

Sc

KEY STAGE

3

LEVELS

3-7

2005

Science tests

Mark scheme for Papers 1 and 2

2005



department for

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Introduction

The test papers will be marked by external markers. The markers will follow the mark scheme in this booklet, which is provided here to inform teachers.

This booklet includes the mark scheme for paper 1 and paper 2 in both tiers.

The structure of the mark scheme for tiers 3–6 and 5–7

The mark scheme for each question shows:

- the teaching points from the key stage 3 programme of study;
- the marks available for each part of the question;
- the total marks available for the question;
- the answer or answers expected, indicated by an asterisk;
- additional guidance to assist markers in making professional judgements.

When a question appears in an identical form in both tiers, the answers to the question are given only once in the mark scheme. For clarity, both question numbers are given. The following example, from tier 3–6 paper 1 question 11 and from tier 5–7 paper 1 question 3, illustrates this.

Tier	Q No
3–6	11
5–7	3

Part	Mark	Answer	Accept	Additional guidance
a 2/2e	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

Where more than one answer is acceptable, this is indicated in the mark scheme by 'any **one** from'. Each possible correct answer is marked with an asterisk. In some cases, alternative answers are indicated by '**or**'.

In the following example from part (d) of tier 5–7 paper 1 question 9, an answer giving ‘no food’ and ‘the population is poisoned’ will be awarded two marks. However an answer which gives ‘the population is poisoned’ and ‘pollution in the water’ will be given only one mark, as both points are correct answers for the same mark.

Part	Mark	Answer	Accept	Additional guidance
d 2/5d	2	any two from * new predators * no food * the population is poisoned * disease * the lake or pond dried up or froze	accept ‘more predators’ accept ‘not enough food’ accept ‘pollution in the water’ accept ‘acid rain’	award marks for answers which indicate sudden, serious changes in conditions

In the following example, from part (b) of tier 3–6 paper 2 question 12 and tier 5–7 question 5, the statement in **bold type** in the **Additional guidance** column is given in order to indicate the general requirement of that part of the question.

Part	Mark	Answer	Accept	Additional guidance
b 1/1b	1	any one from * crushed tablets will dissolve more quickly than whole tablets * a whole tablet will take longer to dissolve * the bigger the surface or area the faster it dissolves	accept ‘the finer the tablet the quicker it dissolves’ accept ‘the smaller the pieces the faster it dissolves’	answers must include a comparison award a mark for an answer in the past tense if a comparison is included

In the **Accept** column there may be:

- examples of answers which are acceptable, although they do not correspond exactly to the expected answers;
- some examples of higher level answers, which could be given by higher attaining pupils answering questions on the lower levels in the tier.

In the **Additional guidance** column there may be:

- answers which are not acceptable;
- a reminder, in questions involving calculations, that consequential marking may be used;
- instructions on action in the event of consequential marking (see below);
- guidance to markers where pupils have not followed the instructions on the question.

Marking

The number of marks available for each part of a question and the maximum number of marks for the question as a whole are shown on the question paper. Every part of a question which has been attempted by a pupil will be marked and the mark for each part recorded in the mark box alongside that part. Half marks will not be given in any question.

The total number of marks awarded for all the parts of questions on a double page will be written in the box at the bottom of the right-hand page. In some instances, this will be the sum of marks awarded for two questions. The total number of marks obtained on the paper will be recorded on the front of the test paper.

The total number of marks available is 180 in tier 3–6 and 150 in tier 5–7.

Using professional judgement in marking

The instructions given in the mark scheme will enable the markers to decide whether pupils have correctly answered a particular question. However, there will be instances where an answer given by a pupil does not correspond to any of the possible responses shown in the mark scheme. In such cases, markers will apply their professional judgement to decide if credit should be given. They will consider whether the response:

- is equivalent to those listed;
- conveys the ideas underlying the question as outlined in the statement in **bold type** in the mark scheme, if one is given.

If any doubt persists, markers will consult with their supervisors for guidance.

Marking misspellings of words

If a pupil misspells a word, markers will apply the following procedures:

- if it is clear that the pupil has made a simple error, eg ‘tow’ for ‘two’ or ‘Son’ for ‘Sun’, then the incorrect spelling will be accepted and the mark awarded;
- if a pupil misspells a word copied from the text of the question or from a selection given, and the new word does not have any inappropriate meaning, the incorrect spelling will be accepted and the mark awarded;
- if specific scientific vocabulary is required in the answer, a creditworthy misspelling must be a phonetic equivalent of the required word, with the major syllables of the correct word represented in the answer.

Marking lists of alternative answers

In some instances, pupils give more than one answer to a single question. If any of the answers given is incorrect, the mark will not be awarded, irrespective of the order in which the answers are given. In some cases, a correct answer is given alongside other answers which, while correct, would be insufficient for the mark. In these cases, the mark will be given for the correct answer.

Marking questions containing calculations

Some questions require pupils to perform calculations. Where two marks are available, they are advised to show their working. Pupils who do not show their working but give the correct answer will be awarded full marks.

The result of one calculation may be required in order to carry out further calculations. In such instances:

- the term ‘consequential marking’ appears in the **Additional guidance**;
- a pupil’s result for the first calculation is treated as the starting point for the second;
- the pupil is awarded full credit for the second calculation if it is carried out correctly, even if the result of the first calculation was wrong.

Marking answers given in the wrong place

In some cases, pupils may write correct answers in the wrong part of the question. Markers will use professional judgement to decide whether a pupil has correctly understood the question and simply written the answer in the wrong place. Similarly, if pupils identify an answer by a cross or other indication when a tick is required, they will be given credit for their responses.

In a planning question, if no answer is given in the expected place but the correct answer is given in the drafting box, the mark(s) will be given.

Awarding levels

The sum of the marks gained on both papers determines the level awarded. A copy of the level threshold tables which show the mark ranges for the award of different levels will be sent to each school by the QCA in July 2005.

Schools will be notified of pupils’ results by means of a marksheet, which will be returned to schools by the External Marking Agency with the pupils’ marked scripts. The marksheet will include pupils’ scores on the test papers and the levels awarded.

The 2005 key stage 3 science tests and mark schemes were developed by the University of Cambridge Local Examinations Syndicate and the Centre for Research into Primary Science and Technology (CRIPSAT) on behalf of the QCA.

Mark Allocation Grid: Tier 3–6

TIER 3–6 Paper 1

Q	Sc1	Sc2	Sc3	Sc4
1		6		
2		5		
3		5		
4			6	
5	8			
6				6
7	1			4
8	4			
9		5		
10		6		
11		5		
12			6	1
13		1	4	1
14				6
15	6			
16				4
Total	19	33	16	22

TIER 3–6 Paper 2

Q	Sc1	Sc2	Sc3	Sc4
1	3			4
2				7
3	3	2	2	
4	1		4	
5			6	
6		7		
7	6			
8				6
9				4
10			3	2
11	2		7	
12	5			
13		5		
14		6		
15	5			
Total	25	20	22	23

**Total
P1 + 2**

44	53	38	45
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Overall

180

Mark Allocation Grid: Tier 5–7

TIER 5–7 Paper 1

Q	Sc1	Sc2	Sc3	Sc4
1		5		
2		6		
3		5		
4			6	1
5		1	4	1
6				6
7	6			
8				4
9	1	4		
10	1	4		
11			5	
12	5			
13				5
14				5
Total	13	25	15	22

TIER 5–7 Paper 2

Q	Sc1	Sc2	Sc3	Sc4
1				6
2				4
3			3	2
4	2		7	
5	5			
6		5		
7		6		
8	5			
9				5
10	5			
11			5	
12			5	
13		5		
14	5			
Total	22	16	20	17

Total P1 + 2	35	41	35	39	Overall
					150

The requirements of the Introduction to the Programme of Study apply across Sc1, Sc2, Sc3 and Sc4.

The Mark Allocation Grids on this pair of pages show the context of these questions in relation to Sc1, Sc2, Sc3 and Sc4.

Tier 3–6	Q No			
Part	Mark	Answer	Accept	Additional guidance
a i 2/5c	1	any one from * A * B	accept 'tadpole' accept 'trout' or 'fish'	
a ii 2/4b	1	any one from * B * D	accept 'trout' or 'fish' accept 'crocodile' or 'reptile'	
b 2/4b	1	* backbones		
c 2/5c	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 2/4b	2	* <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">frog</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">reptiles</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">crocodile</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">mammals</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">water vole</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">amphibians</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			

Tier 3–6	Q No 2		
Part	Mark	Answer	Additional guidance
a i 2/3a	1	* light	accept 'sunlight' <i>do not accept</i> 'Sun'
a ii 2/5b	1	* support	
b 2/3a	1	* no water ✓	if more than one box is ticked, award no mark
c 2/3c	1	* minerals ✓	if more than one box is ticked, award no mark
d 2/3d	1	* C ✓	if more than one box is ticked, award no mark
Total	5		

Tier 3–6	Q No		
Part	Mark	Answer	Accept
a i 2/5e	1	* oak tree → caterpillar → blackbird → owl	
a ii 2/3a	1	* It makes food by photosynthesis. ✓	
b 2/5d	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	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 2/5b	1	* the tree loses its leaves * increased or went up * stayed the same any one from * they had enough food or leaves * more eggs hatched	accept 'no leaves' or 'no food' accept 'it is too cold' accept 'caterpillars change into pupae' or chrysalises or moths'
Total	5		<i>do not accept</i> 'caterpillars hibernate in winter'

Additional guidance

all three answers are required for the mark



if more than one box is ticked, award no mark

do not accept 'caterpillars hibernate in winter'

Tier 3–6	Q No			
Part	Mark	Answer	Accept	Additional guidance
a 3/1d	1 1	* metal any one from * heat * thermal energy		
b 3/3a	1	any one from * nail * paper-clip	accept 'iron' accept 'steel' or 'clip'	
c i 3/1d	1	any one from * plastic * rubber * PVC	accept a named plastic	
c ii 3/1d BS/2b	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 3/1d	1	* iron nail and steel paper-clip ✓		if more than one box is ticked, award no mark
Total	6			

Tier 3–6	Q No									
Part	Mark	Answer	Accept	Additional guidance						
a i 1/2i	1	* temperature of water	accept 'temperature'	<i>do not accept</i> 'heat'						
a ii 1/2i	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 1/2e	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 1/2d	1	* to make the test fair	accept 'as a control'							
d 1/2k	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						

Tier 3–6	Q No 5		
Part	Mark	Answer	Additional guidance
e 1/2k	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		

Tier 3-6	Q No 6		
Part	Mark	Answer	Accept Additional guidance
a i 4/3c	1	*  * it is reflected	accept 'it reflects' accept 'it bounces off' if more than one box is ticked, award no mark
a ii 4/3c	1		accept 'it reflects' accept 'it bounces off'
b i 4/1a	1		accept 'lamp' or 'light'
	1		accept 'cell'
b ii 4/1a	1	* bulb * battery or cells * switch	accept ' for '
		* a series circuit drawn with the correct symbols such as	accept ' or ' accept ' or ' accept curved wires
			accept ' for '
Total	6		

Tier 3–6	Q No	Additional guidance	
	7		
Part	Mark	Answer	Accept
a 4/1d	1	* S <input type="text"/> N	
			both poles are required for the mark
b i 4/1d	1	* repel	
b ii 4/1d	1	* it moved upwards or returned to its original position	accept 'it would move up and down'
c 1/2j	1	* decreased	accept 'got smaller' accept 'moved closer'
d 4/1d	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		

Tier 3–6	Q No 8		
Part	Mark	Answer	Additional guidance
		<p>markers should read the answers to all parts before marking this question</p> <p>the draft box should be consulted for clarification of any ambiguity or omission</p> <p>if an answer is correct, ignore contradictory statements written in the draft box</p>	
a 1/2d	1	<p>any suitable independent variable such as</p> <ul style="list-style-type: none"> * the surface * the angle of the slope * the kind of object * the size of the push 	<p>accept specific variations in objects, such as, 'weight' or 'mass' or 'surface area' or 'type of trainer sole' or 'type of shoe'</p>
b 1/2d 1/2e	1	<p>any suitable dependent variable such as</p> <ul style="list-style-type: none"> * 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 	<p>accept 'the time to reach a given point'</p> <p>accept 'angle or height of ramp'</p> <p>accept 'speed'</p> <p>a dependent variable (DV) without an independent variable (IV) can gain credit</p>
	1	<p>any appropriate equipment to measure the dependent variable such as</p> <ul style="list-style-type: none"> * ruler or metre rule * stopwatch or timer or light gates * newton meter * protractor 	<p>accept 'tape measure'</p> <p>accept 'clock'</p> <p><i>do not</i> accept a measurement strategy if a DV is not given or is incorrect</p>
c 1/2d	1	<p>any appropriate control variable such as</p> <ul style="list-style-type: none"> * the object used * the angle of the slope * the surface used * the height of the ramp * the length of the ramp 	<p>only give credit for a control variable which does not conflict with the suggested investigation</p>
Total	4		

Tier 3–6 5–7	Q No 9 1			
Part	Mark	Answer	Accept	Additional guidance
a i 2/5f	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 2/5d	1	any one from * they are more easily seen * brown earthworms are better camouflaged	accept 'there are more yellow earthworms'	
b 2/5f	1	* the level of copper or arsenic or pollution	accept 'whether it contained arsenic or copper' accept 'where the copper or arsenic is'	
c 2/4b	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 2/5b	1	* They feed on other living things and harm them. ✓		if more than one box is ticked, award no mark
Total	5			

Tier 3–6 5–7	Q No 10 2			
Part	Mark	Answer	Accept	Additional guidance
a 2/2i	1	* carbon monoxide	causes addiction to smoking	if more than one line is drawn from any substance, award no mark for that substance
		* nicotine	causes influenza (flu)	
		* tar	causes lung cancer	
			causes red blood cells to carry less oxygen	
b i 2/2i	1	any one from * fat has been deposited * the artery has become narrower	accept 'fat' accept 'it is blocked'	
b ii 2/2i	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'	<i>do not accept</i> 'less air to the cells' 'nothing can get through' is insufficient
Total	6			

Tier 3–6 5–7	Q No 11 3			
Part	Mark	Answer	Accept	Additional guidance
a 2/2e	1	any one from * the force of the muscle would be less or lost * the (fore)arm or bone would not move	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 2/2e	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 2/2e c ii 2/2e	1 1 1	* C * 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			

Tier 3–6 5–7	Q No 12 4		
Part	Mark	Answer	Accept
a 3/1h	1	* evaporation then condensation ✓	
		Additional guidance	
		if more than one box is ticked, award no mark	
b 3/1h	1	* water	accept 'distillate'
c 3/1a	1	* 100	accept a temperature from 99 to 101
d i 4/5d	1	* a temperature above 15 but below 100 any one from * it is heated by 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 3/1h 3/2c	1	any one from * it condenses * it changes to a liquid * thermal energy or heat is transferred from the water vapour	accept 'it makes condensation' accept 'it is liquid' accept 'it changes state' accept 'it turns to water' accept 'it cools'
		* its temperature falls	
		'it changes temperature' is insufficient	


Tier 3–6 5–7	Q No 12 4		
Part	Mark	Answer	Additional guidance
e 3/1h	1	any one from * cold water replaces warm water * the water stays cold or cooler * there is a bigger difference in temperature between the water vapour and the water * some vapour escapes in B	accept 'it cools the water vapour better or more efficiently or quickly' accept 'it will work faster' accept 'it is cooled over a bigger length or for longer' accept 'more water is collected'
Total	7		

Tier 3–6 5–7	Q No 13 5			
Part	Mark	Answer	Accept	Additional guidance
a i 4/5a	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 3/1e	1	* sulphur dioxide	accept 'sulphur oxide' or 'sulphur trioxide'	
b i 3/3e 3/3f	1	* it raises the pH or it	accept 'it neutralises it' or 'it neutralises some of the acid'	
b ii 3/3e	1	* calcium sulphate ✓		if more than one box is ticked, award no mark
c i 2/3e	1	* leaves are needed for photosynthesis or for making food	accept 'they absorb light'	
c ii 3/2i 3/3g	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			

Tier 3–6 5–7	Q No 14 6			
Part	Mark	Answer	Accept	Additional guidance
a i 4/4c	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 4/4c	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 4/4c	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 1/2j 4/4b	1	* a number greater than 2870 and smaller than 5900		
b ii 1/2j 4/4b	1	* the further away the lower the temperature	accept the converse accept 'the further away the colder it is'	
b iii 4/5g	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'	do not accept 'the Sun's heat cannot reach planets that are far away' 'the Sun is weaker' is insufficient
Total	6			

Tier 3–6 5–7	Q No 15 7			
Part	Mark	Answer	Accept	Additional guidance
a i 1/2d	1	* the number of turns or coils of wire	accept 'the coils' accept 'the turns'	
a ii 1/2d	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'	<i>do not accept</i> 'the number of paper-clips'
a iii 1/2e	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 1/2n	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

Tier 3–6 5–7	Q No 15 7		
Part	Mark	Answer	Accept
c i 1/2g	1	* <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
c ii 1/2e	1	any one from * with bigger paper-clips she might miss the precise point at which the electromagnet stopped picking up paper-clips * the smaller paper-clips might help to identify the precise point at which the electromagnet stopped picking up paper-clips	accept 'she would pick up differences between the number of turns of the coil' accept 'she might not see a change with big paper-clips or she would see a change with smaller paper-clips' accept 'it is more precise or more sensitive'
Total	6		if more than one box is ticked, award no mark 'it will pick up a few large paper-clips but a lot of small paper-clips' is insufficient award a mark for a response identifying that greater precision is possible with smaller increments 'they are smaller' is insufficient
Additional guidance			

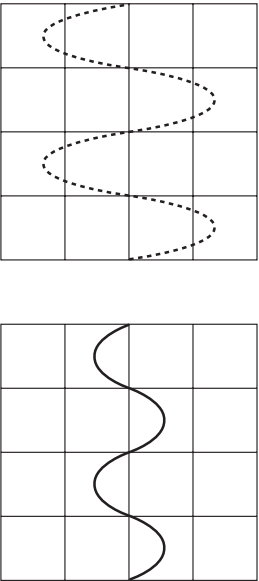
Tier 3–6 5–7	Q No 16 8			
Part	Mark	Answer	Accept	Additional guidance
a 4/2c	1	* A		
b 4/2c	1	any one from * he will remain stationary * he will continue moving at a constant speed	accept 'he floats' accept 'nothing'	
	1	any one from * there is no net force * the pairs of forces are equal	accept 'all the forces cancel out' accept 'they cancel each other out' accept 'the forces are balanced'	'the forces are equal' is insufficient
c 4/2c	1	* 	accept any arrow drawn going up and to the right	
Total	4			

Tier 5–7	Q No			
Part	Mark	Answer	Accept	
		Additional guidance		
a 1/2j 2/5d	1	* B the graph increases most steeply	accept 'the graph is steepest' accept 'the line is steeper' accept 'it is very steep'	both the answer and the correct explanation are required for the mark
b 1/2j 2/5d	1	* C any one from * the slope of the graph becomes less steep * the growth of the population slows down	accept 'the population begins to level off'	both the answer and the correct explanation are required for the mark <i>do not accept</i> 'they stop having offspring' or 'they stop multiplying'
c 1/2j 2/5d	1	* they are equal or the same any one from * the graph is horizontal * the population does not change	accept 'the graph is flat'	both the answer and the correct explanation are required for the mark 'they are steady' is insufficient 'the line is straight' is insufficient
d 2/5d	2	any two from * new predators * no food * the population is poisoned * disease * the lake or pond dried up or froze	accept 'more predators' accept 'not enough food' accept 'pollution in the water' accept 'acid rain'	award marks for answers which indicate sudden, serious changes in conditions
Total	5			

Tier 5–7	Q No 10			
Part	Mark	Answer	Accept	Additional guidance
a 1/2e	1	any one from * it is the temperature of the human body or the stomach * the enzyme or pepsin works best at that temperature		
b 2/2b	1	* there was a larger surface for the enzyme to act on	accept 'the enzyme came into contact with more of the gelatin' accept 'the surface or area was bigger'	'because the gelatin had been chopped up' is insufficient
c	1	* it or the enzyme was destroyed or denatured		<i>do not accept</i> 'the enzyme was killed'
d i 2/2b d ii 2/2c	1 1	* amino acids ✓ any one from * proteins cannot be absorbed * proteins are too big to pass through the lining of the intestine or blood vessels * amino acids can be absorbed * amino acids can pass through the wall of the intestine or blood vessels * amino acids are small enough to be absorbed * to make them soluble	accept 'so proteins or they can be absorbed'	if more than one box is ticked, award no mark 'they need to be digested or broken down' is insufficient
Total	5			

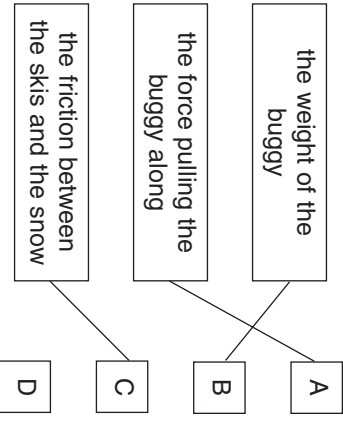
Tier 5–7	Q No 11			
Part	Mark	Answer	Accept	Additional guidance
a i 3/1g a ii 3/1e	1 1	* B * D		
b i 3/1e	1	any one from * a compound or a new substance has been formed * R or the product is a new substance	accept 'the ratio is always 1P to 2Qs' accept 'the atoms or particles have joined' accept 'the elements have joined'	both answers are required for the mark
b ii 3/1e	1	* substance Q: oxygen substance R: carbon dioxide		
b iii 3/2g	1	* the same numbers of each type of atom are present	accept 'the same number of atoms is present' accept 'the same particles or same number of particles are present' accept 'there is the same amount of each element'	'do not accept 'the same number of molecules is there' 'the same amount of elements' is insufficient
Total	5			

Tier 5–7	Q No 12															
Part	Mark	Answer	Additional guidance													
a 1/2a 1/2d	1	* the metal any one from * the change in the mass of the contents of the crucible after burning * the change in the mass of the crucible and its contents after burning	accept 'whether the mass of metal increases or decreases or stays the same' accept 'weight before and after burning'													
1/2e	1	* make sure all the product is weighed	accept 'keep a lid on the crucible' accept 'starting mass of metal' accept 'mass of the metal' accept 'the same crucible' accept 'enough time for the reaction to occur' accept 'sufficient heat for burning to occur' accept 'burn the metals for the same length of time' award a mark for any suitable rigour in the procedure or identification of any control variable 'the atmosphere it is heated in' is insufficient													
1/1c	1	* an increase in the mass following burning for all three metals	accept 'mass will increase' accept 'weight increase'													
b 1/2i	1	* any appropriate table in which the results can be recorded such as <table border="1"> <tr> <td>metal</td> <td>gain or loss or change in mass</td> </tr> </table> or <table border="1"> <tr> <td>metal</td> <td>mass at the start</td> <td>mass after burning</td> </tr> </table>	metal	gain or loss or change in mass	metal	mass at the start	mass after burning	accept a table in which the rows rather than the columns are labelled accept 'weight' for mass accept <table border="1"> <tr> <td></td> <td>change in mass</td> </tr> <tr> <td>metal 1</td> <td></td> </tr> <tr> <td>metal 2</td> <td></td> </tr> <tr> <td>metal 3</td> <td></td> </tr> </table> units are not required in the table ignore incorrect units		change in mass	metal 1		metal 2		metal 3	
metal	gain or loss or change in mass															
metal	mass at the start	mass after burning														
	change in mass															
metal 1																
metal 2																
metal 3																
Total	5															

Tier 5–7	Q No 13		
Part	Mark	Answer	Additional guidance
<p>a i 4/3i</p>	<p>1</p>	<p>* Paul James Sylvia</p>	<p>answers must be in the correct order all three answers in the correct order are required for the mark</p>
<p>a ii 4/2a</p>	<p>1</p>	<p>* 3</p>	<p>1020 accept '____', 340</p>
<p>b i 4/3j b ii 4/3k</p>	<p>1 2</p>	<p>* the energy or the sound is more spread out</p> <p>* </p>	<p>accept 'some of the sound is absorbed by the air' accept 'the amplitude decreases'</p> <p>'vibrations decrease' is insufficient</p> <p>award one mark for a wave with a smaller amplitude award one mark for a wave with the same frequency award the marks for a wave with the correct amplitude and frequency but which is not centred on the middle line of the grid or which is not in phase with the drawn wave the marks may be awarded for a wave drawn on Sylvia's grid</p>
<p>Total</p>	<p>5</p>		

Tier 5–7	Q No 14		
Part	Mark	Answer	Additional guidance
a i 4/2f	1 1	* 2 * Ncm	accept '0.2 × 10' accept 'cmN' accept '0.02 Nm' for both marks
a ii 4/2f	1	* 2 (Ncm)	accept '0.02 Nm' accept 'the same' accept the numerical answer to a i
a iii 4/2f	1	* 0.1	accept the numerical answer to a ii ÷ 20 accept the numerical answer to a i + 20 if a ii has been omitted or if the answer given to a ii is 'the same'
b	1	* 0.3	accept the answer to a iii + 0.2
Total	5		consequential marking applies

Tier 3–6	Q No		
	1		
Part	Mark	Answer	Additional guidance
a i 4/4b	1	* A	
a ii 4/4b	1	* D	
a iii 4/4b	1	* E	
a iv 4/4b	1	* G	accept 'Jupiter'
b i 1/2i	1	* a bar drawn to 12 N/kg	the top of the bar must be in the middle third between 10 and 15
b ii 1/2k	1	any one from * Jupiter * Saturn * Neptune	
b iii 1/2k	1	* Jupiter	
Total	7		

Tier 3–6	Q No		
Part	Mark	Answer	Additional guidance
<p>a 4/2b 4/2c 4/2d</p>	<p>1</p>	<p>* the weight of the buggy</p> <p>* the force pulling the buggy along</p> <p>* the friction between the skis and the snow</p> 	<p>if more than one line is drawn from any one force award no mark for that force</p>
<p>b 4/2a</p>	<p>1</p>	<p>* 800</p>	<p>accept '80 x 10'</p>
<p>c 4/2g</p>	<p>1</p>	<p>any one from</p> <ul style="list-style-type: none"> * it weighed more * the mass was greater * it weighed less at the end 	<p>accept 'it was heavier'</p> <p>accept 'it only weighed 130 at the end'</p> <p>accept 'there was more food or fuel or supplies'</p> <p>accept 'more pressure'</p>

Tier 3–6	Q No 2		
Part	Mark	Answer	Additional guidance
d 4/2g	1	any one from * they spread out the weight * they have a bigger surface or area * they can slide easily	accept 'they do not sink into the snow' accept 'wheels sink' accept 'they reduce the pressure' accept 'less friction' 'they are bigger' is insufficient 'it can slide' is insufficient
e 4/2c	1	any one from * there is a bigger surface or area * there is a bigger force * it catches more air or wind	<i>do not accept</i> 'there is more air resistance'
Total	7		

Tier 3–6	Q No		
Part	Mark	Answer	Additional guidance
a i 1/2k a ii 2/2n a iii 1/2e BS/2b	1	* 35 * 37°C ✓ any one from * less chance of micro-organisms being passed on or spread * glass could break * mercury or alcohol or liquid could spill (if the glass thermometer broke) * mercury is poisonous * you could choke	accept 'less chance of germs being passed on' accept 'might pass on disease' accept 'a child might bite or swallow the thermometer' if more than one box is ticked, award no mark
b 2/2n	1	any one from * bacteria * fungi * protozoa	accept a named non-viral pathogenic micro-organism such as 'salmonella' do not accept names of diseases do not accept 'germs'
c i 1/2f c ii 3/1a 3/2c	1	any one from * so that alcohol can be seen * alcohol is difficult to see * you cannot easily see a colourless liquid * to make it easier to read the thermometer * gas * liquid	accept 'so you can see it' accept 'you cannot see a colourless liquid' accept 'so you can read it' answers must be in the correct order
Total	7		

Tier 3–6	Q No	Additional guidance	
	4		
Part	Mark	Answer	Accept
a i 3/3d	1	any one from * lemonade * fruit juice	accept 'fruit or juice'
a ii 3/3d	1	any one from * milk * water	
b i 3/3d	1	any one from * blue * dark blue * purple	
b ii 1/2k	1	any one from * it bubbled * bubbles were formed	accept 'it fizzed' accept 'bubbles' accept 'effervescence'
c 3/3e	1	* neutralisation ✓	if more than one box is ticked, award no mark
Total	5		

Tier 3–6	Q No	Additional guidance	
Part	Mark	Answer	Accept
a i 3/2b	1	* the water or it went blue	accept 'it changed colour' accept 'it got darker' accept 'there were fewer crystals' accept 'some of the crystals or copper sulphate disappeared'
a ii 3/2b	1	any one from * stir it * heat it * use hotter water * grind up or crush the crystals	accept 'use warm water'
b 3/2c	1	any one from * crystals * copper sulphate	accept 'solid'
c i 1/2k 3/2b c ii 1/2k 3/2b c iii 1/2j 3/2b	1 1 1	* 10 * Q * P <i>and</i> Q	
Total	6		answers may be in either order both answers are required for the mark

Tier 3–6	Q No	Additional guidance	
	6		
Part	Mark	Answer	Accept
a i 2/2b a ii 2/2b a iii 2/2c	1 1 1	* D * E any one from * blood * blood vessels	accept 'plasma' accept a named blood vessel accept 'arteries' accept 'veins'
			a mark should be awarded for 'red or white blood cells' as knowledge of the function of blood cells is not expected at this level the mark is awarded for the reference to blood
b 2/2d	1	* to provide energy ✓	if more than one box is ticked, award no mark
c i 2/2a c ii 2/2a c iii 2/2a	1 1 1	* Clare * Nadia any one from * it causes heart disease * it could give you a heart attack * it clogs your arteries or blood vessels	accept 'lemonade and jam or doughnut' accept 'cheeseburger and chips' or 'burger and chips' accept 'it is bad for your heart' accept 'it might give you a stroke' accept 'it makes you fat' accept 'it is bad for the liver'
Total	7		

Tier 3–6	Q No		
Part	Mark	Answer	Additional guidance
a 1/2k	1	* a male has antlers	accept 'the males have horns' accept 'it was bigger than others' accept 'it has a beard or hair around the neck'
b 1/2o	1	* they all have these characteristics	accept 'all deer have these things' accept 'all young deer look the same' accept 'they all have spots or skinny legs' accept 'an adult fallow deer has spots' 'an adult female has spots' is insufficient
c 1/2k	2	any two from * (adult) red deer does not have spots * the shape of the antlers or horns * the red deer has hair round its neck	accept the converse accept 'the spots' accept 'the things on its head are too wide' accept 'the red deer is hairy' 'it looks like a fallow deer' or 'it is a fallow deer' are insufficient
d 1/2k	2	any two from * beard or hair under neck * the shape of the antlers * rounder nose	accept 'too hairy' accept 'different kind of fur' accept 'the shape of the horns' accept 'horns' accept 'it has more than two antlers' accept 'the head or face is a different shape or size' accept 'the face looks different' accept 'bigger feet' or 'different hooves'
Total	6		<i>do not accept</i> 'it has a hump'

Tier 3–6 5–7	Q No 8 1			
Part	Mark	Answer	Accept	Additional guidance
a i 4/5e	1	* electrical		
a ii 4/5e	1	* kinetic	accept 'movement'	answers must be in the correct order
a iii 4/5e	1	* gravitational potential * kinetic or sound or thermal	accept 'gravitational' or 'potential' accept 'heat' for thermal	accept for two marks 'kinetic <i>into</i> sound' or 'kinetic <i>into</i> thermal'
b 4/5a	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			

Tiers 3–6 5–7	Q No 9 2											
Part	Mark	Answer	Accept	Additional guidance								
a 4/1a 4/1b	1	<table border="1"> <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> </table>	A	B	C	D	off	off	off	off		award a mark for each correct row
	A	B	C	D								
	off	off	off	off								
	1	* off	off	off	off							
1	* on	on	on	on								
1	* on	on	off	off								
b 4/1a 4/1b	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											

Tiers 3-6 5-7	Q No 10 3		
Part	Mark	Answer	Additional guidance
a i 3/1b	1	* five circles not touching and randomly arranged	accept at least three circles accept pairs of similar atoms
a ii 3/1b	1	* they are closer	<i>do not</i> accept 'they are close' <i>do not</i> accept 'they move faster'
b 3/1b	1	* greater than	accept 'greater'
c i 4/3j	1	* the amplitude gets smaller	accept 'the height of the waves gets less' accept 'the waves get shorter or smaller'
c ii 4/3k	1	any one from * the peaks or troughs are equally spaced	accept 'the waves are the same distance apart' accept 'there are four peaks or waves or troughs between the lines' accept 'the width of each wave is the same' accept 'the lines are equally spaced' accept 'the wavelength is the same'
		* the frequency is constant or does not change	
Total	5		

Tiers 3–6 5–7	Q No 11 4
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Part	Mark	Answer	Accept	Additional guidance																								
a 3/3d	2	<table border="1"> <thead> <tr> <th><i>liquid</i></th> <th><i>acidic</i></th> <th><i>neutral</i></th> <th><i>alkaline</i></th> </tr> </thead> <tbody> <tr> <td>alcohol</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td><i>dilute hydrochloric acid</i></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>distilled water</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>vinegar</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>sodium hydroxide solution</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>	<i>liquid</i>	<i>acidic</i>	<i>neutral</i>	<i>alkaline</i>	alcohol		✓		<i>dilute hydrochloric acid</i>	✓			distilled water		✓		vinegar	✓			sodium hydroxide solution			✓		award one mark for a correct tick for both alcohol and distilled water award one mark for a correct tick for both vinegar and sodium hydroxide solution if more than one column is ticked for any liquid award no mark for the corresponding pair of liquids
<i>liquid</i>	<i>acidic</i>	<i>neutral</i>	<i>alkaline</i>																									
alcohol		✓																										
<i>dilute hydrochloric acid</i>	✓																											
distilled water		✓																										
vinegar	✓																											
sodium hydroxide solution			✓																									
b i 1/2f	1	<p>any one from</p> <ul style="list-style-type: none"> * to clean the probe or it * to prevent contamination * to get an accurate reading * so the liquids do not get mixed up * it is neutral 	accept 'to neutralise the probe' or 'so that it does not affect the other liquids' or 'to make it pH 7'	'to make it a fair test' is insufficient																								
b ii 3/3d	1	* alcohol	accept 'the first or top one'																									


Tiers 3–6 5–7	Q No 11 4			
Part	Mark	Answer	Accept	Additional guidance
c i 3/3d	1	* hydrochloric acid has a lower pH or is more acidic	accept the converse accept 'vinegar is a weaker acid'	'vinegar is a weak acid' is insufficient
c ii 1/2k	1	any one from * more bubbles would be given off * bubbles would be given off more rapidly * there would be a bigger rise in temperature * the magnesium would be used up more quickly	accept 'more bubbles' or 'more fizzing' accept 'there would be a rise in temperature' or 'the test-tube would get hot'	
d i 3/1f 3/3e	1 1	* magnesium chloride + * hydrogen		answers may be in either order
d ii 3/3e	1	any one from * the acid was used up * the magnesium was used up	accept 'there were no reactants left' accept 'one of the reactants has been used up' accept 'the reaction was complete'	do not accept 'the magnesium had dissolved'
Total	9			

Tiers 3–6 5–7	Q No 12 5		
Part	Mark	Answer	Accept
a 1/2d	1	any one from * size of pieces of tablet * surface area of the tablet	accept 'size of tablet' accept 'whether the tablet is whole or crushed' accept 'form of the tablet' accept 'particle size' accept 'mass of each piece' accept 'number of pieces'
			<i>do not accept</i> 'mass of tablet'
b 1/1b	1	any one from * crushed tablets will dissolve more quickly than whole tablets * a whole tablet will take longer to dissolve * the bigger the surface or area the faster it dissolves	accept 'the finer the tablet the quicker it dissolves' accept 'the smaller the pieces the faster it dissolves'
			answers must include a comparison award a mark for an answer in the past tense if a comparison is included
c 1/2d	1	* temperature of the water	accept 'temperature'
d 1/2j	1	any one from * the higher the temperature the quicker the tablet dissolves * the lower the temperature the longer it takes to dissolve	answers must include a comparison 'at the lowest temperature it takes a long time to dissolve' is insufficient 'at the highest temperature it dissolves quickly' is insufficient
e 1/2j	1	* 40	accept a temperature from 38 to 44
Total	5		

Tiers 3–6 5–7	Q No 13 6			
Part	Mark	Answer	Accept	Additional guidance
a 2/2g	1	* oviduct ✓		if more than one box is ticked, award no mark
b 2/2g	1	any one from * some eggs or sperm might be eaten or lost * eggs or sperm are not protected inside the body * to increase the chance of an egg being fertilised * some eggs might not be fertilised * some are washed away * some of the offspring might be eaten	accept 'to make fertilisation more likely' accept 'some die' accept 'more tadpoles'	
c i 2/2j	1	any one from * to let oxygen or air into the egg * to let carbon dioxide or waste gases out * to allow gas exchange	accept 'for respiration'	<i>do not accept</i> 'to let waste out'
c ii 2/5c	1	any one from * for protection * to stop the egg drying out * it stops infection or disease	accept 'it stops it drying out' accept 'it stops micro-organisms or bacteria or viruses or germs getting in' accept 'to retain the contents'	'it stops infection getting in' is insufficient
d 2/2h	1	any one from * food passes from the mother to the embryo or baby * the embryo is fed through the placenta * it gets food from the mother's blood	accept 'the mother provides food' accept 'it is fed through the umbilical cord'	<i>do not accept</i> 'it gets food from the blood'
Total	5			

Tiers 3–6 5–7	Q No 14 7			
Part	Mark	Answer	Accept	Additional guidance
a i 2/1b	1	* name: nucleus * function: 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 2/1a	1	* tissue ✓		if more than one box is ticked, award no mark
b i 2/2c	1	any one from * to push food or waste along * to break up large pieces of food * to churn food	accept 'for peristalsis' accept 'mechanical digestion' accept 'to mix in enzymes'	'to digest food' is insufficient
b ii 2/2b	1	* they speed up digestion	accept 'they digest them' accept 'they break them down' accept 'they turn it into amino acids'	
b iii 2/2a	1	* fibre ✓		if more than one box is ticked, award no mark
Total	6			

Tiers 3–6 5–7	Q No 15 8			
Part	Mark	Answer	Accept	Additional guidance
a 1/2e	1	any one from * to make sure the water in the boiling tube had reached the required temperature * to make sure the rate stabilised or adjusted to the new temperature	accept 'time for the water in the test-tube to heat up' accept 'let it settle first' accept 'the bubbles reach a steady pace' accept 'to get rid of bubbles from the liquid' accept 'to get rid of trapped bubbles'	
b i 1/2i b ii 1/2k	1 1	* a smooth curve through all six points * a temperature from 32 to 38	accept any reading consistent with the maximum point on the drawn curve	
c 1/2l	1	any one from * A, B, C * the first three readings * between 10°C and 30°C * between A and C	accept 'A, B, C and D' accept 'between 10°C and 40°C' accept '10°C, 20°C and 30°C' or '10, 20, 30' accept 'between A and B' or 'between A and D' or 'between B and D'	do not accept 'between C and D'
d 1/2p	1	any one from * use smaller intervals of measuring the temperature * use temperatures between 30°C and 40°C	accept an example of specific intervals such as 'do it at intervals of 2°C' accept 'take more measurements' accept 'take a reading at 35°C'	answers must refer to the collection of data rather than to the presentation of data 'repeat the test' is insufficient but may be accepted with additional measurements
Total	5			

Tier 5–7	Q No 9		
Part	Mark	Answer	Additional guidance
a i 4/1f	1	* add more coils or turns * increase the current	accept 'put coils or turns closer together' accept 'increase the number of cells or batteries' accept 'increase the voltage or power'
a ii 4/1f	1	* 	do not accept 'move it closer' all four poles must be correct for the mark
b i 4/1f	1	any one from * steel stays magnetised * iron loses its magnetism * the switch would stay closed * the switch would not spring open	
b ii 4/1b	1	* copper is a better conductor than iron	accept the converse accept 'copper has a lower resistance' accept 'iron or the reed switch has a greater resistance'
Total	5		

Tier 5–7	Q No 10		
Part	Mark	Answer	Additional guidance
a 1/2i	1	* X-axis: time (minutes) Y-axis: temperature (°C) * appropriate scales such as 2 cm represents 10°C, 2 cm represents 1 minute * 11 points plotted to within half a small square * a smooth curve of best fit (not dot-to-dot)	pupils can gain credit for correct responses to other parts if the axes are wrongly labelled both answers are required for the mark units are required for the mark at least one zero must be included at the origin
b 1/2k	1	* an answer consistent with the drawn curve	accept a tolerance of one small square
Total	5		

Tier 5–7	Q No 11											
Part	Mark	Answer	Additional guidance									
a 3/3b	1	<p>* magnesium displaces copper from the copper sulphate</p> <p>* copper is replaced by magnesium</p>	<p>accept 'magnesium has taken the sulphate'</p> <p>accept 'copper and magnesium change places'</p>									
b 3/3b 3/3c	1	<table border="1"> <thead> <tr> <th>pairs of chemicals</th> <th>Does a displacement reaction take place? yes or no</th> <th>reason</th> </tr> </thead> <tbody> <tr> <td>iron + sodium chloride</td> <td>no</td> <td>iron is below sodium (in the reactivity series) or sodium is above iron (in the reactivity series)</td> </tr> <tr> <td>magnesium + lead nitrate</td> <td>yes</td> <td>magnesium is above lead (in the reactivity series) or lead is below magnesium (in the reactivity series)</td> </tr> </tbody> </table>	pairs of chemicals	Does a displacement reaction take place? yes or no	reason	iron + sodium chloride	no	iron is below sodium (in the reactivity series) or sodium is above iron (in the reactivity series)	magnesium + lead nitrate	yes	magnesium is above lead (in the reactivity series) or lead is below magnesium (in the reactivity series)	<p>accept 'iron is less reactive' or the converse</p> <p>accept 'magnesium is more reactive' or the converse</p> <p>both the answer and the correct reason are required for each mark</p>
pairs of chemicals	Does a displacement reaction take place? yes or no	reason										
iron + sodium chloride	no	iron is below sodium (in the reactivity series) or sodium is above iron (in the reactivity series)										
magnesium + lead nitrate	yes	magnesium is above lead (in the reactivity series) or lead is below magnesium (in the reactivity series)										
c i 3/3c	1	<p>any one from</p> <p>* add zinc to a solution of a salt of each of the other metals</p> <p>* add each of the other metals to a solution of a zinc salt</p>	<p>accept 'add zinc to copper chloride and if it reacts add it to a solution of a salt of the next metal up and so on'</p> <p>accept 'add the other metals to zinc chloride'</p> <p>accept any named zinc salt</p>									
c ii 3/3c	1	<p>any one from</p> <p>* place zinc between the metal in the salt which does react and the metal in the salt which does not react</p> <p>* place zinc between the metal which does react and the metal which does not react</p>	<p>accept 'whatever zinc displaced should be below zinc'</p> <p>accept 'put zinc below all the metals that react'</p>									
Total	5		<p>parts c i and c ii should be marked together</p> <p>do not accept 'test the other metals with zinc to see if they react'</p>									

Tier 5–7	Q No 12			
Part	Mark	Answer	Accept	Additional guidance
a 3/2h	2	any two from * they change colour or turn less green because chlorophyll breaks down * they become sweeter because glucose is formed * they become softer because cells break apart without pectin	accept 'it turned red or yellow or orange' accept any suitable colour for a ripe apple	the change and the explanation should be marked together both the answer and the reason are required for each mark
b 3/1b	1	* diffusion	accept 'convection'	<i>do not accept</i> 'the cells break down'
c 3/1f	1 1	* carbon dioxide CO ₂ * water H ₂ O	accept 'carbon monoxide' accept 'CO'	answers may be in either order both the name and formula are required for each mark
Total	5			

Tier 5–7	Q No 13			
Part	Mark	Answer	Accept	Additional guidance
a i 2/2j a ii 2/2j	1	* respiration		
	1	* carbon dioxide is produced	accept 'maggots breathe out carbon dioxide'	
b i 2/3a b ii 2/3a	1	* photosynthesis		
	1	any one from * carbon dioxide is used up * carbon dioxide reacts with water in the plant	accept 'the carbon dioxide reacts with water'	'carbon dioxide is absorbed' is insufficient <i>do not accept</i> 'the carbon dioxide reacts with water in the tube'
c 2/3a 2/3e	1	any one from * carbon dioxide produced by respiration was used up in photosynthesis * carbon dioxide produced by the maggots is used in photosynthesis * carbon dioxide produced by the maggots was used by the leaves		answers must refer either to respiration or maggots and photosynthesis or leaves 'the concentration of carbon dioxide remains unchanged' is insufficient
Total	5			

Tier 5–7	Q No 14		
Part	Mark	Answer	Additional guidance
a 1/2k	1	* they have only investigated British women	accept 'it is only one country' accept 'diet differences elsewhere' accept 'stress may be different elsewhere' accept 'different lifestyles elsewhere' accept 'they have only investigated women in the 60 to 79 age group'
b 1/2h	1	* they used a large sample	accept 'they used 4286 women'
c 1/1a 1/2k 1/2o	1	any one from * no data refers only to older women * no if you include all women the rate could be up or down any one from * no no evidence of the impact of treatment * no previous research could have underestimated the proportion * yes data suggests only 1 in 5 showed signs of heart disease so 4 out of 5 are unlikely to suffer	accept 'no mention of treatment' accept 'it does not tell you' accept 'data shows 1 in 5 had signs of heart disease'
Total	5		

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