Table 1**.
9. Carefully place the Visking tubing on your bench at room temperature.
10. Repeat **steps 6 and 7** and record these heights at 5 and 10 minutes in **Table 1**.



Question 1

(a) (i) Complete **Table 1**.

Table 1

Time / minutes	Height of gas column / mm
0	
5	
10	

[1]

For the remainder of Task 2 you must work alone.

The investigation was repeated by two other students.

Their results are given in **Table 2**.

(ii) Complete **Table 2** by calculating the average height of the gas column at 5 and 10 minutes.

Table 2

Time / minutes	Height of gas column / mm		
	Student 1 results	Student 2 results	Average
0	0	0	0
5	15	11	
10	18	15	

[2]



The students did not place the Visking tubing in a water bath.

Visking tubing is a selectively permeable membrane.

(b) Suggest what would have happened if the students had placed the Visking tubing containing the yeast suspension and glucose solution in a water bath.

[1]

(c) Give **three** changes which occur in the contents of the Visking tubing during the investigation.

1. _____

2. _____

3. _____

[3]



(d) A group of students carried out this investigation under **aerobic** and **anaerobic** conditions.

Table 3 shows their results.

Table 3

Time / minutes	Height of gas column / mm	
	aerobic	anaerobic
0	0	0
5	7	1
10	14	5
15	21	7
20	25	9

(i) Suggest how the yeast suspension and glucose solution could have been prepared to ensure **anaerobic** conditions.

[1]

(ii) Use evidence from **Table 3** to describe and explain the difference in the amount of energy released by aerobic and anaerobic respiration.

No data is required in your answer.

[2]

[Turn over



In **aerobic** conditions, the rate of increase in the height of the gas column during the **first five minutes** (0–5 minutes) is 1.4 mm per minute.

- (e) Calculate the rate of increase in the height of the gas column during the **last five minutes** (15–20 minutes) in aerobic conditions.

Show your working.

_____ mm per minute [3]



(f) One of the students suggested that the change in rate between the first five minutes and the last five minutes was due to the glucose concentration becoming a limiting factor in aerobic conditions.

(i) Suggest what step the students could take to show that the glucose concentration was becoming a limiting factor in the last five minutes.

[1]

(ii) Predict how the results would change in the last five minutes after taking this step.

[1]

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For Examiner's use only	
Question Number	Marks
Task 1	
1	
Task 2	
1	
Total Marks	

Examiner Number

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Rewarding Learning

**General Certificate of Secondary Education
2025**

Biology

Unit 3: Practical Skills

Booklet A

Higher Tier

[GBL33]

APPARATUS AND MATERIALS LIST AND CONFIDENTIAL INSTRUCTIONS

To be accessed by Head of Department only

It is the responsibility of the centre to ensure that appropriate risk assessments are carried out for all practical skills assessments.

Information for Centres

- The apparatus and materials listed is the minimum requirement per group of candidates. Candidates can only be provided with additional apparatus/chemicals that are listed in this document.
- It is the responsibility of the centre to ensure that appropriate risk assessments are carried out for all Practical Skills Assessments.
- CCEA will not provide chemicals or apparatus for the practical assessments.
- Centres should keep a set of results from their trials that should be available to CCEA upon request.

Additional Notes for Centres

- When teachers have trialled the experiments in advance of their scheduled sessions, they can exchange basic apparatus to accommodate centre availability, e.g. size of glassware.
- Teachers should keep trialled results which can be used if suitable results are not obtained by candidates.
- Hazard labelling advised in this document represents the minimum requirement for the chemicals used. It is also the responsibility of the centre to ensure hazard labelling is appropriate for their facilities and resources and all suitable safety precautions are in place.
- Each candidate must wear eye protection for the duration of the investigation.
- Normal precautions with hot water, water baths and chemicals should be observed.
- In trials for Task 1, no colour change was observed after two minutes using 1% starch solution and 0.05% bacterial amylase solution when the investigation was carried out at 30°C.
- In trials for Task 2, it was found that 1 g of fast acting baker's yeast in 10 cm³ water at 50°C and 10 cm³ of 10% glucose solution at 50°C worked well.
- Teachers will need to trial their yeast and glucose solution to ensure that gas is being produced.
- In Task 2, teachers may tie the knots in the Visking tubing during the practical if candidates are unable to tie them themselves.

Task 1: Investigating the effect of temperature on the action of the enzyme amylase

Each group of candidates will require:

- 10 cm³ starch solution (1%)
- 10 cm³ amylase solution (0.05%)
- Iodine solution (0.1 M) in a dropping bottle
- Water bath (250 cm³ beaker half-filled with water) at 30°C
- 2 boiling tubes
- 2 measuring cylinders/syringes (to measure 5 cm³ capacity)
- Spotting tile
- Dropper
- Stirring rod
- Boiling tube rack
- Stopwatch
- Thermometer
- Labels/pens for labelling boiling tubes
- Eye protection

Task 2: Investigating respiration in yeast

Each group of candidates will require:

- 20 cm³ of 10% glucose solution (at 50°C) in a small beaker
- 20 cm³ of yeast suspension (at 50°C) in a small beaker
- 30 cm of Visking tubing soaked in water to soften it
- Syringe (to measure 10 cm³)
- Ruler – mm scale
- Stopwatch
- Eye protection