

Sc

KEY STAGE  
3

LEVELS  
3-7

2006

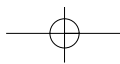
Science tests

# Mark scheme for Papers 1 and 2

2006



department for  
**education and skills**  
creating opportunity, releasing potential, achieving excellence



## Introduction

The test papers will be marked by external markers. The markers will follow the mark scheme in this booklet, which is provided here to inform teachers.

This booklet includes the mark scheme for paper 1 and paper 2 in both tiers.

## The structure of the mark scheme for tiers 3–6 and 5–7

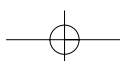
The mark scheme for each question shows:

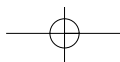
- the teaching points from the key stage 3 programme of study
- the marks available for each part of the question
- the total marks available for the question
- the answer or answers expected, indicated by an asterisk
- additional guidance to assist markers in making professional judgements.

When a question appears in an identical form in both tiers, the answers to the question are given only once in the mark scheme. For clarity, both question numbers are given. The following example, from tier 3–6 paper 2 question 15 and from tier 5–7 paper 2 question 7, illustrates this.

| Tier               | Q No |   |   |  |
|--------------------|------|---|---|--|
| 3–6                | 15   |   |   |  |
| 5–7                | 7    |   |   |  |
| Part               | Mark | Answer  | Accept  | Additional guidance                            |
| <b>b i</b><br>2/5c | 1    | any <b>one</b> from<br>* it protects it<br>* it stops it being damaged<br>* it stops it drying out<br>* it prevents infection<br>* it keeps out disease organisms | accept 'it stops it being eaten'<br>accept 'it keeps the contents in'<br><br>accept 'it stops bacteria <b>or</b> viruses <b>or</b> germs getting in'<br>accept 'it allows oxygen in <b>or</b> carbon dioxide out' | <i>do <b>not</b> accept 'it keeps it warm'</i> |

Where more than one answer is acceptable, this is indicated in the mark scheme by 'any **one** from'. Each possible correct answer is marked with an asterisk. In some cases, alternative answers are indicated by 'or'.





In the following example, from part **b** of tier 3–6 paper 1 question 3, an answer giving ‘water’ and ‘minerals’ will be awarded two marks. However, an answer which gives ‘minerals’ and ‘nutrients’ will be given only one mark, as both points are correct answers for the same mark.

| Part             | Mark | Answer   | Accept   | Additional guidance                |
|------------------|------|--|--|------------------------------------|
| <b>b</b><br>2/3d | 2    | any <b>two</b> from<br>* water<br><br>* minerals<br><br>* oxygen | accept ‘H <sub>2</sub> O’<br>accept ‘moisture’<br>accept a named mineral<br>award two marks for two named minerals<br>accept ‘nutrients’ <b>or</b> ‘salts’ | <i>do <b>not</b> accept ‘food’</i> |

In the following example, from part **d iii** of tier 5–7 paper 1 question 13, the statement in **bold type** in the **Additional guidance** column is given in order to indicate the general requirement of that part of the question.

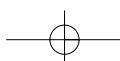
| Part                 | Mark | Answer  | Accept              | Additional guidance   |
|----------------------|------|---|---------------------|---|
| <b>d iii</b><br>4/2c | 1    | any <b>one</b> from<br>* up to 10 seconds the weight is greater than the (upward) force<br>* after 10 seconds there is a resultant <b>or</b> net (upward) force<br>* after 10 seconds the (upward) force is greater than the weight | accept the converse | <b>answers must be in terms of a comparison</b><br>‘it does not have a great enough upward force’ is insufficient<br>‘at 10 seconds the forces are equal’ is insufficient |

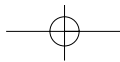
In the **Accept** column there may be:

- examples of answers which are acceptable, although they do not correspond exactly to the expected answers
- some examples of higher level answers, which could be given by higher attaining pupils answering questions on the lower levels in the tier.

In the **Additional guidance** column there may be:

- answers which are not acceptable
- a reminder, in questions involving calculations, that consequential marking may be used
- instructions on action in the event of consequential marking (see below)
- guidance to markers where pupils have not followed the instructions on the question.





## Marking

The number of marks available for each part of a question and the maximum number of marks for the question as a whole are shown on the question paper. Every part of a question which has been attempted by a pupil will be marked and the mark for each part recorded in the mark box alongside that part. Half marks will not be given in any question.

The total number of marks awarded for all the parts of questions on a double page will be written in the box at the bottom of the right-hand page. In some instances, this will be the sum of marks awarded for two questions. The total number of marks obtained on the paper will be recorded on the front of the test paper.

The total number of marks available is 180 in tier 3–6 and 150 in tier 5–7.

## Using professional judgement in marking

The instructions given in the mark scheme will enable the markers to decide whether pupils have correctly answered a particular question. However, there will be instances where an answer given by a pupil does not correspond to any of the possible responses shown in the mark scheme. In such cases, markers will apply their professional judgement to decide if credit should be given. They will consider whether the response:

- is equivalent to those listed
- conveys the ideas underlying the question as outlined in the statement in **bold type** in the mark scheme, if one is given.

If any doubt persists, markers will consult with their supervisors for guidance.

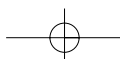
## Marking misspellings of words

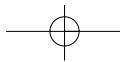
If a pupil misspells a word, markers will apply the following procedures:

- 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
- 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
- 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.

## Marking lists of alternative answers

In some instances, pupils give more than one answer to a single question. If any of the answers given is incorrect, the mark will not be awarded, irrespective of the order in which the answers are given. In some cases, a correct answer is given alongside other answers which, while correct, would be insufficient for the mark. In these cases, the mark will be given for the correct answer.





### Marking questions containing calculations

Some questions require pupils to perform calculations. Where two marks are available, they are advised to show their working. Pupils who do not show their working but give the correct answer will be awarded full marks.

The result of one calculation may be required in order to carry out further calculations. In such instances:

- the term ‘consequential marking’ appears in the **Additional guidance**
- a pupil’s result for the first calculation is treated as the starting point for the second
- the pupil is awarded full credit for the second calculation if it is carried out correctly, even if the result of the first calculation was wrong.

### Marking answers given in the wrong place

In some cases, pupils may write correct answers in the wrong part of the question. Markers will use professional judgement to decide whether a pupil has correctly understood the question and simply written the answer in the wrong place. Similarly, if pupils identify an answer by a cross or other indication when a tick is required, they will be given credit for their responses.

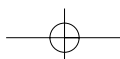
In a planning question, if no answer is given in the expected place but the correct answer is given in the drafting box, the mark(s) will be given.

### Awarding levels

The sum of the marks gained on both papers determines the level awarded. A copy of the level threshold tables which show the mark ranges for the award of different levels will be sent to each school by QCA on 30 June 2006.

Schools will be notified of pupils’ results by means of a marksheet, which will be returned to schools by the External Marking Agency with the pupils’ marked scripts. The marksheet will include pupils’ scores on the test papers and the levels awarded.

The 2006 key stage 3 science tests and mark schemes were developed by the Oxford, Cambridge and RSA Examinations (OCR) and the Centre for Research into Primary Science and Technology (CRIPSAT) on behalf of QCA.



**Mark Allocation Grid: Tier 3–6**

**TIER 3–6 Paper 1**

| Q            | Sc1       | Sc2       | Sc3       | Sc4       |
|--------------|-----------|-----------|-----------|-----------|
| 1            |           | 6         |           |           |
| 2            |           | 7         |           |           |
| 3            |           | 4         |           |           |
| 4            | 5         |           |           |           |
| 5            | 2         |           | 5         |           |
| 6            |           |           | 2         | 2         |
| 7            |           |           |           | 6         |
| 8            |           |           |           | 6         |
| 9            |           | 7         |           |           |
| 10           | 2         | 3         |           |           |
| 11           |           | 4         |           |           |
| 12           | 1         |           | 4         |           |
| 13           |           |           | 4         |           |
| 14           | 4         |           |           |           |
| 15           |           |           |           | 4         |
| 16           |           |           |           | 7         |
| 17           |           |           |           | 5         |
| <b>Total</b> | <b>14</b> | <b>31</b> | <b>15</b> | <b>30</b> |

**TIER 3–6 Paper 2**

| Q            | Sc1       | Sc2       | Sc3       | Sc4       |
|--------------|-----------|-----------|-----------|-----------|
| 1            |           |           |           | 4         |
| 2            | 5         |           |           |           |
| 3            |           |           |           | 5         |
| 4            |           |           | 4         | 2         |
| 5            |           |           | 5         |           |
| 6            |           |           | 5         |           |
| 7            | 7         |           |           |           |
| 8            |           | 8         |           |           |
| 9            |           |           |           | 4         |
| 10           |           |           |           | 5         |
| 11           | 6         |           |           |           |
| 12           |           |           | 5         |           |
| 13           |           | 2         | 4         |           |
| 14           |           | 2         | 5         |           |
| 15           | 2         | 3         | 1         |           |
| 16           | 6         |           |           |           |
| <b>Total</b> | <b>26</b> | <b>15</b> | <b>29</b> | <b>20</b> |

|                     |           |           |           |           |
|---------------------|-----------|-----------|-----------|-----------|
| <b>Total P1 + 2</b> | <b>40</b> | <b>46</b> | <b>44</b> | <b>50</b> |
|---------------------|-----------|-----------|-----------|-----------|

Overall

|            |
|------------|
| <b>180</b> |
|------------|

**Mark Allocation Grid: Tier 5–7**

**TIER 5–7 Paper 1**

| Q            | Sc1       | Sc2       | Sc3       | Sc4       |
|--------------|-----------|-----------|-----------|-----------|
| 1            |           | 7         |           |           |
| 2            | 2         | 3         |           |           |
| 3            |           | 4         |           |           |
| 4            | 1         |           | 4         |           |
| 5            |           |           | 4         |           |
| 6            | 4         |           |           |           |
| 7            |           |           |           | 4         |
| 8            |           |           |           | 7         |
| 9            |           |           |           | 5         |
| 10           |           | 7         |           |           |
| 11           | 4         |           |           |           |
| 12           |           |           | 5         |           |
| 13           | 1         |           | 3         | 2         |
| 14           | 8         |           |           |           |
| <b>Total</b> | <b>20</b> | <b>21</b> | <b>16</b> | <b>18</b> |

**TIER 5–7 Paper 2**

| Q            | Sc1       | Sc2       | Sc3       | Sc4       |
|--------------|-----------|-----------|-----------|-----------|
| 1            |           |           |           | 4         |
| 2            |           |           |           | 5         |
| 3            | 6         |           |           |           |
| 4            |           |           | 5         |           |
| 5            |           | 2         | 4         |           |
| 6            |           | 2         | 5         |           |
| 7            | 2         | 3         | 1         |           |
| 8            | 6         |           |           |           |
| 9            |           |           |           | 5         |
| 10           |           |           | 1         | 4         |
| 11           |           |           | 5         |           |
| 12           | 5         |           |           |           |
| 13           |           | 5         |           |           |
| 14           |           | 5         |           |           |
| <b>Total</b> | <b>19</b> | <b>17</b> | <b>21</b> | <b>18</b> |

|                     |           |           |           |           |
|---------------------|-----------|-----------|-----------|-----------|
| <b>Total P1 + 2</b> | <b>39</b> | <b>38</b> | <b>37</b> | <b>36</b> |
|---------------------|-----------|-----------|-----------|-----------|

**Overall**

|            |
|------------|
| <b>150</b> |
|------------|

The requirements of the Introduction to the Programme of Study apply across Sc1, Sc2, Sc3 and Sc4.

The Mark Allocation Grids on this pair of pages show the context of these questions in relation to Sc1, Sc2, Sc3 and Sc4.

| Tier 3–6            | Q No 1   | Mark | Answer  | Accept  | Additional guidance   |
|---------------------|----------|------|---|---|---|
| <b>a</b><br>2/5e    | 2        |      | any <b>two</b> from<br>* crabeater seal<br>* cod<br>* squid   | accept 'crabeater'<br>accept 'fish'   | 'seal' is insufficient  |
| <b>b i</b><br>2/5e  | 1        |      | * producers ✓   |   | if more than one box is ticked, award no mark                                 |
| <b>b ii</b><br>2/5e | 1        |      | * herbivores ✓  |   | if more than one box is ticked, award no mark                                 |
| <b>c i</b><br>2/5d  | 1        |      | any <b>one</b> from<br>* it would decrease<br>* there would be fewer seals  | accept 'some would die'   | 'they would all die' is insufficient  |
| <b>c ii</b><br>2/5d | 1        |      | any <b>one</b> from<br>* leopard seals eat other animals <b>or</b> food<br>* leopard seals eat cod <b>or</b> fish <b>or</b> squid <b>or</b> penguins<br>* crabeater seals <b>or</b> they only eat krill | accept 'they eat other animals <b>or</b> other food <b>or</b> other things' | 'they have more food' is insufficient<br><br>'they eat krill' is insufficient |
| <b>Total</b>        | <b>6</b> |      |   |   |   |



| Tier<br>3–6 | Q No<br>2 | Part                | Mark     | Answer               | Accept           | Additional guidance |
|-------------|-----------|---------------------|----------|----------------------|------------------|---------------------|
|             |           | <b>a i</b><br>2/1c  | 1        | * sperm              |                  |                     |
|             |           | <b>a ii</b><br>2/2g | 1        | * testis             | accept 'testes'  |                     |
|             |           | <b>b i</b><br>2/1c  | 1        | * ovum <b>or</b> egg |                  |                     |
|             |           | <b>b ii</b><br>2/2g | 1        | * ovary              | accept 'ovaries' |                     |
|             |           | <b>c</b><br>2/1d    | 1        | * fertilisation      |                  |                     |
|             |           | <b>d i</b><br>2/2h  | 1        | * foetus             |                  |                     |
|             |           | <b>d ii</b><br>2/2h | 1        | * uterus             |                  |                     |
|             |           | <b>Total</b>        | <b>7</b> |                      |                  |                     |

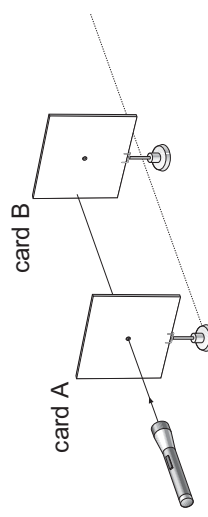
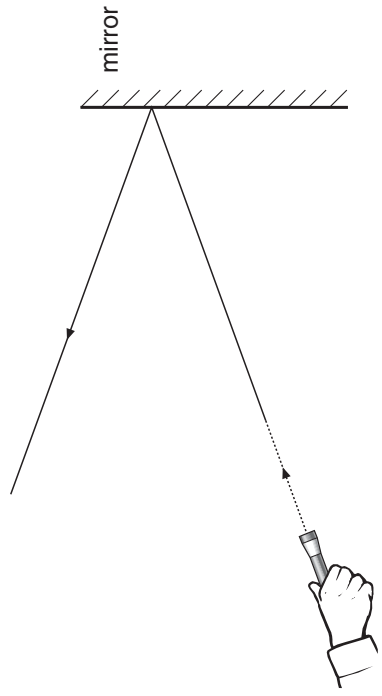
| Tier<br>3–6 | Q No<br>3 | Part         | Mark     | Answer   | Accept   | Additional guidance  |
|-------------|-----------|--------------|----------|--|--|--|
|             |           | a i<br>2/3a  | 1        | any <b>one</b> from<br>* it is long and spindly<br>* the leaves are far apart<br>* the leaves are white <b>or</b> pale | accept 'it is tall' <b>or</b> 'it has grown more'<br>accept 'it is thinner' <b>or</b> 'it is thin'<br>accept 'the leaves are yellow'<br>accept 'it is lighter'<br>accept 'it has no chlorophyll'<br>accept 'its leaves are a different colour' | 'they are shrivelled <b>or</b> crinkled' is insufficient   |
|             |           | a ii<br>2/3a | 1        | any <b>one</b> from<br>* it has wilted<br>* it has drooped<br>* the leaves are floppy                                  | accept 'it is not turgid'<br>accept 'leaves pointing down'<br>accept 'it is floppy'<br>accept 'it has shrivelled'  | 'it has dried out' is insufficient<br><br>'it has died' is insufficient<br>'it is discoloured' is insufficient |
|             |           | b<br>2/3d    | 2        | any <b>two</b> from<br>* water<br>* minerals<br>* oxygen   | accept 'H <sub>2</sub> O'<br>accept 'moisture'<br>accept a named mineral<br>award two marks for two named minerals<br>accept 'nutrients' <b>or</b> 'salts'   | <b>do not accept</b> 'food'  |
|             |           | <b>Total</b> | <b>4</b> |  |  |  |

| Tier 3–6  | Q No      | Mark             | Answer  | Accept   | Additional guidance  |           |                  |            |                        |   |  |  |             |  |   |  |               |  |   |  |   |  |  |   |   |
|---|-----------|------------------|---|--|--|-----------|------------------|------------|------------------------|---|--|--|-------------|--|---|--|---------------|--|---|--|---|--|--|---|---|
| a   | 1/2e      | 1                | any <b>one</b> from<br>* stopwatch<br>* stopwatch                                     | accept 'timer'   | 'clock' is insufficient<br>'watch' is insufficient                                     |           |                  |            |                        |   |  |  |             |  |   |  |               |  |   |  |   |  |  |   |   |
| b   | 1/2d      | 2                |   | <table border="1"> <thead> <tr> <th>factor</th> <th>change it</th> <th>keep it the same</th> <th>measure it</th> </tr> </thead> <tbody> <tr> <td>temperature of the oil</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>type of oil</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>volume of oil</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>time taken for all the oil to flow through the funnel</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table> | factor   | change it | keep it the same | measure it | temperature of the oil | ✓ |  |  | type of oil |  | ✓ |  | volume of oil |  | ✓ |  | time taken for all the oil to flow through the funnel |  |  | ✓ | if all four answers are correct, award two marks<br>if three answers are correct, award one mark<br>if more than one box is ticked in any row, count the answer as incorrect for that row |
| factor  | change it | keep it the same | measure it  |  |  |           |                  |            |                        |   |  |  |             |  |   |  |               |  |   |  |   |  |  |   |   |
| temperature of the oil                                | ✓         |                  |   |  |  |           |                  |            |                        |   |  |  |             |  |   |  |               |  |   |  |   |  |  |   |   |
| type of oil   |           | ✓                |   |  |  |           |                  |            |                        |   |  |  |             |  |   |  |               |  |   |  |   |  |  |   |   |
| volume of oil   |           | ✓                |   |  |  |           |                  |            |                        |   |  |  |             |  |   |  |               |  |   |  |   |  |  |   |   |
| time taken for all the oil to flow through the funnel |           |                  | ✓   |  |  |           |                  |            |                        |   |  |  |             |  |   |  |               |  |   |  |   |  |  |   |   |
| c i   | 1/2j      | 1                | any <b>one</b> from<br>* it <b>or</b> time gets less<br>* it <b>or</b> time decreases | accept 'the time gets faster' <b>or</b> 'it gets faster'<br>accept 'the oil flows faster'<br>accept 'it goes through faster'   | <i>do not</i> accept 'the time gets slower' unless linked to a decrease in temperature |           |                  |            |                        |   |  |  |             |  |   |  |               |  |   |  |   |  |  |   |   |
| c ii  | 1/2k      | 1                | * 180 seconds ✓   |  | if more than one box is ticked, award no mark  |           |                  |            |                        |   |  |  |             |  |   |  |               |  |   |  |   |  |  |   |   |
| <b>Total</b>  |           | <b>5</b>         |   |  |  |           |                  |            |                        |   |  |  |             |  |   |  |               |  |   |  |   |  |  |   |   |

| Tier 3–6                                  | Q No     | Mark | Answer   | Accept  | Additional guidance                           |
|---|----------|------|--|---|---|
|   | 5        |      |  |   |   |
| <b>a</b><br>1/2k                          | 1        |      | * <i>water</i> : increased <b>or</b> went up<br><br>* <i>wax</i> : decreased <b>or</b> went down   | accept 'expanded'<br>accept a reading greater than 7 (cm <sup>3</sup> ) and less than <b>or</b> equal to 8 (cm <sup>3</sup> )<br>accept 'contracted'<br>accept a reading lower than 7 (cm <sup>3</sup> ) and greater than <b>or</b> equal to 5.5 (cm <sup>3</sup> ) | <b>both</b> answers are required for the mark |
| <b>b</b><br>3/2c                          | 1<br>1   |      | * <i>water</i> : liquid<br>* <i>wax</i> : solid  |   |   |
| <b>c i</b><br>1/2k                        | 1        |      | any <b>one</b> from<br>* the liquid had turned blue<br><br>* crystals <b>or</b> copper sulphate <b>or</b> solid could not be seen<br>* there was no solid left | accept 'the colour changed'<br>accept 'the water was blue <b>or</b> coloured <b>or</b> grey'<br>accept 'the crystals disappeared'   | 'it formed a solution' is insufficient        |
| <b>c ii</b><br>3/2b                       | 1        |      | any <b>one</b> from<br>* stir it<br>* heat it<br>* use warm water  | accept 'shake it' <b>or</b> 'mix it'<br><br>accept 'use hotter water'<br>accept 'add more water'  | <b>do not accept</b> 'put less in'            |
| <b>d i</b><br>3/1h<br><b>d ii</b><br>3/1h | 1<br>1   |      | * it evaporated<br><br>* copper sulphate   | accept 'it went into the air'<br><br>accept 'crystals'<br>accept 'sulphate'   |   |
| <b>Total</b>                              | <b>7</b> |      |  |   |   |

| Tier<br>3–6 | Q No<br>6 | Part                | Mark     | Answer  | Accept   | Additional guidance                      |
|-------------|-----------|---------------------|----------|---|--|--|
|             |           | <b>a</b><br>4/1d    | 1        | *<br>N<br>S   |  | both poles are required for the mark     |
|             |           | <b>b i</b><br>4/1d  | 1        | *<br>N<br>S<br>N<br>S   |  | all four poles are required for the mark |
|             |           | <b>b ii</b><br>3/1d | 1        | any <b>one</b> from<br>* iron<br>* steel  | accept 'cobalt <b>or</b> nickel'   |  |
|             |           | <b>c</b><br>3/1d    | 1        | any <b>one</b> from<br>* wood <b>or</b> it is not magnetised<br>* wood <b>or</b> it is not magnetic<br><br>* it increases the distance between the magnets<br>* the magnets are too far apart<br>* the magnets are weak | accept 'the wood does not have any poles'<br>accept 'wood is not a magnet'<br>accept 'the magnet does not attract wood'<br>accept 'magnetism cannot pass through wood' |  |
|             |           | <b>Total</b>        | <b>4</b> |   |  |  |

| Tier 3–6     | Q No 7 | Part     | Mark  | Answer  | Accept   | Additional guidance |
|--------------|--------|----------|---|---|--|---------------------|
| a            | 4/3h   | 1        | any <b>one</b> from<br>* loud sounds can damage hearing<br>* to protect his ears<br>* loud sounds can burst the eardrum | accept 'they could damage his hearing'<br>accept 'loud sounds can damage the ear'<br>accept 'it could make him deaf'<br>accept 'they are very loud'     | 'they are loud' is insufficient as 'loud' is given in the question |                     |
| b            | 4/5g   | 1        | any <b>one</b> from<br>* the further the sound travels the quieter it gets<br>* she was furthest away                   | accept 'the sound <b>or</b> energy spreads out'<br>accept 'she was further away' <b>or</b> 'she was far away'<br>accept 'some of the sound is absorbed' |  |                     |
| c            | 4/3i   | 1        | any <b>one</b> from<br>* the speed of light is greater than the speed of sound<br>* light travels faster than sound     | accept 'sound travels more slowly'<br>accept 'light travels faster'<br>accept 'light gets there before sound'   |  |                     |
| d i          | 4/5e   | 1        | * light   |   |  |                     |
| d ii         | 4/5e   | 1        | * sound   |   |  |                     |
| e            | 4/2b   | 1        | * gravity   | accept 'weight'   |  |                     |
| <b>Total</b> |        | <b>6</b> |   |   |  |                     |

| Tier<br>3–6  | Q No<br>8 | Part | Mark     | Answer   | Accept   | Additional guidance  |
|--------------|-----------|------|----------|--|--|--|
| a            | 4/3a      |      | 1        | * Light travels in straight lines. ✓   |  | if more than one box is ticked, award no mark  |
| b            | 4/3a      |      | 1        | *   | accept a continuous line drawn across card A and reaching card B | award a mark for a straight line from the existing ray passing through the hole in card A and reaching card B<br>the ray must not go beyond card B   |
| c            | 4/3c      |      | 3        | *  |  | award one mark for a continuous straight line that reflects off the mirror<br>award one mark for an angle of reflection approximately equal to the angle of incidence<br>award one mark for a correct arrow on the reflected ray |
| d            | 4/1b      |      | 1        | * Add another battery. ✓   |  | if more than one box is ticked, award no mark  |
| <b>Total</b> |           |      | <b>6</b> |  |  |  |

| Tier<br>3–6<br>5–7 | Q No<br>9<br>1 | Part | Mark | Answer   | Accept  | Additional guidance   |
|--------------------|----------------|------|------|--|---|---|
| <b>a</b><br>2/5b   | 2              |      |      | any <b>two</b> from<br>* less <b>or</b> no food<br>* fewer <b>or</b> no places to nest <b>or</b> shelter<br>* less <b>or</b> no cover  | accept 'trees are producers'<br>accept 'they have lost their home'<br>accept 'their habitat is destroyed'<br>accept 'they cannot hide from predators' | 'they have lost their territory' is insufficient<br>'it spoils the environment' is insufficient |
| <b>b</b><br>2/3a   | 1              |      |      | any <b>one</b> from<br>* more light<br>* more water<br>* more space<br>* more nutrients<br><br>* more photosynthesis can take place  | accept references to nutrients from trees left to rot<br>accept 'photosynthesis can take place'   |   |
| <b>c</b><br>2/3c   | 1              |      |      | any <b>one</b> from<br>* to replace minerals <b>or</b> nitrates that have been removed (by plants)<br>* plants absorb the minerals <b>or</b> nitrates<br>* plants need minerals <b>or</b> nitrates to grow<br>* minerals <b>or</b> nitrates <b>or</b> they are plant nutrients | accept 'minerals <b>or</b> nitrates get washed out of the soil'<br>accept 'so that plants can grow'<br>accept 'plants can grow more'                  | 'plants feed on the nutrients' is insufficient  |



| Tier<br>3–6<br>5–7 | Q No<br>9<br>1 | Mark | Answer  | Accept  | Additional guidance  |
|--------------------|----------------|------|---|---|--|
| d<br>2/5a<br>2/5b  | 2              |      | <p>any <b>two</b> from</p> <ul style="list-style-type: none"> <li>* to provide food for animals</li> <li>* to provide shelter <b>or</b> nesting sites <b>or</b> habitats for birds <b>or</b> animals</li> <li>* trees absorb carbon dioxide</li> <li>* trees produce oxygen</li> <li>* the roots bind soil <b>or</b> prevent soil washing away</li> </ul> | <p>accept 'to provide homes for animals'</p> <p>accept 'provides trees to be cut down in the future'</p> <p>accept 'they need trees for paper' <b>or</b> 'to get paper'</p> | <p>'it is good for the environment' is insufficient</p> <p>'to help animals <b>or</b> birds survive' is insufficient</p> |
| <b>Total</b>       | <b>7</b>       |      |   |   |  |

| Tier<br>3–6<br>5–7 | Q No<br>10<br>2 | Part                | Mark     | Answer  | Accept  | Additional guidance   |
|--------------------|-----------------|---------------------|----------|---|---|---|
|                    |                 | <b>a i</b><br>1/2k  | 1        | * United States                                     | accept 'US' or 'USA'<br>accept 'America'<br>accept lower case letters for 'US'                            |   |
|                    |                 | <b>a ii</b><br>1/2j | 1        | * the less starch eaten, the more people get cancer | accept the converse<br>accept 'starch helps to prevent cancer'<br>accept 'you should eat a lot of starch' | do <b>not</b> accept 'people with cancer eat less starch'<br>'eat starch' is insufficient |
|                    |                 | <b>b i</b><br>2/2a  | 1        | * bread ✓   |   | if more than two boxes are ticked, deduct one mark for each incorrect tick                |
|                    |                 |                     | 1        | * pasta ✓   |   | minimum mark zero   |
|                    |                 | <b>b ii</b><br>2/2c | 1        | * fibre ✓   |   | if more than one box is ticked, award no mark   |
|                    |                 | <b>Total</b>        | <b>5</b> |   |   |   |

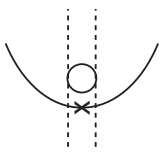
| Tier<br>3–6<br>5–7 | Q No<br>11<br>3 | Part                | Mark     | Answer   | Accept  | Additional guidance  |
|--------------------|-----------------|---------------------|----------|--|---|--|
|                    |                 | <b>a</b><br>2/2e    | 1        | * The biceps contracts and the triceps relaxes. ✓  |   | if more than one box is ticked, award no mark  |
|                    |                 | <b>b</b><br>2/2e    | 1        | * to allow movement <b>or</b> bending  | accept 'otherwise they would snap'  | 'to allow our arms to stretch' is insufficient                                       |
|                    |                 | <b>c i</b><br>2/2e  | 1        | any <b>one</b> from<br>* for smooth movement<br>* to avoid <b>or</b> reduce friction<br>* to prevent bones rubbing together <b>or</b> wearing down<br>* to lubricate the joint | accept 'to protect the bones'<br>accept 'to absorb shocks'                              | 'so you can move <b>or</b> bend' is insufficient<br>'for protection' is insufficient |
|                    |                 | <b>c ii</b><br>2/2e | 1        | any <b>one</b> from<br>* the bones would rub together <b>or</b> wear down<br>* pain<br>* stiffness<br>* movement would be difficult  | accept 'more friction'<br>accept 'arthritis'<br>accept 'you cannot move <b>or</b> bend' | 'friction' is insufficient<br><br><b>do not accept</b> 'the arm will not work'       |
|                    |                 | <b>Total</b>        | <b>4</b> |  |   |  |

| Tier<br>3–6<br>5–7 | Q No<br>12<br>4 | Part                | Mark     | Answer                     | Accept   | Additional guidance   |
|--------------------|-----------------|---------------------|----------|----------------------------|--|---|
|                    |                 | <b>a</b><br>3/1d    | 1        | * steel                    |  | do <b>not</b> accept 'stainless steel'<br>do <b>not</b> accept 'carbon'         |
|                    |                 | <b>b</b><br>3/1d    | 1        | * brass<br>* solder        |  | answers may be in either order<br><b>both</b> answers are required for the mark |
|                    |                 | <b>c</b><br>1/2j    | 1        | * 80                       | accept '100 – 20'  |   |
|                    |                 | <b>d i</b><br>3/3a  | 1        | * it does not contain iron | accept 'it does not contain steel'<br>accept 'only iron rusts' <b>or</b> 'only steel rusts'<br>accept 'it is made of tin, copper and zinc' |   |
|                    |                 | <b>d ii</b><br>3/3a | 1        | * oxygen                   | accept 'O <sub>2</sub> '   |   |
|                    |                 | <b>Total</b>        | <b>5</b> |                            |  |   |

| Tier<br>3–6<br>5–7 | Q No<br>13<br>5 | Part                 | Mark     | Answer   | Accept  | Additional guidance  |
|--------------------|-----------------|----------------------|----------|--|---|--|
|                    |                 | <b>a i</b><br>3/1h   | 1        | * pale blue    yellow    red   |   | answers may be in any order<br><b>all three</b> answers are required for the mark<br>do <b>not</b> accept 'blue' for 'pale blue' |
|                    |                 | <b>a ii</b><br>3/1h  | 1        | * 2<br>because there are two spots on the paper  | accept 'there are two colours from the green ink'<br>accept 'because they are straight up from the green ink'<br>accept 'it has dark blue and yellow'<br>accept 'it shows two'  | <b>both</b> the answer and the correct explanation are required for the mark   |
|                    |                 | <b>a iii</b><br>3/1h | 1        | * pencil<br>any <b>one</b> from<br>* because ink from the felt-tip pen is soluble <b>or</b><br>will dissolve in water<br>* because pencil will not spread out <b>or</b> dissolve<br><b>or</b> run <b>or</b> smudge | accept 'the ink will also produce colours'<br>accept 'the ink expands'  | <b>both</b> the answer and the correct explanation are required for the mark<br>'the pencil has no ink in it' is insufficient    |
|                    |                 | <b>b</b><br>3/2b     | 1        | any <b>one</b> from<br>* the ink would not dissolve in water<br>* the ink would dissolve in ethanol<br>* ethanol is a solvent for the ink  | accept 'the ink was water resistant <b>or</b> permanent<br><b>or</b> waterproof'<br>accept 'ethanol is a suitable solvent'<br>accept 'ethanol can absorb the ink'<br>accept 'ethanol washes out the ink'<br>accept 'some substances will dissolve in one solvent but not another' |  |
|                    |                 | <b>Total</b>         | <b>4</b> |  |   |  |



| Tier<br>3–6<br>5–7   | Q No<br>15<br>7 | Mark     | Answer   | Accept   | Additional guidance   |
|----------------------|-----------------|----------|--|--|---|
| 4/3a<br>4/4a<br>4/4c | 1               | 1        | *<br>A ship going out to sea<br>goes out of sight. | The Earth spins on its<br>axis.                                | if more than one line is drawn from an<br>observation, award no mark for that observation |
|                      | 1               | 1        | *<br>We have day and<br>night.                     | The Earth is a sphere.   |   |
|                      | 1               | 1        | *<br>We have summer and<br>winter.                 | The Earth orbits the<br>Sun and the Earth's<br>axis is tilted. |   |
|                      | 1               | 1        | *<br>One year on Earth is<br>365 days.             | Gravity attracts objects<br>towards the Earth.                 |   |
|                      | 1               | 1        | *<br>One year on Earth is<br>365 days.             | The Earth orbits the<br>Sun.                                   |   |
| <b>Total</b>         |                 | <b>4</b> |  |  |   |

| Tier<br>3–6<br>5–7 | Q No<br>16<br>8 | Part   | Mark     | Answer  | Accept   | Additional guidance   |
|--------------------|-----------------|--------|----------|---|--|---|
| a                  | 4/2b            | 1      | 1        | * Mars  | accept '6 kg'  | do <b>not</b> accept '24 N'   |
| b                  | 4/2b            | 1      | 1        | any <b>one</b> from<br>* 4 kg weighs more on Earth<br>* the weight of the object is greater on Earth  | accept the converse<br>accept the converse<br>accept 'Earth is 40 N and Venus is 36 N'<br>accept 'Earth is 40 and Venus is 36'<br>accept 'more newtons on Earth' <b>or</b> 'less newtons on Venus'<br>accept 'there is a greater force on Earth' | 'different weights' is insufficient<br>do <b>not</b> accept 'it has more mass on the Earth' |
| c                  | 4/2b            | 1<br>1 | 1<br>1   | * less (than) <b>or</b> smaller (than) <b>or</b> lower (than)<br>* the same (as) <b>or</b> equal (to) |  | answers must be in the correct order  |
| d i                | 4/4b            | 1      | 1        | * the greater the distance the greater the time for one orbit   | accept 'it increases'  |   |
| d ii               | 1/2j<br>4/4b    | 1      | 1        | * an answer from 1.6 to 6 inclusive   |  |   |
| e                  | 4/4c            | 1      | 1        | *                |  | award a mark for X marked on the orbit within the tolerances shown                          |
| <b>Total</b>       |                 |        | <b>7</b> |   |  |   |



| Tier<br>3–6<br>5–7 | Q No<br>17<br>9 | Part                | Mark     | Answer                               | Accept                   | Additional guidance   |
|--------------------|-----------------|---------------------|----------|--------------------------------------|--------------------------|---|
|                    |                 | <b>a</b><br>4/2d    | 1        | * B                                  |                          |   |
|                    |                 | <b>b i</b><br>4/2c  | 1        | * A and C                            | accept 'lift and weight' | answers may be in either order<br><b>both</b> letters are required for the mark |
|                    |                 | <b>b ii</b><br>4/2c | 1        | * D and B                            | accept A and C           | answers may be in either order<br><b>both</b> letters are required for the mark |
|                    |                 | <b>c i</b><br>4/2c  | 1        | * Force D is greater than force B. ✓ |                          | if more than one box is ticked, award no mark                                   |
|                    |                 | <b>c ii</b><br>4/2c | 1        | * Force A is greater than force C. ✓ |                          | if more than one box is ticked, award no mark                                   |
|                    |                 | <b>Total</b>        | <b>5</b> |                                      |                          |   |

| Tier 5–7 | Q No 10 | Part                       | Mark     | Answer   | Accept   | Additional guidance   |
|----------|---------|----------------------------|----------|--|--|---|
|          |         | <b>a i</b><br>2/1c<br>2/2g | 1        | * oviduct <b>or</b> fallopian tube   |  |   |
|          |         | <b>a ii</b><br>2/1c        | 1        | * cilia move in a wave <b>or</b> from side to side   | accept 'they waft <b>or</b> carry it along'<br>accept 'the hairs move it along'<br>accept 'the hairs <b>or</b> cilia waft <b>or</b> move'                                      | 'the hairs' <b>or</b> 'the cilia' are insufficient  |
|          |         | <b>b i</b><br>2/2h         | 1        | * <i>embryo</i> : stage 3<br><i>foetus</i> : stage 4   | accept '3'<br>accept '4'   | <b>both</b> answers are required for the mark   |
|          |         | <b>b ii</b><br>2/2h        | 1        | * uterus   | accept 'womb'  |   |
|          |         | <b>c i</b><br>2/4a         | 2        | any <b>two</b> from<br>* a reference to genes <b>or</b> genetic material <b>or</b> DNA <b>or</b> chromosomes<br>* it has a different combination (of genes)<br>* it is made from an egg and sperm<br>* (it gets genetic information) from both parents | accept for one mark 'to be the same as someone else you need exactly the same genes'<br>accept for two marks 'it only has half the DNA <b>or</b> chromosomes from each parent' |   |
|          |         | <b>c ii</b><br>2/4a        | 1        |  |  | <b>all three</b> ticks are required for the mark if there is more than one tick in any row, award no mark |
|          |         | <b>Total</b>               | <b>7</b> |  |  |   |

| human characteristic | inherited only | inherited and affected by environmental conditions |
|----------------------|----------------|--|
| eye colour           | ✓              |  |
| skin colour          |                | ✓  |
| weight               |                | ✓  |

| Tier<br>5–7      | Q No<br>11  | Answer  | Accept   | Additional guidance  |
|------------------|-------------|---|--|--|
| <b>Part</b>      | <b>Mark</b> | <b>markers should read the answers to parts a and b before marking this question parts a and b should be marked together</b>  |  |  |
| <b>a</b><br>1/2d | 1           | * temperature of the water  | accept 'temperature'<br>accept 'room temperature'  | <i>do not accept</i> responses that describe rates of heating  |
|                  | 1           | any <b>one</b> from<br>* rate of evaporation<br>* time taken for all the water to evaporate<br>* volume <b>or</b> mass <b>or</b> amount of water lost in a fixed time | accept 'the time for it to evaporate'<br>accept 'measure how much water is left after a certain time'  | answers must refer to both time taken and amount of water lost<br>'time taken' is insufficient   |
|                  | 1           | any <b>one</b> from<br>* starting volume of water<br>* shape of container<br>* same ambient conditions  | accept 'the amount of water'<br>accept a specified volume of water<br>accept 'room temperature' if the independent variable is 'water temperature' | 'same heater' and 'same starting measurement' are insufficient   |
| <b>b</b><br>1/2i | 1           | * a column <b>or</b> row indicating temperature <b>and</b> a column <b>or</b> row indicating time <b>or</b> volume lost <b>or</b> volume remaining                    | accept a column <b>or</b> row indicating 'rate of evaporation'<br>accept 'amount lost' <b>or</b> 'amount remaining'                                | <b>both</b> headings are required for the mark the units of measurement are not necessary for the mark<br>the second column <b>or</b> row should be consistent with the dependent variable identified in part a<br>ignore other columns in the table |
| <b>Total</b>     | <b>4</b>    |   |  |  |

| Tier 5–7                 | Q No 12 | Mark            | Answer  | Accept  | Additional guidance   |      |           |      |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |
|--------------------------|---------|-----------------|---|---|---|------|-----------|------|-----------------|---|---|---|---|----------------|--|---|---|---|--------------|---|--|---|---|--|-------------------------------------|
| <b>a</b><br>3/3c         | 1       | 1               | <table border="1"> <thead> <tr> <th></th> <th>copper</th> <th>iron</th> <th>magnesium</th> <th>zinc</th> </tr> </thead> <tbody> <tr> <td>calcium nitrate</td> <td>X</td> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>copper nitrate</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>iron nitrate</td> <td>X</td> <td></td> <td>✓</td> <td>✓</td> </tr> </tbody> </table> |   | copper  | iron | magnesium | zinc | calcium nitrate | X | X | X | X | copper nitrate |  | ✓ | ✓ | ✓ | iron nitrate | X |  | ✓ | ✓ |  | award one mark for each correct row |
|                          |         |                 |   |   | copper  | iron | magnesium | zinc |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |
|                          |         |                 |   | calcium nitrate                                 | X   | X    | X         | X    |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |
|                          |         |                 |   | copper nitrate                                  |   | ✓    | ✓         | ✓    |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |
| iron nitrate             | X       |                 | ✓   | ✓   |   |      |           |      |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |
| 1                        | *       | calcium nitrate | X   | X   |   |      |           |      |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |
|                          |         | copper nitrate  |   | ✓   | ✓   |      |           |      |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |
|                          |         | iron nitrate    | X   |   | ✓   |      |           |      |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |
| <b>b</b><br>3/3a<br>3/3e | 2       | *               | calcium carbonate + hydrochloric acid   | no reaction                                     | if all three answers are correct, award two marks<br>if one <b>or</b> two answers are correct, award one mark<br>if more than one line is drawn from a pair of reactants, award no credit for that pair |      |           |      |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |
|                          |         |                 | magnesium + hydrochloric acid   | a chloride, carbon dioxide and water are formed |   |      |           |      |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |
|                          |         |                 | copper + hydrochloric acid  | a chloride and hydrogen are formed              |   |      |           |      |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |
| <b>Total</b>             |         | <b>5</b>        |   |   |   |      |           |      |                 |   |   |   |   |                |  |   |   |   |              |   |  |   |   |  |                                     |

| Tier<br>5–7 | Q No<br>13 | Part                 | Mark     | Answer  | Accept  | Additional guidance   |
|-------------|------------|----------------------|----------|---|---|---|
|             |            | <b>a</b><br>3/1b     | 1        | any <b>one</b> from<br>* liquids <b>or</b> they take up less space<br>* liquids <b>or</b> they are denser   | accept 'particles are closer together in a liquid'<br>accept 'particles are further apart in a gas' | <i>do not accept</i> 'liquids are heavier'<br>'liquids are easier to transport' is insufficient   |
|             |            | <b>b</b><br>3/1e     | 1        | * there is no oxygen in space   | accept 'there is no air in space'<br>accept 'space is a vacuum'                                     |   |
|             |            | <b>c</b><br>3/1e     | 1        | any <b>one</b> from<br>* the weight of the fuel decreases<br>* there is less fuel on board<br>* fuel is being used up<br>* water is released  | accept 'hydrogen and oxygen <b>or</b> oxygen is being used up'<br>accept 'waste gas is given off'   | 'gravity gets weaker' is insufficient   |
|             |            | <b>d i</b><br>1/2k   | 1        | * 27<br>* 16.5  | accept a number from 16.3 to 16.7   | <b>both</b> answers are required for the mark   |
|             |            | <b>d ii</b><br>4/2c  | 1        | * 10.5  | accept the difference between the numbers given<br>in <b>d i</b>                                    | consequential marking applies   |
|             |            | <b>d iii</b><br>4/2c | 1        | any <b>one</b> from<br>* up to 10 seconds the weight is greater than the (upward) force<br>* after 10 seconds there is a resultant <b>or</b> net (upward) force<br>* after 10 seconds the (upward) force is greater than the weight | accept the converse   | <b>answers must be in terms of a comparison</b><br>'it does not have a great enough upward force' is insufficient<br>'at 10 seconds the forces are equal' is insufficient |
|             |            | <b>Total</b>         | <b>6</b> |   |   |   |

| Tier<br>5–7 | Q No<br>14 | Part | Mark | Answer   | Accept  | Additional guidance  |
|-------------|------------|------|------|--|---|--|
| a           | 1/2i       |      | 1    | * X-axis: mass of magnesium (g)<br>Y-axis: mass of magnesium oxide (g)   |   | <b>both</b> labels are required for the mark<br>units are required for the mark<br>pupils can gain credit for correct responses to<br>other parts if the axes are wrongly labelled <b>or</b><br>magnesium is on the Y-axis and magnesium<br>oxide is on the X-axis<br>scale need not begin at zero |
|             |            |      | 1    | * reasonable scales  | accept a scale of 1 g <b>or</b> 2 g per 5 small squares                           |  |
|             |            |      | 1    | * reasonably accurate plotting of all points   | all points plotted to $\pm 1$ small square  |  |
|             |            |      | 1    | * a line of best fit drawn   |   |  |
| b           | 1/2n       | i    | 1    | * E  |   |  |
|             |            | ii   | 1    | any <b>one</b> from<br>* ignore it in drawing the line of best fit<br>* they could predict the figure from the line of<br>best fit<br>* they should repeat the reading | accept 'ignore it'<br>accept 'they could use the graph line'<br>accept 'check it' | pupils can gain credit for a response which<br>suggests they should predict the correct value<br>from the pattern <b>or</b> ignore the anomalous results<br><b>or</b> repeat the reading   |
| c           | 1/2l       |      | 1    | * a number from 11 to 13   | accept a value consistent with the line of best fit                               | the unit is not required for the mark  |

| Tier<br>5–7  | Q No<br>14 | Answer  | Accept | Additional guidance |
|--------------|------------|---|--------|---------------------|
| d            | 1          | any <b>one</b> from<br>* the greater the mass of magnesium burned the greater the mass of oxide formed<br>* the magnesium and oxygen react in fixed proportions<br>* the mass of magnesium oxide formed is proportional to the mass of magnesium burned<br>* the greater the mass of magnesium the greater the mass of oxygen that combines with it |        |                     |
| <b>Total</b> | <b>8</b>   |   |        |                     |

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| Tier<br>3–6  | Q No<br>1 | Part | Mark     | Answer   | Accept                               | Additional guidance |     |    |    |    |                                       |  |  |  |
|--------------|-----------|------|----------|--|--------------------------------------|---------------------|-----|----|----|----|---------------------------------------|--|--|--|
| a            | 4/1a      | 1    | 1        | <table border="1"> <tr> <td>P</td> <td>off</td> </tr> <tr> <td>Q</td> <td>on</td> </tr> <tr> <td>R</td> <td>on</td> </tr> </table> <p>*</p>  | P                                    | off                 | Q   | on | R  | on | accept '1' for 'on' and '0' for 'off' | <b>all three</b> answers are required for the mark |  |  |
| P            | off       |      |          |  |                                      |                     |     |    |    |    |                                       |  |  |  |
| Q            | on        |      |          |  |                                      |                     |     |    |    |    |                                       |  |  |  |
| R            | on        |      |          |  |                                      |                     |     |    |    |    |                                       |  |  |  |
| b            | 4/1c      | 1    | 1        | any <b>one</b> from<br>* battery<br>* cell   | accept 'batteries'<br>accept 'cells' |                     |     |    |    |    |                                       |  |  |  |
| c            | 4/1a      | 2    | 2        | <table border="1"> <tr> <td>on</td> <td></td> </tr> <tr> <td>off</td> <td>✓</td> </tr> </table><br><table border="1"> <tr> <td>on</td> <td></td> </tr> <tr> <td>off</td> <td>✓</td> </tr> </table> | on                                   |                     | off | ✓  | on |    | off                                   | ✓  |  | <p>if all three answers are correct, award two marks<br/>if two answers are correct, award one mark<br/>if more than one box is ticked for any circuit,<br/>award no credit for that circuit</p> |
| on           |           |      |          |  |                                      |                     |     |    |    |    |                                       |  |  |  |
| off          | ✓         |      |          |  |                                      |                     |     |    |    |    |                                       |  |  |  |
| on           |           |      |          |  |                                      |                     |     |    |    |    |                                       |  |  |  |
| off          | ✓         |      |          |  |                                      |                     |     |    |    |    |                                       |  |  |  |
| <b>Total</b> |           |      | <b>4</b> |  |                                      |                     |     |    |    |    |                                       |  |  |  |

| Tier<br>3–6 | Q No<br>2 | Part             | Mark     | Answer   | Accept      | Additional guidance  |
|-------------|-----------|------------------|----------|--|-------------|--|
|             |           | <b>a</b><br>1/2i | 1        | * bar for material A drawn to 40 decibels  |             | allow a tolerance of one small square for the drawn line, either above <b>or</b> below 40 decibels |
|             |           | <b>b</b><br>1/2i | 1        | * 4  |             |  |
|             |           | <b>c</b><br>1/2k | 1        | * D  | accept '35' |  |
|             |           | <b>d</b><br>1/2d | 1<br>1   | * Use the same box each time. ✓<br>* Keep the distance between the sound sensor and the bell the same each time. ✓ |             | if more than two boxes are ticked, deduct one mark for each incorrect tick<br>minimum mark zero    |
|             |           | <b>Total</b>     | <b>5</b> |  |             |  |

| Tier<br>3–6 | Q No<br>3 | Part             | Mark     | Answer   | Accept  | Additional guidance  |
|-------------|-----------|------------------|----------|--|---|--|
|             |           | <b>a</b><br>4/2c | 1        | any <b>one</b> from<br>* the forces are balanced<br>* the forces are equal <b>or</b> the same<br>* the forces are both 1000 N<br>* they pull with the same force <b>or</b> equally hard                          | accept 'the forces are both 1000'<br>accept 'the newtons are even'<br>accept 'both teams have the same strength'  | ignore references to gravity if the answer is in terms of balanced forces<br>'the sides are equal' is insufficient<br><b>do not accept</b> 'both teams weigh 1000 N' |
|             |           | <b>b</b><br>4/2c | 1        | * an arrow drawn to the right  | accept an arrow drawn to the right anywhere on the drawing  |  |
|             |           | <b>c</b><br>4/2c | 1        | any <b>one</b> from<br>* team A pulled harder than team B<br>* team A was stronger<br>* team A was pulling with more than 1000<br>* team B was pulling with less than 1000<br>* there was more force to the left | accept 'team A pulled harder' <b>or</b> 'team A pulled more' <b>or</b> 'they pulled harder'<br>accept the converse<br>accept 'they used more strength'<br>accept 'there are more newtons to the left' |  |
|             |           | <b>d</b><br>4/2c | 1        | * 1200 N ✓   |   | if more than one box is ticked, award no mark  |
|             |           | <b>e</b><br>4/2d | 1        | * friction   |   |  |
|             |           | <b>Total</b>     | <b>5</b> |  |   |  |

| Tier 3–6                    | Q No     | Mark | Answer   | Accept  | Additional guidance   |
|-----------------------------|----------|------|--|---|---|
|                             | 4        |      |  |   |   |
| <b>a i</b><br>3/2d<br>3/3g  | 1        |      | * weathering ✓   |   | if more than one box is ticked, award no mark   |
| <b>a ii</b><br>3/2e<br>3/3g | 1        |      | any <b>one</b> from<br>* it is hard <b>or</b> harder<br>* it is resistant to acid rain<br>* it is less permeable <b>or</b> porous<br>* it is less easily weathered | accept 'limestone is softer'<br>accept 'it is resistant'<br>accept 'limestone is affected by acid rain'<br>accept 'limestone is more permeable <b>or</b> porous'<br>accept 'granite is stronger'<br>accept 'granite does not weather <b>or</b> erode' | 'granite <b>or</b> it is solid' is insufficient   |
| <b>b i</b><br>4/5a          | 1        |      | any <b>one</b> from<br>* coal<br>* gas<br>* oil<br>* peat  | accept 'methane'<br>accept 'petrol' <b>or</b> 'diesel' <b>or</b> 'kerosene'<br>accept 'turf'  |   |
| <b>b ii</b><br>4/5a         | 1        |      | * All fossil fuels are a source of energy. ✓   |   | if more than one box is ticked, award no mark   |
| <b>b iii</b><br>3/3g        | 1        |      | * corrosion ✓  |   | if more than one box is ticked, award no mark   |
| <b>b iv</b><br>3/2i         | 1        |      | * paint  | accept 'grease' <b>or</b> 'oil'<br>accept 'plastic' <b>or</b> 'wax' <b>or</b> 'polish'<br>accept 'varnish'<br>accept 'zinc' <b>or</b> 'galvanise it'  | 'waterproof coating' is insufficient<br>'something to stop them reacting' is insufficient |
| <b>Total</b>                | <b>6</b> |      |  |   |   |

| Tier 3–6                    |          | Q No               |                 |   |
|-----------------------------|----------|--------------------|-----------------|---|
|                             |          | 5                  |                 |   |
| Part                        | Mark     | Answer             | Accept          | Additional guidance                           |
| <b>a i</b><br>3/1 <i>h</i>  | 1        | * filtration ✓     |                 | if more than one box is ticked, award no mark |
| <b>a ii</b><br>3/1 <i>h</i> | 1        | * chromatography ✓ |                 | if more than one box is ticked, award no mark |
| <b>b i</b><br>3/3 <i>d</i>  | 1        | * it is alkaline   | accept 'alkali' |   |
| <b>b ii</b><br>3/3 <i>d</i> | 1        | * red              |                 |   |
| <b>c</b><br>3/3 <i>d</i>    | 1        | * indicator ✓      |                 | if more than one box is ticked, award no mark |
| <b>Total</b>                | <b>5</b> |                    |                 |   |

| Tier<br>3–6 | Q No<br>6 | Part                        | Mark     | Answer   | Accept   | Additional guidance   |
|-------------|-----------|-----------------------------|----------|--|--|---|
|             |           | <b>a i</b><br>3/1d          | 1<br>1   | * It is flexible. ✓<br>* It is strong. ✓                     |  | if more than two boxes are ticked, deduct one mark for each incorrect tick<br>minimum mark zero |
|             |           | <b>a ii</b><br>3/1d         | 1        | * It becomes rusty.  |  |   |
|             |           | <b>b i</b><br>3/1e<br>BS/2b | 1        | any <b>one</b> from<br>* it is flammable<br>* it may explode | accept 'it is inflammable' <b>or</b> 'it catches fire' <b>or</b> 'it burns'<br>accept 'it explodes'<br>accept 'it is reactive <b>or</b> very reactive'<br>accept 'it reacts with air <b>or</b> oxygen' | 'it is poisonous' is insufficient   |
|             |           | <b>b ii</b><br>3/1a         | 1        | * helium   |  |   |
|             |           | <b>Total</b>                | <b>5</b> |  |  |   |

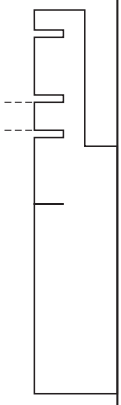
| Tier 3–6 | Q No 7 | Part             | Mark     | Answer  | Accept  | Additional guidance   |
|----------|--------|------------------|----------|---|---|---|
|          |        | <b>a</b><br>1/2g | 1        | * 10.5 or 10½   | accept '105 mm'   |   |
|          |        | <b>b</b><br>1/2k | 1<br>1   | * its teeth<br>* its shape  |   | answers may be in either order  |
|          |        | <b>c</b><br>1/2k | 1        | * the cut on its body   | accept 'fish cannot fly'<br>accept 'it fell out of the sky'<br>accept 'it dropped onto his boat'                |   |
|          |        | <b>d</b><br>1/2b | 1        | any <b>one</b> from<br>* use a key<br>* use the Internet<br>* ask an expert <b>or</b> fisherman <b>or</b> scientist <b>or</b> teacher<br>* look in a book | accept 'use a computer'<br>accept 'take it to a museum'<br>accept 'look it up'<br>accept 'look at the features' |   |
|          |        | <b>e</b><br>1/1a | 2        |   |   | if all four ticks are correct, award two marks<br>if two <b>or</b> three ticks are correct, award one mark<br>if there is more than one tick in any row, award no credit for that row |
|          |        | <b>Total</b>     | <b>7</b> |   |   |   |

| supported by evidence | not supported by evidence |
|-----------------------|---------------------------|
| ✓                     |                           |
| ✓                     |                           |
|                       | ✓                         |
| ✓                     |                           |

| Tier<br>3–6 | Q No<br>8 | Part                | Mark   | Answer  | Accept  | Additional guidance                    |
|-------------|-----------|---------------------|--------|---|---|--|
|             |           | <b>a i</b><br>2/5d  | 1<br>1 | * they decreased <b>or</b> went down<br>any <b>one</b> from<br>* more were eaten<br>* the mink ate them<br>* more animals to eat them   | accept 'more were killed'<br>accept 'some died'   | <i>do not accept 'they all died'</i>   |
|             |           | <b>a ii</b><br>2/5d | 1      | any <b>one</b> from<br>* they decreased <b>or</b> went down<br>* they had less food <b>or</b> rabbits<br>* the mink ate their food  | accept 'there were fewer of them'<br>accept 'they had no food'<br>accept 'they had to share their food <b>or</b> rabbits' |  |
|             |           | <b>b</b><br>2/5e    | 1      | * prey  |   |  |
|             |           | <b>c i</b><br>2/5d  | 1      | any <b>one</b> from<br>* fox<br>* snake<br>* badger<br>* bird of prey   | accept a named bird of prey such as 'owl' <b>or</b> 'hawk' <b>or</b> 'eagle'<br>accept 'cat'                              |  |
|             |           | <b>c ii</b><br>2/5d | 2      | any <b>two</b> from<br>* different climate<br>* disease<br>* not enough food<br>* shot <b>or</b> run over <b>or</b> trapped <b>or</b> poisoned<br>* injury due to fighting<br>* different habitat | accept 'no food' <b>or</b> 'they starved' <b>or</b> 'competition for food'<br>accept 'people killed them'                 | references to old age are insufficient |



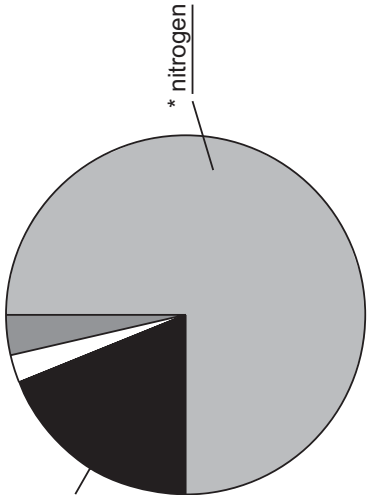
| Tier<br>3–6  | Q No<br>8 | Mark     | Answer   | Accept   | Additional guidance                     |
|--------------|-----------|----------|--|--|---|
| d            | 2/4b      | 1        | any <b>one</b> from<br>* they have fur <b>or</b> hair<br>* they have external ears | accept 'they give birth to live young'<br>accept 'they feed their young on milk' | 'they are warm-blooded' is insufficient |
| <b>Total</b> |           | <b>8</b> |  |  |   |

| Tier<br>3–6<br>5–7 | Q No<br>9<br>1 | Part                | Mark     | Answer  | Accept  | Additional guidance   |
|--------------------|----------------|---------------------|----------|---|---|---|
|                    |                | <b>a i</b><br>4/2e  | 1        | * it is between 20 g and 40 g   | accept a number greater than 20 and less than 40  | 'more than 20' or 'less than 40' are insufficient   |
|                    |                | <b>a ii</b><br>4/2f | 1        | any <b>one</b> from<br>* cut a slot between 20 and 40<br>* cut more slots   | accept 'add a mark for 30'<br>accept 'add more weights'   | award a mark for an answer referring to cutting a slot for any mass between 20 g and 40 g   |
|                    |                | <b>b i</b><br>4/2f  | 1        | any <b>one</b> from<br>* it is on the wrong side of the pivot<br>* it would not make the scale tip                                      | accept 'it is past the pivot line'<br>accept 'the scale is supported on this side'<br>accept 'it does not produce a clockwise moment' | award a mark for an answer indicating that it is on the wrong side of the pivot<br><b>do not accept</b> 'because the cardboard would tilt the other way'<br>'it would not work' is insufficient |
|                    |                | <b>b ii</b><br>4/2f | 1        | * a line drawn between the 40 g and 100 g slots<br> |   | accept answers which clearly indicate the correct position on the diagram<br>the line must not touch the slots for 40 g or 100 g  |
|                    |                | <b>Total</b>        | <b>4</b> |   |   |   |

| Tier<br>3–6<br>5–7  | Q No<br>10<br>2 | Mark | Answer  | Accept   | Additional guidance   |
|---------------------|-----------------|------|---|--|---|
| <b>a</b><br>4/3j    | 1               | 1    | * pluck them harder   | accept 'make the strings vibrate more or move more'  | do <b>not</b> accept 'make the strings vibrate more quickly'  |
| <b>b</b><br>4/3k    | 1               | 1    | * The sound has a higher pitch. ✓   |  | if more than one box is ticked, award no mark   |
| <b>c</b><br>4/3k    | 1               | 1    | * the sound from the thicker string has a lower pitch <b>or</b> a lower frequency | accept 'it has a lower pitch <b>or</b> a lower frequency'<br>accept 'the sound from the thicker string is louder' <b>or</b> 'it is louder' | answers must include a comparison<br>'it is lower' is insufficient  |
| <b>d i</b><br>4/3k  | 1               | 1    | * the sound in A has a higher pitch <b>or</b> a higher frequency                  | accept 'it has a higher pitch <b>or</b> higher frequency'  | answers must show a comparison<br>'the vibrations are quicker' is insufficient<br>'it is higher' is insufficient    |
| <b>d ii</b><br>4/3j | 1               | 1    | * the sound in A is louder  | accept 'it is louder'<br>accept 'the sound in C is quieter'<br>accept 'it has a greater amplitude'   | 'the vibrations are stronger <b>or</b> of greater amplitude' is insufficient<br>do <b>not</b> accept 'it is higher' |
| <b>Total</b>        | <b>5</b>        |      |   |  |   |



| Tier<br>3–6<br>5–7 | Q No<br>12<br>4 | Part                 | Mark     | Answer  | Accept  | Additional guidance   |
|--------------------|-----------------|----------------------|----------|---|---|---|
|                    |                 | <b>a i</b><br>3/1d   | 1        | any <b>one</b> from<br>* iron<br>* copper   | accept 'calcium'  |   |
|                    |                 | <b>a ii</b><br>3/1d  | 1        | any <b>one</b> from<br>* sulphur<br>* chlorine  | accept 'oxygen' <b>or</b> 'carbon'  | answers may be in either order<br><b>both</b> answers are required for the mark   |
|                    |                 | <b>a iii</b><br>3/1e | 1        | any <b>two</b> from<br>* calcium carbonate<br>* calcium oxide<br>* carbon dioxide<br>* iron sulphide    | accept 'copper chloride'  |   |
|                    |                 | <b>b</b><br>3/1e     | 1        | any <b>one</b> from<br>* the iron reacted <b>or</b> combined with sulphur<br><br>* the sulphur had mass | accept 'the iron gained sulphur' <b>or</b> 'sulphur was added to the iron'<br>accept 'the iron has joined with the sulphur'<br>accept 'the sulphur weighed 0.8 g' | <i>do not accept</i> 'iron has mixed with the sulphur'<br><i>do not accept</i> 'sulphur <b>or</b> iron added a new layer' |
|                    |                 | <b>c</b><br>3/1f     | 1        | * copper chloride   |   |   |
|                    |                 | <b>Total</b>         | <b>5</b> |   |   |   |

| Tier<br>3–6<br>5–7                        | Q No<br>13<br>5 | Mark | Answer  | Accept  | Additional guidance                           |
|---|-----------------|------|---|---|---|
| <b>a</b><br>3/1g                          | 2               |      |   |      |   |
| <b>b</b><br>3/2c                          | 1<br>1          |      | * water vapour<br>* condenses   | accept 'vapour'<br>accept 'turns into water or a liquid'<br>accept 'forms condensation' | 'water' or 'moisture' are insufficient        |
| <b>c i</b><br>2/2k<br><b>c ii</b><br>2/2j | 1<br>1          |      | * respiration<br>* Air breathed out has more carbon dioxide and less oxygen than air breathed in. ✓ |   | if more than one box is ticked, award no mark |
| <b>Total</b>                              | <b>6</b>        |      |   |   |   |

| Tier<br>3–6<br>5–7   | Q No<br>14<br>6 | Mark | Answer  | Accept  | Additional guidance   |
|----------------------|-----------------|------|---|---|---|
| <b>a i</b><br>2/3c   | 1               | 1    | * magnesium   |   |   |
| <b>a ii</b><br>2/3c  | 1               | 1    | any <b>one</b> from<br>* a potted plant has a limited amount of soil <b>or</b> minerals<br>* less chance of minerals being returned to the soil by dying <b>or</b> decaying plants <b>or</b> by microbes <b>or</b> fungi <b>or</b> bacteria <b>or</b> worms<br>* no room for roots to extend and find more minerals | accept the converse<br><br>accept 'no room for roots to grow'   | answers must indicate that the soil available to the potted plant is limited <b>or</b> may not be replenished<br>'the garden has more minerals' is insufficient<br>'lack of sunlight' is insufficient |
| <b>b i</b><br>3/1c   | 3               | 3    | *   |   | if all four answers are correct, award three marks<br>if three answers are correct, award two marks<br>if one <b>or</b> two answers are correct, award one mark                                       |
|                      |                 |      |   | accept 'Epsom Salts' <b>or</b> 'MgSO <sub>4</sub> ' <b>or</b> 'magnesium sulphate'<br><br>accept 'A and C' <b>or</b> 'Easy Grow' <b>or</b> 'NH <sub>4</sub> NO <sub>3</sub> ' <b>or</b> 'ammonium nitrate' <b>or</b> 'Saltpetre' <b>or</b> 'KNO <sub>3</sub> ' <b>or</b> 'potassium nitrate'<br><br>accept 'Superphosphate' <b>or</b> 'Ca(H <sub>2</sub> PO <sub>4</sub> ) <sub>2</sub> '<br><br>accept 'Saltpetre' <b>or</b> 'KNO <sub>3</sub> ' <b>or</b> 'potassium nitrate' |   |
| <b>b ii</b><br>3/1f  | 1               | * 3  |   |   |   |
| <b>b iii</b><br>3/1f | 1               | * 9  |   |   |   |
| <b>Total</b>         | <b>7</b>        |      |   |   |   |

| mineral    | letter of fertiliser |
|------------|----------------------|
| magnesium  | B                    |
| nitrogen   | A or C               |
| phosphorus | D                    |
| potassium  | C                    |

| Tier<br>3–6<br>5–7 | Q No<br>15<br>7 | Part | Mark  | Answer  | Accept  | Additional guidance |
|--------------------|-----------------|------|---|---|---|---------------------|
| a                  | 2/5e            | 1    | any <b>one</b> from<br>* it only eats other animals<br>* it only eats meat <b>or</b> fish <b>or</b> flesh   | accept 'predator'<br>accept 'eats meat'   |   |                     |
| b i                | 2/5c            | 1    | any <b>one</b> from<br>* it protects it<br>* it stops it being damaged<br>* it stops it drying out<br>* it prevents infection<br>* it keeps out disease organisms | accept 'it stops it being eaten'<br>accept 'it keeps the contents in'<br><br>accept 'it stops bacteria <b>or</b> viruses <b>or</b> germs getting in'<br>accept 'it allows air <b>or</b> oxygen in <b>or</b> carbon dioxide out' | <b>do not accept</b> 'it keeps it warm'   |                     |
| b ii               | 3/3g            | 1    | * it reacts with the carbonate  | accept 'they react' <b>or</b> 'it reacts with it'<br>accept 'acid reacts with the shell'<br>accept 'it dissolves the shell'<br>accept 'it erodes it' <b>or</b> 'wears it away'  |   |                     |
| b iii              | 2/5c            | 1    | any <b>one</b> from<br>* makes it easier <b>or</b> quicker <b>or</b> easy to hatch <b>or</b> break out of the egg<br>* makes the shell more porous                | accept 'air <b>or</b> oxygen gets in easily' <b>or</b> 'more air gets in'<br>accept 'carbon dioxide gets out more easily'   | 'easy <b>or</b> easier to break' is insufficient<br><br>'to allow for growth' is insufficient |                     |



| Tier<br>3–6<br>5–7 | Q No<br>15<br>7 | Part         | Mark     | Answer  | Accept  | Additional guidance  |
|--------------------|-----------------|--------------|----------|---|---|--|
|                    |                 | c i<br>1/2k  | 1        | any <b>one</b> from<br>* keep the eggs between 26°C and 30°C<br>* keep the temperature at <b>or</b> below 30°C<br>* keep the eggs at 26°C | accept any temperature from 26°C to 30°C<br>accept 'use the three lower temperatures' <b>or</b> 'the lower temperatures in the table' | 'make it cooler' <b>or</b> 'use lower temperatures' are insufficient |
|                    |                 | c ii<br>1/2j | 1        | * between 32°C and 34°C ✓   |   | if more than one box is ticked, award no mark                        |
|                    |                 | <b>Total</b> | <b>6</b> |   |   |  |

| Tier<br>3–6<br>5–7 | Q No<br>16<br>8 | Part | Mark | Answer  | Accept   | Additional guidance  |
|--------------------|-----------------|------|------|---|--|--|
| <b>a</b>           | 1               | 1/2a | 1    | any <b>one</b> from<br>* the distance the ruler dropped<br>* where the hand grabbed the ruler   | accept 'how far until they caught it'<br>accept 'length <b>or</b> measurement on the ruler'<br>accept 'where she caught it'<br>accept 'mm' <b>or</b> 'cm'  | 'ruler' is insufficient<br>'length of ruler' is insufficient   |
| <b>b</b>           | 1               | 1/2e | 1    | any <b>one</b> from<br>* to avoid the effect of his own reaction time<br>* the time is too short to measure with a stopwatch  | accept 'he might stop the watch before <b>or</b> after she reacted'<br>accept 'you cannot stop a stopwatch straightaway'<br>accept 'it might be too fast for the stopwatch'  | 'the time keeper would not have been as accurate' is insufficient<br>'you can time incorrectly' is insufficient<br>'the ruler is more precise' is insufficient |
| <b>c</b>           | 1               | 1/2d | 1    | * pupils  | accept 'pupil' <b>or</b> 'friend' <b>or</b> 'person' <b>or</b> 'human'   |  |
| <b>d</b>           | 2               | 1/2d | 2    | any <b>two</b> from<br>* the position of the ruler above the hand<br>* the way the ruler is released<br>* the ruler<br>* distance between finger and thumb<br>* the conditions in the room<br>* measure to same finger of catcher | accept 'height of ruler'<br>accept 'the height it is dropped from'<br>accept 'handedness'<br>accept 'the same person dropping it'<br>accept 'position of hand' <b>or</b> 'position of ruler'<br>accept examples of possible distractions | 'where he put his hand on the ruler' is insufficient   |
| <b>e</b>           | 1               | 1/2h | 1    | * repeat the investigation <b>or</b> it   | accept 'do more than one test with each person'  | <i>do not accept</i> 'use more people'   |
| <b>Total</b>       | <b>6</b>        |      |      |   |  |  |



| Tier<br>5–7 | Q No<br>10 | Part                       | Mark     | Answer   | Accept  | Additional guidance  |
|-------------|------------|----------------------------|----------|--|---|--|
|             |            | <b>a i</b><br>4/2g         | 1        | * 100  | accept '200 + 2.0'  |  |
|             |            |                            | 1        | * N/cm <sup>2</sup>  | accept '10 <sup>6</sup> N/m <sup>2</sup> ' <b>or</b> '10 <sup>6</sup> Pa' for two marks   |  |
|             |            | <b>a ii</b><br>4/2g        | 1        | * 800  | accept '100 × 8'<br>accept the numerical answer to <b>a i</b> × 8   | the unit is not required for the mark                        |
|             |            | <b>b i</b><br>3/1b<br>4/2g | 1        | any <b>one</b> from<br>* air <b>or</b> gas can be compressed<br>* water <b>or</b> liquids cannot be compressed<br>* gaps between particles of air <b>or</b> gas can be reduced | accept 'gases are easier to compress'<br>accept 'atoms can be compressed together'  | 'air <b>or</b> gas provides less resistance' is insufficient |
|             |            | <b>b ii</b><br>4/2g        | 1        | any <b>one</b> from<br>* less force would be transmitted to the brakes<br>* less pressure at B<br>* piston B would not move  | accept 'the brakes have less effect'<br>accept 'less pressure could be produced'<br>accept 'less <b>or</b> no resistance to the brakes'<br>accept 'the air bubbles could be compressed' | 'the brakes are spongy' is insufficient                      |
|             |            | <b>Total</b>               | <b>5</b> |  |   |  |

| Tier<br>5–7 | Q No<br>11 | Part                | Mark     | Answer   | Accept   | Additional guidance                                     |
|-------------|------------|---------------------|----------|--|--|---|
|             |            | <b>a</b><br>3/2f    | 1        | any <b>one</b> from<br>* it cools more slowly<br><br>* large volume of magma<br>* magma is insulated by rock<br>* heat is transferred more slowly to rock than to air<br>* lava cools more quickly | accept 'it cools slowly' <b>or</b> 'it is cooler above ground'<br>accept 'there is a lot of it'<br>accept 'magma is surrounded by rock'<br>accept 'it is hotter underground' |   |
|             |            | <b>b i</b><br>3/2e  | 1        | * crystals formed underground will be larger   | accept the converse<br>accept 'they will be larger'  |   |
|             |            | <b>b ii</b><br>3/2e | 1        | any <b>one</b> from<br>* magma cools more slowly than lava<br>* lava cools more quickly than magma   | accept 'magma cools slowly'<br>accept 'lava cools quickly'<br>accept 'there is no rock above the lava'   | <b>do not accept</b> 'bigger crystals cool more slowly' |
|             |            | <b>c i</b><br>3/2f  | 1        | any <b>one</b> from<br>* high temperatures<br>* high pressure  | accept 'heat' <b>or</b> 'hot'<br>accept 'pressure'   |   |
|             |            | <b>c ii</b><br>3/2f | 1        | * marble   |  |   |
|             |            | <b>Total</b>        | <b>5</b> |  |  |   |

| Tier 5–7 | Q No 12 | Part                | Mark     | Answer   | Accept  | Additional guidance  |
|----------|---------|---------------------|----------|--|---|--|
|          |         | <b>a i</b><br>1/2e  | 1        | any <b>one</b> from<br>* the effect of adding no extra insulation to the windows and roof<br>* it provides a baseline measure<br>* the temperature without any effort to reduce the heat loss                    | accept 'effect of not adding insulation'<br><br>accept 'as a comparison <b>or</b> control'<br>accept 'how much energy is normally lost'<br>accept 'how much heat single glazing keeps in'<br>accept 'what would happen if we did nothing'                                   |  |
|          |         | <b>a ii</b><br>1/2a | 1        | * double glazing <i>and</i> roof without insulation <b>and</b> a roof with insulation <i>and</i> single glazing  |   | answers may be in either order<br><b>both</b> answers are required for the mark  |
|          |         | <b>b</b><br>1/1b    | 1        | any <b>one</b> from<br>* a longer time (roof insulation) to fall between two temperatures<br>* smaller temperature fall (roof insulation) in a given time  | accept 'slower heat loss for insulation'<br>accept 'faster heat loss for double glazing'<br>accept 'more heat loss for double glazing'<br>accept 'roof insulation stays warmer than double glazing'<br>accept 'if it is quicker for the house to reach a given temperature' |  |
|          |         | <b>c</b><br>1/2j    | 1<br>1   | * both lines <b>or</b> curves starting from the same temperature, descending and approaching (not crossing) the room temperature line<br>* the solid line <b>or</b> curve descending more steeply than the other |   | allow a difference of 5 small squares at the start<br>accept correctly labelled curves which do not use solid and dotted lines as required by the question |
|          |         | <b>Total</b>        | <b>5</b> |  |   |  |

| Tier 5–7     | Q No 13      | Part     | Mark  | Answer | Accept   | Additional guidance   |
|--------------|--------------|----------|---|--------|--|---|
| a            | 2/1c         | 1        | any <b>one</b> from<br>* it is streamlined<br>* it has a pointed head<br>* it does not have much cytoplasm                              |        | accept 'there are enzymes in the head'   | <i>do not accept</i> 'it is streamline'<br>'its shape' is insufficient<br><br>'it has a nucleus' is insufficient as it is not a specific adaptation of a sperm cell |
| b i          | 2/1b         | 1        | any <b>one</b> from<br>* in the cytoplasm of the bacterium<br>* in a nucleus <b>or</b> within a membrane in the cell from the intestine |        | accept 'the bacterium does not have a nucleus <b>or</b> nuclear membrane'<br>accept 'in the bacterium it is not enclosed'                              |   |
| b ii         | 2/1b<br>2/4a | 1        | any <b>one</b> from<br>* it determines the characteristics of the cell<br>* it transfers information                                    |        | accept 'gives the cell instructions'<br>accept 'it tells the cell what to do'<br>accept 'to control the cell'<br>accept 'allows the cell to reproduce' |   |
| c            | 2/1c         | 1        | any <b>one</b> from<br>* it has a large surface area<br>* the folds increase the surface  |        |  |   |
| d            | 2/1a         | 1        | * they are independent cells <b>or</b> they do not work together <b>or</b> do not work in a group                                       |        | accept 'each sperm cell is individual <b>or</b> works individually'  | 'the cells are not joined together' is insufficient   |
| <b>Total</b> |              | <b>5</b> |   |        |  |   |

| Tier<br>5–7 | Q No<br>14 | Part                     | Mark     | Answer   | Accept  | Additional guidance                          |
|-------------|------------|--------------------------|----------|--|---|--|
|             |            | <b>a</b><br>2/3a<br>2/5b | 3        | any <b>three</b> from<br>* plants <b>or</b> algae need light for photosynthesis<br>* photosynthesis <b>or</b> algae <b>or</b> plants supply <b>or</b> produce oxygen<br>* plants <b>or</b> animals need oxygen<br>* photosynthesis supplies glucose <b>or</b> carbohydrate <b>or</b> biomass<br>* carbon dioxide is produced by plants <b>or</b> animals | accept 'for photosynthesis'<br><br>accept 'oxygen is used for respiration'<br>accept 'glucose is a source of energy for the plant'<br>accept 'the herbivores eat the plants' <b>or</b> 'animals eat plants' <b>or</b> 'snails eat plants' |  |
|             |            | <b>b</b><br>2/5b         | 1        | any <b>one</b> from<br>* materials can be recycled<br>* makes nutrients available<br>* makes minerals available  |   |  |
|             |            | <b>c</b><br>2/2j         | 1        | any <b>one</b> from<br>* at 27°C the oxygen concentration would drop too low<br>* at 15°C there is more oxygen   | accept 'the higher the temperature the less oxygen is dissolved'<br>accept 'at a higher temperature they would suffocate'<br>accept 'the lower the temperature the more oxygen there is'  | 'there would be more oxygen' is insufficient |
|             |            | <b>Total</b>             | <b>5</b> |  |   |  |









EARLY YEARS

NATIONAL  
CURRICULUM  
5–16

GCSE

GNVQ

GCE A LEVEL

NVQ

OTHER  
VOCATIONAL  
QUALIFICATIONS

First published in 2006

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