

Sc

KEY STAGE

2

LEVELS

3–5

Mark schemes

Tests A and B

2011



Science sampling test

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Qualifications and Curriculum Development Agency
53–55 Butts Road
Earlsdon Park
Coventry
CV1 3BH
www.qcda.gov.uk

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.	a) If a pupil qualifies a scientifically correct answer with a scientifically incorrect statement, no mark will be awarded for that question part. 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.
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.	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. 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. 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.

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	Award ONE mark for all five stages in the correct order: E..... C..... D..... A..... B..... Youngest-----Oldest														
1b 2/2f	1m	Award ONE mark for both letters written in the correct place: <table><tr><th>Stage (write the letter)</th><th>Description of stage</th></tr><tr><td>C.....</td><td> has just learned to walk is learning to talk is learning to use a toilet </td></tr><tr><td>D.....</td><td> body gets taller quickly and changes shape more body hair starts to grow may get spots (acne) </td></tr></table>	Stage (write the letter)	Description of stage	C.....	has just learned to walk is learning to talk is learning to use a toilet	D.....	body gets taller quickly and changes shape more body hair starts to grow may get spots (acne)	ONE mark may be awarded for both the names of the stages written in the correct place: <table><tr><th>Stage (write the letter)</th><th>Description of stage</th></tr><tr><td>toddler.....</td><td> has just learned to walk is learning to talk is learning to use a toilet </td></tr><tr><td>teenager.....</td><td> body gets taller quickly and changes shape more body hair starts to grow may get spots (acne) </td></tr></table>	Stage (write the letter)	Description of stage	toddler.....	has just learned to walk is learning to talk is learning to use a toilet	teenager.....	body gets taller quickly and changes shape more body hair starts to grow may get spots (acne)	
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toddler.....	has just learned to walk is learning to talk is learning to use a toilet															
teenager.....	body gets taller quickly and changes shape more body hair starts to grow may get spots (acne)															
1c 2/1a	2m or 1m	Award TWO marks for all three missing cells in the table completed: <table><tr><th>Life process</th><th>Evidence of the life process</th></tr><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></table> If you are unable to award two marks, award ONE mark for any two cells correct.	Life process	Evidence of the life process	growth	People get taller.	movement/moves.....	People walk.	nutrition	People eat (food)/feed.....	reproduction.....	People have babies.	Marks may be awarded for indicating that people drinking is evidence of nutrition: drink (water). Do not give credit for an insufficient response describing a result of nutrition: people grow (fatter) people have energy to use. Do not give credit for an insufficient response giving 'sex' in place of reproduction.			
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	Award ONE mark for: Sue should... ☐ eat a variety of different foods. ☒ ☐		
1d ii 2/2h,g	1m	Award ONE mark for a response that describes a way Sue could help to stay healthy: - 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.	ONE mark may be awarded for: - do not drink alcohol - drink water.	Do not give credit for an insufficient response suggesting that Sue should eat/not eat particular foods: - she should eat lots of fruit - not eat too much salt/sugar - eat a balanced diet - drink milk. Do not give credit for an insufficient response: - watch less TV.

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

Test A question 2: *Mixing solids with water*

Question	Mark	Requirements	Allowable answers	Additional guidance
2a 1/2d	1m	Award ONE mark for any two correct control variables: ■ same type/size of sugar (grains) ■ same (amount of) sugar ■ same amount of/type of water ■ same air temperature/place ■ stir (at same rate).	ONE mark may be awarded for naming measuring equipment on which the calibration is likely to vary: ■ thermometer ■ teaspoon. ONE mark may be awarded for: ■ same (type/size of) beaker/container ■ same solid.	Do not give credit for a response that includes incorrect science: ■ same (water) temperature [independent variable] ■ same time [dependent variable]. Do not give credit for an insufficient response: ■ same water ■ same equipment [need to specify]. Do not give credit for a second response which is a repetition or re-statement of the first: ■ the same amount of sugar ■ the same size spoon.
2b 1/2i,j	1m	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: ■ the hotter the water, the quicker/faster/less time (the sugar took to dissolve) ■ the lower the temperature, the slower (the sugar dissolved).	ONE mark may be awarded for two specific comparisons describing the relationship: ■ the hot temperature was very fast and the cold temperature was very slow.	Do not give credit for a response that includes incorrect science with a correct relationship: ■ the hotter the water, the quicker it dissolves because the sugar is burned. Do not give credit for an insufficient response re-stating the temperatures and times from the table without comparison: ■ at 20°C it took 55 s, at 30°C it took 41 s and at 40°C it took 27 s. (continued)

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

Question	Mark	Requirements	Allowable answers	Additional guidance								
2b (continued)				Do not give credit for a response that changes one or both variables: - the higher the temperature, the smaller the sugar [insufficient]. Do not give credit for an insufficient response giving a single comparison of the variables: - when the temperature was high, it did not take a long time. Do not give credit for an insufficient response where the time taken is not described explicitly: - when it is hotter, it will dissolve better/easier.								
2c 1/2j 3/3b	2m or 1m	Award TWO marks for all three parts of the table completed correctly: <table><tr><th>Name of solid</th><th>Did the solid dissolve? Yes or no?</th></tr><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></table> If you are unable to award two marks, award ONE mark for any two parts of the table completed correctly.	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											

Test A question 3: Computer games

Question	Mark	Requirements	Allowable answers	Additional guidance
3a 1/2b	1m	Award ONE mark for: ■ 10/ten (children).		
3b 1/2h	1m	Award ONE mark for: ■ seconds.	ONE mark may be awarded for: ■ s.	Do not give credit for a response that includes incorrect science: ■ 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: ■ (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: ■ they have quick(er) reactions ■ they are quick(er).	Do not give credit for an insufficient response: ■ 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: ■ 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: ■ 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: ■ computers are faster. Do not give credit for an insufficient response: ■ 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
3e 1/2a	1m	Award ONE mark for ticking: ■ Hassan [1 hour] and one of Damien, Milly or Stuart [4 hours] and one of Amy or Tandi [10 hours].		

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

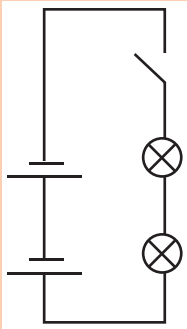
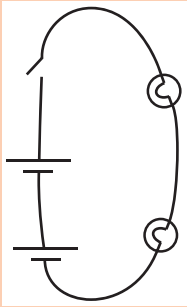
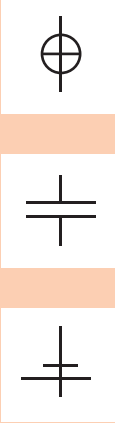
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Test A question 4: Soils

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: ☐ ☐ ☐ ☒ Soil B is more absorbent than soil A.		
4c 3/3a	1m	Award ONE mark for a response naming sieves.		Do not give credit for an insufficient response: ☐ colander ☐ net.
4d 1/2j	1m	Award ONE mark for both conclusions correctly classified: Soil A has more <i>small</i> particles than soil B. Soil B has more <i>large</i> particles than soil A.		

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	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]:  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.		Do not give full credit for a response that includes incorrect science: - 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	Award ONE mark for all three statements correctly classified: add another bulb No..... add another cell Yes..... use longer wires No.....		
5c 4/3a,d	1m	Award ONE mark for an arrow pointing from the star to Emma's eye/head: 		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:

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: ■ it is vibrating.	ONE mark may be awarded for a description of vibrations where the rapid speed of movement is indicated: ■ it moves up and down very quickly.	Do not give credit for an insufficient response: ■ 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: ■ air ■ gas ■ atmosphere.	ONE mark may be awarded for: ■ chairs ■ floor.	Do not give credit for a response that includes incorrect science: ■ airwaves. Do not give credit for an insufficient response: ■ 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: ■ 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: ■ 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: ■ 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: ■ 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.

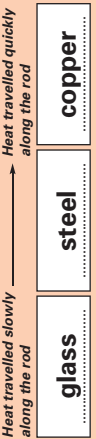
Test A question 6: *Mini garden*

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: ■ root hairs.		Do not give credit for a response that includes incorrect science: ■ 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: ■ transpiration.	Do not give credit for an insufficient response that describes the process of evaporation: ■ 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: ■ 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: ■ 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: ■ 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: ■ water stays in the bowl ■ water turns to water vapour.

Test A question 6: Mini garden (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
6d 3/2e	2m or 1m	Award TWO marks for all four lines drawn correctly: A B C D Rain falls. Water changes into water vapour. Water vapour changes into water. Water flows into lakes or seas. If you are unable to award two marks, award ONE mark for any two or three lines drawn correctly.		

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: ■ (thermal) conductor ■ it conducts.		Do not give credit for a response that includes incorrect science: ■ electrical conductor.
7b 4/2b	1m	Award ONE mark for: ■ gravitational attraction.	ONE mark may be awarded for: ■ weight ■ gravity.	Do not give credit for an insufficient response: ■ downward pull.
7c 1/2h	1m	Award ONE mark for an indication of the material (the rod is made of): ■ (type of) rod ■ material.	ONE mark may be awarded for: ■ pole.	Do not give credit for a response that includes incorrect science: ■ metals. Do not give credit for an insufficient response: ■ object.
7d 1/2i	1m	Award ONE mark for: 		Do not give credit for a response that includes incorrect science: ■ 16 seconds, 26 seconds, 280 seconds. Do not give credit for an insufficient response: ■ 280, 26, 16 [in that order].
7e 1/2g	1m	Award ONE mark for a response indicating that the test should be repeated: ■ 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: ■ make the rods the same length ■ make the test fair. Do not give credit for an insufficient response: ■ 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	Award ONE mark for all three statements correctly classified: The heat travelled quicker along the metal rods than along the glass rod. True The one variable Class 6 changed was the time it took for the paperclip to fall off. False The one variable Class 6 measured was the temperature of each rod. False		

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

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Test A question 8: The Sun

Question	Mark	Requirements	Allowable answers	Additional guidance
8a 4/4d, a	2m or 1m	Award TWO marks for all three correct boxes ticked: The Sun ☒ should be bigger. ☐ The Sun ☒ should be a sphere. ☐ The Moon ☐ should be closer to the Earth. ☒ If you are unable to award two marks, award ONE mark for any two correct boxes ticked.		
8b 4/4b, c	1m	Award ONE mark for a response indicating that the Earth spins on its axis: - the Earth spins/rotates (on its axis) - the Earth turns/moves on its axis.	ONE mark may be awarded for: - the Earth revolves. 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: - the Earth spins as it orbits the Sun - the Earth turns on its axis and moves around the Sun.	Do not give credit for an insufficient response describing the Earth's orbit around the Sun: - the Earth orbits (the Sun) - the Earth turns/spins/rotates around the Sun. Do not give credit for an insufficient response: - the Earth turns/moves (around) - the rotation [does not indicate what is rotating]. Do not give credit for an insufficient response that is ambiguous: - 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

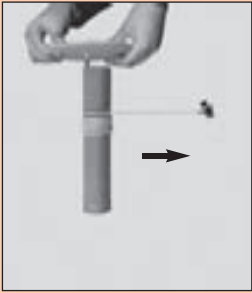
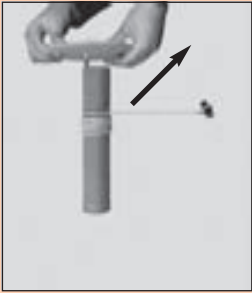
Question	Mark	Requirements	Allowable answers	Additional guidance
1a 1/2m	1m	Award ONE mark for a recognition that the features given are insufficient to enable the butterfly to be identified or for a suggestion of how the features should be used to identify the butterflies: ■ they all have feelers/antennae ■ all butterflies have wings ■ she has not said what shape the wings are.	ONE mark may be awarded for: ■ they all have what she describes.	Do not give credit for an insufficient response that does not state why listing these features is not enough to identify the butterfly: ■ it only tells about the feelers and wings. Do not give credit for an insufficient response stating additional information is needed: ■ she needs to describe it more.
1b 1/1b	1m	Award ONE mark for a description of how the chosen feature is different from that of a Common Blue: ■ body ☒ AND FOR BODY This feature of Ahmed's butterfly is different because... ■ it is not long and thin/it is broad ■ the body ends in a point ■ the body is a different shape. or ■ wings ☒ AND FOR WINGS This feature of Ahmed's butterfly is different because... ■ 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.	ONE mark may be awarded for: ■ body ☒ AND FOR BODY This feature of Ahmed's butterfly is different because... ■ it has not got a long tail. 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... ■ the wings have patterns. 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. 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.	Do not give credit for an insufficient response: ■ it does (not) have a tail ■ the body and wings are different. Do not give credit for an insufficient response referring to the number of body segments: ■ it is/is not in three parts. 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]: ■ the body is (long and) thin ■ the wings do not have patterns. 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: ■ it has/they have different patterns.

Test B question 1: Butterflies (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance																				
1c 1/2j	2m or 1m	Award TWO marks for correctly classifying all four conclusions: <table><thead><tr><th>All of these butterflies...</th><th>True</th><th>False</th><th>Cannot tell</th></tr></thead><tbody><tr><td>have spots on their wings.</td><td>☐</td><td>☒</td><td>☐</td></tr><tr><td>are eaten by the same predators.</td><td>☐</td><td>☐</td><td>☒</td></tr><tr><td>are the same age.</td><td>☐</td><td>☐</td><td>☒</td></tr><tr><td>have antennae which are longer than their bodies.</td><td>☐</td><td>☒</td><td>☐</td></tr></tbody></table> If you are unable to award two marks, award ONE mark for correctly classifying any three conclusions.	All of these butterflies...	True	False	Cannot tell	have spots on their wings.	☐	☒	☐	are eaten by the same predators.	☐	☐	☒	are the same age.	☐	☐	☒	have antennae which are longer than their bodies.	☐	☒	☐		
All of these butterflies...	True	False	Cannot tell																					
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are the same age.	☐	☐	☒																					
have antennae which are longer than their bodies.	☐	☒	☐																					
1d 1/1a	2m or 1m	Award TWO marks for both correct statements identified: There are fewer butterflies because there are... <table><tbody><tr><td>☒ more houses being built on woodland or grassland.</td><td>☐</td><td>☐</td></tr><tr><td>☒ fewer plants which butterflies feed on being grown in gardens.</td><td>☐</td><td>☐</td></tr></tbody></table> If you are unable to award two marks, award ONE mark for any one correct statement identified.	☒ more houses being built on woodland or grassland.	☐	☐	☒ fewer plants which butterflies feed on being grown in gardens.	☐	☐																
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☒ fewer plants which butterflies feed on being grown in gardens.	☐	☐																						

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

Test B question 2: Spinning cardboard roll

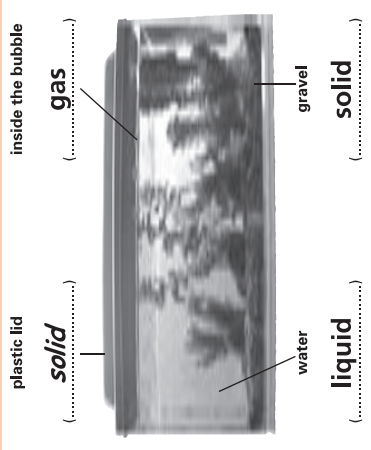
Question	Mark	Requirements	Allowable answers	Additional guidance
2a 4/2e	1m	Award ONE mark for an arrow drawn anywhere on the picture in a downwards direction: 	ONE mark may be awarded for an arrow pointing downwards that is within 45° of the vertical: 	
2b 1/2e	1m	Award ONE mark for: ☐ ☐ ■ Stopwatch ☒		
2c 1/2i	1m	Award ONE mark for an estimate between 1.5 and 2.4 seconds exclusive.		
2d 4/2c	1m	Award ONE mark for: ■ air resistance.	ONE mark may be awarded for: ■ friction ■ drag.	Do not give credit for a response that includes incorrect science: ■ gravity. Do not give credit for an insufficient response: ■ upwards push of air ■ upthrust ■ resistance.

Test B question 2: Spinning cardboard roll (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
2e 1/2b,a	1m	Award ONE mark for: Will the time to unwind be longer if the string is longer? ☐ How can I make the string unwind more slowly? ☐ What happens if I put two weights on the string? ☐		

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
3a 3/1e	1m	Award ONE mark for all three labels correct: 		
3b 3/3a 1/2c	1m	Award ONE mark for an indication that the gravel cannot pass through the sieve but the water can: ■ <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>	ONE mark may be awarded for: ■ <i>The gravel stays</i> ■ <i>The water goes/comes/falls out.</i>	Do not give credit for an insufficient response which describes what happens to one of the materials: ■ <i>The gravel stays in the sieve</i> ■ <i>The water... [response incorrect or missing].</i>

Test B question 3: Fish tank (continued)

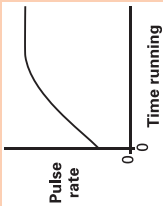
Question	Mark	Requirements	Allowable answers	Additional guidance
3c 2/5f	1m	Award ONE mark for both sentences correctly classified: <i>Micro-organisms ...</i> <i>are small enough to live in between the gravel.</i> True <i>can break down leftover fish food.</i> True		
3d 2/1a 2/5f	1m	Award ONE mark for both correct statements identified: <i>In the fish tank...</i> ■ the micro-organisms need nutrients. ☒ ■ the micro-organisms can move. ☐ ☐ ☒		

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	Award ONE mark for identifying that it will be more accurate or reliable to measure pulse rate with an electronic heartbeat rate sensor: ■ it is more accurate/reliable ■ it is less likely to make a mistake ■ you might lose count (if you use the other method).	ONE mark may be awarded for a methodological reason: ■ it is hard to find your pulse on your wrist.	Do not give credit for an insufficient response implying there is a correct answer: ■ it will give you the correct number of beats. Do not give credit for an insufficient response: ■ 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	Award ONE mark for a question giving the independent variable (IV) and the dependent variable (DV): ■ 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?	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: ■ 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? ONE mark may be awarded for a question that refers to only one or two specific exercises: ■ Does running make your pulse rate increase?	Do not give credit for an insufficient response: ■ 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	Award ONE mark for indicating that the test will be fair or that it allows the results to be compared: ■ so it is a fair test ■ so they are able to compare the results (for each exercise).	ONE mark may be awarded for a response indicating variability between people: ■ because a different person may be fitter ■ different people have different pulse/heart rates.	Do not give credit for an insufficient response indicating that the reliability will be improved: ■ to make the results more accurate/reliable ■ to see if the results are about the same. Do not give credit for an insufficient response: ■ people are different.

Test B question 4: Investigating pulse rate (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
4d 1/2i	1m	Award ONE mark for: ■ 165 beats per minute.		
4e 1/2k	1m	Award ONE mark for: ■ ☐ ☐ ☒ 		

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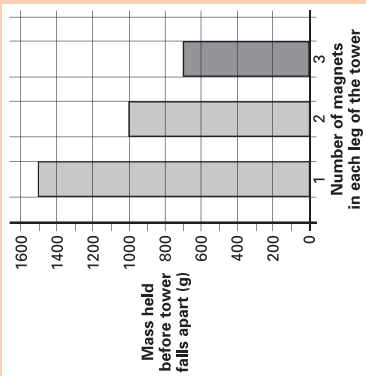
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Test B question 5: *Magnetic toy*

Question	Mark	Requirements	Allowable answers	Additional guidance
5a 4/2a	1m	Award ONE mark for the poles on both pairs of magnets correctly labelled: N S S N N S N S	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: N S N S N S N N S N	
5b 1/2d	2m or 1m	Award TWO marks for all three correct variables ticked: the size of each magnet ☒ the size of each ball ☒ the number of balls in each tower ☒ If you are unable to award two marks, award ONE mark for any two correct variables identified.		

Test B question 5: Magnetic toy (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance								
5c 1/2h	1m	Award ONE mark for a bar drawn between 650 g and 750 g exclusive:  <table><caption>Data from Bar Chart</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>~950</td></tr><tr><td>3</td><td>~600</td></tr></tbody></table>	Number of magnets in each leg of the tower	Mass held before tower falls apart (g)	1	~1450	2	~950	3	~600		
Number of magnets in each leg of the tower	Mass held before tower falls apart (g)											
1	~1450											
2	~950											
3	~600											
5d 1/2k,i	1m	Award ONE mark for a response between 200 g and 600 g inclusive.		Do not give credit for an insufficient response that gives a mass of less than 200 g or more than 600 g.								

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

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: ■ <i>The salt will dissolve/form a solution</i> ■ <i>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: ■ <i>The salt will dissolve</i> ■ <i>The sand will not (dissolve).</i>	Do not give credit for an insufficient response: ■ <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: ■ <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: ■ <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: ■ <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: ■ ☐ evaporation ☒ ■ ☐ ☐		

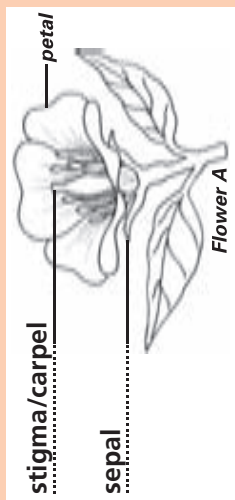
Test B question 6: Separating materials (continued)

Question	Mark	Requirements	Allowable answers	Additional guidance
6d i 3/1a	1m	Award ONE mark for: ☐ steel paperclips ☒ and rice		
6d ii 4/2a	1m	Award ONE mark for indicating that the steel paperclips will be attracted to the magnet and the rice will not: - the steel/paperclips stick(s) to magnets but rice does not - the paperclip will be pulled out of the rice.	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. 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: - steel is attracted to magnets - because one is magnetic (and one is not).	Do not give credit for a response that includes incorrect science which implies other pairs of materials can be separated by a magnet: 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: - the roots anchor/hold it in the soil/in place - the roots absorb/take up/soak up water/moisture/minerals.	ONE mark may be awarded for: - 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. ONE mark may be awarded for a response indicating a supporting function of the roots which may work in conjunction with the stem: - the roots support (the plant) - the roots hold it up - the roots make it stand straight/up. ONE mark may be awarded for a response indicating that the roots can store water.	Do not give credit for a response that includes incorrect science indicating that the root gives the young plant food: - they take/send up/bring/gather/absorb food - they feed it. Do not give credit for a response that includes incorrect science indicating that water is taken up by 'drinking' or 'sucking'. Do not give credit for a response that includes incorrect science indicating that plants produce water/nutrients. Do not give credit for an insufficient response indicating the roots keep the plant balanced. Do not give credit for an insufficient response: - hold it in. Do not give credit for an insufficient response where 'goodness' is used in place of 'nutrients', 'water' or 'minerals'. Do not give credit for an insufficient response that does not recognise the role of the roots: - nutrients/moisture.
7b 2/1b 2/3b	1m	Award ONE mark for: ☐ nutrition ☒ ☐ ☐		

Test B question 7: Trees (continued)

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

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

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... ☐ does not flow. ☒ ☐ does not change shape. ☒ ☐ does not change volume. ☒		
8b 3/2b,d	1m	Award ONE mark for an indication of melting: ☐ it melts.		
8c 3/3e 3/1e	1m	Award ONE mark for an indication that the chocolate can change shape: ☐ it changes to sieve hole shape.	ONE mark may be awarded for an indication that the chocolate can flow: ☐ melted chocolate can flow ☐ it is runny.	Do not give credit for an insufficient response giving properties of liquid chocolate that do not enable it to go through a sieve: ☐ it is soft ☐ it is small enough to go through the holes ☐ it does not change volume (and overflow the sieve). Do not give credit for an insufficient response: ☐ it is a liquid ☐ it has melted ☐ [that it is liquid is given].

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

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**Qualifications and Curriculum
Development Agency**

53–55 Butts Road, Earlsdon Park,
Coventry CV1 3BH

Telephone: 0300 303 3013

Textphone: 0300 303 3012

Fax: 0300 303 3014

Email: assessments@qcda.gov.uk

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