Cambridge Assessment International Education

# Science

Stage 9

Paper 2

**2023**

Cambridge Lower Secondary Progression Test

## Mark Scheme



3146_02_MS_4RP

| Question | Answer | Marks | Further Information |
|---|---|---|---|
| 1 | when nitrate ions and magnesium ions are both present the (barley seedlings) have the greatest dry mass<br><br>nitrate ions have a greater effect on the dry mass than magnesium ions / **ora**<br><br>nitrate ions are needed to make proteins<br><br>magnesium ions are needed to make chlorophyll | **4** | each correct answer = 1 mark<br><br>**Accept** the seedling with just nitrate ions grows more than the seedling with just magnesium ions / **ora**<br><br>**Accept** nitrate ions are needed to make DNA or amino acids<br><br>**Accept** magnesium ions are needed for photosynthesis |

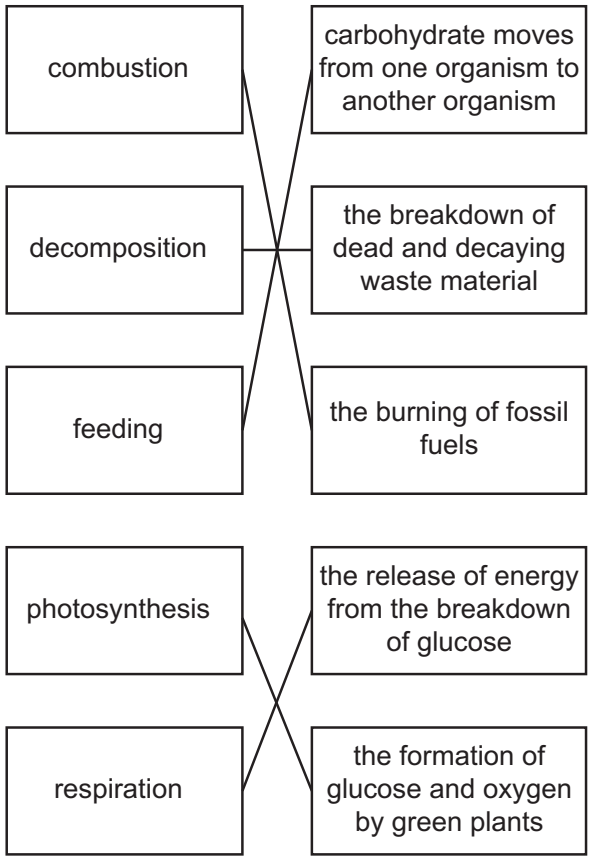
| Question | Answer | Marks | Further Information |
|---|---|---|---|
| 2(a)(i) | concentration (of acid) | **1** | |
| 2(a)(ii) | (dependent variable) volume of gas<br><br>(how it is measured) water level in measuring cylinder | **1** | **both** answers correct for the mark |
| 2(a)(iii) | **any two from**<br><br>(same) mass (of calcium carbonate)<br><br>(same) particle size **or** same surface area (of calcium carbonate)<br><br>(same) temperature<br><br>(same) volume (of acid) | **1** | **both** answers correct for the mark<br><br>**Do not accept** (same) concentration of acid |
| 2(b) | (safety risk) acid is corrosive<br><br>(how to control the risk) wear eye protection | **2** | each correct answer = 1 mark<br><br>**Accept** acid can burn skin or eyes **or** acid can irritate skin or eyes **or** acid can harm skin or eyes<br><br>**Accept** wear gloves |

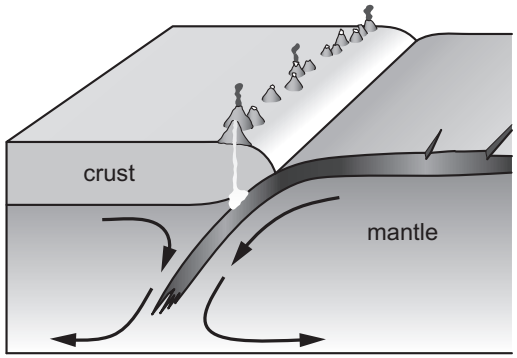
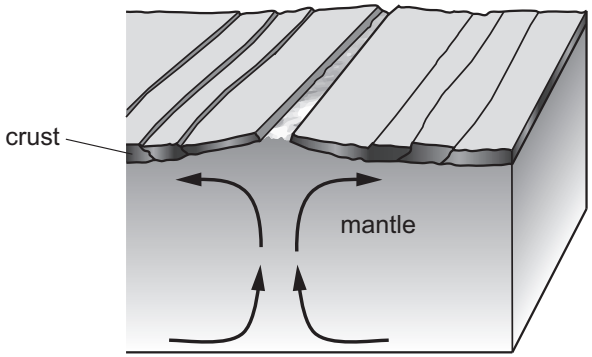
| Question | Answer | Marks | Further Information |
|---|---|---|---|
| 3(a) | 100 (Hz) | **1** | no tolerance |
| 3(b) | 90 000 (Hz)<br>**or**<br>(range is from) 1000 (Hz) to 90 000 (Hz) | **1** | **Accept** between 80 000 and 99 000 (Hz)<br>**Accept** between 80 000 and 99 000 (Hz) for the value of 90 000 (Hz)<br>no tolerance on the value of 1000 (Hz) |
| 3(c)(i) | increases the pitch | **1** | **Accept** higher pitch<br>**Note** answer must be comparative |
| 3(c)(ii) | increases the loudness **or** increases the volume | **1** | **Accept** louder sound<br>**Note** answer must be comparative |
| 3(d)(i) | 4 (times) | **1** | |
| 3(d)(ii) | 2 (times) | **1** | **Accept** waveform **A** has twice the frequency of waveform **B** |

| Question | Answer | Marks | Further Information |
|---|---|---|---|
| 4(a)(i) | decreases | **1** | |
| 4(a)(ii) | line of best fit extended to the *x*-axis<br><br>correct year read from the line to the nearest year | **2** | each correct answer = 1 mark |
| 4(a)(iii) | **any two from**<br>variation within the species<br>(idea of) best adapted survive **or** (idea of) competition<br>advantageous adaptions passed on to offspring | **2** | each correct answer = 1 mark<br><br>**Accept** survival of the fittest |
| 4(b)(i) | (increases) there are more females to produce offspring<br>(decreases) there will be fewer males to mate with the females | **2** | each correct explanation = 1 mark |
| 4(b)(ii) | (effect on the population) decreases (no marks)<br>(reason 1) (idea of) the nesting sites will be flooded<br>(reason 2) the offspring will drown **or** the offspring will have insufficient oxygen to respire | **2** | increase = 0 marks for the question<br>each correct reason= 1 mark |

| Question | Answer | Marks | Further Information |
|---|---|---|---|
| 5(a) | correct substitution of numbers into formula **or** 340 ÷ 38<br><br>correct division, e.g. 8.947368<br><br>correct answer 8.9 | **3** | **Accept** 8.9 with or without working = 3 marks<br><br>**Accept** 8.947368 with or without working = 2 marks<br><br>correct construction of formula<br>mass ÷ volume **or** 340 ÷ 38<br><br>correct division using their values from substitution<br><br>**Accept** truncated answers or incorrect rounding |
| 5(b) | (substance) B<br><br>(explanation) (idea of) lowest density **or** density much lower than others **or** has a very low density | **2** | each correct answer = 1 mark<br><br>**Accept** density of gas usually less than solids or liquids |

| Question | Answer | Marks | Further Information |
|---|---|---|---|
| 6 | **any three from**<br><br>(water) particles gain energy from skin<br><br>more energetic (water) particles escape (from surface of skin **or** to air)<br><br>less energetic (water) particles remain (on skin)<br><br>thermal energy transfers from body or skin | **3** | each correct answer = 1 mark<br><br>**Accept** molecules for particles throughout<br><br>**Accept** faster molecules escape<br><br>**Accept** slower (water) particles remain<br><br>**Accept** heat for thermal energy<br><br>**Accept** evaporation is endothermic as an extra marking point |

| Question | Answer | Marks | Further Information |
|---|---|---|---|
| 7(a) |  | **4** | **all five** correct = 4 marks<br><br>**three** or **four** correct = 3 marks<br><br>**two** correct = 2 marks<br><br>**one** correct = 1 mark<br><br>if t**wo** lines from **one** process to different descriptions = 0 marks for that process |
| 7(b) | photosynthesis | **1** | |

| Question | Answer | Marks | Further Information |
|---|---|---|---|
| 8(a) | tectonic plates | **1** | |
| 8(b)(i) |  | **1** | arrow heads must be in the correct direction on all arrows drawn |
| 8(b)(ii) |  | **1** | arrow heads must be in the correct direction on all arrows drawn<br><br>**Accept** a full convection current |
| 8(c)(i) | (idea of) they follow the same pattern **or** active volcanoes are found where the boundaries of the floating rocks or tectonics plates are located | **1** | |
| 8(c)(ii) | no boundaries near South Africa | **1** | |

| Question | Answer | Marks | Further Information |
|---|---|---|---|
| 9(a) | copper nitrate | **1** | |
| 9(b) | (idea that) mass of reactants is the same as mass of products **or** no loss or gain of mass during the reaction | **1** | |
| 9(c) | (name) covalent bond<br><br>(description) shared pair of electrons | **2** | each correct answer = 1 mark |

| Question | Answer | Marks | Further Information |
|---|---|---|---|
| 10(a) | (pump) cell(s) **or** battery **or** power supply<br><br>(hot water) charge **or** electrons **or** current | **2** | each correct answer = 1 mark<br><br>**Ignore** wire |
| 10(b) | **any one strength from**<br><br>both water and current are not 'used up' as they pass around the pipes/circuit<br><br>there is the same amount of water **or** current at all points<br><br>same rate of flow of water **or** current **or** charge at all points<br><br>**any one limitation from**<br><br>you cannot see what is happening to the water in the pipes<br><br>it takes time for the water to reach the radiator<br><br>it takes time for radiator to get hot (but the lamp turns on straight away)<br><br>water can leak (out of pipes) but current cannot leak (out of wires) | **2** | each correct answer = 1 mark<br><br>**Accept** (idea that) the pump requires energy to work but the cell provides the electrical energy<br><br>**Accept** looks like a circuit so easy to visualise<br><br>**Accept** to help explain a difficult idea, e.g. current |