Pearson Edexcel

Mark Scheme(Results)

Summer 2023

Pearson Edexcel GCSE
In Combined Science Biology
(1SCO) Paper 1BH

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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)	asexual (reproduction)	ignore mitosis reject meiosis accept cloning / binary fission	**(1)**

Question number	Answer	Additional guidance	Mark
1 (b)	One from advantages: • (fruit) will have desired qualities (1) • can be produced faster (1) **AND** One from disadvantages: • susceptible to a disease (1) • can't survive an environmental change (1) • reduced gene pool (1)	ignore genetically identical / no variation for advantages and disadvantages accept examples of characteristics e.g. all tasty / same taste ignore higher yield accept inherited / genetic diseases accept can't survive a selection pressure	**(2)**

Question number	Answer	Additional guidance	Mark
1(c)	A method including four from: • mix starch, enzyme and pH (solution) (1) • use iodine (to test for starch) (1) • (with iodine solution) blue-black means starch is present / {orange / brown} means no starch present (1) • control of one variable e.g. concentration, volume, temperature (1) • **repeat** using different pH solutions (1)	all three solutions are required accept add iodine to a spotting tile ignore blue ignore amount unless a measurement is given	**(4)**

Question Number	Answer	Additional guidance	Mark
1(d)	An explanation linking two from: • enzyme denatures (1) • which changes the shape of the **active site** (1) • so {the enzyme cannot bind to its substrate / active site no longer complementary / no **enzyme-substrate** complexes form} (1)	accept enzyme changes shape accept substrate {no longer fits / is no longer complementary} accept starch for substrate	**(2)**

(Total for question 1 = 9 marks)

Question number	Answer	Additional guidance	Mark
2 (a)	Calculation 300 ÷ 30 / 2^{10} / indication that there are 10 divisions (1) Evaluation 1024	award full marks for the correct answer with no working accept 512 for one mark only	**(2)**

Question number	Answer	Additional guidance	Mark
2(b)(i)	(pathogens are organisms) that **cause** disease	ignore examples of pathogens unless linked to causing disease accept **cause** disease / illness / infections	**(1)**

Question number	Answer	Additional guidance	Mark
2(b)(ii)	An explanation including two from: • they inhibit processes (in bacteria) (1) • so **bacteria** {are destroyed / are killed / growth stops / reproduction stops} (1) • but antibiotics {do not affect/damage} the host cell (1)	 accept named processes e.g. disrupt cell walls accept slows down for stopped	**(2)**

Question number	Answer	Additional guidance	Mark
2(b)(iii)	Substitution 80 ÷ 0.005 (1) 16 000	award full marks for the correct answer with no working	**(2)**

(Total for question 2 = 7 marks)

Question number	Answer	Mark
3(a)(i)	C releases energy contains digestive enzymes **The only correct answer is C** ***A*** *is not correct because structure B does not contain the genetic material* ***B*** *is not correct because structure A does not produce glucose* ***D*** *is not correct because structure A does not produce glucose and structure B does not contain the genetic material*	**(1)**

Question number	Answer	Mark
3(a)(ii)	20 / twenty	**(1)**

Question number	Answer	Mark
3(b)(i)	B prophase → metaphase → anaphase → telophase **The only correct answer is B** ***A*** *is not correct because metaphase is not the first stage* ***C*** *is not correct because anaphase is not the first stage* ***D*** *is not correct because metaphase is before anaphase*	**(1)**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	An answer including: • (stem cells divide) by <u>mitosis</u> (1) • cells **differentiate** / to become specialised cells (1)	 reject meiosis accept produce cells with a specific function	**(2)**

Question number	Answer	Additional guidance	Mark
3(c)(i)	so the tissues matched / to reduce the chance of rejection	accept because they are genetically similar / have similar DNA	**(1)**

Question number	Answer	Additional guidance	Mark
3(c)(ii)	they have the potential to develop into a {foetus / baby / person / life} so embryos are not {harmed / destroyed}	accept people have ethical concerns / think it is unethical / the {embryo / foetus} is alive	**(1)**

Question number	Answer	Additional guidance	Mark
3(c)(iii)	An answer including three from: • means that embryos do not need to be used / a donor is not needed (1) • they can {develop / differentiate / specialise} into any cell (1) • replace damaged {cells / tissue} (1) • they will match the tissue type of the patient / less chance of rejection (1)	accept they are easier to obtain / unlimited supply accept can develop into a named cell (type) accept specific examples of use e.g. Parkinson's ignore repair cells accept repair tissues accept no need to take immune-suppression medication (1)	**(3)**

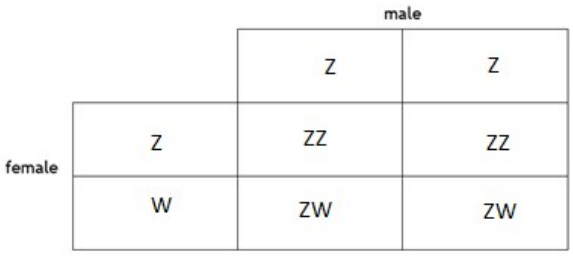
(Total for question 3 = 10 marks)

Question number	Answer	Additional guidance	Mark
4(a)(i)	subtraction 221 – 11 or 210 (1) calculation 210 ÷ 11 x 100 (1) evaluation 1909 (%)	award full marks for the correct answer without workings accept ecf from incorrect subtraction or no subtraction accept 1909.1 accept answer to any number of decimal places correctly rounded accept 19.09 for 2 marks	**(3)**

Question number	Answer	Additional guidance	Mark
4(a)(ii)	increased survival rate / hidden from predators / hidden from prey	accept camouflaged / increased chance of getting food	**(1)**

Question number	Answer	Additional guidance	Mark
4(a)(iii)	An explanation linking three from: • all **genetically** similar / there is less variation (1) • if there is a selection pressure (1) • they will {be susceptible / die} (due to the selection pressure) / **no** survival of the fittest (1) • fewer birds will be able to reproduce (1) • the species cannot evolve (1)	 accept decreased gene pool / **similar** {DNA /genes / alleles} accept examples of selection pressure e.g. disease / change in the environment accept affected for susceptible accept it's less likely there will be adapted bitterns to survive accept fewer offspring are produced	**(3)**

Question number	Answer	Additional guidance	Mark
4(b)	An answer including two of the following: • breed animals who are {not genetically similar / genetically different} (1) • repeat the process over many **generations** (1)	 animals with different characteristics accept this occurs over several **generations** accept prevent the animals inbreeding (1)	**(2)**

Question number	Answer	Additional guidance	Mark
4(c)	 correct parental genotypes (1) correct offspring genotypes (1)	ecf for incorrect parental genotype if Z and W used. Accept WZ	**(2)**

(Total for question 4 = 11 marks)

Question number	Answer	Mark
5(a)(i)	evaluation (8 x 8 x 8) = 512 (1) units mm^3 (1)	**(2)**

Question number	Answer	Additional guidance	Mark
5(a)(ii)	dry the cube / check the balance is on zero	accept use a balance accurate to 1000^{th} gram ignore repeat the investigation	**(1)**

Question number	Answer	Additional guidance	Mark
5(a)(iii)	An explanation linking three from: • mass has decreased (1) • water has moved out (of the cube) (1) • water moves by <u>osmosis</u> (1) • across a partially permeable membrane (1) • from a high water molecule concentration to a low water molecule concentration (1)	 accept the {cube / potato} has lost water accept semi-permeable membrane accept down a water potential gradient	**(3)**

Question number	Answer	Additional guidance	Mark
5(a)(iv)	An answer including three from: • (repeat with) different salt concentrations (1) • between the dilute and the concentrated solution (1) • make repeated readings **at each concentration** (1) • plot a graph to find the concentration with no mass change (1)	 accept at concentrations closest to where there is little mass change accept find an average for each concentration accept idea of finding the point where the line crosses the *x* axis accept control all variables / control an example of a variable e.g. temperature (1)	**(3)**

Question number	Answer	Additional guidance	Mark
5(b)	An explanation linking: • (potato cells) have a cell wall (1) • which provides {structure / support} / which contains cellulose (1)	 accept strong / rigid for idea of structural support accept cells become turgid (1) accept water enters the vacuole (1)	**(2)**

(Total for question 5 = 11 marks)

Question number	Answer	Additional guidance	Mark
6(a)	An answer including two from: • environmental factors (1) • diet / food intake (1) • exercise / activity (1) • if the person is affected by a disease (1)	 accept lifestyle accept calories consumed / named food groups accept calories used / metabolism accept named diseases e.g. hyperthyroidism / diabetes ignore age / sex / smoking / height	**(2)**

Question number	Answer	Additional guidance	Mark
6(b)	An answer including: • BMI is in the overweight range (1) • waist:hip is in the healthy range (1) • suggesting that the fat is not around the vital organs / the patient may have a high percentage of muscle (1) • patient is consuming too much alcohol which {affects the liver / causes liver damage} (1) • not smoking reduces the risk of {cardiovascular disease / lung disease / stroke} (1)	disease risks must be linked to measurements / data from the table accept idea that BMI does not take account of muscle / fat is evenly distributed / fat is not around their middle accept numerical comparisons accept named liver diseases e.g. cirrhosis, liver cancer or fatty liver accept other smoking related diseases e.g. cancer	**(4)**

Question number	Indicative content	Mark
*6(c)	**AO1 6 marks** **Structure** • stimulus detected by a receptor • receptor transfers the signal to the sensory neurone • sensory neurone transfers the signal to the CNS / brain / spinal cord / relay neurone • signal is transferred to a motor neurone • myelin sheath speeds up the transmission of the electrical impulse • the motor neurone transmits the signal to the effector • the effector produces the response **Function** • rapid response • to protect the body / response to danger • involuntary automatic response	**(6)**

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. • Presents an explanation with some structure and coherence.
Level 2	3-4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and /or developed. • Presents an explanation that has a structure which is mostly clear, coherent and logical.
Level 3	5-6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • Presents an explanation that has a well-developed structure which is clear, coherent and logical.

Additional Guidance

Level 1	1–2	• The answers refers to at least one structural aspect of a reflex arc • The response includes reference to the function of a reflex arc
Level 2	3–4	• The explanation links some structural components of a reflex arc • The response includes links to the function of a reflex arc as a rapid **or** protective response
Level 3	5–6	• The explanation links the structural components in a complete reflex arc • The response links this to the function of a reflex arc as a rapid **and** protective response

(Total for question 6 = 12 marks)