Mark Scheme (Results)

Summer 2022

Pearson Edexcel International GCSE In Biology (4BI1) Paper 1BR

Question Number	Answer	Additional guidance	Mark
1(a)(i)	D is the only correct answer A is incorrect as it is the vacuole B is incorrect as it is cytoplasm C is incorrect as it is the cell membrane		**1**

Question Number	Answer	Additional guidance	Mark
1(a)(ii)	A is the only correct answer B is incorrect as animal cells have cytoplasm C is incorrect as animal cells have a cell membrane D is incorrect as animal cells have a nucleus		**1**

Question Number	Answer	Additional guidance	Mark
1 (a)(iii)	D (starch) is the only correct answer A is incorrect as glucose is not a storage molecule B is incorrect as glycerol is not a carbohydrate C is incorrect as plant cells do not have glycogen		**1**

Question Number	Answer	Additional guidance	Mark
1 (b)	These are calculation steps • correct measurement of line as 50 mm	**one** mark for correct measurement of line +/- 1 mm i.e. **one mark** for 50 (mm) or 5 cm	**3**
	• correct conversion of micrometres to millimetres or millimetres to micrometres	**one mark** for length × 1000 OR 0.125 (mm)	
	• correct division of 50 000 μm by 125 **or** correct division of 50 mm by 0.125	**one mark** for dividing by 125	
		two marks for 50 000 (μm) (measurement and conversion) OR **two marks** for (X) 0.4 or (x) 4 or (x) 40 or (x) 40 000	
	(×) 400 (3)	**Allow answer in the range of (x) 392 to (x) 408 for three marks** **Ignore** other units	

Total for question 1= 6 marks

Question Number	Answer	Additional guidance	Mark
2 (a)(i)	B (fungi) is the only correct answer A is incorrect as animals are not single celled C is incorrect as plants do not have chitin or are single celled D is incorrect as protoctists do not have chitin		**1**

Question Number	Answer	Additional guidance	Mark
2(a)(ii)	An answer that makes reference to one of the following: • (viruses) do not grow (1) • (viruses) do not respire (1) • (viruses) are not sensitive / have internal control / eq (1) • (viruses) do not move (1) • (viruses) do not excrete (1) • (viruses) do not reproduce (independently) / need a host to reproduce / eq (1) • (viruses) do not feed / have a nutritional need / eq (1)	**Allow** do not carry out life processes / do not have all the characteristics of life /do not have MRSGREN(C) **Ignore** need another living organisms / host to live / survive **Ignore** need to live inside another cell	**1**

Question Number	Answer	Additional guidance	Mark
2(b)	An answer that makes reference to the following: • restriction (enzymes) cut DNA /gene / plasmid / open plasmid / remove gene / eq (1) • ligase joins DNA to plasmid / joins DNA / joins sticky ends / inserts DNA / attaches DNA / eq (1)	**Allow** endonuclease **Reject** lipase	**2**

Question Number	Answer	Additional guidance	Mark
2 (c)(i)	An explanation that makes reference to three of the following: • respiration / fermentation / (chemical) reactions, releases heat (energy) (1) • checks / monitor, temperature **<u>and</u>** lets (cooling) water in / open valve / water is pumped around / eq (1) • lowers temperature / removes heat / prevents over heating / stops temperature getting too high (1) • maintain <u>optimal temperature</u> / <u>optimum temperature</u> (1) • stop <u>enzymes</u> denaturing / stops <u>enzyme</u> shape changing / eq (1)	**Ignore** cools it down alone	**3**

Question Number	Answer	Additional guidance	Mark
2 (c)(ii)	An explanation that makes reference to two of the following: • (provides) oxygen (1) • for respiration / prevent anaerobic respiration (1)	**Reject** <u>for</u> anaerobic respiration	**2**

Question Number	Answer	Additional guidance	Mark
2 (c)(iii)	An explanation that makes reference to two of the following: • prevent other microbes / bacteria / fungi / pathogens / eq (1) • prevents <u>contamination / contaminate</u> (of product) / toxins (being released) / competition (for nutrients) / eq (1)	**Allow** remove bacteria / keep sterile **Ignore** germs / keep clean	**2**

(Total for Question 2 = 11 marks)

Question Number	Answer	Additional guidance	Mark
3 (a)(i)	A (beavers) is the only correct answer A is incorrect as coyote are secondary consumers B is incorrect as grass is a producer C is incorrect as wolf is a secondary and tertiary consumer		**1**

Question Number	Answer	Additional guidance	Mark
3(a)(ii)	An answer which makes reference to: • community and environment / biotic and abiotic parts / <u>all</u> organisms and the environment / <u>all</u> living things and non-living things / the environment and community / eq	**Ignore** area **Allow** habitat	**1**

Question Number	Answer	Additional guidance	Mark
3(b)	An answer which makes reference to four of the following: • fewer elk / coyote were consumed / more elk (present) / more coyote (present) (1) • more consumption of plants / producers (by elk) / fewer producers / less grass / eq (1) • less food for mice (1) • more beavers eaten / more mice eaten (by coyotes) / eq (1) • old trees not removed (1) • younger trees are shaded / less photosynthesis / less energy fixed / enters ecosystem / eq (1) • less food for hawk / fewer mice for hawk / eq (1) • soil erosion (due to loss of plants) (1) • fewer shelters / habitats / nesting places (for organisms) (1)	**Allow** fewer elk / coyote hunted (by wolves) **Allow** fewer trees / fewer smaller plants / loss of plants **Ignore** no / fewer beavers	**4**

Question Number	Answer	Additional guidance	Mark
3(c)(i)	• 180 – 50 = 130 • (130 ÷ 50) x 100 **260 (%) (2)**	**two marks** for 260 (%) **one mark for** 180 – 50 **or** 130	**2**

Question Number	Answer	Additional guidance	Mark
3 (c)(ii)	An answer that makes reference to two of the following: • food begins to run out / eq (1) • disease (spread) (1) • hunting (1) • new competitors / (high) competition / new predators (1) • loss of habitat (1) • migration (1)	**Allow** coyote / elk numbers fall / eq **Allow** more bears / cougars	**2**

Question Number	Answer	Additional guidance	Mark
3(c)(iii)	An description that makes reference to three of the following: • grid area / <u>quadrat</u> (1) • random (placement) / eq (1) • calculate / measure / count plants / eq (1) • repeat / calculate mean (1) • scale up for whole area (1)	**Ignore** quadrant quadrat<u>s</u> = 2 mark	**3**

(Total for Question 3 = 13 marks)

Question Number	Answer	Additional guidance	Mark
4(a)(i)	B (bronchus) is the only correct answer A is incorrect as bronchioles have no cartilage B is incorrect as oesophagus leads to stomach C is incorrect as there is only one trachea		**1**

Question Number	Answer	Additional guidance	Mark
4 (a)(ii)	An explanation that makes reference to three of the following: • (S / (diaphragm)/ it) contracts (1) • flattens / presses down / moves down / less dome shaped / eq (1) • increases volume (1) • decreases pressure / air flows in down pressure gradient / eq (1)	**Ignore** more space **Allow** low pressure	**3**

Question Number	Answer	Additional guidance	Mark
4(b)(i)	• (cycling) speed (1)		**1**

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	• conversion of dm^3 to cm^3 (65 000) • 65 000 ÷ 25 **2600 (cm^3) (2)**	**one mark** for 65 000 **OR** division by 25 **two marks** for 2600	**2**

Question Number	Answer	Additional guidance	Mark
4(b)(iii)	An answer that makes reference to four of the following: • ventilation (rate) increases (1) • (take in) more oxygen / eq (1) • (release) more energy / ATP / high(er) respiration rate (1) • more / faster muscle contraction (1) • volume of air breathed per breath increases as speed increases (1) • breathing rate increases from 20 / 25 km per hour / breathing rate does not increase between 0 – 20 km per hour (1) • increase in volume of air per breath gets less as cycling speed increases / volume of air per breath stops increasing above 30 km per hour (1)	**Allow** positive correlation between ventilation rate and speed **Allow** depth of breathing **Allow** up to 20 km per hr increase is due to increased volume of air each breath / depth of breathing **Allow** at over 20 km per hr, increase is due to increased rate of breathing	**4**

Question Number	Answer	Additional guidance	Mark
4 (b)(iv)	• repeat / calculate average / mean / more cyclists / more people / eq (1)	**Allow** use other people	**1**

(Total for Question 4 = 12 marks)

Question Number	Answer	Additional guidance	Mark
5(a)(i)	• section / length / part / eq, of DNA / chromosome, that codes for a protein / polypeptide (1)	**Ignore** strand	**1**

Question Number	Answer	Additional guidance	Mark
5(a)(ii)	FF <u>and</u> Ff	**Allow** FF and fF **Allow** FF, Ff, and fF **Allow** alternative letters	**1**

Question Number	Answer	Additional guidance	Mark
5(b)(i)	C (4) is the only correct answer A is not correct as 1, 4, 5 and 6 must be heterozygous B is not correct as 2, 3 and 7 must be homozygous D because only 2, 3 and 7 are not heterozygous		**1**

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	An answer that makes reference to: • parental genotypes of Ff and ff (1) • gametes as F + f <u>and</u> f (+ f) (1) • correct F_1 genotypes (Ff, ff) in correct ratio (1) • 0.5 / 50% / ½ (1)	MP1-3 from Punnet square **Allow** ecf **ONLY** for MPs 2 and 3 with incorrect parental genotypes **Allow** different letters	**4**

Question Number	Answer	Additional guidance	Mark
5 (b)(iii)	An answer that makes reference to three from: • feather is discontinuous / categoric / height is continuous / eq (1) • height is <u>polygenic</u> (1) • height depends on the combination of many / several, genes / not just one gene / eq (1) • height may have environmental effects (1) • feather structure is due to one gene / monogenic (1) • height depends on sex (1)	**Allow** named factors e.g. nutrition	**3**

(Total for Question 5 = 10 marks)

Question Number	Answer	Additional guidance	Mark
6 (a)(i)	C (X and Z) is the only correct answer A is incorrect because the pancreas also produces amylase B is incorrect because the stomach does not produce amylase D is incorrect because the stomach does not produce amylase		**1**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>6(a)(ii)</td><td>
<table>
<tr><th>Enzyme</th><th>Molecule</th><th>Product</th></tr>
<tr><td>amylase</td><td>starch</td><td>maltose</td></tr>
<tr><td>lipase</td><td>lipid</td><td>fatty acids / glycerol</td></tr>
<tr><td>protease</td><td>protein</td><td>amino acids / (poly)peptide</td></tr>
</table>
one mark for each correct row (3)
</td><td></td><td>3</td></tr>
</table>

Question Number	Answer	Additional guidance	Mark
6(b)(i)	• calculate mass of lentils that has 1 g of protein 100 ÷ 25 = 4 g of lentils has 1 g of protein • scale up to 46 g of protein 46 x 4 **184 (2)**	184 = **two marks** **one mark** for ÷ 25 or ×4	**2**

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	An answer that makes reference to five of the following: • excess energy may lead to obesity / eq (1) • (excess energy / obesity) increases risk of diabetes / joint damage / heart disease / eq (1) • enough protein / protein is same as RDA, so growth should be normal (rate) / eq (1) • enough vitamin A / vitamin A is same as RDA so no risk of night blindness / eye problems / vision is normal / eq (1) • vitamin C is low so may be at risk of scurvy / eq (1) • calcium is too low so may be at risk of rickets / osteoporosis / eq (1) • enough iron / iron is same as RDA so no risk of anaemia / can make red blood cells / haemoglobin / no problems carrying oxygen (1) • fibre is low so risk of constipation / can't egest / release faeces / eq (1) • data does not list other named dietary components / eq (1) • no mention of activity levels / sex / age / pregnancy / eq of person (1)	**max three** for effects with no link to RDA e.g. they will become obese **Allow** puts weight on / get fat **Allow** can build muscle / can grow **Allow** more risk of gums bleeding / connective tissue problems / collagen /have healthy skin **Ignore** waste unqualified **max three** for descriptions of functions of dietary components with no ref to deficiency e.g. vitamin C is for healthy skin	**5**

Question Number	Answer	Additional guidance	Mark
6(b)(iii)	An answer that makes reference to two of the following: • activity / exercise / active lifestyle / sport / job (may affect energy need) / eq (1) • pregnancy (may affect energy need) (1) • different metabolic rate (1) • age (may affect energy need) (1) • sex (may affect energy need) (1) • body mass / weight / (may affect energy need) (1)	**Ignore** size	**2**

(Total for question 6= 13 marks)

Question Number	Answer	Additional guidance	Mark
7 (a)	• different /several group of tissues (1)	**Ignore** made of tissues **Allow** made of different cell types	**1**

Question Number	Answer	Additional guidance	Mark
7 (b)(i)	An explanation that makes reference to three of the following: • increased blood flow to skin (surface) / increased blood flow through capillaries / eq (1) • (because) <u>vasodilation</u> occurs (1) • arteriole / blood vessel widens / expands / eq (1)	**Reject** movement of blood vessels **Reject** vasodilation <u>of</u> capillaries / veins **Reject** capillaries / veins widen	**3**

	• (increased) heat loss (1) • by radiation / convection (1)	**Allow** cools **Ignore** refs to sweat / heat evaporates	

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	An answer that makes reference to six of the following: C – drinks of different temperatures / warm drink and cold drink / eq (1) O – people of same age / mass / sex / fitness / body temperature / eq (1) R – repeats / several people / groups / eq (1) M1 – mass of sweat / volume of sweat / weigh cotton wool / weigh shirt / area of sweat /colour of cloth on skin / count sweat drops / eq (1) M2 – over <u>stated</u> time period (1) S1 – same exercise / food / water / volume of drink / type of drink / same clothes / material / eq (1) S2 - same room temperature / air conditioned room / humidity / time of day / eq (1)	**Allow** same person **Ignore** amount **Ignore** body mass **two marks** for time taken to produce set mass / set volume / eq of sweat for M1 and M2	**6**

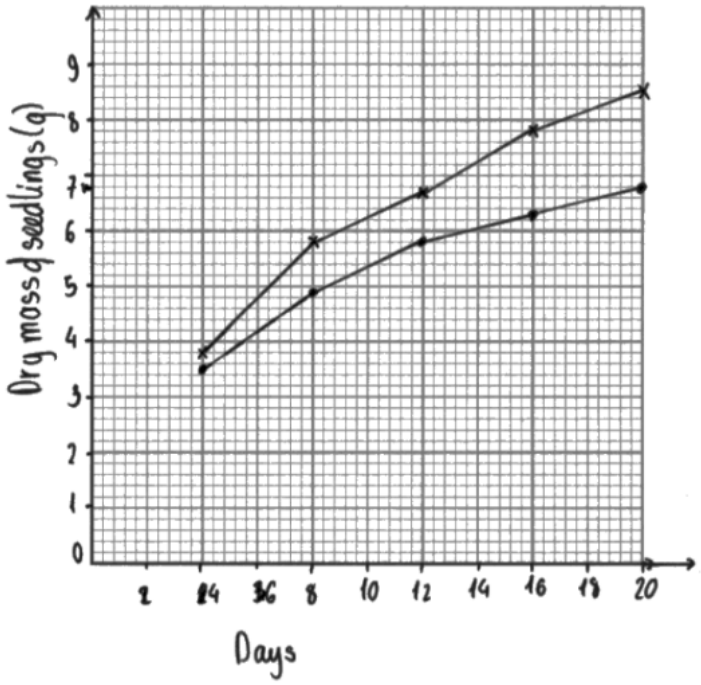
(Total for question 7= 10 marks)

Question Number	Answer	Additional guidance	Mark
8 (a)(i)	An answer that makes reference to two of the following: • light (intensity) / lamp / eq (1) • water volume / watering frequency (1) • mass /weight, of compost (1)	**Ignore** amount **Ignore** fertiliser	**2**

Question Number	Answer	Additional guidance	Mark
8 (a)(ii)	An answer that makes reference to two of the following: • water (content) would vary / water increases the mass / adds mass / makes seeds heavier / some seeds would absorb more water than others (1) • so comparison is valid / fair comparison (1) • water is not biomass / dry mass is the true biomass / (dry mass is) organic molecules (1)	**Allow** water changes mass **Ignore** accuracy / reliable **Ignore** fair test alone **Allow** converse for all MPs	**2**

Question Number	Answer	Additional guidance	Mark
8(b)(i)	S – linear scale that takes up at least half of grid **and** right way round (1) L – ruled, straight lines that join points with no extrapolation (1) A – axes fully labelled with units (1)	**Allow** S, L, A if only one line Bar chart loses L Axes labels are mass (g) and day	**5**

	P – all points correct (1) K – key for each line / each line labelled (1)	<table><tr><th rowspan="2">Day</th><th colspan="2">Dry mass of seedlings in g</th></tr><tr><th>Without fertiliser</th><th>With fertiliser</th></tr><tr><td>4</td><td>3.5</td><td>3.8</td></tr><tr><td>8</td><td>4.9</td><td>5.8</td></tr><tr><td>12</td><td>5.8</td><td>6.7</td></tr><tr><td>16</td><td>6.3</td><td>7.8</td></tr><tr><td>20</td><td>6.8</td><td>8.5</td></tr></table>	



Question Number	Answer	Additional guidance	Mark
8 (b)(ii)	An answer that makes reference to four of the following: • magnesium ions (increase) chlorophyll / chloroplasts (1) • (so more) photosynthesis (1) • (which produces) carbohydrates / glucose / starch / cellulose / eq (1) • nitrate ions for amino acids (1) • (nitrate / amino acid) for protein (synthesis for growth) (1)	If no other marks, award **one mark** for making chlorophyll <u>and</u> amino acids / protein with no ref to minerals **Allow** for enzymes	**4**

(Total for Question 8 = 13 marks)

Question Number	Answer	Additional guidance	Mark
9 (a)(i)	X: stigma (1) Y: anther (1)		**2**

Question Number	Answer	Additional guidance	Mark
9 (a)(ii)	An explanation that makes reference to three of the following: • insect (pollination) / bee / eq (1) • (because it has) large petals / eq (1) • (and) Y / anthers / stamen, within the flower / not hanging out / eq (1) • (and) X / stigma within the flower / not feathery / not hanging out / eq (1)	**Ignore** colours / scents / bright / nectar(y) **Allow** the structures given in part (i) are within the petals if they are correct	**3**

Question Number	Answer	Additional guidance	Mark
9 (b)(i)	*ungerminated seeds*: starch (1) *germinating seeds*: starch and, <u>glucose</u> / <u>sugar</u> / <u>maltose</u> (1)	**Reject** if additional incorrect substances listed e.g. protein, fats **Reject** if additional incorrect substances listed e.g. protein, fats	**2**

Question Number	Answer	Additional guidance	Mark
9 (b)(ii)	An explanation that makes reference to three of the following: *In ungerminated seeds:* • starch is for (energy) storage (1) • as it is insoluble / does not affect osmosis / eq (1) *In germinating seeds:* • (water activates) enzymes / amylase / carbohydrase (1) • digests / converts / breaks down starch into maltose / glucose / sugar (1) • (glucose is used in) respiration / for energy (1)	**Allow** converse throughout **Allow** starch is a store **Allow** starch not broken down into glucose in ungerminated seeds **Allow** less / no respiration in ungerminated seed	**3**

Question Number	Answer	Additional guidance	Mark
9 (b)(iii)	An explanation that makes reference to two of the following: • allows oxygen in (1) • for germination / respiration / eq (1) • allows carbon dioxide to escape / eq (1)	**Ignore** oxygen and carbon dioxide **Reject** if carbon dioxide <u>for</u> respiration **Ignore** light / references to photosynthesis	**2**

(Total for Question 9 = 12 marks)

Question Number	Answer	Additional guidance	Mark
10 (a)(i)	• nucleus (present) (1)	**Allow** converse	**1**

Question Number	Answer	Additional guidance	Mark
10 (a)(ii)	An explanation that makes reference to two of the following: • (shape gives) lower surface area (to volume ratio) (1) • less space / nucleus takes up space (in cell) (1) • (less space for) haemoglobin (1) • less diffusion / less oxygen absorbed / less oxygen taken up / eq (1)	**Allow** converse for human cells **Allow** less volume (for oxygen) **Ignore** gas exchange	**2**

Question Number	Answer	Additional guidance	Mark
10 (b)	An explanation that makes reference to four of the following: • mutation (1) • variation (in haemoglobin / how much oxygen is absorbed) (1) • llamas survive / compete better / eq (1) • reproduce / create offspring / eq (1) • pass on allele / gene / eq (1)	Pass on allele to offspring / next generation = **two marks** **Ignore** pass on characteristic	**4**

Question Number	Answer	Additional guidance	Mark
10 (c)	A description that makes reference to three of the following: • engulf / eq (1) • microbes / pathogens / bacteria / viruses / eq (1) • digest / break down (1) • using enzymes (1)	**Allow** ingest Digestive enzymes is **2 marks**	**3**

(Total for Question 10 = 10 marks)