

Sc

KEY STAGE  
**3**

LEVELS  
**3-7**

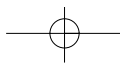
**2006**

Science tests

# Mark scheme for Papers 1 and 2

**2006**





## 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

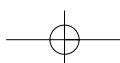
The mark scheme for each question shows:

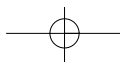
- the teaching points from the key stage 3 programme of study
- the marks available for each part of the question
- the total marks available for the question
- the answer or answers expected, indicated by an asterisk
- additional guidance to assist markers in making professional judgements.

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 2 question 15 and from tier 5–7 paper 2 question 7, illustrates this.

Tier	Q No			
3–6	15			
5–7	7			
Part	Mark	Answer	Accept	Additional guidance
<b>b i</b> 2/5c	1	any <b>one</b> 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 <b>or</b> viruses <b>or</b> germs getting in' accept 'it allows oxygen in <b>or</b> carbon dioxide out'	<i>do <b>not</b> accept 'it keeps it warm'</i>

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 **b** of tier 3–6 paper 1 question 3, an answer giving ‘water’ and ‘minerals’ will be awarded two marks. However, an answer which gives ‘minerals’ and ‘nutrients’ will be given only one mark, as both points are correct answers for the same mark.

Part	Mark	Answer	Accept	Additional guidance
<b>b</b> 2/3d	2	any <b>two</b> from * water  * minerals  * oxygen	accept ‘H <sub>2</sub> O’ accept ‘moisture’ accept a named mineral award two marks for two named minerals accept ‘nutrients’ <b>or</b> ‘salts’	<i>do <b>not</b> accept ‘food’</i>

In the following example, from part **d iii** of tier 5–7 paper 1 question 13, 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.

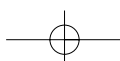
Part	Mark	Answer	Accept	Additional guidance
<b>d iii</b> 4/2c	1	any <b>one</b> from * up to 10 seconds the weight is greater than the (upward) force * after 10 seconds there is a resultant <b>or</b> net (upward) force * after 10 seconds the (upward) force is greater than the weight	accept the converse	<b>answers must be in terms of a comparison</b> ‘it does not have a great enough upward force’ is insufficient ‘at 10 seconds the forces are equal’ is insufficient

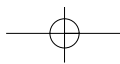
In the **Accept** column there may be:

- 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.

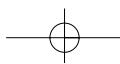
## Marking misspellings of words

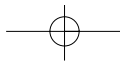
If a pupil misspells a word, markers will apply the following procedures:

- 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.

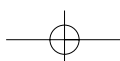
In a planning question, if no answer is given in the expected place but the correct answer is given in the drafting box, the mark(s) will be given.

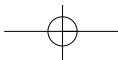
### Awarding levels

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 QCA on 30 June 2006.

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 2006 key stage 3 science tests and mark schemes were developed by the Oxford, Cambridge and RSA Examinations (OCR) and the Centre for Research into Primary Science and Technology (CRIPSAT) on behalf of QCA.





**Mark Allocation Grid: Tier 3–6**

**TIER 3–6 Paper 1**

Q	Sc1	Sc2	Sc3	Sc4
1		6		
2		7		
3		4		
4	5			
5	2		5	
6			2	2
7				6
8				6
9		7		
10	2	3		
11		4		
12	1		4	
13			4	
14	4			
15				4
16				7
17				5
<b>Total</b>	<b>14</b>	<b>31</b>	<b>15</b>	<b>30</b>

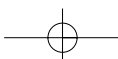
**TIER 3–6 Paper 2**

Q	Sc1	Sc2	Sc3	Sc4
1				4
2	5			
3				5
4			4	2
5			5	
6			5	
7	7			
8		8		
9				4
10				5
11	6			
12			5	
13		2	4	
14		2	5	
15	2	3	1	
16	6			
<b>Total</b>	<b>26</b>	<b>15</b>	<b>29</b>	<b>20</b>

<b>Total P1 + 2</b>	<b>40</b>	<b>46</b>	<b>44</b>	<b>50</b>
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**Overall**

<b>180</b>
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**Mark Allocation Grid: Tier 5–7**

**TIER 5–7 Paper 1**

Q	Sc1	Sc2	Sc3	Sc4
1		7		
2	2	3		
3		4		
4	1		4	
5			4	
6	4			
7				4
8				7
9				5
10		7		
11	4			
12			5	
13	1		3	2
14	8			
<b>Total</b>	<b>20</b>	<b>21</b>	<b>16</b>	<b>18</b>

**TIER 5–7 Paper 2**

Q	Sc1	Sc2	Sc3	Sc4
1				4
2				5
3	6			
4			5	
5		2	4	
6		2	5	
7	2	3	1	
8	6			
9				5
10			1	4
11			5	
12	5			
13		5		
14		5		
<b>Total</b>	<b>19</b>	<b>17</b>	<b>21</b>	<b>18</b>

<b>Total P1 + 2</b>	<b>39</b>	<b>38</b>	<b>37</b>	<b>36</b>
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**Overall**

<b>150</b>
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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	1	
Part	Mark	Answer	Accept	Additional guidance
<b>a</b> 2/5e	2	any <b>two</b> from * crabeater seal * cod * squid	accept 'crabeater' accept 'fish'	'seal' is insufficient
<b>b i</b> 2/5e	1	* producers ✓		if more than one box is ticked, award no mark
<b>b ii</b> 2/5e	1	* herbivores ✓		if more than one box is ticked, award no mark
<b>c i</b> 2/5d	1	any <b>one</b> from * it would decrease * there would be fewer seals	accept 'some would die'	'they would all die' is insufficient
<b>c ii</b> 2/5d	1	any <b>one</b> from * leopard seals eat other animals <b>or</b> food * leopard seals eat cod <b>or</b> fish <b>or</b> squid <b>or</b> penguins * crabeater seals <b>or</b> they only eat krill	accept 'they eat other animals <b>or</b> other food <b>or</b> other things'	'they have more food' is insufficient  'they eat krill' is insufficient
<b>Total</b>	<b>6</b>			



<b>Tier 3–6</b>	<b>Q No 2</b>	<b>Mark</b>	<b>Answer</b>	<b>Accept</b>	<b>Additional guidance</b>
<b>a i</b> 2/1c	1	* sperm			
<b>a ii</b> 2/2g	1	* testis		accept 'testes'	
<b>b i</b> 2/1c	1	* ovum <b>or</b> egg			
<b>b ii</b> 2/2g	1	* ovary		accept 'ovaries'	
<b>c</b> 2/1d	1	* fertilisation			
<b>d i</b> 2/2h	1	* foetus			
<b>d ii</b> 2/2h	1	* uterus			
<b>Total</b>	<b>7</b>				

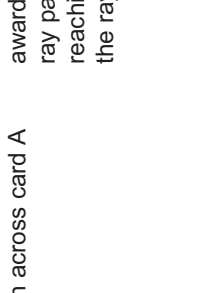
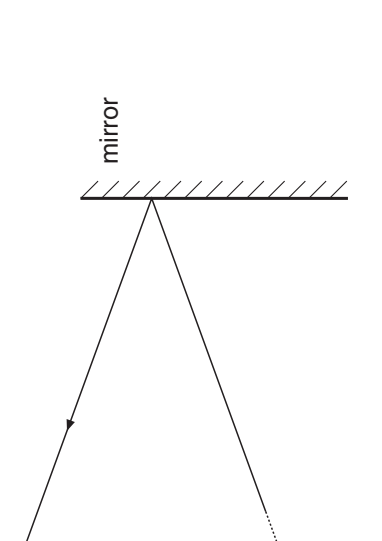
Tier 3–6	Q No 3	Part	Mark	Answer	Accept	Additional guidance
a i	2/3a	1	any <b>one</b> from * it is long and spindly * the leaves are far apart * the leaves are white <b>or</b> pale	accept 'it is tall' <b>or</b> 'it has grown more' accept 'it is thinner' <b>or</b> 'it is thin' accept 'the leaves are yellow' accept 'it is lighter' accept 'it has no chlorophyll' accept 'its leaves are a different colour'	'they are shrivelled <b>or</b> crinkled' is insufficient	
a ii	2/3a	1	any <b>one</b> 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	2/3d	2	any <b>two</b> from * water * minerals * oxygen	accept 'H <sub>2</sub> O' accept 'moisture' accept a named mineral award two marks for two named minerals accept 'nutrients' <b>or</b> 'salts'	<b>do not accept</b> 'food'	
<b>Total</b>		<b>4</b>				

Tier 3–6	Q No 4	Part	Mark	Answer	Accept	Additional guidance																				
a	1/2e	1	1	any <b>one</b> from * stopclock * stopwatch	accept 'timer'	'clock' is insufficient 'watch' is insufficient																				
b	1/2d	2	2	<table border="1"> <thead> <tr> <th>factor</th> <th>change it</th> <th>keep it the same</th> <th>measure it</th> </tr> </thead> <tbody> <tr> <td>temperature of the oil</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>type of oil</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>volume of oil</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>time taken for all the oil to flow through the funnel</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>	factor	change it	keep it the same	measure it	temperature of the oil	✓			type of oil		✓		volume of oil		✓		time taken for all the oil to flow through the funnel			✓		if all four answers are correct, award two marks if three answers are correct, award one mark if more than one box is ticked in any row, count the answer as incorrect for that row
factor	change it	keep it the same	measure it																							
temperature of the oil	✓																									
type of oil		✓																								
volume of oil		✓																								
time taken for all the oil to flow through the funnel			✓																							
c i	1/2j	1	1	any <b>one</b> from * it or time gets less * it or time decreases	accept 'the time gets faster' or 'it gets faster' accept 'the oil flows faster' accept 'it goes through faster'	do <b>not</b> accept 'the time gets slower' unless linked to a decrease in temperature																				
c ii	1/2k	1	1	* 180 seconds ✓		if more than one box is ticked, award no mark																				
<b>Total</b>			<b>5</b>																							

Tier 3–6	Q No	Mark	Answer	Accept	Additional guidance
	5				
<b>a</b> 1/2k	1		* <i>water</i> : increased <b>or</b> went up  * <i>wax</i> : decreased <b>or</b> went down	accept 'expanded' accept a reading greater than 7 (cm <sup>3</sup> ) and less than <b>or</b> equal to 8 (cm <sup>3</sup> ) accept 'contracted' accept a reading lower than 7 (cm <sup>3</sup> ) and greater than <b>or</b> equal to 5.5 (cm <sup>3</sup> )	<b>both</b> answers are required for the mark
<b>b</b> 3/2c	1 1		* <i>water</i> : liquid * <i>wax</i> : solid		
<b>c i</b> 1/2k	1		any <b>one</b> from * the liquid had turned blue  * crystals <b>or</b> copper sulphate <b>or</b> solid could not be seen * there was no solid left	accept 'the colour changed' accept 'the water was blue <b>or</b> coloured <b>or</b> grey' accept 'the crystals disappeared'	'it formed a solution' is insufficient
<b>c ii</b> 3/2b	1		any <b>one</b> from * stir it * heat it * use warm water	accept 'shake it' <b>or</b> 'mix it'  accept 'use hotter water' accept 'add more water'	<b>do not accept</b> 'put less in'
<b>d i</b> 3/1h <b>d ii</b> 3/1h	1 1		* it evaporated  * copper sulphate	accept 'it went into the air'  accept 'crystals' accept 'sulphate'	
<b>Total</b>	<b>7</b>				

Tier 3–6	Q No 6	Part	Mark	Answer	Accept	Additional guidance				
		<b>a</b> 4/1d	1	* <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">S</td> </tr> </table>	N	S		both poles are required for the mark		
N										
S										
		<b>b i</b> 4/1d	1	* <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">N</td> <td style="text-align: center;">S</td> </tr> <tr> <td style="text-align: center;">N</td> <td style="text-align: center;">S</td> </tr> </table>	N	S	N	S		all four poles are required for the mark
N	S									
N	S									
		<b>b ii</b> 3/1d	1	any <b>one</b> from * iron * steel	accept 'cobalt <b>or</b> nickel'					
		<b>c</b> 3/1d	1	any <b>one</b> from * wood <b>or</b> it is not magnetised * wood <b>or</b> 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'					
		<b>Total</b>	<b>4</b>							

Tier 3–6	Q No 7	Part	Mark	Answer	Accept	Additional guidance
a	4/3h	1	any <b>one</b> 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	4/5g	1	any <b>one</b> 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	4/3i	1	any <b>one</b> 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	4/5e	1	* light			
d ii	4/5e	1	* sound			
e	4/2b	1	* gravity	accept 'weight'		
<b>Total</b>		<b>6</b>				

Tier 3–6	Q No 8	Part	Mark	Answer	Accept	Additional guidance
a	4/3a	1	1	* Light travels in straight lines. ✓		if more than one box is ticked, award no mark
b	4/3a	1	1	*  card A card B	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	4/3c	3	3	*  mirror		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	4/1b	1	1	* Add another battery. ✓		if more than one box is ticked, award no mark
<b>Total</b>			<b>6</b>			

Tier 3–6 5–7	Q No 9 1	Part	Mark	Answer	Accept	Additional guidance
<b>a</b> 2/5b	2			any <b>two</b> from * less <b>or</b> no food * fewer <b>or</b> no places to nest <b>or</b> shelter * less <b>or</b> 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>b</b> 2/3a	1			any <b>one</b> from * more light * more water * more space * more nutrients  * more photosynthesis can take place	accept references to nutrients from trees left to rot accept 'photosynthesis can take place'	
<b>c</b> 2/3c	1			any <b>one</b> from * to replace minerals <b>or</b> nitrates that have been removed (by plants) * plants absorb the minerals <b>or</b> nitrates * plants need minerals <b>or</b> nitrates to grow * minerals <b>or</b> nitrates <b>or</b> they are plant nutrients	accept 'minerals <b>or</b> 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



Tier 3–6 5–7	Q No 9 1	Mark	Answer	Accept	Additional guidance
d 2/5a 2/5b	2		<p>any <b>two</b> from</p> <ul style="list-style-type: none"> <li>* to provide food for animals</li> <li>* to provide shelter <b>or</b> nesting sites <b>or</b> habitats for birds <b>or</b> animals</li> <li>* trees absorb carbon dioxide</li> <li>* trees produce oxygen</li> <li>* the roots bind soil <b>or</b> prevent soil washing away</li> </ul>	<p>accept 'to provide homes for animals'</p> <p>accept 'provides trees to be cut down in the future'</p> <p>accept 'they need trees for paper' <b>or</b> 'to get paper'</p>	<p>'it is good for the environment' is insufficient</p> <p>'to help animals <b>or</b> birds survive' is insufficient</p>
<b>Total</b>	<b>7</b>				

Tier 3–6 5–7	Q No 10 2	Part	Mark	Answer	Accept	Additional guidance
		<b>a i</b> 1/2k	1	* United States	accept 'US' or 'USA' accept 'America' accept lower case letters for 'US'	
		<b>a ii</b> 1/2j	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'	do <b>not</b> accept 'people with cancer eat less starch' 'eat starch' is insufficient
		<b>b i</b> 2/2a	1	* bread ✓		
			1	* pasta ✓		if more than two boxes are ticked, deduct one mark for each incorrect tick minimum mark zero
		<b>b ii</b> 2/2c	1	* fibre ✓		if more than one box is ticked, award no mark
		<b>Total</b>	<b>5</b>			

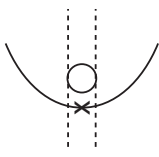
Tier 3–6 5–7	Q No 11 3	Part	Mark	Answer	Accept	Additional guidance
		<b>a</b> 2/2e	1	* The biceps contracts and the triceps relaxes. ✓		if more than one box is ticked, award no mark
		<b>b</b> 2/2e	1	* to allow movement <b>or</b> bending	accept 'otherwise they would snap'	'to allow our arms to stretch' is insufficient
		<b>c i</b> 2/2e	1	any <b>one</b> from * for smooth movement * to avoid <b>or</b> reduce friction * to prevent bones rubbing together <b>or</b> wearing down * to lubricate the joint	accept 'to protect the bones' accept 'to absorb shocks'	'so you can move <b>or</b> bend' is insufficient 'for protection' is insufficient
		<b>c ii</b> 2/2e	1	any <b>one</b> from * the bones would rub together <b>or</b> wear down * pain * stiffness * movement would be difficult	accept 'more friction' accept 'arthritis' accept 'you cannot move <b>or</b> bend'	'friction' is insufficient  <i>do not accept</i> 'the arm will not work'
		<b>Total</b>	<b>4</b>			

Tier 3–6 5–7	Q No 12 4	Part	Mark	Answer	Accept	Additional guidance
		<b>a</b> 3/1d	1	* steel		do <b>not</b> accept 'stainless steel' do <b>not</b> accept 'carbon'
		<b>b</b> 3/1d	1	* brass * solder		answers may be in either order <b>both</b> answers are required for the mark
		<b>c</b> 1/2j	1	* 80	accept '100 – 20'	
		<b>d i</b> 3/3a	1	* it does not contain iron	accept 'it does not contain steel' accept 'only iron rusts' <b>or</b> 'only steel rusts' accept 'it is made of tin, copper and zinc'	
		<b>d ii</b> 3/3a	1	* oxygen	accept 'O <sub>2</sub> '	
		<b>Total</b>	<b>5</b>			

Tier 3–6 5–7	Q No 13 5	Part	Mark	Answer	Accept	Additional guidance
		<b>a i</b> 3/1h	1	* pale blue    yellow    red		answers may be in any order <b>all three</b> answers are required for the mark do <b>not</b> accept 'blue' for 'pale blue'
		<b>a ii</b> 3/1h	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'	<b>both</b> the answer and the correct explanation are required for the mark
		<b>a iii</b> 3/1h	1	* pencil any <b>one</b> from * because ink from the felt-tip pen is soluble <b>or</b> will dissolve in water * because pencil will not spread out <b>or</b> dissolve <b>or</b> run <b>or</b> smudge	accept 'the ink will also produce colours' accept 'the ink expands'	<b>both</b> the answer and the correct explanation are required for the mark 'the pencil has no ink in it' is insufficient
		<b>b</b> 3/2b	1	any <b>one</b> 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 <b>or</b> permanent <b>or</b> 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'	
		<b>Total</b>	<b>4</b>			

Tier 3–6 5–7	Q No 14 6	Part	Mark	Answer	Accept	Additional guidance
<b>a</b> 1/2d	1			any <b>one</b> 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>b</b> 1/2p	2			any <b>two</b> 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 <b>or</b> 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' <b>or</b> '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'	<b>ways of improving the investigation may be:</b> <b>(i) a control</b>  <b>(ii) improved reliability</b> <b>(iii) improved procedure</b> <b>(iv) extend the independent variable</b>  <i>do not accept</i> 'use different stains'
<b>c</b> 1/2a	1			any <b>one</b> from * whether the cloths are stained or not * level of staining <b>or</b> time taken to remove stain	accept 'how much egg is left on cloths' accept 'which cloth was the cleaner <b>or</b> cleanest'	'the cloth' <b>or</b> 'the stain' are insufficient
<b>Total</b>	<b>4</b>					

Tier 3–6 5–7	Q No 15 7	Part	Mark	Answer	Accept	Additional guidance
4/3a			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
4/4a			1	* We have day and night.	The Earth is a sphere.	
4/4c			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.	
			1		The Earth orbits the Sun.	
<b>Total</b>			<b>4</b>			

Tier 3–6 5–7	Q No 16 8	Part	Mark	Answer	Accept	Additional guidance
a	4/2b	1	1	* Mars	accept '6 kg'	do <b>not</b> accept '24 N'
b	4/2b	1	1	any <b>one</b> 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' <b>or</b> 'less newtons on Venus' accept 'there is a greater force on Earth'	'different weights' is insufficient do <b>not</b> accept 'it has more mass on the Earth'
c	4/2b	1 1	1 1	* less (than) <b>or</b> smaller (than) <b>or</b> lower (than) * the same (as) <b>or</b> equal (to)		answers must be in the correct order
d i	4/4b	1	1	* the greater the distance the greater the time for one orbit	accept 'it increases'	
d ii	1/2j 4/4b	1	1	* an answer from 1.6 to 6 inclusive		
e	4/4c	1	1	* 		award a mark for X marked on the orbit within the tolerances shown
<b>Total</b>			<b>7</b>			



Tier 3–6 5–7	Q No 17 9	Part	Mark	Answer	Accept	Additional guidance
		<b>a</b> 4/2d	1	* B		
		<b>b i</b> 4/2c	1	* A and C	accept 'lift and weight'	answers may be in either order <b>both</b> letters are required for the mark
		<b>b ii</b> 4/2c	1	* D and B	accept A and C	answers may be in either order <b>both</b> letters are required for the mark
		<b>c i</b> 4/2c	1	* Force D is greater than force B.	✓	if more than one box is ticked, award no mark
		<b>c ii</b> 4/2c	1	* Force A is greater than force C.	✓	if more than one box is ticked, award no mark
		<b>Total</b>	<b>5</b>			

Tier 5–7	Q No 10	Part	Mark	Answer	Accept	Additional guidance
a i	2/1c 2/2g	a ii	1	* oviduct <b>or</b> fallopian tube		
			1	* cilia move in a wave <b>or</b> from side to side	accept 'they waft <b>or</b> carry it along' accept 'the hairs move it along' accept 'the hairs <b>or</b> cilia waft <b>or</b> move'	'the hairs' <b>or</b> 'the cilia' are insufficient
b i	2/2h	b ii	1	* embryo: stage 3 foetus: stage 4	accept '3' accept '4'	<b>both</b> answers are required for the mark
			1	* uterus	accept 'womb'	
c i	2/4a	c ii	2	any <b>two</b> from * a reference to genes <b>or</b> genetic material <b>or</b> DNA <b>or</b> chromosomes * it has a different combination (of genes) * it is made from an egg and sperm * (it gets genetic information) from both parents	accept for one mark 'to be the same as someone else you need exactly the same genes' accept for two marks 'it only has half the DNA <b>or</b> chromosomes from each parent'	
			1			<b>all three</b> ticks are required for the mark if there is more than one tick in any row, award no mark
<b>Total</b>			<b>7</b>			

human characteristic	inherited only	inherited and affected by environmental conditions
eye colour	✓	
skin colour		✓
weight		✓

Tier 5–7	Q No 11	Part	Mark	Answer	Accept	Additional guidance
				<p>markers should read the answers to parts a and b before marking this question</p> <p>parts a and b should be marked together</p>		
<b>a</b>	1/2d	1	1	<p>* temperature of the water</p> <p>any <b>one</b> from</p> <p>* rate of evaporation</p> <p>* time taken for all the water to evaporate</p> <p>* volume <b>or</b> mass <b>or</b> amount of water lost in a fixed time</p> <p>any <b>one</b> from</p> <p>* starting volume of water</p> <p>* shape of container</p> <p>* same ambient conditions</p>	<p>accept 'temperature'</p> <p>accept 'room temperature'</p> <p>accept 'the time for it to evaporate'</p> <p>accept 'measure how much water is left after a certain time'</p> <p>accept 'the amount of water'</p> <p>accept a specified volume of water</p> <p>accept 'room temperature' if the independent variable is 'water temperature'</p>	<p><i>do not accept</i> responses that describe rates of heating</p> <p>answers must refer to both time taken and amount of water lost</p> <p>'time taken' is insufficient</p> <p>'same heater' and 'same starting measurement' are insufficient</p>
<b>b</b>	1/2i	1	1	<p>* a column <b>or</b> row indicating temperature <b>and</b> a column <b>or</b> row indicating time <b>or</b> volume lost <b>or</b> volume remaining</p>	<p>accept a column <b>or</b> row indicating 'rate of evaporation'</p> <p>accept 'amount lost' <b>or</b> 'amount remaining'</p>	<p><b>both</b> headings are required for the mark the units of measurement are not necessary for the mark</p> <p>the second column <b>or</b> row should be consistent with the dependent variable identified in part a</p> <p>ignore other columns in the table</p>
<b>Total</b>			<b>4</b>			

Tier 5–7	Q No 12	Mark	Answer	Accept	Additional guidance																				
<b>a</b> 3/3c	1	1	<table border="1"> <thead> <tr> <th></th> <th>copper</th> <th>iron</th> <th>magnesium</th> <th>zinc</th> </tr> </thead> <tbody> <tr> <td>calcium nitrate</td> <td>X</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>copper nitrate</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>iron nitrate</td> <td>X</td> <td></td> <td>✓</td> <td>✓</td> </tr> </tbody> </table>		copper	iron	magnesium	zinc	calcium nitrate	X	X	X	X	copper nitrate		✓	✓	✓	iron nitrate	X		✓	✓		award one mark for each correct row
					copper	iron	magnesium	zinc																	
				calcium nitrate	X	X	X	X																	
				copper nitrate		✓	✓	✓																	
iron nitrate	X		✓	✓																					
1	*	calcium nitrate	X	X																					
		copper nitrate		✓	✓																				
		iron nitrate	X		✓																				
<b>b</b> 3/3a 3/3e	2	*	calcium carbonate + hydrochloric acid	no reaction	if all three answers are correct, award two marks if one <b>or</b> 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																				
			magnesium + hydrochloric acid	a chloride, carbon dioxide and water are formed																					
			copper + hydrochloric acid	a chloride and hydrogen are formed																					
<b>Total</b>		<b>5</b>																							

Tier 5–7		Q No 13		
Part	Mark	Answer	Accept	Additional guidance
<b>a</b> 3/1b	1	any <b>one</b> from * liquids <b>or</b> they take up less space * liquids <b>or</b> 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>b</b> 3/1e	1	* there is no oxygen in space	accept 'there is no air in space' accept 'space is a vacuum'	
<b>c</b> 3/1e	1	any <b>one</b> 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 <b>or</b> oxygen is being used up' accept 'waste gas is given off'	'gravity gets weaker' is insufficient
<b>d i</b> 1/2k	1	* 27 * 16.5	accept a number from 16.3 to 16.7	<b>both</b> answers are required for the mark
<b>d ii</b> 4/2c	1	* 10.5	accept the difference between the numbers given in <b>d i</b>	consequential marking applies
<b>d iii</b> 4/2c	1	any <b>one</b> from * up to 10 seconds the weight is greater than the (upward) force * after 10 seconds there is a resultant <b>or</b> net (upward) force * after 10 seconds the (upward) force is greater than the weight	accept the converse	<b>answers must be in terms of a comparison</b> 'it does not have a great enough upward force' is insufficient 'at 10 seconds the forces are equal' is insufficient
<b>Total</b>	<b>6</b>			

Tier 5–7		Q No 14	Answer	Accept	Additional guidance
Part	Mark				
<b>a</b> 1/2i	1	* X-axis: mass of magnesium (g) Y-axis: mass of magnesium oxide (g)			<b>both</b> labels are required for the mark units are required for the mark pupils can gain credit for correct responses to other parts if the axes are wrongly labelled <b>or</b> magnesium is on the Y-axis and magnesium oxide is on the X-axis scale need not begin at zero
	1	* reasonable scales	accept a scale of 1 g <b>or</b> 2 g per 5 small squares		
	1	* reasonably accurate plotting of all points	all points plotted to $\pm 1$ small square		
	1	* a line of best fit drawn			
<b>b i</b> 1/2n <b>b ii</b> 1/2n	1	* E			
	1	any <b>one</b> from * ignore it in drawing the line of best fit * they could predict the figure from the line of best fit * they should repeat the reading	accept 'ignore it' accept 'they could use the graph line' accept 'check it'		pupils can gain credit for a response which suggests they should predict the correct value from the pattern <b>or</b> ignore the anomalous results <b>or</b> repeat the reading
<b>c</b> 1/2i	1	* a number from 11 to 13	accept a value consistent with the line of best fit	the unit is not required for the mark	

Tier 5–7	Q No 14	Part	Mark	Answer	Accept	Additional guidance
		d	1	any <b>one</b> from * the greater the mass of magnesium burned the greater the mass of oxide formed * the magnesium and oxygen react in fixed proportions * the mass of magnesium oxide formed is proportional to the mass of magnesium burned * the greater the mass of magnesium the greater the mass of oxygen that combines with it		
<b>Total</b>			<b>8</b>			

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2006 KS3 Science Mark Scheme

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Tier 3–6	Q No 1	Part	Mark	Answer	Accept	Additional guidance								
a	4/1a	1	1	<table border="1"> <tr> <td>P</td> <td>off</td> </tr> <tr> <td>Q</td> <td>on</td> </tr> <tr> <td>R</td> <td>on</td> </tr> </table> <p>*</p>	P	off	Q	on	R	on	accept '1' for 'on' and '0' for 'off'	<b>all three</b> answers are required for the mark		
P	off													
Q	on													
R	on													
b	4/1c	1	1	any <b>one</b> from * battery * cell	accept 'batteries' accept 'cells'									
c	4/1a	2	2	<table border="1"> <tr> <td>on</td> <td></td> </tr> <tr> <td>off</td> <td>✓</td> </tr> </table> <table border="1"> <tr> <td>on</td> <td></td> </tr> <tr> <td>off</td> <td>✓</td> </tr> </table>	on		off	✓	on		off	✓		<p>if all three answers are correct, award two marks if two answers are correct, award one mark if more than one box is ticked for any circuit, award no credit for that circuit</p>
on														
off	✓													
on														
off	✓													
<b>Total</b>			<b>4</b>											

Tier 3–6		Q No 2		
Part	Mark	Answer	Accept	Additional guidance
<b>a</b> 1/2i	1	* bar for material A drawn to 40 decibels		allow a tolerance of one small square for the drawn line, either above <b>or</b> below 40 decibels
<b>b</b> 1/2i	1	* 4		
<b>c</b> 1/2k	1	* D	accept '35'	
<b>d</b> 1/2d	1 1	* Use the same box each time. ✓ * Keep the distance between the sound sensor and the bell the same each time. ✓		if more than two boxes are ticked, deduct one mark for each incorrect tick minimum mark zero
<b>Total</b>	<b>5</b>			

Tier 3–6	Q No 3	Part	Mark	Answer	Accept	Additional guidance
		<b>a</b> 4/2c	1	any <b>one</b> from * the forces are balanced * the forces are equal <b>or</b> the same * the forces are both 1000 N * they pull with the same force <b>or</b> equally hard	accept 'the forces are both 1000' accept 'the newtons are even' accept 'both teams have the same strength'	ignore references to gravity if the answer is in terms of balanced forces 'the sides are equal' is insufficient <b>do not accept</b> 'both teams weigh 1000 N'
		<b>b</b> 4/2c	1	* an arrow drawn to the right	accept an arrow drawn to the right anywhere on the drawing	
		<b>c</b> 4/2c	1	any <b>one</b> from * team A pulled harder than team B * team A was stronger * team A was pulling with more than 1000 * team B was pulling with less than 1000 * there was more force to the left	accept 'team A pulled harder' <b>or</b> 'team A pulled more' <b>or</b> 'they pulled harder' accept the converse accept 'they used more strength' accept 'there are more newtons to the left'	
		<b>d</b> 4/2c	1	* 1200 N ✓		if more than one box is ticked, award no mark
		<b>e</b> 4/2d	1	* friction		
		<b>Total</b>	<b>5</b>			

Tier 3–6	Q No	Mark	Answer	Accept	Additional guidance
	4				
<b>a i</b> 3/2d 3/3g	1		* weathering ✓		if more than one box is ticked, award no mark
<b>a ii</b> 3/2e 3/3g	1		any <b>one</b> from * it is hard <b>or</b> harder * it is resistant to acid rain * it is less permeable <b>or</b> porous * it is less easily weathered	accept 'limestone is softer' accept 'it is resistant' accept 'limestone is affected by acid rain' accept 'limestone is more permeable <b>or</b> porous' accept 'granite is stronger' accept 'granite does not weather <b>or</b> erode'	'granite <b>or</b> it is solid' is insufficient
<b>b i</b> 4/5a	1		any <b>one</b> from * coal * gas * oil * peat	accept 'methane' accept 'petrol' <b>or</b> 'diesel' <b>or</b> 'kerosene' accept 'turf'	
<b>b ii</b> 4/5a	1		* All fossil fuels are a source of energy. ✓		if more than one box is ticked, award no mark
<b>b iii</b> 3/3g	1		* corrosion ✓		if more than one box is ticked, award no mark
<b>b iv</b> 3/2i	1		* paint	accept 'grease' <b>or</b> 'oil' accept 'plastic' <b>or</b> 'wax' <b>or</b> 'polish' accept 'varnish' accept 'zinc' <b>or</b> 'galvanise it'	'waterproof coating' is insufficient 'something to stop them reacting' is insufficient
<b>Total</b>	<b>6</b>				

<b>Tier 3–6</b>	<b>Q No 5</b>			
<b>Part</b>	<b>Mark</b>	<b>Answer</b>	<b>Accept</b>	<b>Additional guidance</b>
<b>a i</b> 3/1h	1	* filtration ✓		if more than one box is ticked, award no mark
<b>a ii</b> 3/1h	1	* chromatography ✓		if more than one box is ticked, award no mark
<b>b i</b> 3/3d	1	* it is alkaline	accept 'alkali'	
<b>b ii</b> 3/3d	1	* red		
<b>c</b> 3/3d	1	* indicator ✓		if more than one box is ticked, award no mark
<b>Total</b>	<b>5</b>			

Tier 3–6	Q No 3–6	Part	Mark	Answer	Accept	Additional guidance
		<b>a i</b> 3/1d	1 1	* It is flexible. ✓ * It is strong. ✓		if more than two boxes are ticked, deduct one mark for each incorrect tick minimum mark zero
		<b>a ii</b> 3/1d	1	* It becomes rusty.		
		<b>b i</b> 3/1e BS/2b	1	any <b>one</b> from * it is flammable * it may explode	accept 'it is inflammable' <b>or</b> 'it catches fire' <b>or</b> 'it burns' accept 'it explodes' accept 'it is reactive <b>or</b> very reactive' accept 'it reacts with air <b>or</b> oxygen'	'it is poisonous' is insufficient
		<b>b ii</b> 3/1a	1	* helium		
		<b>Total</b>	<b>5</b>			

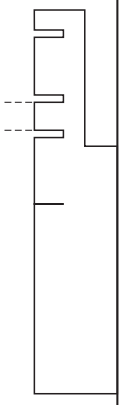
Tier 3–6	Q No 7	Part	Mark	Answer	Accept	Additional guidance
		<b>a</b> 1/2g	1	* 10.5 or 10½	accept '105 mm'	
		<b>b</b> 1/2k	1 1	* its teeth * its shape		answers may be in either order
		<b>c</b> 1/2k	1	* the cut on its body	accept 'fish cannot fly' accept 'it fell out of the sky' accept 'it dropped onto his boat'	
		<b>d</b> 1/2b	1	any <b>one</b> from * use a key * use the Internet * ask an expert <b>or</b> fisherman <b>or</b> scientist <b>or</b> teacher * look in a book	accept 'use a computer' accept 'take it to a museum' accept 'look it up' accept 'look at the features'	
		<b>e</b> 1/1a	2			if all four ticks are correct, award two marks if two <b>or</b> three ticks are correct, award one mark if there is more than one tick in any row, award no credit for that row
		<b>Total</b>	<b>7</b>			

supported by evidence	not supported by evidence
✓	
✓	
	✓
✓	

Tier 3–6	Q No 8	Part	Mark	Answer	Accept	Additional guidance
		<b>a i</b> 2/5d	1 1	* they decreased <b>or</b> went down any <b>one</b> from * more were eaten * the mink ate them * more animals to eat them	accept 'more were killed' accept 'some died'	<i>do not accept 'they all died'</i>
		<b>a ii</b> 2/5d	1	any <b>one</b> from * they decreased <b>or</b> went down * they had less food <b>or</b> rabbits * the mink ate their food	accept 'there were fewer of them' accept 'they had no food' accept 'they had to share their food <b>or</b> rabbits'	
		<b>b</b> 2/5e	1	* prey		
		<b>c i</b> 2/5d	1	any <b>one</b> from * fox * snake * badger * bird of prey	accept a named bird of prey such as 'owl' <b>or</b> 'hawk' <b>or</b> 'eagle' accept 'cat'	
		<b>c ii</b> 2/5d	2	any <b>two</b> from * different climate * disease * not enough food * shot <b>or</b> run over <b>or</b> trapped <b>or</b> poisoned * injury due to fighting * different habitat	accept 'no food' <b>or</b> 'they starved' <b>or</b> 'competition for food' accept 'people killed them'	references to old age are insufficient



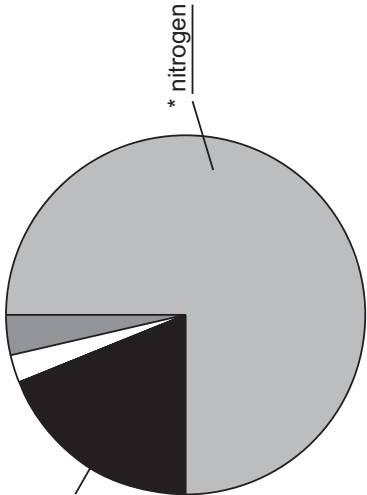
<b>Tier 3–6</b>	<b>Q No 8</b>	<b>Mark</b>	<b>Answer</b>	<b>Accept</b>	<b>Additional guidance</b>
<b>d</b>	<b>2/4b</b>	<b>1</b>	any <b>one</b> from * they have fur <b>or</b> hair * they have external ears	accept 'they give birth to live young' accept 'they feed their young on milk'	'they are warm-blooded' is insufficient
<b>Total</b>		<b>8</b>			

Tier 3–6 5–7	Q No 9 1			
Part	Mark	Answer	Accept	Additional guidance
<b>a i</b> 4/2e	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
<b>a ii</b> 4/2f	1	any <b>one</b> 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>b i</b> 4/2f	1	any <b>one</b> 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 <b>do not accept</b> 'because the cardboard would tilt the other way' 'it would not work' is insufficient
<b>b ii</b> 4/2f	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
<b>Total</b>	<b>4</b>			

Tier 3–6 5–7	Q No 10 2	Part	Mark	Answer	Accept	Additional guidance
		<b>a</b> 4/3j	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>b</b> 4/3k	1	* The sound has a higher pitch. ✓		if more than one box is ticked, award no mark
		<b>c</b> 4/3k	1	* the sound from the thicker string has a lower pitch <b>or</b> a lower frequency	accept 'it has a lower pitch <b>or</b> a lower frequency' accept 'the sound from the thicker string is louder' <b>or</b> 'it is louder'	answers must include a comparison 'it is lower' is insufficient
		<b>d i</b> 4/3k	1	* the sound in A has a higher pitch <b>or</b> a higher frequency	accept 'it has a higher pitch <b>or</b> higher frequency'	answers must show a comparison 'the vibrations are quicker' is insufficient 'it is higher' is insufficient
		<b>d ii</b> 4/3j	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 <b>or</b> of greater amplitude' is insufficient <i>do not accept</i> 'it is higher'
		<b>Total</b>	<b>5</b>			

Tier 3–6 5–7	Q No 11 3	Part	Mark	Answer	Accept	Additional guidance
		<b>a i</b> 1/2i	1	* point plotted for (150, 1.5) to $\pm$ half a small square		the anomalous point should be avoided the line need not be drawn through the origin
		<b>a ii</b> 1/2j	1	* line of best fit		
		<b>b</b> 1/2j	1	* point at (300, 3.8) circled	accept this result circled in the table	
		<b>c i</b> 1/2k	1	* a number from 640 to 660		consequential marking applies to both <b>c i</b> and <b>c ii</b> accept answers consistent with the graph drawn
		<b>c ii</b> 1/2k	1	* a number from 0.4 to 0.6		
		<b>d</b> 1/2n	1	any <b>one</b> from * the pattern is revealed <b>or</b> observed more easily * it tells you the pattern without working it out * it gives readings between the recorded readings * you can see if there are results that are wrong <b>or</b> do not fit the pattern	accept 'it allows you to see a pattern' accept 'you can tell the rule by looking at it' accept 'it is easier to make predictions' accept 'it shows better <b>or</b> more quickly the more mass the more weight' accept 'the data is continuous'	the answer must refer to the results <b>or</b> the pattern shown by the results  <b>do not accept</b> 'it is more accurate <b>or</b> precise'
		<b>Total</b>	<b>6</b>			

Tier 3–6 5–7	Q No 12 4	Part	Mark	Answer	Accept	Additional guidance
		<b>a i</b> 3/1d	1	any <b>one</b> from * iron * copper	accept 'calcium'	
		<b>a ii</b> 3/1d	1	any <b>one</b> from * sulphur * chlorine	accept 'oxygen' <b>or</b> 'carbon'	answers may be in either order <b>both</b> answers are required for the mark
		<b>a iii</b> 3/1e	1	any <b>two</b> from * calcium carbonate * calcium oxide * carbon dioxide * iron sulphide	accept 'copper chloride'	
		<b>b</b> 3/1e	1	any <b>one</b> from * the iron reacted <b>or</b> combined with sulphur * the sulphur had mass	accept 'the iron gained sulphur' <b>or</b> 'sulphur was added to the iron' accept 'the iron has joined with the sulphur' accept 'the sulphur weighed 0.8 g'	<i>do not</i> accept 'iron has mixed with the sulphur' <i>do not</i> accept 'sulphur <b>or</b> iron added a new layer'
		<b>c</b> 3/1f	1	* copper chloride		
		<b>Total</b>	<b>5</b>			

Tier 3–6 5–7	Q No 13 5	Part	Mark	Answer	Accept	Additional guidance
a	3/1g	2		<p>* oxygen</p> 		
b	3/2c	1		* water vapour	accept 'vapour'	'water' or 'moisture' are insufficient
		1		* condenses	accept 'turns into water or a liquid' accept 'forms condensation'	
c i	2/2k	1		* respiration		
c ii	2/2j	1		* Air breathed out has more carbon dioxide and less oxygen than air breathed in. ✓		if more than one box is ticked, award no mark
<b>Total</b>		<b>6</b>				

Tier 3–6 5–7	Q No 14 6	Part	Mark	Answer	Accept	Additional guidance
		<b>a i</b> 2/3c	1	* magnesium		
		<b>a ii</b> 2/3c	1	any <b>one</b> from * a potted plant has a limited amount of soil <b>or</b> minerals * less chance of minerals being returned to the soil by dying <b>or</b> decaying plants <b>or</b> by microbes <b>or</b> fungi <b>or</b> bacteria <b>or</b> 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 <b>or</b> may not be replenished 'the garden has more minerals' is insufficient 'lack of sunlight' is insufficient
		<b>b i</b> 3/1c	3	*		
					accept 'Epsom Salts' <b>or</b> 'MgSO <sub>4</sub> ' <b>or</b> 'magnesium sulphate'  accept 'A and C' <b>or</b> 'Easy Grow' <b>or</b> 'NH <sub>4</sub> NO <sub>3</sub> ' <b>or</b> 'ammonium nitrate' <b>or</b> 'Saltpetre' <b>or</b> 'KNO <sub>3</sub> ' <b>or</b> 'potassium nitrate'  accept 'Superphosphate' <b>or</b> 'Ca(H <sub>2</sub> PO <sub>4</sub> ) <sub>2</sub> '  accept 'Saltpetre' <b>or</b> 'KNO <sub>3</sub> ' <b>or</b> 'potassium nitrate'	if all four answers are correct, award three marks if three answers are correct, award two marks if one <b>or</b> two answers are correct, award one mark
		<b>b ii</b> 3/1f	1	* 3		
		<b>b iii</b> 3/1f	1	* 9		
		<b>Total</b>	<b>7</b>			

mineral	letter of fertiliser
<i>magnesium</i>	B
<i>nitrogen</i>	A or C
<i>phosphorus</i>	D
<i>potassium</i>	C

Tier 3–6 5–7	Q No 15 7	Part	Mark	Answer	Accept	Additional guidance
		<b>a</b> 2/5e	1	any <b>one</b> from * it only eats other animals * it only eats meat <b>or</b> fish <b>or</b> flesh	accept 'predator' accept 'eats meat'	
		<b>b i</b> 2/5c	1	any <b>one</b> 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 <b>or</b> viruses <b>or</b> germs getting in' accept 'it allows air <b>or</b> oxygen in <b>or</b> carbon dioxide out'	<b>do not accept</b> 'it keeps it warm'
		<b>b ii</b> 3/3g	1	* it reacts with the carbonate	accept 'they react' <b>or</b> 'it reacts with it' accept 'acid reacts with the shell' accept 'it dissolves the shell' accept 'it erodes it' <b>or</b> 'wears it away'	
		<b>b iii</b> 2/5c	1	any <b>one</b> from * makes it easier <b>or</b> quicker <b>or</b> easy to hatch <b>or</b> break out of the egg * makes the shell more porous	accept 'air <b>or</b> oxygen gets in easily' <b>or</b> 'more air gets in' accept 'carbon dioxide gets out more easily'	'easy <b>or</b> easier to break' is insufficient  'to allow for growth' is insufficient



Tier 3–6 5–7	Q No 15 7	Part	Mark	Answer	Accept	Additional guidance
		<b>c i</b> 1/2k	1	any <b>one</b> from * keep the eggs between 26°C and 30°C * keep the temperature at <b>or</b> below 30°C * keep the eggs at 26°C	accept any temperature from 26°C to 30°C accept 'use the three lower temperatures' <b>or</b> 'the lower temperatures in the table'	'make it cooler' <b>or</b> 'use lower temperatures' are insufficient
		<b>c ii</b> 1/2j	1	* between 32°C and 34°C ✓		if more than one box is ticked, award no mark
		<b>Total</b>	<b>6</b>			

Tier 3–6 5–7	Q No 16 8	Part	Mark	Answer	Accept	Additional guidance
<b>a</b>	1	1/2a	1	any <b>one</b> from * the distance the ruler dropped * where the hand grabbed the ruler	accept 'how far until they caught it' accept 'length or measurement on the ruler' accept 'where she caught it' accept 'mm' or 'cm'	'ruler' is insufficient 'length of ruler' is insufficient
<b>b</b>	1	1/2e	1	any <b>one</b> from * to avoid the effect of his own reaction time * the time is too short to measure with a stopwatch	accept 'he might stop the watch before or after she reacted' accept 'you cannot stop a stopwatch straightaway' accept 'it might be too fast for the stopwatch'	'the time keeper would not have been as accurate' is insufficient 'you can time incorrectly' is insufficient 'the ruler is more precise' is insufficient
<b>c</b>	1	1/2d	1	* pupils	accept 'pupil' or 'friend' or 'person' or 'human'	
<b>d</b>	2	1/2d	2	any <b>two</b> from * the position of the ruler above the hand * the way the ruler is released * the ruler * distance between finger and thumb * the conditions in the room * measure to same finger of catcher	accept 'height of ruler' accept 'the height it is dropped from' accept 'handedness' accept 'the same person dropping it' accept 'position of hand' or 'position of ruler' accept examples of possible distractions	'where he put his hand on the ruler' is insufficient
<b>e</b>	1	1/2h	1	* repeat the investigation or it	accept 'do more than one test with each person'	<i>do not accept</i> 'use more people'
<b>Total</b>	<b>6</b>					

Tier 5–7	Q No	Mark	Answer	Accept	Additional guidance
	9				
<b>a i</b> 4/5e	1		* kinetic	accept 'movement' <b>or</b> 'motion'	
<b>a ii</b> 4/5e	1		* sound	accept 'kinetic' <b>or</b> 'movement' <b>or</b> 'motion'	
<b>b</b> 4/5e	1		any <b>one</b> from * loud sounds dissipate more energy than quieter sounds * energy is transferred more quickly * more potential <b>or</b> kinetic energy is converted to sound	accept 'energy is used <b>or</b> needed more quickly' accept 'it is using more power' <b>or</b> 'more energy is transferred per second' accept 'more energy is converted to sound' accept 'it is using <b>or</b> transferring more energy' accept 'it produces more electrical energy'	answers must refer to 'energy' <b>or</b> 'power'  <b>do not accept</b> 'it uses more electricity'
<b>c</b> 4/5c 4/5e	1		any <b>one</b> from * solar energy <b>or</b> light energy is used * less energy is provided by <b>or</b> taken from the spring * energy is provided by the solar cell	accept 'the radio is run by sunlight <b>or</b> 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'	
<b>d</b> 4/5c BS/1c	1		any <b>one</b> from * batteries <b>or</b> mains electricity are not available * batteries <b>or</b> mains are not needed * people cannot afford batteries <b>or</b> mains electricity	accept 'the energy resource is free' accept 'they are cheap to run'	'they are cheap' is insufficient
<b>Total</b>	<b>5</b>				

Tier 5–7	Q No 10	Part	Mark	Answer	Accept	Additional guidance
a i	4/2g		1	* 100	accept '200 ÷ 2.0'	
			1	* N/cm <sup>2</sup>	accept '10 <sup>6</sup> N/m <sup>2</sup> ' <b>or</b> '10 <sup>6</sup> Pa' for two marks	
a ii	4/2g		1	* 800	accept '100 × 8' accept the numerical answer to <b>a i</b> × 8	the unit is not required for the mark
			1	any <b>one</b> from * air <b>or</b> gas can be compressed * water <b>or</b> liquids cannot be compressed * gaps between particles of air <b>or</b> gas can be reduced	accept 'gases are easier to compress' accept 'atoms can be compressed together'	'air <b>or</b> gas provides less resistance' is insufficient
b ii	4/2g		1	any <b>one</b> 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 <b>or</b> no resistance to the brakes' accept 'the air bubbles could be compressed'	'the brakes are spongy' is insufficient
		<b>Total</b>	<b>5</b>			

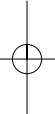
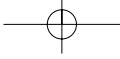
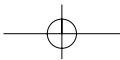
Tier 5–7	Q No 11	Part	Mark	Answer	Accept	Additional guidance
		<b>a</b> 3/2f	1	any <b>one</b> from * it cools more slowly  * large volume of magma * magma is insulated by rock * heat is transferred more slowly to rock than to air * lava cools more quickly	accept 'it cools slowly' <b>or</b> 'it is cooler above ground' accept 'there is a lot of it' accept 'magma is surrounded by rock' accept 'it is hotter underground'	
		<b>b i</b> 3/2e	1	* crystals formed underground will be larger	accept the converse accept 'they will be larger'	
		<b>b ii</b> 3/2e	1	any <b>one</b> 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'
		<b>c i</b> 3/2f	1	any <b>one</b> from * high temperatures * high pressure	accept 'heat' <b>or</b> 'hot' accept 'pressure'	
		<b>c ii</b> 3/2f	1	* marble		
		<b>Total</b>	<b>5</b>			

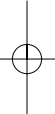
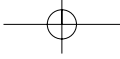
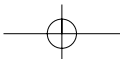
Tier 5–7	Q No 12	Part	Mark	Answer	Accept	Additional guidance
		<b>a i</b> 1/2e	1	any <b>one</b> from * the effect of adding no extra insulation to the windows and roof * it provides a baseline measure * the temperature without any effort to reduce the heat loss	accept 'effect of not adding insulation'  accept 'as a comparison <b>or</b> control' accept 'how much energy is normally lost' accept 'how much heat single glazing keeps in' accept 'what would happen if we did nothing'	
		<b>a ii</b> 1/2a	1	* double glazing <i>and</i> roof without insulation <b>and</b> a roof with insulation <i>and</i> single glazing		answers may be in either order <b>both</b> answers are required for the mark
		<b>b</b> 1/1b	1	any <b>one</b> from * a longer time (roof insulation) to fall between two temperatures * smaller temperature fall (roof insulation) in a given time	accept 'slower heat loss for insulation' accept 'faster heat loss for double glazing' accept 'more heat loss for double glazing' accept 'roof insulation stays warmer than double glazing' accept 'if it is quicker for the house to reach a given temperature'	
		<b>c</b> 1/2j	1 1	* both lines <b>or</b> curves starting from the same temperature, descending and approaching (not crossing) the room temperature line * the solid line <b>or</b> curve descending more steeply than the other		allow a difference of 5 small squares at the start accept correctly labelled curves which do not use solid and dotted lines as required by the question
		<b>Total</b>	<b>5</b>			

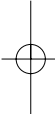
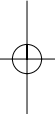
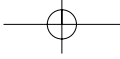
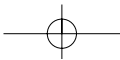
Tier 5–7	Q No 13	Part	Mark	Answer	Accept	Additional guidance
a	2/1c	1	any <b>one</b> from * it is streamlined * it has a pointed head * it does not have much cytoplasm		accept 'there are enzymes in the head'	<i>do not accept</i> 'it is streamline' 'its shape' is insufficient  'it has a nucleus' is insufficient as it is not a specific adaptation of a sperm cell
b i	2/1b	1	any <b>one</b> from * in the cytoplasm of the bacterium * in a nucleus <b>or</b> within a membrane in the cell from the intestine		accept 'the bacterium does not have a nucleus <b>or</b> nuclear membrane' accept 'in the bacterium it is not enclosed'	
b ii	2/1b 2/4a	1	any <b>one</b> from * it determines the characteristics of the cell * it transfers information		accept 'gives the cell instructions' accept 'it tells the cell what to do' accept 'to control the cell' accept 'allows the cell to reproduce'	
c	2/1c	1	any <b>one</b> from * it has a large surface area * the folds increase the surface			
d	2/1a	1	* they are independent cells <b>or</b> they do not work together <b>or</b> do not work in a group		accept 'each sperm cell is individual <b>or</b> works individually'	'the cells are not joined together' is insufficient
<b>Total</b>		<b>5</b>				

Tier 5–7	Q No 14	Part	Mark	Answer	Accept	Additional guidance
<b>a</b>	2/3a 2/5b	3	any <b>three</b> from * plants <b>or</b> algae need light for photosynthesis * photosynthesis <b>or</b> algae <b>or</b> plants supply <b>or</b> produce oxygen * plants <b>or</b> animals need oxygen * photosynthesis supplies glucose <b>or</b> carbohydrate <b>or</b> biomass * carbon dioxide is produced by plants <b>or</b> 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' <b>or</b> 'animals eat plants' <b>or</b> 'snails eat plants'		
<b>b</b>	2/5b	1	any <b>one</b> from * materials can be recycled * makes nutrients available * makes minerals available			
<b>c</b>	2/2j	1	any <b>one</b> 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	
<b>Total</b>		<b>5</b>				









EARLY YEARS

NATIONAL  
CURRICULUM  
5–16

GCSE

GNVQ

GCE A LEVEL

NVQ

OTHER  
VOCATIONAL  
QUALIFICATIONS

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