



Mark Scheme (Results)

Summer 2025

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

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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)(i)	nucleus (1)	Accept found in the chromosomes	1

Question Number	Answer		Mark
1(a)(ii)	A response that makes reference to the following - double helix/ two strands (1) And one from: - has base pairs/complimentary bases (1) - contains hydrogen bonds (1) - polynucleotide/made up of nucleotides/eq (1) - sugar-phosphate backbone (1)	Accept A-T/G-C Accept description e.g. sugar, phosphate and base	2

Question Number	Answer	Additional Guidance	Mark
1(b)	homozygous (1)	Reject heterozygous Reject homologous	1

Question Number	Answer	Additional Guidance	Mark
1(c)	A response that makes reference to the following - selection of cattle with desirable trait/effective converter of feed/grows quickly (1) - cross/breed these cattle together (1) - across multiple generations/ repeated many times eq (1)	Ignore repeated /crossing of offspring unqualified	3

Question Number	Answer	Additional Guidance	Mark
1(d)	89 (%) (2) One mark only for (1030 – 545) or 485 OR division by 545	Accept any number of decimal places correctly rounded (88.9908.....)	2

Question Number	Answer	Additional guidance	Mark
1(e)	A response that makes reference to three of the following 1. mutation may result in triplet which codes for the same amino acid/ does not affect the amino acid sequence /idea of degenerate code / eq (1) 2. no change to protein / same protein made/ eq (1) 3. may not affect the bonding / active site / 3D shape of protein / protein still binds substrate / eq (1) 4. mutation may lead to recessive allele/ be recessive (1) 5. (recessive allele) not expressed in phenotype if it is heterozygous / dominant allele present / eq (1) 6. non-coding DNA / mutation not in a gene / eq (1)		3

(Total question 1 = 12 marks)

Question Number	Answer	Mark
2(a)	An answer that makes reference to the following: to kill any (harmful) bacteria already present / to make the milk safe for human consumption / eq (1)	1

Question Number	Answer	Additional Guidance	Mark
2(b)	An answer that makes reference to two of the following: decrease in pH/ becomes more acidic (1) - proteins in the milk denature / change shape / eq (1) - milk/proteins become (semi) solid/ eq (1)	Ignore reference to optimum pH or enzyme activity Ignore milk becomes sour Ignore proteins are broken down Accept milk becomes thicker/creamier	2

Question Number	Answer	Additional Guidance	Mark
2(c)	An answer that makes reference to three of the following: 1. add a cover / lid / eq (1) 2. use aseptic technique / sterilise petri dishes (before adding <i>Lactobacillus</i>) (1) 3. leave for longer (1) 4. test more (than two) temperatures / use a wider range of temperatures (1) 5. keep in a temperature-controlled environment/ incubator/ water bath/ measure temperature / use a thermometer /eq (1) 6. control (starting) pH / use pH buffer / eq (1) 7. control starting volume/ density/concentration of <i>Lactobacillus</i> (1) 8. ensure same volume/ concentration / surface area of nutrient agar/medium 9. measure percentage cover/count colonies present/ measure <u>dry mass</u> / eq (1) 10.repeat test more than once (for each temperature) (1)	Ignore same time Ignore same temperature unqualified Accept same amount of nutrients Ignore measure mass of agar plate	3

(Total question 2 = 6 marks)

Question Number	Answer	Mark
3(a)	is a primary consumer = zooplankton (1) photosynthesises = phytoplankton/ ice algae (1) is in the fourth trophic level = seal/ sea birds (1)	3

Question Number	Answer		Mark
3(b)	- a correct food chain that has 5 trophic levels and includes the Arctic cod (2) For one mark only: - a correct food chain that has five trophic levels but does not include the Arctic cod (1) OR - A correct food chain that includes the Arctic cod but does not have five trophic levels (1) Original food web <pre> graph BT phytoplankton --> zooplankton ice_algae[ice algae] --> zooplankton zooplankton --> marine_amphipods[marine amphipods] zooplankton --> arctic_cod[Arctic cod] marine_amphipods --> seals arctic_cod --> seals arctic_cod --> sea_birds[sea birds] seals --> killer_whales[killer whales] </pre>	Accept a correct pyramid of numbers with five trophic levels including the Arctic cod for one mark only	2

Question Number	Answer		Mark
3(c)	An answer that makes reference to three of the following: 1. loss of habitat for ice algae/decreased numbers of ice algae (1) 2. less food for zooplankton/ decreased numbers of zooplankton (1) 3. initially decrease numbers of Arctic cod/ lack of food for Arctic cod/ increased competition between Arctic cod / eq (1) 4. number of sea birds may also decrease, decreasing predation of Arctic cod (1) 5. number of seals may decrease, decreasing predation of Arctic cod (1)	Accept Arctic cod will die Accept idea of zooplankton increasing consumption of phytoplankton	3

(Total question 3 = 8 marks)

Question Number	Answer	Additional Guidance	Mark
4(b)(ii)	An answer that makes reference to the following: • more white blood cells / larger <u>middle</u> layer (1) • increased white blood cell production / idea of clonal expansion / eq (1) • example of how white blood cells counteract pathogens e.g. (lymphocytes) produce antibodies / (phagocytes) engulf pathogens / creation of memory cells (1)	Accept named WBC Ignore red blood cells Ignore platelets Ignore fight pathogens/ infection unqualified	2

Question Number	Answer	Additional guidance	Mark
4(b)(iii)	An answer that makes reference to the following: 1. fewer red blood cells in sample from person B than sample from person A (1) 2. presence of less haemoglobin in sample from person B (1) 3. less oxygen can be carried by RBC in person B (1) 4. decreased <u>aerobic</u> respiration (1) 5. less energy released/ ATP produced (1)	ORA throughout Accept person B may be anaemic Accept RBC contain haemoglobin Accept less oxygen in body / reaches the cells	3

Total question 4 = 8 marks)

Question Number	Answer	Additional Guidance	Mark
5(a)	An answer that makes reference to the following: Name amniotic fluid (1) Function protection (of the fetus) (1)	Accept amniotic sac	2

Question Number	Answer	Additional guidance	Mark
5(b)(i)	day 14 (1)	Accept day in range 13-15	1

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	An answer that makes reference to the following: 1. oestrogen and progesterone released by the ovaries (1) 2. oestrogen released by developing follicle (1) 3. oestrogen causes the lining of the uterus to thicken/ build /eq (1) 4. progesterone released after ovulation / from corpus luteum (1) 5. progesterone maintains the lining of the uterus (1) 6. low levels progesterone and oestrogen cause menstruation (1) 7. (high level of) progesterone inhibits ovulation (1)	Accept oestrogen repairs uterus lining Ignore progesterone thickens the uterus lining Accept answers in terms of FSH and LH Oestrogen stimulates the production of LH/inhibits the production of FSH Progesterone inhibits production of LH/ inhibits production of FSH	4

Question Number	Answer	Additional Guidance	Mark
5(c)	An answer that makes reference to two of the following: • increased/early growth of body hair (1) • deeper voice / voice breaking/ eq (1) • increased height/ tall for age/ more muscle mass / eq (1) • enlarged prostate (in boys) (1) • development of acne (1)	Accept decreased fertility / lack of /irregular periods (in girls) Accept (increased) sperm production (in boys) If no other marks given award 1 mark for early/precocious puberty.	2

(Total question 5 = 9 marks)

Question Number	Answer	Additional Guidance	Mark
6(a)	An answer that makes reference to three of the following: 1. use quadrat (1) 2. stated method for randomisation eg. random number generator, dice rolls etc (1) 3. large sample size/stated number of quadrats counted (1) 4. calculation of abundance per m² / calculate average number in quadrat (1) 5. multiply abundance per m² by total area of forest to get population size / scale up to total area / eq (1) 6. Repeat in forest A and forest B/record data for both forests / eq (1)	Reject idea of throwing quadrats Ignore compare population size unqualified	3

Question Number	Answer	Additional Guidance	Mark
6(b)	A response that makes reference to five of the following: 1. biodiversity is a measure of number of different species present / eq 2. forest A has 84 species, forest B has 111 species / forest B has more species than forest A/ forest B has greater species richness (1) 3. indicates forest B is more biodiverse (1) 4. some organisms/species may not be counted / not included in the table (1) 5. data would not include species present during different seasons / data should be collected in other months/over a longer period / eq (1) 6. data would not include nocturnal mammals/birds / data should also be collected at night time / eq (1) 7. some species may not be correctly identified/ may be miscounted (1) 8. there is no information about abundance / number of organisms for each species (1) 9. table does not take into account the different sizes of the two forests (1)	Accept table gives information about the number of different species Accept named comparison from table Accept only looked at a few types of organism Accept all samples taken in one season only	5

(Total question 6 = 8 marks)

Question Number	Answer	Addition Guidance	Mark
7(a)(i)	An answer that makes reference to the following: - shoots have grown (rapidly) upward/long (1) - allows plant to reach the light/ to find light / get more light / eq (1)	Accept elongated / taller Reject phototropism	2

Question Number	Answer	Additional Guidance	Mark
7(a)(ii)	An answer that makes reference to four of the following: (positive) phototropism (1) - due to auxins (1) (auxins) in the tip of the shoot (1) (auxins) diffuse to shaded side of the plant / more auxins on dark side / eq (1) - cell elongation/growth on one side of the stem / shaded side gets longer / eq (1)	Accept one side grows faster	4

Question Number	Answer	Additional Guidance	Mark
7(b)	Positive (1) geotropism/geotropic (1)	Accept positive gravitropism	2

Question Number	Answer	Additional Guidance	Mark
7(c)	20 (2) One mark only for (182.5-102.5) OR 80 seen in working OR Division by 4 or division by (11-7)	Award 2 marks for value in range 18-21 Accept values +- 2.5	2

(Total question 7 = 10 marks)

Question Number	Answer	Mark
8(a)	mass of fertiliser added	1

Question Number	Answer	Additional Guidance	Mark																
8(b)(i)	• scale half grid and linear (1) • both axes labelled including units (1) • axes correct way round with mass of fertiliser on x axis(1) • points correctly plotted (1) <table><tr><th>Mass of fertiliser added in grams</th><th>Mass of wheat seeds in grams</th></tr><tr><td>0</td><td>190</td></tr><tr><td>1</td><td>240</td></tr><tr><td>2</td><td>280</td></tr><tr><td>3</td><td>310</td></tr><tr><td>4</td><td>320</td></tr><tr><td>5</td><td>330</td></tr><tr><td>6</td><td>340</td></tr></table>	Mass of fertiliser added in grams	Mass of wheat seeds in grams	0	190	1	240	2	280	3	310	4	320	5	330	6	340	+/- half a small square Reject if plotted on non linear scale	4
Mass of fertiliser added in grams	Mass of wheat seeds in grams																		
0	190																		
1	240																		
2	280																		
3	310																		
4	320																		
5	330																		
6	340																		

Question Number	Answer	Additional Guidance	Mark
8(b)(ii)	Curve of best fit drawn as a smooth curve (1)	Accept linear section from 3-6g Reject straight line of best fit if points plotted on non linear scale.	1

Question Number	Answer	Additional Guidance	Mark
8(c)	An answer that makes reference to three of the following: 1. Experimental results grown under optimum conditions/ temperature controlled/ consistent light intensity/ same carbon dioxide level /same volume of water provided /eq (1) 2. conditions in glasshouse increase yield/ growth/photosynthesis of wheat plants (1) 3. wheat grown in fields may be affected by pests/disease/eaten by animals / eq (1) 4. (weeds/other plants) may compete with wheat plants for resources/decrease growth/eq (1) 5. wheat grown in small space may and not behave the same way on a larger scale / eq (1)	ORA throughout Accept wheat in glasshouse has no limiting factors Accept there is lower yield/ growth in fields Ignore presence of pesticides	3

(Total question 8 = 9 marks)

Question Number	Answer	Mark
9(a)(i)	xylem	1

Question Number	Answer	Additional Guidance	Mark
9(a)(ii)	An answer that makes reference to the following: - method to ensure plants are genetically identical/similar (1) - grow plants in different (named) conditions (1) - measure the root length of both plants/ eq (1)	E.g. use cuttings from the same plant, cloning etc Accept use same species of plant E.g. grown in soil with different amounts of water	3

Question Number	Answer	Additional Guidance	Mark
9(b)	An answer that makes reference to the following: - correct adaptation e.g. ears have large surface area/blood supply close to the surface (1) - linked to survival in hot environments e.g. to maximise heat loss / maintain body temperature (1) <u>genetic</u> variation (1) - due to mutation (1) - hares with larger ears survive and reproduce / survival of the fittest/ eq (1) - pass on alleles/genes / larger ears to offspring (1)	Ignore large ears unqualified Ignore survive unqualified	6

(Total question 9 = 10 marks)

Question Number	Answer	Mark
10(a)(i)	D (proximal convoluted tubule) A is not correct as U is not the Bowman's capsule B is not correct as U is not the collecting duct C is not correct as U is not the loop of Henle	1

Question Number	Answer	Mark
10(a)(ii)	D (ultrafiltration) A is not correct as it is not ADH production B is not correct as it is not selective reabsorption C is not correct as it is not transpiration	1

Question Number	Answer	Mark
10(a)(iii)	D (Q) A is not correct as S is the glomerulus B is not correct as T is the Bowman's capsule C is not correct as P is the distal convoluted tubule	1

Question Number	Answer	Additional guidance	Mark
10(b)(i)	Calculation steps not mark points Full marks for correct answer $0.1 \times 5 \times 1000/100$ $= 5 (2)$	Allow one mark for $\times 10$ or $\times (1000/100)$ or $\times 5$ or 5 in answer eg 0.05 0.5 etc	2

Question Number	Answer	Mark
10(b)(ii)	An explanation that makes reference to two of the following • protein molecules too large / large mass / too heavy / eq (1) • cannot pass out of glomerulus / into Bowman's capsule / into nephron / into tubules / through basement membrane / eq (1) • so stay in blood / not in filtrate / eq (1)	2

Question Number	Answer	Mark
10(b)(iii)	An explanation that makes reference to two of the following • glucose passes out of glomerulus / into Bowman's capsule / into nephron / into tubules / through basement membrane / eq (1) • (then) reabsorbed / back into blood / eq (1) • by active transport / eq/ (1) • in proximal convoluted tubule / PCT/ eq (1)	3

(Total question 10 = 10 mark

