ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2022

Biology

Assessment Unit AS 3

assessing

Practical Skills in AS Biology

[SBY31]

FRIDAY 10 JUNE, AFTERNOON

MARK SCHEME

General Marking Instructions

Introduction
The main purpose of the mark scheme is to ensure that examinations are marked accurately, consistently and fairly. The mark scheme provides examiners with an indication of the nature and range of candidates' responses likely to be worthy of credit. It also sets out the criteria which they should apply in allocating marks to candidates' responses.

Assessment objectives
Below are the assessment objectives for Biology.

Candidates should be able to demonstrate:

AO1   Knowledge and understanding of scientific ideas, processes, techniques and procedures.

AO2   Apply knowledge and understanding of scientific ideas, processes, techniques and procedures:
- in a theoretical context
- in a practical context
- when handling qualitative data
- when handling quantitative data.

AO3   Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:
- make judgements and reach conclusions
- develop and refine practical design and 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 17 or 18-year-old which is the age at which the majority of candidates sit their GCE 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 17 or 18-year-old GCE 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. To avoid a candidate being penalised, marks can be awarded where correct conclusions or inferences are made from their incorrect calculations.

COVID-19 Context
Given the unprecedented circumstances presented by the COVID-19 public health crisis, senior examiners, under the instruction of CCEA awarding organisation, are required to train assistant examiners to apply the mark scheme in case of disrupted learning and lost teaching time. The interpretation and intended application of the mark scheme for this examination series will be communicated through the standardising meeting by the Chief or Principal Examiner and will be monitored through the supervision period. This paragraph will apply to examination series in 2021-2022 only.

/ denotes alternative points
; denotes separate points
Comments on mark values are given in bold
Comments on marking points are given in italics

1 **(a)** A   columnar epithelial;
      B   goblet cell;
      C   Paneth cell; [3]

  (b) Muscularis mucosa; [1]   **4**

2 **(a)** **(i)** Respirometer; [1]

     (ii) To absorb CO_2 (so it doesn't affect the movement of the oil); [1]

     (iii) Must be airtight/equal volumes of KOH in each side; [1]

  (b) **(i)** Measure distance the oil moves in a set period of time;
       at 10°C and 25°C;
       practical detail, e.g. using a water bath or resetting oil levels
       by syringe; [3]

     (ii) Prediction – The rate of oxygen uptake will be greater at 25 °C than
       10 °C;
       Explanation – Reactants have more kinetic energy;
       faster rate of respiration in the organisms; [3]   **9**

3 **(a)** Interrupted transect/or (random) sampling within each of the 4 dunes;
     method of random (dividing into a grid and random numbers) or systematic
     sampling within each dune;
     apparatus used in sampling, e.g. quadrat/pin frame/pin sampling or by
     description;
     further detail re-sampling, e.g. count numbers of **each** species/percentage
     cover/frequency;
     use of identification key; [5]

  (b) 66/200;
     33%; [2]   **7**

4 **(a)** Meiosis;
     1 – homologous pairs/bivalent;
     2 – chiasmata; [3]

  (b) Prophase 1; [1]   **4**

5 **(a)** **(i)** As the concentration of sucrose solution increases the average % gain in mass decreases; [1]

(ii) Water leaves the potato tissue by osmosis;
as the ψ of the solution is more negative than the tissue; [2]

(b) Potato 0.24 = −660 kPa;
Carrot 0.53 = −1530kPa (allow −1520 to −1540); [2]

(c) The carrot has a more negative/lower water potential than the potato;
as the potato stores carbohydrate as starch which is insoluble;
this doesn't affect the water potential of the potato cells;
(accept converse for carrot) [3]

(d) Any **pair** from:
Variable – Cut same size/diameter/length;
Explanation – SA will affect osmosis;

Variable – method of drying samples before weighing;
Explanation – remove surface water/excessive drying prevent removing internal water;

Variable – Temperature;
Explanation – will affect the rate of osmosis/KE of molecules involved; [2] 10

6 **(a)** Rotate the eyepiece lens/move to higher magnification and it gets larger/ eyepiece scale does not change size at higher magnifications/move stage micrometer/change focus slightly; [1]

(b) 1 EPU = 10 µm; [1]

(c) **(i)** Cell is 33 epu;
33 × 10 µm
= 330; [2]

(ii) Measure the length of several cells and take an average; [1] 5

7 **(a)** **(i)**

Rate of reaction/arbitrary units
11.8
25.6
55.6
15.6
8.9

one mark for correct values;
one mark for correct number
of decimal places

[2]

(ii) Time for complete hydrolysis; [1]

(b) Line graph, with points joined with straight lines;
correct axis labels with units;
points plotted correctly; [3]

(c) **(i)** pH 7; [1]

(ii) Compare – increasing acidity and alkalinity decreases the rate of
reaction;
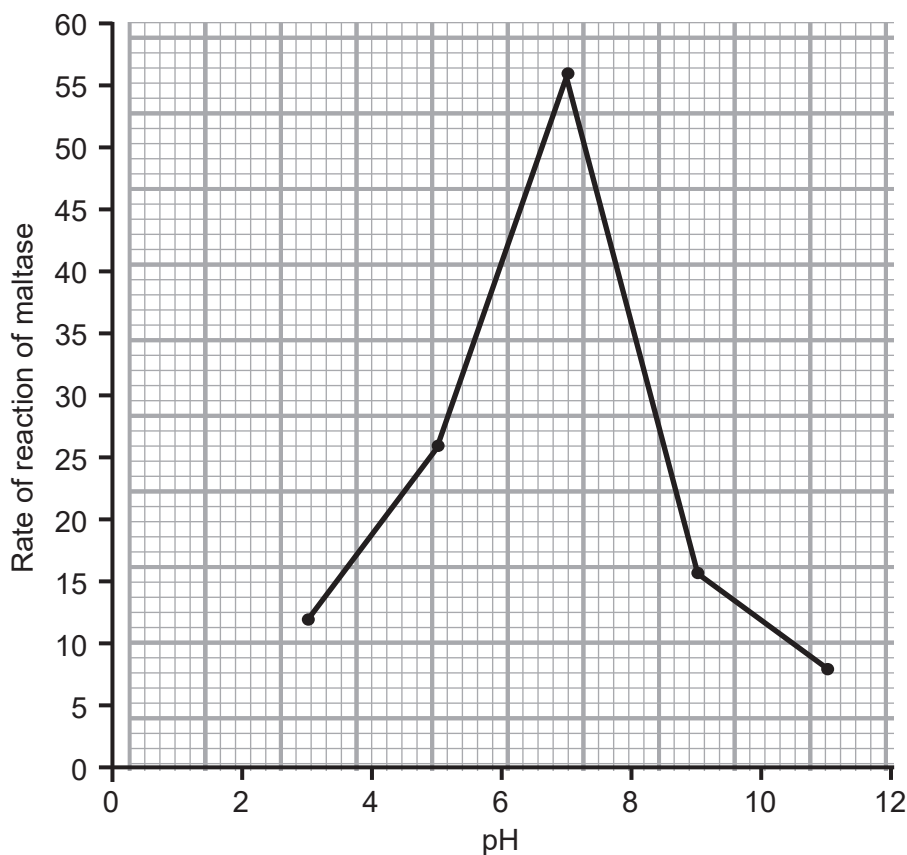Contrast – alkalinity has a more detrimental effect on enzyme rate of
reaction; [2]

(d) Line with peak lower than 55 at pH 7;
but higher at extremes; [2]

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The effect of pH on the rate of reaction of maltase

Total 50