



Rewarding Learning

**General Certificate of Secondary Education
2023**

Biology

Unit 3 Practical Skills Assessment

Booklet B

Higher Tier

[GBL34]

FRIDAY 23 JUNE, MORNING

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses.

Assessment objectives

Below are the assessment objectives for GCSE.

Candidates must:

- AO1** Demonstrate knowledge and understanding of scientific ideas, scientific techniques and procedures;
- AO2** Apply knowledge and understanding of scientific ideas, scientific enquiry, techniques and procedures; and
- AO3** Analyse information and ideas to interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.

Quality of candidates' responses

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

Flexibility in marking

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive marking

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

Awarding zero marks

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Marking Calculations

In marking answers involving calculations, examiners should apply the 'own figure rule' so that candidates are not penalised more than once for a computational error.

Types of mark schemes

Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Levels of response

Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners should look for the 'best fit' bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, examiners are expected to use their professional judgement. The following guidance is provided to assist examiners.

- **Threshold performance:** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.
- **Intermediate performance:** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.
- **High performance:** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Quality of written communication

Quality of written communication (QWC) is taken into account in assessing candidates' responses to all tasks and questions that require them to respond in extended written form.

These tasks and questions are marked on the basis of levels of response. The description for each level of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within levels of response as follows:

Level A: Quality of written communication is excellent.

Level B: Quality of written communication is good.

Level C: Quality of written communication is basic.

In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

Level A (Excellent): The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation and spelling, punctuation and grammar (SPG) are of a sufficiently high standard to make meaning clear.

Level B (Good): The candidate makes a reasonable selection and use of an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation and spelling, punctuation and grammar (SPG) are sufficiently competent to make meaning clear.

Level C (Basic): The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation and spelling, punctuation and grammar (SPG) may be such that intended meaning is not clear.

- 1 (a) (i) (bubble) potometer; [1]
- (ii) shoot loses water;
shoot absorbs/takes up water (to replace water lost); [2]
- (iii) reset bubble; [1]
- (iv) stopclock/timer; [1]
- (b) (i) (clear) plastic bag around shoot; [1]
- (ii) A;
as humidity increases, rate of bubble movement decreases; [2]
- (c) windspeed/temperature/light/surface area of leaves/number of leaves/
size of shoot; [1]

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2 (a) Temperature/°C

21 ÷ 30;

0.70;

[3]

(b) repeat;

calculate **average** rate of diffusion;

[2]

(c) **Indicative content:**

1. as the temperature increases, the rate of diffusion increases;
2. as the temperature increases, diameter of dark area increases
or
smallest dark area at 5 °C vs largest dark area at 25 °C
or
19 mm at 5 °C vs 30 mm at 25 °C;
3. iodine turns agar jelly dark;
4. iodine diffuses **through the agar** jelly/
high concentration to low concentration;
5. iodine molecules have more kinetic energy;

| Band | Response | Mark |
|------|--|---------|
| A | Candidates must use appropriate, specialist terms throughout to describe and explain their conclusions using at least 5 of the points . They use good spelling, punctuation and grammar and the form and style are of a high standard. | [5]–[6] |
| B | Candidates use some appropriate, specialist terms throughout to describe and explain their conclusions using at least 3 of the points . They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard. | [3]–[4] |
| C | Candidates make little use of specialist terms throughout to describe and explain their conclusions using at least 1 of the points . The spelling, punctuation and grammar, form and style are of a limited standard. | [1]–[2] |
| D | Response not worthy of credit. | [0] |

[6]

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MARKS

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| | | | AVAILABLE MARKS | |
|---|---------|---|-----------------|----|
| 3 | (a) | protease; | [1] | 8 |
| | (b) | maintain constant temperature/keep temperature at optimum/37 °C; | [1] | |
| | (c) (i) | as enzyme concentration increases, time taken for protein solution to become clear decreases; time taken then levels off/stays the same; | | |
| | | data mark: decreases from 1–5% enzyme concentration/22–10 minutes or levels off at 5–7%/10 minutes; | [3] | |
| | (ii) | increase in enzyme concentration, more active sites; more enzyme-substrate complexes form/decreased time; at 5% enzyme concentration, all the protein is broken down; | [3] | |
| 4 | (a) | carbon dioxide; | [1] | 8 |
| | (b) (i) | as the number of simple sugars in the carbohydrate molecule increases, the change in height of gas column decreases; | [1] | |
| | (ii) | greatest change in height of gas column; (more/most) carbon dioxide released; (more/most) respiration; | [3] | |
| | (c) | broken down; | [1] | |
| | (d) | Any two from: increased temperature; more yeast; more alcohol; less carbohydrate; | [2] | |
| 5 | (a) | 0.6; | [1] | 13 |
| | (b) | volume increases; increase to 1.8; | [2] | |
| | (c) | more energy needed; increased respiration; more oxygen inhaled/more carbon dioxide exhaled; | [3] | |
| | (d) (i) | 3.5 or 4 breaths; in 15 seconds; 14 or 16 (breaths per minute); | [3] | |
| | (ii) | increased breathing rate; 24 breaths min ⁻¹ ; | [2] | |
| | (e) | Any two from: increased heart rate/pulse rate; increased temperature/sweating/flushed appearance; lactic acid produced; | [2] | |

| | | | AVAILABLE MARKS | |
|---|-----|--|-----------------|-----------|
| 6 | (a) | purple; yellow; | [2] | |
| | (b) | hydrogencarbonate; | [1] | |
| | (c) | photosynthesis in leaf equals; respiration in leaf and insects; carbon dioxide concentration does not change/no net gas exchange; | [3] | |
| | (d) | no light; no/for photosynthesis; plant respiring; carbon dioxide given out, but no carbon dioxide taken in; | [4] | |
| | (e) | lack of oxygen; insects die; | [2] | |
| 7 | (a) | (i) Make a hole in one side of a box and a hole on the top of the second box; Place Petri dish of seedlings in each box; Position bench lamp (on seedlings) above and to the side; Leave for at least 24 hours; | [4] | |
| | | (ii) Any three from: number of seedlings in each dish; type of seedlings; distance between lamp and box/same wattage of bulb/light intensity; appropriate abiotic factor; | [3] | |
| | (b) | light from above, seedlings grow straight up; light from one side, seedlings bend towards the light; | [2] | 9 |
| | | | Total | 70 |