Pearson
Edexcel

Mark Scheme (Results)

Summer 2024

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

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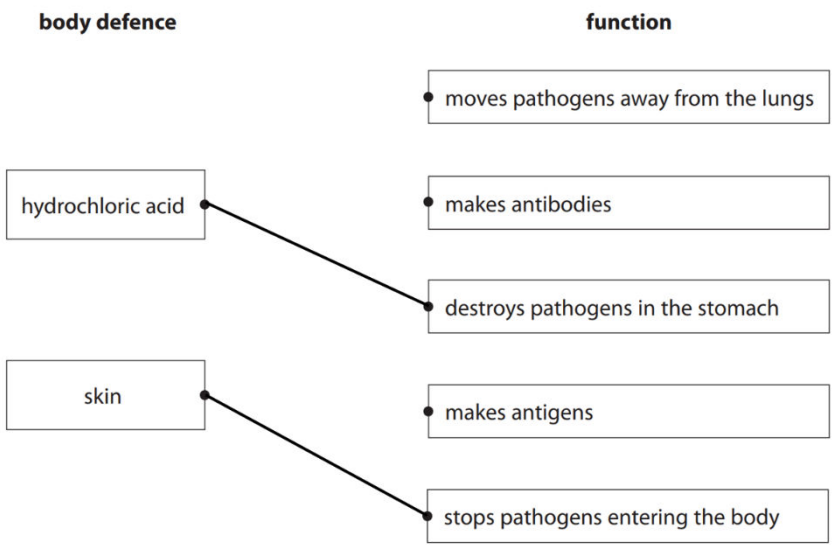
General Marking Guidance

- 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)	A cell wall **The only correct answer is A** *B is incorrect because structure W is not cytoplasm* *C is incorrect because structure W is not chromosomal DNA* *D is incorrect because structure W is not a plasmid*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
1(a)(ii)	flagellum / tail	accept flagella accept phonetic spellings	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
1(a)(iii)	movement	accept swimming ignore references to sperm and eggs	**(1)** **AO1 1**

Question number	Answer	Mark
1(b)	 do not award mark if two lines are drawn from hydrochloric acid box do not award mark if two lines are drawn from skin box	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
1(c)	Any **two** from: • drinking alcohol (1) • taking drugs (1) • malnutrition / overeating / poor diet (1) • lack of exercise (1)	 accept smoking other substances / vaping ignore obesity	**(2)** **AO1 1**

		accept other named lifestyle factors	

Total marks for question 1 = 7 marks

Question number	Answer	Mark
2(a)(i)	• salt (1) • membranes (1) must be in the correct order	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
2(a)(ii)	A description including: • pour the contents (of the beaker) into the **funnel** (1) • (into) filter paper / to filter (it) (1) • to separate DNA (1)	 accept filtration accept separate liquid from solids pour the contents of the beaker into the filter funnel is two marks	**(2)** **AO3 1a**

Question number	Answer	Mark
2(a)(iii)	C white **The only correct answer is C** *A is incorrect because the precipitate is not blue* *B is incorrect because the precipitate is not*	**(1)** **AO1 1**

	orange *D is incorrect because the precipitate is not red*	

Question number	Answer	Mark
2(b)(i)	B 10.4 **The only correct answer is B** *A is incorrect because the range is not 13.2* *C is incorrect because the range is not 5.9* *D is incorrect because the range is not 5.3*	**(1)** **AO2 1**

Question number	Answer	Additional guidance	Mark
2(b)(ii)	6.4		**(1)** **AO1 1**

Total marks for question 2 = 7 marks

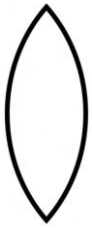
Question number	Answer	Mark
3(a)(i)	A P **The only correct answer is A** *B is incorrect because Q is not the retina* *C is incorrect because R is not the retina* *D is incorrect because S is not the retina*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
3(a)(ii)	cornea		**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
3(a)(iii)	An explanation linking **two** from: • R is the iris (1) • (muscles in R) can contract / relax (1) • to change the size of the **pupil**	accept become bigger / smaller reject ciliary muscles accept makes the **pupil** smaller / larger	**(2)** **AO2 1**

	• so {less / more} light enters the eye (1)	accept constrict / dilate ignore expand / decrease	

Question number	Answer	Additional guidance	Mark
3(b)	An explanation linking two from: • the eye ball is too short / the {cornea / lens} is not curved enough (1) • so light is not focused / converged (1) • (on the) retina (1)	 ignore lens is the wrong shape ignore eyeball is too large / small accept light is not refracted enough / light rays do not meet ignore reflecting ignore back of the eye accept the person is long-sighted (1)	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
3(c)(i)		accept any reasonable drawing of a convex lens ignore 	**(1)** **AO2 1**

Question number	Answer	Additional guidance	Mark
3c(ii)	cataracts / colour blindness	accept astigmatism / glaucoma	**(1)** **AO1 1**

Total marks for question 3 = 8 marks

Question number	Answer	Additional guidance	Mark
4(a)	A description including **three** from: • select birds with highest egg production (1) • breed (these birds) (1) • select / breed birds (with best traits) from these offspring (1) • repeat over many generations (1)	 ignore select the best chickens accept offspring inherit genes for producing more eggs accept repeat over a long time	**(3)** **AO2 1**

Question number	Answer	Mark
4(b)(i)	D diploid **The only correct answer is D** *A is incorrect because chicken body cells are not dominant* *B is incorrect because chicken body cells are not haploid* *C is incorrect because chicken body cells are not recessive*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
4(b)(ii)	39 / thirty nine		**(1)** **AO2 1**

Question number	Answer	Mark
4(c)	<table><tr><th>type of cell produced</th><th>type of cell division</th><th>number of daughter cells produced</th></tr><tr><td>body cell</td><td>mitosis</td><td>2 (1)</td></tr><tr><td>gamete</td><td>meiosis (1)</td><td>4 (1)</td></tr></table> **Additional guidance** Accept alternative spellings of meiosis. Reject if meiosis has a 't' in it.	**(3)** **AO1**

Question number	Answer	Additional guidance	Mark
4(d)	A description including **two** from: • make (new) cells / divide (1) • differentiate / become specialised / become other (named) types of cell (1)	accept mitosis ignore stem cells are unspecialised / undifferentiated ignore repair cells accept repair	**(2)** **AO1 1**

	• (provide new cells) {for growth / to replace (damaged) cells} (1)	damaged tissues / organs	

Total marks for question 4 = 10 marks

Question number	Answer	Additional guidance	Mark
5(a)(i)	stops heat loss / evaporation of water	ignore stops unwanted substances getting in	**(1)** **AO2 2**

Question number	Answer	Additional guidance	Mark
5(a)(ii)	A description including: use the thermometer (1) measure initial temperature **and** final temperature (1) subtract initial temperature from final temperature (1)	 accept measure / take the temperature before **and** after accept an equation	**(2)** **AO3 3a**

Question number	Answer	Additional guidance	Mark
5(b)(i)	50 x 4.2 x 30 (1) 6300 (J)	award full marks for correct answer with no working	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
5(b)(ii)	Any two from: • use the same {mass / volume} of water (1) • use the same mass of food (1) • distance of the burning food from the calorimeter (1) • use the same starting temperature of water (1) • ensure the food is burnt completely (1)	accept repeat with **each** food (1)	**(2)** **AO3 3b**

Question number	Answer	Additional guidance	Mark
5(c)	An explanation including:	ignore values taken from the table unless comparative ignore stated	**(2)** **AO3 2ab**

	• apple has {less / low**er**} energy / avocado has {more / high**er**} energy (1) • (because) apple contains **less** fat / avocado contains **more** fat (1)	differences	

Total marks for question 5 = 9 marks

Question number	Answer	Additional guidance	Mark
6(a)(i)	antibiotics {do not kill / inhibit} viruses / (only) {kill / inhibit} bacteria	accept antibiotics are (only) used to treat bacterial infections / the common cold is not caused by bacteria ignore fight off / get rid of bacteria	**(1)** **AO2 1**

Question number	Answer	Mark
6(a)(ii)	C clinical testing **The only correct answer is C** *A is incorrect because preclinical testing is not the last stage in the production of antibiotics* *B is incorrect because discovery is not the last stage in the production of antibiotics* *D is incorrect because discovery is not the last stage in the production of antibiotics*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
6(b)	An explanation linking **four** from: • some bacteria have a mutation / resistant gene (1) • non-resistant bacteria are killed / the resistant bacteria survive (the antibiotic) (1) • reduces competition / resistant bacteria have more {resources / food} • the resistant bacteria reproduce (1) • pass on beneficial alleles • (eventually) all bacteria are the antibiotic-resistant / bacteria with the mutation (1)	accept allele for gene accept changes / variation in DNA ignore bacteria are immune / get rid of bacteria accept survival of the fittest accept named resources accept resistance gene accept the antibiotic will no longer be effective	**(4)** **AO3 1**

Question number	Answer	Additional guidance	Mark
6(c)	fossils / (structure of) {skeletons / bones / skull / pentadactyl limb}	accept cave paintings / (stone) carvings / discovery of Ardi / Lucy ignore clothes / DNA	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
6(d)(i)	An explanation including: {tool A / newer tool} is more {refined /specialised} (1) so {more recent humans / humans that made tool A} had greater skill (1) because more recent humans were more intelligent (1)	 accept named skill accept had a larger brain	**(3)** **AO2 1**

Question number	Answer	Additional guidance	Mark
6(d)(ii)	compare with other finds (of a known age) / compare their shapes (1) depth in rock layer (1)	accept compare the way the tools were made	**(2)** **AO1 1**

	(radiometric) dating the surrounding rocks (1)	accept position in rock ignore place where they were found ignore carbon dating unless related to organic material found with tools	

Total marks for question 6 = 12 marks

Question number	Answer	Additional guidance	Mark
7(a)(i)	(cancer cells) divide uncontrollably / have mutations	accept {multiply / grow / reproduce} rapidly	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
7(a)(ii)	cells in tissue culture may respond differently to cells in the body	accept the drug may not work **the same** / might produce different results	**(1)** **AO2 1**

Question number	Answer	Additional guidance	Mark
7(b)(i)	autoclave	accept use gamma (rays) / UV ignore heating / radiation	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
7(b)(ii)	An explanation linking: • to kill bacteria / pathogens (1) • so {plant cells / plantlets} can grow disease-free / growth of {plant cells / plantlets} is unaffected (1) • so {plant cells / plantlets} do not compete for resources (with pathogens) (1)	accept to prevent contamination / prevent growth of unwanted organisms ignore reduce the number of bacteria / pathogens accept so {plant cells / plantlets} are not damaged / killed (by pathogens) accept a named resource e.g. nutrients	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
7(b)(iii)	One from: • (tissue culture) allows a {large number of / more} new plants to be produced (1) • only a small quantity of original plant tissue needed (1) • plants do not become extinct (1)	ignore references to yield / less space required / faster process accept genetic material is not lost accept can control environmental factors / can grow plants at any time of year (1) accept plants are easier to monitor (1)	**(1)** **AO1 1**

Question number	Indicative content	Mark
7(c)*	**AO1** <u>cell wall</u> • made of cellulose • tough • difficult for pathogens to break down / digest / gain entry <u>waxy cuticle</u> • protects epidermis and tissues below • difficult for pathogens to get through <u>thorns / prickles / spines</u> • deter herbivores from eating them <u>bark</u> • difficult for pathogens / pests to get through • protects living tissue beneath	**(6)** **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 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 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**	**General additional guidance** The level is determined by the number of physical barriers described. The mark within the level is determined by the level of detail in each description.
Level 1	1–2	• The answer refers to a physical barrier • The response includes a detail about a physical barrier	<u>Possible candidate response</u> • Some stems have thorns • Some stems have thorns, which stop animals eating the plant
Level 2	3–4	• The description refers to more than one physical barrier • The response includes some detail about a physical barrier	<u>Possible candidate response</u> • Plant cells have a tough cell wall. Some stems have thorns.

			• Plant cells have a tough cell wall that stops pathogens getting in. Some stems have thorns.
Level 3	5–6	• The description refers to several physical barriers • The response includes details of at least two physical barriers	<u>Possible candidate responses</u> • Leaves have a waxy cuticle. Plant cells have a cell wall. Trees have bark on the outside. • Leaves have a waxy cuticle on top. Plant cells have a cellulose cell wall. These stop pests piercing the plant. Trees have bark on the outside, which protects living tissue on the inside.

Total for Question 7 = 12 marks

Question number	Answer	Additional guidance	Mark
8(a)	• all points plotted correctly ± one small square (1) • one **curved** line drawn through all the points ± two small squares (1)	ecf accept a line of best fit for their plotted points ignore any extrapolation reject points joined dot-to-dot with straight lines / multiple lines	**(2)** **AO2 2**

Question number	Answer	Mark
8(b)(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
8(b)(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**

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

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

		ignore in the same room / use a thermometer	

Total marks for question 8 = 11 marks

Question number	Answer	Mark
9(a)(i) overlap	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
9(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
9(b)	An explanation linking: • (the number of measles cases reported) has decreased (1)	accept herd	**(2)** **AO2 1**

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

Question number	Answer	Additional guidance	Mark
9(c)	Any **two** from: • white blood cells {kill / destroy} pathogens (1) • (WBC) produce {antibodies / antitoxins} (1) • memory lymphocytes (are produced) (1)	 accept phagocytosis accept WBCs 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
9(d)(i)	(beriberi) is not spread from person to person / is not caused by a {pathogen / named pathogen}	accept organisms for people	**(1)** **AO2 1**

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

Question number	Indicative content	Mark
9(d)(ii)*	**AO2** path • electrical impulses travel from the skin → neurone X → neurone Y → neurone Z → muscle in the arm reflex arc detail • pricking the skin is a stimulus • (the stimulus is) detected by receptors • neurone Y / relay neurone is in the spinal cord /CNS • there are synapses between neurones • chemical transmitters are released at synapses • the muscle is the effector • the muscle contracts - this is the response • electrical impulses do not travel to the brain • the response is very fast neurones • X - sensory neurone • Y - relay neurone • Z - motor neurone	**(6)** **AO2 1**

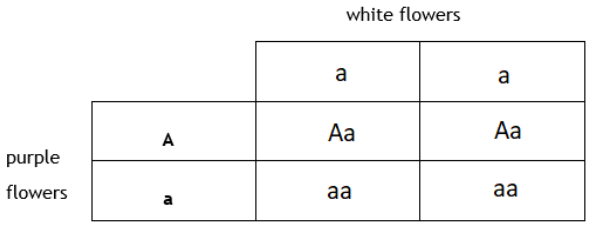
Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• The description attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear.
Level 2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

Level	Mark	Additional Guidance	General additional guidance The level is determined by the quality of the description of the path taken by electrical impulses in a reflex arc The mark within the level is determined by additional detail of the path and reflex
Level 1	1–2	• The answer refers to part of the path taken by electrical impulses • The response includes an additional point of detail of the path	<u>Possible candidate response</u> • Impulses go from the skin through X • Impulses from the skin through X to the spinal cord
Level 2	3–4	• The description of the path includes X to Y to Z • The response includes an additional point of detail of the path AND a named neurone	<u>Possible candidate response</u> • Impulses go through X to Y then to Z • Impulses go from the skin, through the sensory neurone to Y, which is in the spinal cord. Impulses then go to Z and on to the muscle.
Level 3	5–6	• The description of the path includes X to Y to Z and includes the names of at least two neurones OR one named neurone and reference to synapses • The response includes an additional point of detail	<u>Possible candidate responses</u> • Impulses go through the sensory neurone, to Y then to Z, which is a motor neurone. • Impulses go from the skin, through X, the sensory neurone. Y is a relay neurone, which is in the spinal cord. Impulses then go to Z which is a motor neurone.

Total for question 9 = 13 marks

Question number	Answer	Mark
10(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
10(a)(ii)	One from • 40 (1) • 480 (1) • 160 ÷ 4 (x3) (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
10(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+1b**

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

Question number	Answer	Mark
10(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*	**(1)** **AO1 1**

	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*	

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

(Total for question 10 = 11 marks)