Mark Scheme (Results)

Summer 2018

Pearson Edexcel GCSE
In Biology (1BI0) Paper 1H
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	Mark
1(a)(i)	B the lens gets thicker to bend the light rays more **1. The only correct answer is B** ***A** is not correct because it would not bend the light rays more.* ***C** is not correct because the light rays need to be bent more.* ***D** is not correct because the light rays need to be bent more.*	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
1(a)(ii)	light rays meet in front of the retina (1)	accept eye is too long/too big accept light is refracted too much	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
1(a)(iii)	concave /diverging / minus (lens)	ignore contact lens	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
1(b)	An answer that combines the following points to provide a plan: • choose **equal** numbers of people with brown and blue eyes (1) • test their vision /details of a method to test vision (1) • count the number of people in each group who are short-sighted/if more people with brown eyes are short-sighted the hypothesis is correct / ORA (1)	 accept compare the results for the two groups	**(3)** AO 3 3a

Total for Question 1 = 6 marks

Question Number	Answer	Additional guidance	Mark
2(a)	An explanation linking: • exercise {requires energy/ uses respiration} (1) • {obtain 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
2(b)	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
2(c)(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
2(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) • 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 2 = 9 marks

Question Number	Answer	Additional guidance	Mark
3(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
3(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
3(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	Answer	Additional guidance	Mark
3(b)	An explanation that links: • no chloroplasts (in the potato) (1) • (as there is no light) for **photosynthesis** / potato cells do not **photosynthesise** / ORA (1)	accept fewer chloroplasts /chlorophyll (in the potato) more amyloplasts / starch grains in the potato (1) for storage (1)	**(2)** AO 2 1

Total for Question 3 = 9 marks

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

Question Number	Answer		Mark
4(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
4(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
4(a)(iv)	• mutation / disease	accept different alleles/ genotypes/genetic variation	**(1)** AO 2 1

Question Number	Answer	Mark
4(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
4(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
4(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 4 = 11 marks

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

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

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

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

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

Total for Question 5 = 9 marks

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

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

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

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

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

Total for Question 6 = 9 marks

Question Number	Answer	Additional guidance	Mark
7(a)(i)	• same structure of bones/examples of bone structure (1) • (structure is) unlikely to have occurred more than once during evolution / common ancestor had {the pentadactyl limb structure /similar limb structure} (1)	 accept unlikely that different ancestors would have had the same structures	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
7(a)(ii)	• compare the {genes/sequence of genes} from different organisms (1) • closely related organisms have {more similar/identical} sequences /differences in sequence can show evolution (1)	accept idea of identifying similarities and differences in the {genes/sequences} accept organisms with similar gene sequences share a common ancestor	**(2)** AO 1 1

Question Number	Answer	Mark
7(b)(i)	B phenotype **1. The only correct answer is B** ***A*** *is not correct because genotype is the combination of alleles* ***C*** *is not correct because an allele is an alternative version of a gene* ***D*** *is not correct because gametes are sex cells*	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	An explanation linking three of the following: • the first generation were heterozygous (1) • offspring {needed two wrinkled alleles/are homozygous} to have wrinkled seeds (1) • 25% offspring have wrinkled seeds (1) • wrinkled is recessive / round is dominant (1)	accept first generation are carriers accept traits for alleles accept 1 in 4 wrinkled seeds are homozygous recessive = 2 marks accept annotated Punnett squares/ genetic diagrams	**(3)** AO 2 1

Question Number	Answer		Mark
7(c)	Phenotype: • must be unaffected male (1) Explanation including the following: • he has the dominant allele / males have one copy of the allele as is on the X chromosome (1) • (needs a dominant allele) in order to have an unaffected daughter (1)	accept X^DY (accept any other capital letter) for 1 mark accept a Punnett square to show marking points if annotated.	**(3)** AO 3 1b AO 3 2a AO 3 2b

Total for Question 7 = 11 marks

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

Question Number	Answer	Additional guidance	Mark
8(a)(ii)	• mass is a variable/ controlling a variable (1) • 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 ignore references to fair test or reliable results accept enzyme for catalase	**(2)** AO 2 2

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

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

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

Question Number	Answer	Additional guidance	Mark
8(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)** AO 2 1

Total for Question 8 = 12 marks

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

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

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

Question Number	Indicative content	Mark
*9(b)(ii)	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. **DNA sequences** • DNA has 4 different bases • changes in the DNA are mutations • results in different alleles for these genes • affects the phenotype / produces variation **Outcome of DNA sequencing for the individual** • identify genetic diseases • identify the risk of developing diseases • impact of knowing that a disease could develop • allow the individual to modify their lifestyle to reduce risk **Impact on medical treatment** • HGP has determined the location of genes/determined the function of proteins • we have a better understanding of some diseases • take preventative medicine • provide tailor-made medical treatments/personalised medicines	**(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 9 = 12 marks

Question Number	Answer	Additional guidance	Mark
10(a)(i)	• spread {each bacterial species/the bacteria} on a different agar plate, add myxopyronin discs and incubate the plates (1) • {measure / compare} the zone of inhibition (1)	accept filter discs for myxopyronin discs accept descriptions of a zone of inhibition	**(2)** AO 1 2

Question Number	Answer	Additional guidance	Mark
10(a)(ii)	An explanation that links four of the following: • antibiotics destroy bacteria / prevent them reproducing (1) • doesn't affect {eukaryotic cells/host cells/human cells/human RNA polymerase} (1) • prevents production of mRNA /prevents RNA polymerase binding (1) • during transcription /prevents transcription (1) • prevents proteins being produced /no protein synthesis (1)	 ignore inhibit the bacteria/inhibit cell processes accept does not harm humans accept RNA polymerase produces mRNA	**(4)** AO 2 1

Question Number	Indicative content	Mark
10(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. **Lytic lifecycle** • viruses cannot replicate outside a host • virus binds to host cells • inserts genetic material into the host cell • use the cells machinery to produce viral proteins • use the cells machinery to produce nucleic acids • components assemble into new viral particles • viruses exit the cell through the host cell membrane • or causes lysis of the host cell • allows production of many virus particles **Spread of infection** • virus particles leave the host • virus released into body fluids • spread through airborne droplets/contact • allowing spread to another host	**(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 10 = 12 marks

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