Pearson
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Mark Scheme
(Results)

November 2021

Pearson Edexcel GCSE
In Combined Science (1SC0) Paper 2BF

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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

Question Number	Answer	Mark
1(a) (i)	D nucleus **The only correct answer is D** ***A*** *is not correct because mitochondria do not control the white blood cell* ***B*** *is not correct because ribosomes do not control the white blood cell* ***C*** *is not correct because chromosomes are only part of organelle X*	**(1)** **AO1.1a**

Question Number	Answer	Additional guidance	Mark
1(a) (ii)	haemoglobin (1) liquid (1)	answers must be in correct order	**(2)** **AO2.1**

Question Number	Answer	Additional guidance	Mark
1(a) (iii)	A description including **two** from: • make antibodies • {surround / engulf / digest} {pathogens / bacteria / viruses} • remembers pathogens / bacteria / viruses (so can react quickly to secondary infection)	 accept produce memory cells	**(2)** **AO1.1**

Question Number	Answer	Mark
1(b)	10 (μm)	**(1)** **AO2.2**

Question Number	Answer	Additional guidance	Mark
1(c)	An explanation including any **two** from: • greater resolution (1) • so greater magnification is possible (1) • so smaller structures can be seen / identified (1)	 accept more detail of cell structures can be seen accept electrons (with a shorter wavelength) are used (instead of light) (1)	**(2)** **AO1.1**

(Total for question 1 = 8 marks)

Question Number	Answer	Mark
2 (a)	**D** organism, population, community **The only correct answer is D** ***A*** *is not correct because community is not the lowest level of organisation in an ecosystem* ***B*** *is not correct because community is not the lowest level of organisation in an ecosystem* ***C*** *is not correct because population is not the highest level of organisation in an ecosystem*	**(1)** **AO1.1**

Question Number	Answer	Mark
2(b)(i)	The blackbirds will be eating more caterpillars (because there are fewer slugs)	**(1)** **AO3 2a/b**

Question Number	Answer	Mark
2(b) (ii)	There will be more {food / lettuce} for the caterpillars to eat (because there are fewer slugs eating the lettuce)	**(1)** **AO3 2a/b**

Question Number	Answer	Additional guidance	Mark
2(b)(iii)	A description including **two** from: The population of slugs: • falls a little (1) • (then) increases (1) • starts to level off between 2.5 and 3 years / levels off after (approximately) 4 years (1)	 accept 4000 to 4700 slugs for 2.5 to 3 years accept 5100 to 5200 for 4 years accept population doesn't get as high as the pre slug pellet numbers (1)	**(2)** **AO3.1ab**

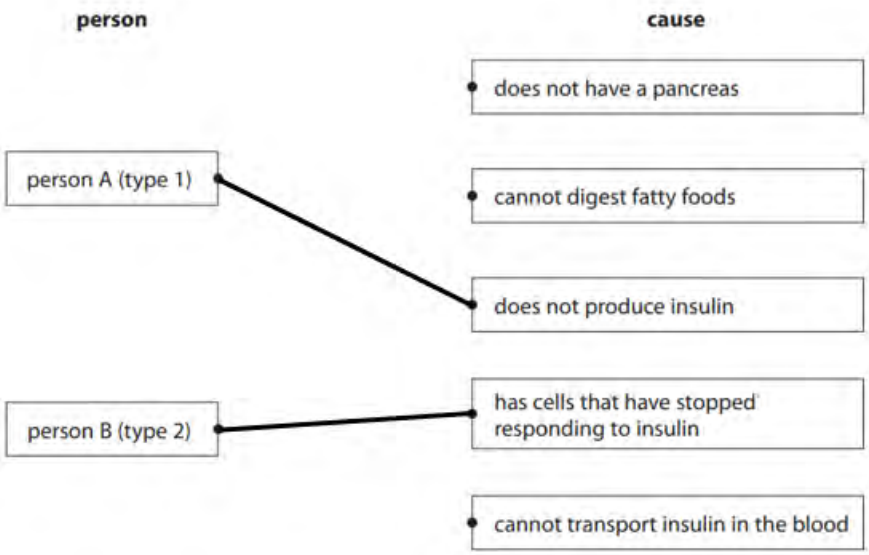
Question Number	Answer	Mark
2 (c)(i)	D non-indigenous **The only correct answer is D** ***A*** *is not correct because pathogenic means disease causing* ***B*** *is not correct because non-pathogenic means does not cause disease* ***C*** *is not correct because indigenous means that the slugs have not come from another country*	**(1)** **AO1.1**

Question Number	Answer	Additional guidance	Mark
2(c)(ii)	An explanation including: • parasites live in / on their host (1) • parasites feed off their host (1)	 accept (because the mites) live on the slug / the slug is the host (for the mites) accept (because the mites) feed on the slug / suck the slug's blood.	**(2)** **AO2.1**

(Total for question 2 = 8 marks)

Question Number	Answer	Mark
3(a)	C pituitary **The only correct answer is C** ***A*** *is not correct because the adrenal glands is situated in the abdomen.* ***B*** *is not correct because the pancreas is situated in the abdomen.* ***D*** *is not correct because the thyroid gland is situated in the neck.*	**(1)** **AO1.1**

Question Number	Answer	Additional guidance	Mark
3(b)			**(2)**

	 Do not award mark if two lines are drawn from Person A (type1) box Do not award mark if two lines are drawn from person B (type 2) box	**AO1.1**

Question Number	Answer	Additional guidance	Mark
3(c)(i)	A description including: • as the waist to hip ratio increases the probability of developing type 2 diabetes increases (1) • accurate data from the results is used in the answer (1)	 accept as one increases, the other increases ignore the columns get bigger	**(2)** **AO3.1ab**

Question Number	Answer	Additional guidance	Mark
3(c)(ii)	evaluation • (78.3 ÷ 90.0) = 0.87 (1)		**(2)**

	probability • 21(%)	award full marks for correct answer no working	**AO2.1**

Question Number	Answer	Additional guidance	Mark
3(d)(i)	Any **two** from: • age (1) • diet (1) • exercise regime (1) • ethnicity (1) • genetic makeup (1)	accept other valid factors	**(2)** **AO3.3b**

Question Number	Answer	Additional guidance	Mark
3(d)(ii)	their high BMI is due to a high % of muscle (instead of fat)	accept their waist to hip ratio is low	**(1)** **AO3.3ab**

(Total for question 3 = 10 marks)

Question Number	Answer	Mark
4a(i)	D 10 4	**(1)**

	The only correct answer is D ***A*** *is not correct because for oxygen to diffuse into the Amoeba the concentration must be lower than in the water.* ***B*** *is not correct because for oxygen to diffuse into the Amoeba the concentration must be lower than in the water.* ***C*** *is not correct because for oxygen to diffuse into the Amoeba the concentration must be lower than in the water.*	**AO2.1**

Question Number	Answer	Additional guidance	Mark
4(aii)	carbon dioxide + water	accept CO_2 for carbon dioxide H_2O for water reject CO2, CO^2. H20 and H^2O products can be in either order.	**(1)** **AO1.1**

Question Number	Answer	Mark
4(b)(i)	A increases increases **The only correct answer is A** ***B*** *is not correct because a decrease in blood glucose concentration would decrease the rate of respiration*	**(1)** **AO1.1**

	C *is not correct because a decrease in heart rate would decrease the rate of respiration* ***D*** *is not correct because a decrease in heart rate and blood glucose concentration would decrease the rate of respiration*	

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	Evaluation (24.7 x 2.7) = 66.69 (1) rounded to one decimal place: 66.7	award 1 mark for correctly rounding an incorrectly calculated answer award full marks for correct answer with no working shown.	**(2)** **AO1.1**

Question Number	Answer	Mark
4(b)(iii)	An investigation including **four** from: • a factor to control about the groups e.g. same age / same BMI (range) (1)	**(4)** **AO1.2**

	• a factor to control about the environment where the test takes place e.g. in the same room / same type of running machine (1) • measure breathing rate / count breaths in set time (1) • calculations of means (1) • Repeat investigation (1)	

Question Number	Answer	Additional guidance	Mark
4(c)	lactic acid	accept lactate	**(1)** **AO1.1**

(Total for question 4 = 10 marks)

Question Number	Answer	Additional guidance	Mark
5(a)	A description including **two** from: • have chlorophyll / chloroplasts (1) • (by) photosynthesis (1) • absorbing / using (sun)light (1) • (to react) water with carbon dioxide (1)	 accept symbol / word equations	**(2)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
5(b)	Any **one** from bacteria / fungi / decomposers / prokaryotes	 accept microorganisms accept named decomposing organisms e.g. worms	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
5(c)	A description including **two** from: • (dissolved) in water (1) • diffusion through the root (1) • (so water moves) through the xylem (1) • by transpiration (stream) (1) • into leaves by diffusion (1)	 accept active transport through the plant reject phloem accept evaporated from the leaves	**(2)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
5(d) (i)	An explanation linking: • as light intensity decreases the number of (small) plants (per m^2) decreases (1) • because the (small) plants will not be able to photosynthesise enough (1)	 accept reverse argument	**(2)** **AO3 1ab**

Question Number	Answer	Additional guidance	Mark
5(d) (ii)	Any **one** from: • same time of day (1) • same meter (1) • same position(s) in area / measure the same size area (1) • same person makes the readings (1) • meter held vertically each time (1)	accept other valid variables that should be controlled	**(1)** **AO3 1ab**

Question Number	Answer	Additional guidance	Mark
5(e)	A description including **three** from: • place a quadrat along a {rope / tape} measure (1) • tape measure to measure along the transect (1) • measure light intensity at different distances (from the wood) (1) • measure the stinging nettles {along the transect / at different light intensities} (1) • way of measuring growth of stinging nettles (in the quadrats) (1)	reject quadrant accept good descriptions of quadrats – e.g. ½ metre wire square accept use a light meter/lux meter accept named examples – e.g. {height / mass/ dry mass / number of leaves / number of plants}	**(3)** **AO3 3a**

(Total for question 5 = 11 marks)

Question Number	Answer	Additional guidance	Mark
6(a)(i)	• a diagram of the cell that reflects its shape and some of the structures (1) • with any **three** cell structures from {nucleus / cytoplasm / membrane / cilia} (3)	ignore a 'textbook' diagram that does not resemble cell A	**(4)** **AO1 2**

Question Number	Answer	Additional guidance	Mark
6(a)(ii)	to {move/waft} {mucus / bacteria / dust} (1)	ignore stop bacteria entering the body / trap bacteria	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
6(b)	measurement (2.5 – 0 =) 2.5 (cm) (1) calculation (25 ÷ 10 =) 2.5 (mm per minute)	accept 25 (mm) ecf for incorrect reading divided by 10 (1) award full marks for correct answer with no working	**(2)** **AO1 1**

Question Number	Indicative content	Mark
6(c)*	**AO1** General points about gas exchange • air is breathed in and out of the lungs • oxygen is absorbed (into blood) • carbon dioxide is released (from blood) • by diffusion Adaptations of alveoli for gas exchange • breathing maintains high concentration of oxygen in alveoli / lungs. • breathing maintains low concentration of carbon dioxide in alveoli / lungs. • many alveoli • large surface area • so that more oxygen is absorbed / more carbon dioxide is released • are moist • so oxygen /carbon dioxide can dissolve / is able to move across into the blood • surrounded by (network of) capillaries blood vessels • has a (good) blood supply / (many) red blood cells • keeps oxygen concentration low in blood • keeps carbon dioxide concentration high in blood • to absorb oxygen (quickly) • to remove carbon dioxide (quickly) • membranes / alveolar walls / cells are thin • membranes / alveolar walls / cells are permeable • allows oxygen / carbon dioxide to move through	**(6)** **Exp** **AO1 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. • 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.

Level	Mark	Additional Guidance
	0	No rewardable material.
Level 1	1–2	• Makes a simple reference to a feature of alveoli, oxygen or carbon dioxide • Linked to gas exchange
Level 2	3–4	• Explains an adaptation of alveoli • Linked to a reference to oxygen or carbon dioxide
Level 3	5–6	• explains more than one adaptation of alveoli • linked to oxygen and carbon dioxide

(Total for question 6 = 13 marks)