Pearson

Mark Scheme (Results)

Summer 2026

Pearson Edexcel Advanced Level In Biology B
9BI0/01

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1(a)	**The only correct answer is C** ***A** is incorrect because all DNA fragments have the same charge (density)* ***B** is incorrect because colour would not work* ***D** is incorrect because the DNA fragments are separated according to size*	(1)

Question Number	Answer	Additional Guidance	Mark
1(b)	An explanation that makes reference to the following: • by comparing the position/distance that the bands have travelled (1) • **all** the child's bands must be present in both parents' bands combined (1)	DO NOT ACCEPT similar ACCEPT band patterns can be compared ACCEPT every band must be in either parent 1 or 2/ the child bands match the parents in set 2	(2)

Question Number	Answer	Additional Guidance	Mark
1(c)	• 400 (µg) (1)	0.8 dm^3 = 800 cm^3 500ng = 0.5 µg 0.5 × 800 = 400	(1)

Question Number	Answer	Additional Guidance	Mark
2(a)	An explanation that makes reference to the following: • to ensure genetic {variation / diversity} (1) to allow the plants to adapt to (future) environmental changes (1)	ACCEPT answers in the context of self-fertilisation ACCEPT to maintain genetic diversity DO NOT ACCEPT to increase genetic diversity ACCEPT named examples e.g disease, (new) selection pressure DO NOT ACCEPT inherited diseases	(2)

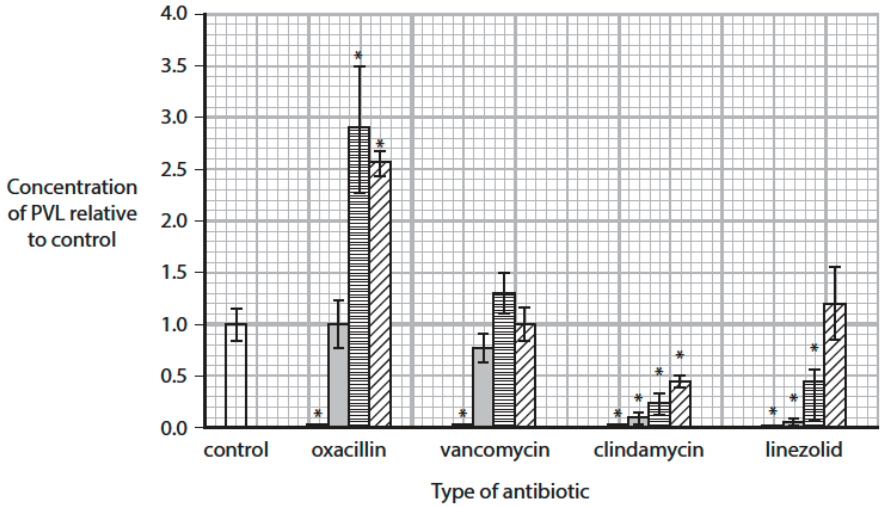
Question Number	Answer	Additional Guidance	Mark
2(b)(i)	An explanation that makes reference to the following: • because the pollen tubes cannot grow down to the {ovary/ovules} (1) • (and without pollen tube growth) the (sperm) nucleus will not **fuse** with the (ovum) nucleus(1)	ACCEPT converse ACCEPT pollen nuclei cannot reach {ovary/ovules/embryo sac} ACCEPT egg for ovum ACCEPT male and female nucleus/ gamete	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	An explanation that makes reference to the following: • because a mutation could change the (DNA) base sequence (1) • which could result in a different amino acid sequence (1) • which would change {the stigma / the pollen / one of the} proteins (1) • therefore the proteins would no longer match and the pollen tubes can grow (1)	ACCEPT nucleotide/codon ACCEPT could result in a different amino acid/primary structure being coded for ACCEPT change to tertiary structure of protein	(4)

Question Number	Answer	Mark
3(a)	**The only correct answer is A** ***B*** *is incorrect because Gram positive do not have an outer membrane* ***C*** *is incorrect because Gram positive bacteria have thick cell walls* ***D*** *is incorrect because Gram positive bacteria have thick cell walls and do not have an outer membrane*	(1)

Question Number	Answer	Additional Guidance	Mark
3(b)	• (some) antibiotics target the (Gram positive) peptidoglycan cell wall /(some) antibiotics cannot pass through the (Gram negative) lipopolysaccharide layer (1)	ACCEPT outer layer for lipopolysaccharide layer	(1)

Question Number	Answer	Mark
3(c)(i)	**The only correct answer is A** ***B*** *is incorrect because both Gram positive and Gram negative bacteria can release exotoxins* ***C*** *is incorrect because exotoxins are released from living bacteria* ***D*** *is incorrect because both Gram positive and Gram negative bacteria can release exotoxins, and exotoxins are released from living bacteria*	(1)



Question Number	Answer	Additional Guidance	Mark
3(c)(ii)	An answer that makes reference to four of the following: • {high concentrations/C_p} of all four antibiotics {inhibits the release of PVL/PVL is 0} (1) • {Low/1/4 C_p /1/8 C_p} concentrations of oxacillin (statistically) increase the release of PVL (1) • clindamycin {inhibits/reduces} the release of PVL (at all concentrations tested) (1) • some concentrations of oxacillin/vancomycin/linezolid have no statistical difference compared to the control (1) • credit relevant comment about overlap of the error bars (1)	ACCEPT C_p for each antibiotic is statistically different from the control ACCEPT all results for clindamycin as statistically different from the control/is the most effective ACCEPT results for clindamycin show less variation in the data/oxacillin and linezolid show most variation in the data	(4)

Question Number	Answer	Mark
4(a)	**The only correct answer is C** ***A** is incorrect because the embryo at day 3 is totipotent, at day 6 is pluripotent and at day 28 is multipotent* ***B** is incorrect because the embryo at day 3 is totipotent, at day 6 is pluripotent and at day 28 is multipotent* ***D** is incorrect because the embryo at day 3 is totipotent, at day 6 is pluripotent and at day 28 is multipotent*	(1)

Question Number	Answer	Additional Guidance	Mark
4(b)	An explanation that makes reference to two of the following: • because at 14 days there are many {undifferentiated/pluripotent} cells (1) • and the embryo has not developed into a fetus (1) • and there is no (developed) nervous system (1)	ACCEPT answers in context of after 14 days ACCEPT after 14 days cells are multipotent/ some cells are specialised/ differentiated After 14 days the embryo is a fetus	(2)

Question Number	Answer	Additional Guidance	Mark
4(c)(i)	An explanation that makes reference to the following: • cells should be taken from an embryo before day 6 (1) • as these will be totipotent (1) • as none of the genes will be permanently switched off (1)	ACCEPT any day before day 6 ACCEPT have the potential to develop into any cell type/no differentiated cells ACCEPT after this some genes will be switched off/ undergone epigenetic modification/methylation	(3)

Question Number	Answer	Additional Guidance	Mark
4(c)(ii)	An answer that makes reference to three of the following: • could be ethical as one embryo can make multiple synthetic embryos} (1) • ethical as these embryos could be used to save lives/more medical advances (1) • not ethical as the synthetic embryos are potential human beings (1) • not ethical as (original) human embryos are still used (1)	ACCEPT reduces the number of human embryos destroyed ACCEPT human embryos are still destroyed	(3)

Question Number	Answer	Additional Guidance	Mark
4(d)(i)	• Oct 4 / Sox 2 / Klf 4 / c-Myc / NANOG /LIN28 (1)		(1)

Question Number	Answer	Additional Guidance	Mark
4(d)(ii)	An explanation that makes reference to two of the following: • because these (fibroblasts/iPS cells) are pluripotent (1) • and therefore cannot differentiate into all cell types (1) • because some of the genes are (permanently) silenced (1)	ACCEPT because they are not totipotent **ACCEPT** cannot differentiate into placental cells/ extra embryonic cells ACCEPT switched off/ some genes will have undergone epigenetic modification	(2)

Question Number	Answer	Additional Guidance	Mark
5(a)	An explanation that makes reference to the following: • it allows the production of antibodies to be {faster / higher / sooner} (1) • (and therefore pathogens can be destroyed) before they can {replicate/cause symptoms} (1)	ACCEPT antibodies produced quickly **ACCEPT** T killer cells produced faster/rapidly **ACCEPT** so infected cells destroyed (by T killer cells) before viruses can replicate	(2)

Question Number	Answer	Additional Guidance	Mark
5(b)(i)	A description that makes reference to the following: • chemical 19 binds to receptor 7 (1) • and is taken in by endocytosis (1)	ACCEPT binds to specific receptor **ACCEPT** facilitated diffusion / active transport/ through carrier/channel proteins/protein pumps	(2)

Question Number	Answer	Additional Guidance	Mark
5(b)(ii)	An explanation that makes reference to the following: • (membrane can change shape) because it is fluid (1) • because the phospholipids can move (within the membrane / phospholipid bilayer) (1)	**ACCEPT** refs to fluid mosaic model **ACCEPT** cholesterol enables fluidity/movement	(2)

Question Number	Answer	Additional Guidance	Mark
5(b)(iii)	An explanation that makes reference to the following: • (uptake of chemical 19) decreases the concentration (of chemical 19) around the dendritic cell (1) • this maintains the concentration gradient (between the dendritic cell and the lymph nodes /chemical 19) (1) • so cells still migrate to the area of high concentration (at the lymph nodes) (1)	ACCEPT increasing concentration gradient	(2)

Question Number	Answer	Additional Guidance	Mark
5(b)(iv)	An explanation that makes reference to two of the following: • (the greater the number of dendritic cells), the more chemical 19 is absorbed (1) • therefore the concentration gradient is steeper (1)	ACCEPT taken up ACCEPT increases the concentration gradient	(2)

Question Number	Answer	Additional Guidance	Mark
6(a)(i)	• because the volume of oxygen used is equal to the volume of carbon dioxide released (1)	ACCEPT mols / number of molecules/ratio ACCEPT amount	(1)

Question Number	Answer	Mark
6(a)(ii)	**The only correct answer is B** ***A** is incorrect because 0.78 ÷ x = 0.9 therefore x = 0.78 ÷ 0.9 = 0.87* ***C** is incorrect because 0.78 ÷ x = 0.9 therefore x = 0.78 ÷ 0.9 = 0.87* ***D** is incorrect because 0.78 ÷ x = 0.9 therefore x = 0.78 ÷ 0.9 = 0.87*	(1)

Question Number	Answer	Additional Guidance	Mark
6(a)(iii)	An explanation that makes reference to two of the following: • because the respiratory substrates will vary (1) • depending on the availability in the cells (1) • not higher than 1 because this is carbohydrate and not lower than 0.7 as this is lipid and there are no other respiratory substrates (1)	ACCEPT mixture of (named) substrates being used as alternative / because all three can be respired ACCEPT they have eaten different diet/done different activity before ACCEPT not higher than one as this would be anaerobic respiration	(2)

Question Number	Answer	Additional Guidance	Mark
6(a)(iv)	An explanation that makes reference to the following: • (some) anaerobic respiration is occurring (1) • therefore more carbon dioxide produced than oxygen being used (1) • as there is not enough oxygen available (1)	**DO NOT ACCEPT** no oxygen used	(2)

Question Number	Answer	Additional Guidance	Mark
6(b)	An explanation that makes reference to three of the following: • (at day 0) RQ is initially 1 as carbohydrate is being respired (1) • (after day 1 RQ drops) seedlings switch to a mixture of respiratory substrates (1) • **at 5-10 days** the respiratory substrate is (only) lipid (1) • (after 10 days) RQ rises due to production of carbohydrate from photosynthesis (1) •	NB check time periods are correct ACCEPT glucose ACCEPT RQ drops as lipids/other substrates also respired ACCEPT later, carbohydrate becomes the main respiratory substrate (1)	(3)

Question Number	Answer	Additional Guidance	Mark
6(c)	• because the carbon dioxide is used in {photosynthesis / light-independent reaction/carbon fixation} (1)	ACCEPT plants also produce oxygen in photosynthesis	(1)

Question Number	Answer	Additional Guidance	Mark
7(a)(i)	• 2.4×10^9	$(8 \times 10^9 \div 10) \times 3 = 2.4 \times 10^9$	(1)

Question Number	Answer	Additional Guidance	Mark
7(a)(ii)	• 21 (%)	$(9.7 - 8) \div 8 \times 100 = 21.25$	(1)

Question Number	Answer	Additional Guidance	Mark
7(b)	An explanation that makes reference to two of the following: • (to increase yield) more water is needed for photosynthesis (1) • to be used in photolysis (1) • more water lost in transpiration (1) • used to take up minerals (1)	ACCEPT more water to maintain turgidity ACCEPT named example e.g nitrates	(2)

Question Number	Answer	Mark

7(c)

Statement about structure	**Structure found in**			
	both starch and protein	starch only	protein only	neither starch nor protein
Contain carbon, hydrogen and oxygen	☐	☐	☐	☐
Monomers joined by ester bonds	☐	☐	☐	☐
Contain hydrogen bonds	☐	☐	☐	☐

(3)

Question Number	Indicative Content
***7(d)**	**Indi dicative content:** **General** • the more photosynthesis the greater the yield • as more GALP/glucose to convert to biomass • more glucose combines with nitrates to produce amino acids for growth **Size of leaves/angle of branches** • larger leaves will have greater surface area • spacing of plants will affect light • more of leaf surface exposed to light • more light absorbed • rate of photosynthesis is faster with more light as faster light-dependent reaction producing more ATP **Reduced photorespiration** • reducing photorespiration means more carbon dioxide is available • then GALP/hexose/glucose production will be higher for growth • grow plants in modified atmospheres with increased carbon dioxide levels/reduce oxygen levels • to decrease photorespiration and increase light-independent stage • grow plants at temperatures that maximise the rate of light-independent stage but do not result in photorespiration • different plants will have different optimal growth temperatures • grow in temperature-controlled environments or select appropriate plants for the climate in a region **Increased recovery from photoprotection** • genetically-modify plants to produce lower levels of protein so that recovery is faster • provide shade so that plants are not exposed to very high levels of sunlight • then plants can start absorbing light for light-dependent reaction • therefore producing NADPH/ATP sooner **C4 photosynthesis** • C4 plants can do carbon fixation/photosynthesise even when stomata are closed

	• C4 plants grown in drier areas because stomata more likely to be closed • can carry out photosynthesis and reduce water loss • more water for photolysis • genetically-engineer plants with genes for C4 components

Level 0	Marks	No awardable content
Level 1	1-2	Simple description of how light levels and carbon dioxide levels affect rate of photosynthesis
Level 2	3-4	Simple explanations of one / two ways
Level 3	5-6	More detailed explanations for three / four ways

Question Number	Answer	Additional Guidance	Mark
8(a)	• number of different species and abundance of each species (1)	ACCEPT the variety of alleles in a gene pool/ the species richness and species evenness	(1)

Question Number	Answer	Additional Guidance	Mark
8(b)	• organisms have a right to life/to ensure that organisms are there for future generations/to prevent extinction/prevent disruption to food webs (1)	ACCEPT suitable alternatives	(1)

Question Number	Answer	Additional Guidance	Mark
8(c)(i)	• n(n-1) calculated for E, F and G • N(N-1) or $\sum n(n-1)$ calculated • D calculated as 4 /4.03/4.0	Example of calculation: 9 × 8 = 72, 22 × 21 = 462, 13 × 12 = 156 (155 × 154) ÷ 5 930 = 23 870 ÷ 5 930 = 4.025295109 72, 462 and 156 23870 or 5930 Correct answer with no working gains 3 marks ACCEPT any number of dp	(3)

Question Number	Answer	Additional Guidance	Mark
8(c)(ii)	• River A because the index of diversity is higher (1)	ACCEPT ECF from 8ci	(1)

Question Number	Answer	Mark
8(d)(i)	**The only correct answer is C** ***A** is incorrect because class comes between phylum and order* ***B** is incorrect because class comes between phylum and order* ***D** is incorrect because class comes between phylum and order*	(1)

Question Number	Indicative content
***8(d)(ii)**	Answers will be credited according to candidates' deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **Indicative content:** **Experimental design** • two samples of water, one with and one without *Daphnia* • incubated at suitable temperature/ incubated for a period of time for both *Daphnia* and *E. coli* • nutrients (broth) to support growth of *Daphnia* and *E. coli* • use of aseptic techniques • same number / concentration / volume of *E. coli* in both samples • all conditions identical for both samples **Counting *E. coli*** • dilution plating • credit details e.g serial dilution/spread on agar plates • optical / turbidity methods • credit details e.g use of colorimeter/measure absorbance • haemocytometer • credit details e.g how to count cells/dilution • means of identifying *E. coli* e.g. antibodies, selective media, colony appearance **Statistical analysis** • several samples taken • standard deviation calculated • suitable stats test / t test • confidence levels calculated and compared/ significance level of at least 5% considered significant

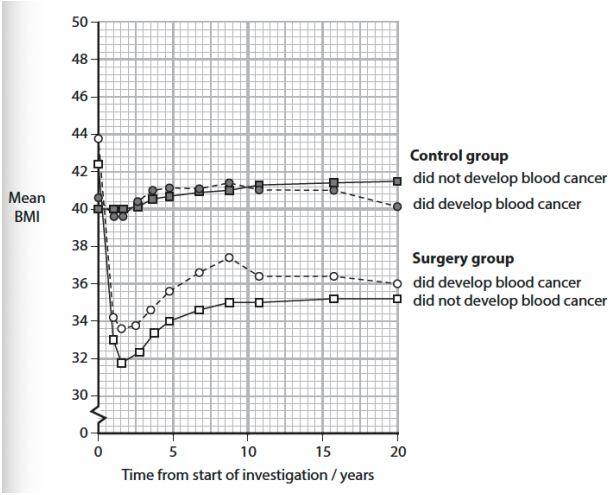
Level 0	Marks	No awardable content	
Level 1	1-2	Simple description of a method	relevant comment = 1 mark samples with and without *Daphnia (or length of time)*

			method to count ***E. coli*** (may not work) = 2 marks
Level 2	3-4	More detailed method that will work	some details of experimental design/details of method to count ***E. coli*** **that works** = 3 marks some details of experimental design and details of method to count ***E. coli*** **that works** = 4 marks
Level 3	5-6	More detailed method that includes identification of bacteria and details of statistical analysis	method includes identification of bacteria/ details of statistical analysis = 5 marks method includes identification of bacteria and detail of statistical analysis = 6 marks

Question Number	Answer	Additional Guidance	Mark
9(a)	• not obese (as BMI is not greater than 30) (1) •	NB candidates must have done the calculation correctly 107 ÷ (1.9 × 1.9) = 29.6398891	(1)

Question Number	Answer	Additional Guidance	Mark
9(b)	An explanation that makes reference to four of the following: • because excess weight can (directly) lead to build up of cholesterol in arteries (1) • because obesity can increase blood pressure (1) • and high blood pressure can damage the lining of the arteries (1) • damage triggers an inflammatory response (1) • increasing the likelihood of {atheroma/plaque} build up (in artery wall) (1) • obesity is a cause of diabetes (type II) (which is a risk factor for atherosclerosis) (1)	NB max 3 for no reference to arteries	(4)

Question Number	Answer	Additional Guidance	Mark
9(c)(i)	• percentages calculated (1) • weight loss/surgery did reduce cancer (1)	(34 × 100) ÷ 2007 = 1.6940707 or (51 × 100) ÷ (4047 – 2007) = 2.5 **ACCEPT** conclusion based on the two calculated values calculations must be made to award mp 2	(2)



Question Number	Answer	Additional Guidance	Mark
9(c)(ii)	An answer that makes reference to three of the following: • the mean BMI of the control group remained (fairly) constant (throughout the 20-year period) (1) • the mean BMI of the surgery group dropped (quickly) after surgery but (gradually) increased (and levelled off after 10 years) (1) • BMI of people who had surgery and developed cancer is higher than those who had surgery and did not develop cancer/ the BMI of people who did not have surgery and developed cancer dropped compared to those who did not develop cancer (1) there are no error bars so we cannot tell if the differences are significant (1)	ACCEPT BMI of people who did not have surgery was higher for the first 10 years and then lower	(3)

Question Number	Answer	Mark
9(d)(i)	**The only correct answer is D** ***A*** *is incorrect because P is a neutrophil and Q is a monocyte* ***B*** *is incorrect because P is a neutrophil and Q is a monocyte* ***C*** *is incorrect because P is a neutrophil and Q is a monocyte*	(1)

Question Number	Answer	Additional Guidance	Mark
9(d)(ii)	An explanation that makes reference to the following: • because the {number / ratio / proportion} of cell types is different (1) • compared with blood smear from a person who is healthy/without cancer (1)	ACCEPT named cell types	(2)

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