Mark Scheme (Results)

Summer 2018

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

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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.

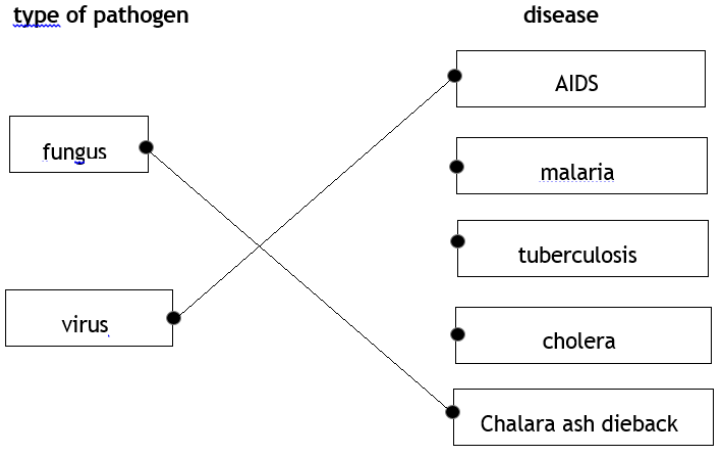
Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of 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)		reject more than one line from each pathogen	**(2)** AO 1 1

Question Number	Answer	Mark
1(b)	C bacteria **1. The only correct answer is C** ***A*** *is not correct because antibiotics do not kill antibodies* ***B*** *is not correct because antibiotics do not kill antigens* ***D*** *is not correct because antibiotics do not kill viruses*	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
1(c)	• (patient Z) has a high(er) white blood cell count (1) • white blood cells kill bacteria / pathogens/microorganisms/produce antibodies / produce antitoxins (1)	accept more wbc/most wbc accept fight infection / destroy bacterial infection	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
1(d)	Any two from: • wear gloves/ goggles/cover wounds/cover cuts (1) • clean up spills/use tongs to handle sample (tubes) (1) • store samples in sealed containers (1) • dispose of samples safely (1)	accept store in fridge/cooler accept burn/incinerate/ sterilise(1)	**(2)** AO 2 1

Total for Question 1 = 7 marks

Question Number	Answer	Mark
2(a) (i)	B double helix **1. The only correct answer is B** ***A*** *is not correct because the shape of a DNA molecule is not a single helix* ***C*** *is not correct because the shape of a DNA molecule is not a complementary helix* ***D*** *is not correct because the shape of a DNA molecule is not a triple helix*	**(1)** AO 1 1

Question Number	Answer	Mark
2(a) (ii)	A sugars and phosphates **1. The only correct answer is A** ***B*** *is not correct because amino acids and bases are not present in the DNA backbone* ***C*** *is not correct because bases are not present in the DNA backbone* ***D*** *is not correct because amino acids are not present in the DNA backbone*	**(1)** AO 1 1

Question Number	Answer	Mark
2(a) (iii)	(weak) hydrogen (bonds)	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
2(b)	• homogenise cells(1) • mix cells with a salt/detergent (solution)(1)	allow grind /crush/squash cells (using pestle and mortar)(1) accept use alcohol/ethanol(1)	**(2)** AO 1 2

Question Number	Answer	Additional guidance	Mark
2(c)	Any two from: • locate genes associated with diseases (1) • treat (genetic) disorders (1) • personalised medicine (1)	 accept genetic screening(1) accept genetic counselling/named disorders(1) accept develop new treatment/medicine (1)	**(2)** AO 1 1

Total for Question 2 = 7 marks

Question Number	Answer	Additional guidance	Mark
3(a) (i)	Any three from: • remove pollen/male gametes from one plant using a brush (1) • transfer pollen/ (male) sex cells to other plant (1) • collect the seeds (1) • grow seeds (in the soil) (1)	accept cross-pollinate	**(3)** AO 2 2

Question Number	Answer	Mark
3(a) (ii)	Any two from: • repeat (1) • compare results (1) • if all the results are the same then they are not anomalous/ORA (1)	**(2)** AO 2 2

Question Number	Answer	Mark
3(b)	Any two from: • **all** offspring are the same/Aa / produced yellow seeds/have same genotype (1) • as dominant allele (A) present in genotype of offspring)/ are heterozygous (1) • proves that both parents are homozygous (1)	**(2)** AO 3 2a AO 3 2b

Question Number	Answer	Additional guidance	Mark
3(c)	• chromosomes/DNA/genes/ alleles not known at the time	accept not yet discovered at that time	**(1)** AO 1 1

Total for Question 3 = 8 marks

Question Number	Answer	Mark
4(a) (i)	D lens **1. The only correct answer is D** ***A*** *is not correct because cataracts do not form in the retina* ***B*** *is not correct because cataracts do not form in the iris* ***C*** *is not correct because cataracts do not form in the cornea*	**(1)** AO 1 1

Question Number	Answer	Mark
4(a) (ii)	An explanation linking: • lens becomes cloudy (1) • less light reaches retina (1)	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
4(b)	Any two from: • positive correlation/increases (1) • by 125 million people/correct manipulation of data (1)	accept increases by 125 million for two marks	**(2)** AO 3 1a AO 3 1b

Question Number	Answer	Additional guidance	Mark
4(c) (i)	Any two from: • surgery / removing the lens (1) • replaced with plastic lens (1)	 accept laser (eye) surgery/ use lasers accept replace with a new lens	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
4(c) (ii)	Any two from: • less risk of infection (to eye) (1) • less risk of permanent damage (to eye) (1) • less cost / easier to do / fewer visits to hospital / no recovery time needed (1)	 accept no surgery needed	**(2)** AO 2 1

Total for Question 4 = 9 marks

Question Number	Answer	Additional guidance	Mark
5(a)	• **all** points plotted correctly to +/- ½ small square (1) • a line showing a steady increase that levels off at 30au/40g (1)	 accept dot-to-dot line	**(2)** AO 2 2

Question Number	Answer	Additional guidance	Mark
5(b)	Any two from: • mass of product formed increases as enzyme concentration increases (1) • then (the mass of product formed) remains the same (1) • 30 au/40 g is point where mass of product remains the same (1)	 accept then levels off (1)	**(2)** AO 3 1a AO 3 1b

Question Number	Answer	Additional guidance	Mark
5(c)	• 5:15 (1) • 1:3	allow full marks for correct final answer with no working	**(2)** AO 2 1

Question Number	Answer	Mark
5(d) (i)	D increase the substrate concentration **1. The only correct answer is D** ***A*** *is not correct because increasing the pH will not increase the mass of product formed in this investigation* ***B*** *is not correct because decreasing the temperature will not increase the mass of product formed in this investigation* ***C*** *is not correct because decreasing the enzyme concentration will not increase the mass of product formed in this investigation*	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
5(d) (ii)	Any three from: • 37°C is the optimum for this enzyme (1) • 80°C /it will **denature** the enzyme/pepsin (1) • change in the shape of the enzyme/active site (1) • No reaction will take place / no enzyme-substrate complexes formed / no product formed (1)	accept 37°C is best temperature for this enzyme (1) accept high temperatures will **denature** the enzyme accept substrate no longer fits active site (1)	**(3)** AO 2 1

Total for Question 5 = 10 marks

Question Number	Answer	Additional guidance	Mark
6(a)	Any two linked pairs from: • a single/thin layer (of cells) needs to be used (1) • so light passes through (the cells) (1) OR • use a stain/named stain(1) • to stain structures/see parts of the cell (1) OR • adjust focus of microscope (1) • to see cells/structures clearly (1) OR • select a higher power lens (1) • to increase magnification (1) OR • change light intensity/adjust mirror (1) • to see cells/structures clearly (1)	accept dye (1) accept to make cells/structures more visible (1) ignore zoom in/out accept clearer image/greater resolution accept increase magnification(1) accept to see cells/ structures clearly (1)	**(4)** AO 3 3b

Question Number	Answer	Mark
6(b) (i)	C meristem **1. The only correct answer is C** ***A*** *is not correct because a chloroplast does not have rapidly dividing cells* ***B*** *is not correct because epithelium does not have rapidly dividing cells* ***D*** *is not correct because a vacuole does not have rapidly dividing cells*	**(1)** AO 1 1

Question Number	Answer	Mark
6(b) (ii)	B metaphase **1. The only correct answer is B** ***A*** *is not correct because the stage of mitosis shown in cell R is not prophase* ***C*** *is not correct because the stage of mitosis shown in cell R is not anaphase* ***D*** *is not correct because the stage of mitosis shown in cell R is not telophase*	**(1)** AO 3 2a

Question Number	Answer	Additional guidance	Mark
6(b) (iii)	• same genes/ DNA/ chromosomes/ alleles (1) • diploid (1)	accept they are (genetically) identical accept 2n/ same number of chromosomes	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
6(b) (iv)	Any two from: • wear goggles (1) • avoid contact with acid/wear gloves (1) •use a water bath to heat acid (1)	accept do not boil/ overheat acid (1) accept heat in fume cupboard (1)	**(2)** AO 3 2a

Question Number	Answer	Mark
6(c)	One advantage explained: • higher resolution (1) • so more detail seen/higher magnification can be used (1) or • higher magnification (1) • so more detail seen (1)	**(2)** AO 1 1

Total for Question 6 = 12 marks

Question number	Answer	Mark
7(a)(i)	• measure 20 cm^3 of the stock solution (1) • mix with 80 cm^3 of water (1)	**(2)** AO 2 2

Question number	Answer	Mark
7(a)(ii)	Any three from: • divide wheat plants into (equal sized) groups (1) • add a different fertiliser solution to each group (1) • measure the height of the plants after a period of time (and calculate the mean increase in height) (1) • The optimum fertiliser concentration is the weakest solution that allows for maximum average growth (1)	**(3)** AO 3 3a

Question number	Answer	Mark
7(a)(iii)	Any one improvement from: light intensity/temperature/moisture level of the soil/volume of fertiliser (solution)/type of fertilizer/soil nutrient level/variety of wheat (1)	**(1)** AO 3 3b

Question number	Indicative content	Mark
7(b)	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 therefore not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. • Plants have physical and chemical defences **Physical defences** • Plant leaves have waxy cuticles • Waxy cuticles are impermeable • Plant cells have cell walls • Cell walls are made of cellulose and are difficult for pests or pathogens to penetrate • Leaf cuticle and cell walls are physical defences • Some plants have spines or hairs which deter pests **Chemical defences** • Chemicals can deter pests • Production of chemicals which are toxic to pests and pathogens • Chemicals have anti-microbial properties • Unpleasant taste which deters pests • Unpleasant smell which deters pests	**(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. (AO1) • 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) • 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) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

Total for Question 7 = 12 marks

Question Number	Answer	Mark
8(a)(i)	B liver **1. The only correct answer is B** ***A*** *is not correct because prolonged alcohol abuse does not cause cirrhosis of the brain* ***C*** *is not correct because prolonged alcohol abuse does not cause cirrhosis of the heart* ***D*** *is not correct because prolonged alcohol abuse does not cause cirrhosis of the skin*	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
8(a)(ii)	(cirrhosis is) not caused by {pathogens/named micro-organisms}/cannot be {passed/spread} (from one person to another)	accept it is not contagious/infectious	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
8(b)	An explanation linking: • exercise {requires energy/ uses respiration} (1) • {obtained from/reducing} fat (1)	accept burns calories accept sweating causes water loss for 1 mark	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
Q8c	An explanation linking two of the following: • reduces the volume of the stomach (1) • so it reduces food intake (1) • so stored {fat/lipids} is used up (1)	accept restricts the amount of food entering the stomach	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
8(d)(i)	substitution (1) $72 \div 1.81^2$ evaluation (1) = 21.977 / 21.98 / 22 3 s.f. (1) 22.0	accept $72 \div 3.2761$ award 2 marks for correct evaluation award full marks for correct numerical answer without working accept 21.9 for 2 marks	**(3)** AO 1 1

Question Number	Answer	Additional guidance	Mark
8(d)(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) • male A's weight distribution is not around the {vital organs/abdomen} (1)	accept male A's weight is distributed evenly over the body accept more weight on the hips than the waist accept mass for weight	**(2)** AO 3 2a AO 3 2b

Total for Question 8 = 11 marks

Question Number	Answer	Additional guidance	Mark
9(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) 48.0	Allow full marks for correct final answer accept 48	**(2)** AO 1 1

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

Question Number	Answer	Additional guidance	Mark
9(a)(iii)	An explanation that links the following: • (cells) lose water / become plasmolysed (1) followed by • (water moves out) by <u>osmosis</u> (1) • 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)	 accept get smaller/shrink/lose mass accept from low solute concentration to a high solute concentration accept from high to low water potential	**(3)** AO 1 1

Question number	Indicative content	Mark
*9(b)	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 therefore not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. • Select variety A because it has large potatoes ; • Select variety B because is faster growing and produces many potatoes ; • Crossbreed variety A with variety B; • Transfer pollen from flower of variety A to flower of variety B / ORA; • Grow the new plants • Select the offspring with the desired characteristics • Repeat the process over many generations; • until all offspring show desired characteristics;	**(6)** AO 2 1

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear. (AO2)
Level 2	3–4	• The explanation is mostly supported through linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, some logical connections made between elements in the context of the question. • Lines of reasoning mostly supported through the application of relevant evidence. (AO2)
Level 3	5–6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. • Lines of reasoning are supported by sustained application of relevant evidence. (AO2)

Total for Question 9 = 13 marks

Question Number	Answer	additional guidance	Mark
10(a)(i)	differentiation (1)	accept specialisation	**(1)** AO 2 1

Question Number	Answer	additional guidance	Mark
10(a)(ii)	A logical description including two of the following: • many plants produced (1) • quicker than sexual reproduction (1) • genetically identical/ clones produced (1) • with the desired characteristics (1) • plants from endangered/rare plants (1)	accept gives more of that plant/higher yield of that plant ignore plants grow faster obtain plants difficult to grow from seed (1)	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
10(a)(iii)	Any two from: • sterilises agar growth medium (1) • destroys unwanted {bacteria /pathogens/fungi/microorganisms/viruses} /there is no contamination (1) • so microorganisms don't {affect growth of plantlets / don't compete with plantlets/ don't use nutrients needed by plantlets} (1)	ignore prevents microorganisms getting in accept only the plantlets grow	**(2)** AO 2 2

Question Number	Answer	Additional guidance	Mark
10(a)(iv)	• mutation / disease	accept different alleles/ genotypes/genetic variation	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
10(b)(i)	An answer that provides a description by making reference to: • add iodine (solution) (1) • blue-black colour indicates presence of starch (1)		**(2)** AO 1 2

Question Number	Answer	Additional guidance	Mark
10(b)(ii)	• it is an insulator/reduces heat loss (1) • so energy from sugar is used to heat water / the result is more accurate (1)	accept stops water loss	**(2)** AO 2 2

Question Number	Answer	Additional guidance	Mark
10(b)(iii)	• ensures heat is distributed (evenly) throughout the water (1)	accept all the water is at the same temperature	**(1)** AO 2 2

Total for Question 10 = 11 marks

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