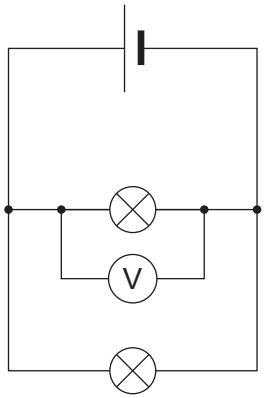
Question	Answer	Marks	Further Information
1(a)(i)	photosynthesis	**1**	
1(a)(ii)	oxygen carbon dioxide	**2**	each correct answer = 1 mark **Accept** either order **Accept** O_2 and CO_2 **Ignore** water vapour
1(b)	(idea that) absorbs light (energy)	**1**	**Ignore** to help with photosynthesis

Question	Answer	Marks	Further Information
2(a)	(sodium atom) loses one electron (chlorine atom) gains one electron	**2**	each correct answer = 1 mark **Accept** sodium atom gains an electron **and** chlorine atom loses an electron **or** sodium atom loses electrons **and** chlorine atom gains electrons = 1 mark if no other mark is scored
2(b)	ions are attracted to each other (because) they are oppositely charged	**2**	each correct answer = 1 mark **Ignore** ionic bond **Accept** electrostatic attraction between ions = 2 marks **Accept** attraction between positive ions and negative ions = 2 marks

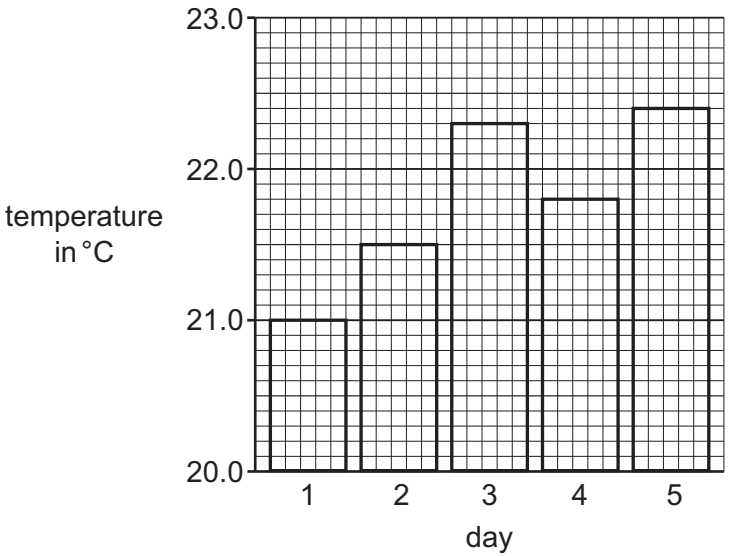
Question	Answer	Marks	Further Information
3		4	**all eight** correct = 4 marks **six** or **seven** correct = 3 marks **four** or **five** correct = 2 marks **two** or **three** correct = 1 mark **one** correct = 0 marks **Note** a tick in both boxes for a sentence means that sentence is incorrect **Accept** any indication of the correct answer, e.g. circling or underlining, but ticking takes precedence

sentence	true	false
Heat is the word used to measure how hot an object is.		✓
Thermal energy is measured in °C.		✓
When thermal energy is transferred more thermal energy is created.		✓
Thermal energy always transfers from hotter objects to colder objects.	✓	
Heat dissipation happens when thermal energy transfers from a hotter region to a colder region.	✓	
A liquid is a good thermal energy conductor.		✓
Convection happens in liquids and gases only.	✓	
Radiation needs particles to transfer thermal energy.		✓

Question	Answer	Marks	Further Information
4(a)	volcanic eruption **or** mountain building **or** earthquakes	**1**	**Accept** seismic activity **Accept** volcano **or** description of volcanic eruption
4(b)	convection (currents)	**1**	**Accept** movement of magma

Question	Answer	Marks	Further Information
5		**2**	voltmeter symbol = 1 mark **Note** ignore wire through voltmeter symbol if drawn in series voltmeter connected in parallel across one lamp = 1 mark **Ignore** junction of conductors

Question	Answer	Marks	Further Information
6(a)	copper carbonate + hydrochloric acid → copper chloride + water + carbon dioxide	**2**	correct reactants any order = 1 mark correct products any order = 1 mark
6(b)	filtration **or** filtering heat(ing) crystallise	**3**	each correct answer = 1 mark **Accept** using a funnel and filter paper **Accept** boiling **Accept** evaporate **Accept** form crystals
6(c)	goggles	**1**	**Accept** local name for safety goggles **Ignore** gloves **or** heat-proof mat **or** laboratory coat **or** fume cupboard **or** fume hood **Do not accept** face mask

Question	Answer	Marks	Further Information
7(a)		**2**	graph with **all five** bars correct = 1 mark **Accept** $\pm\frac{1}{2}$ small square tolerance same thickness bars **and** same spacing between the bars = 1 mark **Ignore** any space between the first bar and the *y*-axis **Ignore** shading of bars
7(b)	**any one from** identifies anomalous results to take an average increases reliability	**1**	**Do not accept** more accurate

Question	Answer	Marks	Further Information
8	**any three from** Moon rock contains material that forms quickly at high temperatures Moon rock contains less iron than Earth rock (as collision blew away crust and mantle in debris) Moon rock has less water than Earth rock (as collision evaporated all of water) Moon rock and Earth rock are very similar in (chemical) composition if the Moon was created somewhere else, it would have a very different (chemical) content	**3**	each correct answer = 1 mark **Accept** Moon rock and Earth rock have the same (chemical) content

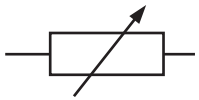
Question	Answer	Marks	Further Information
9(a)	**D**	**1**	more than **one** answer circled = 0 marks **Accept** any indication of the correct answer, e.g. ticking or underlining, but circling on answer line takes precedence
9(b)	**E**	**1**	more than **one** answer circled = 0 marks **Accept** any indication of the correct answer, e.g. ticking or underlining, but circling on answer line takes precedence
9(c)	DNA	**1**	**Accept** deoxyribonucleic acid

Question	Answer	Marks	Further Information
10	(density =) mass / volume **or** 150 / 100 (density =) 1.5 (unit) g / cm^3	**3**	**Accept** 1.5 g / cm^3 with or without working = 3 marks **Accept** 1.5 with or without working = 2 marks correct equation **or** substitution = 1 mark correct units = 1 mark

Question	Answer	Marks	Further Information
11(a)	no ticked (no mark) **and** the current is less **or** the resistance is more	**1**	if yes ticked = 0 marks if both boxes are ticked = 0 marks if neither box ticked **accept** no within the reason
11(b)	(resistance =) voltage ÷ current **or** 1.5 ÷ 4.5 (resistance =) 0.33 (Ω)	**2**	**Accept** correct answer with or without working = 2 marks **Accept** equation **or** evidence of equation, e.g. correct substitution = 1 mark **Accept** V ÷ I **Accept** 0.3 or 0.333 or 0.3333 etc. **Ignore** any unit given

Question	Answer	Marks	Further Information
12(a)	**any two from** more (scientific) evidence **or** data better understanding (of the evidence) models have improved carbon dioxide **or** pollutants (in the air) increased (more than expected)	**2**	each correct answer = 1 mark **Ignore** they have changed their mind
12(b)(i)	22.8 (°C)	**1**	
12(b)(ii)	Measure the air temperature twice a day for one year.	**1**	more than **one** answer ticked = 0 marks **Accept** any indication of the correct answer, e.g. circling or underlining, but ticking takes precedence

Question	Answer	Marks	Further Information
13(a)(i)	(idea that) (pure water) does **not** contain impurities **or** (pure water) does **not** contain other minerals	**1**	**Accept ora**, e.g. tap water is impure **Ignore** universal solvent **or** dissolves minerals **or** it's not dirty
13(a)(ii)	**any two from** (idea that) magnesium has no effect on chlorophyll content between 0 and 5 days (idea that) after 5 days magnesium increases chlorophyll content (idea that) it takes 5 days to make chlorophyll after magnesium is introduced	**2**	each correct answer = 1 mark **Accept** Mg for magnesium **Accept** Mg for magnesium **Accept** Mg for magnesium
13(b)	C (no mark) **and** highest percentage of magnesium (for chlorophyll and sufficient nitrate for leaf growth)	**1**	**Note** if A **or** B = 0 marks

Question	Answer	Marks	Further Information
14(a)		**1**	**Ignore** wires from the buzzer
14(b)		**1**	

Question	Answer	Marks	Further Information
15	(polar bear population) (idea of) population decrease **or** extinction (reason) **any two from** (idea of) decrease in reproduction (idea of) less places to rest **or** sleep **or** give birth (idea of) less food **or** loss of hunting grounds **or** starvation	**3**	correct effect = 1 mark each correct reason = 1 mark **Accept more** cubs die **or more** bears die **or** polar bears **now** endangered **Accept** correct answers wherever seen