Pearson
Edexcel

Mark Scheme (Results)

Summer 2024

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

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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.

Question number	Answer	Mark
1(a)(i)	C natural selection **The only correct answer is C** ***A*** *is not correct because genetic engineering is not involved in the theory of evolution* ***B*** *is not correct because biological control is not involved in the theory of evolution* ***D*** *is not correct because tissue culture is not involved in the theory of evolution*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
1 (a)(ii)	Two from: • genetics / mutation / alleles (1) • sexual reproduction / meiosis (1) • environment / named environmental factors e.g. diet, lifestyle, climate, temperature (1)	 accept genes / genetic modification ignore DNA accept idea of different parents / breeding ignore inbreeding / selective breeding accept changes to the environment ignore adaptations to environment / selection pressures / / natural selection / disease	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
1(a)(iii)	Any one from: • **change** in the environment • competition • (increase in) predators • **change** in {prey / food source / resources / habitat} • natural disaster	accept {climate / weather} **change** accept use of antibiotics / named chemicals e.g. pesticides accept idea of availability of / decrease in ignore bacteria / pathogens / named pathogens	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
1(b)(i)	An answering including two from: • (different) mutations occurred (1) • selection pressure (1) • **different** {environments / climate / habitats / ecosystems} (1)	accept **different** weather / temperature / conditions	**(2)** **AO2 1**

	• **different** {food / prey / predators} (1) • **different** disease (1) • unable to inter-breed (1)	accept pathogens / named pathogens accept unable to reproduce / mate / breed accept geographically isolated accept idea of **different ancestors** (1)	

Question number	Answer	Additional guidance	Mark
1(b)(ii)	One from: • his results {were similar / backed-up the work of Darwin / provided more evidence} • Darwin wanted to get the credit • he showed that animal populations {adapt/evolve} (to their environment) • he showed that animals have evolved from common ancestors	accept idea of it being a form of peer review accept they agreed with each other accept {selection pressure / environment} causes differences in characteristics	**(1)** **AO1 1**

(Total for question 1 = 7 marks)

Question number	Answer	Mark
2(a)(i)	B amino acids **The only correct answer is B** *A is incorrect because sugars are not produced when a protein is broken down.* *C is incorrect because fatty acids are not produced when a protein is broken down.* *D is incorrect because starches are not produced when a protein is broken down.*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
2(a)(ii)	A description including three from: • (activity) increases (1) • from pH 0.2 / to pH 2 (1) • optimum (activity) at pH 2 (1) • (pepsin activity) decreases {from pH 2 / to pH 3.5} (1)	accept best / maximum / most active / optimal / peak for optimum accept pH 3.6	**(3)** **AO3 1a 1b**

Question number	Answer	Mark
2(a)(iii)	(pH) 8 / 8.0 / eight accept phonetic spellings of eight	**(1)** **AO3 1a**

Question number	Answer	Additional guidance	Mark
2(a)(iv)	An explanation including three from: • pH 5 is **too** {acidic / low} (1) • active site (of the enzyme) has changed (1) • (so the) substrate will not {fit into / bind with} (the active site) (1) • no enzyme-substrate complex is formed (1) • because the enzyme is **denatured** (1)	accept proteins for substrate accept enzyme and substrate are no longer complementary ignore references to collisions between the substrate and the active site the active site is denatured is two marks	**(3)** **AO2 1**

Question number	Answer	Additional guidance	Mark
2(a)(v)	(use a) water bath / incubator / idea of how the temperature can be set in a room	accept a description of a water bath ignore in the same room / use a thermometer	**(1)** **AO1 2**

(Total for question 2 = 9 marks)

Question number	Answer	Mark
3(a)(i)	C a protist **The only correct answer is C** *A is incorrect because malaria is not caused by a bacterium* *B is incorrect because malaria is not caused by a fungus* *D is incorrect because malaria is not caused by a virus*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
3(a)(ii)	by vectors / mosquitoes	accept blood transfusions / through blood / **sharing contaminated** needles ignore insects / animals	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
3(b)	An explanation linking: • (the number of measles cases reported) has decreased (1)	accept herd immunity accept by vaccines /	**(2)** **AO2 1**

	• because {people have been immunised / more people are immune} (1)	vaccination	

Question number	Answer	Additional guidance	Mark
3(c)	Any **two** from: • white blood cells {kill / destroy} pathogens (1) • (WBC) produce {antibodies / antitoxins} (1) • memory lymphocytes (are produced) (1)	accept named pathogens accept phagocytosis accept WBC engulf pathogens reject antigens accept memory cells accept rise in body temperature / inflammation / more mucus produced / **more** WBC are produced / WBC move to site of infection (1)	**(2)** **AO1 1**

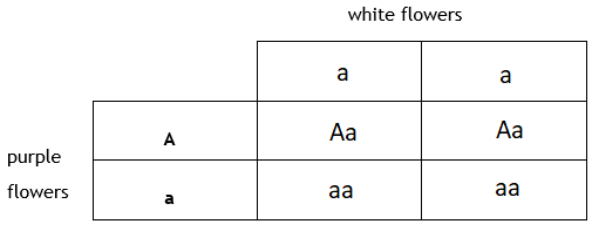
Question number	Answer	Additional guidance	Mark
3(d) **Overlap**	(beriberi) is not spread from person to person / is not caused by a {pathogen	accept organisms for people	**(1)** **AO2 1**

	/ named pathogen}	ignore it is a deficiency disease / not infectious / not contagious / it is caused by a lifestyle factor	

(Total for question 3 = 7 marks)

Question number	Answer	Mark
4(a)(i)	B the characteristic is dominant **The only correct answer is B** ***A*** *is not correct because the characteristic is not recessive* ***C*** *is not correct because the characteristic is not a mutation* ***D*** *is not correct because the characteristic is not environmental*	**(1)** **AO3 1a**

Question number	Answer	Additional guidance	Mark
4(a)(ii)	One from: • 40 (1) • 480 (1) • 160 ÷ 4 (x 3) (1) • 160 x 3 (÷ 4) (1) • 160 x 0.75 (1) • 160 x ¾ (1) **AND** Evaluation 120	award full marks for the correct answer with no workings accept 120:40 for two marks accept 40:120 for one mark	**(2)** **AO2 2**

Question number	Answer	Additional guidance	Mark
4(a)(iii)	 correct genotype for white flowers (1) correct offspring from their parental gametes (1) percentage of white flowers = 50% (1)	accept aA for Aa ignore other letters for genotypes ecf for incorrect gametes for white flowers ecf from incorrect Punnett square	**(3)** **AO3 1a+1 b**

Question number	Answer	Additional guidance	Mark
4(b)	Any two from: • **genetically** identical offspring (1) • they will have the {same / desired} characteristics (1)	 accept clones produced / same (advantageous) alleles ignore no variation / same genes accept same features accept named characteristics e.g. flower colour	**(2)** **AO2 1**

	• (flowering plants) **produced** faster (1) • only one parent plant needed (1)	accept shorter reproductive cycle / reproduce faster accept no need to find a mate / no need for {pollination / (named) pollinators} ignore more plants are produced / needs less resources / energy efficient / cheaper	

Question number	Answer	Mark
4(c)(i)	A a section of a DNA molecule that codes for a protein **The only correct answer is A** ***B*** *is not correct because a chromosome does not code for DNA so it is not a gene* ***C*** *is not correct because the the entire DNA of an organism is not a gene* ***D*** *is not correct because a section of a chromosome which coils into a double helix is not a gene*	**(1)** **AO1 1**

Question number	Answer	additional guidance	Mark
4(c)(ii)	An answer including two from: • A with T / C with G (1) • weak (1)	accept names of bases	**(2)** **AO1 1**

	• **hydrogen** bonds (1)	accept **H** bonds	

(Total for question 4 = 11 marks)

Question number	Answer	additional guidance	Mark
5(a)(i)	One from: • use a sterile {swab / equipment} • avoid the swab touching another surface • dispose of the swab in disinfectant • don't swab too {hard/far back}	 accept sanitise / disinfect for sterile ignore clean / new accept idea of disposal of the {swab/gloves} after ignore general laboratory rules / slide preparation / cleaning the area	**(1)** **AO2 2**

Question number	Answer	Additional guidance	Mark
5(a)(ii)	An answering including: • start with the lowest objective lens (1) • use the focusing wheel / focus (1) • (increase magnification to) ×40 **objective lens** (1) • with a 10x **eye piece lens** (1)	 accept lowest {magnification / lens} / x4 lens accept use {adjustment / focus} knob / move the stage accept 400x objective lens if no eye piece magnification given **If neither of the final two points are given:** accept both named lenses with alternative magnification**s** that total ×400 for 2 marks accept use a x40 and x10 lens for 1 mark accept named objective **and** eye piece lens without	**(3)** **AO1 2**

		magnifications for 1 mark	

Question number	Answer	additional guidance	Mark
5(b)	An explanation linking: • mitochondria (1) • which release energy / are where respiration occurs (1) OR • ribosomes (1) • which is where proteins are made / protein synthesis (1)	 ignore makes / produces energy ignore respirate / anaerobic respiration accept produce ATP accept a description of protein synthesis / translation	**(2)** **AO1 1**

Question number	Answer	additional guidance	Mark
5(c)	An answer including three from: • crush the cells (1) • add detergent / add a protease / add salt (1) • heat the sample (1) • filter (the extract) (1)	 accept crush the fruit accept named detergents / soap accept named protease accept use a water bath	**(3)** **AO2 2**

	• add ethanol (to the filtrate) (1)	accept alcohol	

Question number	Answer	additional guidance	Mark
5(d)	An answer including two from: • {map / find} the genes (1) • find the amino acid sequences / find the functions of proteins (1) • identify {alleles / mutations} (1) • genetic testing / prediction of disease risk (1) • personalised medicines / production of new medicines (1)	accept find the location of genes on chromosomes accept find the role of each gene accept better understanding of {diseases / inherited disorders} accept development of {new / better} treatments / gene therapy accept the idea of studying migration / ancestry (1)	**(2)** **AO1 1**

(Total for question 5 = 11 marks)

Question number	Answer	additional guidance	Mark
6(a)(i)	it is more sophisticated / it is more shaped / it is sharper / been carved	accept ideas around more complex	**(1)** **AO3 1a**

Question number	Answer	additional guidance	Mark
6(a)(ii)	An answer including two from: • location in the rock layer / how deep the tool is found (1) • older tools are deeper / ORA (1) • using other fossils found in the location (1)	accept stratigraphy accept radiometric dating of the rock layer (1) ignore carbon dating ignore measure the radiation in rocks	**(2)** **AO1 1**

Question number	Answer	additional guidance	Mark
6(b)	An answer including two from: • larger skull / indication of larger brain (1) • bipedalism / description of bipedalism (1)	list rule applies accept (changes to) skull shape / larger brain / changes to teeth accept (walking) upright / pelvic changes / straight**er**	**(2)** **AO1 1**

	• taller (1) • opposable thumbs /shorter {fingers / toes} / arched feet (1)	spine accept shorter arms / longer legs / changes in arm:leg ratio ignore limbs get {shorter / longer}	

Question number	Answer	additional guidance	Mark
6(c)(i)	Substitution 434 ÷ 62 000 (1) Evaluation 0.007 (1) Conversion 7 (µm) OR Conversion 434 x 1000 (1) Substitution 434 000 ÷ 62 000 (1) Evaluation 7 (µm)	Award full marks for correct answer without workings ecf for conversion (x 1000) from an incorrect evaluation award two marks for answer to the	**(3)** **AO1 2**

		incorrect order of magnitude.	

Question number	Answer	additional guidance	Mark
6(c)(ii)	An answer linking: • because it has a greater **magnification** (1) • because it has a greater **resolution** (1)	ignore see more detail accept idea that {electrons/electron beams} have a shorter wavelength (1)	**(2)** **AO2 1**

(Total for question 6 = 10 marks)

Question number	Answer	Mark
7(a)(i)	**A** the aphid is a vector **The only correct answer is A** ***B*** *is not correct because the aphid is not the pathogen* ***C*** *is not correct because the aphid is not a protist* ***D*** *is not correct because the aphid is a fungus*	**(1)** **AO2 1**

Question number	Answer	additional guidance	Mark
7(a)(ii)	An answer including: • (the mouthpart goes through) the waxy cuticle (1) • (and through) the cell wall (1)	 accept through the cuticle / waxy outer layer accept (goes through) the cellulose ignore cell membrane	**(2)** **AO2 1**

Question number	Answer	additional guidance	Mark
7(b)(i)	An answer linking: • DNA helix unwinds (1) • **RNA** Polymerase (1) • (enzyme) binds to the **non-coding region** (1) • (mRNA) strand is complementary / mRNA is a chain of nucleotides (1) • it contains U (instead of T) (1)	 accept unzips / DNA bonds broken /strands separated accept mRNA polymerase accept binds to the promoter accept (mRNA) bases are complementary accept nucleotides are joined together (by RNA polymerase) accept A pairs with U	**(4)** **AO2 1**

Question number	Answer	Mark
7(b)(ii)	translation	**(1)** **AO1 1**

Question number	Answer	additional guidance	Mark
7(c)	An answer linking three from: • uses other organisms / different species (to reduce aphids)	accept ladybirds / insects / predator / animals	**(3)** **AO2 1**
	• which is specific to {aphids / the pest} (1)	accept it only affects aphids	
	• {maintains / less effect on} biodiversity (1)	accept increases biodiversity	
	• meaning {chemicals / named chemicals} do not need to be {used / reapplied} (1)	accept less pollution / harm to the environment / less bioaccumulation accept biological control doesn't need to be reapplied accept idea of organic farming ignore fertilisers / herbicides	
	• aphids cannot develop resistance (1)	reject immune	
	• therefore increases crop yield / less damage to the crops / aphids can't feed on crops (1)	accept increased profit accept crops safe to eat / less disease in crops	

		ignore doesn’t affect the food chain / ecosystem	

(Total for question 7 = 11 marks)

Question number	Answer	additional guidance	Mark
8(a)(i)	An answer including two from: • reduce bias (by the doctor) (1) • placebo **effect** (1) • know whether the side effects are due to **statins** (1) • allows effectiveness of statins to be {determined / compared} (1)	allow the drug / medicine / pills for statins accept a description of the placebo **effect** ignore identify side effects / test safety	**(2)** **AO2 1**

Question number	Answer	Mark
8(a)(ii)	D clinical **The only correct answer is D** ***A*** *is not correct because double-blind trials are not the discovery stage* ***B*** *is not correct because double-blind trials are not the development stage* ***C*** *is not correct because double-blind trials are not the preclinical stage*	**(1)** **AO1 1**

Question number	Answer	additional guidance	Mark
8(b)(i)	14.8 ÷ 100 **or** 0.148 (1) 9 199 ÷ 0.148 = 62 155 (1) Evaluation 62 160 **OR** 9 199 ÷ 14.8 **or** 621.55(1) 621.55 x 100 = 62 155 (1) Evaluation 62 160 **OR** 100 ÷ 14.8 **or** 6.757 (1) 6.757 x 9199 = 62155 (1) Evaluation 62160	Award full marks for the correct answer with no working accept any number of d.p. accept any number of d.p. accept any number of d.p. accept 62155 or 62150 or 62200 for 2 marks **maximum of one mark for an answer using a percentage other than 14.8 given to 4 s.f.**	**(3)** **AO3 1**

Question number	Answer	additional guidance	Mark
8(b)(ii)	An answer linking three from: • the data for the placebo and the statins are very similar (1) • in year one more people taking statins reported muscle pain (1) • (in year 1) difference was only 0.8% (1) • over time the muscle pain is reduced in those people taking statins (1) • in {year 2/year 3/year 4} more people taking the placebo reported muscle pain (1)	 accept quoted data from a year to illustrate the similarity accept calculated differences for years 2, 3 or 4.	**(3)** **AO3 1**

Question number	Answer	additional guidance	Mark
8(b)(iii)	Any two from: • age (1)		**(2)** **AO2 1**

	• sex (1) • ethnicity (1) • mass / weight / height (1) • medical history / not on other medication (1) • lifestyle (1)	accept gender accept race / genetic background accept BMI accept level of cardiovascular disease / all healthy accept level of exercise / diet / fitness	

(Total for question 8 = 11 marks)

Question number	Indicative content	Mark
* 9(a)(i)	**AO1 (6 marks)** **Stage 1** **Interphase** • longest stage of the cell cycle • DNA is replicated • more organelles are synthesised • cell grows • chemical reactions / named reactions occur **Stage 2** **Mitosis** • nucleus divides • prophase - nuclear membrane dissolves and the chromosomes condense • spindle fibres form • metaphase - the chromosomes line up on the equator • anaphase - the chromosomes are separated and pulled to the poles • telophase - the nuclear membrane reforms **Stage 3** **Cytokinesis** • the cell divides • into two genetically identical cells which have a diploid nucleus • the cells are body cells needed for growth and repair	**(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, enquiry, techniques and procedures lacks detail. (AO1) • Presents a description which is not logically ordered and with significant gaps. (AO1)

Level 2	3-4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1) • Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) • Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)

Additional guidance

Level	Mark	Response detail
Level 1	1-2	• a description of a process that happens during one stage of the cell cycle • linked to the name of that stage of the cell cycle
Level 2	3-4	• a description of processes that happen during two stages of the cell cycle OR a detailed description of all the steps of stage 2. • linked to the names of the stages of the cell cycle
Level 3	5-6	• a detailed description of process that happens during all three stages of the cell cycle including all of the steps of mitosis • linked to the names of the stages of the cell cycle and mitosis

Question number	Answer	additional guidance	Mark
9(a)(ii)	(cell cycle / cell division) is quick(er) / is uncontrolled / doesn't stop	accept cells split / reproduce for divide	**(1)** **AO1 1**

Question number	Answer	Mark
9(b)(i)	B differentiation **The only correct answer is B** ***A*** *is not correct because cell elongation is not part of growth in animals*	**(1)** **AO1 1**

	C *is not correct because cell wall synthesis is not part of growth in animals* ***D*** *is not correct because transpiration is not part of growth in animals*	

Question number	Answer	additional guidance	Mark
9(b)(ii)	An answer including: • (measure the) {height / mass / head circumference} (1) • find the **percentile** (1) • for their age (1) • measurements should increase along a percentile / repeated measurements over time (1)	 accept weight ignore BMI accept (use a) **percentile** chart accept compare (measurement) with children of their age accept the idea that growth should stay on or around the same percentile	**(4)** **AO2 2**

(Total for question 9 = 12 marks)

Question number	Answer	Mark
10(a)(i)	*Helicobacter / Helicobacter pylori / H. pylori / pylori* accept close phonetic spellings	**(1)** **AO1 1**

Question number	Answer	additional guidance	Mark
10(a)(ii)	to neutralise acid / reduce acidity	accept stomach {contains acid / is acidic} accept to increase pH ignore to make it more alkaline	**(1)** **AO2 1**

Question number	Answer	additional guidance	Mark
10(b)	An answer including three from: • place the antibiotic discs on the plate (1) • use aseptic techniques (1) • (incubate the plate) for 24 hours (1) • at 37°C (1) • use a filter disc with water / use a control **disc** (1) • measure the zone of inhibition / zone of	 accept use the antibiotics on the {agar plate / bacteria} accept use of suitable equipment accept other suitable time scales accept temperatures in range of 25°C – 40°C / optimum temperature accept zones of inhibition show effectiveness of the	**(3)** **AO3 3a**

	inhibition shows bacteria have been killed (1)	antibiotic	

Question number	Indicative content	Mark
* 10(c)	**AO1 (6 marks)** **Infection** • virus binds to the host cell • viral genetic material injected into the host cell **Lytic** • virus is replicated • uses the host cell resources / named resources • to produce more viral genetic material • produce viral proteins • new viruses assemble • the host cell is lysed **Use** • to kill bacteria (instead of antibiotics) • reducing the problem caused by antibiotic resistance / people not finishing the course • bacteriophage do not affect animal cells • replicate themselves (so will continue to have an effect)	**(6)** **AO1** **AO2**

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 a description 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 a description 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 a description that has a well-developed structure which is clear, coherent and logical.

Level	**Mark**	**Additional guidance**
Level 1	1–2	• A brief description of the lytic cycle or the process of infection. • Links this to an indication of how bacteriophage could be used as an alternative to antibiotics
Level 2	3–4	• A good description of the lytic cycle of a virus including the production of virus components or the use of host cell machinery • Gives a reason why bacteriophage could be used as an alternative to antibiotics and does not refer to lysogenic steps
Level 3	5–6	• A detailed description of the lifecycle of a virus including the production of viral **proteins** using the host cell machinery. • Gives reasons why bacteriophage could be used as an alternative to antibiotics and does not refer to lysogenic steps