

Sc

KEY STAGE

2

LEVELS

3–5

Mark schemes

Tests A and B

2011



Science sampling test

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The 2011 key stage 2 science tests and mark schemes were developed by the National Foundation for Educational Research (NFER) on behalf of QCDA.

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Marking the science tests

Following the recommendations of the Expert Group on Assessment it was decided to discontinue national curriculum tests in science at key stage 2 and to monitor national standards in science through externally-marked national sampling. The outcomes will be used to monitor national standards in key stage 2 science.

This booklet contains the mark schemes for tests A and B. External markers under contract to QCDA will mark the test papers using the mark schemes in this booklet.

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, question part and the area of the programme of study assessed.

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 will exercise their professional judgement.

To ensure consistency of marking, the most frequent queries are listed below, along with the action the marker will take.

What if...?	Marking procedure
The pupil gives two or more responses to a particular question part.	<p>a) If a pupil qualifies a scientifically correct answer with a scientifically incorrect statement, no mark will be awarded for that question part.</p> <p>b) 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 mark will be awarded.</p>
The pupil 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 pupil's response. If the correct boxes are left blank, no marks will be awarded.
The pupil ticks more than the required number of boxes.	One mark will be deducted for each incorrect answer. Negative marks will not be awarded.
In a planning question, no answer is given in the expected place, but the correct answer is given in the drafting box.	Where a pupil has shown understanding of the question, the mark(s) will be given.
The pupil misspells a word.	<p>a) If it is clear that the pupil has made a simple error, eg 'tow' for 'two' or 'son' for 'sun', then the incorrect spelling will be accepted and the mark awarded.</p> <p>b) If a pupil misspells a word copied from the text of the question or from a selection given, and the new word does not have any inappropriate meaning, the incorrect spelling will be accepted and the mark awarded.</p> <p>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 syllables of the correct word represented in the answer.</p>

Recording marks awarded

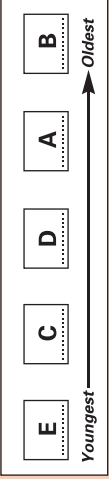
The number of available marks is recorded in the margin of the test booklet, alongside each question part, and also in the second column of the mark scheme. Depending on the type of response made to each part of each question by the pupil, the marker will award one of the following:

- 2 or 1 as appropriate for a creditworthy response
- 0 for an incorrect response
- if no response is made.

The marking is conducted online by external markers using scanned images of the pupils' work. Each paper has 40 marks available.

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Test A question 1: Growth and health

Question	Mark	Requirements	Allowable answers	Additional guidance												
1a 2/2f	1m	<p>Award ONE mark for all five stages in the correct order:</p> 														
1b 2/2f	1m	<p>Award ONE mark for both letters written in the correct place:</p> <table border="1"> <thead> <tr> <th>Stage (write the letter)</th> <th>Description of stage</th> </tr> </thead> <tbody> <tr> <td>C</td> <td> <ul style="list-style-type: none"> ■ has just learned to walk ■ is learning to talk ■ is learning to use a toilet </td> </tr> <tr> <td>D</td> <td> <ul style="list-style-type: none"> ■ body gets taller quickly and changes shape ■ more body hair starts to grow ■ may get spots (acne) </td> </tr> </tbody> </table>	Stage (write the letter)	Description of stage	C	<ul style="list-style-type: none"> ■ has just learned to walk ■ is learning to talk ■ is learning to use a toilet 	D	<ul style="list-style-type: none"> ■ body gets taller quickly and changes shape ■ more body hair starts to grow ■ may get spots (acne) 	<p>ONE mark may be awarded for both the names of the stages written in the correct place:</p> <table border="1"> <thead> <tr> <th>Stage (write the letter)</th> <th>Description of stage</th> </tr> </thead> <tbody> <tr> <td>toddler</td> <td> <ul style="list-style-type: none"> ■ has just learned to walk ■ is learning to talk ■ is learning to use a toilet </td> </tr> <tr> <td>teenager</td> <td> <ul style="list-style-type: none"> ■ body gets taller quickly and changes shape ■ more body hair starts to grow ■ may get spots (acne) </td> </tr> </tbody> </table>	Stage (write the letter)	Description of stage	toddler	<ul style="list-style-type: none"> ■ has just learned to walk ■ is learning to talk ■ is learning to use a toilet 	teenager	<ul style="list-style-type: none"> ■ body gets taller quickly and changes shape ■ more body hair starts to grow ■ may get spots (acne) 	
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teenager	<ul style="list-style-type: none"> ■ body gets taller quickly and changes shape ■ more body hair starts to grow ■ may get spots (acne) 															
1c 2/1a	2m or 1m	<p>Award TWO marks for all three missing cells in the table completed:</p> <table border="1"> <thead> <tr> <th>Life process</th> <th>Evidence of the life process</th> </tr> </thead> <tbody> <tr> <td>growth</td> <td>People get taller.</td> </tr> <tr> <td>movement/moves</td> <td>People walk.</td> </tr> <tr> <td>nutrition</td> <td>People eat (food)/feed</td> </tr> <tr> <td>reproduction</td> <td>People have babies.</td> </tr> </tbody> </table> <p>If you are unable to award two marks, award ONE mark for any two cells correct.</p>	Life process	Evidence of the life process	growth	People get taller.	movement/moves	People walk.	nutrition	People eat (food)/feed	reproduction	People have babies.	<p>Marks may be awarded for indicating that people drinking is evidence of nutrition:</p> <ul style="list-style-type: none"> ■ drink (water). 	<p>Do not give credit for an insufficient response describing a result of nutrition:</p> <ul style="list-style-type: none"> ■ people grow (fatter) ■ people have energy to use. <p>Do not give credit for an insufficient response giving 'sex' in place of reproduction.</p>		
Life process	Evidence of the life process															
growth	People get taller.															
movement/moves	People walk.															
nutrition	People eat (food)/feed															
reproduction	People have babies.															

Test A question 1: Growth and health (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
1d i 2/2b	1m	<p>Award ONE mark for: Sue should...</p> <ul style="list-style-type: none"> ■ <input type="checkbox"/> eat a variety of different foods. <input checked="" type="checkbox"/> ■ <input type="checkbox"/> 		
1d ii 2/2h,g	1m	<p>Award ONE mark for a response that describes a way Sue could help to stay healthy:</p> <ul style="list-style-type: none"> ■ keep fit/exercise ■ go swimming ■ lead an active life ■ do not smoke ■ do not drink too much alcohol ■ do not take drugs (unless it is medicine) ■ brush her teeth regularly ■ get plenty of/enough sleep ■ by washing. 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ do not drink alcohol ■ drink water. 	<p>Do not give credit for an insufficient response suggesting that Sue should eat/hot eat particular foods:</p> <ul style="list-style-type: none"> ■ she should eat lots of fruit ■ not eat too much salt/sugar ■ eat a balanced diet ■ drink milk. <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ watch less TV.

Test A question 2: *Mixing solids with water*

Question	Mark	Requirements	Allowable answers	Additional guidance
2a 1/2d	1m	<p>Award ONE mark for any two correct control variables:</p> <ul style="list-style-type: none"> ■ same type/size of sugar (grains) ■ same (amount of) sugar ■ same amount of/type of water ■ same air temperature/place ■ stir (at same rate). 	<p>ONE mark may be awarded for naming measuring equipment on which the calibration is likely to vary:</p> <ul style="list-style-type: none"> ■ thermometer ■ teaspoon. <p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ same (type/size of) beaker/container ■ same solid. 	<p>Do not give credit for a response that includes incorrect science:</p> <ul style="list-style-type: none"> ■ same (water) temperature [independent variable] ■ same time [dependent variable]. <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ same water ■ same equipment [need to specify]. <p>Do not give credit for a second response which is a repetition or re-statement of the first:</p> <ul style="list-style-type: none"> ■ the same amount of sugar ■ the same size spoon.
2b 1/2i,j	1m	<p>Award ONE mark for a general comparison describing the relationship between the temperature of the water and the time taken for the sugar to dissolve:</p> <ul style="list-style-type: none"> ■ the hotter the water, the quicker/faster/less time (the sugar took to dissolve) ■ the lower the temperature, the slower (the sugar dissolved). 	<p>ONE mark may be awarded for two specific comparisons describing the relationship:</p> <ul style="list-style-type: none"> ■ the hot temperature was very fast and the cold temperature was very slow. 	<p>Do not give credit for a response that includes incorrect science with a correct relationship:</p> <ul style="list-style-type: none"> ■ the hotter the water, the quicker it dissolves because the sugar is burned. <p>Do not give credit for an insufficient response re-stating the temperatures and times from the table without comparison:</p> <ul style="list-style-type: none"> ■ at 20°C it took 55 s, at 30°C it took 41 s and at 40°C it took 27 s. <p>(continued)</p>

Test A question 2: Mixing solids with water (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance								
2b (continued)				<p>Do not give credit for a response that changes one or both variables:</p> <ul style="list-style-type: none"> the higher the temperature, the smaller the sugar [insufficient]. <p>Do not give credit for an insufficient response giving a single comparison of the variables:</p> <ul style="list-style-type: none"> when the temperature was high, it did not take a long time. <p>Do not give credit for an insufficient response where the time taken is not described explicitly:</p> <ul style="list-style-type: none"> when it is hotter, it will dissolve better/easier. 								
2c 1/2j 3/3b	2m or 1m	<p>Award TWO marks for all three parts of the table completed correctly:</p> <table border="1"> <thead> <tr> <th>Name of solid</th> <th>Did the solid dissolve? Yes or no?</th> </tr> </thead> <tbody> <tr> <td>bath crystals</td> <td>Yes</td> </tr> <tr> <td>coconut</td> <td>No</td> </tr> <tr> <td>citric acid crystals</td> <td>Yes</td> </tr> </tbody> </table> <p>If you are unable to award two marks, award ONE mark for any two parts of the table completed correctly.</p>	Name of solid	Did the solid dissolve? Yes or no?	bath crystals	Yes	coconut	No	citric acid crystals	Yes		
Name of solid	Did the solid dissolve? Yes or no?											
bath crystals	Yes											
coconut	No											
citric acid crystals	Yes											

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

Test A question 3: Computer games

Question	Mark	Requirements	Allowable answers	Additional guidance
3a 1/2b	1m	Award ONE mark for: <ul style="list-style-type: none"> 10/ten (children). 		
3b 1/2h	1m	Award ONE mark for: <ul style="list-style-type: none"> seconds. 	ONE mark may be awarded for: <ul style="list-style-type: none"> s. 	Do not give credit for a response that includes incorrect science: <ul style="list-style-type: none"> milliseconds.
3c 1/2j	1m	Award ONE mark for an indication that (the group of) children who play computer games generally have faster reaction times than those who do not: <ul style="list-style-type: none"> (most) children who play computer games have faster reaction times the average reaction time is less for children who play computer games they have practised computer games and are faster. 	ONE mark may be awarded for a response in which 'they' refers to the children who play computer games: <ul style="list-style-type: none"> they have quick(er) reactions they are quick(er). 	Do not give credit for an insufficient response: <ul style="list-style-type: none"> they have more reactions than people who do not play their reaction times are different the ones who play computer games have lower scores [data not interpreted] the children who play computer games are better/good.
3d 1/2f, m	1m	Award ONE mark for an indication that a stopwatch measures reaction times less accurately or with less precision or that the time is too short to measure: <ul style="list-style-type: none"> the computer will measure more accurately you could not start and stop the stopwatch in time in that short time it is difficult to measure less than a second on a stopwatch very well the reaction time of the person using the stopwatch would affect the measurement. 	ONE mark may be awarded for a response implying a stopwatch is less reliable/quick/efficient at measuring: <ul style="list-style-type: none"> a computer is less likely to make mistakes (when measuring) you would not be so exact if you just had a stopwatch. 	Do not give credit for an insufficient response indicating computers are better because they are faster or that stopwatches are slower: <ul style="list-style-type: none"> computers are faster. Do not give credit for an insufficient response: <ul style="list-style-type: none"> the test will not be fair a stopwatch will not give the right answer.

Test A question 3: Computer games (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
<p>3e 1/2a</p>	<p>1m</p>	<p>Award ONE mark for ticking:</p> <ul style="list-style-type: none"> ■ Hassan [1 hour] <p>and one of Damien, Milly or Stuart [4 hours]</p> <p>and one of Amy or Tandi [10 hours].</p>		

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

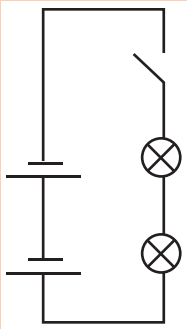
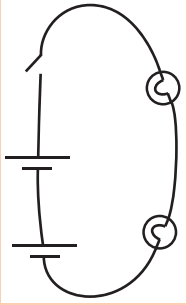
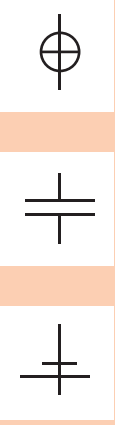


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Test A question 4: Soils

Question	Mark	Requirements	Allowable answers	Additional guidance
4a 1/2h	1m	Award ONE mark for a response between 8.5 and 9.5 cm exclusive.		
4b 3/1d 1/2l	1m	Award ONE mark for: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Soil B is more absorbent than soil A. <input checked="" type="checkbox"/>		
4c 3/3a	1m	Award ONE mark for a response naming sieves.		Do not give credit for an insufficient response: <input type="checkbox"/> colander <input type="checkbox"/> net.
4d 1/2j	1m	Award ONE mark for both conclusions correctly classified: Soil A has more small particles than soil B. True Soil B has more large particles than soil A. True		

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

Test A question 5: School play

Question	Mark	Requirements	Allowable answers	Additional guidance
5a 4/1c	2m or 1m	<p>Award TWO marks for a circuit diagram drawn correctly with 2 bulbs, 2 cells and a switch [the components may be drawn in any order but the cells must be correctly orientated]:</p>  <p>If you are unable to award two marks, award ONE mark for a correctly drawn circuit which is missing one component or for a circuit which contains the correct components but there is one mistake in either the symbols used or how they have been connected.</p>	<p>TWO marks may be awarded for a non-rectilinear circuit or a circuit containing an obsolete symbol for a bulb:</p> 	<p>Do not give full credit for a response that includes incorrect science:</p> <ul style="list-style-type: none"> circuits containing symbols not given or gaps between components of more than 2 mm circuits with extra/fewer components terminals on the cells facing each other circuits with incorrectly drawn components, eg: 
5b 4/1b	1m	<p>Award ONE mark for all three statements correctly classified:</p> <p>add another bulb add another cell use longer wires</p> <p>No..... Yes..... No.....</p>		
5c 4/3a,d	1m	<p>Award ONE mark for an arrow pointing from the star to Emma's eye/head:</p> 	<p>Do not give credit for an insufficient response showing an arrowhead in the correct orientation, but without a line showing the path of the light:</p> 	

Test A question 5: School play (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
5d i 4/3e	1m	Award ONE mark for a response recognising the triangle vibrates: <ul style="list-style-type: none"> it is vibrating. 	ONE mark may be awarded for a description of vibrations where the rapid speed of movement is indicated: <ul style="list-style-type: none"> it moves up and down very quickly. 	Do not give credit for an insufficient response: <ul style="list-style-type: none"> it wobbles/shakes it moves back and forwards.
5d ii 4/3g	1m	Award ONE mark for an indication that the sound travels through the air: <ul style="list-style-type: none"> air gas atmosphere. 	ONE mark may be awarded for: <ul style="list-style-type: none"> chairs floor. 	Do not give credit for a response that includes incorrect science: <ul style="list-style-type: none"> airwaves. Do not give credit for an insufficient response: <ul style="list-style-type: none"> triangle vibrations waves [the sound travels in the form of vibrations or waves, not through vibrations or waves].
5e 4/3f BoS 2a	1m	Award ONE mark for a general comparison describing the relationship between the distance people are from the triangle and how loud they hear it: <ul style="list-style-type: none"> the further away the people, the quieter it will be the nearer, the louder the further away, the less well you can hear it. 	ONE mark may be awarded for two specific comparisons describing the relationship: <ul style="list-style-type: none"> if you are near the triangle it will be loud, but if you are far away the sound will be quiet/soft. 	Do not give credit for a response that changes one or both variables: <ul style="list-style-type: none"> the further away, the lower the sound [incorrect] the sound will be louder when Ali bangs the triangle harder [insufficient]. Do not give credit for an insufficient response giving a single comparison of the variables: <ul style="list-style-type: none"> it will be loud if you are close.

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

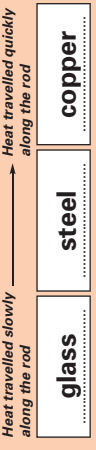
Test A question 6: Mini garden

Question	Mark	Requirements	Allowable answers	Additional guidance
6a 2/3c	1m	Award ONE mark for naming root. ❖ Give credit for a correct response that goes beyond the key stage 2 programme of study: <ul style="list-style-type: none"> ■ root hairs. 		Do not give credit for a response that includes incorrect science: <ul style="list-style-type: none"> ■ stem ■ leaves.
6b 3/2d,e	1m	Award ONE mark for naming evaporation.	❖ ONE mark may be awarded for a response that goes beyond the key stage 2 programme of study: <ul style="list-style-type: none"> ■ transpiration. 	Do not give credit for an insufficient response that describes the process of evaporation: <ul style="list-style-type: none"> ■ water changes into water vapour/a gas [given].
6c 1/2c,l	1m	Award ONE mark for an indication that water is trapped inside the sealed container or that water is recycled within the container or that the plastic wrap causes the water vapour to condense and fall back down: <ul style="list-style-type: none"> ■ the water (vapour) cannot escape from the container ■ if it was not well sealed the water inside the mini garden would escape ■ the water is recycled in the bowl ■ after the water evaporates, it condenses on the plastic wrap and drips back down, watering the plant again ■ the water evaporates and then cools down again turning the water vapour into water again. 	ONE mark may be awarded for: <ul style="list-style-type: none"> ■ the water vapour cannot leak out ■ it gets water from water vapour ■ the water vapour condenses on the plastic wrap ■ condensed water will drip onto the soil. 	Do not give credit for a response that includes incorrect science: <ul style="list-style-type: none"> ■ it stops the water evaporating [the water evaporates inside the mini garden]. Do not give credit for an insufficient response which does not imply the water is recycled: <ul style="list-style-type: none"> ■ water stays in the bowl ■ water turns to water vapour.

Test A question 6: Mini garden (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
<p>6d 3/2e</p>	<p>2m</p> <p>or</p> <p>1m</p>	<p>Award TWO marks for all four lines drawn correctly:</p> <div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">A</div> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">B</div> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">C</div> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">D</div> </div> <div style="display: flex; flex-direction: column; align-items: flex-start; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-bottom: 5px;">Rain falls.</div> <div style="border: 1px solid black; padding: 2px 5px; margin-bottom: 5px;">Water changes into water vapour.</div> <div style="border: 1px solid black; padding: 2px 5px; margin-bottom: 5px;">Water vapour changes into water.</div> <div style="border: 1px solid black; padding: 2px 5px;">Water flows into lakes or seas.</div> </div> </div> <p>If you are unable to award two marks, award ONE mark for any two or three lines drawn correctly.</p>		

Test A question 7: Heating rods

Question	Mark	Requirements	Allowable answers	Additional guidance
7a 3/1b	1m	Award ONE mark for naming the property of conductivity: <ul style="list-style-type: none"> ■ (thermal) conductor ■ it conducts. 		Do not give credit for a response that includes incorrect science: <ul style="list-style-type: none"> ■ electrical conductor.
7b 4/2b	1m	Award ONE mark for: <ul style="list-style-type: none"> ■ gravitational attraction. 	ONE mark may be awarded for: <ul style="list-style-type: none"> ■ weight ■ gravity. 	Do not give credit for an insufficient response: <ul style="list-style-type: none"> ■ downward pull.
7c 1/2h	1m	Award ONE mark for an indication of the material (the rod is made of): <ul style="list-style-type: none"> ■ (type of) rod ■ material. 	ONE mark may be awarded for: <ul style="list-style-type: none"> ■ pole. 	Do not give credit for a response that includes incorrect science: <ul style="list-style-type: none"> ■ metals. Do not give credit for an insufficient response: <ul style="list-style-type: none"> ■ object.
7d 1/2i	1m	Award ONE mark for: 		Do not give credit for a response that includes incorrect science: <ul style="list-style-type: none"> ■ 16 seconds, 26 seconds, 280 seconds. Do not give credit for an insufficient response: <ul style="list-style-type: none"> ■ 280, 26, 16 [in that order].
7e 1/2g	1m	Award ONE mark for a response indicating that the test should be repeated: <ul style="list-style-type: none"> ■ repeat the test/it again ■ do the test/it 3 times ■ try the test/it again. 		Do not give credit for a response that includes incorrect science referring to fair testing: <ul style="list-style-type: none"> ■ make the rods the same length ■ make the test fair. Do not give credit for an insufficient response: <ul style="list-style-type: none"> ■ check their results/it/the test (again).

Test A question 7: Heating rods (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
7f 1/2j,d	1m	<p>Award ONE mark for all three statements correctly classified:</p> <p>The heat travelled quicker along the metal rods than along the glass rod. True</p> <p>The one variable Class 6 changed was the time it took for the paperclip to fall off. False</p> <p>The one variable Class 6 measured was the temperature of each rod. False</p>		

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Test A question 8: The Sun

Question	Mark	Requirements	Allowable answers	Additional guidance
8a 4/4d, a	2m or 1m	<p>Award TWO marks for all three correct boxes ticked:</p> <p>The Sun should be <input checked="" type="checkbox"/> bigger. <input type="checkbox"/></p> <p>The Sun should be <input checked="" type="checkbox"/> a sphere. <input type="checkbox"/></p> <p>The Moon should be closer <input type="checkbox"/> to the Earth. <input checked="" type="checkbox"/></p> <p>If you are unable to award two marks, award ONE mark for any two correct boxes ticked.</p>		
8b 4/4b, c	1m	<p>Award ONE mark for a response indicating that the Earth spins on its axis:</p> <ul style="list-style-type: none"> ■ the Earth spins/rotates (on its axis) ■ the Earth turns/moves on its axis. 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ the Earth revolves. <p>ONE mark may be awarded for a response correctly indicating the spin of the Earth, as well as describing the Earth's orbit around the Sun:</p> <ul style="list-style-type: none"> ■ the Earth spins as it orbits the Sun ■ the Earth turns on its axis and moves around the Sun. 	<p>Do not give credit for an insufficient response describing the Earth's orbit around the Sun:</p> <ul style="list-style-type: none"> ■ the Earth orbits (the Sun) ■ the Earth turns/spins/rotates around the Sun. <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ the Earth turns/moves (around) ■ the rotation [does not indicate what is rotating]. <p>Do not give credit for an insufficient response that is ambiguous:</p> <ul style="list-style-type: none"> ■ it spins/rotates (on its axis) ['it' could mean the Sun].

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

Test B question 1: Butterflies

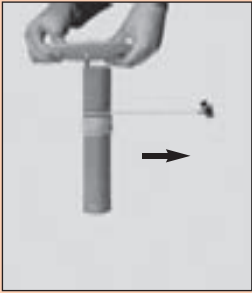
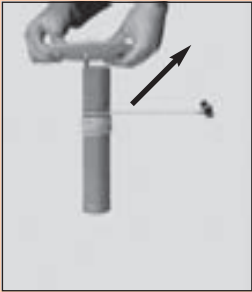
Question	Mark	Requirements	Allowable answers	Additional guidance
1a 1/2m	1m	<p>Award ONE mark for a recognition that the features given are insufficient to enable the butterfly to be identified or for a suggestion of how the features should be used to identify the butterflies:</p> <ul style="list-style-type: none"> ■ they all have feelers/antennae ■ all butterflies have wings ■ she has not said what shape the wings are. 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ they all have what she describes. 	<p>Do not give credit for an insufficient response that does not state <i>why</i> listing these features is not enough to identify the butterfly:</p> <ul style="list-style-type: none"> ■ it only tells about the feelers and wings. <p>Do not give credit for an insufficient response stating additional information is needed:</p> <ul style="list-style-type: none"> ■ she needs to describe it more.
1b 1/1b	1m	<p>Award ONE mark for a description of how the chosen feature is different from that of a Common Blue:</p> <ul style="list-style-type: none"> ■ body <input checked="" type="checkbox"/> <p>AND FOR BODY This feature of Ahmed's butterfly is different because...</p> <ul style="list-style-type: none"> ■ it is not long and thin/it is broad ■ the body ends in a point ■ the body is a different shape. <p>or</p> <ul style="list-style-type: none"> ■ wings <input checked="" type="checkbox"/> <p>AND FOR WINGS This feature of Ahmed's butterfly is different because...</p> <ul style="list-style-type: none"> ■ it has patterns/spots ■ the wings have a different pattern ■ the wings are a different shape/its shape is different ■ the Common Blue does not have spots. 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ body <input checked="" type="checkbox"/> <p>AND FOR BODY This feature of Ahmed's butterfly is different because...</p> <ul style="list-style-type: none"> ■ it has not got a long tail. <p>ONE mark may be awarded where the body box is ticked, followed by a description of a feature of the wings, provided it is clearly stated that it is the wings being described: This feature of Ahmed's butterfly is different because...</p> <ul style="list-style-type: none"> ■ the wings have patterns. <p>ONE mark may be awarded where the wings box is ticked, followed by a description of a feature of the body, provided it is clearly stated that it is the body being described.</p> <p>ONE mark may be awarded if neither box is ticked but the creditworthy response clearly states if either a feature of the body or the wings is being described.</p>	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ it does (not) have a tail ■ the body and wings are different. <p>Do not give credit for an insufficient response referring to the number of body segments:</p> <ul style="list-style-type: none"> ■ it is/is not in three parts. <p>Do not give credit for an insufficient response giving a feature of the body/wings of the Common Blue butterfly [unless it is made clear that the feature relates to the Common Blue]:</p> <ul style="list-style-type: none"> ■ the body is (long and) thin ■ the wings do not have patterns. <p>Do not give credit for an insufficient response where body has been ticked followed by a response where a feature of the wings is described but 'wings' are not referred to explicitly in the answer:</p> <ul style="list-style-type: none"> ■ it has/they have different patterns.

Test B question 1: Butterflies (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
<p>1c 1/2j</p>	<p>2m</p> <p>or</p> <p>1m</p>	<p>Award TWO marks for correctly classifying all four conclusions:</p> <p>All of these butterflies... True False Cannot tell</p> <p>have spots on their wings. <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/></p> <p>are eaten by the same predators. <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/></p> <p>are the same age. <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/></p> <p>have antennae which are longer than their bodies. <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/></p> <p>If you are unable to award two marks, award ONE mark for correctly classifying any three conclusions.</p>		
<p>1d 1/1a</p>	<p>2m</p> <p>or</p> <p>1m</p>	<p>Award TWO marks for both correct statements identified:</p> <p>There are fewer butterflies because there are...</p> <ul style="list-style-type: none"> ■ more houses being built on woodland or grassland. <input checked="" type="checkbox"/> <input type="checkbox"/> ■ fewer plants which butterflies feed on being grown in gardens. <input checked="" type="checkbox"/> <input type="checkbox"/> <p>If you are unable to award two marks, award ONE mark for any one correct statement identified.</p>		

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

Test B question 2: Spinning cardboard roll

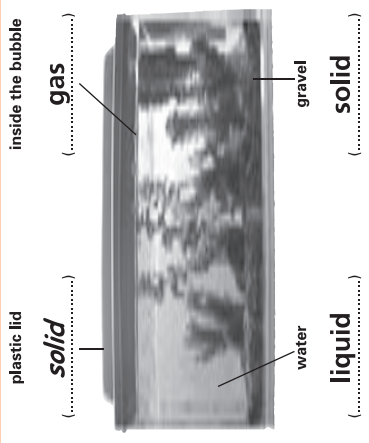
Question	Mark	Requirements	Allowable answers	Additional guidance
2a 4/2e	1m	<p>Award ONE mark for an arrow drawn anywhere on the picture in a downwards direction:</p> 	<p>ONE mark may be awarded for an arrow pointing downwards that is within 45° of the vertical:</p> 	
2b 1/2e	1m	<p>Award ONE mark for:</p> <p><input type="checkbox"/> <input type="checkbox"/></p> <p>■ Stopwatch <input checked="" type="checkbox"/></p>		
2c 1/2i	1m	<p>Award ONE mark for an estimate between 1.5 and 2.4 seconds exclusive.</p>		
2d 4/2c	1m	<p>Award ONE mark for:</p> <p>■ air resistance.</p>	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ friction ■ drag. 	<p>Do not give credit for a response that includes incorrect science:</p> <ul style="list-style-type: none"> ■ gravity. <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ upwards push of air ■ upthrust ■ resistance.

Test B question 2: Spinning cardboard roll (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
<p>2e 1/2b,a</p>	<p>1m</p>	<p>Award ONE mark for:</p> <ul style="list-style-type: none"> ■ Will the time to unwind be longer if the string is longer? <input checked="" type="checkbox"/> ■ How can I make the string unwind more slowly? <input checked="" type="checkbox"/> <p>What happens if I put two weights on the string? <input type="checkbox"/></p>		

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

Test B question 3: Fish tank

Question	Mark	Requirements	Allowable answers	Additional guidance
<p>3a 3/1e</p>	<p>1m</p>	<p>Award ONE mark for all three labels correct:</p> 		
<p>3b 3/3a 1/2c</p>	<p>1m</p>	<p>Award ONE mark for an indication that the gravel cannot pass through the sieve but the water can:</p> <ul style="list-style-type: none"> ■ <i>The gravel/ is too big to go through the sieve</i> ■ <i>The water passes through</i> ■ <i>The gravel/ stays in the sieve</i> ■ <i>The water goes through</i> ■ <i>The gravel/ is caught in the sieve</i> ■ <i>The water goes into the sink.</i> 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> ■ <i>The gravel stays</i> ■ <i>The water goes/comes/falls out.</i> 	<p>Do not give credit for an insufficient response which describes what happens to one of the materials:</p> <ul style="list-style-type: none"> ■ <i>The gravel stays in the sieve</i> ■ <i>The water... [response incorrect or missing].</i>

Test B question 3: Fish tank (continued)

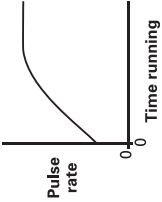
Question	Mark	Requirements	Allowable answers	Additional guidance
<p>3c 2/5f</p>	<p>1m</p>	<p>Award ONE mark for both sentences correctly classified: <i>Micro-organisms...</i> <i>are small enough to live in between the gravel.</i> True <i>can break down leftover fish food.</i> True </p>		
<p>3d 2/1a 2/5f</p>	<p>1m</p>	<p>Award ONE mark for both correct statements identified: <i>In the fish tank...</i></p> <ul style="list-style-type: none"> ■ the micro-organisms need nutrients. <input checked="" type="checkbox"/> ■ the micro-organisms can move. <input type="checkbox"/> 		

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


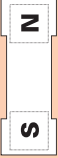




Test B question 4: Investigating pulse rate

Question	Mark	Requirements	Allowable answers	Additional guidance
4a 1/2c	1m	<p>Award ONE mark for identifying that it will be more accurate or reliable to measure pulse rate with an electronic heartbeat rate sensor:</p> <ul style="list-style-type: none"> it is more accurate/reliable it is less likely to make a mistake you might lose count (if you use the other method). 	<p>ONE mark may be awarded for a methodological reason:</p> <ul style="list-style-type: none"> it is hard to find your pulse on your wrist. 	<p>Do not give credit for an insufficient response implying there is a correct answer:</p> <ul style="list-style-type: none"> it will give you the correct number of beats. <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> it is quicker [given] it is easier/more efficient you do not have to count [does not describe an error] it measures it automatically.
4b 1/2a	1m	<p>Award ONE mark for a question giving the independent variable (IV) and the dependent variable (DV):</p> <ul style="list-style-type: none"> What is the pulse rate after different exercises/sports? How do different sports affect your heart rate? Which exercise will make your pulse rate go up the most? 	<p>ONE mark may be awarded for a question where the IV (type of exercise) is not described explicitly or only one type of exercise is referred to:</p> <ul style="list-style-type: none"> Does exercise/sport affect pulse rate? Does the amount of exercise affect the pulse rate? What will the pulse rate be after resting and after exercise? <p>ONE mark may be awarded for a question that refers to only one or two specific exercises:</p> <ul style="list-style-type: none"> Does running make your pulse rate increase? 	<p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> Why does your pulse rate go faster if you exercise? After the plan, is your pulse rate faster or slower [IV not identified]?
4c 1/2d	1m	<p>Award ONE mark for indicating that the test will be fair or that it allows the results to be compared:</p> <ul style="list-style-type: none"> so it is a fair test so they are able to compare the results (for each exercise). 	<p>ONE mark may be awarded for a response indicating variability between people:</p> <ul style="list-style-type: none"> because a different person may be fitter different people have different pulse/heart rates. 	<p>Do not give credit for an insufficient response indicating that the reliability will be improved:</p> <ul style="list-style-type: none"> to make the results more accurate/reliable to see if the results are about the same. <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> people are different.

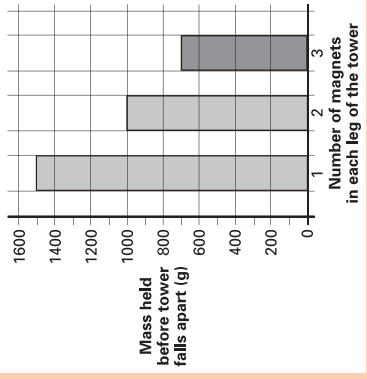
Test B question 4: Investigating pulse rate (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
<p>4d 1/2i</p>	<p>1m</p>	<p>Award ONE mark for: ■ 165 beats per minute.</p>		
<p>4e 1/2k</p>	<p>1m</p>	<p>Award ONE mark for:</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 20px;">■</div> <div style="text-align: center;">  <p style="font-size: small;">Pulse rate 0 Time running</p> </div> <div style="margin-left: 20px;"> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> </div> </div>		

Test B question 5: Magnetic toy

Question	Mark	Requirements	Allowable answers	Additional guidance
5a 4/2a	1m	<p>Award ONE mark for the poles on both pairs of magnets correctly labelled:</p> <p>■  </p> <p>■  </p>	<p>ONE mark may be awarded for a response in which one or both of the far right boxes on the magnet are left blank in an otherwise correct response:</p> <p>■ </p> <p>■ </p>	
5b 1/2d	2m or 1m	<p>Award TWO marks for all three correct variables ticked:</p> <p>■ the size of each magnet <input checked="" type="checkbox"/></p> <p>■ the size of each ball <input checked="" type="checkbox"/> the number of balls in each tower <input checked="" type="checkbox"/></p> <p><input type="checkbox"/></p> <p>If you are unable to award two marks, award ONE mark for any two correct variables identified.</p>		

Test B question 5: Magnetic toy (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance								
<p>5c 1/2h</p>	<p>1m</p>	<p>Award ONE mark for a bar drawn between 650 g and 750 g exclusive:</p>  <table border="1"> <caption>Mass held before tower falls apart (g)</caption> <thead> <tr> <th>Number of magnets in each leg of the tower</th> <th>Mass held before tower falls apart (g)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1450</td> </tr> <tr> <td>2</td> <td>1000</td> </tr> <tr> <td>3</td> <td>550</td> </tr> </tbody> </table>	Number of magnets in each leg of the tower	Mass held before tower falls apart (g)	1	1450	2	1000	3	550		
Number of magnets in each leg of the tower	Mass held before tower falls apart (g)											
1	1450											
2	1000											
3	550											
<p>5d 1/2k,i</p>	<p>1m</p>	<p>Award ONE mark for a response between 200 g and 600 g inclusive.</p>		<p>Do not give credit for an insufficient response that gives a mass of less than 200 g or more than 600 g.</p>								

Test B question 6: Separating materials

Question	Mark	Requirements	Allowable answers	Additional guidance
6a 3/3b 3/2a	1m	Award ONE mark for an indication that the salt will dissolve in the water but the sand will not: <ul style="list-style-type: none"> ■ <i>The salt will dissolve/form a solution/ The sand will stay as it is/do nothing/ sink/go to the bottom of the jar.</i> 	ONE mark may be awarded for indicating that the salt will dissolve in the water but the sand will not: <ul style="list-style-type: none"> ■ <i>The salt will dissolve</i> <i>The sand will not (dissolve).</i> 	Do not give credit for an insufficient response: <ul style="list-style-type: none"> ■ <i>The salt will disappear</i> <i>The sand will stay (in the water) [implies the salt is no longer present].</i>
6b 3/3c	1m	Award ONE mark for a response indicating that the sand remains in the filter while the water and salt go through: <ul style="list-style-type: none"> ■ <i>The water goes through the filter paper</i> <i>The salt goes through the filter paper (with the water)</i> <i>The sand stays in the filter paper.</i> 	ONE mark may be awarded for: <ul style="list-style-type: none"> ■ <i>The water goes through</i> <i>The salt goes through (with the water)</i> <i>The sand does not go through.</i> 	Do not give credit for an insufficient response describing the sand: <ul style="list-style-type: none"> ■ <i>The sand blocks the hole up</i> <i>The sand stays in the funnel</i> [implies it has passed through the filter paper to the funnel] ■ <i>The sand stays the same.</i>
6c 3/3d	1m	Award ONE mark for: <ul style="list-style-type: none"> ■ <input type="checkbox"/> evaporation <input checked="" type="checkbox"/> <input type="checkbox"/> 		


Test B question 6: Separating materials (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
6d i 3/1a	1m	<p>Award ONE mark for:</p> <p><input type="checkbox"/> steel paperclips <input checked="" type="checkbox"/> and rice</p>		
6d ii 4/2a	1m	<p>Award ONE mark for indicating that the steel paperclips will be attracted to the magnet and the rice will not:</p> <ul style="list-style-type: none"> ■ the steel/paperclips stick(s) to magnets but rice does not ■ the paperclip will be pulled out of the rice. 	<p>ONE mark may be awarded if part 6d i has been answered incorrectly but an appropriate description is given that explicitly names and explains how steel paperclips and rice can be separated.</p> <p>ONE mark may be awarded for a response indicating that steel is attracted to a magnet but that does not refer to the rice or for a response recognising that only one of the materials is magnetic but without identifying which one:</p> <ul style="list-style-type: none"> ■ steel is attracted to magnets ■ because one is magnetic (and one is not). 	<p>Do not give credit for a response that includes incorrect science which implies other pairs of materials can be separated by a magnet:</p> <ul style="list-style-type: none"> ■ the magnet picks up the brass pins but not the peas.

Test B question 7: Trees

Question	Mark	Requirements	Allowable answers	Additional guidance
7a 2/3c	1m	Award ONE mark for a response stating that the roots are used to anchor the plant in the soil or absorb water/minerals from the soil: <ul style="list-style-type: none"> the roots anchor/hold it in the soil/in place the roots absorb/take up/soak up water/moisture/minerals. 	<p>ONE mark may be awarded for:</p> <ul style="list-style-type: none"> they anchor/keep it in they stabilise the plant (keep it steady) they take in/get water/nutrients the roots draw/drain/carry water (from the soil) the roots collect/gather water/nutrients. <p>ONE mark may be awarded for a response indicating a supporting function of the roots which may work in conjunction with the stem:</p> <ul style="list-style-type: none"> the roots support (the plant) the roots hold it up the roots make it stand straight/up. <p>ONE mark may be awarded for a response indicating that the roots can store water.</p>	<p>Do not give credit for a response that includes incorrect science indicating that the root gives the young plant food:</p> <ul style="list-style-type: none"> they take/send up/bring/gather/absorb food they feed it. <p>Do not give credit for a response that includes incorrect science indicating that water is taken up by 'drinking' or 'sucking'.</p> <p>Do not give credit for a response that includes incorrect science indicating that plants produce water/nutrients.</p> <p>Do not give credit for an insufficient response indicating the roots keep the plant balanced.</p> <p>Do not give credit for an insufficient response: <ul style="list-style-type: none"> hold it in. </p> <p>Do not give credit for an insufficient response where 'goodness' is used in place of 'nutrients', 'water' or 'minerals'.</p> <p>Do not give credit for an insufficient response that does not recognise the role of the roots: <ul style="list-style-type: none"> nutrients/moisture. </p>
7b 2/1b 2/3b	1m	Award ONE mark for: <ul style="list-style-type: none"> <input type="checkbox"/> nutrition <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 		

Test B question 7: Trees (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance								
7c 2/3d	2m or 1m	<p>Award TWO marks for both the sepal and stigma/carpel correctly labelled:</p>  <p>If you are unable to award two marks, award ONE mark for either the sepal or the stigma/carpel correctly labelled.</p>										
7d 2/3d	1m	<p>Award ONE mark for:</p> <p><input type="checkbox"/> <input type="checkbox"/></p> <p>■ by wind <input checked="" type="checkbox"/> <input type="checkbox"/></p>										
7e 2/4b	2m or 1m	<p>Award TWO marks for all five flowers correctly classified:</p> <table border="1"> <tr> <td>Flowers are grouped together on the stem</td> <td>Pear Elder</td> <td>Flower has five petals</td> <td>Flower does not have five petals Manna ash Lilac</td> </tr> <tr> <td>Flowers are spread out along the stem</td> <td>Almond</td> <td>Almond</td> <td>Magnolia</td> </tr> </table> <p>If you are unable to award two marks, award ONE mark for any three or four flowers correctly classified.</p>	Flowers are grouped together on the stem	Pear Elder	Flower has five petals	Flower does not have five petals Manna ash Lilac	Flowers are spread out along the stem	Almond	Almond	Magnolia		<p>Do not give credit for an insufficient response where a flower has been sorted into more than one group.</p>
Flowers are grouped together on the stem	Pear Elder	Flower has five petals	Flower does not have five petals Manna ash Lilac									
Flowers are spread out along the stem	Almond	Almond	Magnolia									

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

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Test B question 8: Chocolate

Question	Mark	Requirements	Allowable answers	Additional guidance
8a 3/1e	1m	Award ONE mark for all three correct boxes ticked: Solid chocolate... <ul style="list-style-type: none"> ■ <input type="checkbox"/> does not flow. <input checked="" type="checkbox"/> ■ <input type="checkbox"/> does not change shape. <input checked="" type="checkbox"/> ■ <input type="checkbox"/> does not change volume. <input checked="" type="checkbox"/> 		
8b 3/2b,d	1m	Award ONE mark for an indication of melting: <ul style="list-style-type: none"> ■ it melts. 		
8c 3/3e 3/1e	1m	Award ONE mark for an indication that the chocolate can change shape: <ul style="list-style-type: none"> ■ it changes to sieve hole shape. 	<p>ONE mark may be awarded for an indication that the chocolate can flow:</p> <ul style="list-style-type: none"> ■ melted chocolate can flow ■ it is runny. 	<p>Do not give credit for an insufficient response giving properties of liquid chocolate that do not enable it to go through a sieve:</p> <ul style="list-style-type: none"> ■ it is soft ■ it is small enough to go through the holes ■ it does not change volume (and overflow the sieve). <p>Do not give credit for an insufficient response:</p> <ul style="list-style-type: none"> ■ it is a liquid ■ it has melted ■ [that it is liquid is given].

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