



Pearson
Edexcel

Mark Scheme (Results)

January 2021

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

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 1(a)(i) | <p>The only correct answer is D S</p> <p>A is not correct as P does not contain chlorophyll</p> <p>B is not correct as Q does not contain chlorophyll</p> <p>C is not correct as R does not contain chlorophyll</p> | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 1(a)(ii) | <p>The only correct answer is C magnesium</p> <p>A is not correct as chlorophyll does not contain calcium</p> <p>B is not correct as chlorophyll does not contain iron</p> <p>D is not correct as chlorophyll does not contain water</p> | 1 |

| Question Number | Answer | Mark |
|------------------|---|----------|
| 1(a)(iii) | <p>A description that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • absorb / trap / captures / eq, light (1) • photosynthesis (1) • make carbohydrate / make starch / make glucose / eq (1) | 2 |

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

| Question Number | Answer | Mark | | | | | | | | | | |
|-----------------------------|--|-------------------|-------------------|-----------------------------|-------|------------|------------|--------------------------|---|----------------|-------------------------------|----------|
| 1(c) | <table border="1"> <thead> <tr> <th>Role of substance</th> <th>Name of substance</th> </tr> </thead> <tbody> <tr> <td>cause positive phototropism</td> <td>auxin</td> </tr> <tr> <td>digest fat</td> <td>lipase (1)</td> </tr> <tr> <td>diffuse across a synapse</td> <td>neurotransmitter / acetylcholine / noradrenaline / correct named neurotransmitter (1)</td> </tr> <tr> <td>prevent scurvy</td> <td>vitamin C / ascorbic acid (1)</td> </tr> </tbody> </table> | 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) | 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) | <p>The only correct answer is C Y</p> <p>A is not correct as W is not adrenal gland</p> <p>B is not correct as X is not adrenal gland</p> <p>D is not correct as Z is not adrenal gland</p> | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 2(b) | <ul style="list-style-type: none"> several / different tissues carrying out a / one / particular, function / purpose / eq (1) | 1 |

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|-----------------|---|----------|
| 2(c) | <p>An answer that makes reference to five of the following points:</p> <ul style="list-style-type: none"> (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) | <p>The only correct answer is B</p> <p>A is not correct as it does not produce hydrochloric acid</p> <p>C is not correct as it does not produce hydrochloric acid</p> <p>D is not correct as it does not produce hydrochloric acid</p> | 1 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 3(a)(ii) | <p>The only correct answer is D</p> <p>A is not correct as it does not store faeces</p> <p>B is not correct as it does not store faeces</p> <p>C is not correct as it does not store faeces</p> | 1 |

| | Answer | Mark |
|-------------|--|----------|
| 3(b) | <p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • 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) | <p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • 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) | <p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • 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) | <p>Allow sugar for glucose</p> <p>e.g. iron for haemoglobin</p> | 4 |

Total = 13 marks

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 4(a)(i) | <p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • 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) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • act as a control / for a comparison (1) • show photosynthesis can occur with CO₂ present / show difference between X and Y is due to CO₂ (1) • show that when CO₂ is present light is required for photosynthesis / eq (1) | 2 |

| Question Number | Answer | Mark |
|------------------|---|----------|
| 4(a)(iii) | <p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • 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) | <p>An explanation that makes reference to the following points</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • 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) | <p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • (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) | <p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • diagram 2 / Klinefelter has an extra chromosome / has 47 (1) • X chromosome / sex chromosomes are different / eq (1) | <p>Allow converse for karyotype 1</p> <p>has extra X chromosome scores 2 marks</p> <p>has three sex chromosomes scores two marks</p> | 2 |

| Question Number | Answer | Additional guidance | Mark |
|------------------|---|----------------------|----------|
| 5(b)(iii) | An answer that makes reference to the following points: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • (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 <ul style="list-style-type: none"> • 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 <p>Points in favour of GM crops:</p> <ul style="list-style-type: none"> • 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) <p>Points against GM:</p> <ul style="list-style-type: none"> • 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) | <p>S scale linear and uses at least half the grid (1)</p> <p>L line straight, neat and through points (1)</p> <p>A axes labelled 'mean height in mm' and 'time in weeks' (1)</p> <p>P points plotted correctly (1)</p> <p>K each line labelled with correct temperature (1)</p> | 5 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 7(a)(ii) | <p>An answer that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • (shell) height / growth of shell / (1) | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 7(a)(iv) | <ul style="list-style-type: none"> • uses group / uses many / calculates mean / repeat / eq (1) | 1 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|---|----------|
| 7(b)(i) | <ul style="list-style-type: none"> • $1.2 - 0.3 = 0.9$ • $0.9 \div 1.2 \times 100 = 75$ (2) | <p>Award full marks for correct numerical answer without working</p> <p>Award one mark for 0.9 or 0.75 or $\div 1.2$</p> | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---|----------|
| 7(b)(ii) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • eat plants / producers (1) • cannot digest parts / (primary consumer) produces more faeces / more inedible parts / more waste egested (1) | <p>Allow converse for secondary consumer for both MPs</p> | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|---|----------|
| 7(c) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • more respiration / higher metabolic rate (1) • maintain body temperature / more movement / activity / eq (1) • heat loss / eq (1) | <p>Allow converse for snail for all MPs</p> | 2 |

Total = 16 marks

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

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 8(b)(i) | <p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • $120 - 60 = 60$ minutes • $4.7 - 1.4 = 3.3$ in one hour • $3.3 \div 60 = 0.055$ (3) | <p>Award full marks for correct numerical answer without working</p> <p>Award 1 mark for 1.4 <u>and</u> 4.7 or 3.3</p> <p>Award one mark for $\div 60$</p> | 3 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---|----------|
| 8(c) | <p>An answer that makes reference to the following points:</p> <p>C plus and minus pesticide / range of concentrations of pesticides (1)</p> <p>O same / variety / age / mass / size, of apple tree type (1)</p> <p>R use many trees / orchard / repeats / eq (1)</p> <p>M1 number of apples / mass of apples (1)</p> <p>M2 same time / stated period of time (1)</p> <p>S1 same soil / fertiliser / compost / water / eq (1)</p> <p>S2 light/ temp/ CO₂/ bees / eq (1)</p> | <p>Allow same species</p> <p>Ignore yield</p> | 6 |

Total 12 marks

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|------------------------|----------|
| 9(a) | <p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> • glucose • carbon dioxide • water <p>all 3 correct scores 2 marks 2 or 1 correct scores 1 mark</p> | Allow correct formulae | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|--------------------------|--------------|
| 9(b) | <p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • 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) | <p>The only correct answer is C pulmonary vein</p> <p>A is not correct as X it is not the aorta</p> <p>B is not correct as X is not the pulmonary artery</p> <p>D is not correct as X is not the vena cava</p> | 1 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---------------------|----------|
| 9(c)(ii) | <p>An explanation that makes reference to one of the following points:</p> <ul style="list-style-type: none">• 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) | <p>An answer that makes reference to five of the following points:</p> <ul style="list-style-type: none"> • 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) | <p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • measurement of diagram = 58 mm / 5.8 cm • divide diagram measurement in mm by 0.013 • answer 4462 (2) | <p>Award full marks for correct numerical answer without working</p> <p>Accept answers between 4307 to 4616</p> <p>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</p> | 2 |

| Question Number | Answer | Mark |
|------------------|---|----------|
| 10(b)(ii) | <ul style="list-style-type: none"> • nucleus (1) | 1 |

| Question Number | Answer | Mark |
|-------------------|--|----------|
| 10(b)(iii) | <p>An answer that makes reference to</p> <ul style="list-style-type: none"> • engulf / ingest / eq bacteria / pathogen / microbe / eq (1) • digest / break down (1) • enzymes (1) | 2 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 10(c) | <p>An answer that makes reference to</p> <p>Biuret / add NaOH and CuSO₄ / albustix /eq (1)</p> | 1 |

Total 10 marks