# GCE AS MARKING SCHEME

**SUMMER 2019**

**AS (NEW)**
**BIOLOGY - UNIT 2**
**2400U20-1**

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## INTRODUCTION

This marking scheme was used by WJEC for the 2019 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

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**WJEC GCE AS BIOLOGY(NEW)**

**UNIT 2 - BIODIVERSITY AND PHYSIOLOGY OF BODY SYSTEMS**

**SUMMER 2019 MARK SCHEME**

## GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statement. Award the middle mark in the level if most of the content statements are given and the communication statement is partially met. Award the lower mark if only the content statements are matched.



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Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
ecf = error carried forward
bod = benefit of doubt



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| Question | | | | Marking details | Marks Available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **1** | *(a)* | (i) | | Eubacteria **/** Archaea | 1 | | | 1 | | |
| | | (ii) | | Can {exist in / live in / thrive in / withstand/ survive} {extreme/ wide/ high/ owtte/ harsh} {environment/ conditions / temperature / pH / acidity / alkalinity / chemical concentration / pressure} | 1 | | | 1 | | |
| | | (iii) | | {Plantae / plants} **+** Fungi **+** Protoctist(a) (correct spelling only) | 1 | | | 1 | | |
| | *(b)* | (i) | | Phylum | 1 | | | 1 | | |
| | | (ii) | | A. different (developmental/evolutionary) origin / don't share recent common ancestor (1)<br>B. Analogous structures (1)<br>C. Similar / same function (1) | | 3 | | 3 | | |
| | | | | **Question 1 total** | **4** | **3** | **0** | **7** | **0** | **0** |



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| Question | | | | Marking details | Marks Available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **2** | *(a)* | | | $3.6 \times 10^3$ = 2 marks<br>If incorrect award 1 mark for<br>$1.2 \times 10^3 \times 3$ /<br>3600 /<br>$36 \times 10^2$ | | 2 | | 2 | 2 | |
| | *(b)* | | | Blood carried in {vessels / named vessels}/ vascularisation (1)<br>transport {molecules / substances / materials / named substances} {<u>to / from</u>} {exchange surfaces/cells/ (named) tissues} (1)<br>Ignore transported around body | 2 | | | 2 | | |
| | *(c)* | | | Any **four** (× 1) from<br>A. Amphibian has greater SA:vol (ratio) / ora (1)<br>B. Amphibian can use (permeable) skin for {gas exchange / diffusion/ to absorb oxygen}/ ora (1)<br>C. Amphibians have short diffusion pathway/ ora (1)<br>D. Amphibian has lower oxygen requirement / diffusion across skin alone would meet oxygen requirement/ ora (1)<br>E. Amphibian has lower metabolic rate / lower body temperature/ does not need to maintain body temperature/ less energy is needed/ ora (1) | | 4 | | 4 | | |
| | | | | **Question 2 total** | **2** | **6** | **0** | **8** | **2** | **0** |



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| Question | | | | Marking details | Marks Available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **3** | (a) | | | Less grazing of the clover/ avoid being eaten/ owtte<br>Reject reference to predator | | 1 | | 1 | | |
| | (b) | (i) | | Any **two** (× 1) from<br>Single leaf/ number of leaves (1)<br>Size/ volume of tube (1)<br>(Incubation) time (1)<br>temperature (1) | | 2 | | 2 | | 2 |
| | | (ii) | | Cyanide {released/ produced} / ora | | | 1 | 1 | | 1 |
| | | (iii) | | (gets on to skin when) {handling paper/ touching paper} + use gloves/ forceps<br>OR<br>(Chemical)could be transferred from hand to eye when handling paper + wear eye protection/ wash hands<br>Accept answer on either line e.g. use gloves when handling paper | | 1 | | 1 | | 1 |
| | (c) | (i) | | Independent = Altitude **and**<br>Dependent variable = {number/ percentage} of cyanogenic clover | 1 | | | 1 | | 1 |
| | | (ii) | | A. Axes/ tapes/ grid (1)<br>B. random number table/calculator/dice/ other suitable method (to give coordinates) (1)<br>C. {sample / collect} at intersect (of coordinates)/ from within quadrat/ owtte (1) reject count leaves | 3 | | | 3 | | 3 |
| | *(d)* | | | No **and** Temperature not measured. | | | 1 | 1 | | |



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| Question | | | | Marking details | Marks Available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| | (e) | | | Any **two** (× 1) from:<br>A. The existence of {a number of / two / more than one/ several} {form(s) / traits/ types/ phenotypes} / or description of (1)<br>B. that cannot be explained by mutation alone (1)<br>C. {a number of / two / more than one/ several} alleles for the same {gene/ locus} (1) | 2 | | | 2 | | |
| | | | | **Question 3 total** | **6** | **4** | **2** | **12** | **0** | **8** |



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| Question | | | | Marking details | Marks Available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **4** | (a) | | | • Biconcave + {increases diffusion/ more oxygen absorbed/ increase gas exchange} / large surface area + {diffusion/ oxygen absorbed/ gas exchange} (1)<br>• {Biconcave/ thin} + short diffusion pathway (1)<br>• Enucleate/no nucleus + more space for haemoglobin (1) | 3 | | | 3 | | |
| | (b) | | | 12 or 13 or 14 (μm) = 3 marks<br><br>If incorrect award 2 marks for<br>answer between 12-15 and shown to a decimal place<br><br>If both above incorrect award 1 mark for<br>(diameter of B/ diameter of A) × 8 (1) | | 3 | | 3 | 3 | |
| | (c) | (i) | | 100 (2)<br>(45 /4.5 × $10^6$) × $10^7$ (1) | 1 | 1 | | 2 | 2 | |
| | | (ii) | | Yes. Mean volume higher than {normal / 95} (ecf) | | | 1 | 1 | | |
| | | (iii) | | Any **two** (× 1) from:<br>A. Fewer cells so {less haemoglobin/ lower total surface area} (1)<br>B. Larger cell therefore {smaller SA : vol / increased diffusion pathway} (1)<br>C. Larger cells so harder for red blood cells to pass through capillaries (1) | | | 2 | 2 | | |
| | | | | **Question 4 total** | **4** | **4** | **3** | **11** | **5** | **0** |



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| Question | | | | Marking details | Marks Available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **5** | (a) | (i) | | 2 | | 1 | | 1 | 1 | |
| | | (ii) | | (-)1.7 | | 1 | | 1 | 1 | |
| | | (iii) | | Lymph (capillary / vessel) / lymphatic<br>Reject node/ lacteal | 1 | | | 1 | | |
| | (b) | | | Any **three** (× 1) from<br>A. Fewer plasma proteins/ not enough protein in blood (1)<br>B. Which {raises/increases} {water/solute} potential of {plasma/blood}/ osmotic pressure is too low (1)<br>C. reduces {water/solute} potential gradient / hydrostatic pressure is greater than osmotic pressure (1)<br>D. less water/ fluid reabsorbed (by osmosis) (1)<br>Ignore concentration of water | | | 3 | 3 | | |
| | | | | **Question 5 total** | **1** | **2** | **3** | **6** | **2** | **0** |



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| Question | | | | Marking details | Marks Available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **6** | (a) | (i) | | {Large/long/sharp/pointed/curved} canines + {piercing/seizing/tearing/killing/ holding} (prey) | | 1 | | 1 | | |
| | | (ii) | | Diastema + {manipulating food/owtte}<br>OR {interlocking/WM} {molars/premolar} + {grinding/chewing}<br>OR incisors + {slicing/cutting} | | 1 | | 1 | | |
| | (b) | | | Duodenum<br>mouth/buccal cavity<br>stomach<br>All correct = 2 marks<br>2 correct = 1 mark<br>1/0 correct = 0 marks | 2 | | | 2 | | |
| | (c) | | | Any **five** (× 1) from:<br>A. {shortening/blunting} of villi/ fewer microvilli (1)<br>B. reduced SA (1)<br>C. less {enzymes / named enzyme(s)} (1)<br>D. so reduced {digestion / hydrolysis} (leading to weight loss)/ less absorption of {products of digestion/ named products}(1)<br>E. more solutes in lumen / lower water potential in lumen (1)<br>F. less water absorption / water moves from cells into lumen (leading to diarrhoea) (1) | | 1 | 4 | 5 | | |
| | (d) | | | A. Lowers $Na^+$ conc in epithelial cell / creates {conc/ diffusion} gradient for $Na^+$ (1)<br>B. $Na^+$ **and** glucose enter (epithelial cell) by {cotransport / facilitated diffusion} (not active transport) (1)<br>C. increases glucose conc in cell / creates {conc/diffusion} gradient for glucose (1)<br>D. glucose {leaves epithelial cells/ enters blood} by facilitated diffusion (not active transport) (1) | | 4 | | 4 | | |
| | | | | **Question 6 total** | **2** | **7** | **4** | **13** | | |



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| Question | | | | Marking details | Marks Available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **7** | (a) | | | Chloroplasts (1)<br>unevenly thickened cell walls (1) | 2 | | | 2 | | |
| | (b) | (i) | | Expressed to 3sf = 198 = 4 marks<br>If incorrect sig fig allow 3 marks for<br>198.159 / 198.0758/ 198.16<br>If rounded area allow 3 marks for<br>197 / 200<br>If answer incorrect award 2 mark for calculation of area<br>0.07065 / 0.07068/ 0.071<br>If area incorrect award 1 mark for Substitution into formula<br>($\pi \times 0.15 \times 0.15$) = 1 mark<br><br>*if candidate uses diameter instead of radius<br>award 3 marks for<br>49.5<br>Award 2 marks for incorrect sig fig<br>49.539/ 49.522<br>Award 1 mark for calculation of area<br>0.2826 / 0.2827 | | 4 | | 4 | 4 | 4 |
| | | (ii) | | Epidermal cells are larger {in shade/ diagram 2}/ORA (1)<br>so fewer of them (per unit area) {in shade/ diagram 2}/ ORA (1) | | | 2 | 2 | | |
| | (c) | (i) | | Prevent {air/ bubbles} entering xylem (1)<br>which would break {cohesion/ hydrogen bonds}/ affect cohesive forces (between water molecules) (1) | 2 | | | 2 | | 2 |



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| Question | | | | Marking details | Marks Available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| | | (ii) | | A. Humidity falls (1)<br>B. because {ABA/ hormone} causes closure of stomata (1)<br>C. causes reduced {transpiration/ water vapour loss/ evaporation} (from leaf/ stomata)(1)<br>NOT stops<br>D. (Benefit to plant) conserves water / reduces water loss / maintain turgor/ prevent wilting (when low soil water) (1)<br>NOT stops<br><br>Penalise stop once only | | 2 | 2 | 4 | | |
| | | | | **Question 7 total** | **4** | **6** | **4** | **14** | **4** | **4** |



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| Question | Marking details | Marks Available | | | | | |
|---|---|---|---|---|---|---|---|
| | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **8** | Indicative content<br>**Section A: From epidermis and across cortex:**<br>• Apoplast + symplast + vacuolar pathway<br>• (Apoplast) Along cell walls<br>• (Symplast) through cytoplasm/ plasmodesmata<br>• (Vacuolar pathway) passes through tonoplast/ cytoplasm<br>• Down water potential gradient / by osmosis<br>**Section B: Into vascular tissue:**<br>• Endodermis has Casparian strip<br>• Waterproof / composed of suberin<br>• Blocks apoplast pathway<br>• Water {forced / passes} into symplast<br>• Active transport of {salts / minerals} into xylem<br>• Lowers water potential in xylem<br>• Water enters xylem by osmosis / down water potential gradient<br>**Waterlogged soil:**<br>• {Less / no} oxygen (for respiration)<br>• {Less / no} respiration so {less / no} {energy / ATP}<br>• for active transport of minerals in the {endodermis/ root hairs} Must be in context of no oxygen<br>• Lower water potential gradient as a result of less active transport of salts / minerals into xylem<br>• Less water enters xylem which lowers root pressure | 5 | 4 | | | | |



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| Question | | | | Marking details | Marks Available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| | | | | **7-9 marks**<br>Indicative content of this level is detailed content from all three areas<br><br>*The candidate constructs an articulate, integrated account, correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses scientific conventions and vocabulary appropriately and accurately.*<br><br>**4-6 marks**<br>Indicative content of this level is detailed content from two areas or less detail from three areas<br><br>*The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate usually uses scientific conventions and vocabulary appropriately and accurately.*<br><br>**1-3 marks**<br>Indicative content of this level is any correct statement from indicative content<br><br>*The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate has limited use of scientific conventions and vocabulary.*<br><br>**0 marks**<br>*The candidate does not make any attempt or give a relevant answer worthy of credit.* | | | | | | |
| | | | | **Question 8 total** | **5** | **4** | **0** | **9** | **0** | **0** |



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## UNIT 2: BIODIVERSITY AND PHYSIOLOGY OF BODY SYSTEMS

## SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

| Question | AO1 | AO2 | AO3 | TOTAL MARK | MATHS | PRAC |
|---|---|---|---|---|---|---|
| 1 | 4 | 3 | 0 | 7 | 0 | 0 |
| 2 | 2 | 6 | 0 | 8 | 2 | 0 |
| 3 | 6 | 4 | 2 | 12 | 0 | 8 |
| 4 | 4 | 4 | 3 | 11 | 5 | 0 |
| 5 | 1 | 2 | 3 | 6 | 2 | 0 |
| 6 | 2 | 7 | 4 | 13 | 0 | 0 |
| 7 | 4 | 6 | 4 | 14 | 4 | 4 |
| 8 | 5 | 4 | 0 | 9 | 0 | 0 |
| TOTAL | 28 | 36 | 16 | 80 | 13 | 12 |



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