Pearson Edexcel

Mark Scheme (Results)

January 2022

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 1B and Science
(Double Award) (4SD0) Paper 1B

Question Number	Answer	Additional guidance	Mark
1 (a) (i)	An explanation that makes reference to two of the following: • (Flask B) as (mouthpiece) connected to long tube in flask B / (mouthpiece) connected to flask A is shorter / eq (1) • (Flask B) tube (from mouthpiece) in limewater / tube in liquid in flask B / causes bubbles (in limewater) in B / not in liquid / draws air in flask A / eq (1) • cannot inhale in flask B as limewater would be sucked in / would get mouthful of liquid / Flask A for inhalation as no liquid drawn up eq (1)	No credit if identify flask A air into limewater limewater not breathable	**2**

Question Number	Answer	additional guidance	Mark
1 (a) (ii)	An explanation that makes reference to two of the following: • (Limewater) in flask A stays clear / no change / <u>less</u> cloudy / goes cloudy slowly / eq (1) • (Limewater in) flask B goes (more) cloudy / milky / cloudy quicker / (1) • as less carbon dioxide in inhaled / atmospheric air / (more) carbon dioxide in exhaled / eq (1) • due to respiration (1)	allow stays clear cloudy in both flasks scores 1 no credit for changes colour or cloudy (in both) as contains CO_2 also scores 1	**2**

		ignore no CO_2 in inhaled	

Question Number	Answer	Mark
1 (a) (iii)	• Sodium hydrogen-carbonate / sodium bicarbonate (solution)/ hydrogen-carbonate / bicarbonate indicator (1)	**1**

Question Number	Answer	Additional guidance	Mark
1 (b)	An answer that makes reference to four of the following: • diaphragm contracts (1) • diaphragm flattens / moves down /eq (1) • (external) intercostal muscles contract (1) • rib cage raised / moves out (1) • volume (of chest cavity / thorax) increases (1) • pressure in (chest cavity / thorax) decreases / reduces (1) • air drawn into lungs / lungs inflate /eq (1)	ignore volume of lungs	**4**

total 9 marks

Question Number	Answer	Mark
2(a)(i)	The only correct answer is **A** P is the anther **B** is not the answer as it is the filament **C** is not the answer as it is the stigma **D** is not the answer as it is the style	**1**

Question Number	Answer	Mark
2(a)(ii)	The only correct answer is **B** Q is the petal **A** is not the answer as it is the leaf **C** is not the answer as it is the stem **D** is not the answer as it is the style	**1**

Question Number	Answer	Mark
2(a)(iii)	The only correct answer is **D** structure S the stigma **A** is not the answer as they do not germinate on P anther **B** is not the answer as they do not germinate on Q petal **C** is not the answer as they do not germinate on R stem	**1**

Question Number	Answer	Mark
2(b)	An answer that makes reference to the following: • P / anthers exposed / hanging out / outside / eq (1) • S / stigma feathery / exposed / hanging out / longer /outside / eq (1) • Q / petals smaller/ absent / green / not coloured / not scented / eq (1)	**3** allow hairy

Question Number	Answer	Additional guidance	Mark
2(c)(i)	runners / eq	**allow** corms / bulbs / rhizomes/ tubers	**1**

Question Number	Answer	Additional guidance	Mark
2(c)(ii)	cuttings/ eq	**allow** grafting / layering / micropropagation **/** tissue culture	**1**

Question Number	Answer	Additional guidance	Mark
2(c)(iii)	An answer that makes reference to two the following: • no / (less) <u>genetic</u> variation /a clone / eq (1) • maintain phenotype / colour / flavour / desired characteristic / same characteristics / eq (1) • faster / eq (1) • seeds not viable / produce rare plants / eq (1)	allow converse for sexual not just get a copy off ign more plants	**2**

total 10 marks

Question Number	Answer	Mark
3(a)	Carbon / C (1)	**1**

Question Number	Answer	Mark
3(b)(i)	The only correct answer is **A** W is combustion **B** is not the answer as W is not decomposition **C** is not the answer as W is not feeding **D** is not the answer as W is not respiration	**1**

Question Number	Answer	Mark
3(b)(ii)	The only correct answer is **D** X is respiration **A** is not the answer as X is not combustion **B** is not the answer as X is not decomposition **C** is not the answer as X is not feeding	**1**

Question Number	Answer	Mark
3(c)	bacteria / fungi / allow correct genus and species names (1)	**1**

Question Number	Answer	additional guidance	Mark
3(d)	A description that makes reference to six of the following points: • C different pH of organic material / add acid /alkali / add buffers/ eq (1) • O same organic material / plant / age / species / type / mass / volume of organic material(1) • R repeat (at each different pH) (1) • M1 measure change / loss in mass of organic material / initial mass – final mass /volume of carbon dioxide released / change in hydrogen-carbonate indicator / change in limewater /eq (1) • M2 after stated time period (1) • S1 same temperature / oxygen / eq (1) • S2 same water / same mineral ions / same humidity / same volume of each acid /alkali/ buffer / same bacteria / fungi / decomposer added / eq (1)	same state of decay or allow time taken M2 for same mass M1 to decompose 1 hour + allow same number of bacteria /decomposers / eq	**6**

total 10 marks

Question Number	Answer	additional guidance	Mark
4(a)(i)	356 / (356+1331) 356 /1687 x 100 = 21.1% (2)	allow 1 mark for 356 / 1687 or 356 / (356+1331) allow full marks for correct answer allow 21	**2**

Question Number	Answer	Additional guidance	Mark
4(a)(ii)	85147 and 7206 ratio = 11.82:1 12:1 (2)	allow full marks for correct answer allow 1 mark for 85147 **and** 7206	**2**

Question Number	Answer	Additional guidance	Mark
4(b)	An answer that that makes reference to six the following points: yes smoking important • higher % of low birth mass (at every age) / smokers have more low mass babies/ eq (1) • large numbers in study (1) No because • big age effect / more with low birth mass at under 19 • more with low birth mass over 35 (1) • greater effect of smoking at older ages above 35 (1) • as older mothers may have smoked for many years / no information on number of years mothers have smoked for (1) • no information on mothers' mass / weight (1) • no information on mothers' health care / medical condition / alcohol / diet / drugs / eq (1) • no information on premature birth /eq (1) • no information on frequency of smoking or	allow correlation between smoking and low birth mass ignore lifestyle	**6**

	when during pregnancy (1) own knowledge • smoking reduces oxygen / eq (1) • less respiration / eq (1)		

total 9 marks

Question Number	Answer	Mark
5 (a)	An explanation that makes reference to two of the following: • anaerobic respiration (1) • (by) bacteria / named bacteria (1) • produces lactic acid / eq (1)	**2**

Question Number	Answer	Mark
5 (b)	• temperature / volume / mass of milk / lactose content of milk / type of milk / eq	**1**

Question Number	Answer	Additional guidance	Mark
5(c)(i)	A graph that makes includes: • scales linear and at least half page and axes the correct way around time on x axis (1) • (time in) minutes **and** acidity %(1) • straight lines joining points (1) • points correctly plotted (1) • key to identify normal and low oxygen (1)	Allow truncated y axis if starts at 0.2 or 0 and // within a small square	**5**

Question Number	Answer	additional guidance	Mark
5 (c)(ii)	An explanation that makes reference to the following: • reduced oxygen (more) anaerobic respiration (of milk) / less <u>aerobic</u> respiration / eq (1) • acidity increases <u>faster</u> / sooner / more rapidly / eq (1)	allow converse for more oxygen	**2**

total 10 marks

Question Number	Answer	Mark
6 (a)	A oesophagus / gullet (1) B stomach (1) C small intestine / ileum / duodenum / jejunum (1) D large intestine / colon / eq (1)	**4**

Question Number	Answer	additional guidance	Mark
6 (b)	An explanation that makes reference to three of the following: • (plants contain) cellulose (1) • digested by cellulase / enzyme (1) • into <u>glucose</u> (1) • energy released / respiration / eq (1)	 allow broken down by cellulase converse for no cellulase energy not released / energy lost in feaces / eq	**3**

Question Number	Answer	Mark
6 (c)(i)	• humans do not digest cellulose / do not eat only plant material / omnivores / eat fewer / less plants / vegetables / eq (1)	**1**

Question Number	Answer	additional guidance	Mark
6 (c)(ii)	An answer that makes reference to two the following: • removes <u>useful</u> bacteria / fewer / no useful bacteria / eq (1) • reduces competition / eq (1) • pathogenic bacteria increase / survive / multiply / grow / more harmful bacteria / eq (1)	not just appendix contains useful bacteria as this is in stem allow toxic / bad / eq to harmful bacteria	**2**

total 10 marks

Question Number	Answer	Mark
7(a)(i)	The only correct answer is D oak tree A blackbird is not correct as it is not the producer B centipede is not correct as it is not the producer C earthworm is not correct as it is not the producer	**1**

Question Number	Answer	Mark
7(a)(ii)	The only correct answer is A blackbird is a secondary and tertiary consumer B earthworm is not a secondary and tertiary consumer	**1**

	C ground beetle is not a secondary and tertiary consumer D sparrowhawk is not a secondary and tertiary consumer	

Question Number	Answer		Mark
7 (b)(i)	An explanation that makes reference to the following: • some light / colours / wavelengths reflected (1) • light falls on flowers / not on leaves / some does not fall on chloroplasts / chlorophyll / eq (1)	ignore shade allow not enough chloroplasts	**2**

Question Number	Answer	additional guidance	Mark
7 (b)(ii)	• producer to primary consumer 1.4 / 87 x 100 = 1.61 % (1) allow 1.6% • primary to secondary consumer 1.6 / 14 x 100 = 11.4 % (1) allow 11% 11.43% or ENERGY LOST producer to primary 98.4% (1) ENERGY LOST primary to secondary 88.6% (1) so student is incorrect primary to secondary consumer most efficient	must calculate % to score allow 1 mark for each correct calculation allow calc of energy lost	**2**

Question Number	Answer	Mark
7 (c)(i)	• involuntary / automatic / does not involve the brain / spontaneous / without thinking / unconscious / eq (1)	**1**

Question Number	Answer	additional guidance	Mark
7 (c)(ii)	• protects from predators / only exposes hard shell /eq (1)	ignore danger / harm /injury	**1**

Question Number	Answer	additional guidance	Mark
7(c)(iii)	An answer that makes reference to four of the following: • (gene) mutation/ mutated gene / eq (1) • variation (1) • woodlice that roll up survive / not eaten /eq (1) • reproduce / eq (1) • pass on <u>alleles</u>/ <u>genes</u> (for rolling behaviour) (1)	 allow converse allow converse not just pass on mutation /behaviour	**4**

total 13 marks

Question Number	Answer	additional guidance	Mark
8 (a)	0.04% = 0.04 in 100 1000000 ÷100 = 10000 10000 x 0.04 = 400 (ppm) (2)	allow 2 marks for correct answer no working allow 1 mark for 10000	**2**

Question Number	Answer	Mark
8 (b)(i)	An answer that makes reference to the following: • (increasing CO_2) increases (relative)(rate of photosynthesis) (1) • (begins to) level off / reaches maximum (at 0.10 % at 1.12) / rate of increase steepest up to 0.06 %/ eq (1)	**2**

Question Number	Answer	additional guidance	Mark
8 (b)(ii)	An answer that makes reference to two the following: • steepest increase / most effect at 35°C / higher temperatures / eq (1) • increasing CO_2 increases (relative) rate of photosynthesis at all temperatures (1) • at CO_2 of 0.03 %, temperature is not the limiting factor / CO_2 is limiting factor so increasing the temperature has little effect.(1)	allow converse	**2**

Question Number	Answer	Mark
8 (b)(iii)	An explanation that makes reference to three the following: • increasing temperature increases (relative) rate of photosynthesis (1) • as more (kinetic) energy (supplied to molecules) /eq (1) • more (frequent) collisions / faster collisions (between substrate and enzyme molecules) / more enzyme substrate complexes formed/ eq (1) • temperature becomes limiting factor at 5°C / increasing CO_2 has less effect on rate/eq (1)	**3**

Question Number	Answer	additional guidance	Mark
8 (c)(i)	An explanation that makes reference to one pair of the following: • nitrate (1) • for / amino acids/ proteins /stunted growth/	 allow	**2**

	yellow leaves / eq OR • magnesium (1) • for chlorophyll / yellow leaves chlorosis /eq (1) OR • other correct mineral (1) • correct effect (1)	chloroplasts allow chloroplasts must have named mineral to get effect	

Question Number	Answer	additional guidance	Mark
8 (c)(ii)	An explanation that makes reference to two of the following: • (increasing) light (intensity) (1) • provides energy for / required for photosynthesis / absorbed / trapped / used by chloroplasts /chlorophyll / stomata open more / eq (1) OR • changing wavelength / colour of light (1) • some not absorbed / affect photosynthesis (1) OR • (availability of) water (1) • as reactant / substrate / used in photosynthesis (1)	allow no light no photosynthesis= required for	**2**

total 13 marks

Question Number	Answer	additional guidance	Mark
9 (a)	• only expressed / seen in phenotype of homozygous / requires two / both (copies) to be expressed in phenotype / only seen / expressed / shown if no dominant allele present / not expressed if dominant allele present / eq (1)	allow only expressed if aa / cc etc	**1**

Question Number	Answer	additional guidance	Mark
9 (b)(i)	• Parents Aa and Aa (1) • gametes A and a (1) • offspring genotypes AA Aa aa (1) • offspring phenotypes or ratio 3 no symptoms to 1 alkaptonuria / eq (1) eg parents AN and AN gametes A and N offspring AA AN AN NN	allow other symbols allow different letters eg A and N if cross works NOT X and Y gametes circled or in Punnet or separated allow ecf for max 2 marks for correct gametes and offspring ie mp 2 and 3 allow full marks for Punnet square	**4**

Question Number	Answer	Mark
9 (b)(ii)	0.375/ 37.5% / 3/8 / eq (1)	**1**

Question Number	Answer	additional guidance	Mark
9 (c)(i)	did not receive the drug / no treatment / eq (1)	current best treatment / placebo	**1**

Question Number	Answer	Additional guidance	Mark
9(c)(ii)	An answer that that makes reference to five of the following points: yes • control group so valid study /eq (1) • showed improvement /reduced symptoms / activity / life / eq (1) • quicker to stand up/eq (1) • improved distance walked/ eq (1) No because • small group size / should be tested on more people / repeat study / eq (1) • not all finished study/ eq (1) • adverse / side effects / eq (1) • one died in drug group /eq (1) • no information on age / mass / sex / other health conditions / activity / exercise / eq (1)	allow converse for control	**5**

Question Number	Answer	additional guidance	Mark
9(d)	An answer that that makes reference to two of the following points: • patients may not know what foods contain these / what proteins contain these/ eq (1) • present in many / most foods / most proteins /eq (1) • proteins required for growth / repair / eq (1)	 allow contain these proteins allow provide essential amino acids	**2**

total 14 marks

Question Number	Answer	Mark
10(a)	The only correct answer is C it is specific A it lasts a short time is not correct B it leads to bioaccumulation is not correct D it is quicker is not correct	**1**

Question Number	Answer	additional guidance	Mark
10(b)(i)	An answer that includes the following • sucrose / sugars (1) • amino acids / eq (1)	ignore water reject starch / glucose allow named amino acid	**2**
Question Number	Answer	additional guidance	Mark
10(b)(ii)	An explanation answer that makes reference to four of the following:		**4**

	• less respiration / eq (1) • less ATP / less energy (1) • less active transport/ less minerals absorbed / eq (1) • less / remove / eat carbohydrate / sucrose / sugars / less amino acids / eq (1) • less growth (of leaves / tubers /bulbs /grain/ fruit) (1) • less starch stored / less proteins (synthesis) (1) • less photosynthesis (1) • less nectar (1) • less (insects for) pollination (1) • spread disease / infection / eq (1)	not glucose stored or carried in phloem	

Question Number	Answer	Additional guidance	Mark
10(c)	An answer that that makes reference to five the following points: yes • hoverflies eat / consume more aphids / eq (1) • at each/ all temperature(s) / eq (1) • therefore fewer hoverflies need to be used (1) • greatest / most difference (×3) at 12 °C /eq / least at 18 °C (×1.9) (1) • (both) flies consume more at higher temperatures /eq (1) but not conclusive because • only one larvae used /should use more larvae / not repeated / eq (1) • (less valid) not natural habitat / not a field study / done in laboratory setting / eq (1) • only 2 species hoverfly and silverfly compared / eq (1)	allow % difference	**5**

total 12 marks