Pearson Edexcel

Mark Scheme (Results)

November 2020

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.

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

Question number	Answer	Mark
1(a)(i)	B many deaths were not confirmed to be caused by Ebola **The only correct answer is B** **A** *is not correct because people are not immune to Ebola* ***C*** *is not correct because Ebola spreads easily* ***D*** *is not correct because Ebola causes symptoms*	**(1)** **AO2 1**

Question number	Answer	Additional Guidance	Mark
1(a)(ii)	(exchange of) bodily fluids / named body fluids / contact with body fluids	accept any contact or body fluid transmission	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
1(a)(iii)	A description including: • virus particles are assembled (1) • virus lyses the cell / virus exits the cell (1)	accept virus is made/produced ignore virus reproduces	**(2)** **AO2 1**

Question number	Answer	Mark
1(b)(i)	lysogenic (pathway) accept phonetically correct misspellings	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
1(b)(ii)	all the {genetic material/DNA} of an organism	accept all the genes of an organism	**(1)** **AO1 1**

(Total for question 1 = 6 marks)

Question number	Answer	Mark
2(a)	C white blood cell **The only correct answer is C** ***A is not correct because the HIV virus does not destroy red blood cells*** ***B is not correct because the HIV virus does not destroy nerve cells*** ***D is not correct because the HIV virus does not destroy sperm cells***	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
2(b)	An answer linking three from: • (pathogens have) antigens (1) • (that trigger) antibodies to be produced (1) • by lymphocytes (1) • (leads to the) destruction of the pathogen (1) • memory {cells/ lymphocytes} produced (1) • cause a secondary response (in the event of infection by the same pathogen) (1)	 accept bacteria/virus for pathogen ignore WBC accept engulf pathogen accept description of a secondary response e.g. before symptoms/before the person gets ill/can react quickly	**(3)** **AO1 1**

Question number	Indicative content	Additional guidance	Mark
2(c)(i)	Substitution (1) 21.00 x 11.18 Evaluation (1) 234.78 3 significant figures 235	award full marks for correct numerical answer without working award 2 marks for correct evaluation ecf for the incorrect calculation correctly rounded to 3 s.f.	**(3)** **AO3 1a 1b**

Question number	Indicative content	Additional guidance	Mark
2(c)(ii)	One from: • each country has a different size population (1) • allows comparisons to be made between countries (1)	 ignore it is easier to read/easier to analyse	**(1)** AO3 1a

Question number	Indicative content	Additional Guidance	Mark
2(c)(iii)	One from: • vaccination (1) • {reporting/diagnosis} systems (1) • {access to/quality of} healthcare (1) • environmental factors (1)	 accept examples of relevant environmental factors e.g. population density, proximity of country to others. (1) accept herd immunity (1)	**(1)** AO2 1

(Total for question 2 = 9 marks)

Question number	Answer	Additional guidance	Mark
3(a)(i)	Two from: • (meristem cells) are undifferentiated • (meristem cells) divide / produce more cells (1) • by mitosis (1)	accept are stem cells accept (the cells produced) can differentiate /become specialised/elongate (1)	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
3(a)(ii)	An answer including: • use a thin section of {cells/meristem} (1) • add a stain / named stain (1) • place a cover slip on top of the sample (1)	accept add a sample of the cells to the microscope slide accept a description of a coverslip	**(3)** **AO1 2**

Question number	Answer	Mark
3(b)(i)	chloroplast / chloroplasts accept phonetically correct misspellings	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	(aerobic) respiration / release energy	ignore make / produce energy accept word equation for respiration accept to produce ATP	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
3(b)(iii)	Any two from: • no nucleus/ chromosomal DNA (in the cytoplasm) (1) • no membrane-bound organelles (1) • circular/plasmid DNA (1) • no mitochondria (1) • no chloroplasts (1) • no vacuole (1)	accept: presence of flagellum (1) presence of a slime coat (1) presence of pili (1) accept cell wall not made of cellulose (1)	**(2)** **AO1 1**

(Total for question 3 = 9 marks)

Question number	Answer	Additional guidance	Mark
4(a)(i)	An answer that links the following • tall is dominant (1) • they are heterozygous / have one tall allele (1)	accept short is recessive accept one of each allele ignore genes accept they have inherited one tall dominant allele for 2 marks	**(2)** **AO3 (2a+2b)**

Question number	Answer	Additional Guidance	Mark
4(a)(ii)	Any two from: • provide {optimal/identical /best/ideal/controlled} growth conditions (1) • reduce chances of disease/ pests/pathogens (1)	accept all grown under the same conditions accept examples of optimal conditions. accept prevent unwanted pollination	**(2)** **AO2 1**

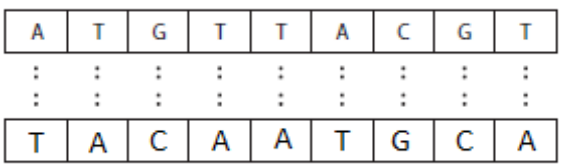
Question number	Answer	Additional guidance	Mark
4(b)(i)	One mark for gametes One mark for the offspring 25 (%) (1)	accept aA accept ecf from the Punnett square	**(3)** **AO3 2a+2b** **Exp**

	A	a
A	AA	Aa
a	Aa	aa

Question number	Answer	Additional guidance	Mark
4(b)(ii)	An answer linking the following: • genetic variation increase / (offspring) show variation (1) • more likely to survive {a disease / environmental change / selection pressure} / allows evolution/survival of the fittest (1)	 accept different combination of alleles accept allows dispersal of offspring through seeds accept other examples of a survival reason e.g natural disaster	(2) AO2 1

Question number	Answer	additional guidance	Mark
4(c)	An answer linking: • mix the food in ethanol and pour into water (1) • white emulsion forms (1)	 accept add water and ethanol and mix accept white precipitate / goes cloudy / emulsion test accept rub pea / food on filter paper (1) and look for a translucent mark (1)	(2) AO1 2

(Total for question 4 = 11 marks)

Question number	Answer	Mark
5(a)(i)	 accept lower case letters	(1) AO1 1

Question number	Answer	Mark
5(a)(ii)	C a double helix with strands joined by hydrogen bonds between bases **The only correct answer is C** **A** *is not correct because DNA strands are not held together with strong bonds* ***B*** *is not correct because complementary bases do not form the helix* ***D*** *is not correct because there are two complementary strands*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
5(a)(iii)	Mutation	accept genetic modification / genetic engineering / insertion / deletion / substitution	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
5(b)	An explanation linking four of the following: • the population of great tits shows variation (1) • bird feeders provide a selection pressure (1) • birds with longer beaks {can feed from bird feeders/get more food} (1) • these birds are more likely to {survive/ reproduce} / survival of the fittest (1) • pass the {allele/gene /characteristic} for long beaks to their offspring (1) • over many generations the beak length of the bird population increases (1)	 accept there is a mutation that leads to some birds having longer beaks accept there is competition for food / birds with longer beaks outcompete accept birds with shorter beaks can't get food accept birds with shorter beaks die out accept offspring have long beaks accept the process continues/repeats itself	(4) AO2 1

Question number	Answer	Mark
5(c)(i)	A they have membrane-bound organelles **The only correct answer is A** **B** *is not correct because they have a nucleus* ***C*** *is not correct because they do not have a cell wall* ***D*** *is not correct because this is not a specific feature of eukaryotic cells*	(1) AO1 1

Question number	Answer	Additional guidance	Mark
5(c)(ii)	genetic analysis / based on {DNA/genetics} / DNA of Archaea more similar to eukaryotes (1)	accept more knowledge because of better microscopes	(1) AO1 1

(Total for question 5 = 9 marks)

Question number	Answer	Mark
6(a)(i)	all the starch has been converted into glucose / all the starch has reacted with the amylase / all the starch is digested (1)	(1) AO3 2a

Question number	Answer	Mark
6(a)(ii)	Any two from: • pH of the solution (1) • concentration of amylase (1) • concentration of starch (1) • amount of mixing (1) • size of the tube used (1) • time interval must be the same (1)	(2) AO2 2

Question number	Answer	Additional guidance	Mark
6(a)(iii)	it is a control/to check that starch doesn't breakdown into glucose without amylase (1)	ignore control variable ignore allow results to be compared	(1) AO2 2

Question number	Answer		Mark
6(b)	A plan including three of the following: • mix starch solution with amylase (1) • use different pH values (1) • using buffers / test at pH solutions between pH 6.5 and 7.5 (1) • control named variables (1) • a method of testing for glucose/a method of testing for starch • the sample that produces glucose in the shortest time is closest to the **optimum** (1)	ignore mix the solutions accept ranges around 5 to 8 accept **test** the sample for starch/glucose	**(3)** **AO3 3b**

Question number	Answer	Mark
6(c)	An explanation linking: • the stomach is {acidic/low pH/pH 2}(1) • which will denature the {amylase/enzyme} (1) • changes the shape of the active site/substrate will not {bind/fit} into the active site (1)	**(3)** **AO2 1**

(Total for question 6 = 10 marks)

Question number	Answer	Additional guidance	Mark
7(a)(i)	Any two from: • wash hands/wear gloves (1) • keep lid on the samples/only remove the lid for a short time (1) • work close to a Bunsen flame (1) • use sterile equipment (1)	accept {flame/heat} the loop before taking the sample accept clean bench with ethanol/sterilising fluid (1)	**(2)** **AO2 2**

Question number	Answer	Additional guidance	Mark
7(a)(ii)	{57/58} minutes / {94/95} minutes (1) 37 minutes	two marks for correct answer with no working	**(2)** **AO3 1a+1b**

Question number	Answer	Additional guidance	Mark
7(a)(iii)	• use a stain/focus the microscope/increase the magnification	accept use an electron microscope	**(1)** **AO3 3b**

Question number	Answer	Mark
7(b)(i)	C genetic engineering **The only correct answer is C** **A** *is not correct because selective breeding is not a method of inserting genes* ***B*** *is not correct because asexual reproduction is not a method of inserting genes* ***D*** *is not correct because tissue culture is not a method of inserting genes*	**(1)** **AO1(1)**

Question number	Indicative content	Mark
*7(b)(ii)	**AO1** **Advantages** • less damage to crops • increased yield/more food • more profit • that the toxin only affects target insects • less use of chemical insecticides • no need to buy chemicals **Disadvantages** • insects develop resistance to the toxin • plants are more expensive to produce initially • risk of cross fertilisation with wild plants/other crops • reduces biodiversity • detrimental impact on the food web in the area • possibility of bioaccumulation • reliance on seed companies • consumer concerns with eating GM crops	**(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 an explanation with some structure and coherence.
Level 2	3–4	• Demonstrates biological understanding, which is mostly

		relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. • Presents an explanation that has a structure which is mostly clear, coherent and logical.
Level 3	5–6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • Presents an explanation that has a well-developed structure which is clear, coherent and logical.

Level	**Mark**	**Descriptor**
Level 1	1-2	A simple discussion of either advantages or disadvantages of growing plants that produce toxins. The response clearly distinguishes advantages and disadvantages.
Level 2	3-4	A simple discussion of both advantages and disadvantages of the growing plants that produce toxins OR a detailed discussion of advantages or disadvantages of the growing plants that produce toxins. The response clearly distinguishes advantages and disadvantages and uses some key scientific terms correctly.
Level 3	5-6	A detailed discussion of advantages and disadvantages of the growing plants that produce toxins. The response clearly distinguishes advantages and disadvantages and uses key scientific terms correctly.

Level	Mark	Examples of possible responses
	0	• No rewardable material.
Level 1	1 2	• Less crops are eaten by insects • A disadvantage is that insects may develop resistance to the toxin
Level 2	3 4	• Less crops are eaten by insects, increasing the yield. The toxin gene could spread to other plants. • An advantage is that less crops are eaten by insects increasing the yield. A disadvantage is that the insects could become resistant to the toxin.
Level 3	5 6	• Less crops are eaten by insects increasing the yield and the farmer does not need to use pesticides. The toxin gene could spread to other plants or it could spread through the food chain and affect other organisms. • The advantages are that less crops are eaten by insects increasing the yield and the farmer does not need to use pesticides on the crop. The disadvantages are that the insects could become resistant to the toxin, it reduces the biodiversity, and the toxin could build up in the food chain by bioaccumulation.

Total for question 7 = 12 marks

Question number	Answer	Additional guidance	Mark
8(a)(i)	0.035 ÷ 5 = 0.007 (1) 7 / -7 (ms)	award two marks for correct answer with no working accept 0.033 ÷ 4 =0.008 for 1 mark if working shown accept 8 / -8 (ms) for 2 marks if working shown. allow ecf for incorrect mean converted into ms for 1 mark	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
8(a)(ii)	Any two from: • test the drink on more people / different people (1) • more repeats on the same people (1) • repeat using different volumes of the drink (1) • repeat using different times between drinking and the test (1) • repeat the experiment with just water (1) • control other environmental factors/named factors (1)	 accept different amounts accept use a control/use a placebo accept tiredness/health/drug intake/food intake	**(2)** **AO3 3b**

Question number	Answer	Additional guidance	Mark
8(b)(i)	sensory (neurone)	accept phonetically correct misspellings	**(1)** **AO1 1**

Question number	Answer	Mark
8(b)(ii)	B cell body dendron **The only correct answer is B** **A** *is not correct because P is the cell body* ***C*** *is not correct because P is the cell body* ***D*** *is not correct because Q is the dendron*	**(1)** **AO1 1**

Question number	Indicative content	Mark
* 8(c)	**AO2 (6 marks)** **Synapse transmission** • neurones transmit electrical impulses • the synapse is a gap between 2 neurones • triggering the release of neurotransmitters • which diffuse across the synapse • as a chemical signal • neurotransmitters bind to receptors on the next neurone • triggering an electrical impulse in the next neurone **Painkillers** • prevent neurotransmitters binding to receptors in the next neurone • electrical impulse is not triggered • signal is not received by the central nervous system • person does not feel pain	**(6)**

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
Level 2	3–4	• The explanation 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 • Line of reasoning mostly supported through the application of relevant evidence
Level 3	5–6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question • Line of reasoning are supported by sustained application of relevant evidence

Level	Mark	Descriptor
Level 1	1-2	A simple explanation of how messages are transmitted either over the synapse or along the neurone Linked to the effect of painkillers
Level 2	3-4	At least one link between how messages are transmitted between the neurone and the synapse or across the synapse Linked to the effect of painkillers
Level 3	5-6	A detailed description of how messages are passed across the synapse Linked to the effect of painkillers binding to receptors

Level	Mark	Examples of possible responses
	0	• No rewardable material.
Level 1	1 2	• Messages are passed along neurones as electrical impulses • A synapse is a gap between neurones and the painkillers prevent the pain message getting through to the brain
Level 2	3 4	• Synapses are gaps between neurones. Neurotransmitters diffuse across the gap to the next neurone. • Synapses are gaps between neurones. Neurotransmitters diffuse across the gap to the next neurone. The painkillers bind to receptors stopping the message being passed on to the CNS so the person does not feel pain.

Level 3	5	• Synapses are gaps between neurones. The electrical impulse reaches the synapse and causes neurotransmitters to diffuse across the gap to the next neurone. A new impulse is initiated in the next neurone.
	6	• Synapses are gaps between neurones. The electrical impulse reaches the synapse and causes neurotransmitters to diffuse across the gap to the next neurone. A new impulse is initiated in the next neurone. The painkillers prevent the neurotransmitters binding to the next neurone, so a new impulse is not generated and the message is not passed to the CNS.

(Total for question 8 = 12 marks)

Question number	Answer		Mark
9(a)(i)	An answer including three from: • (cells are triggered to divide) by mitosis (1) • this division is uncontrolled (1) • creates a mass/large number of cells /tumour (1)	accept cells won't stop dividing/faster cell division/increased cell division	(3) AO2 1

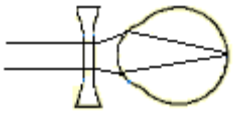
Question number	Answer	Mark
9(a)(ii)	C interphase **The only correct answer is C** **A** *is not correct because the DNA is not replicated in anaphase* ***B*** *is not correct because the DNA is not replicated in prophase* ***D*** *is not correct because the DNA is not replicated in telophase*	(1) AO1 1

Question number	Answer	Additional guidance	Mark
9(a)(iii)	An answer combining: • 1 in 20 is a rate of 5% (1) • obesity increases the risk of bowel cancer more (than other types of cancer) (1)	accept 13% is 1 in 8/1 in 7.7 accept other correct manipulation of figures accept obesity is less of a contributing factor to other types of cancer	(2) AO3 2a+ 2b

Question number	Answer	Additional guidance	Mark
9(b)	An explanation linking: • BMI calculation takes into account height / divides mass by height^2 (1) • the obese man must be shorter / the normal man is taller (1)	ignore references to muscle mass accept BMI relies on measurements of height and weight/mass accept equation for BMI accept the men are different heights	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
9(c)	An answer including: • surgery to treat narrow or blocked arteries (1) • lifestyle changes including {healthy diet/more exercise} (1) • (life-long) medication to {prevent blood clots/reduce blood pressure/thin the blood} (1)	 accept by-pass surgery / stents / heart surgery / other relevant surgeries such as gastric bands accept examples of lifestyle changes e.g. stop smoking accept named medications used for cardiovascular disease	**(3)** **AO1 1**

(Total for question 9 = 11 marks)

Question number	Answer	Additional guidance	Mark
10(a)	An explanation linking: • (a diverging lens) {bends/refracts} light rays outwards (1) • so the light rays {meet/converge/focus} on the retina (1)	ignore refract light rays less accept refract light onto the retina. accept the back of the eye accept a diagram for either or both marking points 	(2) AO1 1

Question number	Answer	Mark
10(b)(i)	B 85 000 **The only correct answer is B** **A** *is not correct because the number of affected males is not 42 500* **C** *is not correct because the number of affected males is not 166 666* ***D*** *is not correct because the number of affected males is not 1 020 000*	(1) AO2 1

Question number	Answer	Additional guidance	Mark
10(b)(ii)	An explanation linking two of the following: • allele is located on the X chromosome (1) • men are XY/have one X chromosome (1) • if they have one {recessive/affected} allele they are colour blind (1)	ignore sex-linked ignore X/Y genes. accept the idea that if woman have one affected allele, they have a second allele/women would need two recessive alleles	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
10(b)(iii)	An explanation linking: • 0% / he will not be colour blind (1) • he will inherit the Y chromosome from his father that does not have the allele / inherits an X chromosome from his mother with the {dominant / normal / unaffected} allele (1)		**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
10(c)	An explanation linking four of the following: • changes the sequence of the mRNA (1) • produced in transcription (1) • leads to a different amino acid (in the polypeptide sequence) (1) • which is added {by tRNA/during translation/at the ribosome} (1) • changes the **shape**/**function** of the protein / a cone cell does not detect the coloured light correctly (1)	accept mRNA produced from the DNA sequence accept the (mRNA) determines the amino acid sequence ignore a different protein is produced	**(4)** **AO2 1**

(Total for question 10 = 11 marks)