

Mark Scheme (Results)

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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.

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	За	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)	D cytoplasm	(1)
	The only correct answer is D	AO1 1
	A is not correct because W is not the cell wall	
	B is not correct because W is not the nucleus	
	C is not correct because W is not the cell membrane	

Question Number	Answer	Mark
1(a)(ii)	A nucleus	(1)
	The only correct answer is A	AO2 1
	B is not correct because a tail is not found in cheek cells	
	C is not correct because a middle piece is not found in cheek cells	
	D is not correct because an acrosome is not found in cheek cells	

Question	Answer	Mark
Number		
1(b)	cell wall	(1)
		AO1 1

Question Number	Answer	Mark
1(c)	An answer including:	(2)
	(add) iodine (solution) (1)(iodine solution changes from brown to) blue-	AO1 2
	black / black (1)	

Question Number	Answer	Mark
1(d)(i)	L	(1)
		AO2 2

Question	Answer	Mark
Number		
1(d)(ii)	K	(1)
		AO2 2

(Total for question 1 = 7 marks)

Question Number	Answer	Mark
2(a)(i)	B chromosome	(1)
	The only correct answer is B	AO1 1
	A is not correct because Z is not an allele	
	C is not correct because Z is not the spindle	
	D is not correct because Z is not the nuclear membrane	

Question Number	Answer	Mark
2(a)(ii)	Any two from:	(2)
	• for growth (1)	AO1 1
	• for repair (of tissues / organs) (1)	
	• for asexual reproduction (1)	

Question Number	Answer	Mark
2(a)(iii)		(2)
	stage of cell cycle description	AO1 1
	the nuclear membrane breaks down	
	interphase two nuclei are formed	
	the cell divides in two	
	cytokinesis • a spindle is formed	
	DNA is copied	
	Do not award mark if two lines are drawn from interphase	
	box	
	Do not award mark if two lines are drawn from cytokinesis box	

Question	Answer	Additional	Mark
Number		guidance	
2(b)(i)	use a stain / named stain	accept dye	(1)
		accept add a cover slip	AO2 2

Question Number	Answer	Mark
2(b)(ii)	D x 400	(1)
	The only correct answer is D	AO2 2
	A is not correct because the total magnification is not x 4	
	B is not correct because the total magnification is not x 30	
	C is not correct because the total magnification is not x 50	

Question Number	Answer	Additional guidance	Mark
2(c)	focusing wheel	accept (move the) stage / lens (up and down) accept (adjust) mirror	(1) AO1 1

(Total for question 2 = 8 marks)

Question Number	Answ	ver			Mark
3(a)(i)					(1)
			D	d	AO3 2a
		D	DD	Dd	
		d	Dd	dd	
	Acce	pt dD for Dd			

Question Number	Answer	Mark
3(a)(ii)	25 (%)	(1)
		AO3 2b

Question Number	Answer	Additional guidance	Mark
3(a)(iii)	An explanation including:		(2)
	all the children will have the genotype Dd / will be heterozygous (1)	accept children will always inherit a dominant allele / D from their mother accept a correctly completed Punnett square for this marking point	AO2 1
	 but to have sickle cell disease the children must have {the genotype dd / two recessive alleles} (1) 		

Question	Answer	Mark
Number		
3(b)	A description including two from:	(2)
	 {cross / breed} Brahman cattle with Shorthorn cattle (1) 	AO2 1
	 select the offspring with the desired characteristics and {cross / breed} them (1) repeat over many generations (1) 	

Question Number	Answer	Additional guidance	Mark
3(c)	Any two from: • (wheat) plants not damaged (1)	accept the (wheat) plants would live longer	(2) AO2 1
	 the spread of the fungus would be reduced (1) greater yield / profit (1) reduced use of fungicides / pesticides (1) 		
		accept their offspring would also be resistant to fungal disease (1)	

(Total for question 3 = 8 marks)

Question Number	Answer	Additional guidance	Mark
4(a) (i)	water (1)	answers must be in the correct order	(2)
	lid (1)		AO2 2

Question Number	Answer	Additional guidance	Mark
4(a)(ii)	interpretation	full marks for correct	(2)
	(85 – 21) = 64 (1)	answer without any working	AO2 1
	calculation		
	(25 x 4.2 x 64)		
	6720 (J)		
		award one mark for	
		an answer correctly	
		calculated from an	
		incorrect temperature	
		change	

Question Number	Answer	Additional guidance	Mark
4(a)(iii)	An explanation including two from:		(2)
	 the {temperature change / rise in temperature} was smaller (1) 		AO3 2a 2b
	this type of cheese contained less {energy / fat} / the piece of cheese had a smaller mass / a smaller mass of the cheese burned / the cheese was held further away from the container (1)	accept other valid variables	
	therefore less energy was transferred to the water (1)		

Question Number	Answer	Additional guidance	Mark
4(b)(i)	substitution 64.8 ÷ 1.8 x 1.8 (1) OR 64.8 ÷ 3.24 (1)	full marks for correct answer without any working	(2) AO2 1
	20		

Question Number	Answer	Mark
4(b)(ii)	B healthy weight	(1)
	The only correct answer is B	AO2 1
	A is not correct because person B is not underweightC is not correct because person B is not overweight	
	D is not correct because person B is not obese	

Question Number	Answer	Additional guidance	Mark
4(b)(iii)	 An explanation including: do more exercise /named exercise (1) so more energy is used up (1) 		(2) AO2 1
	 OR reduce fat / carbohydrate intake (1) so energy intake is reduced (1) 	accept eat less	

Question Number	Answer	Mark
5(a)	C phenotype	(1)
	The only correct answer is C	AO1 1
	A is not correct because genotype does not describe the physical characteristics	
	B is not correct because monohybrid does not describe the physical characteristics	
	D is not correct because heterozygous does not describe the physical characteristics	

Question Number	Answer	Additional guidance	Mark
5(b)(i)	Any one from:		(1)
	a single result could be anomalous (1)	accept to see if the results are the same / similar	AO1 2
	• to calculate a mean (1)		
		ignore references to increasing accuracy	

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	Any two from:		(2)
	 measure the length / width of the carrot sticks (1) 		AO3 3b
	 cut sticks from the same carrot / same part of carrot (1) 		
	 use the same variety of carrot (1) 		
	(surface) dry the carrot sticks before weighing (1)	accept other valid ways of improving this method, e.g. using more than three carrot sticks	

Question	Answer	Additional	Mark
Number		guidance	
5(b)(iii)	substitution	full marks for	(3)
	(0.8 ÷ 4.2) x 100 (1)	correct answer	
		without any	AO2 1
		working	
	evaluation	accept 19.0476 /	
	19.048 (1)	19.05 (2)	
	2 significant figures	award one mark	
		for rounding an	
	19 (%)	incorrectly	
		calculated answer	
		to 2 significant	
		figures	

Question Number	Answer	Mark
5(b)(iv)	An explanation linking any two from:	(2)
	 the carrot sticks gained mass (1) 	AO3 2a 2b
	 because water moved into the carrot (cells) (1) 	
	• by osmosis / description of osmosis (1)	

(Total for question 5 = 9 marks)

Question Number	Answer	Mark
6(a)	B because they speed up biological processes	(1)
	The only correct answer is B	AO1 1
	A is not correct because enzymes do not slow down biological processes	
	C is not correct because enzymes do not denature biological processes	
	D is not correct because enzymes do not stop biological processes	

Answer	Mark
use a water bath / description of a water bath	(1)
	AO1 2

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	An explanation linking three from:		(3)
	 enzymes have an optimum temperature (1) 		AO2 1
	 so temperature will affect the rate of enzyme activity / the time taken to produce 20cm³ of oxygen (1) 		
	 enzyme activity increases as temperature increases (up to the enzyme's optimum temperature) (1) 		
	{enzymes / active sites} are denatured / enzyme activity stops at high temperatures (1)		
		accept hydrogen peroxide concentration is the independent variable, so other variables (such as temperature) must be controlled (1)	

Question	Answer	Additional	Mark
Number		guidance	
6(b)(iii)	all 4 points plotted accurately		(2)
	(± half a small square) (1)		AO3 1a 1b
	 smooth curve / dot-to-dot line drawn (1) 		
		ignore extrapolations	

Question Number	Answer	Additional guidance	Mark
6(b)(iv)	A description including:		(3)
	 the time taken to collect 20 cm³ oxygen decreases as hydrogen peroxide concentration increases (1) the curve flattens (1) 	accept negative correlation	AO3 1a 1b
	the correct use of data from the table (1)	data must be used not just quoted from the table	

(Total for question 6 = 10 marks)

Question	Answer	Mark
Number		
7(a)	A description including two from:	(2)
	 they have a similar arrangement of bones / five digits / pentadactyl limb (1) 	AO1 1
	evolved from a common ancestor (1)	
	adapted for different functions (1)	

Question Number	Answer	Mark
7(b)(i)	A biological control	(1)
	The only correct answer is A	AO2 1
	B is not correct because this method of limiting the population of weeds is not chemical control	
	C is not correct because this method of limiting the population of weeds is not tissue culture	
	D is not correct because this method of limiting the population of weeds is not genetic engineering	

Question Number	Answer	Mark
7(b)(ii)	Any two from:	(2)
	 (using insects is) safer than using 	AO2 1
	{pesticides/chemicals} (1)	
	• the insects used are specific to this weed (1)	
	• insects do not need to be repeatedly reapplied (1)	
	• cacti could become resistant to chemicals (1)	

Question Number	Indicative content	Mark
7(c)*	 Advantages less crop damage / spoilage so higher yield so more food for people 	(6) AO2 1
	 crop plants are less likely to have diseases that are spread by insects so less pesticides / insecticides used 	
	more profitso more income for developing countries	
	Disadvantages	
	 concerns about the long-term effects (of genetically modified organisms) ethical concerns / wrong to move genes between species GM crops could contribute to the development of medical conditions in humans GM crops could trigger allergic reactions genes could be transferred to other species / weeds so weeds could grow out of control / compete with crop plants genetically modified seeds could be more expensive to buy reliance of farmers on GM seed companies 	
	 reduced gene pool insects will evolve so crops are no longer resistant to insect pests 	

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. Lines 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, logical connections made between elements in the context of the question. Lines of reasoning are supported by sustained application of relevant evidence.
Level 1	1-2	 an advantage OR a disadvantage is identified makes an attempt to explain the advantage / disadvantage
Level 2	3-4	 an advantage AND a disadvantage is identified OR more than one advantage OR more than one disadvantage is identified clearly explains one of the advantages OR clearly explains one of the disadvantages
Level 3	5-6	 more than one advantage AND more than one disadvantage is identified clearly explains one of the advantages AND clearly explains one of the disadvantages

Question	Answer	Mark
Number		
8(a)(i)	arrow showing direction of travel is from left to right	(1)
		AO1 1

Answer	Mark
K – myelin (sheath) (1)	(2)
L – axon (1)	AO1 1
	K – myelin (sheath) (1)

Question Number	Answer	Additional guidance	Mark
8(b)(i)	A description including three from:		(3)
	the impulse (in the relay neurone) triggers the release of a chemical (1)		AO1 1
	• neurotransmitter (1)	accept chemical messenger	
	• (neurotransmitter) diffuses (1)	J	
	• across the synapse (1)	accept across the gap	
	 new impulse triggered in {motor neurone / next neurone} (1) 		

Question Number	Answer	Additional guidance	Mark
8(b)(ii)	 An explanation linking two from: a process that occurs in response to danger (1) which bypasses the {brain / parts of the brain} / is an {involuntary process / subconscious process} (1) 	accept goes to the spinal cord accept react without thinking	(2) AO1 1
	 so there is a faster transmission (of electrical impulses) / faster response / allows a quick reaction (1) to protect the body from harm (1) 	accept examples of actions to protect the body e.g. pulling hand away	

Question	Answer	Mark
Number		
8(c)(i)		(1)
	C 215 milliseconds	
		AO2 1
	The only correct answer is C	
	A is not correct because the median is not 200 milliseconds	
	B is not correct because the median is not 210 milliseconds	
	D is not correct because the median is not 225 milliseconds	

Question Number	Answer	Additional guidance	Mark
8(c)(ii)	A description including three from:		(3)
	 measure their reaction time using red squares (1) 	accept see how fast they react with red squares	AO3 3a
	 keep everything else the same (as using blue squares) (1) 		
	 repeat measurements (for each student) (1) 		
	 calculate a mean reaction time (1) 		
	 control other variables (1) 	accept examples of other variables e.g. tiredness / environment / health	

(Total for question 8 = 12 marks)

Question Number	Answer	Mark
9(a)	World Health Organization / WHO	(1)
		AO1 1

Question Number	Answer	Additional guidance	Mark
9(b)(i)	An answer including two from:		(2)
	• (communicable) is passed from person to person (1)	accept reverse arguments for non- communicable diseases	AO1 1
	 (communicable) caused by {pathogens / example of pathogen} (1) 		
	(communicable diseases) cannot be inherited (1)		

Question Number	Answer	Additional guidance	Mark
9(b)(ii)	An explanation including:		(2)
	{cough / sneeze} into a tissue / avoid close contact with infected people / avoid cramped living conditions (1)	accept regular hand washing / wear a mask / isolate an infected person	AO2 1
	 because spread of TB is airborne droplets / TB is spread through the air (1) 	accept spread by coughing / breathing it {in / out}	
	 vaccination / immunisation (1) to provide immunity / reduces the chance of a person getting infected (1) OR 	accept reduces the chances of contact with an infected person	
	 treat infected people with antibiotics (1) reduces the number of infected people (1) 		

Question Number	Answer	Additional guidance	Mark
9(b)(iii)	 suitable heading for each column, with country in left column (1) 	accept country / region / number of people / people with TB	(2) AO2 1
	all data entered accurately (1)	countries can be entered in any order	

Question Number	Indicative content	Mark
9(c)*	Physical barriers	(6)
	 mucus is produced by cells that line some surfaces of the body mucus traps pathogens 	AO1 1
	 cilia are found on epithelial / lining cells ciliated cells line the inside of the respiratory system cilia move mucus across the surface of cells 	
	 cilia move pathogens out of the body / into the throat 	
	 skin is a thick covering over the body skin has dead cells on its surface skin is waterproof pathogens are unable to enter the body 	
	through the skin	
	tears wash pathogens awayear wax traps pathogens	
	 nasal hairs trap pathogens 	
	blood clots / scabs cover wounds to prevent the entry of pathogens	
	Chemical defences	
	 skin has glands that secrete lysozymes lysozymes are enzymes found in tears, saliva and mucus lysozymes kill some bacteria 	
	 hydrochloric acid is in the stomach hydrochloric acid has a low pH which kills many pathogens 	
	antibodies are present on mucus linings	

	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.
	1	
Level 1	1-2	a physical barrier OR a chemical defence is identified
		 a function of the physical barrier OR a chemical defence is described
Level 2	3-4	more than one physical barrier OR more than one chemical defence is identified
		 functions of the physical barriers OR chemical defences are described
		OR
		a physical barrier AND a chemical defence are identified
		 a function of the physical barrier AND a function of the chemical defence are described
Level 3	5-6	more than one physical barrier AND more than one chemical defence are identified
		 functions of most of these physical barriers AND chemical defences are described
	1	

Descriptor

Level

Mark

(Total for question 9 = 13 marks)

Question Number	Answer	Mark
10 (ai)	C aseptic	(1)
	The only correct answer is C	AO1 2
	A is not correct because clinical is not a technique	
	B is not correct because diagnostic does not prevent contamination	
D is not correct because lysogenic describes a stage of the virus lifecycle		

Question Number	Answer	Additional Guidance	Mark
10 (a)(ii)	Any two from:		(2)
	 keep the lid on at all possible times (1) 		AO1 2
	 use sterile equipment (1) 	accept a method of sterilising equipment e.g. flaming loops / disinfect the working area	
	• autoclave agar (1)	accept use sterile growth medium	
	wear gloves / mask(1)		
	 work close to a Bunsen (burner) (1) 		

Question Number	Answer	Additional Guidance	Mark
10 (b)(i)	radius 4.5 mm (1)	award full marks for correct answer with no working	(3) AO2 1
	calculation (3.14 x 4.5 x 4.5 / 3.14 x 4.5 ²) = 63.585 (1)	accept 63.617 ecf if diameter used 254.469 / 254.34 for one mark	
	evaluation 63.6 (mm²)	ecf if diameter used 254.5 / 254.3 (mm²) to 1 DP for two marks	

Question Number	Answer	Additional Guidance	Mark
10 (b)(ii)	as a control / to compare	accept to see the effect without using toothpaste	(1)
		/ to see the effect of just saliva	AO2 2

Question Number	Answer	Additional Guidance	Mark
10 (b)(iii)	Any two from:		(2)
	the test only uses one species of bacteria (1)		AO2 2
	there are still bacteria on the agar plate (1)		
	the test is not done on teeth (1)		
	 the conditions in the mouth are different (1) 	accept temperature in the mouth may not be 37°C	
	 toothpaste is only used on teeth for a short time (1) 		
		accept the test only uses one type of toothpaste (1)	

Question Number	Answer	Additional Guidance	Mark
10(c)	An explanation linking:		(2)
	the toothpastes were not harmful to the cells (1)	accept toothpaste has the same effect as saliva / accept toothpaste 2 is less harmful to cells	AO3 2a +2b
	because the % of healthy cells after 2 hours was similar to saliva (1)	accept a description of the data values to illustrate a similar effect	