

Sc

KEY STAGE

2

Science

2014 science sampling tests

Mark schemes for selected questions

2014

National curriculum assessments

Marking the science tests

The Standards and Testing Agency (STA) was responsible for the development and delivery of statutory science sampling tests in 2014. STA is an executive agency of the Department for Education (DfE).

This booklet contains the mark schemes for the selected questions released from the 2014 science sampling tests.

The questions were marked by external markers using these mark schemes, which are supplied to teachers for information.

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 part.

The '**Mark**' column gives the number of marks available for each question part.

The '**Requirements**' column may include three types of information:

- a general statement describing what is required for the award of marks
- examples of specific creditworthy responses demonstrating correct science
- examples of creditworthy responses that are beyond the key stage 2 programme of study.

The '**Allowable answers**' column gives examples of allowable creditworthy responses, showing correct science which may not be as clearly expressed.

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 incorrect scientific knowledge is implied
- answers which are insufficient in themselves to gain credit, but are not incorrect science, and would therefore not lose credit if combined with a correct response.

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 exercised their professional judgement.

Key stage 2: additional marking guidance

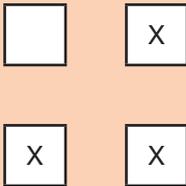
The following guidance should be read carefully in conjunction with the specific mark scheme for each question.

General guidance

<i>What if?</i>	<i>Marking procedure</i>
<p>The answer is written outside of the answer space.</p>	<p>Credit may be awarded if no answer is given in the designated answer space, but a correct response is written somewhere else and it is unambiguous which question is being answered.</p>
<p>A correct answer has been given and is crossed out and not replaced.</p>	<p>Credit may be given if the pupil has written the correct answer, crossed it out and not replaced it, provided that the response is clearly legible.</p>
<p>The pupil's response does not match closely any of the examples given.</p>	<p>Illustrative examples of pupils' responses to questions are sometimes given in the mark schemes. However, markers should always refer to the guidance given before the illustrative examples and apply their professional judgement as to which code to give. If uncertain, markers should escalate the issue to a more senior colleague.</p>
<p>The pupil gives two or more responses to a particular question.</p>	<p>a) If a pupil gives two creditworthy responses, for example one response from the requirements column and one from the allowable answers column, then the response should be deemed creditworthy.</p> <p>b) If a pupil gives two non-creditworthy responses, one of which is insufficient and the other is incorrect, then the response should be deemed non-creditworthy.</p> <p>c) If a pupil qualifies a scientifically correct answer with a scientifically incorrect statement then the response should be deemed non-creditworthy.</p> <p>d) If a pupil 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 response can be marked as creditworthy.</p>

<i>What if?</i>	<i>Marking procedure</i>
The pupil misspells a word.	<p>a) If it is clear that the pupil has made a simple error, for example 'son' for 'sun' then the incorrect spelling will be accepted and credit can be given.</p> <p>b) 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.</p>
The pupil uses the word 'it' in an answer without explicitly making clear what 'it' refers to. For example 'it dissolves faster'.	In these instances markers should refer to the question stem. If it is obvious from the question stem what the 'it' refers to then you can assume that this is what the pupil means. In cases where the meaning of 'it' is ambiguous then credit cannot be awarded and the response should be marked as directed in the mark scheme.

Single tick box questions

<i>What if?</i>	<i>Marking procedure</i>
The box is crossed rather than ticked.	This is an acceptable response, in the absence of ticks, as it is an unambiguous indication of the pupil's answer.
The box is circled rather than ticked.	This is an acceptable response, in the absence of ticks, as it is an unambiguous indication of the pupil's answer.
The answer contains a combination of ticks and crosses.	Ticks always take precedence over crosses and other alternative markings used by the pupil to indicate their selection.
The pupil places three crosses and leaves one box blank.	 <p>In this case the response should be deemed non-creditworthy.</p>

Circling the correct answer

<i>What if?</i>	<i>Marking procedure</i>
The pupil underlines their answer.	This is an acceptable response as it is an unambiguous indication of the pupil's answer.

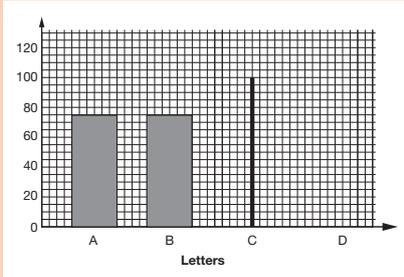
Matching questions

<i>What if?</i>	<i>Marking procedure</i>
Lines are drawn which do not touch the boxes.	Accept lines that do not touch the boxes provided that the intention is clear.
The pupil uses a numbering system instead of drawing lines.	Accept this as an unambiguous way for the pupil to indicate the correct answer.
Multiple lines are drawn to/from the same box.	This type of response will usually be non-creditworthy, although please refer to the mark scheme.

Table completion

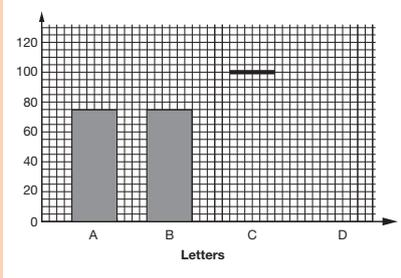
<i>What if?</i>	<i>Marking procedure</i>
A pupil indicates their selection using a tick in one row and a cross in another row.	Markers are to treat each row independently, as directed by the mark scheme.

Bar charts

<i>What if?</i>	<i>Marking procedure</i>
<p>A pupil draws a vertical line from the x-axis to the correct data point instead of plotting a bar, for example:</p> 	<p>These responses should be credited provided they are plotted to the correct data point. Please refer to the mark scheme for the individual question for the tolerance levels permitted on the plotting of the data point.</p>

What if?

A pupil correctly draws a line on the data point but does not draw a bar, e.g.



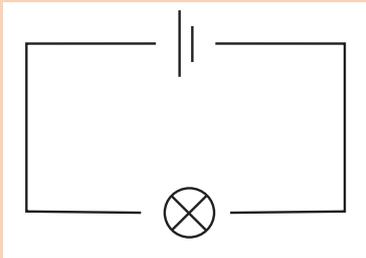
Marking procedure

These responses should be credited provided they are plotted at the correct data point. Please refer to the mark scheme for the individual question for the tolerance levels permitted on the plotting of the data point.

Electrical circuits

What if?

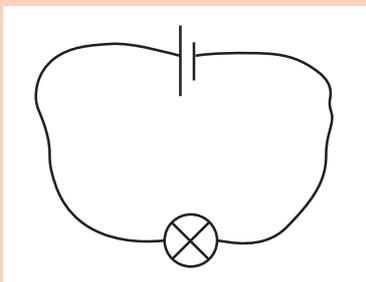
A pupil draws a circuit diagram with gaps between the electrical components in the circuit, for example:



Marking procedure

If the gap between components in the circuit is 2 mm or less then credit can be given. If the gap is greater than 2 mm then the response is deemed to be incorrect science and marked accordingly.

A pupil draws a non-rectilinear circuit diagram, for example:



Provided that the electrical circuit is drawn correctly, non-rectilinear circuit diagrams are acceptable.

A pupil draws the symbol for a light bulb in the wrong orientation, for example:



This symbol is not considered creditworthy as a representation of a bulb.

Key scientific terminology

Independent variable (IV) – the variable that is changed in an investigation.

Dependent variable (DV) – the variable that is measured in an investigation.

Control variable (CV) – the variables that are kept the same in an investigation to make the investigation a fair test.

So in an experiment which investigates the time it takes for sugar to dissolve in water at different temperatures, the **independent variable** would be the temperature of the water and the **dependent variable** would be the time taken for the sugar to dissolve. Examples of **control variables** would be the volume of the water used and the mass of sugar used.

Continuous variables – these are variables which can take any value, for example height or weight.

Discrete variables – these are variables which only take certain values from a fixed set, for example sex (male or female).

Anomalous results – a result which does not fit the pattern. In key stage 2 (KS2) pupils often use phrases such as ‘the result looked odd’ or ‘the result looked different to the others’ in order to describe an anomalous result.

Accuracy and reliability – these are two words which pupils often confuse and will sometimes use interchangeably:

- Accuracy – measurements are considered accurate if they are close to the ‘true value’.
- Reliability – this refers to how similar the results are if you repeat the investigation multiple times. The more similar the results are, the more reliable they are and the greater confidence you can have in them.

Repeatable – a measurement is repeatable if the person doing the investigation repeats the investigation using the same method and equipment and the same results are obtained.

Reproducible – a measurement is reproducible if the investigation is repeated by **another person** and the same results are obtained.

At KS2 it is common that pupils will use the word ‘reliable’ to mean repeatable or reproducible.

Fair test and fair comparison – this is when only the **independent variable** has been allowed to affect the **dependent variable** and all other variables have been kept the same. A **fair test** has a continuous independent variable, such as height or temperature. A **fair comparison** has a discrete independent variable, such as when comparing different environments or objects.

Other points to note

Anthropomorphisms – responses of this nature are particularly common in questions on plants, for example pupils often refer to plants ‘drinking water’. Anthropomorphisms of this nature should be treated as responses containing incorrect science and so should be marked accordingly.

The solar system – markers need to be very careful about marking the words pupils use to describe celestial movements, for example rotate/spin/turn/move. As there are two different types of movement for the Earth (rotation on its axis and its orbit around the Sun) it needs to be clear which type of movement pupils are referring to in their answers.

Magnetism – markers need to remember that a response which does not mention attraction does not automatically imply repulsion. The wording of the response needs to be considered carefully.

Magnets – if pupils refer to the poles as being ‘positive’ and ‘negative’ then this is considered to be incorrect science and so should be marked accordingly.

If pupils refer to the poles as ‘ends’ or ‘sides’ then this is considered to be an insufficient response as opposed to a response containing incorrect science.

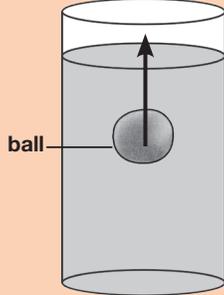
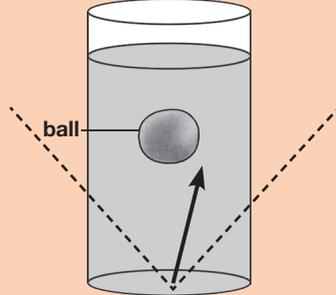
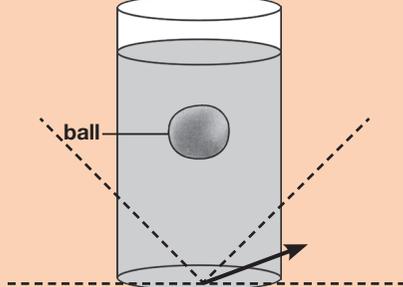
Question 2: **Rabbit hutch**

Question	Mark	Requirements	Allowable answers	Additional guidance
ai	1m	Award ONE mark for: <ul style="list-style-type: none"> ■ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> D <input checked="" type="checkbox"/> 		Do not give credit if more than one box has been ticked.
a ii	1m	Award ONE mark for the two correct reasons from the table why D is the best material for a roof, e.g. <ul style="list-style-type: none"> ■ it is waterproof ■ it is a good thermal insulator ■ it is strong ■ it isn't damaged by sunlight. 	ONE mark may be awarded for reasons describing why a property in the table is suitable, e.g. <ul style="list-style-type: none"> ■ it will keep out the rain ■ it will help keep the hutch warm. 	Do not give credit for a response if the second reason given is a restatement or repetition of the first, e.g. <ul style="list-style-type: none"> ■ waterproof [and] ■ it doesn't let the rain in.
bi	1m	Award ONE mark for a response that identifies that material Q is not breakable or an advantage of it being flexible, e.g. <ul style="list-style-type: none"> ■ it doesn't break ■ it's flexible so could bend round a corner to make a bigger window. 	ONE mark may be awarded for a response that gives a disadvantage of R rather than an advantage of material Q, e.g. <ul style="list-style-type: none"> ■ R can break/smash. 	
b ii	1m	Award ONE mark for a response that identifies that material Q is damaged by sunlight, e.g. <ul style="list-style-type: none"> ■ it can be damaged by sunlight. 	ONE mark may be awarded for a response that refers to R, e.g. <ul style="list-style-type: none"> ■ R is not damaged by sunlight. 	Do not give credit for an insufficient response, e.g. <ul style="list-style-type: none"> ■ Q is flexible [this is not necessarily a disadvantage for making a window].

Question 4: **Sports day**

Question	Mark	Requirements	Allowable answers	Additional guidance									
d	2m	Award TWO marks for all five tests correctly classified:											
	or	<table border="1"> <thead> <tr> <th>Test</th> <th>Yes or no?</th> </tr> </thead> <tbody> <tr> <td>Hold a magnet next to each medal.</td> <td>yes</td> </tr> <tr> <td>Put each medal in an electric circuit with a bulb and cell.</td> <td>yes</td> </tr> <tr> <td>Drop some water on each medal.</td> <td>no</td> </tr> <tr> <td>Weigh each medal.</td> <td>yes</td> </tr> <tr> <td>Shine a light on each medal.</td> <td>no</td> </tr> </tbody> </table>			Test	Yes or no?	Hold a magnet next to each medal.	yes	Put each medal in an electric circuit with a bulb and cell.	yes	Drop some water on each medal.	no	Weigh each medal.
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Hold a magnet next to each medal.	yes												
Put each medal in an electric circuit with a bulb and cell.	yes												
Drop some water on each medal.	no												
Weigh each medal.	yes												
Shine a light on each medal.	no												
	1m	If you are unable to award two marks, award ONE mark for any four tests correctly classified.											

Question 5: **Dropping modelling clay**

Question	Mark	Requirements	Allowable answers	Additional guidance
a	1m	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ <input type="checkbox"/> Clay is soft and flexible. <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 		Do not give credit if more than one box has been ticked.
b	1m	Award ONE mark for correctly naming the ball.		Do not give credit for an insufficient response: ■ 0.5
c	1m	<p>Award ONE mark for:</p> <p style="text-align: center;"><input type="checkbox"/> <input type="checkbox"/></p> <ul style="list-style-type: none"> ■ They fell quickly through the syrup. <input checked="" type="checkbox"/> <input type="checkbox"/> 		Do not give credit if more than one box has been ticked.
d	1m	<p>Award ONE mark for an arrow pointing vertically upwards anywhere on the diagram, e.g.</p> 	<p>ONE mark may be awarded for an arrow pointing upwards within 45° (exclusive) of the vertical, e.g.</p> 	<p>Do not give credit for a response that includes <u>incorrect science</u>, showing an arrow pointing upwards within 45° (inclusive) of the horizontal, e.g.</p>  <p>Do not give credit for a response that includes <u>incorrect science</u>, showing an arrow pointing downwards.</p> <p>Do not give credit for an insufficient response where a line, rather than an arrow, is drawn.</p>

Question 6: **Sound**

Question	Mark	Requirements	Allowable answers	Additional guidance
a	1m	Award ONE mark for an indication that the elastic band vibrates, e.g. <ul style="list-style-type: none"> ■ the (elastic) band(s). 	ONE mark may be awarded for: <ul style="list-style-type: none"> ■ rubber ■ elastic. 	<p>Do not give credit for a response that includes <i>incorrect science</i>, stating that other parts of the instrument vibrate to make the sound, e.g.</p> <ul style="list-style-type: none"> ■ pencil ■ pencil holder. <p>Do not give credit for an incorrect response that includes a part not presented in the photograph, e.g.</p> <ul style="list-style-type: none"> ■ string.
b	1m	Award ONE mark for a response indicating that sound travels through the air, e.g. <ul style="list-style-type: none"> ■ air ■ gas ■ (the) atmosphere. 		<p>Do not give credit for a response that includes <i>incorrect science</i>:</p> <ul style="list-style-type: none"> ■ air waves. <p>Do not give credit for an insufficient response giving a solid object the sound may travel through, e.g.</p> <ul style="list-style-type: none"> ■ floor ■ walls ■ table. <p>Do not give credit for an insufficient response referring to how sound travels, e.g.</p> <ul style="list-style-type: none"> ■ vibrations ■ (sound) waves. <p>Do not give credit for an insufficient response referring to what else sound may travel through, e.g.</p> <ul style="list-style-type: none"> ■ wind ■ musical instrument [given] ■ ear (drum) [given] ■ the pencil holder ■ the wood ■ the holes for the pencils.

Question 6: **Sound**

Question	Mark	Requirements	Allowable answers	Additional guidance
c	1m	<p>Award ONE mark for a response indicating the pitch of the sound gets lower, e.g. <i>A thicker elastic band makes the sound...</i></p> <ul style="list-style-type: none"> ■ lower/deeper. 		<p>Do not give credit for a response that includes <i>incorrect science</i>, suggesting the volume of the sound changes, e.g. <i>A thicker elastic band makes the sound...</i></p> <ul style="list-style-type: none"> ■ louder ■ softer. <p>Do not give credit for a response that includes <i>incorrect science</i> suggesting the pitch gets higher.</p> <p>Do not give credit for an insufficient response referring to a change in pitch (but not specifying how it changes), e.g.</p> <ul style="list-style-type: none"> ■ have a different pitch.
d	1m	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ Pluck the elastic band harder. <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 		<p>Do not give credit if more than one box has been ticked.</p>
e	1m	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ Move the pencils further apart. <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 		<p>Do not give credit if more than one box has been ticked.</p>

Question 7: **Candles burning**

Question	Mark	Requirements	Allowable answers	Additional guidance
a	1m	<p>Award ONE mark for an understanding that the sand tray reduces the risk of fire or getting burned, e.g.</p> <ul style="list-style-type: none"> ■ to prevent a fire ■ the sand won't burn/catch fire ■ so he will not be burned. <p>Award ONE mark for recognising a benefit for the experiment, e.g.</p> <ul style="list-style-type: none"> ■ to form a seal. 	<p>ONE mark may be awarded for responses identifying that the sand will support the candle, e.g.</p> <ul style="list-style-type: none"> ■ to stop the candle falling over. 	<p>Do not give credit for an insufficient response that implies the sand will help the candles go out or stop them burning, e.g.</p> <ul style="list-style-type: none"> ■ to see if the candles go out more quickly ■ to stop the candles burning. <p>Do not give credit for an insufficient response, e.g.</p> <ul style="list-style-type: none"> ■ to be safe.
b	1m	<p>Award ONE mark for an indication that Hamza needs to see the candle during the experiment, e.g.</p> <ul style="list-style-type: none"> ■ he needs to watch the candle ■ to see when it (the candle) goes out ['it' clearly implies the pupil is referring to the candle]. 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ to see what happens. 	<p>Do not give credit for an insufficient response identifying what transparent means without stating why this is important for the experiment, e.g.</p> <ul style="list-style-type: none"> ■ to see through it. <p>Do not give credit for an insufficient response where a pupil has referred to a different property of the beakers, e.g.</p> <ul style="list-style-type: none"> ■ so they do not melt ■ to stop the candles from falling over ■ so the beakers do not catch fire. <p>Do not give credit for an insufficient response, e.g.</p> <ul style="list-style-type: none"> ■ to time when it goes out [no reference to seeing] ■ so he won't touch a hot beaker.

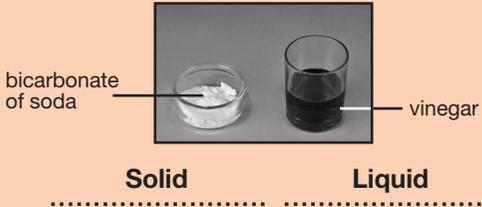
Question 7: **Candles burning**

Question	Mark	Requirements	Allowable answers	Additional guidance
c	1m	<p>Award ONE mark for recognising that the time of burning is proportional to the amount of air/gas in the beaker, e.g.</p> <ul style="list-style-type: none"> ■ there is more air/gas in beaker A ■ there is less air/gas in beaker B. <p>❖ Give credit for responses that go beyond the KS2 programme of study by referring to oxygen in place of gas or air, e.g.</p> <ul style="list-style-type: none"> ■ there is more oxygen in beaker A ■ it has less oxygen. 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ the candle with a lot of air took a long time to go out ■ the gas ran out first in B ■ it has less air/gas [B implied from question cue]. <p>ONE mark may be awarded for a response that indicates the gas ran out but does not explicitly state that it ran out first, e.g.</p> <ul style="list-style-type: none"> ■ the gas ran out (in beaker B). 	<p>Do not give credit for an insufficient response that only refers to the size of a beaker and does not link this to the amount of gas, e.g.</p> <ul style="list-style-type: none"> ■ because beaker B/it is smaller ■ A is bigger than B ■ beaker B/it has less space. <p>Do not give credit for an insufficient response, e.g.</p> <ul style="list-style-type: none"> ■ the candle in the big beaker took longer to go out [given].
d	1m	<p>Award ONE mark for an answer in the range 25–26 (inclusive).</p>		
e	1m	<p>Award ONE mark for a response indicating that the test should be repeated, e.g.</p> <ul style="list-style-type: none"> ■ repeat the test/it again ■ do the test/it 3 times ■ try the test/it again. 		<p>Do not give credit for an insufficient response referring to checking rather than repeating, e.g.</p> <ul style="list-style-type: none"> ■ check the results/it/the test/them (again) [given]. <p>Do not give credit for a response that includes <i>incorrect science</i> referring to fair testing, e.g.</p> <ul style="list-style-type: none"> ■ make the test fair ■ use the same size candles.

Question 7: **Candles burning**

Question	Mark	Requirements	Allowable answers	Additional guidance												
f	1m	<p>Award ONE mark for all three statements in the table correctly classified:</p> <table border="1"> <thead> <tr> <th>Statement</th> <th>Melting</th> <th>Burning</th> </tr> </thead> <tbody> <tr> <td>A new material is made.</td> <td></td> <td>✓</td> </tr> <tr> <td>It is a reversible change.</td> <td>✓</td> <td></td> </tr> <tr> <td>A solid changes to a liquid.</td> <td>✓</td> <td></td> </tr> </tbody> </table>	Statement	Melting	Burning	A new material is made.		✓	It is a reversible change.	✓		A solid changes to a liquid.	✓			
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A new material is made.		✓														
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A solid changes to a liquid.	✓															

Question 8: **Toy rocket**

Question	Mark	Requirements	Allowable answers	Additional guidance
ai	1m	<p>Award ONE mark for correctly identifying both materials:</p>  <p>.....</p>		
a ii	1m	<p>Award ONE mark for an indication that a gas is produced:</p> <ul style="list-style-type: none"> ■ gas. <p>✦ Give credit for a correct response that goes beyond the KS2 programme of study, naming the gas as carbon dioxide or indicating that a salt and/or water is/are produced, e.g.</p> <ul style="list-style-type: none"> ■ CO₂ ■ salt and water are made ■ water is made. 	<p>ONE mark may be awarded for an indication that bubbles are produced, e.g.</p> <ul style="list-style-type: none"> ■ bubbles ■ froth. 	<p>Do not give credit for a response that includes <u>incorrect science</u>, e.g.</p> <ul style="list-style-type: none"> ■ oxygen ■ air. <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ fizzy/fizziness.
b	1m	<p>Award ONE mark for the two correct boxes ticked:</p> <ul style="list-style-type: none"> ■ use the same amount of vinegar <input checked="" type="checkbox"/> ■ use the same rocket <input checked="" type="checkbox"/> ■ <input type="checkbox"/> ■ <input type="checkbox"/> 		
c	1m	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ 1.25 	<p>ONE mark may be awarded for any other response from 1.20–1.30 (inclusive).</p>	

Question 8: **Toy rocket**

Question	Mark	Requirements	Allowable answers	Additional guidance
d	1m	<p>Award ONE mark for a response using evidence from the graph that proves Layla's statement is false, e.g.</p> <ul style="list-style-type: none"> ■ the rocket travelled the same distance when 2g and 2.5g were used ■ after 2g the rocket did not travel any further ■ the rocket travelled 7.5m for two amounts of bicarbonate of soda. 	<p>ONE mark may be awarded for a response that clearly shows Layla's statement is false from the graph, but does not identify exact points from the x-axis, e.g.</p> <ul style="list-style-type: none"> ■ after a certain quantity of bicarbonate of soda has been used, the rocket does not travel any further ■ for two amounts of bicarbonate of soda, the rocket travelled the same distance. <p>ONE mark may be awarded for a response that clearly shows Layla's statement is false by referring to the distance plateauing, e.g.</p> <ul style="list-style-type: none"> ■ the distance (the rocket travels) levels off. 	<p>Do not give credit for an insufficient response that does not interpret the results/graph line, e.g.</p> <ul style="list-style-type: none"> ■ the graph line levels off. <p>Do not give credit for an insufficient response that does not explicitly describe the dependent variable (the distance), e.g.</p> <ul style="list-style-type: none"> ■ for 2.0g and 2.5g, it stays the same ■ for 2.0g and 2.5g, it went the same height [ambiguous as could refer to the height of the graph or the height of the rocket itself] ■ after a certain amount of bicarbonate it stays the same.

Question 9: **Friction**

Question	Mark	Requirements	Allowable answers	Additional guidance
cii	1m	<p>Award ONE mark for an explanation, indicating that one of the results for the tiles was a lot lower than the other two results for the tiles or that the tiles' results are <u>very</u> different to each other, e.g.</p> <ul style="list-style-type: none"> ■ the second result for the tiles was much lower than the others ■ 72cm is much shorter than 105cm and 107cm ■ two of the results are very similar, but the other result is not ■ the results for tiles are too different (to each other) ■ the results for tiles have too big a range. <p>Award ONE mark for a creditworthy explanation that does not refer to the results for the tiles, but the pupil gave 'tile' as their response to ci so it is clear that it is this result they are referring to, e.g.</p> <ul style="list-style-type: none"> ■ the second result is much smaller ■ the difference between the second try and the other two tries is very large. 	<p>ONE mark may be awarded for a response indicating there is an odd result for tiles, e.g.</p> <ul style="list-style-type: none"> ■ one of the results for the tiles looks wrong. 	<p>Do not give credit for an insufficient response, implying that the results for tiles are different to the results of other surfaces or with no indication that the size of difference is too big, e.g.</p> <ul style="list-style-type: none"> ■ the tiles' results are different ■ the results (for tiles) are all different ■ it only went 72cm on its second go. <p>Do not give credit for an insufficient response that repeats the results for the tiles without interpretation, e.g.</p> <ul style="list-style-type: none"> ■ it started at 105cm, and then was 72cm, and then it went to 105cm. <p>Do not give credit for an insufficient response that is unclear, e.g.</p> <ul style="list-style-type: none"> ■ it is much smaller [not clear what 'it' refers to].
d	1m	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ <input type="checkbox"/> <input checked="" type="checkbox"/> carpet ■ <input type="checkbox"/> <input type="checkbox"/> 		<p>Do not give credit if more than one box has been ticked.</p>

Question 10: **Parachutes**

Question	Mark	Requirements	Allowable answers	Additional guidance																								
c	2m 1m	<p>Award TWO marks for the table completed correctly:</p> <table border="1"> <thead> <tr> <th>Variable</th> <th>Variable to be changed</th> <th>Variable to be measured</th> <th>Variable to be kept the same</th> </tr> </thead> <tbody> <tr> <td>height of drop</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>mass of modelling clay</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>size of parachute</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>material of parachute</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>time taken to fall to the ground</td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table> <p>If you are unable to award two marks, award ONE mark for correctly completing any four rows of the table.</p>	Variable	Variable to be changed	Variable to be measured	Variable to be kept the same	height of drop			✓	mass of modelling clay			✓	size of parachute			✓	material of parachute	✓			time taken to fall to the ground		✓			Do not give credit for a row where more than one box has been ticked.
Variable	Variable to be changed	Variable to be measured	Variable to be kept the same																									
height of drop			✓																									
mass of modelling clay			✓																									
size of parachute			✓																									
material of parachute	✓																											
time taken to fall to the ground		✓																										
d	1m	Award ONE mark for 2.9 circled (for netting).		Do not give credit for an insufficient response in which 'netting' or 'test 1' is circled.																								
e	1m	<p>Award ONE mark for a prediction that is greater than 0 but less than 2.4 seconds (0–2.4 exclusive), e.g.</p> <ul style="list-style-type: none"> ■ 1.5 seconds. 		Do not give credit for an incorrect response giving 2.4 or greater.																								

Question 11: **Model house**

Question	Mark	Requirements	Allowable answers	Additional guidance
bii	2m	<p>Award up to TWO marks for giving any two correct responses as indicated below.</p> <p>Award ONE mark for a correct response that refers to <u>adding</u> cells/batteries or <u>increasing the number</u> of cells/batteries, e.g.</p> <ul style="list-style-type: none"> ■ add a battery. 	<p>ONE mark may be awarded for a reference to decreasing the length of wire in the circuit, e.g.</p> <ul style="list-style-type: none"> ■ use shorter wires. 	<p>Do not give credit for an insufficient response implying they will replace the battery with a bigger one, e.g.</p> <ul style="list-style-type: none"> ■ use a bigger battery. <p>Do not give credit for an insufficient response that refers to increasing the power, e.g.</p> <ul style="list-style-type: none"> ■ add more power. <p>Do not give credit for an insufficient response that contradicts the question stem, e.g.</p> <ul style="list-style-type: none"> ■ take away the buzzer. <p>Do not give credit for an insufficient response, e.g.</p> <ul style="list-style-type: none"> ■ make the circuit smaller. <p>Do not give credit for a second response that is a repetition or restatement of the first, e.g.</p> <ul style="list-style-type: none"> ■ 1. remove a bulb 2. remove another bulb.
	or	<p>Award ONE mark for a correct response that refers to reducing the number of bulbs/lamps, e.g.</p> <ul style="list-style-type: none"> ■ take away one/both of the lamps/ bulbs. <p>❖ Give credit for a correct response that goes beyond the KS2 programme of study, e.g.</p> <ul style="list-style-type: none"> ■ increase the voltage ■ use a higher volt battery. 		
	1m	<p>If you are unable to award two marks, award ONE mark for any one correct response.</p>		

Question 12: **Sun, Earth and Moon**

Question	Mark	Requirements	Allowable answers	Additional guidance								
a	1m	<p>Award ONE mark for the correct fruit given for all three objects in space:</p> <table border="1"> <tr> <td>Object in space</td> <td>Sun</td> <td>Earth</td> <td>Moon</td> </tr> <tr> <td>Which fruit should be used for the model?</td> <td>melon</td> <td>orange</td> <td>cherry</td> </tr> </table>	Object in space	Sun	Earth	Moon	Which fruit should be used for the model?	melon	orange	cherry		
Object in space	Sun	Earth	Moon									
Which fruit should be used for the model?	melon	orange	cherry									
bi	1m	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> <input type="checkbox"/> <input type="checkbox"/> ■ lunch break: 12.00 – 1.00 pm <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 		<i>Do not</i> give credit if more than one box has been ticked.								
bii	1m	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ the spin of the Earth <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 		<i>Do not</i> give credit if more than one box has been ticked.								

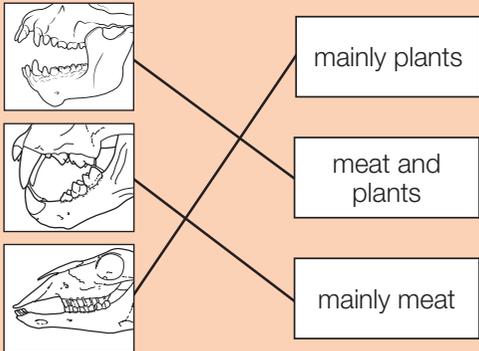
Question 12: **Sun, Earth and Moon**

Question	Mark	Requirements	Allowable answers	Additional guidance																
ci	1m	<p>Award ONE mark for completing 'Time movement takes' column correctly:</p> <table border="1"> <thead> <tr> <th>Movement in space</th> <th>Time movement takes</th> </tr> </thead> <tbody> <tr> <td>Earth orbits the Sun</td> <td>365 days</td> </tr> <tr> <td>Earth spins once on its axis</td> <td>1 day/24 hours</td> </tr> <tr> <td>.....</td> <td>28 days</td> </tr> </tbody> </table>	Movement in space	Time movement takes	Earth orbits the Sun	365 days	Earth spins once on its axis	1 day/24 hours	28 days	<p>ONE mark may be awarded for implying 1 day (no unit given) since the other two are in days:</p> <table border="1"> <thead> <tr> <th>Movement in space</th> <th>Time movement takes</th> </tr> </thead> <tbody> <tr> <td>Earth orbits the Sun</td> <td>365 days</td> </tr> <tr> <td>Earth spins once on its axis</td> <td>1</td> </tr> <tr> <td>.....</td> <td>28 days</td> </tr> </tbody> </table>	Movement in space	Time movement takes	Earth orbits the Sun	365 days	Earth spins once on its axis	1	28 days	<p>Do not give credit for an insufficient response in the 'Time movement takes' column:</p> <ul style="list-style-type: none"> • 24
Movement in space	Time movement takes																			
Earth orbits the Sun	365 days																			
Earth spins once on its axis	1 day/24 hours																			
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Movement in space	Time movement takes																			
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cii	1m	<p>Award ONE mark for completing the 'Movement in space' column correctly:</p> <table border="1"> <thead> <tr> <th>Movement in space</th> <th>Time movement takes</th> </tr> </thead> <tbody> <tr> <td>Earth orbits the Sun</td> <td>365 days</td> </tr> <tr> <td>Earth spins once on its axis</td> <td></td> </tr> <tr> <td>Moon orbits the Earth</td> <td>28 days</td> </tr> </tbody> </table> <p>❖ Give credit for a correct response that goes beyond the KS2 programme of study indicating that the Moon spins (on its axis), e.g.</p> <ul style="list-style-type: none"> ■ the Moon rotates/spins (on its axis). 	Movement in space	Time movement takes	Earth orbits the Sun	365 days	Earth spins once on its axis		Moon orbits the Earth	28 days	<p>ONE mark may be awarded for a response in the 'Movement in space' column which implies the Moon orbits the Earth, e.g.</p> <ul style="list-style-type: none"> ■ Moon goes around the Earth ■ Moon rotates around the Earth. 	<p>Do not give credit for a response that includes <i>incorrect science</i> referring to other movements in space, e.g.</p> <ul style="list-style-type: none"> ■ the Sun rotates on its axis ■ Mars orbits the Sun. <p>Do not give credit for:</p> <ul style="list-style-type: none"> ■ the Moon orbits. <p>Do not give credit for an insufficient response in the 'Movement in space' column, e.g.</p> <ul style="list-style-type: none"> ■ the Moon (and the Earth) ■ full Moon ■ lunar month. 								
Movement in space	Time movement takes																			
Earth orbits the Sun	365 days																			
Earth spins once on its axis																				
Moon orbits the Earth	28 days																			

Question 13: **Country walk**

Question	Mark	Requirements	Allowable answers	Additional guidance								
a	2m	<p>Award TWO marks for correctly completing the key, e.g.</p> <pre> graph TD Root[Things Maryam photographed] --> Living[Living] Root --> NonLiving[Non-living] Living --> plant[plant] Living --> animal[animal] plant --> tree[tree] animal --> 4legs[4 legs] animal --> 2legs[2 legs] 4legs --> Horse[Horse] 2legs --> Bird[Bird] NonLiving --> Solid[Solid] NonLiving --> liquid[liquid] Solid --> rock[rock] liquid --> Stream[Stream] </pre>	<p>Credit may be awarded for any acceptable groupings for the Living and Non-living things, e.g.</p> <ul style="list-style-type: none"> ■ Living: producer and consumer ■ Non-living: (solid and) not a solid ■ Non-living: (solid and) wet/runny. <p>Credit may be awarded for naming a specific type of tree/plant, e.g.</p> <ul style="list-style-type: none"> ■ oak. <p>Credit may be awarded for 'stone' used instead of 'rock'.</p> <p>Credit may be awarded for a specific type of rock, e.g.</p> <ul style="list-style-type: none"> ■ limestone. 	<p>Do not give credit for an insufficient answer, e.g.</p> <ul style="list-style-type: none"> ■ Non-living: (solid and) flowing [could also refer to gases] ■ Non-living: (solid and) water. 								
	or											
	1m	<p>If you are unable to award TWO marks, award ONE mark for correctly completing any four or five boxes in the key.</p>										
b	1m	<p>Award ONE mark for correctly classifying each reason in the table:</p> <table border="1"> <thead> <tr> <th>Reason</th> <th>Yes or no?</th> </tr> </thead> <tbody> <tr> <td>to sort things into groups</td> <td>yes</td> </tr> <tr> <td>to show feeding relationships</td> <td>no</td> </tr> <tr> <td>to help identify things</td> <td>yes</td> </tr> </tbody> </table>	Reason	Yes or no?	to sort things into groups	yes	to show feeding relationships	no	to help identify things	yes		
Reason	Yes or no?											
to sort things into groups	yes											
to show feeding relationships	no											
to help identify things	yes											

Question 13: **Country walk**

Question	Mark	Requirements	Allowable answers	Additional guidance
c	1m	<p>Award ONE mark for correctly matching each animal skull to what the animal eats:</p> 		
d	1m	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ molar. 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ pre-molar. 	<p>Do not give credit for naming an incorrect tooth type, e.g.</p> <ul style="list-style-type: none"> ■ incisor/canine.

Question 14: **Pulse rate**

Question	Mark	Requirements	Allowable answers	Additional guidance
a	1m	<p>Award ONE mark for all three sentences completed correctly:</p> <ul style="list-style-type: none"> ■ The heart pumps blood around the body. ■ The vessels carry blood around the body. ■ The ribs protect the heart. 		
b	1m	<p>Award ONE mark for:</p> <p style="text-align: center;"><input type="checkbox"/> <input type="checkbox"/></p> <p>■ stopwatch <input checked="" type="checkbox"/> <input type="checkbox"/></p>		Do not give credit if more than one box is ticked.
c	1m	<p>Award ONE mark for all three statements classified correctly:</p> <ul style="list-style-type: none"> ■ Different types of exercise can affect pulse rate by different amounts. True ■ Different people can have different resting pulse rates. True ■ A high pulse rate means the heart is beating fast. True 		
d	1m	<p>Award ONE mark for both pulse rates within the acceptable ranges:</p> <p>After running for 10 minutes:</p> <ul style="list-style-type: none"> ■ 95–190 (inclusive). <p>After resting for 20 minutes:</p> <ul style="list-style-type: none"> ■ 90 	<p>ONE mark may be awarded for the correct accepted range given in 'after running for 10 minutes' and for:</p> <p>After resting for 20 minutes:</p> <ul style="list-style-type: none"> ■ 85–95 (inclusive) [95 may not be accepted if given as the 'after running' rate]. 	Do not give credit for a response that includes <i>incorrect science</i> in which the 'after resting' rate given is the same or greater than the 'after running' rate.

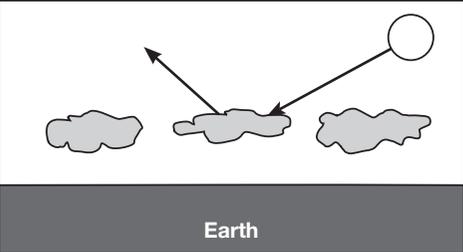
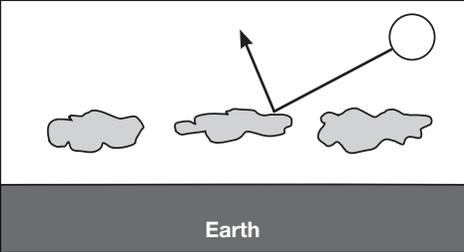
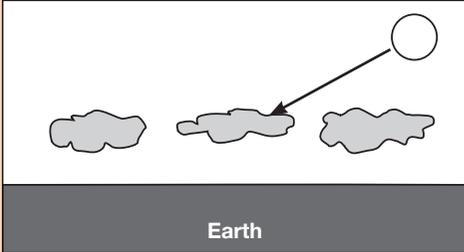
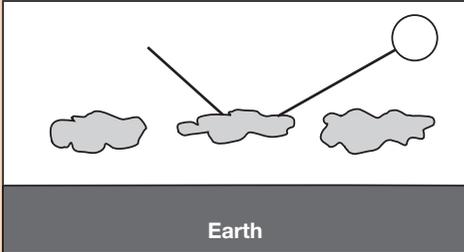
Question 14: **Pulse rate**

Question	Mark	Requirements	Allowable answers	Additional guidance
e	2m	<p>Award TWO marks for the correct three questions ticked:</p> <p>Where is the heart found in the body? <input type="checkbox"/></p> <p>How does age affect a person's heart rate? <input checked="" type="checkbox"/></p> <p>How does the heart work? <input type="checkbox"/></p> <p>What does the heart look like? <input type="checkbox"/></p> <p>Do tall people have faster pulse rates than short people? <input checked="" type="checkbox"/></p> <p>Do people who exercise regularly eat more food than people who do not exercise? <input checked="" type="checkbox"/></p>		Deduct one mark for each incorrect question ticked.
	1m	<p>If you are unable to award two marks, ONE mark may be awarded for any two questions correctly ticked.</p>		

Question 15: **Clouds**

Question	Mark	Requirements	Allowable answers	Additional guidance
ai	1m	<p>Award ONE mark for naming a form of precipitation, e.g.</p> <ul style="list-style-type: none"> ■ rain ■ snow ■ hail. <p>❖ Give credit for a correct response that goes beyond the KS2 programme of study:</p> <ul style="list-style-type: none"> ■ precipitation. 		<p>Do not give credit for <i>incorrect science</i>, e.g.</p> <ul style="list-style-type: none"> ■ condensation.
aii	1m	<p>Award ONE mark for naming gravity.</p>	<p>ONE mark may be awarded for naming gravitational attraction.</p> <p>ONE mark may be awarded for naming weight.</p>	<p>Do not give credit for an insufficient response, e.g.</p> <ul style="list-style-type: none"> ■ downward pull.
b	1m	<p>Award ONE mark for a response naming condensation.</p>		<p>Do not give credit for a response that includes <i>incorrect science</i> naming evaporation.</p>

Question 15: **Clouds**

Question	Mark	Requirements	Allowable answers	Additional guidance
c	1m	<p>Award ONE mark for two arrows: one arrow pointing from the Sun to a cloud and one arrow from the same cloud into space (the reflected arrow points away from the Earth when extended in the direction it is pointing), e.g.</p> 	<p>ONE mark may be awarded for one continuous arrow from the Sun to a cloud and from the same cloud into space, e.g.</p> 	<p>Do not give credit for an insufficient response giving only one non-reflected/reflected arrow, e.g.</p>  <p>Do not give credit for two correct lines if no arrowheads are given, e.g.</p> 

Question 15: **Clouds**

Question	Mark	Requirements	Allowable answers	Additional guidance
d	1m	Award ONE mark for two correct boxes ticked: ■ Turn off electric lights when they are not needed. <input checked="" type="checkbox"/> ■ Use public transport instead of cars. <input checked="" type="checkbox"/>		
e	1m	Award ONE mark for: <div style="display: flex; justify-content: space-around;"> <input type="checkbox"/> <input type="checkbox"/> </div> ■ translucent <input checked="" type="checkbox"/> <input type="checkbox"/>		<i>Do not give credit if more than one box has been ticked.</i>

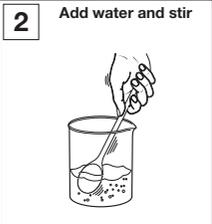
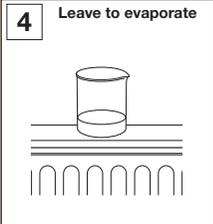
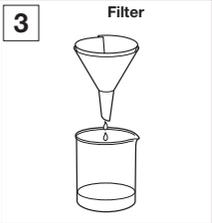
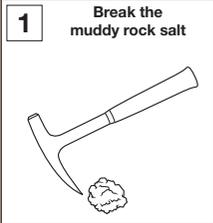
Question 16: **Growing seeds**

Question	Mark	Requirements	Allowable answers	Additional guidance
a	1m	<p>Award ONE mark for the correct number written in each box:</p> <ul style="list-style-type: none"> ■ a root grows <input type="text" value="1"/> a flower grows <input type="text" value="4"/> ■ a stem grows <input type="text" value="2"/> leaves grow <input type="text" value="3"/> 		Do not give credit for any other number given.
b	1m	<p>Award ONE mark for the two correct boxes ticked:</p> <ul style="list-style-type: none"> ■ <input type="checkbox"/> water <input checked="" type="checkbox"/> warmth <input checked="" type="checkbox"/> 		
c	1m	<p>Award ONE mark for two correct boxes ticked:</p> <ul style="list-style-type: none"> ■ to collect new evidence <input checked="" type="checkbox"/> to reach a conclusion <input checked="" type="checkbox"/> <li style="margin-left: 100px;"><input type="checkbox"/> <input type="checkbox"/> 		
d	1m	<p>Award ONE mark for a response recognising that there is air beneath the clear plastic with the seeds, e.g.</p> <ul style="list-style-type: none"> ■ because there is still air around the seeds ■ it is impossible to get out all of the air from under the clear plastic. 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ air is inside (already). 	<p>Do not give credit for an insufficient response that repeats information already given in the question stem that no air can get in, e.g.</p> <ul style="list-style-type: none"> ■ air cannot get in (through the clear plastic). <p>Do not give credit for a response that includes <u>incorrect science</u>, indicating that there is no air in the dish under the clear plastic, e.g.</p> <ul style="list-style-type: none"> ■ because there is no air in the dish.

Question 17: **Rock salt**

Question	Mark	Requirements	Allowable answers	Additional guidance
a	1m	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ dissolving ■ it dissolves. <p>❖ Give credit for a correct response that goes beyond the KS2 programme of study:</p> <ul style="list-style-type: none"> ■ (it forms a) solution. 		<p>Do not give credit for an insufficient response indicating the salt is no longer apparent, e.g.</p> <ul style="list-style-type: none"> ■ it disappeared.
b	1m	<p>Award ONE mark for responses identifying that you should dissolve the salt again (in water), e.g.</p> <ul style="list-style-type: none"> ■ the salt will dissolve again if you put water back in ■ dissolve it again. <p>Award ONE mark for responses that recognise that water needs to be added to the salt, e.g.</p> <ul style="list-style-type: none"> ■ add some water (and stir the mixture). 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ put them back together again ■ put the salt in water. 	<p>Do not give credit for an incorrect response implying that you still have salty water and should add more salt, e.g.</p> <ul style="list-style-type: none"> ■ add more salt to the water.
c	1m	<p>Award ONE mark for an indication that the rate of evaporation will increase, e.g.</p> <ul style="list-style-type: none"> ■ the water will evaporate more quickly ■ heating will speed up the evaporation ■ it will be faster. 	<p>ONE mark may be awarded for responses that refer to the salt forming more quickly, e.g.</p> <ul style="list-style-type: none"> ■ the salt forms more quickly/sooner. 	<p>Do not give credit for an insufficient response relating to the amount of evaporation, e.g.</p> <ul style="list-style-type: none"> ■ it will evaporate more. <p>Do not give credit for an insufficient response referring to dissolving, e.g.</p> <ul style="list-style-type: none"> ■ it makes it dissolve quicker.

Question 17: **Rock salt**

Question	Mark	Requirements	Allowable answers	Additional guidance
d	1m	<p>Award ONE mark for the correct number given in each box to show the sequence for separating salt from rock salt:</p> <div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <p>2 Add water and stir</p>  </div> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <p>4 Leave to evaporate</p>  </div> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <p>3 Filter</p>  </div> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <p>1 Break the muddy rock salt</p>  </div> </div>		
e	1m	<p>Award ONE mark for identifying a method which would increase Oliver's safety from bits of flying rock, e.g.</p> <ul style="list-style-type: none"> ■ Oliver should put on safety glasses/goggles ■ Oliver should wear gloves/safety clothes/protection ■ he should put the rock salt in a bag ■ he should put a cloth over the rock salt (before breaking it). 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ he should wear a mask. <p>ONE mark may be awarded for asking an adult to do it, e.g.</p> <ul style="list-style-type: none"> ■ he should get a teacher to do it. 	<p>Do not give credit for an insufficient response, e.g.</p> <ul style="list-style-type: none"> ■ stand (well) back ■ tie his hair back ■ wearing glasses ■ break it in a container ■ break the rock gently [will not control where the flying pieces go].



Standards & Testing Agency

2014 science sampling tests: mark schemes for selected questions

Electronic PDF version product code: STA/17/7914/e ISBN: 978-1-78644-386-1

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