Pearson Edexcel

Mark Scheme (Results)

November 2020

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

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November 2020
Publications Code 1BI0_1F_2011_MS

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)	C iodine solution **The only correct answer is C** ***A*** *is not correct because amylase is not used to test for starch* ***B*** *is not correct because ethanol is not used to test for starch* ***D*** *is not correct because hydrochloric acid is not used to test for starch*	**(1)**

Question number	Answer	Additional guidance	Mark
1(b)(i)	Two from: • wear goggles (1) • wear gloves (Benedict's solution is an irritant to skin) (1) • use tongs to handle test tube (1)	accept other relevant safety precautions (1) ignore PPE without additional detail	**(2)**

Question number	Answer	Additional guidance	Mark
1(b)(ii)	heat up contents of the tube / allow a reaction to take place (between food sample and Benedict's solution)	accept speed up the reaction / safer than using a Bunsen burner	**(1)**

Question number	Answer	Additional guidance	Mark
1(c)(i)	One from: • mass of biscuit • volume of Benedict's solution • temperature of water (bath) • time left in water (bath)	accept weight of biscuit. ignore references to 'amount' ignore references to 'amount'	(1)

Question number	Answer	Additional guidance	Mark
1(c)(ii)	Two from: • all biscuits contain (reducing) sugar /glucose (1) • most in biscuit B (1) • least in biscuit A (1)	accept high in B accept low in A accept B is greater than C is greater than A for 2 marks	(2)

(Total for question 1 = 7 marks)

Question number	Answer	Mark
2(a)(i)	B cell wall **The only correct answer is B** ***A*** *is not correct because X is not the cell membrane* ***C*** *is not correct because X is not the cytoplasm* ***D*** *is not correct because X is not the nucleus*	**(1)**

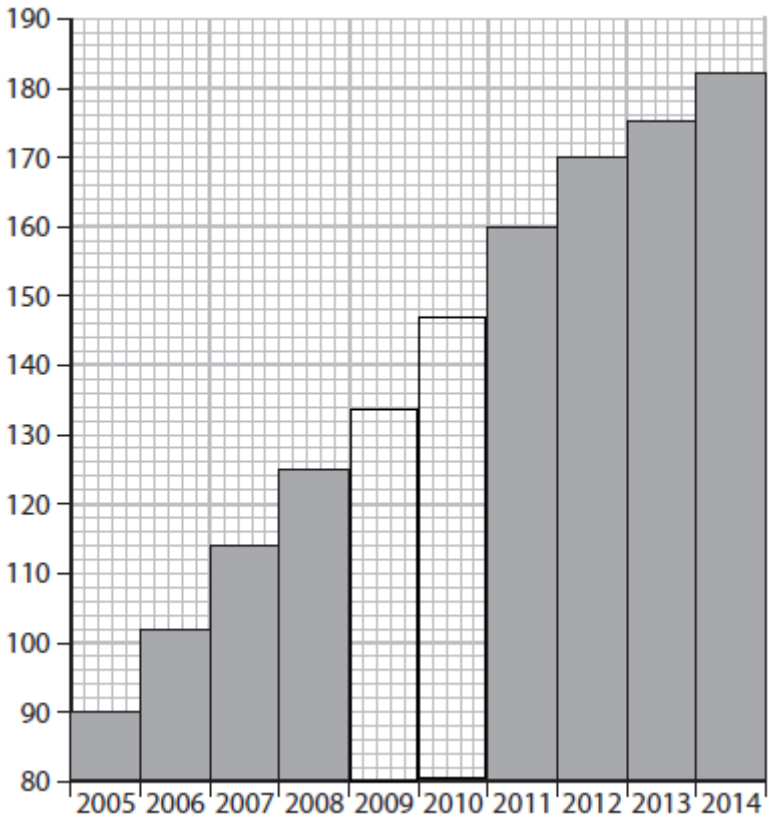
Question number	Answer	Mark
2(a)(ii)	(allows) movement / swim / motility	**(1)**

Question number	Answer	Additional guidance	Mark
2(a)(iii)	• (bacteria) have no nucleus / have chromosomal DNA / have a cell wall	accept converse for all differences	**(1)**

Question number	Answer	Mark
2(b)	C diffusion **The only correct answer is C** ***A*** *is not correct because oxygen does not move into and out of cells by transpiration* ***B*** *is not correct because oxygen does not move into and out of cells by active transport* ***D*** *is not correct because oxygen does not move into and out of cells by osmosis*	(1)

Question number	Answer	Additional guidance	Mark
2(c)	Substitution 500 x 0.04 (1) Evaluation 20 (mm)	 award two marks for correct answer with no working	(2)

(Total for question 2 = 6 marks)

Question number	Answer	Mark
3(a)(i)	Bar for 2009 drawn correctly at 134 +/- half a small square (1) Bar for 2010 drawn correctly at 147 +/- half a small square (1) 	(2)

Question number	Answer	Additional guidance	Mark
3(a)(ii)	A description including: • (gradual) increase (in area of land used) (between 2005 and 2014) (1) • the increase is less from 2012 (1)	accept other correct references to data	(2)

Question number	Answer	Mark
3(b)	(Larger yield means) less land is needed to grow GM crops	**(1)**

Question number	Answer	Mark
3(c)(i)	C biological control **The only correct answer is C** ***A*** *is not correct because using ladybirds is not an example of chemical control* ***B*** *is not correct because using ladybirds is not an example of enzyme technology* ***D*** *is not correct because using ladybirds is not an example of tissue culture*	**(1)**

Question number	Answer	Additional guidance	Mark
3(c)(ii)	An explanation linking two of the following: • reduces use of chemicals / pesticides (1) • so pests do not become resistant to insecticides / chemicals do not build up in the environment (1) OR • specific to the pest (1) • so other beneficial animals / insects are not affected (1)	accept cheaper (1) if explained (1)	**(2)**

Question number	Answer	Additional guidance	Mark
3(d)	risk of GM plants cross-pollinating with other plants / reduced biodiversity	accept creates 'super weeds' / consumers do not want GMOs	**(1)**

(Total for question 3= 9 marks)

Question number	Answer	Additional guidance	Mark
4(a)(i)	Substitution 3 ÷ 120 (1) 0.025 (mm)	 award two marks for correct answer with no working	**(2)**

Question number	Answer	Additional guidance	Mark
4(a)(ii)	Repeat (the investigation)	accept compare with results from other groups	**(1)**

Question number	Answer	Additional guidance	Mark
4(b)	A logical plan including three from the following: • heat (hydrochloric) acid to different temperatures (1) • use same size agar jelly cubes (1) • use same volume/ concentration of acid (1) • for same amount of time (1) • measure clear distance (from outside of cube) at each temperature (1)	 accept heat agar jelly cubes to different temperatures ignore amount of acid accept for 2 marks time how long for agar jelly to go clear (mp 4 and 5)	**(3)**

Question number	Answer	Mark
4(c)	A against a concentration gradient using energy **The only correct answer is A** ***B*** *is not correct because active transport is not down a concentration gradient using energy* ***C*** *is not correct because active transport is not against a concentration gradient without using energy* ***D*** *is not correct because active transport is not down a concentration gradient without using energy*	**(1)**

Question number	Answer	Mark
4(d)(i)	C 34% **The only correct answer is C** ***A*** *is not correct because the percentage of preventable cases of cancer caused by tobacco is not 41%* ***B*** *is not correct because percentage of preventable cases of cancer caused by tobacco is not 37%* ***D*** *is not correct because percentage of preventable cases of cancer caused by tobacco is not 26%*	**(1)**

Question number	Answer	Additional guidance	Mark
4(d)(ii)	Substitution (7 x 163440) ÷ 100 / 163440 x 7% / 163440 x 0.07 (1) Correctly rounded to 11441	accept 11440.8 (1) award two marks for correct answer with no working	**(2)**

(Total for question 4 = 10 marks)

Question number	Answer	Mark
5(a)(i)	An answer including: • select large chickens / chicks from larger chickens (1) • breed together (1) • repeat over (many) generations / long period of time (1)	(3)

Question number	Answer	Mark
5(a)(ii)	Benefit • produces more food / fewer chickens needed for the same amount of meat (1) Risk • less variation / losing useful genes (from the gene pool) / losing traits which may be desirable in the future / health issues related to larger bodies (1)	(2)

Question number	Answer	Mark
5(b)(i)	39 / thirty-nine	(1)

Question number	Answer	Additional guidance	Mark
5(b)(ii)	meiosis / meiotic cell division	reject mitosis / mitotic cell division	(1)

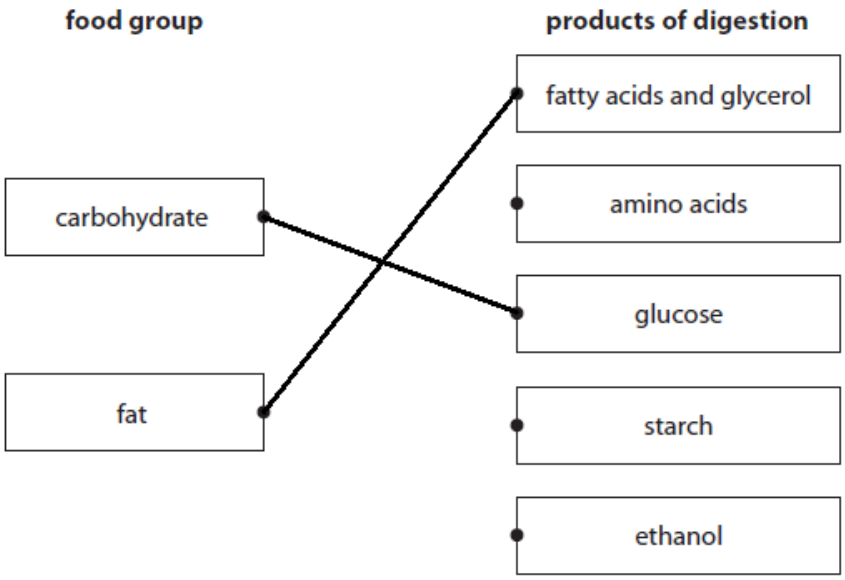
Question number	Answer	Mark
5(c)(i)	C all the genetic material of an organism **The only correct answer is C** ***A*** *is not correct because a genome is not all the cells of an organism* ***B*** *is not correct because a genome is not all the enzymes of an organism* ***D*** *is not correct because a genome is not all the cytoplasm of an organism*	**(1)**

Question number	Answer	Mark
5(c)(ii)	Any two from: • identify useful genes (1) • track evolution/ identify new species to show which species are more closely related (1) • understand diseases (of crop plants and animals) (1) • discover new medicines / find a cure for diseases (1) • identify the sequences that allow some plants and animals to cope with environmental change (1)	**(2)**

(Total for question 5 = 10 marks)

Question number	Answer	Additional guidance	Mark
6(a)(i)	Any two from: • mass of product increases up to 40ºC /300mg (1) • mass of product decreases after 40ºC /300mg (1) • mass of product decreases faster than it increases (1)	accept maximum mass is 300mg / 40ºC is the optimum temperature (1) accept increases then decreases for 1 mark	(2)

Question number	Answer	Mark
6(a)(ii)	An explanation linking two from: • (maximum product at 40ºC) because the enzyme is at its optimum temperature (1) • (between 40ºC and 60ºC the amount of product decreases) because the enzyme is becoming less active/ is being denatured /at 60ºC the enzyme is denatured (1) • (because) the active site is changing shape / substrate can't bind to the active site / fewer enzyme-substrate complexes formed (1)	(2)

Question number	Answer	Mark
6(b)(i)	Two lines drawn correctly as shown.  Reject more than one line from each food group	(2)

Question number	Answer	Mark
6(b)(ii)	D lipase **The only correct answer is D** ***A*** *is not correct because carbohydrase does not break down fat* ***B*** *is not correct because amylase does not break down fat* ***C*** *is not correct because protease does not break down fat*	(1)

Question number	Answer	Additional guidance	Mark
6(c)	An explanation linking: • (shape of) <u>active site</u> of enzyme (1) • not complementary to / will not fit substrate Q (1) • (therefore) the enzyme cannot cause the reaction to occur (so no product is formed) (1)	accept lock and key are not complementary/ enzyme and substrate don't fit together	**(3)**

(Total for question 6 = 10 marks)

Question number	Answer	Mark
7(a)(i)	D optic nerve **The only correct answer is D** ***A*** *is not correct because the cornea does not carry impulses to the brain* ***B*** *is not correct because the iris does not carry impulses to the brain* ***C*** *is not correct because the lens does not carry impulses to the brain*	**(1)**

Question number	Answer	Additional guidance	Mark
7(a)(ii)	iris	accept radial muscles / circular muscles	**(1)**

Question number	Answer	Mark
7(b)	An answer linking four from: • cone cells (1) • (cone cells) responsible for colour vision (1) • rod cells (1) • (rod cells) detect intensity of light (1) • (both) send impulses to the brain (1)	**(4)**

Question number	Answer	Mark
7(c)	antibiotics / antibacterials / named antibiotics	(1)

Question number	Indicative content	Mark
* 7(d)	**Short-sightedness** • eyeball too long • cornea too curved • lens too curved / too convex • light refracted too much by cornea / lens • light rays not brought to a focus on retina • light rays focused in front of retina **Long-sightedness** • eyeball too short • cornea not curved enough • lens too thin /not convex enough • light refracted too little by cornea / lens • light rays not brought to a focus on retina • light rays focused behind retina	(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. • Presents a description which is not logically ordered and with significant gaps.
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. • Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing.
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. • 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 eye defects covered within the response. The mark within the level is determined by the detail within the descriptions.
	0	No rewardable material	
Level 1	1–2	• A description of one cause of the eye defects. • Linked to an interpretation of the structures in a relevant diagram.	<u>Possible candidate responses</u> • With short-sightedness, light rays are focused in front of the retina. • The eyeball is too long. • With long-sightedness, light rays are focused behind the retina.
Level 2	3–4	• A description of at least two causes of the eye defects. • Linked to an interpretation of the structures in both diagrams.	<u>Possible candidate responses</u> • With short-sightedness, light rays are focused in front of the retina and the eyeball is too long. • With long-sightedness, light rays are focused behind the retina and the eyeball is too short.
Level 3	5–6	• A description of more than two causes of the eye defects. • Linked to an interpretation of both diagrams.	<u>Possible candidate responses</u> • With short-sightedness light rays are focused in front of the retina and the cornea refracts light rays too much. The cornea is too convex. • With long-sightedness light rays are focused behind the retina and the lens doesn't refract light enough. The eyeball is too short.

(Total for question 7 = 13 marks)

Question number	Answer	Mark
8(a)(i)	C a pathogen **The only correct answer is C** ***A*** *is not correct because a virus cannot also be classified as a bacterium* ***B*** *is not correct because a virus cannot also be classified as a fungus* ***D*** *is not correct because a virus cannot also be classified as a protist*	**(1)**

Question number	Answer	Additional guidance	Mark
8(a)(ii)	(communicable disease) can be {passed / transferred / spread} (from person to person)	accept it is contagious / infectious	**(1)**

Question number	Answer	Mark
8(b)	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)**

Question number	Answer	Additional guidance	Mark
8(c)	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)**

Question number	Answer	Additional guidance	Mark
8(d)(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)**

Question number	Answer	Additional guidance	Mark
8(d)(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)**

Question number	Answer	Additional Guidance	Mark
8(d)(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)**

(Total for question 8 = 11 marks)

Question number	Answer	Additional guidance	Mark
9(a)(i)	Two from: • (meristem cells) are undifferentiated (1) • (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)

Question number	Answer	Additional guidance	Mark
9(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)

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

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

Question number	Indicative content	Mark
9(c)	**Structure of DNA** • polymer • four bases (A, T, C, G) • (complementary) base pairs • A-T and C-G • (weak) hydrogen bonds join bases • two strands • double helix • nucleotides **DNA extraction** • crush up / grind / squash cells • add detergent / salt solution / protease • heat in a water bath / heat to 60°C • add to (ice cold) ethanol • DNA forms as a precipitate /white strands	(6)

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1–2	• Demonstrates elements of biological understanding, some of which is accurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. • Presents a description which is not logically ordered and with significant gaps.
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. • Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing.
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. • 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 areas of indicative content covered within the response. The mark within the level is determined by the detail within each description.
	0	No rewardable material	
Level 1	1–2	• A simple description of DNA structure. • A brief description of how to extract DNA from plants	<u>Possible candidate responses</u> • DNA contains four bases • DNA can be extracted by crushing up fruit
Level 2	3–4	• A description of DNA structure. • A description of how to extract DNA from plants	<u>Possible candidate responses</u> • DNA contains four bases A, T, C and G and DNA is a double helix. • DNA can be extracted by crushing up fruit and adding detergent.
Level 3	5-6	• A detailed description of DNA structure. • A detailed description of how to extract DNA from plants.	<u>Possible candidate responses</u> • The DNA molecule is a double helix. DNA contains four bases which pair A-T and C-G. The bases are held together by hydrogen bonds. • DNA can be extracted by crushing up fruit with detergent and pouring the mixture into (ice-cold) ethanol. DNA appears as a precipitate.

(Total for question 9 = 13 marks)

Question number	Answer	Additional guidance	Mark
10 (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)

Question number	Answer	Additional Guidance	Mark
10(a)(ii)	An answer including: • 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)

Question number	Answer	Additional guidance	Mark
10 (b)(i)	One mark for gametes One mark for the offspring 25 (%) (1)	accept aA accept ecf from the Punnett square	(3)

	A	a
A	AA	Aa
a	Aa	aa

Question number	Answer	Additional guidance	Mark
10(b)(ii)	An answer linking the following: • genetic variation increases / (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)

Question number	Answer	additional guidance	Mark
10 (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)

(Total for question 10 = 11 marks)