

Mark Scheme (Results)

January 2021

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 1BR and Science (Double Award) (4SD0) Paper 1B

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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	Mark
1(a)(i)	The only correct answer is D S A is not correct as P does not contain chlorophyll B is not correct as Q does not contain chlorophyll C is not correct as R does not contain chlorophyll	**1**

Question Number	Answer	Mark
1(a)(ii)	The only correct answer is C magnesium A is not correct as chlorophyll does not contain calcium B is not correct as chlorophyll does not contain iron D is not correct as chlorophyll does not contain water	**1**

Question Number	Answer	Mark
1(a)(iii)	A description that makes reference to two of the following points: • absorb / trap / captures / eq, light (1) • photosynthesis (1) • make carbohydrate / make starch / make glucose / eq (1)	**2**

Question Number	Answer	Mark
1(b)	The only correct answer is C a plant stem growing towards light A a plant root growing away from light is not correct B a plant root growing downwards due to gravity is not correct D a plant stem growing upwards due to gravity is not correct	**1**

Question Number	Answer	Mark
1(c)		**3**

Role of substance	Name of substance
cause positive phototropism	**auxin**
digest fat	lipase (1)
diffuse across a synapse	neurotransmitter / acetylcholine / noradrenaline / correct named neurotransmitter (1)
prevent scurvy	vitamin C /ascorbic acid (1)

Total = 8 marks

Question Number	Answer	Mark
2(a)	The only correct answer is C Y A is not correct as W is not adrenal gland B is not correct as X is not adrenal gland D is not correct as Z is not adrenal gland	**1**

Question Number	Answer	Mark
2(b)	• several / different tissues carrying out a / one / particular, function / purpose / eq (1)	**1**

Question Number	Answer	Mark
2(c)	An answer that makes reference to five of the following points: • (more) light into eye / retina (1) • to see danger / be more aware of surroundings / eq (1) • more blood to lungs (1) • more blood to (leg) muscles / blood diverted to (leg) muscles (1) • more oxygen (to muscles) (1) • more glucose (to muscles / in blood) (1) • more respiration / less anaerobic respiration / less lactic acid produced (1) • more ATP / energy (1) • run faster / escape / contract muscles more / eq (1)	**5**

Total 7 marks

Question Number	Answer	Mark
3(a)(i)	The only correct answer is B A is not correct as it does not produce hydrochloric acid C is not correct as it does not produce hydrochloric acid D is not correct as it does not produce hydrochloric acid	**1**

Question Number	Answer	Mark
3(a)(ii)	The only correct answer is D A is not correct as it does not store faeces B is not correct as it does not store faeces C is not correct as it does not store faeces	**1**

	Answer	Mark
3(b)	An explanation that makes reference to two of the following points: • neutralises acid / eq (1) • optimal pH for enzymes / lipase eq (1) • emulsifies lipid / eq (1) • breaks down (large droplets) into small droplets / eq (1) • increases surface area for enzyme action /eq (1)	**3**

Question Number	Answer	Mark
3(c)(i)	An explanation that makes reference to four of the following points: • large surface area (1) • microvilli (1) • capillaries / blood supply to maintain concentration gradient / diffusion gradient (1) • absorb digested food / molecules / vitamins / minerals / correct named molecule / eq (1) • lacteal to absorb fats / correct vitamin / transport fats / eq (1) • thin wall / one cell thick / capillaries close to surface (1) • so short diffusion path / rapid diffusion / rapid active transport (1)	**4**

Question Number	Answer		Mark
3(c)(ii)	An answer that makes reference to four of the following points: • shorter / few / no villi / microvilli (1) • reduced surface area (1) • less absorption of digested food / molecules / vitamins / minerals / correct example / eq (1) • less glucose / lipid / eq, for energy / respiration / ATP (1) • fewer amino acids for growth / protein synthesis (1) • less vitamins / minerals / named vitamin or mineral for correct function of named vitamin or mineral (1)	Allow sugar for glucose e.g. iron for haemoglobin	**4**

Total = 13 marks

Question Number	Answer	Mark
4(a)(i)	An explanation that makes reference to two of the following points: • no photosynthesis (1) • remove all starch / destarch / eq (1) • by respiration (1) • so any starch present is due to photosynthesis (in the experiment) (1)	**2**

Question Number	Answer	Mark
4(a)(ii)	An explanation that makes reference to the following points: • act as a control / for a comparison (1) • show photosynthesis can occur with CO_2 present / show difference between X and Y is due to CO_2 (1) • show that when CO_2 is present light is required for photosynthesis / eq (1)	**2**

Question Number	Answer	Mark
4(a)(iii)	An answer that makes reference to four of the following points: • place leaf in boiling water (1) • boil / heat in ethanol (1) • use water bath / switch off Bunsen / keep away from Bunsen / eq (1) • wear safety glasses / use tongs / forceps / eq (1) • add iodine solution (1) • if starch present goes blue/black / see if it goes blue / black (1)	**4**

Question Number	Answer	Additional guidance	Mark
4(b)	An explanation that makes reference to the following points • on leaf Y (1) • no starch present under black paper strip (1) • so this part will be yellow/ orange / not blue black / eq (1)	Allow converse for rest of leaf	**3**

Question Number	Answer		Mark
4(c)	An explanation that makes reference the following points: • starch is insoluble / eq (1) • does not have osmotic effect on plant cell does not diffuse / pass out of cells / eq (1)	Allow converse for glucose for both MPs	**2**

Total = 13 marks

Question Number	Answer	Mark
5(a)(i)	An explanation that makes reference to the following points: • male (1) • as has X and Y / different sized length of chromosomes / heterogametic / has a Y chromosome / female would be XX / eq (1)	**2**

Question Number	Answer	Mark
5(a)(ii)	An explanation that makes reference to two of the following points: • (Diagram 1 is) diploid (1) • because diploid has two of each chromosome / has 23 pairs / has 46 chromosomes / has 2 sets of chromosomes / eq (1) • haploid only has one of each pair / would have 23 chromosomes / has one set of chromosomes / would have half the number of chromosomes / eq (1)	**2**

Question Number	Answer	additional guidance	Mark
5(b)(i)	An answer that makes reference to two of the following points: • diagram 2 / Klinefelter has an extra chromosome / has 47 (1) • X chromosome / sex chromosomes are different / eq (1)	Allow converse for karyotype 1 has extra X chromosome scores 2 marks has three sex chromosomes scores two marks	**2**

Question Number	Answer	Additional guidance	Mark
5(b)(iii)	An answer that makes reference to the following points: • mutation (1) • failure of chromosomes to separate (1) • during meiosis / gamete formation (1)	Allow nondisjunction	**2**

Question Number	Answer	Additional guidance	Mark
5(b)(iii)	49 % of 66 million = 32 340 000 men 1/660 x 32 340 000 = 49 000 (2)	Award full marks for correct numerical answer without working one mark for 32 340 000	**2**

Question Number	Answer	Mark
5(b)(iv)	An answer that makes reference to one of the following points: • mutation more likely (1) • gametes are older / eq (1)	**1**

Total = 11 marks

Question Number	Answer	Mark
6 (a)(i)	An explanation that makes reference to the following points • (transfer of a) gene / allele / DNA (1) • from a different species / eq (1)	**2**

Question Number	Answer	Mark
6 (a)(ii)	An answer that makes reference to the following points • restriction enzyme / endonuclease cuts DNA / gene / allele (1) • ligase joins DNA / gene / allele / plasmid (1)	**2**

Question Number	Answer	Mark
6 (b)	An answer that makes reference to four of the following points **Points in favour of GM crops:** • less insecticide / pesticide used (1) • less bioaccumulation of pesticides / less evolution of resistance to pesticides / no pesticide remaining in soil / eq (1) • pest resistant crops do not affect non-target species / pollinators (1) • weedkiller kills weeds but not (GM) crops / easier to remove weeds / eq (1) • less spread of viruses to other species / crops / eq (1) **Points against GM:** • gene transfer to other species / (cross) pollinate with other species / eq (1) • outcompete native species / affect food chains / eq (1) • reduction in insect populations (1) • requires herbicide use / more use of herbicides (1)	**4**

Total = 8 marks

Question Number	Answer	Mark
7(a)(i)	S scale linear and uses at least half the grid (1) L line straight, neat and through points (1) A axes labelled 'mean height in mm' and 'time in weeks' (1) P points plotted correctly (1) K each line labelled with correct temperature (1)	**5**

Question Number	Answer	Mark
7(a)(ii)	An answer that makes reference to three of the following points: • higher temperatures produce more growth / faster growth / eq (1) • enzymes (1) • more kinetic energy (1) • more frequent collisions / enzyme substrate complexes form faster / eq (1) • faster respiration (1)	**3**

Question Number	Answer	Mark
7(a)(iii)	• (shell) height / growth of shell / (1)	**1**

Question Number	Answer	Mark
7(a)(iv)	• uses group / uses many / calculates mean / repeat / eq (1)	**1**

Question Number	Answer	Additional guidance	Mark
7(b)(i)	• 1.2 – 0.3 = 0.9 • 0.9 ÷ 1.2 × 100 = 75 (2)	Award full marks for correct numerical answer without working Award one mark for 0.9 or 0.75 or ÷ 1.2	**2**

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	An explanation that makes reference to the following points: • eat plants / producers (1) • cannot digest parts / (primary consumer) produces more faeces / more inedible parts /more waste egested (1)	Allow converse for secondary consumer for both MPs	**2**

Question Number	Answer	Additional guidance	Mark
7(c)	An explanation that makes reference to the following points: • more respiration / higher metabolic rate (1) • maintain body temperature / more movement / activity / eq (1) • heat loss / eq (1)	Allow converse for snail for all MPs	**2**

Total = 16 marks

Question Number	Answer	Mark
8(a)	the only correct answer is A anther B is not correct as ovary does not contain pollen grains C is not correct as petal does not contain pollen grains D is not correct as sepal does not contain pollen grains	**1**

Question Number	Answer	Mark
8(b)(i)	An answer that makes reference to two of the following points: • supplies glucose / sucrose / sugar / carbohydrate / nutrients (1) • respiration / energy / ATP (1) • supplies amino acids (1) • make protein (1) • supplies water (1) • cell elongation / eq (1)	**2**

Question Number	Answer	Additional guidance	Mark
8(b)(ii)	• 120 – 60 = 60 minutes • 4.7 – 1.4 = 3.3 in one hour • 3.3 ÷ 60 = 0.055 (3)	Award full marks for correct numerical answer without working Award 1 mark for 1.4 and 4.7 or 3.3 Award one mark for ÷ 60	**3**

Question Number	Answer	Additional guidance	Mark
8(c)	An answer that makes reference to the following points: C plus and minus pesticide / range of concentrations of pesticides (1) O same / variety / age / mass / size, of apple tree type (1) R use many trees / orchard / repeats / eq (1) M1 number of apples / mass of apples (1) M2 same time / stated period of time (1) S1 same soil / fertiliser / compost / water / eq (1) S2 light/ temp/ CO_2/ bees / eq (1)	 Allow same species Ignore yield	**6**

Total 12 marks

Question Number	Answer	Additional guidance	Mark
9(a)	An answer that makes reference to the following points: • glucose • carbon dioxide • water all 3 correct scores 2 marks 2 or 1 correct scores 1 mark	Allow correct formulae	**2**

Question Number	Answer	Additional guidance	Mark
9(b)	An explanation that makes reference to three of the following points: • mouse is smaller / less body mass (1) • larger surface area to volume ratio (1) • heat loss / eq (1) • maintain body temperature (1) • (more) respiration / higher metabolic rate (1)	Allow converse for human	**3 exp**

Question Number	Answer	Mark
9(c)(i)	The only correct answer is C pulmonary vein A is not correct as X it is not the aorta B is not correct as X is not the pulmonary artery D is not correct as X is not the vena cava	**1**

Question Number	Answer	Additional guidance	Mark
9(c)(ii)	An explanation that makes reference to one of the following points: • human heart has 4 chambers / frog heart has 3 chambers (1) • frog heart has one ventricle / human heart has two ventricles (1) • no septum / no division between ventricles / human has septum (1) • frog artery splits into two / frog only has one artery leaving the heart (1) • frog heart has no semi lunar valves (1)		**1**

Question Number	Answer	Mark
9(c)(iii)	An answer that makes reference to five of the following points: • one ventricle (1) • oxygenated and deoxygenated blood mixes / blood from body mixes with blood from lung / eq (1) • less deoxygenated blood goes to lungs / some oxygenated blood to lungs / eq (1) • less efficient gas exchange in lungs / eq (1) • no semi-lunar valves (1) • backflow of blood into ventricle (1) • less oxygenated blood to body / some deoxygenated blood to body / less oxygen (to body) / eq (1) • less respiration / more anaerobic respiration (1) • lactic acid accumulation / less ATP made / less energy released (1)	**5**

Total 12 marks

Question Number	Answer	Mark
10(a)	An explanation that makes reference to four of the following points: • glucose (transported) from intestine / ileum / liver / glucose (transported) to body cells / to liver (1) • amino acids (transported) from ileum / liver / amino acids (transported) to body cells / liver (1) • fatty acids / vitamins / minerals / eq (transported) from intestine / fatty acids / vitamins / minerals / eq (transported) to cells (1) • hormones (transported) from (endocrine) glands / hormones (transported) to organs / tissues (1) • urea (transported) from liver / urea (transported) to kidney (1) • carbon dioxide (transported) from cells / carbon dioxide (transported) to lungs (1) • antibodies (transported) to site of infection / eq (1) • fibrinogen / clotting proteins (transported) to wound / eq (1)	**4**

Question Number	Answer	Additional guidance	Mark
10(b)(i)	• measurement of diagram = 58 mm / 5.8 cm • divide diagram measurement in mm by 0.013 • answer 4462 (2)	Award full marks for correct numerical answer without working Accept answers between 4307 to 4616 Award one mark for 56 mm up to 60 mm or 5.6 cm up to 6.0 cm or award one mark for a division by 0.013	**2**

Question Number	Answer	Mark
10(b)(ii)	• nucleus (1)	**1**

Question Number	Answer	Mark
10(b)(iii)	An answer that makes reference to • engulf / ingest / eq bacteria / pathogen / microbe / eq (1) • digest / break down (1) • enzymes (1)	**2**

Question Number	Answer	Mark
10(c)	An answer that makes reference to Biuret / add NaOH and CuSO4 **/** albustix /eq (1)	**1**

Total 10 marks

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