

Sc

KEY STAGE

2

LEVELS

3–5

2004

Science tests

Mark schemes

Tests A and B, levels 3–5



department for

education and skills

creating opportunity, releasing potential, achieving excellence

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Marking the science tests

As in 2003, external markers, employed by the external marking agencies under contract to QCA, will mark the test papers. The markers will follow the mark schemes in this booklet, which is supplied to teachers for information.

This booklet contains the mark schemes for the levels 3–5 tests A and B. Level threshold tables will be posted on the QCA website (www.qca.org.uk/) on **Monday 21 June**.

General guidance

The structure of the mark schemes

The marking information for each question is set out in the form of tables. The ‘**question**’ column on the left-hand side of each table provides a quick reference to the question number and question part. The ‘**requirements**’ column may include four types of information:

- a general statement describing what is required for the award of the mark;
- examples of specific creditworthy responses showing correct science;
- examples of ‘allowable’ creditworthy responses, showing correct science which may not be as clearly expressed;
- examples of creditworthy responses beyond the key stage 2 programme of study.

The ‘**mark**’ column gives the number of marks available for each question part.

The ‘**additional guidance**’ column may include different types of information:

- specific responses which are not creditworthy either because information from the question has been rephrased, or because the responses imply incorrect scientific knowledge;
- answers which are insufficient in themselves to gain credit, but are not incorrect science, and would therefore not lose credit if used with a correct response.

Where **two** marks are available for a question which describes the **relationship between two continuous variables**, the following will apply:

- *two* marks will be awarded for a creditworthy general comparison of the variables in question, eg the *bigger* the grains, the *longer* the sugar takes to dissolve;
- *one* mark will be awarded for a pair of creditworthy specific comparisons, eg big grains dissolve *slowly* and small grains dissolve *fast*;
- *one* mark will be awarded for a single creditworthy comparison, eg the *biggest* grains dissolve *most slowly*.

Applying the mark schemes

The mark schemes give scientifically correct answers to each question as well as providing guidance on, and examples of, other answers which are allowable. In cases of alternative wording or where an answer is drawn rather than written, external markers will exercise their professional judgement.

In order to ensure consistency of marking, the most frequent queries are listed below, with the action the marker will take.

What if...?	Marking procedure
The child gives two or more responses to a particular question part.	a) If a child qualifies a scientifically correct answer with a scientifically incorrect statement, no mark will be awarded for that question part. b) If a child qualifies a scientifically correct answer with an incorrect statement which is not relevant to the context of the question, the latter response is regarded as 'neutral' and the mark will be awarded.
The child has not used ticks to indicate the correct response in a multiple-choice question.	Any unambiguous positive indication of the correct answer will be accepted. Ticks take precedence over any other form of response. Therefore, when ticks and any other sort of response are given together, the boxes with ticks will be assumed to be the child's response. If the correct boxes are left blank, no marks will be awarded.
The child ticks more than the required number of boxes.	One mark will be deducted for each incorrect answer. Negative marks will not be awarded.
In a planning question, no answer is given in the expected place but the correct answer is given in the drafting box.	Where a child has shown understanding of the question, the mark(s) will be given.
The child misspells a word.	a) If it is clear that the child has made a simple error, eg 'tow' for 'two' or 'son' for 'sun', then the incorrect spelling will be accepted and the mark awarded. b) If a child 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. c) If specific scientific vocabulary is required in the answer, a creditworthy misspelling must be a phonetic equivalent of the required word, with the major phonemes of the correct word represented in the answer.

Recording marks awarded

In the grey margin, alongside each question part, there is a mark box for each question part. Depending on the type of response made to each part of each question by the child, the external marker will put one of the following into each box:

- '1' for an acceptable/allowable response;
- '0' for an incorrect response;
- '-' if no response is made.

The number of marks gained on each double page will be written in the box at the bottom of the right-hand page. The total number of marks gained on each paper will be recorded on the front of the test paper, and on the marksheet.

Each paper has the following number of marks available:

- Test A has 40;
- Test B has 40.

The 2004 key stage 2 science tests and mark schemes were developed by the National Foundation for Educational Research (NFER) and the Centre for Research into Primary Science and Technology (CRIPSAT) on behalf of QCA.

Test A question 1: Food and health

Question	Requirements	Mark	Additional guidance
<p>1a</p> <p>2/2b</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ <input type="checkbox"/> eating foods from different food groups <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	1m	
<p>1b</p> <p>2/2b,h</p>	<p>Award ONE mark for all three responses correct [in the given order]:</p> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; margin: 10px 0;"> <p><i>A balanced diet will help my bones grow strong.</i></p> <p style="text-align: center;">true</p> </div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; margin: 10px 0;"> <p><i>A balanced diet gives me all the nutrients I need.</i></p> <p style="text-align: center;">true</p> </div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; margin: 10px 0;"> <p><i>A balanced diet means I do not need to exercise to stay healthy.</i></p> <p style="text-align: center;">false</p> </div>	1m	

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test A question 2: Guitar

Question	Requirements	Mark	Additional guidance
<p>2a</p> <p>4/3e</p>	<p>Award ONE mark for indicating that the string vibrates to make a sound:</p> <ul style="list-style-type: none"> ■ it vibrates; ■ it is vibrating. <p>Allow: a description of vibration:</p> <ul style="list-style-type: none"> ■ it moves up and down quickly. 	<p>1m</p>	<p>Do not give credit for an insufficient response describing the guitar vibrating:</p> <ul style="list-style-type: none"> ■ the guitar vibrates. <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ it moves/twangs/wobbles.
<p>2b</p> <p>4/3f</p>	<p>Award ONE mark for a response that indicates the loudness of the sound gets quieter:</p> <ul style="list-style-type: none"> ■ it gets quieter; ■ the volume decreases; ■ the louder the sound, the closer she is; ■ it/the sound gets softer. <p>Allow:</p> <ul style="list-style-type: none"> ■ (when Julia is far away) the sound is quiet; ■ the sound is harder to hear. 	<p>1m</p>	<p>Do not give credit for an insufficient response that describes the pitch getting lower:</p> <ul style="list-style-type: none"> ■ the sound/it gets lower.
<p>2c</p> <p>4/3g</p>	<p>Award ONE mark for naming one of the following:</p> <ul style="list-style-type: none"> ■ wall/stone/brick/concrete; ■ glass/window; ■ door/wood. <p>Allow:</p> <ul style="list-style-type: none"> ■ eardrum; ■ floor. 	<p>1m</p>	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ air [given]; ■ solid/gas.

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test A question 3: Hardness of rocks

Question	Requirements	Mark	Additional guidance
3a 1/2j	Award ONE mark for: <ul style="list-style-type: none"> ■ talc. 	1m	
3b 1/2i 3/1d	Award ONE mark for a response indicating that granite was the only rock not to be scratched by the objects: <ul style="list-style-type: none"> ■ none of the objects were able to scratch granite, but some could scratch the other rocks; ■ all the other rocks were scratched by at least one object; ■ fewer objects/tools could scratch granite than the others. Allow: an absolute response that does not describe whether the other rocks were scratched: <ul style="list-style-type: none"> ■ no object could scratch granite; ■ it could not be scratched. 	1m	Do not give credit for an insufficient response that does not interpret the table: <ul style="list-style-type: none"> ■ it only has crosses, where the other rocks have at least one tick.
3c 3/1a 1/2i	Award ONE mark for all the rocks written in the correct place: <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px 5px;">talc</div> <div style="border: 1px solid black; padding: 2px 5px;">sandstone</div> <div style="border: 1px solid black; padding: 2px 5px;">marble</div> <div style="border: 1px solid black; padding: 2px 5px;">granite</div> </div>	1m	
3d 1/2d	Award ONE mark for: <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <input type="checkbox"/> <input type="checkbox"/> </div> <ul style="list-style-type: none"> ■ <input type="checkbox"/> It was difficult to scratch each rock with the same force. <input checked="" type="checkbox"/> 	1m	
3e 3/1d 1/2j	Award ONE mark for identifying that granite feels rough and is not permeable: <ul style="list-style-type: none"> ■ granite is rough/not smooth; and ■ granite is not permeable/water cannot pass through granite. 	1m	Do not give credit for a response that includes incorrect science: <ul style="list-style-type: none"> ■ water can pass through granite. Do not give credit for an insufficient response describing the results of the scratch test: <ul style="list-style-type: none"> ■ granite is hard to scratch.

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test A question 4: Sorting animals

Question	Requirements	Mark	Additional guidance									
4a 2/4b	<p>Award ONE mark for both correct boxes ticked:</p> <ul style="list-style-type: none"> ■ <input type="checkbox"/> They both have fur or hair. <input checked="" type="checkbox"/> ■ <input type="checkbox"/> They both have four legs. <input checked="" type="checkbox"/> 	1m										
4b 2/4b 1/2h	<p>Award TWO marks for placing all four animals in the table correctly:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Has feathers</th> <th>Does not have feathers</th> </tr> </thead> <tbody> <tr> <th>Can fly</th> <td>Sparrowhawk</td> <td>Butterfly</td> </tr> <tr> <th>Cannot fly</th> <td>Ostrich [given]</td> <td>Cow Camel (in any order)</td> </tr> </tbody> </table> <p>If you are unable to award two marks, award ONE mark for a response that correctly places two or three animals.</p>		Has feathers	Does not have feathers	Can fly	Sparrowhawk	Butterfly	Cannot fly	Ostrich [given]	Cow Camel (in any order)	<p>2m</p> <p>or</p> <p>1m</p>	<p>Do not give credit for an insufficient response naming other animals clearly not given in the question.</p> <p>Do not give credit for an insufficient response where 'bird' is given in place of 'sparrowhawk'.</p>
	Has feathers	Does not have feathers										
Can fly	Sparrowhawk	Butterfly										
Cannot fly	Ostrich [given]	Cow Camel (in any order)										
4c 2/4a	<p>Award ONE mark for all three questions correctly classified:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Question</th> <th>The question goes in box...</th> </tr> </thead> <tbody> <tr> <td>Does it have a long neck?</td> <td>1 (2) 3</td> </tr> <tr> <td>Does it have horns?</td> <td>1 2 (3)</td> </tr> <tr> <td>Does it have antennae?</td> <td>(1) 2 3</td> </tr> </tbody> </table>	Question	The question goes in box...	Does it have a long neck?	1 (2) 3	Does it have horns?	1 2 (3)	Does it have antennae?	(1) 2 3	1m		
Question	The question goes in box...											
Does it have a long neck?	1 (2) 3											
Does it have horns?	1 2 (3)											
Does it have antennae?	(1) 2 3											
4d 2/4c	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ to compare the many types of animal <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	1m										

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test A question 5: Threads

Question	Requirements	Mark	Additional guidance
<p>5a</p> <p>1/2e</p>	<p>Award ONE mark for an awareness of specific danger:</p> <ul style="list-style-type: none"> ■ they could fall over (and hurt themselves); ■ the forcemeter might spring back and hurt them; ■ the thread could hit them in the eye; ■ the forcemeter might break and hurt someone. <p>Allow:</p> <ul style="list-style-type: none"> ■ they should be careful not to fall over. 	<p>1m</p>	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ <i>the thread might break;</i> ■ <i>they could hurt themselves.</i>
<p>5b</p> <p>1/2m</p>	<p>Award ONE mark for recognition of the difficulty of taking accurate readings from the forcemeter at the point when the thread breaks:</p> <ul style="list-style-type: none"> ■ the forcemeter reading when the thread breaks will be difficult to read; ■ when the thread breaks the forcemeter will spring back; ■ the reading will go back to zero; ■ you need to be quick to read the meter; ■ you need an extra person to read it. <p>Allow:</p> <ul style="list-style-type: none"> ■ the measurement might go off the forcemeter; ■ unless you know when the string breaks it will be difficult. 	<p>1m</p>	
<p>5c</p> <p>1/2m</p>	<p>Award ONE mark for recognising that the range on the 10 N forcemeter was too small:</p> <ul style="list-style-type: none"> ■ 10 was the biggest number on the forcemeter; ■ it took at least 10 N to break the threads but it could have been more/off the scale; ■ you would not expect all the results to be the same. <p>Allow:</p> <ul style="list-style-type: none"> ■ the threads were different; ■ they expected some difference in results. 	<p>1m</p>	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ <i>the results are the same;</i> ■ <i>all the threads turn out to be 10 N.</i>

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test A question 5: Threads (continued)

Question	Requirements	Mark	Additional guidance																								
5d 1/2d	<p>Award TWO marks for all four statements correctly classified:</p> <table border="1"> <thead> <tr> <th>Statements</th> <th>must be the same.</th> <th>must be different.</th> <th>make no difference.</th> </tr> </thead> <tbody> <tr> <td>The kinds of threads they use...</td> <td></td> <td>✓ [given]</td> <td></td> </tr> <tr> <td>The colours of the threads...</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>The persons doing the pulling...</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>If the strengths of the threads are the same, the forces required to break each one...</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>If the strengths of the threads are different, the forces required to break each one...</td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table> <p>If you are unable to award two marks, award ONE mark for any three correct responses.</p>	Statements	must be the same.	must be different.	make no difference.	The kinds of threads they use...		✓ [given]		The colours of the threads...			✓	The persons doing the pulling...			✓	If the strengths of the threads are the same, the forces required to break each one...	✓			If the strengths of the threads are different, the forces required to break each one...		✓		<p>2m</p> <p>or</p> <p>1m</p>	
Statements	must be the same.	must be different.	make no difference.																								
The kinds of threads they use...		✓ [given]																									
The colours of the threads...			✓																								
The persons doing the pulling...			✓																								
If the strengths of the threads are the same, the forces required to break each one...	✓																										
If the strengths of the threads are different, the forces required to break each one...		✓																									

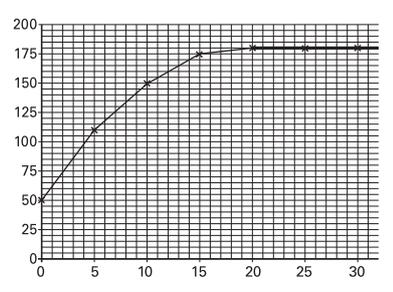
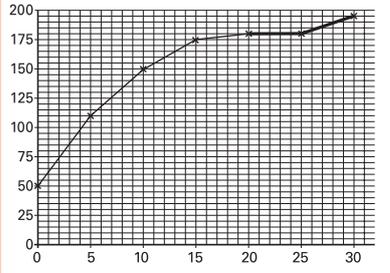
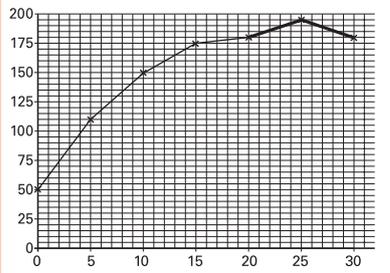
When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test A question 6: Toffee

Question	Requirements	Mark	Additional guidance
<p>6a</p> <p>3/2a 3/3b</p>	<p>Award ONE mark for a response that indicates sugar dissolves:</p> <ul style="list-style-type: none"> ■ the sugar dissolves; ■ it forms a solution. 	1m	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ it mixes with water.
<p>6b</p> <p>3/2b</p>	<p>Award ONE mark for a response describing the evaporation of the water:</p> <ul style="list-style-type: none"> ■ the water evaporates; ■ it changes into water vapour. <p>Allow:</p> <ul style="list-style-type: none"> ■ it boils. 	1m	<p>Do not give credit for a response that includes incorrect science implying the sugar evaporates with the water:</p> <ul style="list-style-type: none"> ■ the mixture will evaporate/change to water vapour. <p>Do not give credit for an insufficient response describing what happens to the whole mixture not just the water:</p> <ul style="list-style-type: none"> ■ it bubbles; ■ it goes golden brown.
<p>6c</p> <p>3/2c</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ <input type="checkbox"/> temperature <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	1m	
<p>6d</p> <p>3/1b</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ Wood is a poor conductor of heat. <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	1m	
<p>6e</p> <p>3/2b</p>	<p>Award ONE mark for a response stating that the mixture has cooled:</p> <ul style="list-style-type: none"> ■ the tray cooled the mixture down; ■ the temperature of the mixture has dropped; ■ it cooled down. <p>Allow:</p> <ul style="list-style-type: none"> ■ it has frozen. 	1m	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ it goes hard because water evaporates; ■ it dries up [enough water does not evaporate when it is poured into the tray]; ■ the mixture solidifies/goes hard/sets. <p>Do not give credit for an insufficient response referring to a procedure:</p> <ul style="list-style-type: none"> ■ they put it in a tray; ■ the tray has been in a freezer (given).

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test A question 7: Growing up (continued)

Question	Requirements	Mark	Additional guidance
<p>7e</p> <p>1/2i 2/2f</p>	<p>Award ONE mark for a graph line which levels off to become horizontal (points do not need to be marked on the graph at 25 and 30 years):</p> <p>■ </p> <p>Allow: a response which does not decrease below 175 cm.</p>	<p>1m</p>	<p>Do not give credit for an insufficient response where the graph line intentionally increases or decreases after becoming horizontal or forms a peak without becoming horizontal:</p> <p>■ </p> <p>■ </p>

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test A question 8: Drinks and teeth

Question	Requirements	Mark	Additional guidance
<p>8a</p> <p>1/2d</p>	<p>Award ONE mark for any factor in an experiment or survey that is a relevant independent variable (IV) in an investigation about drinks and teeth, eg:</p> <ul style="list-style-type: none"> ■ type of drink; ■ amount of drink; ■ frequency of drinking; ■ amount of sugar in drinks; ■ temperature of drinks. <p>Allow:</p> <ul style="list-style-type: none"> ■ drink(s); ■ the liquid. 	<p>1m</p>	<p><i>The draft box can be consulted for clarification of any ambiguity in the marked response, or when no answer is given in the expected place but the correct answer is given in the drafting box.</i></p>
<p>8b i</p> <p>1/2d</p>	<p>Award ONE mark for any acceptable dependent variable (DV) identified, eg:</p> <ul style="list-style-type: none"> ■ discoloration; ■ dissolving of marble chips; ■ mass of marble chips. <p>Allow:</p> <ul style="list-style-type: none"> ■ marble chips; ■ how much teeth rot. 	<p>1m</p>	<p><i>A dependent variable (DV) without an independent variable (IV) can gain credit.</i></p> <p><i>If there is an IV the DV must agree with it.</i></p>
<p>8b ii</p> <p>1/2f</p>	<p>Award ONE mark for a response which indicates a way of measuring the DV given or implied in 8bi, eg:</p> <ul style="list-style-type: none"> ■ time taken to dissolve; ■ amount of marble chip dissolved; ■ amount of damage to marble chips. <p>Allow:</p> <ul style="list-style-type: none"> ■ use a stop watch; ■ use a newton meter/balance; ■ count how many of each colour; ■ order according to colour change; ■ use a machine/chart to measure colour. <p>Allow:</p> <p>specification of units, eg:</p> <ul style="list-style-type: none"> ■ seconds; ■ grams; ■ cc. 	<p>1m</p>	<p>Do not give credit for a measurement strategy if a DV is not given.</p> <p><i>A response in 8bi which describes measurement of the DV can gain credit.</i></p>
<p>8c</p> <p>1/2d</p>	<p>Award ONE mark for any acceptable control that is not already used as an IV, eg:</p> <ul style="list-style-type: none"> ■ amount of drink; ■ quantity of marble chips; ■ the time marble chips left in drink; ■ put the drinks in the same place; ■ kind of teeth/marble. <p>Allow:</p> <ul style="list-style-type: none"> ■ how healthy teeth are; ■ type of drink. 	<p>1m</p>	<p><i>Only give credit for a control variable which is relevant to the stated IVIDV</i></p> <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ marble chips.

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test A question 9: Tractor

Question	Requirements	Mark	Additional guidance
<p>9a</p> <p>4/2a</p>	<p>Award ONE mark for an indication that there are forces of attraction between the magnets OR that the magnets have opposite poles facing each other:</p> <ul style="list-style-type: none"> ■ they are attracted (to each other); ■ because opposite poles attract; ■ the tractor magnet pulls on the trailer magnet; ■ because the North pole of the trailer's magnet is facing the South pole of the tractor's magnet. <p>Allow:</p> <ul style="list-style-type: none"> ■ the magnets stick/stay together; ■ they are opposite poles. <p>Allow:</p> <p>a response implicitly indicating that the magnet attracts the toy:</p> <ul style="list-style-type: none"> ■ the magnet attracts the trailer/ tractor. 	<p>1m</p>	<p>Do not give credit for an insufficient response where it is unclear as to whether Rachel's pulling force or the magnetic force is being discussed:</p> <ul style="list-style-type: none"> ■ because the force is pulling it. <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ the magnets touch; ■ opposite sides on the magnets are together.
<p>9b</p> <p>4/2a</p>	<p>Award ONE mark for an understanding that the magnets repel each other OR that the magnets have like poles facing each other:</p> <ul style="list-style-type: none"> ■ because the magnets are now repelling each other; ■ because two like poles push each other away; ■ she has put like poles together. <p>Allow:</p> <ul style="list-style-type: none"> ■ they are like poles; ■ like poles do not attract; ■ the tractor and trailer repel each other. <p>Allow:</p> <p>a response implicitly indicating that the magnet repels the toy:</p> <ul style="list-style-type: none"> ■ the magnet repels the tractor; ■ the magnet is pushing it away. 	<p>1m</p>	
<p>9c i</p> <p>4/2c</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ friction. <p>Allow:</p> <ul style="list-style-type: none"> ■ air resistance. 	<p>1m</p>	
<p>9c ii</p> <p>4/2b</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ weight; ■ gravitational attraction. <p>Allow:</p> <ul style="list-style-type: none"> ■ gravity. 	<p>1m</p>	

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test A question 9: *Tractor (continued)*

Question	Requirements	Mark	Additional guidance
9d 1/2i 4/2c	Award ONE mark for: ■ <input type="checkbox"/> floorboards <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1m	

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 1: Flames

Question	Requirements	Mark	Additional guidance									
1a 3/2g	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ <input type="checkbox"/> new materials made by burning <input checked="" type="checkbox"/> ■ <input type="checkbox"/> <input type="checkbox"/> 	1m										
1b 2b	<p>Award ONE mark for describing a safety precaution that is shown in the picture:</p> <ul style="list-style-type: none"> ■ she is using tongs; ■ the metal dish stops fire spreading; ■ the tray and sand (do not burn); ■ the short/small candle/nightlight is less likely to fall over; ■ she uses a safe flame; ■ there is sand around the candle. <p>Allow:</p> <ul style="list-style-type: none"> ■ use soil in the dish [in place of sand]; ■ sand/(metal) dish/tongs. 	1m	<p>Do not give credit for an insufficient response indicating an alternative method of keeping safe that is not shown in the picture:</p> <ul style="list-style-type: none"> ■ she wears goggles; ■ the teacher does the experiment. 									
1c 3/2g	<p>Award ONE mark for correctly completing the table:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Material</th> <th>Does it burn?</th> <th>Is the change reversible?</th> </tr> </thead> <tbody> <tr> <td>wood</td> <td>yes</td> <td>No</td> </tr> <tr> <td>bread</td> <td>yes</td> <td>No</td> </tr> </tbody> </table>	Material	Does it burn?	Is the change reversible?	wood	yes	No	bread	yes	No	1m	
Material	Does it burn?	Is the change reversible?										
wood	yes	No										
bread	yes	No										
1d 3/2g	<p>Award TWO marks for correctly identifying the only two materials that will burn:</p> <ul style="list-style-type: none"> ■ cardboard [given] <input checked="" type="checkbox"/> cotton wool <input checked="" type="checkbox"/> ■ <input type="checkbox"/> <input type="checkbox"/> ■ newspaper <input checked="" type="checkbox"/> <input type="checkbox"/> <p>If you are unable to award two marks, award ONE mark for correctly identifying one of the materials.</p>	<p>2m</p> <p>or</p> <p>1m</p>										

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 2: Puppet show

Question	Requirements	Mark	Additional guidance
<p>2a</p> <p>4/3c</p>	<p>Award ONE mark for an awareness that light reflects off a shiny surface:</p> <ul style="list-style-type: none"> the metal/crown reflects the light; light bounces on/off the metal/crown; it acts like a mirror. <p>Allow:</p> <ul style="list-style-type: none"> light reflects on/off the metal/crown; it reflects/is a reflection; the light is scattering off the metal crown. 	1m	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> because the metal/crown is shiny; because the light is shining on it [restatement of the stem]; the light reflects on to the crown [implies light is reflected from another surface on to the crown but not off it again].
<p>2b</p> <p>4/3a,c,d</p>	<p>Award TWO marks for two arrows showing the correct path [lines] and direction of light [arrowheads]. The arrows must point from the torch to the crown/puppet and from the crown/puppet to Emma's eyes/head:</p> <ul style="list-style-type: none">  <p>Allow:</p> <p>a response showing one continuous reflected arrow:</p> <ul style="list-style-type: none">  <p>If you are unable to award two marks, award ONE mark for a response showing two lines (or one continuous reflected line) indicating the correct path:</p> <p>OR</p> <p>a response showing two arrowheads pointing unambiguously in the correct directions:</p> <p>Correct lines</p> <ul style="list-style-type: none">   <p>Correct arrowheads</p> <ul style="list-style-type: none">  	<p>2m</p> <p><i>or</i></p> <p>1m</p>	<p>Do not give credit for an insufficient response showing only one correct arrow:</p> <ul style="list-style-type: none"> 

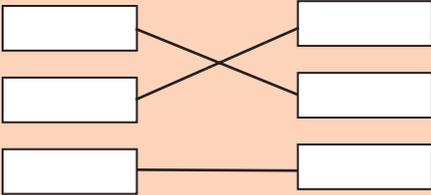
When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 2: Puppet show (continued)

Question	Requirements	Mark	Additional guidance
<p>2c 4/3b</p>	<p>Award ONE mark for an awareness that the puppet is made from materials that light cannot pass through. The response must make reference to blocked light or opacity:</p> <ul style="list-style-type: none"> ■ the (material of the) puppet is opaque; ■ the light cannot pass through the puppet; ■ the puppet stops/blocks the light; ■ the light cannot get to the wall behind because the puppet is in the way; ■ the light is blocked. 	<p>1m</p>	<p>Do not give credit for an insufficient response that does not explain shadow formation:</p> <ul style="list-style-type: none"> ■ light goes round the puppet; ■ light travels in straight lines; ■ light cannot get past the puppet [it passes on either side]; ■ the puppet is solid [a solid object can be transparent]; ■ the puppet is in the way of the light [does not necessarily mean it is blocking the light]; ■ light cannot get behind the puppet; ■ light cannot get to the wall [do not say why].
<p>2d 4/3b</p>	<p>Award ONE mark for:</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> </div> </div> <ul style="list-style-type: none"> ■  <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 5px;"> <div style="text-align: center;"> <input checked="" type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> </div> </div> 	<p>1m</p>	

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 3: Flowers

Question	Requirements	Mark	Additional guidance
<p>3a</p> <p>2/3c</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ stem. <p>Allow:</p> <ul style="list-style-type: none"> ■ stalk. 	1m	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ roots; ■ shoot.
<p>3b</p> <p>1/2c</p>	<p>Award ONE mark for predicting that the flowers would turn red:</p> <ul style="list-style-type: none"> ■ the (bunch of) flowers would turn red/pink; ■ it would turn red/pink. <p>Allow:</p> <ul style="list-style-type: none"> ■ the plant turns red; ■ the flowers change colour; ■ the red dye would travel up the stem(s) to the flower(s). 	1m	<p>Do not give credit for an insufficient response indicating that the flowers themselves have been dipped in dye:</p> <ul style="list-style-type: none"> ■ there would be drops of dye on the flowers. <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ half the flower(s) changed colour; ■ the flowers turned blue.
<p>3c</p> <p>2/1b</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ reproduction <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	1m	
<p>3d</p> <p>2/3d</p>	<p>Award ONE mark for matching all three flower parts to their correct function:</p> 	1m	

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

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Test B question 4: Nature walk

Question	Requirements	Mark	Additional guidance																
<p>4a</p> <p>2/5d</p>	<p>Award ONE mark for an indication that the arrows are pointing in the opposite direction:</p> <ul style="list-style-type: none"> ■ the arrows are the wrong way round; ■ the arrows should be pointing from left to right; ■ the order of the pictures is reversed; ■ this food chain shows that the bird eats the cat. <p>❖ Give credit for a correct response that goes beyond the key stage 2 programme of study:</p> <ul style="list-style-type: none"> ■ the energy flow in the food chain is reversed. 	<p>1m</p>	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ the arrows; ■ they got the arrows wrong [does not identify the mistake]; ■ it is the wrong way round [does not imply just the arrows]. 																
<p>4b</p> <p>2/5d</p>	<p>Award TWO marks for all three rows correctly ticked:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Animal</th> <th>Predator</th> <th>Prey</th> <th>Both</th> </tr> </thead> <tbody> <tr> <td>caterpillar</td> <td></td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>bird</td> <td></td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>cat</td> <td style="text-align: center;">✓</td> <td></td> <td></td> </tr> </tbody> </table> <p>Allow: a response for the bird where both predator and prey boxes (with or without the 'both' box) are ticked.</p> <p>If you are unable to award two marks, award ONE mark for any two rows correctly ticked.</p>	Animal	Predator	Prey	Both	caterpillar		✓		bird			✓	cat	✓			<p>2m</p> <p style="text-align: center;">or</p> <p>1m</p>	
Animal	Predator	Prey	Both																
caterpillar		✓																	
bird			✓																
cat	✓																		
<p>4c</p> <p>2/5e</p>	<p>Award ONE mark for:</p> <p style="text-align: center;"><input type="checkbox"/> <input type="checkbox"/></p> <p>■ <input type="checkbox"/> producer <input checked="" type="checkbox"/></p>	<p>1m</p>																	

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 4: Nature walk (continued)

Question	Requirements	Mark	Additional guidance
<p>4d i</p> <p>2/4a</p>	<p>Award ONE mark for a question about a feature or habitat in the table for which the answer is 'yes' for a spider and 'no' for a duck:</p> <ul style="list-style-type: none"> ■ was it in the grass? ■ does it have eight legs? ■ is it wingless? <p>Allow:</p> <p>a question based on a feature or behaviour not given in the table, for which the answer is 'yes' for a spider and 'no' for a duck:</p> <ul style="list-style-type: none"> ■ does it make a web? 	<p>1m</p>	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ where did they find it? [cannot be answered 'yes' or 'no']. <p>Do not give credit for an insufficient response giving a question about a relative term such as size:</p> <ul style="list-style-type: none"> ■ does it have long legs? ■ is it a little animal? <p>Do not give credit to a question for which the 'yes' answer is duck.</p>
<p>4d ii</p> <p>2/4a</p>	<p>Award ONE mark for all three animals entered correctly:</p> <pre> graph TD A[] --> B[] A --> C[] B --> D[mayfly] B --> E[female glow-worm] C --> F[spider [given]] C --> G[duck] </pre>	<p>1m</p>	<p>Do not give credit for a response that includes animals other than those given in this question, Nature walk.</p>

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 5: Dissolving sugar

Question	Requirements	Mark	Additional guidance
5a 1/2e	<p>Award ONE mark for indicating the mistake Luis has made, or conversely, indicating how he should take the temperature of the water:</p> <ul style="list-style-type: none"> ■ the thermometer is out of the water; ■ put the thermometer in the water; ■ leave the thermometer in the water while taking the reading. <p>Allow:</p> <ul style="list-style-type: none"> ■ he has taken it out; ■ he did not leave the thermometer in. 	1m	<p>Do not give credit for an insufficient response indicating he has removed the thermometer too soon:</p> <ul style="list-style-type: none"> ■ he has not left it long enough. <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ he should look carefully; ■ not enough water.
5b 1/2d	<p>Award ONE mark for recognition of the independent variable, eg:</p> <ul style="list-style-type: none"> ■ the temperature of (water). <p>Allow:</p> <ul style="list-style-type: none"> ■ heat of water; ■ the warmth of the water. 	1m	<p>Do not give credit for an insufficient response which does not clearly describe the independent variable:</p> <ul style="list-style-type: none"> ■ water. <p>Do not give credit for a response that includes incorrect science which redefines the independent variable:</p> <ul style="list-style-type: none"> ■ amount of water.
5c 1/2d	<p>Award ONE mark for an awareness of one of the factors to be controlled:</p> <ul style="list-style-type: none"> ■ volume of water; ■ amount/kind of water; ■ amount of sugar; ■ type/size of sugar grain; ■ how he stirs; ■ how sugar is added. <p>Allow:</p> <ul style="list-style-type: none"> ■ sugar; ■ containers. 	1m	<p>Do not give credit for an insufficient response which is ambiguous:</p> <ul style="list-style-type: none"> ■ keep the water the same. <p>Do not give credit for measurement strategies which would improve accuracy:</p> <ul style="list-style-type: none"> ■ keep the thermometer in water.
5d 1/2g	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ 40°C. 	1m	<p>Do not give credit for:</p> <ul style="list-style-type: none"> ■ 12°C.

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 5: Dissolving sugar (continued)

Question	Requirements	Mark	Additional guidance
<p>5e i, ii</p> <p>1/1b</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ Yes <input checked="" type="checkbox"/> <input type="checkbox"/> <p>and</p> <p>an indication of how the evidence of temperature and time support the prediction, eg:</p> <ul style="list-style-type: none"> ■ the time to dissolve gets less as the temperature increases; ■ at the hottest temperature the time is less; ■ when the temperature was 60°C the sugar dissolved more quickly; ■ at 30°C it takes more time to dissolve than at 60°C. <p>Allow:</p> <ul style="list-style-type: none"> ■ it is quickest at 60°C; ■ the three tests show that the sugar dissolves more quickly when the water is hotter. <p>Allow:</p> <p>if neither box is ticked, but the creditworthy explanation indicates that Jack's prediction is supported by the evidence, the mark may be awarded.</p>	<p>1m</p>	<p>Do not give credit if the 'no' box is ticked.</p> <p>Do not give credit for an insufficient response which restates the time variable:</p> <ul style="list-style-type: none"> ■ it dissolves more easily. <p>Do not give credit for an insufficient response which does not specify the time variable:</p> <ul style="list-style-type: none"> ■ the hotter the temperature, the smaller the numbers. <p>Do not give credit for an insufficient response which reads off one set of data without any comparison:</p> <ul style="list-style-type: none"> ■ because the temperature was 60°C and it took 10 minutes to dissolve; ■ it's quick at 60°C.

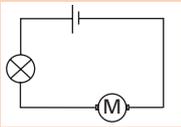
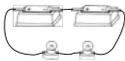
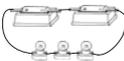
When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 6: Acid rain

Question	Requirements	Mark	Additional guidance								
<p>6a</p> <p>1/2l 3/2d,f</p>	<p>Award ONE mark for both correct:</p> <p>The change is non-reversible.True.....</p> <p>The bubbles evaporate.False.....</p>	1m									
<p>6b</p> <p>3/1e</p>	<p>Award ONE mark for all three materials correctly classified:</p> <table border="1"> <thead> <tr> <th>Material</th> <th>Solid, liquid or gas?</th> </tr> </thead> <tbody> <tr> <td>inside the bubble</td> <td>gas</td> </tr> <tr> <td>vinegar</td> <td>liquid</td> </tr> <tr> <td>chalk rock</td> <td>solid</td> </tr> </tbody> </table>	Material	Solid, liquid or gas?	inside the bubble	gas	vinegar	liquid	chalk rock	solid	1m	
Material	Solid, liquid or gas?										
inside the bubble	gas										
vinegar	liquid										
chalk rock	solid										
<p>6c</p> <p>1/2j</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ limestone; ■ pumice. <p>Allow:</p> <ul style="list-style-type: none"> ■ chalk. 	1m									

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 7: Circuits and sensors

Question	Requirements	Mark	Additional guidance
<p>7a i</p> <p>4/1b</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> <input type="checkbox"/> circuit 1 <input checked="" type="checkbox"/> circuit 2 <input type="checkbox"/> circuit 3 <input type="checkbox"/> circuit 4 	1m	
<p>7a ii</p> <p>4/1b</p>	<p>Award ONE mark for an indication that this circuit has the least components in it (to the power supply) or that it has the least number of components compared to the other circuits:</p> <ul style="list-style-type: none"> all the other circuits have more components/things; there are fewer components/things (compared to the number of cells). <p>Allow:</p> <ul style="list-style-type: none"> the battery/cell has to power only one component/bulb/thing; the bulb does not have to share the electricity from the battery; there is more electricity for each component; there is just/only one bulb in the circuit. 	1m	<p>Do not give credit for an ambiguous response:</p> <ul style="list-style-type: none"> there is one bulb in the circuit [circuit 3 also has one bulb].
<p>7b</p> <p>4/1c</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none">  <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	1m	
<p>7c</p> <p>4/1b</p>	<p>Award ONE mark for indicating that the bulbs will be brighter:</p> <p><i>The bulbs will...</i></p> <ul style="list-style-type: none"> get brighter. <p>Allow:</p> <p><i>The bulbs will...</i></p> <ul style="list-style-type: none"> get lighter; blow. <p>Allow:</p> <p>an absolute response:</p> <p><i>The bulbs will...</i></p> <ul style="list-style-type: none"> be bright. 	1m	<p>Do not give credit for an insufficient response:</p> <p><i>The bulbs will...</i></p> <ul style="list-style-type: none"> light (up).
<p>7d</p> <p>4/1b 1/2l</p>	<p>Award ONE mark for all three circuits correctly identified:</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>circuit C</p> </div> <div style="text-align: center;">  <p>circuit A</p> </div> <div style="text-align: center;">  <p>circuit B</p> </div> </div>	1m	

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 8: *Brine shrimps*

Question	Requirements	Mark	Additional guidance
8a 1/2f	Award ONE mark for: <ul style="list-style-type: none"> ■ 3. 	1m	
8b 1/2f	Award ONE mark for an indication that measurements of time in the light and dark were compared: <ul style="list-style-type: none"> ■ she planned to compare how long the shrimp was in the light and the dark; ■ time in light or dark. <p>Allow:</p> <ul style="list-style-type: none"> ■ the time they spent in each. 	1m	Do not give credit for a response which redefines the dependent variable: <ul style="list-style-type: none"> ■ <i>how many times the shrimp went into the light;</i> ■ <i>how many were in the light.</i>
8c 1/2b	Award ONE mark for an indication that Rebecca would subtract the number in the light from the total: <ul style="list-style-type: none"> ■ she would count how many were in the light and take these away from 10; ■ by taking the number of shrimps in the light from 10; ■ count the number you can see in the light and take it from the total. <p>Allow:</p> <ul style="list-style-type: none"> ■ compare the number in the light and the number out of sight in the dark; ■ step 4; ■ she counted how many were in the light and assumed the rest were in the dark. <p>Allow:</p> <p>a response which suggests awareness of the process:</p> <ul style="list-style-type: none"> ■ by taking the number in the light from 5. 	1m	Do not give credit for a response which uses incorrect reasoning: <ul style="list-style-type: none"> ■ <i>she took how many were in the light from how many in the dark.</i> <p>Do not give credit for an insufficient response which refers to light:</p> <ul style="list-style-type: none"> ■ <i>count how many were in the light.</i>

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 8: Brine shrimps (continued)

Question	Requirements	Mark	Additional guidance
8d 1/2c	<p>Award ONE mark for either of the following correct responses:</p> <p>EITHER</p> <ul style="list-style-type: none"> ■ Amy's <input checked="" type="checkbox"/> <input type="checkbox"/> <p>and</p> <p>a relevant criterion used to compare the two investigations clearly stating why Amy's is the better plan:</p> <ul style="list-style-type: none"> ■ gives the shrimp more time to move; ■ Rebecca did not record her measurements; ■ gives it more time to decide whether it likes light or dark; ■ with 10 in a bowl it would be harder to count them. <p>OR</p> <ul style="list-style-type: none"> ■ <input type="checkbox"/> Rebecca's <input checked="" type="checkbox"/> <p>and</p> <p>a relevant criterion used to compare the two investigations clearly stating why Rebecca's is the better plan:</p> <ul style="list-style-type: none"> ■ one shrimp might like the dark, if you have more some might like the dark and some might like the light; ■ because in Rebecca's you don't have to look at the dish all the time just every 10 seconds; ■ less chance of a mistake because it has more brine shrimps. 	1m	<p>Do not give credit for an insufficient response which fails to make the criteria clear:</p> <ul style="list-style-type: none"> ■ it was quicker/easier/better. <p>Do not give credit for an insufficient response that falls short of explaining why the plan is better:</p> <ul style="list-style-type: none"> ■ Amy's <input checked="" type="checkbox"/> <input type="checkbox"/> <p>and</p> <ul style="list-style-type: none"> ■ she takes more time. <p>OR</p> <ul style="list-style-type: none"> ■ <input type="checkbox"/> Rebecca's <input checked="" type="checkbox"/> <p>and</p> <ul style="list-style-type: none"> ■ she has more shrimps. <p>Do not give credit for a conclusion or an explanation of how a conclusion might be drawn from the results:</p> <ul style="list-style-type: none"> ■ <input type="checkbox"/> Rebecca's <input checked="" type="checkbox"/> <p>and</p> <ul style="list-style-type: none"> ■ if there were 6 in one and 4 in another you would know how many they liked best.

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

Test B question 9: *The water cycle*

Question	Requirements	Mark	Additional guidance									
<p>9a</p> <p>3/2e</p>	<p>Award ONE mark for:</p> <p style="text-align: right;"> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> </p> <p>■ water evaporating</p>	1m										
<p>9b</p> <p>3/2e</p>	<p>Award ONE mark for both statements correctly classified:</p> <table style="width: 100%; border: none;"> <tr> <td></td> <td style="text-align: center;">True</td> <td style="text-align: center;">False</td> </tr> <tr> <td>■ from water produced by condensation</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>■ from water vapour in the air</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>		True	False	■ from water produced by condensation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	■ from water vapour in the air	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1m	
	True	False										
■ from water produced by condensation	<input checked="" type="checkbox"/>	<input type="checkbox"/>										
■ from water vapour in the air	<input checked="" type="checkbox"/>	<input type="checkbox"/>										
<p>9c</p> <p>3/2e 3/3d,e</p>	<p>Award ONE mark for an understanding that rain water is not salty because only the water evaporates and the salt does not:</p> <ul style="list-style-type: none"> ■ water evaporates but salt does not; ■ only water evaporates; ■ salt does not evaporate with the water. 	1m	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ <i>the (sea) water evaporates [does not indicate what happens to the salt].</i> 									

When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

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