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KEY STAGE

2

LEVELS

3–5

2003

Science tests

# Mark schemes

Tests A and B, levels 3–5

2003

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Guarding standards

department for

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# Marking the science tests

As in 2002, 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/](http://www.qca.org.uk/)) on 23 June 2003.

## 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.

<b>What if...?</b>	<b>Marking procedure</b>
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.
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.

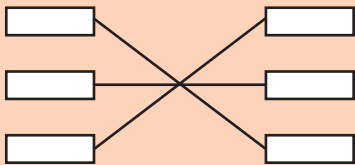
Each paper has the following number of marks available:

■ Test A has 40;

■ Test B has 40.

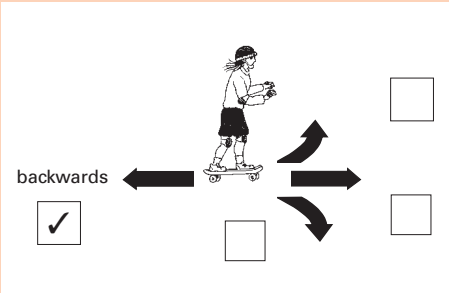
The 2003 key stage 2 science tests and mark schemes were developed by the National Foundation for Educational Research (NFER) and the Centre for Research into Primary Science and Technology (CRIPSAT) on behalf of QCA.

### Test A question 1: *Balanced diets*

Question	Requirements	Mark	Additional guidance
<p><b>1a</b></p> <p>1/2i</p>	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li>■ 6;</li> <li>■ six.</li> </ul>	<b>1m</b>	
<p><b>1b</b></p> <p>1/2i</p>	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li>■ (eleven) children said they eat vegetables once a week;</li> <li>■ once a week.</li> </ul>	<b>1m</b>	
<p><b>1c</b></p> <p>2/2b</p>	<p>Award <b>ONE</b> mark for:</p> 	<b>1m</b>	
<p><b>1d</b></p> <p>2/2b,g,h</p>	<p>Award <b>ONE</b> mark for identifying the <b>two</b> best facts:</p> <div style="border: 1px solid black; padding: 10px; width: fit-content;"> <p>To stay healthy you should:</p> <ul style="list-style-type: none"> <li>• eat different kinds of food. <input type="checkbox"/></li> <li>• exercise often. <input checked="" type="checkbox"/></li> </ul> </div>	<b>1m</b>	

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

## Test A question 2: Opposing forces

Question	Requirements	Mark	Additional guidance
<p><b>2a</b></p> <p>1/2e</p>	<p>Award <b>ONE</b> mark for any <b>two</b> of the following:</p> <ul style="list-style-type: none"> <li>■ helmet;</li> <li>■ chin pad;</li> <li>■ knee pads;</li> <li>■ elbow pads;</li> <li>■ wrist guards/gloves/pads.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ shin pads.</li> </ul>	<b>1m</b>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ safety equipment [given].</li> </ul>
<p><b>2b</b></p> <p>4/2d,e</p>	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li>■</li> </ul> 	<b>1m</b>	
<p><b>2c i</b></p> <p>4/2d</p>	<p>Award <b>ONE</b> mark for an indication that Louis travels further (forwards) on the second push:</p> <ul style="list-style-type: none"> <li>■ Louis travels further (on the second push than the first push).</li> </ul>	<b>1m</b>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ Louis travels faster [given];</li> <li>■ Louis went further than Jane.</li> </ul>
<p><b>2c ii</b></p> <p>4/2d</p>	<p>Award <b>ONE</b> mark for an indication that Jane travels further (backwards):</p> <ul style="list-style-type: none"> <li>■ Jane travels further (on the second push).</li> </ul>	<b>1m</b>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ Jane travels faster [given];</li> <li>■ Jane went further than Louis.</li> </ul>
<p><b>2d</b></p> <p>4/2b</p>	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li>■ weight.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ gravity.</li> </ul>	<b>1m</b>	

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

### Test A question 3: Vegetable patch

Question	Requirements	Mark	Additional guidance
<p><b>3a</b></p> <p>2/1a</p>	<p>Award <b>TWO</b> marks for <b>all five</b> living things correctly identified:</p> <p style="text-align: center;"> <span style="margin-right: 100px;"><input type="checkbox"/></span> <span>tree <input checked="" type="checkbox"/></span> </p> <p style="text-align: center;"> <span style="margin-right: 50px;"><input type="checkbox"/></span> <span>starling <input checked="" type="checkbox"/></span> <span>fly <input checked="" type="checkbox"/></span> </p> <p style="text-align: center;"> <span style="margin-right: 100px;"><input checked="" type="checkbox"/></span> <span>rabbit <input type="checkbox"/></span> <span>daisy <input checked="" type="checkbox"/></span> </p> <p>If you are unable to award two marks, award <b>ONE</b> mark for correctly identifying <b>any four</b> living things.</p>	<p><b>2m</b></p> <p><i>or</i></p> <p><b>1m</b></p>	
<p><b>3b</b></p> <p>2/5d</p>	<p>Award <b>TWO</b> marks for <b>all three</b> organisms in the correct order <b>and</b> arrows marked in the correct direction:</p> <ul style="list-style-type: none"> <li>■ cabbage → snail → thrush;</li> <li>■ thrush ← snail ← cabbage.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ cabbage → snail → bird.</li> </ul> <p>If you are unable to award two marks, award <b>ONE</b> mark for <b>all three</b> organisms in the correct order, <b>but</b> arrows missing or inconsistent:</p> <ul style="list-style-type: none"> <li>■ cabbage ← snail ← thrush;</li> <li>■ thrush → snail → cabbage;</li> <li>■ cabbage plant – snail – thrush;</li> <li>■ thrush snail cabbage.</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>■ correct arrows in a biologically correct food chain.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ bird snail cabbage.</li> </ul>	<p><b>2m</b></p> <p><i>or</i></p> <p><b>1m</b></p>	<p><b>Do not</b> give credit for an insufficient description of the producer:</p> <ul style="list-style-type: none"> <li>■ plant;</li> <li>■ vegetable.</li> </ul>
<p><b>3c</b></p> <p>2/3b</p>	<p>Award <b>ONE</b> mark for:</p> <p style="text-align: center;"> <span style="margin-right: 100px;"><input type="checkbox"/></span> <span><input type="checkbox"/></span> </p> <ul style="list-style-type: none"> <li>■ <input type="checkbox"/> produce new material for growth. <input checked="" type="checkbox"/></li> </ul>	<p><b>1m</b></p>	
<p><b>3d</b></p> <p>2/3a</p>	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li>■ less light. <input checked="" type="checkbox"/> <input type="checkbox"/></li> <li style="margin-left: 100px;"><input type="checkbox"/> <input type="checkbox"/></li> </ul>	<p><b>1m</b></p>	

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

### Test A question 4: Paper towels

Question	Requirements	Mark	Additional guidance
4a  1/1b	<p>Award <b>ONE</b> mark for:</p> <p><input type="checkbox"/> <input type="checkbox"/></p> <p>■ <input type="checkbox"/> an observation. <input checked="" type="checkbox"/></p>	1m	
4b  1/2a	<p>Award <b>ONE</b> mark for identifying both the independent variable [the (kind of) paper towel] and the dependent variable [how much water it holds]:</p> <ul style="list-style-type: none"> <li>■ how much water is soaked up by each paper towel?</li> <li>■ how much water does each paper towel hold?</li> <li>■ how much water was absorbed in each paper towel?</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ which towel soaked up most water?</li> <li>■ what type of paper soaks up most water?</li> <li>■ the amount of water soaked up by each paper towel.</li> </ul> <p><b>Allow:</b> statements which are not framed as questions:</p> <ul style="list-style-type: none"> <li>■ the amount of water different kinds of paper towels hold.</li> </ul>	1m	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ which paper towel is best?</li> </ul> <p><b>Do not</b> give credit for questions which identify an incorrect independent variable or dependent variable:</p> <ul style="list-style-type: none"> <li>■ which size of towel soaks up most water?</li> <li>■ which towel will not tear?</li> </ul> <p><b>Do not</b> give credit for an insufficient response that gives a conclusion:</p> <ul style="list-style-type: none"> <li>■ thicker paper towels hold more water.</li> </ul> <p><b>Do not</b> give credit for an insufficient response that suggests that causal factors are being investigated:</p> <ul style="list-style-type: none"> <li>■ why do different paper towels soak up different amounts of water?</li> </ul>
4c  1/2d	<p>Award <b>ONE</b> mark for a recognition of the independent variable as the paper towel:</p> <ul style="list-style-type: none"> <li>■ the (type of) paper towel.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ towel;</li> <li>■ paper;</li> <li>■ tissue;</li> <li>■ material.</li> </ul>	1m	<p><b>Do not</b> give credit for an insufficient response that indicates an investigation of a factor not mentioned in the table:</p> <ul style="list-style-type: none"> <li>■ strength of towels;</li> <li>■ thickness of towels;</li> <li>■ softness of towels.</li> </ul> <p><b>Do not</b> give credit for an insufficient response that gives the dependent variable:</p> <ul style="list-style-type: none"> <li>■ how much water was soaked up.</li> </ul>

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



### Test A question 5: Shadows

Question	Requirements	Mark	Additional guidance
<p><b>5a</b></p> <p>4/3a</p>	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li>■ the Sun;</li> <li>■ sunlight.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ daylight.</li> </ul>	<b>1m</b>	<p><b>Do not</b> give credit for a response that includes incorrect science describing the use of artificial light sources [they would not produce a dark shadow on a sunny day]:</p> <ul style="list-style-type: none"> <li>■ spotlights.</li> </ul> <p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ the sky [this is the location of the source, not the source itself].</li> </ul>
<p><b>5b</b></p> <p>4/3b</p>	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li>■ opaque. <input checked="" type="checkbox"/> <input type="checkbox"/></li> <li><input type="checkbox"/> <input type="checkbox"/></li> <li><input type="checkbox"/> <input type="checkbox"/></li> </ul>	<b>1m</b>	
<p><b>5c</b></p> <p>1/2i</p>	<p>Award <b>ONE</b> mark for an indication that the shadow became shorter:</p> <ul style="list-style-type: none"> <li>■ the shadow kept getting shorter;</li> <li>■ it got shorter.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ it was less long at lunchtime;</li> <li>■ it was longer at first.</li> </ul>	<b>1m</b>	

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

### Test A question 5: Shadows (continued)

Question	Requirements	Mark	Additional guidance
<p><b>5d</b></p> <p>4/4b 1/2h</p>	<p>Award <b>ONE</b> mark for a graph with a minimum point of no lower than 95cm, occurring between noon and 1pm. Following the minimum point, the graph should go upwards to a maximum point of no more than 160cm and no less than 105cm.</p> <div data-bbox="331 584 774 875" style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p><b>Minimum at noon</b></p> </div> <div data-bbox="331 898 774 1189" style="border: 1px solid black; padding: 5px;"> <p><b>Minimum at 1pm</b></p> </div>	<p><b>1m</b></p>	<p><i>Do not</i> give credit for an insufficient response where the line remains level or gets lower at any time after 1pm.</p>

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

### Test A question 6: Germinating seeds

Question	Requirements	Mark	Additional guidance
<p><b>6a</b></p> <p>1/2h</p>	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li>0 [in correct cell in table].</li> </ul> <p><b>Allow:</b> a correct response outside the table or in the wrong place in the table.</p>	<b>1m</b>	
<p><b>6b</b></p> <p>1/2a</p>	<p>Award <b>ONE</b> mark for identifying both the independent variable [the temperature] and one of the dependent variables [the (number of) seeds germinating <b>or</b> the time taken (to start) to grow]:</p> <ul style="list-style-type: none"> <li>how many seeds germinated at (different) temperatures?</li> <li>how many seeds (started to) grow at (different) temperatures?</li> <li>how long it takes lettuce seeds to (start to) grow/germinate at different temperatures?</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>how does temperature affect germination?</li> <li>how many seeds came up at each temperature?</li> <li>what is the best temperature for seeds to grow?</li> </ul> <p><b>Allow:</b> statements which are not framed as questions:</p> <ul style="list-style-type: none"> <li>the number of seeds germinating at each temperatures;</li> <li>the time taken for seeds to (start to) grow at different temperatures;</li> <li>the number of seeds that (start to) grow at different temperatures.</li> </ul>	<b>1m</b>	<p><b>Do not</b> give credit for an insufficient response giving a conclusion:</p> <ul style="list-style-type: none"> <li>more seeds grew at higher temperatures.</li> </ul> <p><b>Do not</b> give credit for questions identifying an incorrect independent variable or dependent variable:</p> <ul style="list-style-type: none"> <li>which seeds grow at different temperatures?</li> </ul>

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

### Test A question 6: Germinating seeds (continued)

Question	Requirements	Mark	Additional guidance																				
<p><b>6c i, ii</b></p> <p>1/2i,j</p>	<p>Award up to <b>TWO</b> marks for <b>all four</b> correct:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">True</th> <th style="width: 10%; text-align: center;">False</th> <th style="width: 20%; text-align: center;">Can't tell</th> </tr> </thead> <tbody> <tr> <td>The quickest germination was 25°C.</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>At 25°C all the seeds germinated by Day 6.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>5°C is too cold for the seeds to germinate.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>The best temperature for seeds to germinate was 15°C.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table> <p>If you are unable to award two marks, award <b>ONE</b> mark for <b>two</b> or <b>three</b> correct.</p>		True	False	Can't tell	The quickest germination was 25°C.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	At 25°C all the seeds germinated by Day 6.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5°C is too cold for the seeds to germinate.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The best temperature for seeds to germinate was 15°C.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p><b>2m</b></p> <p><b>or</b></p> <p><b>1m</b></p>	
	True	False	Can't tell																				
The quickest germination was 25°C.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																				
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<p><b>6d i, ii</b></p> <p>1/2c</p>	<p>Award <b>ONE</b> mark for <b>both</b> parts correct:</p> <p>■ agree with Faiza</p> <p style="text-align: center;"><input type="checkbox"/>                      <input checked="" type="checkbox"/>                      <input type="checkbox"/></p> <p style="text-align: center;"><b>AND</b></p> <p>a response which shows an awareness that only one kind of seed has been tested or that all temperatures were not tested:</p> <ul style="list-style-type: none"> <li>■ they did not test different kinds of seed;</li> <li>■ they only tested one kind of seed;</li> <li>■ they only used lettuce seeds;</li> <li>■ they didn't test all other temperatures.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ some seeds may need more heat to germinate;</li> <li>■ 25°C might be the best temperature for lettuce seeds;</li> <li>■ they might not have allowed sufficient time;</li> <li>■ you do not know what would happen if you left it longer.</li> </ul> <p><b>Allow:</b></p> <p>if neither box is ticked but the creditworthy explanation indicates that the pupils believe Faiza is correct, the mark may be awarded.</p>	<p><b>1m</b></p>	<p><b>Do not</b> give credit where a box other than 'agree with Faiza' is ticked.</p> <p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ more information.</li> </ul>																				

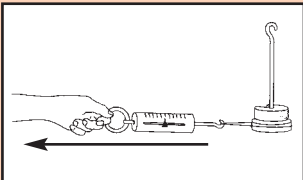
When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

### Test A question 7: Temperature changes in drinks

Question	Requirements	Mark	Additional guidance
7a  1/2j	<p>Award <b>ONE</b> mark for an explanation that the slope of the graph for cup B is steeper and/or the line for cup B is lower (than cup A):</p> <ul style="list-style-type: none"> <li>the graph for cup B goes down more quickly;</li> <li>the graph for cup B drops more steeply in the first 40 minutes;</li> <li>after 40 minutes, cup B is at a lower temperature than cup A;</li> <li>cup B's temperature went down more quickly.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>cup B goes down more than cup A;</li> <li>after 40 minutes, cup B is at <math>39(\pm 1)^{\circ}\text{C}</math> and cup A is at <math>45(\pm 1)^{\circ}\text{C}</math>;</li> <li>it/its line is lower.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>cup B reached room temperature first.</li> </ul>	1m	<p><b>Do not</b> give credit for an insufficient response that restates that cup B cooled more quickly:</p> <ul style="list-style-type: none"> <li>cup B cooled the quickest;</li> <li>cup A is hotter.</li> </ul> <p><b>Do not</b> give credit for an insufficient response that only describes the temperature in one cup:</p> <ul style="list-style-type: none"> <li>cup B is at <math>39^{\circ}\text{C}</math>.</li> </ul> <p><b>Do not</b> give credit for an insufficient response that is ambiguous as to which cup is being described:</p> <ul style="list-style-type: none"> <li>one line goes down faster than the other.</li> </ul>
7b  1/2h	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li><math>25^{\circ}\text{C}</math>.</li> </ul> <p><b>Allow:</b> a response within the range of <math>23\text{--}27^{\circ}\text{C}</math> inclusive.</p>	1m	
7c  3/1b	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li>thermal insulator <input checked="" type="checkbox"/> <input type="checkbox"/></li> <li><input type="checkbox"/> <input type="checkbox"/></li> </ul>	1m	
7d  3/1b 1/2c	<p>Award <b>ONE</b> mark for a response that increases the amount of insulation and reduces the heat leaving her drink:</p> <ul style="list-style-type: none"> <li>put a lid on it;</li> <li>wrap it in another insulating material/use a mug warmer;</li> <li>put the drink in a thicker/more insulating cup;</li> <li>put the cup inside another cup;</li> <li>wrap it in foil;</li> <li>hold the cup in her hands;</li> <li>put the drink in a flask.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>put it in a warm place.</li> </ul>	1m	<p><b>Do not</b> give credit for a response that includes incorrect science:</p> <ul style="list-style-type: none"> <li>put the drink in a metal cup [metal is a good conductor].</li> </ul> <p><b>Do not</b> give credit for an insufficient response that indicates re-heating the drink:</p> <ul style="list-style-type: none"> <li>put it on the cooker/in the oven;</li> <li>re-heat it in the microwave; [these do not describe how to minimise heat loss].</li> </ul>

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

### Test A question 8: Stacking masses

Question	Requirements	Mark	Additional guidance
<p><b>8a</b></p> <p>4/2e</p>	<p>Award <b>ONE</b> mark for an arrow in the direction of pull anywhere in the box:</p>  <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>an arrow towards the left at an angle of <math>45^\circ</math> above or below the horizontal.</li> </ul>	<b>1m</b>	
<p><b>8b</b></p> <p>4/2c 1/2i</p>	<p>Award <b>TWO</b> marks for a general comparison describing the relationship between the <b>number of masses</b> and the <b>size of the force</b> required to pull them:</p> <ul style="list-style-type: none"> <li>the more masses there are, the greater the force needed to pull them;</li> <li>the fewer masses there are, the smaller the force needed to pull them.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>for every mass added, the force increases by 0.15 N;</li> <li>the greater the weight, the bigger the force needed to pull them.</li> </ul> <p>Award <b>ONE</b> mark for two specific comparisons describing the relationship:</p> <ul style="list-style-type: none"> <li>lots of masses need a big force and one mass needs a small force.</li> </ul> <p>Award <b>ONE</b> mark for a single comparison of the variables:</p> <ul style="list-style-type: none"> <li>more force is needed when there are lots of masses;</li> <li>less force is needed when there is one mass.</li> </ul> <p>Award <b>ONE</b> mark for a response indicating that the force increases for every mass added, but the amount of increase is incorrect:</p> <ul style="list-style-type: none"> <li>for every mass added, the force increases by 15 N.</li> </ul>	<p><b>2m</b></p> <p><b>or</b></p> <p><b>1m</b></p>	<p><b>Do not</b> give credit for an insufficient response that changes a variable:</p> <ul style="list-style-type: none"> <li>the more masses there are, the bigger the forcemeter.</li> </ul> <p><b>Do not</b> give credit for an insufficient response that replaces frictional force with weight:</p> <ul style="list-style-type: none"> <li>the more the mass, the greater the weight (force).</li> </ul>

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

### Test A question 8: Stacking masses (continued)

Question	Requirements	Mark	Additional guidance
<p><b>8c</b></p> <p>1/2m</p>	<p>Award <b>ONE</b> mark for an indication that his results are recorded in reverse order <b>or</b> a response that identifies the incorrect relationship in the table:</p> <ul style="list-style-type: none"> <li>■ his results are the wrong way round;</li> <li>■ his results show that the more masses he added, the easier it was to pull;</li> <li>■ he put that the least mass needs the biggest force to pull it.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ they are in the wrong order;</li> <li>■ it is backwards.</li> </ul>	<p><b>1m</b></p>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ his results;</li> <li>■ his results do not match his notes;</li> <li>■ they are all in the wrong place;</li> <li>■ the first and last readings need to be swapped.</li> </ul> <p><b>Do not</b> give credit for an insufficient response that replaces frictional force with weight:</p> <ul style="list-style-type: none"> <li>■ his table shows that the higher the number of masses, the more it weighs.</li> </ul>
<p><b>8d</b></p> <p>1/2g</p>	<p>Award <b>ONE</b> mark for an indication that he should check his method and/or repeat his test:</p> <ul style="list-style-type: none"> <li>■ do his test again (to check his results);</li> <li>■ repeat his test;</li> <li>■ make sure he is doing his test correctly;</li> <li>■ review his plan.</li> </ul>	<p><b>1m</b></p>	<p><b>Do not</b> give credit for an insufficient response that relates to checking his results:</p> <ul style="list-style-type: none"> <li>■ check his test results [repetition of stem];</li> <li>■ keep going over it again and again;</li> <li>■ double check it;</li> </ul> <p>[it is ambiguous whether these refer to repeating the test or checking the results again].</p>

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

### Test A question 9: Citric acid and bicarbonate of soda

Question	Requirements	Mark	Additional guidance																
<p><b>9a</b></p> <p>3/1e</p>	<p>Award <b>TWO</b> marks for <b>all three</b> ticks correctly placed:</p> <table border="1"> <thead> <tr> <th>Material</th> <th>Solid</th> <th>Liquid</th> <th>Gas</th> </tr> </thead> <tbody> <tr> <td>Citric acid powder</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Bicarbonate of soda powder</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Water</td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table> <p>If you are unable to award two marks, award <b>ONE</b> mark for <b>any two</b> ticks correctly placed.</p>	Material	Solid	Liquid	Gas	Citric acid powder	✓			Bicarbonate of soda powder	✓			Water		✓		<p><b>2m</b></p> <p><b>or</b></p> <p><b>1m</b></p>	
Material	Solid	Liquid	Gas																
Citric acid powder	✓																		
Bicarbonate of soda powder	✓																		
Water		✓																	
<p><b>9b</b></p> <p>3/3d,e</p>	<p>Award <b>TWO</b> marks for a response that describes the following events in the context of the experiment in the given order:</p> <ol style="list-style-type: none"> <li>1) the water evaporates;</li> <li>2) the citric acid remains in the container/dish:</li> </ol> <ul style="list-style-type: none"> <li>■ evaporate the water and the citric acid will stay in the container;</li> <li>■ put the water and citric acid mixture somewhere warm. The water will turn to vapour and the citric acid will remain.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ they heat the mixture. The citric acid powder is left behind.</li> </ul> <p>If you are unable to award two marks, award <b>ONE</b> mark for a response that describes one event:</p> <ul style="list-style-type: none"> <li>■ evaporate the water from the container;</li> <li>■ the citric acid forms crystals once the water is gone.</li> </ul> <p><b>Allow:</b></p> <p>a response that indicates they move the container to a warmer place (to increase the rate of evaporation):</p> <ul style="list-style-type: none"> <li>■ move the container/mixture to a warmer place;</li> <li>■ put the bowl on the radiator.</li> </ul>	<p><b>2m</b></p> <p><b>or</b></p> <p><b>1m</b></p>	<p><b>Do not</b> credit the first marking point for a response that includes incorrect science indicating the citric acid may evaporate with the water:</p> <ul style="list-style-type: none"> <li>■ evaporate the solution.</li> </ul> <p><b>Do not</b> credit the first marking point for an insufficient response that is unclear or ambiguous as to what is evaporating:</p> <ul style="list-style-type: none"> <li>■ evaporate it.</li> </ul>																

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



## Test B question 1: *Playing football*

Question	Requirements	Mark	Additional guidance
<p><b>1a</b></p> <p>2/2c</p>	<p>Award <b>ONE</b> mark for an indication that pulse rate is a measure of heart rate:</p> <ul style="list-style-type: none"> <li>■ heart rate;</li> <li>■ the number of heart beats per minute;</li> <li>■ how fast your heart is pumping;</li> <li>■ how much the heart beats.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ (the speed of your) heart beat;</li> <li>■ the number of beats per second.</li> </ul>	<p><b>1m</b></p>	<p><b>Do not</b> give credit for a response that includes incorrect science:</p> <ul style="list-style-type: none"> <li>■ how fast you are breathing.</li> </ul> <p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ how fast your heart is moving/going;</li> <li>■ (the speed of) your heart.</li> </ul>
<p><b>1b</b></p> <p>2/2d 1/2l</p>	<p>Award <b>ONE</b> mark for a response indicating that the heart rate had increased:</p> <ul style="list-style-type: none"> <li>■ their heart beat was faster;</li> <li>■ their hearts were pumping more quickly.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ the heart pumps more blood around the body;</li> <li>■ the blood is pumped around the body faster.</li> </ul> <p>❖ <b>Give credit</b> for a correct response that goes beyond the key stage 2 programme of study indicating that the human body requires more oxygen/energy from the blood during exercise:</p> <ul style="list-style-type: none"> <li>■ the blood moves more quickly because the body needs more energy;</li> <li>■ they needed more oxygen/food/glucose so their hearts were pumping faster;</li> <li>■ to get rid of carbon dioxide from cells more quickly.</li> </ul>	<p><b>1m</b></p>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ their pulse goes up because they are running/moving around [given];</li> <li>■ they need more blood.</li> </ul>
<p><b>1c</b></p> <p>2/2d</p>	<p>Award <b>ONE</b> mark for an indication that their pulse would decrease and/or return to normal:</p> <p><i>The children's pulse rates will...</i></p> <ul style="list-style-type: none"> <li>■ return to normal;</li> <li>■ go down;</li> <li>■ get slower.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ drop;</li> <li>■ calm down.</li> </ul>	<p><b>1m</b></p>	<p><b>Do not</b> give credit for an insufficient response:</p> <p><i>The children's pulse rates will...</i></p> <ul style="list-style-type: none"> <li>■ change.</li> </ul>

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

### Test B question 2: *Mixing liquids*

Question	Requirements	Mark	Additional guidance									
<p><b>2a</b></p> <p>3/2f</p>	<p>Award <b>ONE</b> mark for <b>both</b> parts correct:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"></td> <td style="width: 40%; text-align: center;"><i>Yes</i></td> <td style="width: 40%; text-align: center;"><i>No</i></td> </tr> <tr> <td>■</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>■</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table>		<i>Yes</i>	<i>No</i>	■	<input type="checkbox"/>	<input checked="" type="checkbox"/>	■	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>1m</b>	
	<i>Yes</i>	<i>No</i>										
■	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
■	<input type="checkbox"/>	<input checked="" type="checkbox"/>										
<p><b>2b</b></p> <p>3/2f</p>	<p>Award <b>ONE</b> mark for:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"></td> <td style="width: 40%; text-align: center;"><input type="checkbox"/></td> <td style="width: 40%; text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>■</td> <td>a solid formed. <input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>		<input type="checkbox"/>	<input type="checkbox"/>	■	a solid formed. <input checked="" type="checkbox"/>	<input type="checkbox"/>	<b>1m</b>				
	<input type="checkbox"/>	<input type="checkbox"/>										
■	a solid formed. <input checked="" type="checkbox"/>	<input type="checkbox"/>										
<p><b>2c</b></p> <p>1/2a,c</p>	<p>Award <b>ONE</b> mark for a response indicating that the children should add different volumes of vinegar to the milk:</p> <ul style="list-style-type: none"> <li>■ put different amounts of vinegar in each;</li> <li>■ put a small amount of vinegar in one container. Put a bit more vinegar in the next container and lots in the last one.</li> </ul>	<b>1m</b>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ <i>put vinegar in each.</i></li> </ul>									

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

## Test B question 2: *Mixing liquids (continued)*

Question	Requirements	Mark	Additional guidance
<p><b>2d</b></p> <p>1/2c</p>	<p>Award <b>ONE</b> mark for an indication that the children could weigh the balls:</p> <ul style="list-style-type: none"> <li>■ they could weigh the balls.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ put the balls on scales.</li> </ul> <p><b>OR</b></p> <p>Award <b>ONE</b> mark for a response which controls the size of the balls in at least one dimension and describes the dimension to be measured (if it is different to the method already given):</p> <ul style="list-style-type: none"> <li>■ the children could put the balls into identical containers, squash them flat and measure the height;</li> <li>■ the children could flatten the balls to the same height and measure the area;</li> <li>■ the children could harden the balls in the fridge/freezer/oven before measuring;</li> <li>■ draw a circle around the ball and measure its area (on graph paper).</li> </ul> <p><b>Allow:</b></p> <p>a response that attempts to control the size of the ball in one dimension without indicating how they will measure it:</p> <ul style="list-style-type: none"> <li>■ make the white ball flat and measure it.</li> </ul> <p>❖ <b>Give credit</b> for a correct response that goes beyond the key stage 2 programme of study, showing an understanding that the size of the white balls may be measured by displacement when the balls are pushed into the water:</p> <ul style="list-style-type: none"> <li>■ measure how much the volume increases when the white ball is pushed into the water.</li> </ul>	<p><b>1m</b></p>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ measure its area;</li> <li>■ use a ruler;</li> <li>■ use string;</li> <li>■ look at them.</li> </ul>

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

### Test B question 3: Bouncing balls

Question	Requirements	Mark	Additional guidance
3a 1/2e	Award <b>ONE</b> mark for: <ul style="list-style-type: none"> <li>■ ruler;</li> <li>■ metre rule;</li> <li>■ tape measure.</li> </ul> <b>Allow:</b> <ul style="list-style-type: none"> <li>■ measurement stick;</li> <li>■ metre stick.</li> </ul>	1m	<b>Do not</b> give credit for an insufficient response: <ul style="list-style-type: none"> <li>■ a piece of string.</li> </ul>
3b 1/2h	Award <b>ONE</b> mark for: <ul style="list-style-type: none"> <li>■ <input type="checkbox"/> <input type="checkbox"/> in a table <input checked="" type="checkbox"/></li> </ul>	1m	
3c 1/2d	Award <b>ONE</b> mark for a recognition of the need for control/fair test: <ul style="list-style-type: none"> <li>■ to make the test fair;</li> <li>■ making it different will make it unfair.</li> </ul> <b>OR</b> <p>identification of lack of comparability:</p> <ul style="list-style-type: none"> <li>■ dropping it at different heights will make it go higher/different;</li> <li>■ dropping it at different heights will be unfair.</li> </ul>	1m	<b>Do not</b> give credit for an insufficient response: <ul style="list-style-type: none"> <li>■ to see if it changed.</li> </ul>
3d 1/2d	Award <b>ONE</b> mark for a recognition of the independent variable as the surface: <ul style="list-style-type: none"> <li>■ the surface;</li> <li>■ the surface used to bounce the ball.</li> </ul> <b>Allow:</b> <ul style="list-style-type: none"> <li>■ ground;</li> <li>■ material.</li> </ul>	1m	<b>Do not</b> give credit for a response that includes incorrect science which indicates an investigation of a factor not mentioned in the table: <ul style="list-style-type: none"> <li>■ area.</li> </ul> <b>Do not</b> give credit for a response that includes incorrect science giving the dependent variable: <ul style="list-style-type: none"> <li>■ how high it bounces.</li> </ul>

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

### Test B question 3: *Bouncing balls (continued)*

Question	Requirements	Mark	Additional guidance
3e  1/2i	<p>Award <b>ONE</b> mark for:</p> <p style="text-align: center;"><input type="checkbox"/>                      <input type="checkbox"/></p> <p>■ concrete <input checked="" type="checkbox"/>                      <input type="checkbox"/></p>	1m	
3f  1/2i	<p>Award <b>TWO</b> marks for a general comparison describing the relationship between the <b>height of drop</b> and the <b>height of bounce</b>:</p> <ul style="list-style-type: none"> <li>■ the higher the drop the higher the bounce;</li> <li>■ the lower the drop the lower the bounce.</li> </ul> <p>If you are unable to award two marks, award <b>ONE</b> mark for <b>two specific</b> comparisons describing the relationship:</p> <ul style="list-style-type: none"> <li>■ the highest drop bounces highest, the lowest drop bounces lowest.</li> </ul> <p>Award <b>ONE</b> mark for a single comparison of the variables:</p> <ul style="list-style-type: none"> <li>■ the highest makes it bounce high;</li> <li>■ the lowest height makes it bounce low;</li> <li>■ a low height makes it bounce low.</li> </ul>	<p>2m</p> <p>or</p> <p>1m</p>	<p><i>Do not give credit for a response that changes one or both variables:</i></p> <ul style="list-style-type: none"> <li>■ <i>the higher it drops the faster it goes;</i></li> <li>■ <i>the higher the drop the harder it bounces.</i></li> </ul> <p><i>Do not give credit for a response that gives an incorrect or correct explanation:</i></p> <ul style="list-style-type: none"> <li>■ <i>there is more force pulling down so the bounce is bigger.</i></li> </ul>

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

### Test B question 4: Seeds

Question	Requirements	Mark	Additional guidance
<p><b>4a</b></p> <p>2/3d</p>	<p>Award <b>ONE</b> mark for an indication that plants need to produce seeds to reproduce, or to allow the plant type to disperse:</p> <ul style="list-style-type: none"> <li>■ to allow it to reproduce;</li> <li>■ it allows the species/type of plant to survive;</li> <li>■ so that it produces new/young plants/seedlings;</li> <li>■ so that new plants can grow in different places;</li> <li>■ to complete the life cycle;</li> <li>■ so that a young plant will grow.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ to spread the plants out;</li> <li>■ without seeds, no new plants would grow;</li> <li>■ to make baby plants;</li> <li>■ to produce more plants.</li> </ul>	<p><b>1m</b></p>	<p><b>Do not</b> give credit for an insufficient response that implies the individual plant will die if it does not produce seeds:</p> <ul style="list-style-type: none"> <li>■ it allows the plant to survive;</li> <li>■ to carry on living.</li> </ul> <p><b>Do not</b> give credit for a non-specific or ambiguous response:</p> <ul style="list-style-type: none"> <li>■ they would not grow if they did not have seeds;</li> <li>■ to (help them) grow;</li> <li>■ so that it can grow [implies that the original plant regrows].</li> </ul>
<p><b>4b</b></p> <p>2/3d</p>	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li>■ <input type="checkbox"/> Birds spread the seeds in their droppings. <input checked="" type="checkbox"/></li> <li>■ <input type="checkbox"/> <input type="checkbox"/></li> </ul>	<p><b>1m</b></p>	

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

### Test B question 4: Seeds (continued)

Question	Requirements	Mark	Additional guidance
4c i  1/2j	Award <b>ONE</b> mark for: <ul style="list-style-type: none"> <li>red.</li> </ul>	1m	
4c ii  2/5c 1/2l	Award <b>ONE</b> mark for a response that links the colour/visibility (of the berries) with attraction to birds and/or to seed dispersal: <ul style="list-style-type: none"> <li>birds can see red seeds more easily and they will be eaten more often;</li> <li>birds will eat the red berries that they can see easier;</li> <li>berries that blend in may not be eaten as often as when the berries are ripe;</li> <li>the brighter the seeds, the more are dispersed.</li> </ul> <p><b>Allow:</b>            a response that links colour of berries to visibility, implying that more or less seeds are dispersed, depending on colour referred to:</p> <ul style="list-style-type: none"> <li>birds can see red more clearly;</li> <li>birds may not notice berries which are the same colour as the leaves;</li> <li>the brighter the berry, the easier it is for birds to see them;</li> <li>the more contrast between the leaves and the colour of the berry, the more likely the birds are to see them.</li> </ul>	1m	<p><b>Do not</b> give credit for an insufficient response that does not refer to visibility of the berries to the birds:</p> <ul style="list-style-type: none"> <li>the berries are brighter;</li> <li>red stands out;</li> <li>red is better.</li> </ul> <p><b>Do not</b> give credit for an insufficient response that changes a variable in the relationship:</p> <ul style="list-style-type: none"> <li>the number of berries depends on the type of bird.</li> </ul>

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

### Test B question 5: Evaporation

Question	Requirements	Mark	Additional guidance
<p><b>5a</b></p> <p>3/1e 3/2d</p>	<p>Award <b>ONE</b> mark for:</p> <p><input type="checkbox"/> <input type="checkbox"/></p> <p>■ <input type="checkbox"/> liquid to gas. <input checked="" type="checkbox"/></p>	<b>1m</b>	
<p><b>5b i</b></p> <p>1/2d</p>	<p>Award <b>ONE</b> mark for identifying one way her test is not fair:</p> <ul style="list-style-type: none"> <li>■ the containers are different shapes/sizes;</li> <li>■ the vinegar container is wider;</li> <li>■ there is more vinegar than water;</li> <li>■ there is less water.</li> </ul>	<b>1m</b>	
<p><b>5b ii</b></p> <p>1/2d</p>	<p>Award <b>ONE</b> mark for an understanding that her results will not be reliable if her test is not fair:</p> <ul style="list-style-type: none"> <li>■ because she will not be able to trust her results if her test is not fair;</li> <li>■ because she will not know what her results mean;</li> <li>■ because she will not be sure if her results are the true results of her test;</li> <li>■ she will not be able to interpret/compare her results.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ she will not be able to tell which liquid evaporates more quickly.</li> </ul>	<b>1m</b>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ <i>her results will not be accurate [her test may be accurate but because her test is not fair, she cannot draw a reliable conclusion from her results].</i></li> </ul>

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



### Test B question 5: *Evaporation (continued)*

Question	Requirements	Mark	Additional guidance
<p><b>5c</b></p> <p>1/2j</p>	<p>Award <b>ONE</b> mark for a conclusion indicating that more vinegar than water evaporated (over three days):</p> <ul style="list-style-type: none"> <li>■ less water than vinegar evaporated;</li> <li>■ the vinegar's volume decreased more than the water's.</li> </ul> <p><b>Allow:</b> a response that does not make explicit the two factors being compared:</p> <ul style="list-style-type: none"> <li>■ vinegar evaporated most;</li> <li>■ water evaporated least.</li> </ul> <p>❖ <b>Give credit</b> for a correct response that goes beyond the key stage 2 programme of study, indicating the relationship in terms of a rate:</p> <ul style="list-style-type: none"> <li>■ the vinegar evaporated a bit faster than the water (over the three days);</li> <li>■ overall, the water evaporated at a slower rate than the vinegar.</li> </ul>	<b>1m</b>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ different amounts of water and vinegar evaporated;</li> <li>■ she found an answer to her test;</li> <li>■ she was right/wrong;</li> <li>■ the vinegar evaporated first.</li> </ul>
<p><b>5d</b></p> <p>3/2d 1/2l</p>	<p>Award <b>ONE</b> mark for an indication that the air temperature increased <b>or</b> that there was more movement of air:</p> <ul style="list-style-type: none"> <li>■ it was hotter;</li> <li>■ it might have been a warmer day;</li> <li>■ it was sunnier;</li> <li>■ it was more draughty/windy;</li> <li>■ the air was drier/less humid;</li> <li>■ it was not as hot on the other days;</li> <li>■ it was cooler/less windy on Monday and Wednesday.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ it was sunnier;</li> <li>■ there was more sunlight; [implies it was hotter].</li> </ul> <p><b>Allow:</b> a response given in absolute terms:</p> <ul style="list-style-type: none"> <li>■ it was hot;</li> <li>■ it was draughty.</li> </ul>	<b>1m</b>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ the heat was different [does not specify an increase].</li> </ul> <p><b>Do not</b> give credit for an incorrect response:</p> <ul style="list-style-type: none"> <li>■ they might have put it somewhere warmer.</li> </ul>

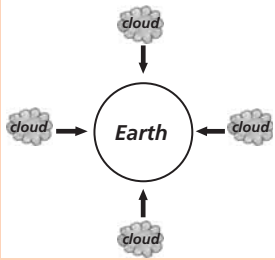
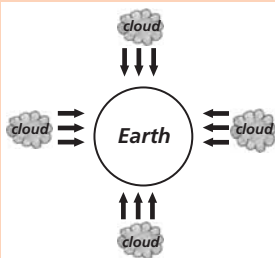
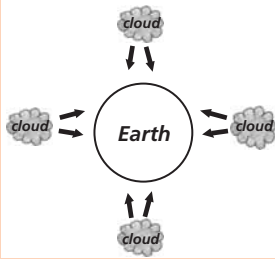
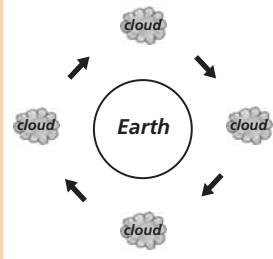
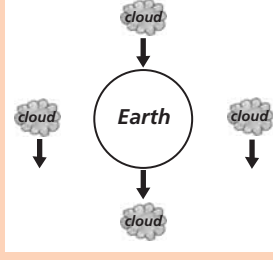
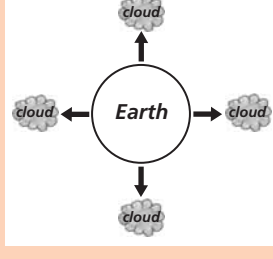
When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

### Test B question 6: Planet Earth

Question	Requirements	Mark	Additional guidance																		
<p><b>6a</b></p> <p>4/4a</p>	<p>Award <b>ONE</b> mark for an awareness that the Earth is spherical:</p> <ul style="list-style-type: none"> <li>■ the Earth is a sphere;</li> <li>■ the Earth is spherical;</li> <li>■ a sphere.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ the Earth is shaped like a ball.</li> </ul> <p>❖ <b>Give credit</b> for a correct response that goes beyond the key stage 2 programme of study:</p> <ul style="list-style-type: none"> <li>■ ovoid;</li> <li>■ geoid.</li> </ul>	<p><b>1m</b></p>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ round;</li> <li>■ circular;</li> <li>■ oval.</li> </ul>																		
<p><b>6b i, ii</b></p> <p>4/4c</p>	<p>Award <b>TWO</b> marks for <b>all five</b> ideas correctly classified:</p> <table border="1" data-bbox="331 875 767 1167"> <thead> <tr> <th>Idea</th> <th>True</th> <th>False</th> </tr> </thead> <tbody> <tr> <td>The Earth goes around the Sun.</td> <td>✓</td> <td></td> </tr> <tr> <td>The Earth spins on its axis.</td> <td>✓</td> <td></td> </tr> <tr> <td>The Sun is hidden behind the Moon at night.</td> <td></td> <td>✓</td> </tr> <tr> <td>The Sun orbits the Earth.</td> <td></td> <td>✓</td> </tr> <tr> <td>Night is dark because thick clouds cover the Sun.</td> <td></td> <td>✓</td> </tr> </tbody> </table> <p>If you are unable to award two marks, award <b>ONE</b> mark for <b>any four</b> ideas correctly classified.</p>	Idea	True	False	The Earth goes around the Sun.	✓		The Earth spins on its axis.	✓		The Sun is hidden behind the Moon at night.		✓	The Sun orbits the Earth.		✓	Night is dark because thick clouds cover the Sun.		✓	<p><b>2m</b></p> <p><b>or</b></p> <p><b>1m</b></p>	
Idea	True	False																			
The Earth goes around the Sun.	✓																				
The Earth spins on its axis.	✓																				
The Sun is hidden behind the Moon at night.		✓																			
The Sun orbits the Earth.		✓																			
Night is dark because thick clouds cover the Sun.		✓																			

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

## Test B question 6: Planet Earth (continued)

Question	Requirements	Mark	Additional guidance
<p><b>6c i</b></p> <p>4/2b,e</p>	<p>Award <b>ONE</b> mark for <b>four</b> arrows drawn from the clouds towards the centre of the Earth:</p> <ul style="list-style-type: none"> <li>  </li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>  </li> </ul> <p><b>Allow:</b></p> <p>a response in which the arrows are not drawn horizontally or vertically as long as they point from the clouds towards the Earth:</p> <ul style="list-style-type: none"> <li>  </li> </ul>	<p><b>1m</b></p>	<p><b>Do not</b> give credit for a response that includes incorrect science showing any of the arrows drawn at an inappropriate angle [not the direction in which gravity acts]:</p> <ul style="list-style-type: none"> <li>  </li> <li>  </li> <li>  </li> </ul>
<p><b>6c ii</b></p> <p>4/2b</p>	<p>Award <b>ONE</b> mark for an explanation that gravity acts towards (the centre of) the Earth/a large mass and/or exerts a pulling force on the rain:</p> <ul style="list-style-type: none"> <li>gravity acts towards the centre of the Earth;</li> <li>gravity acts towards the centre of the mass of a body;</li> <li>gravity pulls the rain towards the Earth;</li> <li>gravity pulls the rain down.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>gravity pulls you to Earth;</li> <li>the rain is pulled to the ground.</li> </ul>	<p><b>1m</b></p>	<p><b>Do not</b> give credit for a response that includes incorrect science:</p> <ul style="list-style-type: none"> <li>gravity pushes the rain to the ground.</li> </ul> <p><b>Do not</b> give credit for an insufficient response that does not explain how gravity acts on the rain:</p> <ul style="list-style-type: none"> <li>rain falls down due to gravity;</li> <li>the rain falls to the ground; the force is called gravity;</li> <li>everything falls towards the ground (wherever you are on Earth) [no reference to a force].</li> </ul>

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

### Test B question 7: Edward Jenner

Question	Requirements	Mark	Additional guidance
7a  1/1b	<p>Award <b>ONE</b> mark for:</p> <ul style="list-style-type: none"> <li>■ an observation <input checked="" type="checkbox"/> <input type="checkbox"/></li> <li><input type="checkbox"/> <input type="checkbox"/></li> </ul>	1m	
7b  1/2g	<p>Award <b>ONE</b> mark for an indication that he needed to have similar results from more than one person <b>or</b> to check that it is safe to use on humans:</p> <ul style="list-style-type: none"> <li>■ to check that his results could be applied to different people;</li> <li>■ to see if his results applied to everyone;</li> <li>■ to check his results;</li> <li>■ to see if it is safe (to give people cowpox);</li> <li>■ to see if some people are allergic to it.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ it might not affect some people;</li> <li>■ in case it did not work on one person;</li> <li>■ different people might react differently to it;</li> <li>■ so there is more evidence.</li> </ul> <p><b>Allow:</b></p> <p>a response indicating they are checking the accuracy of the results;</p> <ul style="list-style-type: none"> <li>■ to see if his results were accurate.</li> </ul>	1m	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ to make his test fair.</li> </ul> <p><b>Do not</b> give credit for an insufficient response indicating that people should be tested, but <b>not</b> indicating that there could be variation within a population:</p> <ul style="list-style-type: none"> <li>■ to see what effect it could have.</li> </ul>
7c  1/2e	<p>Award <b>ONE</b> mark for an understanding that these are safety precautions:</p> <ul style="list-style-type: none"> <li>■ so that they do not breathe in/out the micro-organism;</li> <li>■ so that the micro-organism does not get on to their skin;</li> <li>■ so they do not get the illness themselves;</li> <li>■ to protect them from the disease;</li> <li>■ so the germs do not spread (to the scientist).</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ because micro-organisms can be harmful/dangerous;</li> <li>■ to stop them catching a disease;</li> <li>■ to be safe.</li> </ul>	1m	

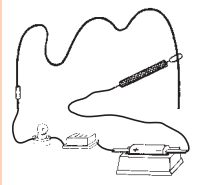
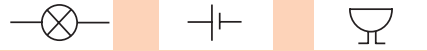
When applying this mark scheme, please also refer to the *General guidance* given on pages 1 and 2.

### Test B question 7: Edward Jenner (continued)

Question	Requirements	Mark	Additional guidance
<p><b>7d</b></p> <p>2/5f</p>	<p>Award <b>ONE</b> mark for <b>one</b> correct response indicating a positive benefit of micro-organisms:</p> <ul style="list-style-type: none"> <li>■ to make compost;</li> <li>■ to break down waste material;</li> <li>■ to make cheese;</li> <li>■ to make bread;</li> <li>■ to make yogurt;</li> <li>■ in brewing;</li> <li>■ to help you digest things.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ to make medicines;</li> <li>■ to preserve things [like sauerkraut];</li> <li>■ to give yogurt/cheese flavour.</li> </ul> <p>❖ <b>Give credit</b> for a correct response that goes beyond the key stage 2 programme of study:</p> <ul style="list-style-type: none"> <li>■ some are producers in a food chain.</li> </ul>	<p><b>1m</b></p>	<p><b>Do not</b> give credit for an insufficient response, repeating information from the stem:</p> <ul style="list-style-type: none"> <li>■ to stop you getting ill;</li> <li>■ to help make you better when you are ill.</li> </ul> <p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ in food and drink [can have good and bad effects].</li> </ul>
<p><b>7e</b></p> <p>2/4a</p>	<p>Award <b>TWO</b> marks for <b>all three</b> correct:</p> <ul style="list-style-type: none"> <li>■ A is bacterium;</li> <li>■ B is euglena;</li> <li>■ C is blue-green algae.</li> </ul> <p>If you are unable to award two marks, award <b>ONE</b> mark for <b>any two</b> correct.</p>	<p><b>2m</b></p> <p><b>or</b></p> <p><b>1m</b></p>	

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

### Test B question 8: *The steady hand game*

Question	Requirements	Mark	Additional guidance
8a  3/1c	Award <b>ONE</b> mark for: <ul style="list-style-type: none"> <li>■ conductors.</li> </ul>	1m	<b>Do not</b> give credit for a response that includes incorrect science: <ul style="list-style-type: none"> <li>■ thermal conductor.</li> </ul>
8b  3/1c	Award <b>TWO</b> marks for identifying <b>all three</b> insulators:  <ul style="list-style-type: none"> <li>■ sticky tape <input checked="" type="checkbox"/> <input type="checkbox"/></li> <li>■ plasticine <input checked="" type="checkbox"/> newspaper <input checked="" type="checkbox"/></li> <li><input type="checkbox"/> <input type="checkbox"/></li> </ul> <p>If you are unable to award two marks, award <b>ONE</b> mark for correctly identifying <b>any two</b> insulators.</p>	2m  <i>or</i>  1m	
8c  4/1c	Award <b>ONE</b> mark for:  <ul style="list-style-type: none"> <li>■  <input type="checkbox"/> <input type="checkbox"/></li> <li><input checked="" type="checkbox"/> <input type="checkbox"/></li> </ul>	1m	
8d  4/1c	Award <b>ONE</b> mark for correctly labelling <b>all three</b> symbols:   <b>bulb</b> <b>cell</b> <b>buzzer</b>  <b>Allow:</b> <ul style="list-style-type: none"> <li>■ battery [in place of 'cell'].</li> </ul>	1m	

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

### Test B question 8: *The steady hand game (continued)*

Question	Requirements	Mark	Additional guidance
8e  4/1b	<p>Award <b>ONE</b> mark for an indication of an increase in voltage <b>or</b> that the bulb could be removed from the circuit:</p> <ul style="list-style-type: none"> <li>■ add a cell/battery;</li> <li>■ use a cell with a higher voltage;</li> <li>■ take the bulb out of the circuit;</li> <li>■ have two/more cells in the circuit.</li> </ul> <p><b>Allow:</b></p> <ul style="list-style-type: none"> <li>■ use a stronger cell;</li> <li>■ put another cell in;</li> <li>■ recharge the battery;</li> <li>■ use a new cell;</li> <li>■ use a more powerful battery;</li> <li>■ make the circuit/wire shorter/smaller.</li> </ul> <p>❖ <b>Give credit</b> for a correct response that goes beyond the key stage 2 programme of study:</p> <ul style="list-style-type: none"> <li>■ use thicker wire;</li> <li>■ use less wire.</li> </ul>	<b>1m</b>	<p><b>Do not</b> give credit for an insufficient response:</p> <ul style="list-style-type: none"> <li>■ use a bigger cell [does not indicate an increase in voltage];</li> <li>■ make a parallel circuit;</li> <li>■ change the position of the buzzer in the circuit;</li> <li>■ remove the bulb [does not refer to the circuit].</li> </ul>

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

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