



Pearson
Edexcel

Mark Scheme (Results)

Summer 2023

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 2BR

Question Number	Answer	Mark
1(a)	<ul style="list-style-type: none"> in a test tube / culture dish / jar / glass / petri dish / container / in culture solution / in a lab / outside a living organism / eq (1) 	1

Question Number	Answer	additional guidance	Mark
1(b)	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> plant cells can differentiate / eq (1) into all / different types / kinds of tissues or cells / specialised cells eq (1) throughout the plants life / eq (1) can form / regenerate (whole) new plant / eq(1) 	<p>allow converse for human cells</p> <p>only stem cells can</p> <p>only embryonic</p>	2

Question Number	Answer	additional guidance	Mark
1(c)	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • mineral 1 (1) • function (1) • mineral 2 (1) • function (1) 	<p>allow for eg</p> <p>named minerals</p> <p>to get function mineral must match</p> <p>no mineral no function</p> <p>not just for growth</p> <p>nitrate</p> <p>amino acids / proteins / DNA/ nucleic acids /eq</p> <p>Magnesium</p> <p>chlorophyll / chloroplasts / photosynthesis</p> <p>Phosphate</p> <p>ATP / DNA / RNA / nucleic acids / cell membranes/ eq</p> <p>Calcium</p> <p>cell wall / cell membranes / eq</p> <p>Potassium</p> <p>stomatal opening / eq</p> <p>allow other correct mineral ions</p> <p>ignore nitrogen / nitrites / phosphorous /</p>	4

Question Number	Answer	additional guidance	Mark
1(d)	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • <u>enzyme</u> affected by pH / by acid / by alkali / works best at optimum (1) • shape of active site changed / substrate can no longer bind / fit / eq (1) • <u>enzyme</u> / <u>active site</u> denatured (1) 	to score mp 1 must mention enzymes somewhere in answer	2

Question Number	Answer	additional guidance	Mark
1(e)	<p>A description that makes includes three of the following points:</p> <ul style="list-style-type: none"> • (shoot) in light from one side / unidirectional light / eq (1) • (shoot) in darkness / light all around / light from other side / eq (1) • leave for both for stated time / use shoots of same type / same temperature / same water / other control variable / eq (1) • description of bending or growing towards light or measure angle / look at curve / bending / eq (1) 	allow leave for a few days	3

Question Number	Answer	additional guidance	Mark
1(f)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • maintain biodiversity / reduce damage to food chains / ecosystems / eq (1) • prevent extinction (1) • keep (species / varieties / genotypes) for future generations / future use / eq (1) • in case climate changes / eq (1) • for medicinal properties / eq 	ignore increase biodiversity	2

Question Number	Answer	Mark
1(g)	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • (agitation) to mix contents / mix media / mix oxygen / mix carbon dioxide (with plant cells) / substrates with plant cells / take up minerals / take up nutrients / eq (1) • (light) for photosynthesis / eq (1) • (suitable temperature) for enzyme action / eq (1) 	3

Total = 17 marks

Question Number	Answer	Mark
2(a)(i)	<p>The only correct answer is D (I is the vacuole)</p> <p>A is not correct as F is the cell wall</p> <p>B is not correct as G is the nucleus</p> <p>C is not correct as H is the cytoplasm</p>	1

Question Number	Answer	Mark
2(a)(ii)	<p>The only correct answer is B (G is the nucleus)</p> <p>A is not correct as F is the cell wall</p> <p>C is not correct as H is the cytoplasm</p> <p>D is not correct as J is a mitochondrion</p>	1

Question Number	Answer	additional guidance	Mark
2(b)	<p>correct measurement of P to Q</p> <p>conversion to μm</p> <p>division of PQ \div actual length</p> <p>correct answer = 475 (3)</p> <p>allow 450-500 for 3 marks</p> <p>allow in standard form (4.75×10^2)</p>	<p>allow 36-40 mm</p> <p>or 3.6 to 4.0 cm</p> <p>for correct measurement with units 1 mark</p> <p>and 1 m a r k for $\div 80$</p>	3

Question Number	Answer	additional guidance	Mark
2(c)	<p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • long (root hair) / reaches into soil / penetrates / branches / eq (1) • increases surface area (1) • to absorb water / eq (1) • by osmosis (1) • to absorb minerals / ions / eq • by diffusion (1) • active transport (1) 	protuberance	4

Total = 8 marks

Question Number	Answer		Mark
3(a)	<p>mass of starch ÷ mass of carbohydrate</p> <p>× 100</p> <p>98% (2)</p>	<p>allow 1 mark for ÷ 68</p> <p>allow 97.8 / 97.79 / 97.794 etc for 2 marks</p>	2

Question Number	Answer	additional guidance	Mark
3(b)	<p>An answer that that makes reference to four of the following points:</p> <p>biscuit B , difference and explanation</p> <ol style="list-style-type: none"> 1. less energy/ kJ so less stored as fat / less weight gain / stored fat used for energy / eq (1) 2. less lipid / so less (energy) stored as fat / less weight gain / less blood cholesterol / less risk of CHD / eq (1) 3. less sugar / so less (energy) stored as fat / less weight gain / less risk of diabetes / eq (1) 4. more starch so energy released (more) slowly / eq (1) 5. less salt so less effect on blood pressure / less risk of CHD/ eq (1) 6. more protein for repair / growth / eq(1) 	<p>allow converse for biscuit A</p> <p>if no reason and explanation allow one max for biscuit B and correct difference(s)</p> <p>not just to lose weight</p>	4

Question Number	Answer	additional guidance	Mark
3(c)(i)	<p>A description that makes reference to four of the following points:</p> <ol style="list-style-type: none"> 1. measure out cm^3 / same volume / measure mass of water / eq (1) 2. use sample of biscuits of same mass / known mass / eq (1) 3. hold under boiling tube of water / eq (1) 4. relight if goes out / continue until completely burnt / eq (1) 5. (use thermometer to) measure increase in water temperature / measure initial and final temperature of water/ eq (1) 6. highest temperature rise / ref to equation has most energy / eq (1) 	<p>allow mp 1 2 5 6 from equation</p> <p>energy = (mass of water x temp rise x 4.2) \div mass of biscuit</p>	4

Question Number	Answer	Mark
3(c)(ii)	<p>An answer that includes two of the following</p> <ul style="list-style-type: none"> • some energy lost / some heat escapes / (to surroundings) / not all energy reaches tube / some released as light / eq (1) • not completely burnt / not all energy released / not burnt in oxygen / eq (1) • temperature of water uneven / eq (1) 	2

Total = 12 marks

Question Number	Answer	Mark
4(a)(i)	<p>The only correct answer is A (P is nitrogen fixation)</p> <p>B is not correct as Q is not nitrogen fixation</p> <p>C is not correct as T is not nitrogen fixation</p> <p>D is not correct as V is not nitrogen fixation</p>	1

Question Number	Answer	Mark
4(a)(ii)	<p>The only correct answer is C (T is nitrification)</p> <p>A is not correct as Q is not nitrification</p> <p>B is not correct as U is not nitrification D is not correct as W is not nitrification</p>	1

Question Number	Answer	Mark
4(a)(iii)	<p>The only correct answer is D (W is denitrification)</p> <p>A is not correct as P is not denitrification</p> <p>B is not correct as T is not denitrification</p> <p>C is not correct as V is not denitrification</p>	1

Question Number	Answer	Mark
4(b)(i)	<p>A description that that makes reference to five of the following points:</p> <ol style="list-style-type: none"> 1. increase in nitrates / phosphates/ eq (1) 2. <u>eutrophication</u> (1) 3. algal bloom / more algae / plants grow on surface / eq (1) 4. blocks sunlight / prevents photosynthesis /eq (1) 5. plants die / algae die / eq (1) 6. bacteria decompose / bacteria respire / microorganisms decompose / microorganisms respire /eq (1) 7. oxygen depleted / oxygen used (in respiration) / oxygen required (for respiration) / eq (1) 8. fish / aquatic organisms / die /eq (1) 	5

Question Number	Answer	Mark
4(b)(ii)	<ul style="list-style-type: none"> • animal manure / dung / faeces / animal waste / eq (1) 	1

Total = 9 marks

Question Number	Answer	additional guidance	Mark
5(a)(i)	C C G A T C A A C	all correct 2 marks one letter incorrect 1 mark	2

Question Number	Answer	Mark
5(a)(ii)	3 (1)	1

Question Number	Answer	additional guidance	Mark
5(a)(iii)	C C G A U C A A C	all correct 2 marks one letter incorrect 1 mark	2

Question Number	Answer	Additional Guidance	Mark
5(b)	<p>30 % of 50 000</p> <p>so 15 000 are A and</p> <p>30 % are T 15 000</p> <p>leaving 20 000 bases 40%</p> <p>(30 % are) T 15 000 (1)</p> <p>(20% will be) C 10 000 (1)</p> <p>(20% will be) G 10 000 (1)</p>	<p>allow 2 marks if put % in correctly instead of numbers</p> <p>so 30% T</p> <p>20% C</p> <p>20% G scores 2 marks</p>	3

Question Number	Answer	additional guidance	Mark
5(c)	<p>A description that includes:</p> <p>Transcription</p> <p>Location</p> <ul style="list-style-type: none"> transcription in nucleus / eq(1) <p>Produces</p> <ul style="list-style-type: none"> transcription produces mRNA/ e q (1) <p>Starts with</p> <ul style="list-style-type: none"> transcription starts with DNA /eq (1) <p>Uses</p> <ul style="list-style-type: none"> no tRNA in transcription /eq (1) 	<p>or converse for Translation</p> <p>takes place in cytoplasm / ribosome mRNA exits nucleus / enters cytoplasm/eq</p> <p>produces amino acid chain / polypeptide / protein/eq</p> <p>starts with mRNA /eq</p> <p>(so transcription) from DNA to mRNA = start and produces = 2 marks</p> <p>uses tRNA/eq</p>	4

Total 12 marks

Question Number	Answer	additional guidance	Mark
6(a)	<p>number at 2009 = 462 000</p> <p>number at 2019 = 506 000</p> <p>change = 506-462 = 44</p> <p>% change = $(44 \div 462) \times 100 =$</p> <p>9.52 % / 9.5% / 9.524% / 9.5238 % / etc (2)</p>	<p>allow 1 for 44</p> <p>allow full marks for 9.52 / 9.524 / 9.5238 with no working</p>	2

Question Number	Answer	additional guidance	Mark
6(b)	<p>An answer that makes reference to four of the following points:</p> <ol style="list-style-type: none"> 1. number of admissions due to smoking increased (2009 to 2019) /eq (1) 2. number of admissions due to smoking level / little change from 2009 to 2012 / eq (1) 3. number of admissions due to smoking decreased from 2012 to 2013 / least in 2013. (1) 4. but % / proportion of all admissions due to smoking declined / lowest in 2019 / eq (1) 5. as other admissions increased / other illnesses / diseases becoming more frequent / eq (1) 6. smaller percentage of people (started) smoking / greater percentage people stopped / eq (1) 7. population size increases / eq (1) 8. reliable / valid data / covers large numbers / all admissions / long period of time / eq (1) 	<p>From Graph 1</p> <p>must have date ref</p> <p>From Graph 2</p> <p>fewer people smoking / smoking habits change people using alternatives e cigarettes</p>	4

Question Number	Answer	Mark
6(c)	<p>A description that makes reference to five of the following points:</p> <ol style="list-style-type: none"> 1. destroys cilia in trachea / cilia no longer function / eq (1) 2. mucus builds up / cannot be removed /eq (1) 3. leads to (bacterial) infection (of alveoli) /pneumonia / eq (1) 4. loss of surface area / loss of / damage to alveoli /emphysema / eq (1) 5. airways inflamed or narrowed / bronchitis / eq (1) 6. can lead to COPD (1) 7. (lung) cancer (1) 	5

Total = 11 marks