# GCSE Additional Science 2

# Higher Tier

# Unit 6H

# SPECIMEN MARK SCHEME

# Version 1.0

**Quality of Written Communication and levels marking**

In Question 5(b) candidates are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Candidates will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

**Level 1: basic**

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

**Level 2: clear**

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

**Level 3: detailed**

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

In order to attain a mark within a certain level, **both** the science **and** the QWC must be of a standard appropriate to that level.

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**COMPONENT NAME: GCSE Additional Science 2 Unit 6H**

**STATUS: Specimen V1.0**

| question | answers | extra information | mark |
|---|---|---|---|
| **1 (a)(i)** | **C** | | 1 |
| **1 (a)(ii)** | **B** | | 1 |
| **1 (a)(iii)** | **E** | | 1 |
| **1(b)** | neutralise acid / provides alkaline conditions<br>for enzymes in small intestine to work most effectively | <br><br>accept<br>emulsifies fats / breaks down fat drops into smaller droplets<br>greater surface area for enzyme action | 1<br>1 |
| **Total** | | | **5** |

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| question | answers | extra information | mark |
|---|---|---|---|
| **2(a)** | any **three** from:<br>• oxygen used in aerobic respiration<br>• more energy from aerobic respiration<br>• carbon dioxide and water are end products of aerobic respiration<br>• lactic acid is end product of anaerobic respiration | | 3 |
| **2(b)** | (Student **Y**) had<br>• the lower resting heart rate<br>• the lower heart rate increase and<br>• the quicker recovery time | accept converse for student **X** | <br>1<br>1<br>1 |
| **2(c)** | when exercising the rate of respiration (in the muscles) is higher<br>(the increased heart rate delivers) more oxygen to the (respiring) muscles<br>(the increased heart rate delivers) more glucose to the (respiring) muscles<br>and results in faster removal of carbon dioxide and lactic acid | | 1<br>1<br>1<br>1 |
| **Total** | | | **10** |

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| question | answers | extra information | mark |
|---|---|---|---|
| **3(a)** | because carbon dioxide is produced | accept gas is produced | 1 |
| | carbon dioxide / gas escapes, therefore the mass of the flask and contents decreases | | 1 |
| **3(b)(i)** | balance B | | 1 |
| **3(b)(ii)** | the balance is measuring small changes in mass | | 1 |
| **3(c)(i)** | sensible curve missing anomalous point | | 1 |
| **3(c)(ii)** | 7 minutes | | 1 |
| **3(c)(iii)** | answer in the range of 100.35 – 100.5 | | 1 |
| **3(c)(iv)** | reaction goes quickly at first | | 1 |
| | reaction stops | accept reaction slows down | 1 |
| **3(d)** | the (marble) powder has a larger surface area than the (marble) chips | | 1 |
| | therefore there would be more collisions with the acid particles (within the same amount of time) | | 1 |
| **Total** | | | **11** |

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| question | answers | extra information | mark |
|---|---|---|---|
| **4(a)** | ions can move / are attracted to electrode<br>**or**<br>attracted to named electrode<br>**or**<br>ions are charged **or** ions form / carry the current **or** ions form the charge | accept ions are free<br>allow 'they' for ions | 1 |
| **4(b)(i)** | gains electrons / reduction<br>form hydrogen atoms | | 1<br>1 |
| **4(b)(ii)** | sodium hydroxide **or** NaOH **or** caustic soda | | 1 |
| **Total** | | | **4** |

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| question | answers | extra information | mark |
|---|---|---|---|
| **5(a)** | fusion<br><br>energy | correct order only | 1<br><br>1 |

**5(b)**

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 2.

| 0 marks | Level 1 (1-2 marks) | Level 2 (3-4 marks) | Level 3 (5-6 marks) |
|---|---|---|---|
| No relevant content. | There is a brief description of the life cycle of a star like the sun. | There is some description of the life cycle of a star like the sun. | There is a clear, balanced and detailed description of the life cycle of a star like the sun. |

| examples of the physics points made in the response | extra information |
|---|---|
| | to score full marks either the term red giant or white dwarf **must** be used |
| • gases and dust pulled together by gravity | |
| • nuclear fusion begins | |
| • when forces are balanced star is stable | |
| • expands | |
| • cools | |
| • becomes a red giant | do **not** accept red supergiant |
| • shrinks | |
| • temperature rises | |
| • glows much brighter | |
| • becomes a white dwarf | any mention of supernova negates a mark<br>any mention of black hole negates a mark |
| | individual points must be linked in a correct sequence |

| Total | | | 8 |
|---|---|---|---|

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| question | answers | extra information | mark |
|---|---|---|---|
| **6(a)(i)** | cosmic | | 1 |
| **6(a)(ii)** | longer the flight time, greater the dose | accept positive correlation<br>do **not** accept directly proportional | 1 |
| **6(a)(iii)** | accept any value between 0.055 and 0.062 inclusive | | 1 |
| | receive higher dose than an 8 hour flight but less than a 11 hour flight | | 1 |
| **6(b)** | he should not be concerned because the additional dose is very small (1.5) / additional dose is only 1.5 | accept 0.75 for 1.5 | 1 |
| | which is well below the dose that may cause cancer | | 1 |

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| question | answers | extra information | mark |
|---|---|---|---|
| **6(c)** | almost the same number of non-aircrew developed leukaemia /cancer | | 1 |
| | therefore other factors could be involved | accept specific examples for either aircrew or other sample | 1 |
| **Total** | | | **8** |

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| question | answers | extra information | mark |
|---|---|---|---|
| **7(a)** | (genotype / gametes from **P** / father) D and d (*) | (*) eg may be in punnett square<br>allow own upper and lower case symbols or allow any symbol correctly used with key | 1 |
| | (genotype / gametes from **Q** / mother) d and d / accept d(*) | | 1 |
| | offspring genotypes correctly derived from correct gametes(*) | | 1 |
| | offspring phenotypes **R** and **S** identified | | 1 |

**Question 7 continues on the next page . . .**

**Question 7 continued . . .**

| question | answers | extra information | mark |
|---|---|---|---|
| **7(b)** | up to **two** from<br><br>*for cystic fibrosis*<br>*pros*:<br>• termination of pregnancies would reduce number of people with cystic fibrosis (in population)<br>• reduce health-care costs<br>• allows decision / emotional argument eg allows people to make choices about termination<br><br>up to **two** from<br>*cons:*<br>• possible damage / risk to embryo / fetus / baby<br>• possible harm / risk to mother<br>• (may) have to make ethical / moral / religious decisions<br><br>up to **two** from<br><br>*for polydactyly*:<br>• detects possibility of 'disfigurement' in embryo<br>• but condition not life threatening<br>• so risks to fetus / mother unjustified<br><br>do **not** exceed **four** marks | | 4 |
| **Total** | | | **8** |

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| question | answers | extra information | mark |
|---|---|---|---|
| **8(a)** | there is a lack of valid / reliable evidence | | 1 |
| | because the early organisms were soft bodied **or** because remains were destroyed by geological action | | 1 |
| **8(b)** | populations of salamanders became isolated / separated | | 1 |
| | by areas between mountains | | 1 |
| | there was genetic variation in these isolated communities | | 1 |
| | natural selection acted differently on these isolated communities | | 1 |
| | eventually resulting in interbreeding being no longer possible and so new species have been formed | | 1 |
| **Total** | | | **7** |

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| question | answers | extra information | mark |
|---|---|---|---|
| **9(a)** | any **five** from the following<br>• aluminium oxide is melted / made liquid<br>• aluminium ions are attracted to the negative electrode<br>• at the negative electrode aluminium is formed **or** aluminium ions gain electrons<br>• oxide ions are attracted to the positive electrode<br>• oxygen is formed at the positive electrode **or** oxide ions lose electrons<br>• the oxygen reacts with carbon to make carbon dioxide or<br>• carbon dioxide formed at positive electrode | | 5 |
| **9(b)** | • there are electrons that can move around the structure<br>• this is because metals have a small number of electrons in the outer shell / energy level<br>• these electrons can delocalise<br>• and the delocalised electrons carry the current / charge | if the candidates use the terms covalent / ionic / molecules / intermolecular etc. incorrectly in the answer this will limit the mark to a maximum of 3 | 4 |
| **Total** | | | **9** |

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| question | answers | extra information | mark |
|---|---|---|---|
| **10(a)** | Compound A<br>any **one** from:<br>• sodium bromide<br>• potassium bromide<br>• ammonium bromide<br>• hydrogen bromide<br>• any metal bromide except silver and lead<br>Compound B<br>• silver nitrate | <br>accept correct formulae<br><br><br><br><br><br><br><br>accept silver sulfate | 1<br><br><br><br><br><br><br><br>1 |
| **10(b)** | the silver compound will decompose / silver ions be reduced to silver (owtte) | accept film would darken owtte<br>accept any idea of light changing silver bromide / silver ions / silver nitrate / silver sulfate<br>allow 'forms a black solid' / it would turn black | 1 |
| **10(c)** | precipitation | accept descriptions of precipitation reactions<br>accept double decomposition<br>accept precipitate<br>do **not** allow displacement | 1 |
| **10(d)** | because the reaction involves electrons<br>which are gained by silver ions | | 1<br>1 |
| **Total** | | | **6** |

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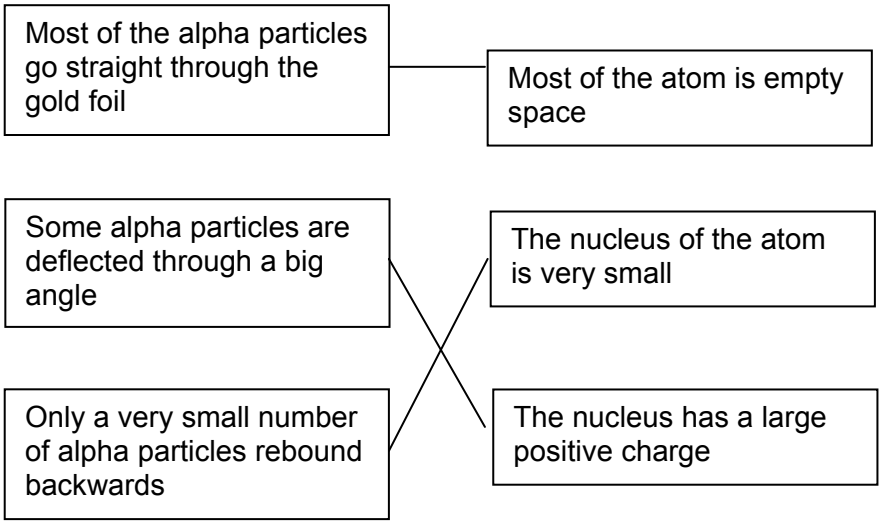
| question | answers | extra information | mark |
|---|---|---|---|
| **11(a)** | (mass of) positive charge | | 1 |
| **11(b)** | three lines correct<br>  <br> | allow **1** mark for 1 correct line<br><br>if more than 1 line is drawn from a box in **List A** then all those lines are incorrect | 2 |
| **11(c)** | new scientific evidence / data is obtained<br><br>which cannot be explained by the model | | 1<br><br>1 |
| **Total** | | | **5** |

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| question | answers | extra information | mark |
|---|---|---|---|
| **12(a)** | a.c. is constantly changing direction | | 1 |
| | whilst d.c. always flows in the same direction | | 1 |
| **12(b)(i)** | 46.9 | accept 47.0<br><br>allow **1** mark for correct transformation and substitution<br>ie $\frac{10800}{230}$ | 2 |
| | ampere | accept A | 1 |
| **12(b)(ii)** | current (46.9 A) exceeds maximum safe current for 2.5 $mm^2$ cable | accept cable needs to be 16.0 $mm^2$ | 1 |
| | therefore if a 2.5$mm^2$ cable were used it would overheat / melt | cable needs to be 10.0 $mm^2$ limits maximum credit to **1** mark | 1 |
| **12(b)(iii)** | can be reset | | 1 |
| | disconnects circuit faster (than a fuse) | | 1 |
| **Total** | | | **9** |