Mark Scheme (Results)

Summer 2018

Pearson Edexcel GCSE
In Biology (1BI0) Paper 2F
Paper 2

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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	Mark
1(a)(i)	C pancreas liver and muscles **1. The only correct answer is C** ***A*** *is not correct because the adrenal glands do not produce insulin* ***B*** *is not correct because the adrenal glands do not produce insulin and the small and large intestines are not the target organs for insulin* ***D*** *is not correct because the small and large intestines are not the target organs for insulin*	**(1)** AO 1 1

Question number	Answer	Mark
1(a)(ii)	A plasma **1. The only correct answer is A** ***B*** *is not correct because red blood cells do not transport insulin* ***C*** *is not correct because white blood cells do not transport insulin* ***D*** *is not correct because platelets do not transport insulin*	**(1)** AO 1 1

Question number	Answer	Additional guidance	Mark
1(b)	An explanation that includes **two** from: • (More) insulin (is released / produced) (1) • causes glucose to be converted to glycogen (1) • glucose is used for respiration (1)	 accept glucose is stored (in the body / muscles / liver) accept glucose is used in exercise	**(2)** AO 2 1

Question number	Answer	Mark
1(c)	Any **one** from: • (pancreas / body) {does not make insulin / makes very little insulin} (1) • {pancreatic /beta} cells are absent / destroyed (by immune system) (1) • (condition is) {inherited / genetic} / (can be) born with the condition (1)	**(1)** AO 1 1

Question number	Answer	Mark
1(d)	An explanation that includes the following: • reduce the levels of carbohydrate / sugars / glucose in the diet (1) • to ensure that blood glucose levels do not rise too high / too quickly / so that the insulin can cope. (1) OR • lose weight (1) • insulin resistance reduced / body will produce more insulin / cells respond to insulin (1)	**(2)** AO 1 2

Question number	Answer	Additional Guidance	Mark
1(e)	Any **two** from: • gender (1) • age (1) • life style / exercise / diet (1) • size / weight / BMI (1)	accept health (1)	**(2)** AO 2 2

Total for Question 1 = 9 marks

Question number	Answer	Mark
2(a)	smaller (1) diffusion (1) must be in correct order accept any reasonable spellings.	**(2)** AO 1 1 AO 2 1

Question number	Answer	Additional guidance	Mark
2(b)(i)	A description which includes **two** from: • as running speed increases, oxygen absorbed increases (1) • then levels off (1) • at 12 km per hour / 4.1 to 4.2 dm^3 (of oxygen per minute) (1)	accept any value between 10 and 13 km per hour	**(2)** AO 3 1a AO 3 1b

Question number	Answer	Mark
2(b)(ii)	A increasing aerobic respiration **1. The only correct answer is A** ***B*** *is not correct because increasing anaerobic respiration does use more oxygen* ***C*** *is not correct because decreasing aerobic respiration does use more oxygen* ***D*** *is not correct because decreasing anaerobic respiration does use more oxygen*	**(1)** AO 2 1

Question number	Answer	Mark
2(b)(iii)	An explanation including: • will respire **anaerobically** (more) (1) • because there is not enough oxygen (in the muscles) (1)	**(2)** AO 2 1

Total for Question 2 = 7 marks

Question number	Answer	Mark
3(a)	C tray with air holes and moist soil **1. The only correct answer is C** ***A*** *is not correct because dry soil is not the best condition for decomposition* ***B*** *is not correct because neither an airtight tray or dry soil is not the best condition for decomposition* ***D*** *is not correct because an airtight tray is not the best condition for decomposition*	**(1)** AO 1 1

Question number	Answer	Additional guidance	Mark
3(b)(i)	Substitution: (0.2 ÷ 5.4) X 100 =3.7037(%) (1) Evaluation: 3.7 (%) (1)	accept 3.703 with recurring dots over the 7 and last 3. award full marks for answer without working	**(2)** AO 2 1

Question number	Answer	Mark
3(b)(ii)	An explanation that combines identification via a judgement (1 mark) to reach a conclusion via justification/reasoning (1 mark): • 55 (^{o}C) (1) • because (55^{o}C) is the largest **percentage** decrease in mass (1) • because (55^{o}C) is the **optimum** temperature for the {enzymes / bacteria / fungi / decomposers} (1)	**(2)** AO 3 2a AO 3 2b

Question number	Answer	Mark
3(b)(iii)	Any **two** improvements from: • use more leaves / use more bags of leaves / use the same type of leaves / same (tree) species (1) • use same type / amount of soil / bury to same depth (1) • dry leaves before measuring mass / use biomass (1) • increase the length of time / check mass at regular time intervals (1) • increase number of temperatures (between 10 and 85ºC) (1)	**(2)** AO 3 3b

Total for Question 3 = 7 marks

Question number	Answer	Mark
4(a)(i)	B reduced growth and lighter green leaves **1. The only correct answer is B** ***A*** *is not correct because low nitrate ion concentration in soils will not cause darker green leaves* ***C*** *is not correct because low ion nitrate concentration in soils will not cause neither increased growth or darker green leaves* ***D*** *is not correct because low nitrate ion concentration in soils will not cause increased growth*	**(1)** AO 2 1

Question number	Answer	Mark
4(a)(ii)	A bacteria **1. The only correct answer is A** ***B*** *is not correct because mammals do not convert nitrogen to nitrate ions* ***C*** *is not correct because fungi do not convert nitrogen to nitrate ions* ***D*** *is not correct because worms do not convert nitrogen to nitrate ions*	**(1)** AO 2 2

Question number	Answer	Additional guidance	Mark
4(b)(i)	Substitution: 288 000 ÷ 36 000 (= 8) (1) Evaluation: 1:8	award full marks for correct ratio with no working	**(2)** AO 2 2

Question number	Answer	Additional guidance	Mark
4 (b)(ii)	An explanation including: • increases the surface area (1) • for absorption of (more) mineral ions / named mineral ions / water (1)	accept increases anchorage (1)	**(2)** AO 1 1

Question number	Answer	Mark
4(c)	An explanation that combines identification via a judgment (1 mark) to reach a conclusion via justification/reasoning (2 marks): Judgement: • the number of algae increase (1) Two reasons: • increased {temperature / light intensity} / longer daylight (1) • for (more) photosynthesis (for growth) (1) OR • increased minerals / nitrate ions / eutrophication in the lake (1) • (more) protein / chlorophyll (for growth) (1)	**(3)** AO 3 2a AO 3 2b

Total for Question 4 = 9 marks

Question number	Answer	Mark
5(a)	C glow-worm larvae will eat more slugs **1. The only correct answer is C** ***A*** *is not correct because fewer snails will not cause the population of glow-worms to increase* ***B*** *is not correct because fewer snails will not cause the adult glow-worms to eat more snails* ***D*** *is not correct because fewer snails will not cause the adult female glow-worms to glow more brightly*	**(1)** AO 2 1

Question number	Answer	Mark
5(b) (i)	An answer that combines the following points to provide a logical description of the plan: Step 2: add {some / set amount of} enzyme to each of the flasks (1) Step 3: time how long the glow lasts / measure intensity of glow (1)	**(2)** AO 3 3a

Question number	Answer	Mark
5(b) (ii)	**D** keep the volume of each solution the same in each flask. **1. The only correct answer is D** ***A*** *is not correct because changing the concentration of the protein solution in each flask will not improve the investigation* ***B*** *is not correct because changing the volume of the protein solution added to each flask will not improve the investigation* ***C*** *is not correct because keeping the concentration of dissolved oxygen the same in each flask will not improve the investigation*	**(1)** AO 3 3b

Question number	Answer	Additional guidance	Mark
5(b)(iii)	An explanation including any **two** from: • enzymes are pH sensitive / this enzyme has an <u>optimum</u> / <u>optimal</u> pH of 8 (1) • because the {enzyme / active site} will change shape / become denatured (1) • so the enzyme is not able to bind so easily to {substrate / protein / oxygen} (1)	accept pH 8 is alkaline **and** pH 5 is acidic reject kill enzyme	**(2)** AO 2 1

Question number	Answer	Mark
5(c)(i)	An answer that provides a description by making reference to **three** of the following points: • use of <u>quadrat</u> (1) • random placement (of quadrat) (1) • **count** the number of (female) glow-worms in the quadrat / $1m^2$ / square (1) • use several samples (1) • total number found ÷ number of samples (1)	**(3)** AO 2 1

Question number	Answer	Mark
5(c)(ii)	4000 / 4 X 10^3	**(1)** AO 1 1

Total for Question 5 = 10 marks

Question number	Answer	Mark
6(a)(i)	**D** waxy cuticle **1. The only correct answer is D** ***A*** *is not correct because R is not the cell wall* ***B*** *is not correct because R is not cytoplasm* ***C*** *is not correct because R is not the stomata*	**(1)** AO 2 1

Question number	Answer	Additional guidance	Mark
6(a)(ii)	A description including: • more glucose produced in the palisade (mesophyll) layer (1) • correct manipulation of data – e.g. 14 mg more / 2.75 times more (1)	 accept more than double / almost three times more.	**(2)** AO 3 1a AO 3 1b

Question number	Answer	Mark
6(b)	An explanation which includes the following: • (between 9 and midday) light intensity is high / highest (1) • so more photosynthesis occurs (which produces oxygen) (1) OR • (more) photosynthesis is occurring (1) • so oxygen moves out of the leaf by diffusion / description of diffusion (1)	**(2)** AO 2 1

Question number	Answer	Mark
6(c)(i)	D carbohydrate **1. The only correct answer is D** ***A*** *is not correct because glucose is not a vitamin* ***B*** *is not correct because glucose is not a protein* ***C*** *is not correct because glucose is not a carbohydrate*	**(1)** AO 1 1

Question number	Answer	Mark
6(c) (ii)	A description including the following • (heat with) Benedict's reagent / solution (1) • turns (from blue) to green/yellow/orange/ (brick-)red (1)	**(2)** AO 1 2

Question number	Answer	Mark
6(d)	• carbohydrase / amylase (1)	**(1)** AO 2 1

Total for Question 6 = 9 marks

Question number	Answer	Additional guidance	Mark
7(a)	P ureter Q bladder	reject urethra	**(2)** AO 1 1

Question number	Answer	Mark
7(b)(i)	An explanation that includes • there is no / 0g (protein) in the filtrate / nephron(1) • because protein molecules are too large (to pass through the membrane / enter nephron) (1)	**(2)** AO 2 1

Question number	Answer	Additional guidance	Mark
7(b)(ii)	An explanation that includes any **three** of the following • ultrafiltration (1) • due to higher pressure in the blood plasma (1) • across a partially permeable membrane (into the nephron) (1) • from the glomerulus / into the bowman's capsule (1)		**(3)** AO 1 1

Question number	Indicative content	Mark
***7(c)**	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. **Blood to machine** • kidney dialysis is used when a person's kidneys are damaged / don't remove urea from blood • blood taken from arm / passes into the dialysis machine • blood is separated from the dialysis solution by a (partially permeable) membrane • blood returned to body **Unwanted substances** • toxic substances • for example urea / alcohol • excess ions / named ions e.g. sodium and chloride **How substances are removed from blood** • (unwanted substances) move into the dialysis fluid • by diffusion across the membrane • down a concentration gradient • fresh dialysis fluid is pumped through to maintain the concentration gradient	**(6)** 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 • 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 fully 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.

Total for Question 7 = 13 marks

Question number	Answer	Mark
8(a)(i)	C a cell wall **1. The only correct answer is C** ***A*** *is not correct because both plant and animal cells have cytoplasm* ***B*** *is not correct because both plant and animal cells have a cell membrane* ***D*** *is not correct because both plant and animal cells have mitochondria*	**(1)** AO 1 1

Question number	Answer	Additional guidance	Mark
8(a)(ii)	substitution 20.5 x 400 (1) evaluation 8 200 µm	award full marks for correct answer with no working	**(2)** AO 1 2

Question number	Answer	Additional guidance	Mark
8(a)(iii)	substitution (3.08 ÷ 400) = 0.0077 (1) evaluation 7.7 x 10^{-3}	award full marks for correct answer with no working accept 0.008 accept 8 x 10^{-3}	**(2)** AO 2 2

Question number	Answer	Additional guidance	Mark
8(b)(i)	An answer that combines **three** of the following points to provide a method: • measure the length of the tissue (1) • add masses / mass (1) • remove the mass and measure length of the tissue (1) • repeat until the tissue no longer returns to its original length (1)	accept remove the mass and see if the tissue returns to its original size	**(3)** AO 3 3a

Question number	Answer	Additional guidance	Mark
8(b)(ii)	Any one from: • wash hands (1) • wear gloves (1) • sterilise the apparatus after use / disinfect working area (1)	ignore standard lab rules accept cover open wounds	**(1)** AO 2 2

Question number	Answer	Additional guidance	Mark
8(c)	An explanation including any **three** from: • (frogs) have one ventricle / three chambers (1) • (whereas) humans have two ventricles/ four chambers (1) • no wall / septum separating ventricles (1) • oxygenated and deoxygenated blood mix (in the ventricle / heart) (1)	accept some blood going to the lungs is already oxygenated (1)	**(3)** AO 2 1

Total for Question 8 = 12 marks

Question number	Answer	Additional guidance	Mark
9(a)(i)	Any one from: • keep leaf peel flat (1) • keep leaf peel in place (1) • protect the (objective) lens (1) • protect the specimen (1)	ignore to prevent drying out	**(1)** AO 2 2

Question number	Answer	Additional guidance	Mark
9(a)(ii)	An explanation linking **two** of the following: • the leaf peel is thin / leaf is too thick (1) • as the leaf peel allows light to pass through it/the leaf would not allow light to shine through it (1) • to enable the {stomata / cells/ guard cells} to be identified (1)	accept leaf would be opaque accept to see stomata / cells	**(2)** AO 2 2

Question number	Answer	Additional guidance	Mark
9(b)(i)	3 / three		**(1)** AO 2 2

Question number	Answer	Additional guidance	Mark
9(b)(ii)	A description including **three** of the following points: • guard cells (1) • take in water (1) • by osmosis (1) • (guard cells) become turgid/change shape/swell (1)	accept uneven thickness of guard cell walls leads to bulging	**(3)** AO 1 1

Question number	Indicative content	Mark
***9(c)**	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. **Xylem** • made of dead cells • cells with lignin • forming narrow/hollow tubes • carries water / mineral ions / named mineral ion • from roots up to leaves / shoots / buds • driven by transpiration • where water evaporates from the leaves • cell to cell/into/out of xylem by osmosis **Phloem** • made from living cells • have sieve tubes • this carries sugars / sucrose (in water) • from the leaves • down to roots • up to buds / flowers • movement by translocation • cell to cell/into out of phloem by active transport	**(6)** 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 • 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 fully 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.

Total for Question 9 = 13 marks

Question number	Answer	Additional guidance	Mark
10(a)(i)	Pyramid of biomass • pyramid shape with labels (1) • correct proportions: chipmunks must be {equal to/less than} 50% of the acorns, wild dogs must be {equal to/less than} 50% of chipmunks (1)	 accept names in bars or triangle for this mp must be bars: reject triangle against this mp.	**(2)** AO 2 1

Question number	Answer	Mark
10(a)(ii)	An answer that combines **two** of the following points of application and understanding to provide a logical description: • few chipmunks are { eaten / killed } (due to the lack of predators) (1) • so the number of chipmunks (in France) will increase (1) • therefore more chipmunks can reproduce (1)	**(2)** AO 2 1

Question number	Answer	Additional guidance	Mark
10(a)(iii)	Substitution 9 7500 ÷ 100 = 975 (1) Evaluation 975 x 9.5 = 9 262.5 (1) Nearest whole number 9 263 (kJ) OR 97500 x 0.095 (1) = 9 262.5 (kJ) Nearest whole number 9 263 (kJ)	award full marks for correct answer with no working	**(3)** AO 2 2

Question number	Answer	Additional guidance	Mark
10(b)(i)	Substitution 27 000 - 9 500 = 17 500 (1) Evaluation (17 500 ÷ 9 500) x 100 = 184.2 / 184 (%)	award full marks for correct answer with no working accept answer to any number of decimal places rounded correctly from: 184.2105263158	**(2)** AO 2 1

Question number	Answer	Mark
10(b)(ii)	An explanation including the following: • (the number chipmunks in the wild have increased) {so the ticks have more food / there are more ticks} (1) • so humans are more likely to be bitten (and contract Lyme disease) (1)	**(2)** AO 2 1

Total for Question 10 = 11 marks

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