



Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE
In Biology (4WBI2) Unit 2B

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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	Additional guidance	Mark
1(a)	a community of organisms / different species / group of living things AND their non-living environment/habitat (1)		1

Question Number	Answer	Additional guidance	Mark
1(b)	Two of the following • decrease in carbon dioxide absorbed/more carbon dioxide in atmosphere /contributes to climate change/global warming (1) • decreased oxygen in atmosphere (1) • increase in soil erosion (1) • reduced soil quality (1) • habitat loss (1) • reduction in biodiversity (1) • decreased availability of medicinal plants (1)	Ignore references to balance of carbon dioxide and oxygen in atmosphere Accept extinction Accept affects water cycle/references to rainfall	2

Question Number	Answer	Additional guidance	Mark
1(c)	A response that makes reference to three of the following points: • enzymes activated (by water) (1) • carbohydrate/food stores in the seed will be broken down (1) • growth of radicle/root (1) • growth of plumule/shoot (1)	Ignore absorb water Accept respiration/ metabolic processes increase Ignore stem	3

Question Number	Answer	Additional guidance	Mark
1(d)	Two of the following • carbon dioxide (1) • water vapour (1) • nitrous oxide (1) • methane (1) • chlorofluorocarbons/CFCs (1)	Accept chemical formulae Ignore nitrogen (di)oxide Reject carbon monoxide/CO	2

Question Number	Answer	Additional guidance	Mark
1(e)	A response that makes reference to three of the following points: • removal of a few cells/formation of explants (1) • (explants) placed in medium with growth hormones (1) • cell division by mitosis/formation of a callus (1) • root formation (1) • transfer to compost/ greenhouse /climate-controlled growing conditions/ eq (1)	Accept named example e.g. auxins	3

Question Number	Answer	Additional guidance	Mark
1(f)	area = $9(.0) \times 10^6 \text{ km}^2$ (2) Only one mark for: $(150\,000\,000 \times 0.06) = 9\,000\,000$ OR Answer to their calculation correctly given in standard form.	Correct answer without working scores full marks	2

(Total for Question 1 = 13 marks)

Question Number	Answer	Mark
2(a)	B (F) <i>A is not the answer as E is a leaf</i> <i>C is not the answer as G is the stem</i> <i>D is not the answer as H is a flower</i>	1

Question Number	Answer	Additional guidance	Mark
2(b)	One from the following: - sucrose/sugars (1) - amino acids (1)	Ignore glucose Accept hormones	1

Question Number	Answer	Additional guidance	Mark
2(c)	Two of the following - xylem has lignin/phloem does not have lignin (1) - xylem does not have companion cells/ phloem has companion cells (1) - xylem has no end walls between cells/phloem have sieve plates (1) - xylem does not contain cytoplasm/organelles / phloem has (minimal) cytoplasm/organelles (1)	Ignore xylem is hard / thick Accept xylem is hollow	2

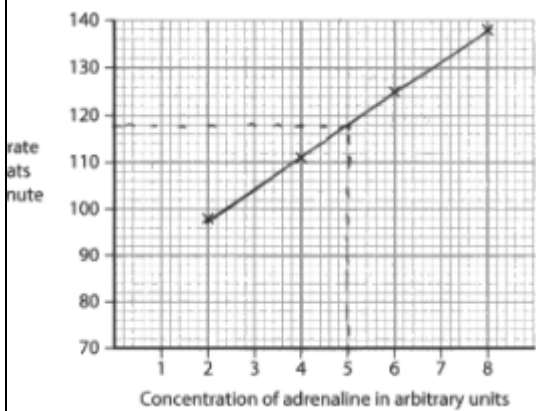
Question Number	Answer	Mark
2(d)(i)	concentration of salt (solution) (1)	1

Question Number	Answer	Additional guidance	Mark
2(d)(ii)	Three from the following: • use same length celery stalks/measure each celery stalk used / eq (1) • use stalks from the same celery plant / use same variety of celery /age of celery/ eq (1) • use same volume/concentration of red dye/ eq (1) • use same starting <u>volume</u> of salt solution (1) • ensure all beakers have the same amount of sunlight/same temperature (1) • same air movement / wind / humidity (1)	Accept same size stalk Ignore mass of celery Accept same type of celery Accept amount/mass of dye Accept same distance from light source/ window etc	3

(Total for Question 2 = 8 marks)

Question Number	Answer	Additional guidance	Mark
3(a)(i)	prevent backflow (of blood) (1)	accept description eg. stop blood from going in the wrong direction	1

Question Number	Answer	Mark
3(a)(ii)	D (right atrium → right ventricle → left atrium → left ventricle) <i>A is not the answer as blood does not enter the left atrium from the vena cava</i> <i>B is not the answer as blood does not enter the left atrium from the vena cava</i> <i>C is not the answer as blood does not move from the right atrium to the left atrium</i>	1

Question Number	Answer	Additional guidance	Mark
3(b)(i)	correctly drawn line of best fit (1) 	Accept straight lines with extrapolation	1

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	heart rate = 118 bpm (1)	Accept values in range 117-119 Accept ecf from 3(b)(i)	1

Question Number	Answer	Additional guidance	Mark
3(c)(i)	A response that makes reference to the following points: • blood glucose levels increase (1) • glycogen is broken down (to glucose) (1) • (from glycogen stores) in the liver (1)	Accept blood glucose is high	3

Question Number	Answer	Additional guidance	Mark
3(c)(ii)	A response that makes reference to two of the following points: • (provide more glucose) for increased respiration (1) • to release more energy/produce ATP (1) • (energy is) used for muscle contraction (1)	Ignore energy used in respiration	2

(Total for Question 3 = 9 marks)

Question Number	Answer	Mark
4(a)(i)	B (Q) <i>A is not the answer as P is the stigma</i> <i>C is not the answer as R is the style</i> <i>D is not the answer as S is the anther</i>	1

Question Number	Answer	Additional guidance	Mark
4(a)(ii)	anther (1)	Ignore stamen Ignore S	1

Question Number	Answer	Additional guidance	Mark
4(a)(iii)	Two from the following: (wind pollinated plants) • have smaller/less bright petals (1) • have no sweet smell (1) • do not produce nectar (1) • have larger/exposed anthers (1) • have larger/ exposed stamen (1) • have feathery stigma (1) • produce lighter/smaller pollen grains (1)	ORA throughout	2

Question Number	Answer	Additional guidance	Mark
4(a)(iv)	An explanation that makes reference to two of the following points: • grows (from the stigma) down the style (1) • allows the pollen grain nucleus to enter the ovule (1) • to allow for fertilisation/fusion of male and female gametes (1)	Accept through the micropyle Accept male gamete for pollen grain	2

Question Number	Answer	Additional guidance	Mark
4(b)(i)	mitosis	Reject mei... e.g. meitosis/ Accept mytosis mitoses	1

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	An explanation that makes reference to four of the following points, maximum two from each section: Advantage - as offspring are genetically identical (to parents) (1) - beneficial alleles/characteristics guaranteed to be passed to offspring (1) OR - don't need another plant/parent to reproduce (1) - reproduction is faster/ can happen when conditions are favourable / eq (1) Disadvantage - decreased/lack of genetic variation (1) - undesirable characteristics present in all offspring/ may increase susceptibility to diseases/ eq (1)	Ignore identical unqualified Accept genes for alleles Accept no need for fertilisation Ignore variation unqualified Accept no natural selection/ evolution /cannot adapt/	4

(Total for Question 4 = 11 marks)

Question Number	Answer	Mark
5(a)	D (Sensory neurone) <i>A is not the answer as Z is not the effector</i> <i>B is not the answer as Z is not the motor neurone</i> <i>C is not the answer as Z is not the receptor</i>	1

Question Number	Answer	Additional guidance	Mark
5(b)	An explanation that makes reference to the following points: • neurotransmitters (1) • <u>diffuse</u> across the synapse/gap between neurones (1) • bind to receptors (on post synaptic neurone) (1)		3

Question Number	Answer	Additional guidance	Mark
5(c)(i)	An answer that makes reference to two of the following points: • allows for unconscious control/ involuntary /automatic (1) • faster/immediate response (1) • to prevent damage to the eye/overstimulation of the retina/ eq (1)	Accept consequence of damage to retina eg. blindness Ignore reference to weak/clear vision	2

Question Number	Answer	Additional guidance	Mark
5(c)(ii)	An answer that makes reference to the following points: 1. ciliary muscles relax (1) 2. cause (suspensory) ligaments to tighten/stretch /eq (1) 3. lens becomes flattened/thinner/less curved/ less convex / eq (1) 4. to focus incoming rays on retina/ incoming rays are less bent (1)	Ignore circular/ radial muscles Ignore contract Accept less refraction of light Accept image formed on retina	4

(Total for Question 5 = 10 marks)

Question Number	Answer	Additional guidance	Mark
6(a)	An explanation that makes reference to the following points: • diploid (1) • egg (cell) / ovum (1) • (electric) shock / shock (1) • mitosis (1) • uterus / womb (1)	Accept 2n Reject mei... e.g. meiosis/ Accept mitosis Ignore endometrium	5

Question Number	Answer	Additional guidance	Mark
6(b)	An answer that makes reference to five of the following points: 1. most embryos made with cattle / fewest embryos made with goats / eq (1) 2. low success rate / few live births / few survive / pets usually live longer than two years / low life expectancy / eq (1) 3. cattle have highest survival rate (from live births) / goats have lowest survival rates (from live births) / eq (1) 4. goats have highest live birth rate / cattle have lowest live birth rate (1) 5. credit <u>manipulated</u> data (1) 6. cloning is expensive / not cost effective / more cost than buying a new pet / eq (1) 7. cloned pets are <u>genetically</u> identical / little <u>genetic</u> variation / could pass on harmful alleles / eq (1) 8. some variation is environmental / not all variation is genetic / some features of pets will not be same / eq (1) 9. no data for pets / pets may be different to farm animals / needs to be repeated for pets / eq (1) 10. raises ethical issues / may not be ethical / eq (1) 11. pet cloning could provide emotional benefits for people / eq (1)	Accept many attempts with cattle / few attempts with goats Accept most eggs / clones / embryos are wasted / very wasteful process Accept goats have highest (overall) survival rate (from embryos) / sheep have lowest (overall) survival rate (from embryos) Accept calculated percentages / fractions / ratios Accept not everyone can afford it Accept harmful genes would be the same in clones Accept behaviour / learning of pets may be different Accept may not be seen as moral	5

	% live birth	% of live birth surviving	% of embryos surviving
cow	1	73.33...	0.733...
sheep	1.42..	30	0.428571
goat	5	20	1

(Total for Question 6 = 10 marks)

Question Number	Answer	Additional guidance	Mark
7(a)	One from: • wear appropriate clothing/footwear/ eq (1) • do not directly handle invertebrates collected/wear gloves (1) • avoid direct contact with sewage from outlet (1) • avoid deep/fast running water/eq (1)	Ignore wear goggles/mask Accept life/safety /buoyancy jacket	1

Question Number	Answer	Additional guidance	Mark														
7(b)(i)	• scale half grid and linear (1) • axis labelled with organism name/sampling area (1) • axis labelled number of organisms (counted) (1) • bars plotted correctly +/- half small square (1) <table><tr><th rowspan="2">Organism name</th><th colspan="2">Number of organisms counted</th></tr><tr><th>sampling area A</th><th>sampling area B</th></tr><tr><td>mayfly nymphs</td><td>29</td><td>0</td></tr><tr><td>water striders</td><td>19</td><td>18</td></tr><tr><td>bloodworms</td><td>7</td><td>49</td></tr></table>	Organism name	Number of organisms counted		sampling area A	sampling area B	mayfly nymphs	29	0	water striders	19	18	bloodworms	7	49	Reject scales which do not start at zero. Accept x- and y-axes drawn either way around	4
Organism name	Number of organisms counted																
	sampling area A	sampling area B															
mayfly nymphs	29	0															
water striders	19	18															
bloodworms	7	49															

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	22% (2) One mark only for (67-55) or 12 seen in working OR division by 55	Accept 21.8(1818...) correctly rounded for both marks. correct answer without working scores full marks	2

Question Number	Answer	Additional guidance	Mark
7(c)	An answer that makes reference to five of the following points: 1. mayfly numbers decrease AND blood worm numbers increase (1) 2. contamination by sewage may reduce oxygen levels/area B is low oxygen/oxygen decreases from A to B/ eq (1) 3. due to respiration of bacteria/microorganisms (1) 4. water striders may not be affected (by oxygen levels) because they live on the surface (1) 5. number of water striders doesn't change/ water striders are present in both areas so not likely to be toxic metal contamination (1) 6. may not get an accurate count for each organism (1) 7. due to errors in identification/organism not being active when sample taken/organism living further from the bank etc (1) 8. appropriate suggestion of way validity could be improved (eg repeats, trials in other areas with similar conditions, direct measurement of oxygen levels etc) (1) 9. population may be affected by other factors eg. presence of toxins, different predators etc (1)	Accept small change in water striders	5

(Total for Question 7 = 12 marks)

Question Number	Answer	Additional guidance	Mark
8(a)	smallest gene chromosome nucleus largest cell		1

Question Number	Answer	Additional guidance	Mark
8(b)	33% (2) Only one mark for (17 x 2) or (17+17) OR 34 seen in working	Correct answer without working scores full marks	2

Question Number	Answer	Additional guidance	Mark
8(c)	A response that makes reference to the following points: • results in a different sequence on mRNA/different codon (1) • so will not match with correct tRNA/anticodon (1) • so different amino acid will be added to the polypeptide chain (1)	Accept will change anti codon Accept change in amino acid sequence	3

(Total for Question 8 = 6 marks)

Question Number	Answer	Additional guidance	Mark
9(a)	A response that makes reference to one linked pair from the following: • damage leaves/green parts of plant/eq (1) • preventing photosynthesis/growth (1) OR • damage fruit/seed/edible part of plant (1) • meaning plant no longer suitable for sale (1) OR • infection/transfer of pathogens (1) • which can damage/kill plants (1)	Accept consumption of sap	2

Question Number	Answer	Additional guidance	Mark
9(b)	An explanation that makes reference to six of the following points: 1. ladybirds/predatory species are specific /do not affect populations of non-pest species (1) 2. pests do not become resistant to biological control (1) 3. biological control does not need to be continually reapplied / is longer lasting (1) 4. biological control won't completely remove the aphids (1) 5. biological control is slower (1) 6. pesticides may accumulate in the food chain/ bioaccumulation / biomagnification (1) 7. pesticides may damage organisms higher up the food chain/be harmful to humans (1) 8. pesticides may lead to a reduction in biodiversity (1)	Ignore reference to pollution Accept reverse argument throughout	6

Question Number	Answer	Additional guidance	Mark
9(c)	An explanation that makes reference to three of the following points: 1. identify {bacterium/organism} with ability to produce pesticides/gene for pesticide production (1) 2. cut DNA with restriction enzyme (1) 3. production of sticky ends (1) 4. join with DNA ligase (1) 5. insert gene into target plant using a vector/eq (1)		3

(Total for Question 9 = 11 marks)

