Mark Scheme (Results)

January 2023

Pearson Edexcel International GCSE
Biology (4BI1)
Paper 1B

Question Number	Answer	Mark
1(a)(i)	The only correct answer is **C** V to P as V is anther and P is stigma A is not the answer as P is not anther and Q is not stigma B is not the answer as P is not anther and T is not stigma D is not the answer as it S not stigma	**1**

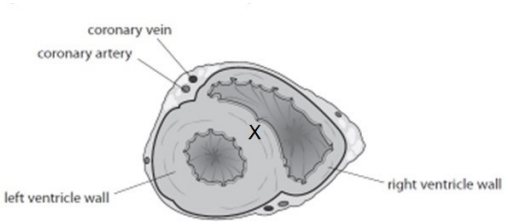
Question Number	Answer	Mark
1(a)(ii)	The only correct answer is **A** as Q is the style B is not correct as U is the filament C is not correct as V is the anther D is not correct as R is the petal	**1**

Question Number	Answer	Mark
1(a)(iii)	The only correct answer is **C** as T is the ovule A is not correct as P is the stigma B is not correct as S is the ovary D is not correct as V is the anther	**1**

Question Number	Answer	Additional guidance	Mark
1 (b)	An answer that makes reference to three of the following: • large <u>petals</u> /eq (1) • coloured <u>petals</u> / bright <u>petals</u> / scented <u>petals</u> (1) • stigma / style within flower / stigma sticky / eq (1) • stamen / anther within flower / eq(1) • nectary (1) • pollen large / sticky /eq (1)	allow converse ignore flower no / small petals green petals ignore coloured stigma / style outside flower / stigma feathery / hairy stamen outside flower / hinged / long filament no nectary ignore nectar small / dust / like	**3**

Question Number	Answer	Additional guidance	Mark
1 (c)	An explanation that refers to two of the following: • eaten by birds / animals / people / insects / eq (1) • disperse / taken / moved / carried to new area / elsewhere / eq (1) • egested / deposited / waste / defecate / thrown away / discarded / in faeces / eq (1)	 allow consume /consumers ignore excreted allow excrement	**2**

Total 8 marks

Question Number	Answer	Mark
2(a)(i)		**1**

Question Number	Answer	additional guidance	Mark
2(a)(ii)	An answer that makes reference to the following • coronary artery contains (more) oxygen / oxygenated (1) • coronary artery contains less carbon dioxide / no carbon dioxide (1)	No credit for pressure vein no / less oxygen / deoxygenated vein (more) CO_2	**2**

Question Number	Answer	additional guidance	Mark
2(a)(iii)	An explanation that makes reference to three of the following • (left wall) much thicker / eq (1) • more muscle / muscular (tissue) / eq (1) • (generates) more pressure / more force / eq (1) • pumps blood (all) around body / eq (1)	allow converse for each mp thinner less muscle less pressure /force ignore withstands pressure to lungs thicker muscle = mp1 and mp 2	**3**

Question Number	Answer	additional guidance	Mark
2(b)	An explanation that makes reference to four of the following 1. genetics / inheritance / some people inherit increased risk from parents eq (1) 2. high blood pressure (puts more strain on heart) / eq (1) 3. high fat diet / lipid / cholesterol / (blocks coronary artery walls) / eq (1) 4. smoking (raises blood pressure and increase chances of clots) / eq (1) 5. stress (raises blood pressure) / eq (1) 6. lack of exercise , (exercise reduces blood pressure and strengthens heart) / eq (1) 7. obesity / being overweight / diabetes (increase strain on heart) / eq (1)	allow converse for each mp Ign bad diet unqalified	**4**

Total 10 marks

Question Number	Answer	additional guidance	Mark
3(a)(i)	An answer that makes reference to five of the following 1. oat milk provides more energy kJ / calories / (per 225 g) / eq (1) 2. more energy less weight loss / idea of carbohydrate / fats not used so stored / so more weight gain/ eq (1) 3. oat provides more (saturated) fat / eq (1) 4. oat provides more carbohydrate / eq (1) 5. oat provides similar sugar / same sugar/eq (1) 6. oat provides more protein (required for growth) / eq (1) 7. oat milk provides more fibre (1) 8. for peristalsis /prevent constipation / eq 9. but balance diet required / depends upon other foods consumed / eq (1) 10. weight loss depends upon activity age / eq (1)	allow converse Idea of energy balance more consumed than used	**5**

Question Number	Answer	Mark
3(a)(ii)	An answer that makes reference to the following • allergy / allergic / lacks enzyme / lactase / lactose intolerant / wants reduced (saturated) fat diet / cow's milk contains more fat / are vegan / wants to avoid constipation as cow's milk has no fibre / eq (1)	**1**

Question Number	Answer	additional guidance	Mark
3(b)	A description that makes reference to two of the following • Benedict's added / eq (1) • heated / eq (1) • red / green / yellow / orange / eq (1)	allow alternative test Fehlings or $CuSO_4$ and Na_2CO_3 allow Benedict's test for mp 1 allow clinistix / ursitix / glucose testing strip for mp 1 and correct colour change for mp 3 / brown	**2**

Question Number	Answer	Mark
3(c)	An explanation that makes reference to three of the following • <u>antibodies</u> (1) • (specific to / against / for) antigen / virus / bacterium / pathogen / eq (1) • <u>stick / clump / burst / label</u> bacteria / virus/ pathogen /eq (1) • <u>destroy / kill</u> bacteria / virus / pathogen / eq (1)	**3**

Total 11 marks

Question Number	Answer	Additional guidance	Mark
4(a)	calculation % dark-coloured moths in 1992 27÷ 36 × 100 = 75% % dark-coloured moths in 1998 9÷ 22 × 100 = 41% 75 - 41 = 34(%) (3) allow 34.1 or 34.09 etc	 allow 1 mark for 75 allow one mark for 41 or 40.9 full marks for correct answer no working	**3**

Question Number	Answer	Mark
4 (b)(i)	• Scale half grid and linear (1) • Lines straight and through all points (1) • Axis correct way round and labelled with number of moths (and year) (1) • Points correctly plotted within half a small square (1) • Key light-coloured and dark-coloured moths or lines labelled (1)	**5** No L if extrapolation (to 0) No L if bar chart

Question Number	Answer	additional guidance	Mark
4(b)(ii)	An answer that makes reference to five of the following 1. numbers of light increases / (decrease then) increase (1) 2. numbers of dark decrease (then increase) / eq (1) 3. overall total numbers of moths decrease (then increase)/ eq (1) 4. due to disease predation lack of food / eq (1) 5. at start / up until 1994 more dark than light moths / eq (1) 6. at end (from 1994) more light than dark moths (apart from 1996) / eq (1) 7. as less coal (used) / burning / pollution in city decreased / eq (1) 8. dark less camouflaged / cannot hide / light more/ better camouflaged / better adapted in unpolluted areas **OR** dark better adapted in polluted areas / eq (1) 9. easily seen by birds / predators / eq (1) 10. (better adapted) pass on allele / gene to offspring / eq(1)		**5**

Total 13 marks

Question Number	Answer	Mark
5(a)(i)	An explanation that makes reference to the following • no nucleus (1) • (so) no chromosomes (1)	**2**

Question Number	Answer	Mark
5(a)(ii)	• mitosis / mitotic (1)	**1**

Question Number	Answer	Mark
5(a)(iii)	An answer that includes • contains a Y chromosome / has X and Y chromosomes / only one X chromosome / 23 rd pair are different / 23 one big one small / eq (1)	**1**

Question Number	Answer	additional guidance	Mark
5(b)(i)	An answer that makes reference to four of the following 1. karyotype 2 45 chromosomes / karyotype 1 46 chromosomes / only one in 23 rd pair / one less chromosome /eq (1) 2. karyotype 2 only 1 X / one sex chromosome / lacks an X or lacks a Y / eq (1) 3. so female karyotype as it lacks Y / eq (1) 4. does not undergo normal puberty/ delayed puberty eq (1) 5. does not develop secondary sexual characteristics / eq (1) 6. cannot release oestrogen / less oestrogen / eq (1) 7. cannot produce gametes / eggs / is infertile / cannot reproduce / eq (1) 8. slower repair of inner uterus lining/lining not being maintained (1) 9. may produce gametes that contain only 22 chromosomes / lack a sex chromosome / eq (1)	Fewer chromes Ignore 23 alone **Lacks a sex chromosome scores mp 1 and mp 2** allow examples breast development / height / growth spurt / body hair less fertile	**4**

Question Number	Answer	Mark
5(b)(ii)	• mutation / failure of chromosomes to separate / failure in meiosis / one of the sex chromosomes did not replicate (just prior to cell division) / eq (1)	**1**

Total 9 marks

Question Number	Answer	Additional guidance	Mark
6(a)(i)	A description that makes reference to the following • diffusion / movement of solvent / water through partially permeable membrane / eq (1) • from dilute to concentrated solution / high to low water potential / eq (1)	 allow semi-permeable/ selectively permeable allow from high concentration (of water)to low(er) concentration (of water) **allow** movement of water from high to low concentration across partially permeable membrane for mp 1 and mp 2	**2**

Question Number	Answer	Mark
6(a)(ii)	• tube contents / the liquid / the solution / the concentration / what is in the tube / eq (1)	**1**

Question Number	Answer	Additional guidance	Mark
6(b)(i)	calculation = (2 × 3.14 x 0.25 x 5) + (2 × 3.14 × $(0.25)^2$) = 7.85 + 0.3925 = 8.2425 = **8.2 (cm^2) to 8.25** (2)	 allow 1 mark for 7.85 7.855 7.86 Or 0.39 0.393 0.3925 or 0.39275	**2**

		full marks for correct answer with no working	

Question Number	Answer	Mark
6(b)(ii)	An explanation that makes reference to the following • increases rate of osmosis / eq (1) • as more contact (between potato and water / solution) / more space / eq (1)	**2**

Question Number	Answer	Additional guidance	Mark
6(b)(iii)	• temperature / type of potato / eq (1)	ignore time / volume of solution mass of potato	**1**

Question Number	Answer	Mark
6(c)(i)	An explanation that makes reference to three of the following • **distilled water** (increases in mass) water enters potato from distilled water (1) • **air** (little change in mass) no movement of water / no osmosis / water evaporates / eq (1) • **sucrose solution** (decrease in mass) water leaves potato into sucrose solution / eq (1) • Correct ref to water potential gradient or from dilute solution to concentrated solution / down water potential	**3**

	gradient / from higher concentration of water to lower concentration of water / eq (1)	

Question Number	Answer	Additional guidance	Mark
6(c)(ii)	calculation percentage change in mass in sucrose solution = (1.8- 2.1)÷ 2.1 = -0.3 -0.3 ÷2.1 = -0.143 × 100 = - 14.3 % 14.3 % of 5.0 cm = 0.143 ×5 = -0.71cm 5-0.71 = 4.3(4.29) allow **4.28 to 4.3** cm (3)	full marks for correct answer with no working allow 1 mark for 14.3 or 14.29 or 14.286 or 0.143 or 0.14286 etc **and** allow 1 mark for 0.71 to 0.72 etc	**3**

Total 14 marks

Question Number	Answer	Mark
7(a)(i)	The only correct answer is D zebra A is not correct as acacia is a producer B is not correct as lion is a secondary consumer C is not correct as star grass is a producer	**1**

Question Number	Answer	Mark
7(a)(ii)	The only correct answer is B star grass to baboon A is not correct as giraffe to cheetah is not least efficient C is not correct as wildebeest to wild dog is not least efficient D is not correct as zebra to lion is not least efficient	**1**

Question Number	Answer	Mark
7(a)(iii)	The only correct answer is B gazelle A is not correct as baboon is affected more C is not correct as wildebeest is affected more D is not correct as zebra is affected more	**1**

Question Number	Answer	Additional guidance	Mark
7(b)(i)	An explanation that makes reference to four of the following • not all organisms consumed /eq (1) • some die / decompose / eq (1) • some parts not eaten / bones / eq (1) • energy lost as heat / respiration / used in movement / muscle contraction / eq (1) • some food not digested / absorbed / egested / faeces /eq (1) • energy lost as excretion / urea / eq (1)	No credit for energy loss alone	**4**

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	A description that makes reference to four of the following • quadrat / eq (1) • (placed) at random / use random number generator / eq (1) • count (number in each quadrat) / eq (1) • repeat / take average / eq (1) • multiply up / scale up to calculate numbers in area / eq (1)	quadrats = mp 1 and mp 4 ignore area coverage	**4**

Question Number	Answer	Additional guidance	Mark
7(c)	An explanation that makes reference to the following • weakest prey killed / faster / stronger survive / eq (1) • (strongest mate) / reproduce / weakest do not reproduce / eq (1) • pass on alleles / genes / genetic material / DNA / eq (1) • (sick animals removed) prevents infection / bacteria / virus / pathogen spreading / eq (1) • weak animals slow down herd / eq (1)	allow survival of fittest not sickness spreading	**3**

Total 14 marks

Question Number	Answer	Mark
8(a)(i)	The only correct answer is **B** fungi A is not correct as yeast is not a bacterium C is not correct as yeast is not a plant D is not correct as yeast is not a protoctist	**1**

Question Number	Answer	Mark
8(a)(ii)	The only correct answer is **B** chitin A is not correct as wall is not made of cellulose C is not correct as wall is not made of sucrose D is not correct as wall is not made of starch	**1**

Question Number	Answer	Mark
8(b)(i)	An explanation that makes reference to the following • water bath / Bunsen / thermostat to vary temperature to heat up water / eq (1) • thermometer to measure temperature / eq (1) • clock watch / timer to measure time period / how long / rate per minute / eq (1)	**2**

Question Number	Answer	Mark
8(b)(ii)	• prevent entry of oxygen / makes conditions anaerobic / eq (1)	**1**

Question Number	Answer	Mark
8(b)(iii)	• limewater / calcium hydroxide solution / hydrogen carbonate indicator / sodium hydrogencarbonate / bicarbonate indicator / sodium bicarbonate (1)	**1**

Question Number	Answer	Additional guidance	Mark
8(b)(iv)	An explanation that makes reference to two the following • originally blue as oxygen present so yeast is respiring (aerobically) / eq (1) • (changes to pink)(all) oxygen **used** up / **taken in** / **consumed in** (aerobic) respiration / eq (1) • (when pink / when no oxygen present) now respiring <u>anaerobically</u> /eq (1)	oxygen used in respiration	**2**

Question Number	Answer	Additional guidance	Mark
8(c)	An explanation that makes reference to four of the following • enzyme / substrate / particles / molecules move faster / increased (kinetic) energy / eq (1) • collide more frequently / form more enzyme substrate complexes / eq (1) • (until) <u>optimum</u> temperature / eq (1) • then <u>active site</u> changes shape / eq (1) • substrate no longer fits / binds with enzyme / enzyme denatures / eq (1)	more kinetic energy not yeast denatures	**4**

Total 12 marks

Question Number	Answer	additional guidance	Mark
9(a)	$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$ (2)	allow 1 mark for correct formula but incorrect balance no credit for word equation	**2**

Question Number	Answer	additional guidance	Mark
9(b)(i)	Calculation 78 bubbles per minute gives $1 \div d^2$ value from x axis of 0.16 therefore $1 \div d^2 = 0.16$ $d^2 = 6.25$ distance d = 2.5 (cm) (2)	 Graph clearly 0.16 allow 1 mark for 0.16 or 6.25	**2**

Question Number	Answer	Mark
9(b)(ii)	A description that makes reference to the following • more bubbles released / rate of photosynthesis increases / eq (1) • very steeply at low light intensities / at first / eq (1) • number of bubbles levels off / becomes constant / stays same / reaches maximum / rate of increase slows down / eq (1)	**3**

Question Number	Answer	Additional guidance	Mark
9(b)(iii)	An explanation that makes reference to two of the following • rate doesn't change / no change / increasing / changing light / light intensity / has no effect / / eq (1) • as light **no** longer / **not** limiting factor / other factor limiting / eq (1) • need more carbon dioxide / need higher temperature to increase photosynthesis rate / eq (1)	 No credit for light is limiting factor carbon dioxide / chlorophyll is limiting factor / temperature limiting factor **scores mp 2 and mp 3**	**2**

Total 9 marks

10 (a)		Substrate	Enzyme	Products of digestion	**4**
		starch	***amylase (1)***	maltose	
		maltose	maltase	***glucose(1)***	
		proteins / peptides / polypeptides (1)	protease	amino acids	
		lipids	lipase	***fatty acids /glycerol (1)***	

Question number		Additional guidance	
10 (b)	C use different concentrations of vinegar / vinegar and no vinegar / range of pH acids / eq (1) O of same mass of starch / flour / bread /potato / rice / eq (1) R repeat (for each concentration (of vinegar) / eq (1) M1 use iodine to test for (digestion of) starch (1) M2 measure time it takes for all starch to be digested / iodine test to be negative / orange / yellow / or description of negative positive result / eq (1) S1 same temperature / use water bath / eq (1) S2 same time to react / same volume of amylase / same concentration of amylase / same mass of amylase / same volume of vinegar / same volume of iodine / same volume Benedic'ts /eq (1)	allow amount / more or less for C ignore amount Benedict's if starch still present will be blue black allow same volume of vinegar if vary conc in C	**6**

total 10 marks