

# Mark Scheme (Results)

## Summer 2018

Pearson Edexcel GCSE
In Biology (1SC0) Paper 1BH
Paper 1: Biology 1

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Summer 2018
Publications Code 1SC0_1BH_1806_MS
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**General Marking Guidance**

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.

Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.

When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

| **Assessment Objective** | | **Command Word** | |
|---|---|---|---|
| **Strand** | **Element** | **Describe** | **Explain** |
| AO1* | | An answer that combines the marking points to provide a logical description | An explanation that links identification of a point with reasoning/justification(s) as required |
| AO2 | | An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding | An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding) |
| AO3 | 1a and 1b | An answer that combines points of interpretation/evaluation to provide a logical description | |
| AO3 | 2a and 2b | | An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning |
| AO3 | 3a | An answer that combines the marking points to provide a logical description of the plan/method/experiment | |
| AO3 | 3b | | An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning |

*there will be situations where an AO1 question will include elements of recall of knowledge directly from the specification (up to a maximum of 15%). These will be identified by an asterisk in the mark scheme.

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **1(a)** | An explanation linking:<br><br>• exercise {requires energy/ uses respiration} (1)<br><br>• {obtain from/reducing} fat (1) | <br><br>accept burns calories<br><br><br><br>accept sweating causes water loss for 1 mark | **(2)**<br><br>AO 1 1 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **1(b)** | An explanation linking two of the following:<br><br>• reduces the volume of the stomach (1)<br><br>• so it reduces food intake (1)<br><br>• so stored {fat/lipids} is used up (1) | <br><br><br><br>accept restricts the amount of food entering the stomach | **(2)**<br><br>AO 2 1 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **1(c)(i)** | Substitution (1)<br>$72 \div 1.81^2$<br><br>Evaluation (1)<br>= 21.977 / 21.98 / 22<br><br>3 s.f. (1)<br>22.0 | accept $72 \div 3.2761$<br><br><br>award 2 marks for correct evaluation<br><br><br>award full marks for correct numerical answer without working<br><br>accept 21.9 for 2 marks | **(3)**<br><br>AO 1 1 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| 1(c)(ii) | • the BMI shows male A is overweight but his waist:hip ratio {shows he is not abdominally obese / is below 0.9/is healthy} (1)<br><br>• male A's weight distribution is not around the {vital organs/abdomen} (1) | accept male A's weight is distributed evenly over the body<br><br>accept more weight on the hips than the waist<br><br>accept mass for weight | **(2)**<br><br>AO 3 2a<br>AO 3 2b |

**Total for Question 1 = 9 marks**

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **2(a)(i)** | (2 x 5.0 x 2.0) + (2 x 5.0 x 2.0) + (2 x 2.0 x 2.0) or 20 + 20 + 8 (1)<br><br>48.0 | Allow full marks for correct final answer<br><br>accept 48 | **(2)**<br><br>AO 1 1 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **2(a)(ii)** | • chip B has greater surface area (1)<br><br>• therefore **more** water {absorbed / moved into the potato chip} (1) | accept chip B is bigger / has more cells | **(2)**<br><br>AO 3 2a<br>AO 3 2b |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **2(a)(iii)** | An explanation that links the following:<br><br>• (cells) lose water / become plasmolysed (1)<br><br>followed by<br><br>• (water moves out) by <u>osmosis</u> (1)<br><br>• from a high concentration of water molecules (in the potato) to a low concentration of water molecules (in the solution) / through the partially permeable membrane (to the salt solution) (1) | <br><br>accept get smaller/shrink/lose mass<br><br><br><br>accept from low solute concentration to a high solute concentration<br><br>accept from high to low water potential | **(3)**<br><br>AO 1 1 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **2(b)** | An explanation that links:<br><br>• no chloroplasts (in the potato) (1)<br><br>• (as there is no light) for **photosynthesis** / potato cells do not **photosynthesise** / ORA (1) | <br><br>accept fewer chloroplasts /chlorophyll (in the potato)<br><br><br><br>more amyloplasts / starch grains in the potato (1)<br>for storage (1) | **(2)**<br><br>AO 2 1 |

**Total for Question 2 = 9 marks**

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **3(a)(i)** | Any two from:<br>• wash hands after contact (1)<br>• avoid direct contact / wear {gloves/protective clothes} (1)<br>• wear a (protective) mask (1)<br>• **sterilise** equipment {before /after} use (1) | accept hand gels<br>accept protect your face<br>be immunised (1) | **(2)**<br>AO 2 2 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **3(a)(ii)** | subtraction 5943 - 2830 = 3113 (1)<br>3113 ÷2830 x 100 = 110 % | accept 5943 - 2830 ÷ 2830<br>award full marks for correct numerical answer without working<br>accept other valid methods for the calculation | **(2)**<br>AO 2 1 |

| Question Number | Answer | Mark |
|---|---|---|
| **3(a)(iii)** | A it does not have flagella<br>**1. The only correct answer is A**<br>***B*** *is not correct because plasmids do not allow motility.*<br>***C*** *is not correct because it does have ribosomes.*<br>***D*** *is not correct because acrosomes are not found in bacteria.* | **(1)**<br>AO 2 1 |

| Question Number | Answer | Mark |
|---|---|---|
| **3(b)** | D testing using cultured cells → testing in healthy volunteers → double blind trials on patients<br><br>**1. The only correct answer is D**<br><br>***A*** *is not correct because the medicine is tested on cultured cells first.*<br><br>***B*** *is not correct because double blind trials are used after testing in healthy volunteers.*<br><br>***C*** *is not correct because the medicine is tested on cultured cells first.* | **(1)**<br><br>AO 1 1 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **3(c)** | An answer linking three of the following:<br><br>• exposure to the {toxin/antigen/ pathogen/bacteria} (1)<br><br>• stimulates an **immune response** (1)<br><br>• production of {(B)**lymphocytes** /antibodies} (1)<br><br>• production of memory lymphocytes (1) | <br><br>accept immunised /vaccinated<br><br><br><br>accept antitoxins | **(3)**<br><br>AO 2 1 |

**Total for Question 3 = 9 marks**

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **4(a)** | Any three from:<br><br>• have the potential to produce any cell type (1)<br><br>• no need to use embryonic stem cells (1)<br><br>• less chance of patient rejecting their own cells (1)<br><br>• used to treat conditions which are currently incurable / used for **cell** transplants /used to replace faulty cells (1) | <br><br>accept can turn into **many** cell types /pluripotent /totipotent<br><br>accept embryos do not need to be killed<br><br><br><br>accept named conditions e.g Parkinson's / diabetes<br><br>ignore references to cloning body parts / replace organs / treat cancer unless qualified | **(3)**<br><br>AO 2 1 |

| Question Number | Answer | Mark |
|---|---|---|
| **4(b)(i)** | B $R \rightarrow Q \rightarrow S \rightarrow P$<br><br>**1. The only correct answer is B**<br><br>***A*** *is not correct because Q is after R*<br><br>***C*** *is not correct because S is after Q*<br><br>***D*** *is not correct because R is before Q and S* | **(1)**<br><br>AO 3 1b |

| Question Number | Answer | Mark |
|---|---|---|
| 4(b)(ii) | A anaphase<br><br>**1. The only correct answer is A**<br><br>***B*** *is not correct because R is prophase*<br><br>***C*** *is not correct because P is telophase*<br><br>***D*** *is not correct because Q is metaphase* | **(1)**<br><br>AO 3 1a |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| 4(b)(iii) | Any two from:<br><br>• DNA is replicated (1)<br><br>• production of cell {components /proteins / organelles}(1)<br><br>• {metabolic activities / cell reactions} occur / **cell** growth(1) | <br><br>accept DNA duplicates /chromosomes duplicate<br><br>accept sub-cellular structures / named structures<br><br>chromosomes coil up / condense (1) | **(2)**<br><br>AO 1 1 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| 4(c) | • selection of 40 x **objective** lens (1)<br><br>• combines with 10 x **eye piece** lens (1) | <br><br>accept other combinations that multiply together to make 400 x with the eye piece as equal or the lower power<br><br>accept use two lenses with correct magnification to make 400x for 1 mark | **(2)**<br><br>AO 1 2 |

**Total for Question 4 = 9 marks**

| Question Number | Answer | Mark |
|---|---|---|
| **5(a)(i)** | B substrate<br><br>**1. The only correct answer is B**<br><br>***A*** *is not correct because oxygen and water are the products*<br><br>***C*** *is not correct because the active site is part of the catalase enzyme*<br><br>***D*** *is not correct because a control would using water and not hydrogen peroxide* | **(1)**<br><br>AO 2 1 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **5(a)(ii)** | • mass is a variable/ controlling a variable (1)<br><br>• so the results could be compared/equal amount of catalase in each reaction (1) | accept the idea that different masses would need more or less oxygen/rise quicker or slower<br><br>ignore references to fair test or reliable results<br>accept enzyme for catalase | **(2)**<br><br>AO 2 2 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **5(a)(iii)** | Any two from:<br><br>temperature (1)<br><br>**volume** of hydrogen peroxide (1)<br><br>the distance the potato had to rise (1)<br><br>pH (1)<br><br>size of test tube (1)<br><br>age/variety/type of potato (1)<br><br>surface area of potato (1) | <br><br><br><br>ignore amount of hydrogen peroxide<br>accept mass for volume<br><br><br><br><br><br>accept all discs from the same potato<br><br><br>the same stock solution of hydrogen peroxide (1) | **(2)**<br><br>AO 3 3b |

| Question Number | Answer | | Mark |
|---|---|---|---|
| **5(b) (i)** | **Conclusion for 1 mark**<br><br>• increasing the concentration of hydrogen peroxide {increases the rate of reaction/decreases the time taken for the disc to rise} (1)<br><br>**and any three from:**<br><br>• provides more substrate (1)<br>• increases collisions (1)<br>• more active sites occupied (1)<br>• forming more enzyme-substrate complexes (1)<br>• oxygen is released faster (1) | <br><br><br><br><br><br><br><br>accept hydrogen peroxide for substrate<br><br><br><br><br>accept more oxygen released | **(4)**<br><br>AO 3 2a<br>AO 3 2b |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **5(b)(ii)** | substitution 1÷75 = 0.013333 / 0.01 (1)<br><br>correct number of decimal places 0.013 ($s^{-1}$) (1) | 2 marks for correct answer to 3 decimal places with no working | **(2)**<br><br>AO 2 2 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **5(b)(iii)** | substrate is not the rate limiting factor/all active sites (of catalase) are occupied | accept the {enzyme/another factor} is the limiting factor | **(1)**<br><br>AO 2 1 |

**Total for Question 5 = 12 marks**

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **6(a)(i)** | An explanation linking two of the following:<br><br>• cut the {plasmid/gene/DNA} with a **restriction enzyme** (1)<br><br>• insert the gene into the plasmid using **ligase** (1)<br><br>• gene and plasmid have the same sticky ends / complementary sticky ends (1) | accept vector for plasmid | **(2)**<br><br>AO 1 1 |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **6(a)(ii)** | An evaluation that combines three of the following points:<br><br>At least one from benefits<br><br>• (yeast grows rapidly) increasing yield (1)<br><br>• it can be produced in a shorter time period (1)<br><br>• production is cheaper/easier to extract (1)<br><br>• takes up less space than growing plants (1)<br><br>• yeast growth is not weather dependent (1)<br><br>At least one from risks<br><br>• concerns over the genetically modified yeast being manufactured illegally (1)<br><br>• the painkillers may not be identical/as effective (1)<br><br>• concerns over GM organisms entering environment (1) | Max of 2 marks for benefits.<br><br>Max of 2 marks for risks.<br><br>accept possible health risks of painkillers from GM yeast | **(3)**<br><br>AO 2 1 |

| Question Number | Answer | Mark |
|---|---|---|
| **6(b)(i)** | C sugar<br><br>**1. The only correct answer is C**<br><br>***A*** *is not correct because the base is the rectangle*<br><br>***B*** *is not correct because the phosphate is the circle*<br><br>***D*** *is not correct because a polymer is composed of repeated subunits* | **(1)**<br><br>AO 1 1 |

| Question Number | Indicative content | Mark |
|---|---|---|
| *6(b)(ii) | **DNA sequences**<br>• DNA has 4 different bases<br>• changes in the DNA are mutations<br>• results in different alleles for these genes<br>• affects the phenotype / produces variation<br>**Outcome of DNA sequencing for the individual**<br>• identify genetic diseases<br>• identify the risk of developing diseases<br>• impact of knowing that a disease could develop<br>• allow the individual to modify their lifestyle to reduce risk<br>**Impact on medical treatment**<br>• HGP has determined the location of genes/determined the function of proteins<br>• we have a better understanding of some diseases<br>• take preventative medicine<br>• provide tailor-made medical treatments/personalised medicines | **(6)**<br>AO 1 1 |

| Level | Mark | Descriptor |
|---|---|---|
| | 0 | No rewardable material. |
| Level 1 | 1–2 | • Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1)<br>• Presents an explanation with some structure and coherence. (AO1) |
| Level 2 | 3–4 | • Demonstrates elements of biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1)<br>• Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1) |
| Level 3 | 5–6 | • Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1)<br>• Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1) |

**Total for Question 6 = 12 marks**

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