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1 Biology

1.1 Characteristics of living things, cells and microorganisms

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* C and E		answers may be in any order both answers are required for the mark
a ii	1	* C		
a iii	1	any one from * to trap or absorb light * photosynthesis	accept 'to make glucose or sugar or starch or carbohydrate or food'	
b i	1	* A		
b ii	1	any one from * windpipe * trachea * airways * bronchus * bronchiole * oviduct or fallopian tube	accept 'lungs'	
b iii	1	* to remove mucus	accept 'to remove bacteria' accept 'to move mucus along' accept 'to move or remove bacteria or dust particles' accept 'to move an ovum or egg along' if the oviduct or fallopian tube is given as the answer to part ii	'it is a self cleaning mechanism' is insufficient do not accept 'they clean dust or bacteria out of the lungs'
c	1	* B		
Total	7			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* light	accept 'sunlight'	<i>do not accept</i> 'Sun'
a ii	1	* support		
b	1	* no water ✓		if more than one box is ticked, award no mark
c	1	* minerals ✓		if more than one box is ticked, award no mark
d	1	* C ✓		if more than one box is ticked, award no mark
Total	5			

	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a i	1 1	* <i>name</i> : nucleus * <i>function</i> : it controls the cell	accept 'nuclei' accept 'it contains genetic information' accept 'contains chromosomes'	'it is the brain of the cell' is insufficient
a ii	1	* tissue ✓		if more than one box is ticked, award no mark

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
a	1 1	* chloroplast any one from * photosynthesis * absorbs or traps light	accept 'chlorophyll' accept 'it produces food or glucose or sugar or carbohydrate'	'contains chlorophyll' is insufficient
b	1 1	* nucleus * it controls the cell	accept 'it tells the cell what to do' accept 'it transfers or contains genetic information or chromosomes'	'brain of the cell' is insufficient <i>do not accept</i> 'for reproduction' 'it controls substances entering or leaving the cell' is insufficient
c	1	any two from * A * B * D	accept 'chloroplast' or 'chlorophyll' accept 'vacuole' accept 'cell wall'	
d	1	* it has chloroplasts or chlorophyll	accept 'it is green'	'it is a different shape' is insufficient 'it does not have a hair' is insufficient
Total	6			

	Q No 5			
Part	Mark	Answer	Accept	Additional Guidance
a 2/1b	2	any two from * it has a flagellum or tail to help it move * it does not have a (cell) wall * it does not have a vacuole * it has a reservoir (for taking in food)	accept 'can move or swim' accept 'it has a tail' accept 'it does not have a fixed shape' or 'it changes shape' accept 'it takes in or eats food' accept 'it has a mouth-like structure'	'whip' is insufficient <i>do not accept</i> 'it does not have a membrane' 'it only has a cell membrane' is insufficient 'it has a mouth' is insufficient
b 2/1b	1	* it has chloroplasts	accept 'chlorophyll'	'it makes food' is insufficient
c 2/3b	1 1	* water * oxygen	accept 'H ₂ O' accept 'O ₂ '	answers must be in the correct order
Total	5			

1.2 Plants growth, photosynthesis and plants reproduction

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1	any one from * to make food or glucose or sugar or starch * photosynthesis	accept 'for growth'	
(ii)	1	any one from * there is not enough light * there is less light	accept 'no light' or 'no Sun' accept 'light cannot reach them'	<i>do not accept</i> 'because plants need light'
(b)	2	any two from * oxygen * water * minerals or nutrients	accept a named mineral such as 'nitrate' accept for two marks two named minerals such as 'nitrates' and 'phosphates'	
(c)	1	* B ✓		if more than one box is ticked, award no mark
Total	5			

Tier	Q No			
	2			
Part	Mark	Answer	Accept	Additional guidance
a	2	any two from * less or no food * fewer or no places to nest or shelter * less or no cover	accept 'trees are producers' accept 'they have lost their home' accept 'their habitat is destroyed' accept 'they cannot hide from predators'	'they have lost their territory' is insufficient 'it spoils the environment' is insufficient
b	1	any one from * more light * more water * more space * more nutrients	accept references to nutrients from trees left to rot accept 'photosynthesis can take place'	
	1	* more photosynthesis can take place		
c	1	any one from * to replace minerals or nitrates that have been removed (by plants) * plants absorb the minerals or nitrates * plants need minerals or nitrates to grow * minerals or nitrates or they are plant nutrients	accept 'minerals or nitrates get washed out of the soil' accept 'so that plants can grow' accept 'plants can grow more'	'plants feed on the nutrients' is insufficient
Part	Mark	Answer	Accept	Additional guidance
d	2	any two from * to provide food for animals * to provide shelter or nesting sites or habitats for birds or animals * trees absorb carbon dioxide * trees produce oxygen * the roots bind soil or prevent soil washing away	accept 'to provide homes for animals' accept 'provides trees to be cut down in the future' accept 'they need trees for paper' or 'to get paper'	'it is good for the environment' is insufficient 'to help animals or birds survive' is insufficient
Total	7			

Tier	Q No													
	3													
Part	Mark	Answer	Accept	Additional guidance										
a i	1	* magnesium												
a ii	1	any one from * a potted plant has a limited amount of soil or minerals * less chance of minerals being returned to the soil by dying or decaying plants or by microbes or fungi or bacteria or worms * no room for roots to extend and find more minerals	accept the converse accept 'no room for roots to grow'	answers must indicate that the soil available to the potted plant is limited or may not be replenished 'the garden has more minerals' is insufficient 'lack of sunlight' is insufficient										
b i	3	* <table border="1"><thead><tr><th>mineral</th><th>letter of fertiliser</th></tr></thead><tbody><tr><td><i>magnesium</i></td><td>B</td></tr><tr><td><i>nitrogen</i></td><td>A or C</td></tr><tr><td><i>phosphorus</i></td><td>D</td></tr><tr><td><i>potassium</i></td><td>C</td></tr></tbody></table>	mineral	letter of fertiliser	<i>magnesium</i>	B	<i>nitrogen</i>	A or C	<i>phosphorus</i>	D	<i>potassium</i>	C	accept 'Epsom Salts' or 'MgSO ₄ ' or 'magnesium sulphate' accept 'A and C' or 'Easy Grow' or 'NH ₄ NO ₃ ' or 'ammonium nitrate' or 'Saltpetre' or 'KNO ₃ ' or 'potassium nitrate' accept 'Superphosphate' or 'Ca(H ₂ PO ₄) ₂ ' accept 'Saltpetre' or 'KNO ₃ ' or 'potassium nitrate'	if all four answers are correct, award three marks if three answers are correct, award two marks if one or two answers are correct, award one mark
mineral	letter of fertiliser													
<i>magnesium</i>	B													
<i>nitrogen</i>	A or C													
<i>phosphorus</i>	D													
<i>potassium</i>	C													
b ii	1	* 3												
b iii	1	* 9												
Total	7													

Tier	Q No			
	4			
Part	Mark	Answer	Accept	Additional guidance
a	1	* root hair		'root' is insufficient
b	1	any one from * they prevent insects or flies from crawling out * insects slide in * they make it difficult for them to crawl out		'to attract insects' is insufficient
c	1	* the more insects there are or food there is the more bacteria there will be	accept the converse	
d i	1	* carbon dioxide + <i>water</i> →		
	1	<i>glucose</i> + * oxygen		
d ii	1	* to provide energy ✓		if more than one box is ticked, award no mark
Total	6			

Tier	Q No			
	5			
Part	Mark	Answer	Accept	Additional guidance
	1	* modified and unmodified plant	accept 'type of plant'	markers should read through the whole answer before marking this question '(flowers from) different plants' is insufficient
	1	* the number of days or weeks or months the flowers stayed fresh	accept 'how long they stayed fresh'	
	1	any one from * modified and unmodified plants should be the same variety		
	1	* conditions under which flowers are kept should be the same	accept 'amount of sunlight should be the same' accept 'amount of water should be the same' accept 'nutrients added should be the same'	
	1	* modified and unmodified plants should be the same starting age A suitable time span (which will allow comparison) for example * 'until they have all wilted' or * 'until all ordinary plants have wilted'		award a mark for answers of 2 weeks or more
Total	4			

Tier	Q No			
	6			
Part	Mark	Answer	Accept	Additional guidance
a i	1	any one from * it is long and spindly * the leaves are far apart * the leaves are white or pale	accept 'it is tall' or 'it has grown more' accept 'it is thinner' or 'it is thin' accept 'the leaves are yellow' accept 'it is lighter' accept 'it has no chlorophyll' accept 'its leaves are a different colour'	'they are shrivelled or crinkled' is insufficient
a ii	1	any one from * it has wilted * it has drooped * the leaves are floppy	accept 'it is not turgid' accept 'leaves pointing down' accept 'it is floppy' accept 'it has shrivelled'	'it has dried out' is insufficient 'it has died' is insufficient 'it is discoloured' is insufficient
b	2	any two from * water * minerals * oxygen	accept 'H ₂ O' accept 'moisture' accept a named mineral award two marks for two named minerals accept 'nutrients' or 'salts'	<i>do not accept 'food'</i>
Total	4			

	Q No 7			
Part	Mark	Answer	Accept	Additional guidance
a 1/2a	2	any two from * he used the same amount of pollen * he measured the concentration of the solutions or he used a range of strengths of solution * he observed the pollen grains after one hour * he worked out the percentage which germinated	accept 'he used the same number of pollen grains' or 'he controlled the number of pollen grains' accept 'he has given percentages' accept 'he used a range of sugar solutions' accept 'he used exact amounts' accept 'he looked at them after one hour' or 'he kept the time the same' accept 'more detail' or 'more precise'	'more accurate' is insufficient 'it is a fair test' is insufficient accept answers formulated in terms of what Amy's plan does not do
b 1/2d	1	* the concentration of sugar solution	accept 'strength of solution' accept 'different sugar solutions' accept 'the sugar solution' accept 'the amount or percentage of sugar'	<i>do not accept</i> 'the amount of sugar solution'
c 1/2i	1	* a point at (20,10) plotted to \pm half a small square		

1.3 How the Body Works: Major organ systems and staying healthy

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1	* water		
(ii)	1	* skin or peel		
(b)	1	* 18 28		answers must be in the correct order both answers are required for the mark
(c)	1 1 1	<div> <div> <div>* not enough calcium</div> <div>* not enough fibre</div> <div>* too much fat</div> </div> <div> <div>heart</div> <div>intestine</div> <div>lung</div> <div>bones</div> </div> </div>		if more than one line is drawn from any fact about the diet, award no mark for that fact
Total	6			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
(a)	1	* No ✓ and any one from * sulphuric acid did not cure scurvy * not all the sailors recovered * only two pairs recovered * only those that had fruit-related additions recovered * some with acid failed to recover * a week is not long enough to show the effect	accept 'some acids did not cure scurvy' accept 'only pair 5 totally recovered' accept 'a week is not long enough'	if more than one box is ticked, award no mark both the answer and the explanation are required for the mark 'only those who received vitamin C recovered' is insufficient
(b) (i)	1	any one from * addition to their diet * food or drink supplements * type of acid	accept 'the acid' accept 'amount of acid'	do not accept 'type of food or drink' do not accept 'kind of meal' do not accept conclusions such as '4 out of 6 pairs of sailors had scurvy'
(ii)	1	any one from * whether they recovered * return to health * recovery from scurvy * effect after one week	accept 'scurvy is cured'	do not accept 'time to recover'

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
(c)	1	any one from * there must be a different substance or something present in fruits that cures scurvy	accept 'fruits will cure scurvy' accept 'vitamin in the fruit would cure scurvy' accept 'vitamin C will cure scurvy' accept any named vitamin for vitamin C accept 'vitamins would have an effect'	'the acids in oranges and lemons cure scurvy' is insufficient 'oranges and lemons will cure scurvy' is insufficient
(d)	1	any one from * effects due to diet may take more than a week to reveal themselves * the body takes time to adjust to the diet * time is needed for the results to reveal themselves * the effects do not take place before a week * the longer the time the more reliable the results	accept 'one week is too short' or 'you need to see long term effects' accept 'oranges or lemons might be a short term cure'	
Total	5			

	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
(a)	1	any one from * to prevent it collapsing * to keep it open * for support	accept 'protects against collapse' accept 'for strength' accept 'for flexibility'	'for protection' is insufficient
(b) (i)	1	* A: oxygen B: carbon dioxide	accept 'O ₂ ' accept 'CO ₂ '	both answers are required for the mark
(ii)	1	any one from * it is thin * it is one cell thick * it is close to the blood supply	accept 'there is a diffusion gradient' accept 'it is moist'	
(c) (i)	1	any one from * it moves mucus * it sweeps dust from lungs	accept 'it moves bacteria'	'to clear or clean the airways' is insufficient
(ii)	1	any one from * it paralyses the cilia * it stops the cilia working * it clogs the cilia	accept 'it destroys them'	do not accept 'it kills cilia'
(iii)	1	* nicotine		
Total	6			

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* vertebrates		<i>do not accept 'vertebrae'</i>
a ii	1	* reptiles		
b	1	any one from * so that it can bend * to allow movement		
c	1	any one from * to stop the bones rubbing together * to stop bones getting worn down * to cushion the bones	accept 'it reduces friction' accept 'it can be squashed' accept 'it absorbs shock'	
d	1	* <i>the biceps</i> contracts <i>the triceps</i> relaxes		both answers are required for the mark
Total	5			

Tier	Q No			
	5			
Part	Mark	Answer	Accept	Additional guidance
a	1 1 1	<div> <div>carbon monoxide</div> <div>nicotine</div> <div>tar</div> </div>	<div>causes addiction to smoking</div> <div>causes influenza (flu)</div> <div>causes lung cancer</div> <div>causes red blood cells to carry less oxygen</div>	if more than one line is drawn from any substance, award no mark for that substance
b i	1	any one from * fat has been deposited * the artery has become narrower	accept 'fat' accept 'it is blocked'	
b ii	2	any two from * less oxygen to the cells or heart muscle * less glucose to the cells or heart muscle * less blood to the cells or heart muscle	accept 'no oxygen' accept 'no glucose' accept 'it stops the circulation of blood' accept 'blood cannot flow through' accept 'it stops blood getting to the heart' accept 'there is a build-up of carbon dioxide' accept for two marks 'they get less oxygenated blood'	do not accept 'less air to the cells' 'nothing can get through' is insufficient
Total	6			

	Q No 6			
Part	Mark	Answer	Accept	Additional guidance
a	1	any one from * the force of the muscle would be less or lost * the (fore)arm or bone would not move * the biceps or muscle could not pull on the bone * the biceps or muscle would have no effect * the biceps or muscle would have less effect	accept 'you could not bend or straighten your arm' accept 'the biceps or muscle would not work properly'	'the arm would not work properly' is insufficient
b	1	any one from * when one contracts the other relaxes * when the biceps contracts the forearm is raised and when the triceps contracts the forearm is lowered	accept 'one muscle moves the joint or bone or arm one way and the other muscle moves it the other way'	<i>do not accept</i> 'when one contracts the other expands' 'they work together' or 'they do opposite things' is insufficient
c i	1	* C		
c ii	1 1	* B and C ✓ * D and A ✓		if more than two boxes are ticked, deduct one mark for each incorrect tick minimum mark zero
Total	5			

	Q No 7			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* United States	accept 'US' or 'USA' accept 'America' accept lower case letters for 'US'	
a ii	1	* the less starch eaten, the more people get cancer	accept the converse accept 'starch helps to prevent cancer' accept 'you should eat a lot of starch'	<i>do not accept</i> 'people with cancer eat less starch' 'eat starch' is insufficient
b i	1	* bread ✓		if more than two boxes are ticked, deduct one mark for each incorrect tick minimum mark zero
	1	* pasta ✓		
b ii	1	* fibre ✓		if more than one box is ticked, award no mark
Total	5			

1.4 Classification, adaptation, variation and inheritance

	Q No 8			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* 1000		
a ii	3	any three from * she was using her muscles more * she needed more energy * her rate of respiration increased * more oxygen was used up * more carbon dioxide was produced	accept 'she was using her muscles' accept 'more respiration' accept 'more oxygen was needed' accept 'there was more carbon dioxide to remove' accept for the first two marking points 'her muscles need more energy'	
b i	1	* it became faster		
b ii	1	any one from * the breaths are closer together * there are more breaths in 10 s	accept 'the waves are closer together' accept 'there are more waves in 10 s' accept 'there are three breaths in the first ten seconds and five in the next ten seconds'	
Total	6			

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
a	1	* They produce milk to feed their young. ✓		if more than one box is ticked, award no mark
b	1	any one from * they can fly * they have wings		
c	1	any one from * it is streamlined * its limbs are like fins or paddles * it has a wide or powerful tail	accept 'its fur is smooth or fine or slopes backwards' accept 'it does not have legs' accept 'it has flippers'	'it can swim' is insufficient
d	1	any one from * they protect it against predators * they make it difficult for other animals to eat it or catch it	accept 'they protect it' accept 'they stop it being eaten'	
e i	1	any one from * it keeps them warm * it traps air	accept 'it insulates them' accept 'it prevents them getting cold'	<i>do not accept</i> 'it keeps the cold out'
e ii	1	* foxes or predators cannot see them	accept 'they cannot be seen' accept 'they are camouflaged' accept 'they are the same colour as the snow'	
Total	6			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
a i	1	any one from * A * B	accept 'tadpole' accept 'trout' or 'fish'	
a ii	1	any one from * B * D	accept 'trout' or 'fish' accept 'crocodile' or 'reptile'	
b	1	* backbones		
c	1	any one from * it has fins * it is streamlined	accept 'the tail helps it swim' accept a description of streamlining such as 'it is narrow or thin' accept 'scales make it smooth' or 'it is smooth'	'it has a tail' is insufficient 'it has gills' or 'it has gills to breathe or to take in oxygen' are insufficient
d	2	<div> <div> <div>frog</div> <div>crocodile</div> <div>water vole</div> </div> <div> <div>reptiles</div> <div>mammals</div> <div>amphibians</div> </div> </div>		if all three lines are correct, award two marks if one or two lines are correct, award one mark if more than one line is drawn from any animal, award no credit for that animal
Total	6			

1.5 Habitats, ecology and human influences on the environments

Tier	Q No 3			
Part	Mark	Answer	Accept	Additional Guidance
a i 1/2k	2	any two from * one has spots * one has upright or floppy or pointy ears * one has a straight or curvy or bent snout * different shaped body * one is darker or lighter	accept 'the spots' or 'it has different markings' accept 'the ears' accept '(longer) nose or snout or face' accept 'shape of head' accept 'fatter' or 'thinner' accept 'they are different colours' accept 'length of legs'	'different shaped' or 'bigger' are insufficient 'skin' is insufficient
a ii	1	* variations ✓		if more than one box is ticked, award no mark
b	1	any one from * upright ears * its snout is longer * its legs are longer	accept 'the ears' accept 'shape of head or body' accept 'its snout' accept 'its legs' accept 'thinner' or 'it is thin'	'smaller' is insufficient
c i	1 1	* egg cell ✓ * sperm cell ✓		if more than two boxes are ticked, deduct one mark for each incorrect tick minimum mark zero
c ii	1	* fertilisation ✓		if more than one box is ticked, award no mark
Total	7			

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1	* producer		
(ii)	1	* predator		
(iii)	1	any one from * prey * herbivore		
(b)	1	any one from * they had less food * they would decrease	accept 'no food' or 'they died out' or 'they died'	
(c)	1	* reptiles ✓		if more than one box is ticked, award no mark
Total	5			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* grasshopper		
a ii	1	any one from * they eat the plants * the insects eat them	accept 'they eat them'	
b	1	any one from * <i>predator</i> : partridge <i>prey</i> : grasshopper or snail * <i>predator</i> : fox <i>prey</i> : partridge * <i>predator</i> : stoat <i>prey</i> : partridge		both the predator and its prey are required for the mark
c	1	* They make food by photosynthesis. ✓		if more than one box is ticked, award no mark
d	1	any one from * they can see predators or foxes or stoats * it keeps them warm		
e i	1	any one from * fewer will be found by predators * fewer will be eaten	accept 'they will not be seen' or 'they are camouflaged' accept 'they will not get eaten'	
e ii	1	any one from * they may be trodden on or damaged * predators can get to them easily	accept 'they can be found easily'	
Total	7			

	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* oak tree → caterpillar → blackbird → owl		all three answers are required for the mark
a ii	1	* It makes food by photosynthesis. ✓		if more than one box is ticked, award no mark
b	1 1 1 1 1	either * decreased or went down any one from * fewer leaves to feed on * gypsy moth caterpillars ate most of the leaves * less food or any one from * increased or went up * stayed the same any one from * they had enough food or leaves * more eggs hatched	accept 'gypsy moth caterpillars ate the leaves' accept 'the gypsy moth caterpillars ate all the leaves or all the food' accept 'no food' accept 'they were competing for food'	
c	1	* the tree loses its leaves	accept 'no leaves' or 'no food' accept 'it is too cold' accept 'caterpillars change into pupae or chrysalises or moths'	do not accept 'caterpillars hibernate in winter'
Total	5			

	Q No			
	4			
Part	Mark	Answer	Accept	Additional guidance
a i	1	any one from * blackbirds eat earthworms and sparrowhawks eat blackbirds * it eats blackbirds which eat earthworms * it is passed on through the food chain	accept 'from their food or from blackbirds' accept 'it is passed on or up'	
a ii	1	any one from * they are more easily seen * brown earthworms are better camouflaged	accept 'there are more yellow earthworms'	
b	1	* the level of copper or arsenic or pollution	accept 'whether it contained arsenic or copper' accept 'where the copper or arsenic is'	
c	1	* it has segments	accept 'its body is split into sections'	award a mark for any appropriate description of segments such as 'rings' or 'lines' or 'creases' 'they look similar' is insufficient 'same texture' or 'body shape' or 'structure' are insufficient
d	1	* They feed on other living things and harm them. ✓		if more than one box is ticked, award no mark
Total	5			

	Q No 5			
Part	Mark	Answer	Accept	Additional guidance
a	1	any one from * it only eats other animals * it only eats meat or fish or flesh	accept 'predator' accept 'eats meat'	
b i	1	any one from * it protects it * it stops it being damaged * it stops it drying out * it prevents infection * it keeps out disease organisms	accept 'it stops it being eaten' accept 'it keeps the contents in' accept 'it stops bacteria or viruses or germs getting in' accept 'it allows air or oxygen in or carbon dioxide out'	<i>do not accept</i> 'it keeps it warm'
b ii	1	* it reacts with the carbonate	accept 'they react' or 'it reacts with it' accept 'acid reacts with the shell' accept 'it dissolves the shell' accept 'it erodes it' or 'wears it away'	
b iii	1	any one from * makes it easier or quicker or easy to hatch or break out of the egg * makes the shell more porous	accept 'air or oxygen gets in easily' or 'more air gets in' accept 'carbon dioxide gets out more easily'	'easy or easier to break' is insufficient 'to allow for growth' is insufficient

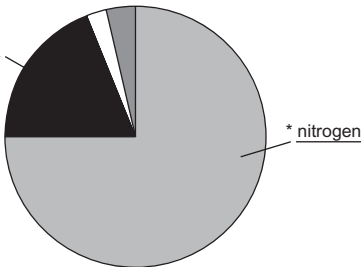
	Q No 5			
Part	Mark	Answer	Accept	Additional guidance
c i	1	any one from * keep the eggs between 26°C and 30°C * keep the temperature at or below 30°C * keep the eggs at 26°C	accept any temperature from 26°C to 30°C accept 'use the three lower temperatures' or 'the lower temperatures in the table'	'make it cooler' or 'use lower temperatures' are insufficient
c ii	1	* between 32°C and 34°C ✓		if more than one box is ticked, award no mark
Total	6			

2 Chemistry

2.1 The states of matter and particles theory

	Q No 6			
Part	Mark	Answer	Accept	Additional guidance
a	3	any three from * plants or algae need light for photosynthesis * photosynthesis or algae or plants supply or produce oxygen * plants or animals need oxygen * photosynthesis supplies glucose or carbohydrate or biomass * carbon dioxide is produced by plants or animals	accept 'for photosynthesis' accept 'oxygen is used for respiration' accept 'glucose is a source of energy for the plant' accept 'the herbivores eat the plants' or 'animals eat plants' or 'snails eat plants'	
b	1	any one from * materials can be recycled * makes nutrients available * makes minerals available		
c	1	any one from * at 27°C the oxygen concentration would drop too low * at 15°C there is more oxygen	accept 'the higher the temperature the less oxygen is dissolved' accept 'at a higher temperature they would suffocate' accept 'the lower the temperature the more oxygen there is'	'there would be more oxygen' is insufficient
Total	5			

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* 4		
a ii	1 1	* water * gas	accept H ₂ O accept 'carbon dioxide' or 'CO ₂ '	answers may be in either order
b	1	* solvent ✓		if more than one box is ticked, award no mark
Total	4			

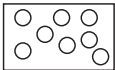

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
a	2			
b	1 1	* water vapour * condenses	accept 'vapour' accept 'turns into water or a liquid' accept 'forms condensation'	'water' or 'moisture' are insufficient
c i	1 1	* respiration * Air breathed out has more carbon dioxide and less oxygen than air breathed in. ✓		if more than one box is ticked, award no mark
Total	6			

	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* a mixture ✓		if more than one box is ticked, award no mark
a ii	1	* a compound ✓		if more than one box is ticked, award no mark
a iii	1	any one from * they are denser than the liquid * the liquid is less dense than the solid	accept 'it is heavier than the liquid or the paint' accept 'the solid particles are more dense or heavier or too heavy' accept 'the solid is denser' accept 'the liquid is less dense' or 'the liquid is lighter'	<i>do not accept</i> 'solid particles are heavy' without a comparison or qualifier eg 'too heavy'
b	1	any one from * it is insoluble in water * water is not a solvent for the paint * it dissolves in white spirit * white spirit is a solvent for the paint		'it is waterproof' is insufficient
Total	4			

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
a	1	* water: increased or went up wax: decreased or went down	accept 'expanded' accept a reading greater than 7 (cm ³) and less than or equal to 8 (cm ³) accept 'contracted' accept a reading lower than 7 (cm ³) and greater than or equal to 5.5 (cm ³)	both answers are required for the mark
b	1 1	* water: liquid * wax: solid		
c i	1	any one from * the liquid had turned blue * crystals or copper sulphate or solid could not be seen * there was no solid left	accept 'the colour changed' accept 'the water was blue or coloured or grey' accept 'the crystals disappeared'	'it formed a solution' is insufficient
c ii	1	any one from * stir it * heat it * use warm water	accept 'shake it' or 'mix it' accept 'use hotter water' accept 'add more water'	do not accept 'put less in'
d i	1	* it evaporated	accept 'it went into the air'	
d ii	1	* copper sulphate	accept 'crystals' accept 'sulphate'	
Total	7			

	Q No 5			
Part	Mark	Answer	Accept	Additional guidance
a i	1 1	* oxygen * water		answers may be in either order 'air' is insufficient 'moisture' or 'dampness' or 'wet' are insufficient
a ii	1	any one from * it prevents contact between the steel or the car and oxygen or water * it is waterproof or water runs off	accept 'it prevents air getting to the car' accept 'wax fills scratches or chips where paint is damaged'	'it forms a protective layer' is insufficient
a iii	1	any one from * paint * chrome	accept 'they are coated in zinc' or 'they are galvanised' accept 'polish'	'rust treatment' is insufficient 'cover it' is insufficient
b	1	* acid rain	accept 'sulphur dioxide' accept 'oxides of nitrogen' accept 'car exhaust fumes' accept 'burning fossil fuels' accept 'sea air' or 'salty air' or 'salt'	'carbon dioxide' is insufficient

2.2 Elements, atoms, periodic table, compounds and mixtures, metals and non-metals

	Q No 5			
Part	Mark	Answer	Accept	Additional guidance
c i	1	<p>* <i>gas</i>: particles randomly arranged and most not touching</p> 	<p>accept black shaded circles if drawn correctly accept fewer or more than 8 circles if the arrangement is clear</p>	<p>ignore arrows attached to circles</p>
c ii	1	<p>* <i>solid</i>: particles regularly arranged and all touching</p> 	<p>accept white circles if drawn correctly accept 2 rows of particles with at least 2 particles in the second row accept fewer or more than 8 circles if a regular arrangement is clear</p>	<p>ignore location of circles in box <i>do not accept</i> a single row of circles</p>
Total	7			

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
a	1	* a magnet	accept 'an electromagnet'	<i>do not accept</i> 'a sieve' <i>do not accept</i> 'tweezers'
b	1	any one from * they dissolved * they are soluble in water	accept 'they formed a solution' accept 'they are soluble'	
c i	1	* bubbles formed		
c ii	1	* It turned cloudy. ✓		if more than one box is ticked, award no mark
Total	4			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
a	1	* evaporation then condensation ✓		if more than one box is ticked, award no mark
b	1	* water	accept 'distillate'	
c	1	* 100	accept a temperature from 99 to 101	
d i	1	* a temperature above 15 but below 100 any one from * it is heated by the water vapour * thermal energy or heat is transferred from the water vapour	accept 'vapour or steam or hot water' for water vapour accept 'it heats up'	both the answer and the correct explanation are required for the mark
d ii	1	any one from * it condenses * it changes to a liquid	accept 'it makes condensation' accept 'it is liquid' accept 'it changes state' accept 'it turns to water'	
	1	* its temperature falls	accept 'it cools'	'it changes temperature' is insufficient

	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* pale blue yellow red		answers may be in any order all three answers are required for the mark <i>do not accept</i> 'blue' for 'pale blue'
a ii	1	* 2 because there are two spots on the paper	accept 'there are two colours from the green ink' accept 'because they are straight up from the green ink' accept 'it has dark blue and yellow' accept 'it shows two'	both the answer and the correct explanation are required for the mark
a iii	1	* pencil any one from * because ink from the felt-tip pen is soluble or will dissolve in water * because pencil will not spread out or dissolve or run or smudge	accept 'the ink will also produce colours' accept 'the ink expands'	both the answer and the correct explanation are required for the mark 'the pencil has no ink in it' is insufficient
b	1	any one from * the ink would not dissolve in water * the ink would dissolve in ethanol * ethanol is a solvent for the ink	accept 'the ink was water resistant or permanent or waterproof' accept 'ethanol is a suitable solvent' accept 'ethanol can absorb the ink' accept 'ethanol washes out the ink' accept 'some substances will dissolve in one solvent but not another'	
Total	4			

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
a	1	* copper for the base of a saucepan	It is lighter than air.	if more than one line is drawn from any element, award no mark for that element minimum mark zero
	1	* gold for a ring	It is a good conductor of heat.	
	1	* helium in a balloon	It is a good conductor of electricity.	
	1	* mercury in a thermometer	It stays shiny because it does not react with oxygen.	
			It is a liquid at room temperature.	
b	1	* helium ✓		if more than one box is ticked, award no mark
Total	5			

	Q No 5			
Part	Mark	Answer	Accept	Additional guidance
a	1 1	* metal any one from * heat * thermal energy		
b	1	any one from * nail * paper-clip	accept 'iron' accept 'steel' or 'clip'	
c i	1	any one from * plastic * rubber * PVC	accept a named plastic	
c ii	1	any one from * to stop you getting a shock * so the wires do not touch	accept 'to stop you being electrocuted' accept 'to make it safe' accept 'to prevent them short circuiting' accept 'it does not conduct electricity'	'to insulate them' is insufficient as it is given in the question
d	1	* iron nail and steel paper-clip ✓		if more than one box is ticked, award no mark
Total	6			

2.3 Acids and alkalis, common salts

	Q No 6			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* A		
a ii	1	* E		
a iii	1	* C		
b	1	any one from * a compound contains two or more elements chemically combined or bonded * a mixture contains two or more elements or compounds or substances not chemically combined or bonded	accept 'a compound contains different elements or atoms of different types joined together' accept 'a mixture can be separated by physical means'	<i>do not accept</i> 'a compound contains two or more atoms joined together' 'a mixture can be separated' is insufficient
c i	1	any one from * name: oxygen formula: O ₂ * name: hydrogen formula: H ₂ * name: nitrogen formula: N ₂ * name: chlorine formula: Cl ₂	accept any other element which exists as diatomic molecules in the gaseous state	both the name and formula are required for the mark <i>do not accept</i> 'O' or 'H' or 'N' or 'Cl'
c ii	1	any one from * name: carbon dioxide formula: CO ₂ * name: water formula: H ₂ O * name: sulphur dioxide formula: SO ₂ * name: nitrogen dioxide or nitrogen oxide formula: NO ₂	accept any compound with the formula XY ₂ , eg magnesium chloride MgCl ₂	both the name and formula are required for the mark
Total	6			

Tier	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1	* 7		<i>do not accept 'neutral'</i>
(ii)	1	* it was neutral ✓		if more than one box is ticked, award no mark consequential marking applies accept 'it was acidic' if the answer to part (i) was less than 7 accept 'it was alkaline' if the answer to part (i) was greater than 7 and up to 14
(b)	1	any one from * it decreased or went down * it became acidic or more acidic	accept 'it dropped to 5'	
(c)	1	* an alkali ✓		if more than one box is ticked, award no mark
Total	4			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* red or pink	accept 'orange' or 'yellow'	
a ii	1	* any number greater than 0 and smaller than 7	accept '0'	
b i	1	* carbon dioxide is gas	accept 'carbon dioxide or a gas is produced'	
b ii	1	any one from * no more carbon dioxide or gas was produced * the reaction stopped * all the hydrochloric acid was used up * there was an excess of magnesium carbonate or carbonate	accept 'the acid had been neutralised'	<i>do not accept</i> 'all the magnesium carbonate was used up'
c	1 1	* a compound ✓ * a salt ✓		if more than two boxes are ticked, deduct one mark for each incorrect tick minimum mark zero
d	1	any one from * without it digestion would stop or slow down * acid is needed for digestion * the enzymes only work in acid conditions or at a low pH * it is needed to kill bacteria or microbes	accept 'to break down food'	<i>do not accept</i> 'germs'
Total	7			

2.4 Chemistry in everyday life, pattern of reactivity

	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a i	1	any two from * coal * peat * natural gas * oil	accept 'gas' accept 'petrol' or 'diesel'	answers may be in either order both answers are required for the mark
a ii	1	* sulphur dioxide	accept 'sulphur oxide' or 'sulphur trioxide'	
b i	1	* it raises the pH or it	accept 'it neutralises it' or 'it neutralises some of the acid'	
b ii	1	* calcium sulphate ✓		if more than one box is ticked, award no mark
c i	1	* leaves are needed for photosynthesis or for making food	accept 'they absorb light'	
c ii	1	any one from * it weathers limestone * it reacts with the stone	accept 'it erodes them or wears away the building' accept 'it dissolves limestone or the building'	'it damages the stone' is insufficient 'it corrodes them' is insufficient
Total	6			

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1	* water	accept 'H ₂ O'	
(ii)	1	* carbon dioxide	accept 'CO ₂ '	
(b) (i)	1	* do not use antifreeze or methanol near a naked flame and do not swallow	accept 'it catches fire easily and it is poisonous' accept 'wash hands after use' for do not swallow accept 'it is flammable or inflammable and it is poisonous'	both answers are required for the mark
(ii)	1	any one from * water froze * the mixture froze * the contents froze	accept '10% antifreeze is not enough to stop the water freezing'	'not enough antifreeze used' is insufficient do not accept 'it froze'
	1	* and expanded		
Total	5			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
a	1	* steel		do not accept 'stainless steel' do not accept 'carbon'
b	1	* brass * solder		answers may be in either order both answers are required for the mark
c	1	* 80	accept '100 – 20'	
d i	1	* it does not contain iron	accept 'it does not contain steel' accept 'only iron rusts' or 'only steel rusts' accept 'it is made of tin, copper and zinc'	
d ii	1	* oxygen	accept 'O ₂ '	
Total	5			

2.5 Rocks and soil

	Q No 3	
Part	Mark	Answer Accept Additional guidance
a	1 1 1	<div> <div> <div></div> <div> copper iron magnesium zinc </div> </div> <div> <div>calcium nitrate</div> <div>copper nitrate</div> <div>iron nitrate</div> </div> <div> <div>X</div> <div></div> <div>X</div> </div> <div> <div>X</div> <div>✓</div> <div></div> </div> <div> <div>X</div> <div>✓</div> <div>✓</div> </div> <div> <div>X</div> <div></div> <div>✓</div> </div> <div> <div>X</div> <div></div> <div>✓</div> </div> </div> <p>award one mark for each correct row</p>
b	2	<div> <div>calcium carbonate + hydrochloric acid</div> <div>magnesium + hydrochloric acid</div> <div>copper + hydrochloric acid</div> <div>no reaction</div> <div>a chloride, carbon dioxide and water are formed</div> <div>a chloride and hydrogen are formed</div> </div> <p>if all three answers are correct, award two marks if one or two answers are correct, award one mark if more than one line is drawn from a pair of reactants, award no credit for that pair</p>
Total	5	

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1	* C		
(ii)	1	* A		
(iii)	1	* D		
(b)	1	* igneous rock ✓		if more than one box is ticked, award no mark
(c)	1	* water is heated to form water vapour ✓		if more than one box is ticked, award no mark
(d) (i)	1	* skeleton or bones	accept 'spine' or 'backbone' or 'ribs' or 'skull'	
(ii)	1	* fossils	accept 'scales'	
Total	7			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
(a)	1	any one from * it contains more than one substance which are not chemically combined * they can be separated by physical means or by sedimentation or filtration * she sees a red and a brown layer	accept 'substances are not combined' accept 'they can be separated easily' accept 'there are layers' accept 'it splits into sand and clay'	
(b) (i)	1	any one from * heat the liquid * evaporate the water	accept 'leave it until the water had gone' accept 'leave it on a radiator' accept 'distill it'	mark parts (b) (i) and (b) (ii) together 'leave it' is insufficient
(ii)	1	* a deposit left behind	accept 'a deposit' or 'a salt' or 'a solid' or 'crystals'	
(c)	1	* transported deposited compacted		all three processes in the correct order are required for the mark
Total	4			

	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a	1	any one from * it cools more slowly * large volume of magma * magma is insulated by rock * heat is transferred more slowly to rock than to air * lava cools more quickly	accept 'it cools slowly' or 'it is cooler above ground' accept 'there is a lot of it' accept 'magma is surrounded by rock' accept 'it is hotter underground'	
b i	1	* crystals formed underground will be larger	accept the converse accept 'they will be larger'	
b ii	1	any one from * magma cools more slowly than lava * lava cools more quickly than magma	accept 'magma cools slowly' accept 'lava cools quickly' accept 'there is no rock above the lava'	<i>do not accept</i> 'bigger crystals cool more slowly'
c i	1	any one from * high temperatures * high pressure	accept 'heat' or 'hot' accept 'pressure'	
c ii	1	* marble		
Total	5			

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
a	1	any one from * it absorbed water * its mass or weight increased	accept 'it soaks up water' accept 'the mass or weight of the granite or marble did not increase or change'	'granite or marble did not change' is insufficient
b i	1	any one from * it would crack * it would crumble or break up	accept 'the grains would move apart'	
b ii	1	* weathering	accept 'freeze-thaw' accept 'erosion'	
c	1	any one from * granite would not react with acid rain * marble reacts with acid rain	accept 'granite or it is not affected by acid rain or acid' accept 'granite would not erode or crumble or corrode' accept 'marble is affected by acid rain or rain' accept 'marble would erode' accept 'rain or pollution might have acid in it'	'granite does not react with air pollution' is insufficient <i>do not accept 'it would erode'</i>

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
d i	2	* <div> <div>granite</div> <div>sedimentary</div> <div>marble</div> <div>igneous</div> <div>sandstone</div> <div>metamorphic</div> </div>		if all three lines are correct, award two marks if one or two lines are correct, award one mark if more than one line is drawn from a name of a rock, do not credit that line
d ii	2	* <div> <div>sedimentary</div> <div>the effect of high temperature and pressure on limestone</div> <div>igneous</div> <div>formed when magma cools</div> <div>metamorphic</div> <div>particles are deposited in layers</div> </div>		if all three lines are correct, award two marks if one or two lines are correct, award one mark if more than one line is drawn from a group of rocks, do not credit that line
Total	8			

3 Physics


3.1 Forces, moment, pressure, motion and speed

	Q No 5			
Part	Mark	Answer	Accept	Additional Guidance
a i	1	* feathers	accept 'wings' accept 'beak' accept 'hollow or thin bones'	'it could fly' is insufficient
a ii	1	* scales		
b	1	any one from * only the imprint of feathers or bones are left or seen * not enough evidence or proof * it is now extinct	accept 'they do not know whether it had feathers or scales' accept 'no feathers were found' accept 'its flesh or skin is not there' or 'only its bones are there' accept 'there are no animals like it around today' accept 'they have not seen one'	'they do not know if it is a reptile or bird' is insufficient 'no evidence or proof' is insufficient 'they do not know what it looked like' is insufficient 'they do not know what colour it was' is insufficient
c	1	* fossils		
d	1	* it is too hot	accept 'they burn or melt' accept 'it is hot' accept 'heat'	'they are destroyed' is insufficient
Total	5			

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
(a)	1	* down		
(b)	1	* Ellie and Maggy		names may be in either order both names are required for the mark do not accept '540 and 540' this rules out the same person being used twice
(c)	1	* A B up down		award the mark if only one of these correct responses is given provided an incorrect response is not written in the other box
(d)	1	any one from * Rosie * Jack * Rosie or Jack		do not accept '490' do not accept '510' do not accept '490 or 510' do not accept 'Rosie and Jack'
Total	4			


	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	2	any two from * gravity or weight * friction * reaction * air resistance	accept 'upthrust' accept 'drag'	<i>do not accept</i> 'centrifugal force' or 'centripetal force' or 'g-force'
(ii)	1	any one from * constant speed * steady speed * it stays the same	accept 'it is the same' or 'it does not change'	
(b)	1	* friction is less		'it is smoother' or 'it is slippery' are insufficient
(c)	1 1	* it increases * because there is less air resistance or friction	accept 'he goes more quickly' accept 'he is streamlined or aerodynamic'	
Total	6			

	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* C		
a ii	1	* B		
b	1	* 20		
c	1	any one from * friction * air resistance or drag * reaction	accept 'upthrust'	<i>do not accept 'gravity'</i>
Total	4			

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
a	1	* A		
b	1	any one from * he will remain stationary * he will continue moving at a constant speed	accept 'he floats' accept 'nothing'	
	1	any one from * there is no net force * the pairs of forces are equal	accept 'all the forces cancel out' accept 'they cancel each other out' accept 'the forces are balanced'	'the forces are equal' is insufficient
c	1	* 	accept any arrow drawn going up and to the right	
Total	4			

	Q No 5			
Part	Mark	Answer	Accept	Additional guidance
a	1	* B		
b i	1	* A and C	accept 'lift and weight'	answers may be in either order both letters are required for the mark
b ii	1	* D and B	accept A and C	answers may be in either order both letters are required for the mark
c i	1	* Force D is greater than force B. ✓		if more than one box is ticked, award no mark
c ii	1	* Force A is greater than force C. ✓		if more than one box is ticked, award no mark
Total	5			

	Q No 6			
Part	Mark	Answer	Accept	Additional guidance
a	1	any one from * liquids or they take up less space * liquids or they are denser	accept 'particles are closer together in a liquid' accept 'particles are further apart in a gas'	<i>do not accept</i> 'liquids are heavier' 'liquids are easier to transport' is insufficient
b	1	* there is no oxygen in space	accept 'there is no air in space' accept 'space is a vacuum'	
c	1	any one from * the weight of the fuel decreases * there is less fuel on board * fuel is being used up * water is released	accept 'hydrogen and oxygen or oxygen is being used up' accept 'waste gas is given off'	'gravity gets weaker' is insufficient
d i	1	* 27 * 16.5	accept a number from 16.3 to 16.7	both answers are required for the mark
d ii	1	* 10.5	accept the difference between the numbers given in d i	consequential marking applies
d iii	1	any one from * up to 10 seconds the weight is greater than the (upward) force * after 10 seconds there is a resultant or net (upward) force * after 10 seconds the (upward) force is greater than the weight	accept the converse	answers must be in terms of a comparison 'it does not have a great enough upward force' is insufficient 'at 10 seconds the forces are equal' is insufficient
Total	6			

	Q No 7			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* it is between 20 g and 40 g	accept a number greater than 20 and less than 40	'more than 20' or 'less than 40' are insufficient
a ii	1	any one from * cut a slot between 20 and 40 * cut more slots	accept 'add a mark for 30' accept 'add more weights'	award a mark for an answer referring to cutting a slot for any mass between 20 g and 40 g
b i	1	any one from * it is on the wrong side of the pivot * it would not make the scale tip	accept 'it is past the pivot line' accept 'the scale is supported on this side' accept 'it does not produce a clockwise moment'	award a mark for an answer indicating that it is on the wrong side of the pivot <i>do not accept</i> 'because the cardboard would tilt the other way' 'it would not work' is insufficient
b ii	1	* a line drawn between the 40 g and 100 g slots 		accept answers which clearly indicate the correct position on the diagram the line must not touch the slots for 40 g or 100 g
Total	4			

	Q No 8			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* 100	accept '200 ÷ 2.0'	
	1	* N/cm ²	accept '10 ⁶ N/m ² ' or '10 ⁶ Pa' for two marks	
a ii	1	* 800	accept '100 × 8' accept the numerical answer to a i × 8	the unit is not required for the mark
b i	1	any one from * air or gas can be compressed * water or liquids cannot be compressed * gaps between particles of air or gas can be reduced	accept 'gases are easier to compress' accept 'atoms can be compressed together'	'air or gas provides less resistance' is insufficient
b ii	1	any one from * less force would be transmitted to the brakes * less pressure at B * piston B would not move	accept 'the brakes have less effect' accept 'less pressure could be produced' accept 'less or no resistance to the brakes' accept 'the air bubbles could be compressed'	'the brakes are spongy' is insufficient
Total	5			

3.2 Energy and energy transfers

		Q No 9			
Part	Mark	Answer	Accept	Additional guidance	
a i	1	* 75	accept '50 × 1.5'	do not accept lower case n	
	1	* Nm			
a ii	1	* 750	accept $\frac{50 \times 1.5}{0.1}$ or '50 × 15'	accept the numerical answer to part a i ÷ 0.1	
b	1	any one from * a current flows in the coil * the coil or the iron core becomes magnetised	accept 'there is a magnetic field' or 'the electromagnet switches on'	do not accept 'the core becomes magnetic'	
	1	any one from * the counterweight is attracted to the coil or core or the electromagnet * the electromagnet produces a bigger moment	accept 'the left-hand side of the barrier moves down'	'the right-hand side moves up' is insufficient	
Total	5				

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
(a)	1 1	* oil * natural gas	accept 'gas'	answers may be in either order
(b) (i)	2	any two from * wind * solar * tidal * biomass * geothermal		answers may be in either order
(ii)	2	* <u> C </u> <u> E </u> <u> A </u> <u> B </u> <u> D </u>		if all three letters are correct, award two marks if one letter is correct, award one mark
Total	6			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1	* electrical to chemical ✓		if more than one box is ticked, award no mark
(ii)	1	* chemical to electrical to sound ✓		if more than one box is ticked, award no mark
(b)	1 1 1	* Q * R * P		
Total	5			

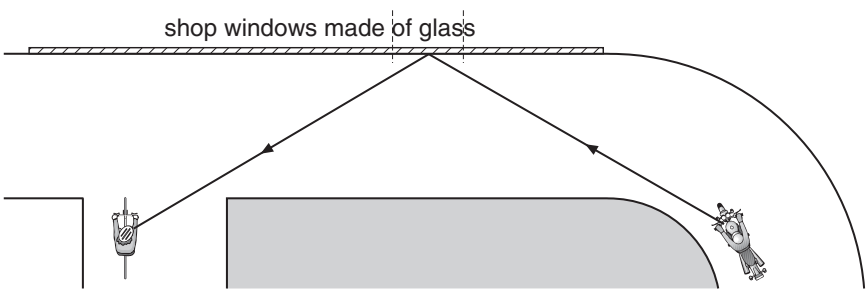
	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* kinetic	accept 'movement' or 'motion'	
a ii	1	* sound	accept 'kinetic' or 'movement' or 'motion'	
b	1	any one from * loud sounds dissipate more energy than quieter sounds * energy is transferred more quickly * more potential or kinetic energy is converted to sound	accept 'energy is used or needed more quickly' accept 'it is using more power' or 'more energy is transferred per second' accept 'more energy is converted to sound' accept 'it is using or transferring more energy' accept 'it produces more electrical energy'	answers must refer to 'energy' or 'power' <i>do not accept 'it uses more electricity'</i>
c	1	any one from * solar energy or light energy is used * less energy is provided by or taken from the spring * energy is provided by the solar cell	accept 'the radio is run by sunlight or light' accept 'the light provides a second source of energy' accept 'the radio is run by the Sun' accept 'the radio has two sources of energy'	
d	1	any one from * batteries or mains electricity are not available * batteries or mains are not needed * people cannot afford batteries or mains electricity	accept 'the energy resource is free' accept 'they are cheap to run'	'they are cheap' is insufficient
Total	5			

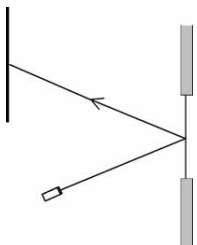
	Q No			
	4			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* electrical		
a ii	1	* kinetic	accept 'movement'	
a iii	1	* gravitational potential	accept 'gravitational' or 'potential'	answers must be in the correct order
	1	* kinetic or sound or thermal	accept 'heat' for thermal	
			accept for two marks 'kinetic <i>into</i> sound' or 'kinetic <i>into</i> thermal'	
b	1	<i>advantage</i> * the energy will always be replaced * it is renewable * it is free to run * a battery might leak	accept 'it will not run out' accept 'it does not use fuel or mains electricity' accept 'it is cheap' accept 'no pollution with a solar cell'	<i>do not accept</i> 'can be used again'
	1	<i>disadvantage</i> * if the Sun goes in the pump will stop * it will not work at night or in the dark	accept 'it must be in the Sun to work' accept 'it is not sunny all the time'	
Total	6			


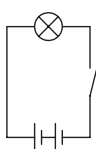
	Q No 5			
Part	Mark	Answer	Accept	Additional guidance
a	1	any one from * loud sounds can damage hearing * to protect his ears * loud sounds can burst the eardrum	accept 'they could damage his hearing' accept 'loud sounds can damage the ear' accept 'it could make him deaf' accept 'they are very loud'	'they are loud' is insufficient as 'loud' is given in the question
b	1	any one from * the further the sound travels the quieter it gets * she was furthest away	accept 'the sound or energy spreads out' accept 'she was further away' or 'she was far away' accept 'some of the sound is absorbed'	
c	1	any one from * the speed of light is greater than the speed of sound * light travels faster than sound	accept 'sound travels more slowly' accept 'light travels faster' accept 'light gets there before sound'	
d i	1	* light		
d ii	1	* sound		
e	1	* gravity	accept 'weight'	
Total	6			

3.3 Light and sound

	Q No 6			
Part	Mark	Answer	Accept	Additional guidance
a	1 1	* coal * gas	accept 'coal fire' or 'A' accept 'gas boiler' or 'D' accept 'petrol' or 'petrol generator' or 'C' or 'oil'	answers may be in either order 'fire' is insufficient 'boiler' is insufficient 'generator' is insufficient
b i	1	* the Sun	accept 'solar energy' or 'solar' accept 'light' or 'sunlight'	references to heat are insufficient
b ii	1	any one from * it is dark * no light * the Sun has set	accept 'it needs light' accept 'no Sun'	references to heat are insufficient
c	1	* wind	accept 'moving air' or 'air' accept 'air currents'	
d	1	any one from * Sun or solar energy * waves * wind	accept 'solar panel' or 'E' accept 'wave turbine' or 'F' accept 'wind turbine' or 'turbine' or 'B'	'water' is insufficient
Total	6			

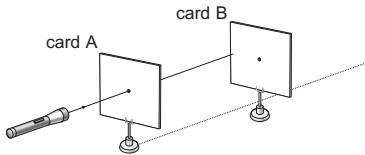
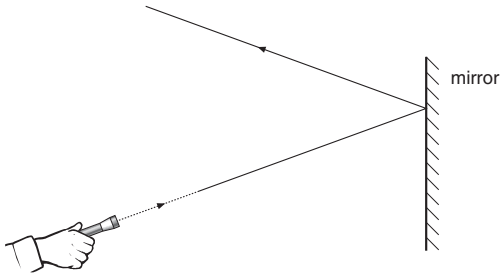
	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
(a)	1	* B ✓		if more than one box is ticked, award no mark
(b) (i)		<div style="text-align: center;">shop windows made of glass</div> 		
	1	* a continuous straight line from Joan's motor bike to the glass, and then from the glass to Nadia's head		the incident ray and the reflected ray must touch the glass at the same point
	1	* angle of incidence must be approximately equal to the angle of reflection		the incident ray must hit the mirror within the tolerance shown
	1	* an arrow pointing away from Joan's motor bike on either section of the ray		
(ii)	1	any one from * traffic coming round the bend or at the junction will be seen * Nadia or Joan or you can see round the bend		
Total	5			

Q No 2				
Part	Mark	Answer	Accept	Additional guidance
a	1	* the angles of incidence and reflection must be equal		the ray must hit the screen in the middle 2 cm
	1	* the ray must be continuous and straight with an arrow in the correct direction	accept one arrow in the correct direction on either the incident or the reflected ray	
				
b i	1	any one from * sound waves travel to the window or glass * vibrations pass through the air * sound waves or vibrations hit the window	accept 'sound travels to the window' accept 'sound hits the window'	
b ii	1	* the beam will vibrate or move or jump about	accept 'scatter' for vibrate accept 'it would go to other places in the room' accept 'it would go in different directions' accept 'it shakes' or 'it wobbles'	<i>do not accept</i> 'it is blurred' 'it goes in a different direction' is insufficient
c	1	* B ✓		if more than one box is ticked, award no mark
Total		5		

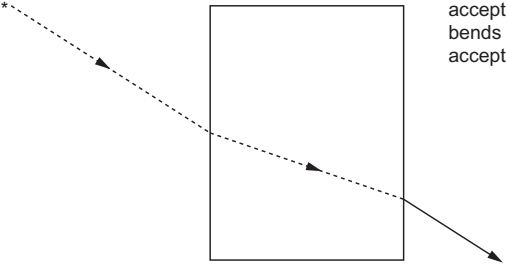
		Q No 3			
Part	Mark	Answer	Accept	Additional guidance	
a i	1	 ✓		if more than one box is ticked, award no mark	
a ii	1	* it is reflected	accept 'it reflects' accept 'it bounces off'		
b i	1 1 1	* bulb * battery or cells * switch	accept 'lamp' or 'light' accept 'cell'	answers must be in the correct order	
b ii	1	* a series circuit drawn with the correct symbols such as 	accept '— —' for '— —' accept '— —' or '— ---- —' accept curved wires		
Total	6				

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
a	1	* pluck them harder	accept 'make the strings vibrate more or move more'	<i>do not accept</i> 'make the strings vibrate more quickly'
b	1	* The sound has a higher pitch. ✓		if more than one box is ticked, award no mark
c	1	* the sound from the thicker string has a lower pitch or a lower frequency	accept 'it has a lower pitch or a lower frequency' accept 'the sound from the thicker string is louder' or 'it is louder'	answers must include a comparison 'it is lower' is insufficient
d i	1	* the sound in A has a higher pitch or a higher frequency	accept 'it has a higher pitch or higher frequency'	answers must show a comparison 'the vibrations are quicker' is insufficient 'it is higher' is insufficient
d ii	1	* the sound in A is louder	accept 'it is louder' accept 'the sound in C is quieter' accept 'it has a greater amplitude'	'the vibrations are stronger or of greater amplitude' is insufficient <i>do not accept</i> 'it is higher'
Total	5			

	Q No 5			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* A and C		answers may be in either order both answers are required for the mark
a ii	1	any one from * B * D		
b	1	any one from * not all the light is reflected * some of the light is refracted * some of the light is absorbed * light is scattered by the glass	accept 'it splits into two rays' or 'it splits'	
Total	3			

Q No 6				
Part	Mark	Answer	Accept	Additional guidance
a	1	* Light travels in straight lines. ✓		if more than one box is ticked, award no mark
b	1	* 	accept a continuous line drawn across card A and reaching card B	award a mark for a straight line from the existing ray passing through the hole in card A and reaching card B the ray must not go beyond card B
c	3	* 		award one mark for a continuous straight line that reflects off the mirror award one mark for an angle of reflection approximately equal to the angle of incidence award one mark for a correct arrow on the reflected ray
d	1	* Add another battery. ✓		if more than one box is ticked, award no mark
Total	6			

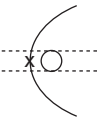
3.4 The Earth and beyond

	Q No 7			
Part	Mark	Answer	Accept	Additional guidance
a	1	* 65 it is different from the angle of incidence or all the others are the same	accept 'number 4' or 'the fourth' accept 'it is not 60°' or 'it should be 60°' accept 'the angle of reflection and the angle of incidence should be the same' accept 'it is 5° out' accept 'they are not the same'	both the answer and the correct explanation are required for the mark award a mark for '60' if the explanation is correct 'they go up in tens' is insufficient 'it does not fit the pattern' is insufficient
b i	1	* a number from 30 to 32		
b ii	1	* greater than	accept 'greater' or 'bigger'	
c	1		accept a continuous straight line that bends away from the normal accept a line without an arrow	the ray need not be parallel to the incident ray
Total	4			

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1	* four arrows, all towards the centre of the Earth		all four arrows, correctly drawn, are required for the mark the arrows may be drawn outside the Earth
(ii)	1	* ball hanging towards the centre of the Earth at B, C and D		all three positions, B, C and D, are required for the mark
(b) (i)	1	* 365 days	accept '365'	
(ii)	1	* 24 hours	accept '24'	
Total	4			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
a	1	* He observed the environment. ✓		if more than one box is ticked, award no mark
b	1	any one from * data from further away can be collected * data from fainter objects or smaller details can be collected * data is clearer because there is no atmospheric distortion * more information is collected * more detailed or more accurate information * wider spectrum of information including photographs or pictures of planet * other radiation can be detected	accept 'equipment can land on the planet' accept 'telescopes can be sited outside Earth's atmosphere'	a mark may be awarded for a description of a specific way information is different or a description of a specific way previous limitations are reduced
c	1	any one from * our knowledge is increasing * our knowledge is changing	accept 'we probably do not know everything about the solar system'	
d	1	any one from * new evidence which challenges ideas may be collected * there might be a new way of thinking about how the facts fit together * new interpretations of evidence * old ideas do not explain the observation	accept 'more observations' accept 'new evidence' accept 'old ideas do not work or fit data'	
Total	4			

	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* C it is the closest to the Sun	accept 'it is closer or close'	both the letter and the correct explanation are required for the mark
a ii	1	* an arrow from each of the points A, B, C and D towards the Sun		all four arrows are required for the mark
a iii	1	* A it is furthest from the Sun or the effect of the Sun's gravity is weakest	accept 'it is further or far away' accept 'gravity is low or lower'	both the letter and the correct explanation are required for the mark
b i	1	* a number greater than 2870 and smaller than 5900		
b ii	1	* the further away the lower the temperature	accept the converse accept 'the further away the colder it is'	
b iii	1	any one from * planets further away receive less energy or heat * energy from the Sun spreads out * less heat reaches the planets that are further away	accept 'light' for energy accept 'the Sun's rays are weaker or not as strong'	<i>do not accept</i> 'the Sun's heat cannot reach planets that are far away' 'the Sun is weaker' is insufficient
Total	6			

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
a	1	* Mars	accept '6 kg'	do not accept '24 N'
b	1	any one from * 4 kg weighs more on Earth * the weight of the object is greater on Earth	accept the converse accept the converse accept 'Earth is 40 N and Venus is 36 N' accept 'Earth is 40 and Venus is 36' accept 'more newtons on Earth' or 'less newtons on Venus' accept 'there is a greater force on Earth'	'different weights' is insufficient do not accept 'it has more mass on the Earth'
c	1 1	* less (than) or smaller (than) or lower (than) * the same (as) or equal (to)		answers must be in the correct order
d i	1	* the greater the distance the greater the time for one orbit	accept 'it increases'	
d ii	1	* an answer from 1.6 to 6 inclusive		
e	1	* 		award a mark for X marked on the orbit within the tolerances shown
Total	7			

3.5 Electromagnetism

	Q No 5			
Part	Mark	Answer	Accept	Additional guidance
a	1 1	* X: the Sun * Y: Mercury		
b	2	any two from * it has a longer orbit * it is further from the Sun * the Sun's gravity is less * it is slower	accept 'it has a bigger orbit' accept 'it has a greater distance to cover' accept 'it is further out' accept 'Mars is closer to the Sun' accept 'there is a smaller gravitational pull on it'	'it is further away' or 'it is further' are insufficient
c i	1	any one from * the orbit times were the same * it came at regular intervals * they saw it every 76 years	accept 'he took 1531 from 1607 and 1607 from 1683'	
c ii	1	* 2062		
Total	6			

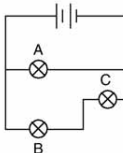
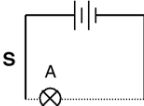
	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* series * all		answers must be in the correct order both answers are required for the mark
a ii	1	* parallel * none		answers must be in the correct order both answers are required for the mark
b	1	* they were reflected or scattered	accept 'some light was absorbed or refracted' accept 'they bounced off'	
c	1 1	* They absorb water from the soil. ✓ * They absorb minerals from the soil. ✓		if more than two boxes are ticked, deduct one mark for each incorrect tick minimum mark zero
Total	5			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
a	1 1	* gravity * magnetic force or magnetism	accept 'weight' accept 'repulsion' or 'upthrust'	answers may be in either order <i>do not accept</i> 'air resistance'
b i	1	* 12		
b ii	1	any one from * the paper cup stopped moving * the paper cup reached the bottom magnet	accept 'it hit the bottom' accept 'the paper cup could not go any further'	
c	1	any one from * iron is magnetic * iron nails are attracted to a magnet * there is a magnetic force on the iron	accept 'aluminium is not magnetic' accept 'the rivets are not attracted to a magnet'	<i>do not accept</i> 'aluminium or rivets are less magnetic' <i>do not accept</i> 'iron or nails are more magnetic than aluminium or rivets'
Total	5			

	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a	1	* <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: center;">S N</div>		both poles are required for the mark
b i	1	* repel		
b ii	1	* it moved upwards or returned to its original position	accept 'it would move up and down'	
c	1	* decreased	accept 'got smaller' accept 'moved closer'	
d	1	any one from * it was attracted to the base * it moved down * it sank	accept 'the magnets are attracting' accept 'the N and S poles attract' accept 'it would not float' accept 'it would stick to the base'	
Total	5			

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
a i	1	* the number of turns or coils of wire	accept 'the coils' accept 'the turns'	
a ii	1	any one from * the current * the length or thickness or material of the wire or coil * the circumference of the coil * the size of paper-clips	accept 'the voltage or power' accept 'the wire' accept 'the paper-clips' accept 'position of the coil on the nail' accept 'tightness of the coil' accept 'distance between turns' accept 'the nail'	<i>do not accept 'the number of paper-clips'</i>
a iii	1	any one from * count the paper-clips picked up * measure their mass	accept 'number of paper-clips' accept 'count them' accept 'weigh them' accept 'the more clips the stronger the magnet' accept 'measure the distance at which a magnet will just pick up a paper-clip'	
b	1	any one from * an inaccuracy in results * a problem with the data or results * a problem with the method	accept a description of inaccuracies, such as 'she counted the number of clips wrongly' accept 'something wrong with the tests' accept 'she used different sized paper-clips' accept 'the paper-clips were already magnetised' accept 'she did something wrong'	'the test is unfair' is insufficient

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
c i	1	* <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		if more than one box is ticked, award no mark
c ii	1	<p>any one from</p> <p>* with bigger paper-clips she might miss the precise point at which the electromagnet stopped picking up paper-clips</p> <p>* the smaller paper-clips might help to identify the precise point at which the electromagnet stopped picking up paper-clips</p>	<p>accept 'she would pick up differences between the number of turns of the coil'</p> <p>accept 'she might not see a change with big paper-clips or she would see a change with smaller paper-clips'</p> <p>accept 'it is more precise or more sensitive'</p>	<p>'it will pick up a few large paper-clips but a lot of small paper-clips' is insufficient</p> <p>award a mark for a response identifying that greater precision is possible with smaller increments</p> <p>'they are smaller' is insufficient</p>
Total	6			

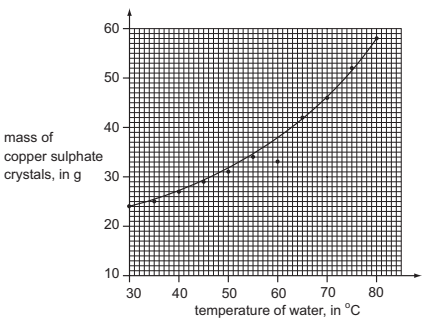
		Q No 5		
Part	Mark	Answer	Accept	Additional guidance
a	1 1	<p>* one mark for B and C in series</p> <p>* one mark for A in parallel with B and C for example</p> 		<p>both marks should only be awarded if the circuit is correct</p> <p>award one mark if all three bulbs are drawn in parallel or all in series</p>
b	1	<p>* A</p> <p>any one from</p> <p>* it has more current passing through it</p> <p>* A has 3 V across it and B and C have 1.5 V across them</p> <p>* A has twice the voltage of B or C</p> <p>* because it is directly connected to the supply</p>	<p>accept 'the others have less current passing through them'</p> <p>accept 'A has a greater voltage across it'</p> <p>accept 'B and C have less voltage across them'</p> <p>accept 'there is less resistance in the top or A branch of the circuit'</p> <p>accept 'the others are in series'</p>	<p>both the letter and the reason are required for the mark</p> <p>answers should convey the idea that energy or voltage is shared between B and C but A is not sharing energy or voltage</p>
c	1	<p>* a letter S in any part of the circuit before it branches</p> 	<p>accept a letter S in any part of the circuit if the three bulbs are drawn in series</p>	
Total	4			

		Q No																							
		6																							
Part	Mark	Answer	Accept	Additional guidance																					
a		<table><tr><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>off</td><td>off</td><td>off</td><td>off</td></tr><tr><td>off</td><td>off</td><td>off</td><td>off</td></tr><tr><td>on</td><td>on</td><td>on</td><td>on</td></tr><tr><td>on</td><td>on</td><td>off</td><td>off</td></tr></table>	A	B	C	D	off	off	off	off	off	off	off	off	on	on	on	on	on	on	off	off		award a mark for each correct row	
A	B	C	D																						
off	off	off	off																						
off	off	off	off																						
on	on	on	on																						
on	on	off	off																						
	1	*																							
	1	*																							
	1	*																							
b	1	any one from * close S ₄ and S ₅ * only leave S ₃ open	accept 'close 4 and 5' accept 'only leave 3 open'	'leave switch 3 or 3 open' is insufficient																					
Total	4																								

4 Scientific Enquiry

	Q No 7							
Part	Mark	Answer	Accept	Additional guidance				
a	1	* <table border="1"><tr><td>N</td></tr><tr><td>S</td></tr></table>	N	S		both poles are required for the mark		
N								
S								
b i	1	* <table border="1"><tr><td>N</td></tr><tr><td>S</td></tr><tr><td>N</td></tr><tr><td>S</td></tr></table>	N	S	N	S		all four poles are required for the mark
N								
S								
N								
S								
b ii	1	any one from * iron * steel	accept 'cobalt or nickel'					
c	1	any one from * wood or it is not magnetised * wood or it is not magnetic * it increases the distance between the magnets * the magnets are too far apart * the magnets are weak	accept 'the wood does not have any poles' accept 'wood is not a magnet' accept 'the magnet does not attract wood' accept 'magnetism cannot pass through wood'					
Total	4							

	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
(a)	1	* Glossy or it would have more or higher bubbles than the others	accept 'more bubbles'	<i>do not accept</i> 'lots of bubbles'
(b)	1	any one from * to make the test fair * if they use different amounts it will be unfair	accept 'it is a controlled experiment'	
(c)	1	any one from * they could not compare the amounts of bubbles * they could not compare them * they could not tell which was better * they could not tell the difference * they could not know which made the most bubbles	accept 'they were all the same' accept an appropriate practical problem which would prevent the collection of valid results such as 'the bung stops the bubbles' or 'the test-tubes are not long enough' or 'they used too much washing-up liquid'	<i>do not accept</i> 'the bubbles all went to the top' <i>do not accept</i> 'they could not see how many bubbles there were'
(d)	1	any one from * Shine will have most bubbles * Shine will make most froth	accept 'Shine made the most bubbles' accept 'Shine would produce more bubbles than glossy'	
Total	4			

	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1	* the point at (60,33) circled		
(ii)	1	* a smooth curve touching all points except the anomalous point at 60°C 	accept a reasonable smooth curve	the curve must be near to or touching all points except the anomalous point <i>do not accept</i> a dot to dot drawing <i>do not accept</i> lines which are thicker than the points if the points are not visible the lines are too thick
(iii)	1	* 38	accept answers from 37 to 39	
(b)	1	any one from * they measured mass or temperature inaccurately * they failed to make sure the solution was saturated * the solution had cooled	accept 'they counted the mass wrong' accept 'not enough time to dissolve' accept 'they did not stir the solution properly' accept 'they did not use enough water'	<i>do not accept</i> 'carelessness' or 'measured it wrong' <i>do not accept</i> 'it was not a fair test' <i>do not accept</i> 'they measured in wrong units' <i>do not accept</i> 'they wrote it down wrong'
Total	4			

	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a	1	* predictions ✓		if more than one box is ticked, award no mark
b	1	any one from * to make sure any effect of everyone jumping was detected * to make the effect as large as possible	accept 'so the sensor can detect the vibrations'	'fair test' is insufficient 'to get the best results' is insufficient
c i	1	any one from * there are vibrations in recordings A and B only * no vibrations at C	accept 'there are more or bigger vibrations at A and B' accept 'wider lines in recordings A and B' accept 'bigger amplitude in A and B' accept 'no vibrations far away'	
c ii	1	any one from * more people jumped near A * people jumped from a greater height near A * sensor A is nearer the site than sensor B * more sensitive detectors at A * the ground could be different	accept 'fewer jumped at B' accept the converse accept the converse accept 'the sensor is nearer site A than B' accept 'sensor A is closer to the pupils' accept the converse accept 'one concrete the other grass'	<i>do not accept</i> 'different numbers of people' 'different sensors' is insufficient
Total	4			

	Q No 4			
Part	Mark	Answer	Accept	Additional guidance
a	1	* E D A B C		all five letters must be in the correct order
b	1	* to measure volume	accept 'to make sure they used the same volume of water in each beaker' accept 'to measure amount of water' accept 'to measure the volume of salt or sugar'	'to measure salt or sugar' is insufficient
c	1	any one from * they used the same volume of water	accept 'they used the same amount of water' accept 'they stirred the same number of times' accept 'they stirred at the same speed' accept 'they stirred for the same time'	'they stirred it' is insufficient
d i	1	any one from * you might not get the same mass each time * you will not know how much was added	accept 'you might not get the same amount of salt or sugar' accept 'it is not precise or a measurement'	accept answers which suggest that using a spatula is not a precise measurement
d ii	1	any one from * measure the mass * measure the number of grams	accept 'measure weight' or 'weigh it' accept 'use a balance or scales' accept 'use grams' accept 'use a measuring cylinder' accept 'level it with a knife'	
e	1	* from 1–31 inclusive		
Total	6			

	Q No 5			
Part	Mark	Answer	Accept	Additional guidance
a	2	any two from * initial temperature of water * exclusion of draughts * volume or mass of water * surface area (of water) * humidity	accept 'same amount of draughts' accept 'amount of water' accept 'shape or size or material of container' accept 'the time it is left for'	'temperature' is insufficient do not accept 'size of room'
b	1	* they have not collected data about temperature * no data recorded about temperature	accept 'they did not measure temperature' accept 'no information about temperature' accept 'no temperature'	
c	1	* the line is not straight (converse) * the line should be straight	accept 'the line is zig-zag' accept 'they joined up all the points' accept 'they didn't go between the points' accept 'the line does not need to go through all the points'	
d	1	* 6 points correctly plotted to the nearest half square		
e	1	* a straight line of best fit between some of the points		

		Q No 5			
Part	Mark	Answer	Accept	Additional guidance	
f	1	<div><input type="checkbox"/></div> <div><input checked="" type="checkbox"/> room 2</div> <p>and</p> <ul style="list-style-type: none">* the points for room 2 are lower than room 1* the container in room 2 reaches 30g in 5 days, room 1 reaches 45g* more water evaporated in the same time * the volume goes down more quickly	<p>accept 'there is less water in the container in room 2 than in room 1'</p> <p>accept 'amount of water dropped more in the first three days'</p> <p>accept 'the line for room 2 is steeper'</p> <p>accept 'the numbers go down more quickly'</p> <p>accept 'the mass goes down more quickly'</p>		
Total	7				

	Q No 6			
Part	Mark	Answer	Accept	Additional guidance
a	1	any one from * a bigger sample * more data are collected in the survey	accept 'one person could make it up' accept 'one garden may not be typical'	
b	2	any two from * time of year or season * location or gardens * duration of the observation	accept 'the time' for one mark if 'time of year' or 'season' or 'duration' is not given	'the environment' is insufficient
c i	1	any one from * they would need to look at the pattern in the data for more than a year * they would need to compare data collected in another year with that available in 2002	accept 'data from another year or last year' accept 'more data or data from the time when his grandad was young' accept 'data from when his grandad was young is not available'	
c ii	1	* data would need to show fewer sparrows in 2002 than in earlier years	accept 'more sparrows would need to be recorded in earlier years than in 2002'	
Total	5			

	Q No 7									
Part	Mark	Answer	Accept	Additional guidance						
a i	1	* temperature of water	accept 'temperature'	<i>do not accept</i> 'heat'						
a ii	2	* <table border="1"><tr><td>57</td><td>34</td></tr><tr><td>40</td><td>74</td></tr><tr><td>20</td><td>144</td></tr></table>	57	34	40	74	20	144		award one mark for all three rows of information recorded accurately in the table award one mark for the temperature presented in ascending or descending order
57	34									
40	74									
20	144									
b	2	any two from * clock or timer or stopwatch * thermometer or temperature sensor * measuring cylinder * balance	accept 'beaker' accept 'scales'	'measuring jug' is insufficient						
c	1	* to make the test fair	accept 'as a control'							
d	1	any one from * it did not use her results * she did not describe the relationship between temperature and dissolving	accept 'it did not describe what she has found out' accept 'she has not given the pattern in her results' accept 'she did not say if changing the temperature affected the time' accept 'she did not say what the result showed'	'she did not explain in detail' is insufficient answers referring to her evaluation of her investigation or method are insufficient 'she did not say what the results were' is insufficient						

Q No
7

Part	Mark	Answer	Accept	Additional guidance
e	1	any one from * the hotter the water the quicker it dissolves * the higher the temperature the less time is taken for the cold cure to dissolve	accept 'the hottest dissolved quickest' accept the converse accept 'when the water is cold it takes longer to dissolve' accept 'when the water is hot it dissolves quickly' accept 'temperature does affect the time to dissolve'	the conclusion should refer to the independent and dependent variable
Total	8			

	Q No 8			
Part	Mark	Answer	Accept	Additional guidance
		markers should read the answers to all parts before marking this question the draft box should be consulted for clarification of any ambiguity or omission if an answer is correct, ignore contradictory statements written in the draft box		
a	1	any suitable independent variable such as * the surface * the angle of the slope * the kind of object * the size of the push	accept specific variations in objects, such as, 'weight' or 'mass' or 'surface area' or 'type of trainer sole' or 'type of shoe'	
b	1	any suitable dependent variable such as * the distance travelled * the time to move down the ramp * the force needed to start the object moving * the angle of the ramp at which the object starts moving	accept 'the time to reach a given point' accept 'angle or height of ramp' accept 'speed'	a dependent variable (DV) without an independent variable (IV) can gain credit
	1	any appropriate equipment to measure the dependent variable such as * ruler or metre rule * stopwatch or timer or light gates * newton meter * protractor	accept 'tape measure' accept 'clock'	<i>do not accept</i> a measurement strategy if a DV is not given or is incorrect
c	1	any appropriate control variable such as * the object used * the angle of the slope * the surface used * the height of the ramp * the length of the ramp	accept 'distance travelled'	only give credit for a control variable which does not conflict with the suggested investigation
Total	4			

	Q No 9			
Part	Mark	Answer	Accept	Additional guidance
a	1	any one from * they left the cloth in water for 30 minutes * they soaked the cloth for the same time	accept 'cloth in both bowls was egg-stained'	
b	2	any two from * same cloth(s) in each bowl * same size fabric * same level of staining on cloth * same amount of each powder * same volume of water added * same temperature of water added * same pH of solutions * repeat the test * stir or agitate the cloth * measure the water * vary the amount of powder * time how long it takes for the stain to go * vary the amount of egg stain	accept 'same amount of egg' or 'same size stain' accept 'use egg-stained cloth in water' accept 'measure the powder' accept 'longer time' accept 'do it at different temperatures' accept 'use different washing powders'	ways of improving the investigation may be: (i) a control (ii) improved reliability (iii) improved procedure (iv) extend the independent variable <i>do not accept 'use different stains'</i>
c	1	any one from * whether the cloths are stained or not * level of staining or time taken to remove stain	accept 'how much egg is left on cloths' accept 'which cloth was the cleaner or cleanest'	'the cloth' or 'the stain' are insufficient
Total	4			

	Q No 7			
Part	Mark	Answer	Accept	Additional guidance
	1	* A ship going out to sea goes out of sight.	The Earth spins on its axis.	if more than one line is drawn from an observation, award no mark for that observation
	1	* We have day and night.	The Earth is a sphere.	
	1	* We have summer and winter.	The Earth orbits the Sun and the Earth's axis is tilted.	
	1	* One year on Earth is 365 days.	Gravity attracts objects towards the Earth.	
			The Earth orbits the Sun.	
Total	4			

	Q No 10			
Part	Mark	Answer	Accept	Additional guidance
		markers should read the answers to parts a and b before marking this question parts a and b should be marked together		
a	1	* temperature of the water	accept 'temperature' accept 'room temperature'	do not accept responses that describe rates of heating
	1	any one from * rate of evaporation * time taken for all the water to evaporate * volume or mass or amount of water lost in a fixed time	accept 'the time for it to evaporate' accept 'measure how much water is left after a certain time'	answers must refer to both time taken and amount of water lost 'time taken' is insufficient
	1	any one from * starting volume of water * shape of container * same ambient conditions	accept 'the amount of water' accept a specified volume of water accept 'room temperature' if the independent variable is 'water temperature'	'same heater' and 'same starting measurement' are insufficient
b	1	* a column or row indicating temperature and a column or row indicating time or volume lost or volume remaining	accept a column or row indicating 'rate of evaporation' accept 'amount lost' or 'amount remaining'	both headings are required for the mark the units of measurement are not necessary for the mark the second column or row should be consistent with the dependent variable identified in part a ignore other columns in the table
Total	4			