Pearson Edexcel

Mark Scheme (Results)

November 2020

Pearson Edexcel GCSE
In Biology (1BI0) Paper 2H

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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 high pollution The only correct answer is **B** high pollution A is incorrect because bloodworms are not found in unpolluted water C is incorrect because there are only low levels of bloodworms in areas of some pollution D is incorrect because there are only low levels of bloodworms in areas of low pollution	(1)

Question number	Answer	Additional guidance	Mark
1(a)(ii)	Stone fly (1) Freshwater shrimp (1) Accept phonetic misspellings	answers can be in either order	(2)

Question number	Answer	Additional guidance	Mark
1(b)	An explanation linking the following points: • increased levels of (aerobic) bacteria (1) • use oxygen from the water in respiration (1) OR • prevent plants from getting light/kills plants (1) • so no oxygen produced by photosynthesis (1)	 accept microorganisms / bloodworms / sludgeworms / decomposers accept plants broken down by decomposers	(2)

Question number	Answer	Additional guidance	Mark
1(c)(i)	eutrophication / nitrification accept phonetic misspellings		(1)

Question number	Answer	Additional guidance	Mark
1(c)(ii)	water is moving (so the nitrates are moved away) (1)	accept the water in lakes is still/not moving	**(1)**

Total for question 1 = 7 marks

Question number	Answer	Additional guidance	Mark
2(a)	An explanation including the following: • lower surface (of leaf) is not in contact with air / is in water (1) • so gas exchange cannot occur (1)	 accept water would enter the stomata accept oxygen /carbon dioxide /water (vapour) accept reduced/no transpiration	**(2)**

Question number	Answer	Mark
2(b) (i)	D chloroplast The only correct answer is **D** chloroplast A is incorrect because the nucleus does not photosynthesise B is incorrect because the vacuole does not photosynthesise C is incorrect because the mitochondrion does not photosynthesise	**(1)**

Question number	Answer	Mark
2(b)(ii)	C sucrose The only correct answer is **C** sucrose A is incorrect because glycerol is not a sugar B is incorrect because although ribose is a sugar this is found in DNA D is incorrect because starch is not a sugar	**(1)**

Question number	Answer	Additional guidance	Mark
2(b)(iii)	A description including two from: • in the phloem (1) • dissolved (in water) (1) • by translocation (1) • using active transport (1)	 reject xylem accept by diffusion	**(2)**

Question number	Answer	Mark
2(c)	An explanation including three of the following: • because { conditions / named conditions} are suitable for { growth / photosynthesis} /conditions similar to native conditions /it is adapted to the conditions (1) • it outcompeted the natural plants (1) • therefore, it { grows / reproduces} (1) • as no natural herbivores { eat it / restrict it} (1)	**(3)**

Question 2 = 9 marks

Question number	Answer		Mark
3(a)(i)	6 / six		(1)

Question number	Answer	Mark
3(a)(ii)	D cell wall, chloroplast, large vacuole. The only correct answer is **D** cell wall, chloroplast, large vacuole A is incorrect because both the cell membrane and nucleus are also found in animal cells B is incorrect because the cell membrane and cytoplasm are also found in animal cells C is incorrect because the nucleus is also found in animal cells	(1)

Question number	Answer	Additional guidance	Mark
3(b)(i)	Substitution (50 – 30 =) 20 (1) (20 ÷ 50 x 100 =) - 40(%)	 Accept 40% award full marks for answer without working	(2)

Question number	Answer	Additional guidance	Mark
3(b) (ii)	Any **two** from: • variety of potato (1) • mass of potato (1) • age of potato (1) • temperature (1) • storage conditions/humidity (1)	 accept type / species accept weight/size accept potato cells taken from the same part of each potato	(2)

Question number	Indicative content	Additional guidance	Mark
3(b)(iii)	for energy / respiration	ignore make / produce energy accept to produce ATP	**(1)**

Question number	Indicative content	Additional guidance	Mark
3 (b)(iv)	Any two from: • enzyme / amylase / carbohydrase (1) • starch fits into the **active site** (1) • bonds (between glucose molecules in starch) broken (1)	 accept maltase accept polymer broken down into monomers	**(2)**

Question 3 = 9 marks

Question number	Answer	Additional guidance	Mark
4(a)	7 (billion) (1) 0.91 (billion)	 award full marks for answer without working accept 910 000 000 for 1 mark	**(2)**

Question number	Answer	Additional guidance	Mark
4(b)	A description including the following: • add Biuret (reagent / solution) (1) • colour change (from blue) to mauve / purple (1)	 accept sodium hydroxide and copper sulfate	**(2)**

Question number	Answer	Additional guidance	Mark
4(c)	substitution (from graph) increase = 275 – 225 (= 50) (1) evaluation rate = 50 ÷ 10 = 5	 accept tolerance +/- 2 for graph readings accept values of 4.6 to 5.4 award full marks for answer without working	**(2)**

Question number	Answer	Additional guidance	Mark
4(d)(i)	An explanation including two from: • there is less energy in the cattle than in the plants (1) • not all of the energy from the plants is passed on to the cattle (1) • (because) not all plant material is digested / eaten (1) • (and) some energy is used for respiration / movement / metabolism (1)	accept plants are eaten by cattle accept excretion	**(2)**

Question number	Indicative content	Additional guidance	Mark
4(d)(ii)	An explanation linking three of the following: • there will be less food for people to eat (1) • farming meat does not produce as much food (per acre as arable farming) (1) • so more land used for {meat farming / animal feed} (1) • means less {arable land / food (crops) grown for humans} (1)	accept a diet including a large amount of meat has health implications e.g. high cholesterol (1)	**(3)**

Question 4 = 11 marks

Question number	Answer	Mark
5(a)(i)	D proteins The only correct answer is **D** proteins A is incorrect because carbohydrates are broken down by carbohydrases /amylase B is incorrect because lipids need to be digested by lipase C is incorrect because fibre is not broken down by enzymes	(1)

Question number	Answer	Additional guidance	Mark
5(a)(ii)	An explanation linking the following: • to increase the surface area of the food (1) • so trypsin will break down more protein (1)	 accept the food molecules are smaller accept there is a faster rate of reaction	(2)

Question number	Answer	Additional guidance	Mark
5(b)(i)	Any **one** from: • temperature (1) • the food used (1) • the volume/size of test tube (1)	accept other valid variables	(1)

Question number	Answer	Additional guidance	Mark
5(b)(ii)	Any **one** from: • use of a water bath/ description of alternative to water bath (1) • use food from the same source (1) • use test tubes which have the same shape/volume (1)	accept other valid variables to be controlled	(1)

Question number	Answer	Additional guidance	Mark
5(c)(i)	A description including **two** of the following: • { as pH increases to pH 4/more acidic/low pH} the time taken for the food to digest { decreased/was shorter} (1) • The shortest time was pH 4 (1) • { after pH 4 to pH 6/above pH 4} the time taken for the food to digest increased/was longer} (1)	 accept time data instead of pH data accept optimum pH was at pH 4 accept time data instead of pH data	**(2)**

Question number	Answer	Additional guidance	Mark
5(c)(ii)	substitution 1.5 ÷ 42 = 0.035(7142857) (1) Evaluation 0.04 (g per minute)	 accept any correctly rounded value e.g 0.036	**(2)**

Question number	Answer	Additional guidance	Mark
5(c)(iii)	An explanation linking two of the following: • the rate of reaction at pH 1 is slower (1) • because enzymes are becoming denatured /changing the conformation of the active site / stopping enzyme substrate complexes forming (1) OR • pH 4 is the optimum pH (1) • because at pH 4 more enzyme substrate complexes are formed / more active sites of the enzyme are filled (1)	accept so that the substrate cannot bind accept rate of reaction is fastest at pH 4	**(2)**

Total for Question 5 = 11 marks

Question number	Answer	Additional guidance	Mark
6(a)(i)	Linear scale on both axis (1) Plotted points (1) Correctly drawn graph (1)	 Accept accurate plotting to ½ small square Accept dot to dot drawing or a freehand single line linking points	(3)

Question number	Answer	Additional guidance	Mark
6(a)(ii)	An answer including **two** of the following: • wear gloves (1) • wash hands after handling (1) • sterilise equipment after use / use sterile equipment / keep it in a sealed container (1)	 accept cover {open wounds/cuts}	(2)

Question number	Answer	Mark
6(b)(i)	C platelets The only correct answer is **C** platelets A is incorrect because erythrocytes are red blood cells which carry oxygen B is incorrect because lymphocytes are white blood cells which are part of the immune system D is incorrect because antibodies are part of the immune response	(1)

Question number	Answer	Additional guidance	Mark
6(b)(ii)	to stop blood loss / prevent bacteria entering /stops bleeding (1)	Accept microorganisms/pathogen/virus for bacteria	**(1)**

Question number	Answer	Additional guidance	Mark
6(c)	An answer linking two of the following: • veins contain valves (1) • which prevent the backflow of blood (1) OR • veins have a large lumen (1) • to maximise blood flow (1)	 accept keep blood flowing in one direction accept to carry a lot of blood	**(2)**

Total for question 6 = 9 marks

Question number	Answer	Additional guidance	Mark
7(a)(i)	Any one from: • make sure all areas have the same amount of light/water/minerals (1) • use the same volume of solution / weedkiller (1) • temperature (1) • pH of soil (1)	 ignore amount accept mass	**(1)**

Question number	Answer	Additional guidance	Mark
7(a)(ii)	An explanation linking the conclusion with two of the explanation marks: Conclusion • 80 (arbitrary units) is the best concentration to use (1) Explanation • because it kills the maximum amount of dandelion plants (1) • at lower concentrations not all the weeds were killed (1) • because the highest concentration contains the most weedkiller (1)	 accept the highest concentration of weedkiller is the best to use accept it kills **all** the weeds	**(3)**

Question number	Answer	Additional guidance	Mark
7(b)	An explanation linking three of the following: • (weed killers contain) auxins (1) • these act on broad leaf plants / only act on the weeds (1) • causing them to overgrow (1) • (selective) weedkillers do not kill grass plants (1)	accept the weeds grow too fast	**(3)**

Question number	Answer	Additional guidance	Mark
7(c)	An explanation linking three of the following: • phototropism is controlled by the hormone auxin (1) • auxins move to the shaded side of the shoot (1) • causing **cell** elongation (1) • causing the shoot to bend towards the light (1)		**(3)**

Total for question 7 = 10 marks

Question number	Answer	Additional guidance	Mark
8(a)	An answer comparing the following: • the heart rate of person A is higher than the heart rate of person B (1) • the heart rate of person A increases **more** during exercise than person B (1) • the heart rate of person B is level during exercise whereas the heart rate of person A keeps increasing (1) • person B returns to their resting heart rate faster than person A (1) • comparative data analysis (1)	accept the rate of increase for person A is higher than person B	**(4)**

Question number	Answer	Additional guidance	Mark
8 (b)	Substitution: 65 x 61 (1) Evaluation: = 3 965 (1) Conversion: 3 965 ÷ 1000 = 3.965 (litres per minute)	Full marks for correct answer no working Conversion 61 ÷ 1000 (1) 0.061 x 65 for substitution mark With 3.965/4 for evaluation mark Accept 4 or any other correct rounding	**(3)**

Question number	Answer	Additional guidance	Mark
8(c)	An answer linking the following: • person A had a lower stroke volume (1) • pumps less blood out per beat (1) • so needed to have a higher heart rate to get a similar cardiac output (1) • in order to exercise at the same intensity (1) • to supply oxygen/glucose to the muscles (1)	accept the heart is not used to exercise	**(3)**

Total for question 8 = 10 marks

Question number	Answer	Additional guidance	Mark
9(a)(i)	causes the thyroid gland to enlarge / swell / increase thyroxine production (1)		(1)

Question number	Answer	Mark
9(a)(ii)	C endocrine system The only correct answer is **C** endocrine system A is incorrect because the circulation involves the movement of blood around the body B is incorrect because the digestive system involves the breakdown of food D is incorrect because the urinary system deals with the removal of excretory products	(1)

Question number	Answer	Mark
9(b)	An explanation including **four** of the following: • Low levels of thyroxine cause TRH to be produced (1) • (TRH is produced) in the hypothalamus (1) • this causes TSH to be released (1) • (TSH is released) from the pituitary (1) • (TSH causes the) thyroid gland to produce thyroxine (1) • As thyroxine levels increase it inhibits the {release of TRH / production of TSH} (1)	(4)

Question number	Indicative content	Mark
* 9(c)	• There are four hormones involved in the menstrual cycle oestrogen, progesterone, LH and FSH • At the start of the cycle FSH causes the egg to develop in the follicle • FSH is released from the pituitary gland • As progesterone and oestrogen levels are low • Oestrogen levels start to rise • Oestrogen is released from the ovaries • This causes the lining of the uterus to build up • High levels cause a surge of LH • Released from the pituitary gland • Causing ovulation • An egg is released from the ovary • Progesterone is produced • From the corpus luteum • This caused the lining of the uterus to be maintained • If an egg is fertilised oestrogen and progesterone levels remain high • To maintain the lining of the uterus	(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 ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
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. (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)

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Either a list of two or more hormones or a hormone linked to its role in the menstrual cycle/or the endocrine gland it is released from • There must be a coherent flow to the answer linking the correct hormone with the correct role
Level 2	3-4	• At least two hormones of the menstrual cycle linked to their role or the endocrine they are released from • Answer must be correctly linked and in a logical order although the candidate may start at any point within the menstrual cycle
Level 3	5-6	• Links at least three hormones of the menstrual cycle to their role and endocrine gland they are released from • Answer must be logically ordered and links must be correctly made only minor errors are acceptable

Level	Mark	Examples of possible responses
	0	• No rewardable material.
Level 1	1 2	• FSH and LH control the menstrual cycle / LH controls ovulation and the uterus thickening (note an error here) • LH controls ovulation
Level 2	3-4	• Oestrogen causes the uterus lining to thicken and LH to be released which causes ovulation • Oestrogen causes the uterus lining to thicken and LH to be released from the pituitary gland
Level 3	5-6	• FSH causes the egg to mature in the follicle, oestrogen causes the thickening of the uterus lining and causes LH to be released which results in ovulation. • FSH and LH are released from the pituitary gland, Oestrogen and progesterone are released from the ovaries. FSH causes the egg to mature in the follicle, oestrogen causes the thickening of the uterus lining and causes LH to be released which results in ovulation.

Total for question 9 = 12 marks

Question number	Answer	Additional guidance	Mark
10(a)(i)	A description that combines the following points to provide a logical description of the method: • use Benedict's reagent to test for glucose (1) • add it to the solution and heat, if glucose is present it turns green/brick red (1) • use iodine to test for starch (1) • add it to the solution and if starch is present it turns blue/black (1)	accept orange/brown for brick red	(4)

Question number	Answer	Additional guidance	Mark
10(a)(ii)	An explanation linking two from the following: • (substances) move through the membrane by **<u>diffusion</u>** (1) • from where they are in high concentration to where they are in low concentration / down a concentration gradient (1) OR • the dialysis membrane acts as a cell membrane (1) • shows small molecules /glucose moving through the membrane (1)	accept dialysis machine for cell membrane	(2)

Question number	Indicative content	Mark
*10(b)	Ultrafiltration • Blood enters the nephron into the glomerulus • Then is filtered under pressure into the Bowman's capsule/renal capsule Selective reabsorption • The filtrate enters the (proximal convoluted tubule • Where glucose is reabsorbed • By selective reabsorption • Active transport • Using energy from respiration • Through the loop of Henlé • Where water and ions are exchanged • Into the (distal convoluted) tubule Urine formation • The filtrate enters the collecting duct • Where waste products/urea and excess water are removed from the body • Urine id formed from water and urea	(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 ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
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. (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)

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Gives at least one structure of the nephron or a simple description of a process occurring in the nephron • Links one structure of the nephron to its function e.g. glomerulus filters the blood or links two parts of the nephron in the correct order e.g. filtrate travels from glomerulus to Bowman's capsule
Level 2	3-4	• Links at least two structures to their function or process • Both structures must be correctly linked to their function in the correct order
Level 3	5-6	• Describes the flow of filtrate through the kidney linking at least three structures linked to their function or process • Three structures must be linked to their function in the correct logical order to include two of ultrafiltration, selective reabsorption and urine formation

Level	Mark	Example responses
	0	• No rewardable material.
Level 1	1-2	• The blood enters in the glomerulus • The blood is filtered in the glomerulus
Level 2	3-4	• The blood is filtered in the glomerulus and enters the Bowman's capsule where the filtrate moves into the rest of the nephron • The blood is filtered in the glomerulus and enters the Bowman's capsule where the filtrate moves into the rest of the nephron and urine is collected in the collecting duct
Level 3	5-6	• The blood is filtered into the nephron through the glomerulus and the Bowmans capsule. It enters the first tubule and substances are reabsorbed by diffusion. The waste products pass to the collecting duct where urine in formed. • The blood is filtered into the nephron through the glomerulus and the Bowmans capsule this is called ultrafiltration. It enters the first tubule and substances are reabsorbed by diffusion and substances like glucose are selectively reabsorbed. The filtrate moves through the loop of Henlé where some eater is reabsorbed. The waste products pass to the collecting duct where urine in formed.

Total for question 10 = 12 marks