

Sc

KEY STAGE

3

TIERS

3–7

Science tests

# Mark scheme

for Papers 1 and 2

2008



National curriculum assessments

## 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 expected answers, 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 11 and from tier 5–7 paper 2 question 4, illustrates this.

Tier 3–6 5–7	Q No 11 4	Part	Mark	Answer	Accept	Additional guidance
		a i 3/3d	1	* it is neutral ✓		if more than one box is ticked, award no mark
		a ii 3/3d	1	* any number less than 7		
		a iii 3/3f	1	any <b>one</b> from * they are alkaline <b>or</b> an alkali  * they react with the acid	accept 'a soluble base' accept 'it has a pH above 7'	specific pH values such as 'its pH is 8.5' are insufficient

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 a of tier 3–6 paper 2 question 3, an answer giving ‘crushed into powder’ and ‘smoother and broken into pieces’ will be awarded two marks. However, an answer which gives ‘smooth like a pebble’ will be given only one mark, as ‘smooth’ and ‘like a pebble’ are equivalent answers.

Part	Mark	Answer	Accept	Additional guidance
a i 1/2g	2	any <b>two</b> from * smoother <b>or</b> rounder * broken <b>or</b> crumbled <b>or</b> crushed <b>or</b> it was smaller pieces * powder <b>or</b> dust formed	accept ‘it was more like a pebble’ accept ‘it eroded’ <b>or</b> ‘it weathered’	

In the following example, from part a of tier 5–7 paper 2 question 11, the statement in **bold type** in the **Additional guidance** column is given in order to indicate the general requirement of the question.

Part	Mark	Answer	Accept	Additional guidance
a 1/2k				<b>one conclusion should relate to the number of cigarettes and the other to the effect of age</b>
	1	* the more cigarettes smoked, the greater the number <b>or</b> percentage that die	accept ‘smoking 5 cigarettes a day is less harmful than smoking 20’	statements that do not make a generalisation, such as ‘nearly 1% of men aged 55–64 who smoke 20 cigarettes a day will die of heart disease’ are insufficient
	1	* the risk increases with age <b>or</b> is greater in older men	accept statements such as ‘20 cigarettes a day is worse when you are 45–64 than under 45’ accept the converse	

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 page 5)
- guidance to markers where pupils have not followed the instructions in 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 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 misspelling must, in order to be creditworthy, 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.

### Awarding levels

Level threshold tables, which show the mark ranges for the award of different levels, will be available on the NAA website [www.naa.org.uk/tests](http://www.naa.org.uk/tests) from 23 June 2008.

**Mark Allocation Grid: Tier 3–6**

**TIER 3–6 Paper 1**

Q	Sc1	Sc2	Sc3	Sc4
1	2	4		
2	2	6		
3	5			
4	1		3	
5	4		1	1
6	1			4
7			2	4
8	5			
9	2	3		
10	1	4		
11	6			
12	4		3	
13	1		4	
14	5			
15				7
16	3			2
<b>Total</b>	<b>42</b>	<b>17</b>	<b>13</b>	<b>18</b>

**TIER 3–6 Paper 2**

Q	Sc1	Sc2	Sc3	Sc4
1	2		1	3
2	2			4
3	5		3	
4	1		5	1
5		6		
6	6			
7		4		2
8	4			1
9	2			3
10				6
11	3		3	
12			9	
13	4	2		
14		8		
<b>Total</b>	<b>29</b>	<b>20</b>	<b>21</b>	<b>20</b>

<b>Total P1 + 2</b>	<b>71</b>	<b>37</b>	<b>34</b>	<b>38</b>
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**Overall**

<b>180</b>
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**Mark Allocation Grid: Tier 5–7**

**TIER 5–7 Paper 1**

Q	Sc1	Sc2	Sc3	Sc4
1	2	3		
2	1	4		
3	6			
4	4		3	
5	1		4	
6	5			
7				7
8	3			2
9	6			
10		6		
11	5			1
12			6	
13	5			1
<b>Total</b>	<b>38</b>	<b>13</b>	<b>13</b>	<b>11</b>

**TIER 5–7 Paper 2**

Q	Sc1	Sc2	Sc3	Sc4
1	4			1
2	2			3
3				6
4	3		3	
5			9	
6	4	2		
7		8		
8	2		1	2
9	5			
10	2		5	
11	2	6		
12				5
<b>Total</b>	<b>24</b>	<b>16</b>	<b>18</b>	<b>17</b>

<b>Total P1 + 2</b>
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<b>62</b>	<b>29</b>	<b>31</b>	<b>28</b>
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**Overall**

<b>150</b>
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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.

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Tier 3–6	Q No 1	Mark	Answer	Accept	Additional guidance
<b>a i</b> 1/2k	1		* A and C any <b>one</b> from * grass has germinated <b>or</b> grown  * seeds did not germinate <b>or</b> grow in B	accept 'A and C have hair' accept 'something has grown in A and C' accept 'they have hair' accept 'they have longer <b>or</b> more grass' accept 'B has no hair'	answers may be in either order  <b>both</b> the letters and the reason are required for the mark 'A and C are the same' is insufficient  'seeds need water to grow' is insufficient
<b>a ii</b> 1/2c 2/3a	1		any <b>one</b> from * it would have longer grass * the grass would have grown more	accept 'it had more grass <b>or</b> more hair' accept 'it grew more <b>or</b> faster' accept 'it would have grown less because it was over-watered'	'it would be greener' is insufficient 'it would be healthier' is insufficient
<b>b</b> 2/3a	1		any <b>one</b> from * it grew towards the light * that is where the light is coming from	accept 'it grew towards the Sun' accept 'to get light <b>or</b> sunlight' accept 'plants <b>or</b> grass need light' accept 'to get more Sun'	'because of the sunlight' is insufficient  'to get more heat' is insufficient
<b>c i</b> 2/1c	1		* B ✓		if more than one box is ticked, award no mark
<b>c ii</b> 2/3d	2		any <b>two</b> from * water * oxygen * minerals	accept 'moisture' <b>or</b> 'dampness'  accept a named mineral accept 'nutrients' <b>or</b> 'salts' accept, for two marks, two named minerals such as 'nitrates' and 'phosphates'	<b>do not accept</b> 'plant food' <b>or</b> 'food' <b>or</b> 'nutrition'
<b>Total</b>	<b>6</b>				

Tier 3–6	Q No 2	Mark	Answer	Accept	Additional guidance
a i 2/2m	2	*	<div style="display: flex; flex-wrap: wrap;"> <div style="border: 1px solid black; padding: 5px; margin: 5px;">reactions are slower</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">a person loses weight</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">skin gets warmer</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">a person can get hurt without knowing it</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">more blood travels to the surface of the body</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">activity of the brain slows down</div> <div style="border: 1px solid black; padding: 5px; margin: 5px;">sense of pain is reduced</div> </div>		<p>award two marks for <b>all three</b> lines correct</p> <p>award one mark for any <b>two</b> lines correct</p> <p>if more than one line is drawn from any box, do not credit either line</p>
a ii 2/2m	1	*	reactions are slower	<p>accept 'activity of the brain slows down'</p>	
b i 2/2h	1	*	placenta	<p>accept 'umbilical cord' <b>or</b> 'cord'</p>	
b ii 2/2h	1	*	amniotic fluid	<p>accept 'fluid'</p> <p>accept 'uterus'</p>	

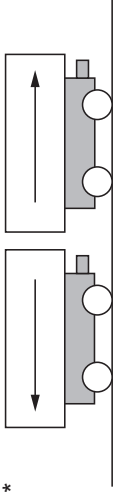
Tier 3–6	Q No 2	Answer	Accept	Additional guidance
<b>c i</b> 1/2i BS/2a	1 1	* toxic * flammable	accept 'inflammable'	answers must be in the correct order
<b>c ii</b> 2/2m BS/2b	1	any <b>one</b> from * they can cause brain damage * it makes you less co-ordinated	accept 'it makes you dizzy <b>or</b> light-headed' accept 'you can hallucinate' accept 'they affect the brain <b>or</b> liver' accept 'they damage your lungs' accept 'it burns your throat'	'it damages <b>or</b> harms your body <b>or</b> makes you ill' are insufficient as they are equivalent to <i>dangerous</i>
<b>Total</b>	<b>8</b>		accept 'it is poisonous' <b>or</b> 'they can kill you'	'they are toxic' is insufficient 'it contains solvents' is insufficient 'they may dissolve chemicals in the body' is insufficient

Tier 3–6	Q No 3	Answer	Accept	Additional guidance
<b>a</b> 1/2e	1	* a ruler	accept 'a metre rule' accept 'a tape measure'	'cm' is insufficient 'a measuring stick' is insufficient
<b>b i</b> 1/2j	1	* 30		<i>do not accept</i> '30 seconds'
<b>b ii</b> 1/2j	1 1	* A to B: any number from 5 to 10' * D to E: any number from 45 to 80	accept a range such as '5 to 10' accept a range such as '50 to 60'	
<b>c</b> 1/2e	1	any <b>one</b> from * you can measure smaller intervals of time * the lines are closer	accept 'each section burns for a shorter time' accept 'it is more precise <b>or</b> accurate' accept 'the lines are close' accept 'the lines are further apart on candle 1' accept 'the lines are 1 cm apart on candle 1 and 0.5 cm apart on candle 3' accept 'there are more lines <b>or</b> smaller spaces <b>or</b> smaller segments' accept 'more sections <b>or</b> rings'	'it is easier to read' is insufficient 'the lines are smaller' is insufficient
<b>Total</b>	<b>5</b>			

Tier 3–6	Q No 4	Mark	Answer	Accept	Additional guidance
<b>a i</b> 1/2k 3/3a	1		any <b>one</b> from * bubbles * fizzing * gas is given off	accept 'effervescence'	'metal goes into solution <b>or</b> turns into a salt' and 'there would be a rise in temperature' are insufficient answers as they are <b>not</b> shown in the drawings
<b>a ii</b> 3/3c 1/2k	1		* magnesium zinc iron copper	accept 'Mg' accept 'Zn' accept 'Fe' accept 'Cu'	answers must be in the correct order <b>all four</b> answers are required for the mark
<b>b i</b> 3/1d	1		* copper	accept 'Cu'	
<b>b ii</b> 3/3a	1		* iron	accept 'Fe'	
<b>Total</b>	<b>4</b>				

Tier 3–6	Q No 5	Mark	Answer	Accept	Additional guidance
a i 1/2g	1	1	* 60 cm <sup>3</sup>		
			* 10 cm <sup>3</sup>	accept '60 – 50'	
b i 1/2j	1	1	* lead weight	accept 'lead' or 'weight'	'800 g' is insufficient
			* wood puzzle	accept 'wood' or 'puzzle'	'500 cm <sup>3</sup> ' is insufficient
c i 3/1a 3/3a	1	1	any <b>one</b> from * it has a low density * it does not rust	accept 'it is light'	<i>do not accept</i> 'it does not rust as easily as other metals'
			* friction	accept 'it does not bend' accept 'it is strong'	
<b>Total</b>		<b>6</b>			

Tier 3–6	Q No 6	Answer	Accept	Additional guidance
<b>a i</b> 4/2b	1	* C	accept 'down'	
<b>a ii</b> 4/2c	1	* A	accept 'up'	
<b>b i</b> 1/2m 4/2b	1	* increases ✓		if more than one box is ticked, award no mark
<b>b ii</b> 4/2b	1	any <b>one</b> from * there are two people on the same <b>or</b> Jo's trapeze * the weight is greater * there is Sara as well	accept 'Sara is pulling on Jo'	this mark cannot be awarded if the response given conflicts with part (bi)  'the force is greater' is insufficient 'it is heavier' is insufficient as 'it' refers to force
<b>c</b> 4/2b	1	* it decreases	accept 'it is less' accept 'there is less weight on it' accept 'there is no force' <b>or</b> 'it becomes zero'	'it springs back up' is insufficient
<b>Total</b>	<b>5</b>			

Tier 3–6	Q No 7	Answer	Accept	Additional guidance
<b>a</b> 4/1d	1	* Magnet A N S		marks may be awarded for part (a) if the magnets are correctly labelled in part (b) and no answer is given in part (a)  both poles are required for the mark
	1	* Magnet C S N		both poles are required for the mark
<b>b</b> 4/1d	1	* repel attract		answers must be in the correct order both answers are required for the mark
<b>c</b> 4/1d 4/2c	1	* 		both arrows are required for the mark
<b>d i</b> 3/1d 4/2c	1	* it is attracted	accept 'it gets faster'	'they stick together' is insufficient
<b>d ii</b> 3/1d	1	* nothing	accept 'it is not attracted or repelled' accept 'it is not attracted' accept 'it is not repelled'	do <b>not</b> accept 'it repels'
<b>Total</b>	<b>6</b>			



Tier 3–6	Q No 8	Answer	Accept	Additional guidance
<b>a i</b> 1/2e	1	any <b>one</b> from * add more books * make the pile of books higher	accept 'use bigger books' accept 'lift one end of the ramp higher' accept 'bring the ramp closer to the books'	'change the number of books' or 'change the size of the books' are insufficient 'lift the ramp higher' is insufficient  do <b>not</b> award a mark for answers implying the use of a different ramp
<b>a ii</b> 1/2j	1	* E		
<b>a iii</b> 1/2h 1/2j	1	any <b>one</b> from * some results are the same * some results do not fit the pattern	accept 'there are two 16s' accept 'to check her results' accept 'to make it more reliable' accept 'in case one was an odd result'	do <b>not</b> accept '34' 'because there was no pattern' is insufficient  do <b>not</b> accept 'to make it a fair test'
<b>b i</b> 1/2j	1	* 26 cm		
<b>b ii</b> 1/2k 1/2j	1	* increases	accept 'goes up'	
<b>Total</b>	<b>5</b>			

Tier 3–6 5–7	Q No 9 1	Mark	Answer	Accept	Additional guidance
<b>a i</b> 1/2j	1		* more fishing boats	accept 'more people were fishing' accept 'more fishing' accept 'more boats'	'more being caught' is insufficient
<b>a ii</b> 1/2m 1/2k	1		any <b>one</b> from * overfishing  * fish were caught before they could breed * fish were not allowed time to breed	accept 'too many fish were caught' accept 'few fish or herring were left in the sea'  accept 'fish were smaller'	'lots of fish were caught' is insufficient <i>do not accept</i> 'no herring or fish left' <i>do not accept</i> 'too many boats'  'the herring are too young' is insufficient  'less being caught' is insufficient
<b>a iii</b> 2/5a	1		any <b>one</b> from * to allow numbers to recover <b>or</b> increase * to allow more herring to breed * to allow more herring to mature	accept 'so the herring would be old enough <b>or</b> mature enough to breed' accept 'it is the breeding time'	<i>do not accept</i> 'they were becoming extinct' 'to allow herring to be born' is insufficient  'there were fewer herring left' is insufficient

Tier 3–6 5–7	Q No 9 1	Mark	Answer	Accept	Additional guidance
<b>b i</b> 2/5d	1		any <b>one</b> from * cod eat sand eels instead of herring * cod eat more sand eels * cod eat capelin instead of herring so there is less food for sand eels	accept 'cod would eat more capelin' accept 'cod would eat the sand eels' food'	'cod have to eat something else' is insufficient 'cod eat sand eels' is insufficient 'less food for sand eels' is insufficient as it implies that sand eels eat herring 'because the cod only had two choices' is insufficient
<b>b ii</b> 2/5d	1		any <b>one</b> from * there would be more animal plankton * fewer cod	accept 'more plankton'	'they will have more to eat <b>or</b> more food' is insufficient 'the animal plankton would get bigger' is insufficient 'less food for cod' is insufficient
<b>Total</b>	<b>5</b>				

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Tier 3–6 5–7	Q No 10 2	Answer	Accept	Additional guidance
<b>a</b> 1/2m 2/5c	1	* leaves are bigger	accept 'there are leaves <b>or</b> a canopy' accept 'leaves open <b>or</b> grow'	'trees block the light' is insufficient
<b>b</b> 2/3a 2/5c	2	any <b>two</b> from * light is needed for photosynthesis * more (photosynthesis)  * light provides energy for growth * biomass <b>or</b> food <b>or</b> sugar <b>or</b> starch <b>or</b> carbohydrate is produced	accept 'photosynthesis' accept, for two marks, 'the rate <b>or</b> amount of photosynthesis increases if the light increases'	'they need light to grow' is insufficient 'light is a source of food' is insufficient
<b>c</b> 2/2k	1 1	* glucose * water		answers must be in the correct order
<b>Total</b>	<b>5</b>			

Tier 3–6 5–7	Q. No 11 3	Mark	Answer	Accept	Additional guidance
<b>a</b> 1/2m 2/5a	1	1	any <b>two</b> from * less <b>or</b> no competition for food * plenty of food <b>or</b> water <b>or</b> they get fed * they have shelter * veterinary <b>or</b> medical treatment	accept 'good <b>or</b> balanced diet' accept 'protected from bad weather' accept 'they are vaccinated' accept 'they are kept healthier'	<b>both</b> answers are required for the mark 'they are looked after' is insufficient 'protection' is insufficient because it is not specific 'they get fewer diseases' is insufficient <b>do not accept</b> 'they are less likely to get a disease' 'they are healthier' is insufficient
<b>b i</b> 1/2j	1	1	* they are less likely to be injured <b>or</b> killed <b>or</b> there is no hunting of lions	accept 'they do not fight as much' accept 'there are no predators of lions'	accept a curved <b>or</b> straight line
<b>b ii</b> 1/2j	1	1	any <b>one</b> from * animals with longer pregnancies live longer * the shorter the pregnancy the shorter the life span	accept 'the shorter the life span the shorter the pregnancy'	a comparative answer is required

Tier 3–6 5–7	Q. No 11 3	Answer	Accept	Additional guidance
<b>c i</b> 1/2i	2	* all three points plotted correctly	accept a tolerance of $\pm$ half a small square	if all three points are correct, award two marks if one <b>or</b> two points are correct, award one mark
<b>c ii</b> 1/2i	1	* no <input checked="" type="checkbox"/> any <b>one</b> from * the data is more scattered * there is no link between the number of days pregnant and the expected life span * the human has the longest life span but the shortest pregnancy * the giraffe has the shortest life span but the longest pregnancy * the (new) points show the longer the pregnancy the shorter the life span	accept 'they do not go up in a straight line' accept 'they do not fit the line of best fit'  accept 'giraffes <b>or</b> horses have a longer pregnancy than humans but a shorter life span' accept the converse  accept 'they are opposite to the other results'	if more than one box is ticked, award no mark <b>both</b> the answer and the correct explanation are required for the mark
<b>Total</b>	<b>6</b>			

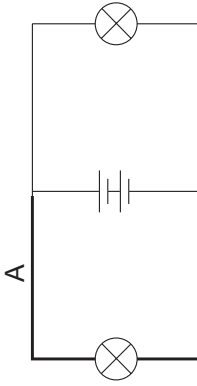
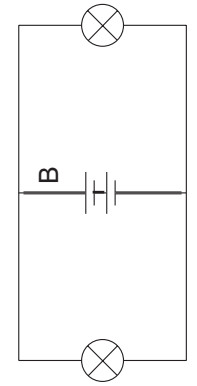
Tier 3–6 5–7	Q No 12 4	Part	Mark	Answer	Accept	Additional guidance
	1	<b>a i</b> 1/2k 3/1a	1	* mercury	accept 'Hg'	
	1	<b>a ii</b> 1/2k 3/1a	1	* iron	accept 'Fe'	
	1	<b>a iii</b> 1/2k 3/1a	1	* mercury	accept 'Hg'	
	1	<b>a iv</b> 1/2k 3/1a	1	* aluminium	accept 'Al'	
	1	<b>b i</b> 3/1a 1/2i	1	* an arrow drawn at 0°C	accept any unambiguous indication	
	1	<b>b ii</b> 3/1a 1/2i	1	* gas ✓		if more than one box is ticked, award no mark
	1	<b>b iii</b> 3/1a 1/2i	1	* liquid ✓		if more than one box is ticked, award no mark
<b>Total</b>	<b>7</b>					

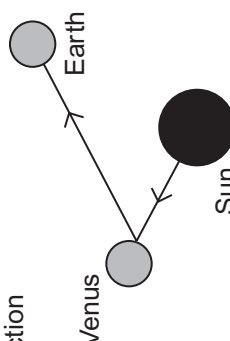
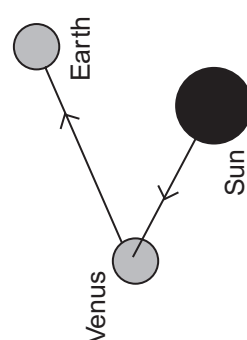


Tier 3–6 5–7	Q No 13 5	Part	Mark	Answer	Accept	Additional guidance
		<b>a i</b> 3/1h BS/1b	1	any <b>one</b> from * to stop water vapour <b>or</b> steam escaping * to stop lavender oil vapour escaping  * to reduce heat loss	accept 'gas <b>or</b> vapour <b>or</b> particles could escape' accept 'to stop oil escaping' accept 'to make sure the oil goes down the tube' accept 'the oil <b>or</b> vapours could not be collected' accept 'to stop heat loss' <b>or</b> 'to keep heat in' accept 'to stop the heat escaping' accept 'to maintain the pressure'	'to stop water escaping <b>or</b> spilling out' is insufficient  'to stop the smell escaping' is insufficient
		<b>a ii</b> 1/2f 3/1b	1	any <b>one</b> from * it could explode * it could break	accept 'the lid might come off' accept 'so the pressure does not break the seal'	'the pressure would be too high' is insufficient 'it would get too hot' is insufficient
		<b>b i</b> 3/2c	1	* <i>from</i> gas to liquid		<b>both</b> answers are required for the mark answers must be in the correct order
		<b>b ii</b> 3/1a	1	any <b>one</b> from * it sinks * it is at the bottom	accept 'lavender oil floats' accept 'the oil is on the top'	'they are not mixed' is insufficient
		<b>c</b> 3/1b	1	* B		if more than one letter is identified, award no mark
		<b>Total</b>	<b>5</b>			

Tier 3–6 5–7	Q No 14 6	Part	Mark	Answer	Accept	Additional guidance
<b>a</b> 1/2c 4/5f	1			* African its ears have a larger surface area	accept 'larger surface area' accept 'larger ears'	<b>both</b> the answer and the correct explanation are required for the mark 'they have large ears' is insufficient
<b>b i</b> 1/2d	1			any <b>one</b> from * he used identical cans  * he used the same amount of water	accept 'the cans were made of the same metal' accept 'the cans were the same size <b>or</b> shape' accept 'he used the same metal for the strips'  accept 'he kept them in the same place'	'he used metal for the strips' is insufficient 'he took the temperature every 5 minutes for both' is insufficient
<b>b ii</b> 1/2i	1			any <b>one</b> from * the pattern <b>or</b> relationship can be seen more easily <b>or</b> more quickly  * anomalous results can be seen more quickly <b>or</b> easily	accept 'the pattern <b>or</b> relationship is clearer'  accept 'the temperature change is clearer' accept 'the pattern can be seen straight away' accept 'you can compare them more easily'  accept 'you can make predictions more easily <b>or</b> more quickly'	'the pattern <b>or</b> the way the temperature changes can be seen' is insufficient 'it is clearer' is insufficient 'to see them better' is insufficient  <b>do not accept</b> 'a graph is more accurate'

Tier 3–6 5–7	Q No 14 6	Mark	Answer	Accept	Additional guidance
<b>b iii</b> 1/2/	1	1	* yes ✓ the greater the surface area of metal the greater the heat loss <b>or</b> the lower the temperature	accept 'the bigger strips cause the greatest heat loss' accept 'metal A represents big ears'  accept 'the can with bigger strips cooled more quickly' accept answers that relate the size <b>or</b> surface of the strips to the size <b>or</b> surface of the ears  accept 'no' and a relevant supporting explanation <b>only if</b> 'Indian elephant' is given as an answer to part (a). An example would be 'no, as I thought smaller ears would cool quicker'	if more than one box is ticked, award no mark <b>both</b> the answer 'yes' and the correct explanation are required for the mark  <b>do not accept</b> 'can B was a better insulator'
<b>c</b> 1/2g	1	1	any <b>one</b> from * it reduces error  * readings are continuous * it can draw a graph	accept 'it is more accurate' accept 'less human error' <b>or</b> 'is more reliable' accept 'it is more precise' accept 'it takes more readings'  accept 'you can leave it to take results' accept 'it would record the results for him'	'you can leave it' is insufficient
<b>Total</b>		<b>5</b>			

Tier 3–6 5–7	Q No 15 7	Mark	Answer	Accept	Additional guidance
<b>a i</b> 4/1a	1	*	 <p>A</p>	accept a switch drawn and labelled A marked on any part of the circuit highlighted	do <b>not</b> accept a switch at either junction the switch must be labelled for the mark
<b>a ii</b> 4/1a	1	*	 <p>B</p>	accept a switch drawn and labelled B marked on any part of the circuit highlighted	do <b>not</b> accept a switch at either junction the switch must be labelled for the mark
<b>b</b> 4/3f	1		* they are absorbed	accept 'they are blocked or filtered out'	'they are filtered' is insufficient
<b>c</b> 4/5e 4/5g	1 1 1 1		* chemical * electrical * light * thermal		answers must be in the correct order  'heat' is insufficient as the question asks for a word from the box
<b>Total</b>	<b>7</b>				

Tier 3–6 5–7	Q No 16 8	Mark	Answer	Accept	Additional guidance
<b>a</b> 1/2m 4/4c	1		<p>any <b>one</b> from</p> <ul style="list-style-type: none"> <li>* Venus is nearer to the Sun</li> <li>* the Sun's gravity on Venus is greater</li> <li>* it travels faster</li> <li>* it has a smaller orbit</li> </ul>	<p>accept 'it does not have as far to go'</p>	<p>a comparative statement is needed 'it is closer' is insufficient</p>
<b>b</b> 4/3b 4/4d	1 1		<p>* a straight line from the Sun to Venus <b>and</b> a straight line from Venus to Earth</p> <p>* arrows drawn on both rays in the correct direction</p> 	<p>accept two discontinuous straight lines that touch the Sun, Venus and the Earth</p> 	<p>do <b>not</b> accept a line from the Sun which touches the Earth</p>
<b>c i</b> 1/1a 1/1c	1		<p>any <b>one</b> from</p> <ul style="list-style-type: none"> <li>* they had not been discovered</li> <li>* they had not been seen</li> </ul>	<p>accept 'he did not know they existed'</p> <p>accept 'they could not be seen'</p>	<p>do <b>not</b> accept 'they did not exist' 'they are too far away' is insufficient</p>
<b>c ii</b> 1/2m 4/4b	1		<p>any <b>one</b> from</p> <ul style="list-style-type: none"> <li>* the Earth is not at the centre</li> <li>* the planets do not go round the Earth <b>or</b> the planets orbit the Sun</li> <li>* the Earth goes round the Sun</li> <li>* the Sun is in the middle</li> </ul>	<p>accept answers which give the correct order of the planets in the solar system</p>	<p>answers must refer to the arrangement and <b>not</b> to missing planets</p> <p>'there are more planets' is insufficient</p>
<b>Total</b>	<b>5</b>				

Tier 5–7	Q No 9	Mark	Answer	Accept	Additional guidance
a i 1/2d	1		any <b>one</b> from * to see how the heart rate had changed * to compare the rate before and after the treatment	accept 'to see the result of the treatment' <b>or</b> 'to see if the treatment made a difference' accept 'to get a baseline <b>or</b> standard' <b>or</b> 'to make a comparison'	'to make it a fair test' <b>or</b> 'for a control' are insufficient responses
a ii 1/2e	1		* so the water fleas could adjust to the solution <b>or</b> settle down	accept 'to allow time for the drug to work' accept 'to allow the treatment to get around its body'	
a iii 1/2h	1		* use more than 20 water fleas in each group	accept 'use more water fleas' accept 'repeat it with the same fleas after the effects have worn off'	'repeat it' is insufficient
b i 1/2d	1		* to show if alcohol <b>or</b> kava affects the heart rates <b>or</b> water fleas	accept 'it shows alcohol alone increases <b>or</b> affects the heart rate' accept 'to see what effect alcohol has' accept 'to show it is the kava that affects <b>or</b> reduces the heart rate of fleas' accept 'to show it is not alcohol that affects <b>or</b> reduces the heart rate' accept '(it acts) as a control'	'as a comparison' is insufficient

Tier 5–7	Q No 9	Mark	Answer	Accept	Additional guidance
<b>b ii</b> 1/2k	1		<p>any <b>one</b> from</p> <ul style="list-style-type: none"> <li>* take the average heart rate resulting from kava in alcohol away from the average heart rate resulting from alcohol</li> <li>* take the difference between kava in alcohol and alcohol only</li> <li>* look at the difference between group 1 and group 2 after treatment</li> </ul>	<p>accept 'add the increase with alcohol to the decrease with kava and alcohol'</p> <p>accept 'subtract 35 from 41 <b>or</b> 42'</p>	
<b>c</b> 1/2o	1		<p>any <b>one</b> from</p> <ul style="list-style-type: none"> <li>* there may be side effects</li> <li>* the effect could be different in humans</li> <li>* it has not been tested on humans</li> <li>* human hearts are different from fleas' hearts</li> </ul>	<p>accept 'humans are bigger <b>or</b> from a different group <b>or</b> species'</p> <p>accept 'we do not know anything about the dose <b>or</b> amount given'</p>	<p>'they are not the same' <b>or</b> 'they are different animals' are insufficient responses</p>
<b>Total</b>	<b>6</b>				

Tier 5–7	Q No 10	Mark	Answer	Accept	Additional guidance
<b>a</b> 2/1b	1	1	* genetic material <b>or</b> genes <b>or</b> DNA	accept 'nucleus' accept 'chromosomes'	
<b>b</b> 2/2n	1	1	<b>method</b> * touch <b>or</b> contact <b>prevention</b> any <b>one</b> from * wash hands before <b>or</b> after touching a patient <b>or</b> before <b>or</b> after touching surfaces <b>or</b> articles * use alcohol rub when entering <b>or</b> leaving ward <b>or</b> room <b>or</b> hospital	accept 'quarantine patients suspected of carrying disease' accept 'change gloves between patients' accept 'stop contact with others' <b>or</b> 'limit visitors'	<b>each method of prevention must be related to the method of spread for a mark</b> the method of spread <b>and</b> prevention are required for each mark the same prevention method cannot be used for both methods of spread
	1	1	<b>method</b> * coughing <b>or</b> sneezing <b>prevention</b> * cover mouth <b>or</b> nose <b>or</b> use a handkerchief <b>or</b> wear a mask	accept 'through the air' <b>or</b> 'breathing on someone' accept 'quarantine patients suspected of carrying disease' accept 'stop contact with others' <b>or</b> 'limit visitors'	

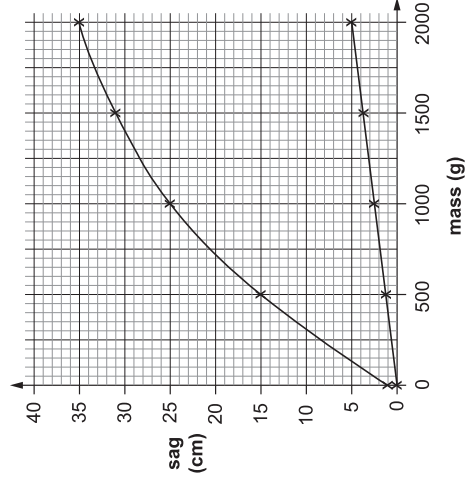


Tier 5–7	Q No 10	Answer	Accept	Additional guidance
<b>c</b> 2/2n	3	any <b>three</b> from * vaccine contains a dead <b>or</b> weakened form of the bacterium <b>or</b> virus * antibodies <b>or</b> antitoxins (are produced) * (made by) white blood cells * further infections are prevented <b>or</b> bacteria <b>or</b> viruses <b>or</b> toxins are destroyed	accept 'inject with protein from the bacterium <b>or</b> virus'  accept 'white cells' accept 'kills the bacteria <b>or</b> viruses'	'it contains a small amount of bacteria <b>or</b> virus' is insufficient  'stop you getting it again' is insufficient 'fights bacteria' is insufficient  'you become immune to the disease' is insufficient as it is given in the question
<b>Total</b>	<b>6</b>			

Tier 5–7	Q.No 11	Part	Mark	Answer	Accept	Additional guidance
		<b>a i</b> 1/2a 1/2h 1/2e	1	* 0.75 s	accept $\frac{1.5}{2}$ or $\frac{3}{4}$	
		<b>a ii</b> 1/2a 1/2h 1/2e	2	any <b>two</b> from * measure the depth of the water * measure the time for the wave to travel * work out the speed * make sure the waves are the same size <b>or</b> use the same force <b>or</b> repeat at the same depth	accept an answer that indicates how high to fill the tank, for example 'fill the tank to 10 cm' accept 'measure the speed of the wave'	
			1	* repeat at different depths	accept 'add more water <b>or</b> change the depth and do it again' accept 'repeat with different volumes of water'	
		<b>b</b> 1/2j	1	* <b>A to B</b> : decreases <b>or</b> slows down * <b>B to C</b> : remains constant <b>or</b> stays the same		<i>do not accept 'gets slower'</i>
		<b>Total</b>	<b>6</b>			

Tier 5–7	Q No 12	Mark	Answer	Accept	Additional guidance
<b>a i</b> 3/1f 3/3e	2		* sodium chloride + * water	accept 'hydrogen oxide' for water	answers must be in the correct order
<b>a ii</b> 3/1f	1		* H <sub>2</sub> O		
<b>b</b> 3/2g	1		any <b>one</b> from * the same atoms are present in the reactants and the products * no gas was given off	accept 'mass is conserved'  accept 'nothing was added <b>or</b> lost'	'the mass did not change' is insufficient 'the particles are the same' is insufficient <i>do not accept</i> 'the molecules are the same'
<b>c i</b> 3/3e 3/1f	1		* sodium chloride carbon dioxide water		answers may be in any order <b>all three</b> answers are required for the mark
<b>c ii</b> 3/2g 3/3e	1		any <b>one</b> from * carbon dioxide <b>or</b> gas escapes * carbon dioxide is a gas * one of the products is a gas <b>or</b> escapes		'mass is lost' is insufficient as it is given in the question
<b>Total</b>	<b>6</b>				

Tier 5–7	Q No 13	Mark	Answer	Accept	Additional guidance
<b>a</b> 1/2e	1		any <b>one</b> from * the original height of the plank and the height with masses * the height of the plank before and after adding masses	accept 'take the height with the mass added away from the height of the table' accept 'take the height of the plank with the mass added away from the height with no mass' accept 'vertical distance moved'	'distance moved' is insufficient
<b>b i</b> 1/2i 1/2j	1 1		* five points plotted to within one small square * smooth curve of best fit	accept an appropriate straight line of best fit	
<b>b ii</b> 4/2b	1		any <b>one</b> from * the weight <b>or</b> mass of the (wooden) plank * the (larger) overhang		'the weight <b>or</b> mass' is insufficient



Tier 5–7	Q No 13	Answer	Accept	Additional guidance
<b>Part</b>	<b>Mark</b>	<b>Answer</b>	<b>Accept</b>	<b>Additional guidance</b>
<b>c i</b> 1/2]	1	* as the mass increases the sag increases	accept the converse accept 'the lines both went up' accept 'sag increases in both'	
<b>c ii</b> 1/2]	1	any <b>one</b> from * there is more sag for each mass * the increase in sag is not constant * the increase in sag gets less	accept 'the plank sags more' accept 'in the second test they did not go up in equal amounts' accept 'first test gives a straight line, the second was a curve' accept 'first went up gradually, the second went up steeply'	'the plank sagged before he added any mass' is insufficient
<b>Total</b>	<b>6</b>			

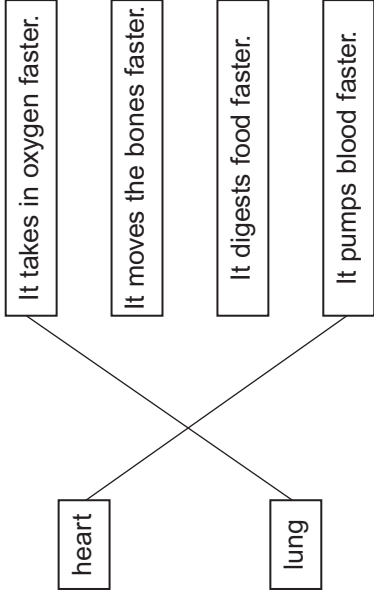
Tier 3–6	Q No 1	Mark	Answer	Accept	Additional guidance
<b>a</b> BS/2a 4/1a	2	*			award two marks for all <b>four</b> correct lines award one mark for any <b>two</b> or <b>three</b> correct lines if more than one line is drawn from any box, do not credit either line
<b>b</b> 4/1a	1		* off ✓ off ✓		both ticks are required for the mark if more than one box is ticked in any row, award no mark
	1		* on ✓ on ✓		both ticks are required for the mark if more than one box is ticked in any row, award no mark
<b>c</b> 4/1c	1		* battery	accept 'cell' or 'cells'	
<b>d</b> 3/1d	1		* Copper is a good conductor of electricity. ✓		if more than one box is ticked, award no mark
<b>Total</b>	<b>6</b>				

Tier 3–6	Q No 2	Answer	Accept	Additional guidance
<b>a</b> 4/4c 4/4e	1	* gravity ✓		if more than one box is ticked, award no mark
<b>b</b> 4/4e	1	any <b>one</b> from * telecommunications * television <b>or</b> TV * telephones * radio * weather * military <b>or</b> spy observations * land use observations * GPS * internet * monitoring <b>or</b> taking pictures of the Earth	accept 'communication' accept 'phone' <b>or</b> 'fax'  accept 'navigation'	'looking at <b>or</b> taking pictures of planets <b>or</b> stars <b>or</b> galaxies' is insufficient as it is given in the question
<b>c</b> 4/4d	1	* produces reflects		answers must be in the correct order <b>both</b> answers are required for the mark
<b>d</b> 1/2i	1	* a bar drawn to 4		
<b>e i</b> 4/4b	1	* Hubble telescope    Earth    Sun	accept 'Hubble' <b>or</b> 'telescope' for Hubble telescope	answers must be in the correct order all three answers are required for the mark
<b>e ii</b> 1/2m 4/4b	1	* They are further away than the Sun ✓		if more than one box is ticked, award no mark
<b>Total</b>	<b>6</b>			

Tier 3–6	Q No 3	Mark	Answer	Accept	Additional guidance
<b>a i</b> 1/2g	2		any <b>two</b> from * smoother <b>or</b> rounder * broken <b>or</b> crumbled <b>or</b> crushed <b>or</b> it was smaller pieces * powder <b>or</b> dust formed	accept 'it was more like a pebble' accept 'it eroded' <b>or</b> 'it weathered'	
<b>a ii</b> 1/2m 3/2e	1		* it was harder than the chalk	accept 'it was hard <b>or</b> strong'	'it did not erode <b>or</b> weather' is insufficient 'it is solid' is insufficient
<b>b</b> 1/2m 3/2e	1		* <i>chalk</i> : B <i>granite</i> : A		<b>both</b> answers are required for the mark answers must be in the correct order
<b>c i</b> 3/2f	1		* fossils		
<b>c ii</b> 1/2k	1		* starfish ✓ it is the same shape <b>or</b> has five parts	accept 'it looks like a star <b>or</b> starfish' accept 'it has five legs'	if more than one box is ticked, award no mark <b>both</b> the answer and the correct explanation are required for the mark
<b>d i</b> 3/2f	1		any <b>one</b> from * it is too hot for animals to live (in molten rock)  * there are no animals in magma <b>or</b> melted rock	accept 'animals would be burnt' accept 'it is too hot' accept 'fossils are destroyed' accept 'they would melt'	'animals do not live underground' is insufficient  if more than one box is ticked, award no mark
<b>d ii</b> 3/2f	1		* magma ✓		
<b>Total</b>	<b>8</b>				



Tier 3–6	Q No 4	Mark	Answer	Accept	Additional guidance
<b>a</b> 3/2c	3	*	<div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px; margin: 2px;">solid to liquid</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">liquid to gas</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">gas to liquid</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">liquid to solid</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">evaporating</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">melting</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">condensing</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">freezing</div> </div>		<p>award three marks for <b>all four</b> correct lines</p> <p>award two marks for any <b>three</b> correct lines</p> <p>award one mark for any <b>two</b> correct lines</p> <p>if more than one line is drawn from any change of state, do not credit that change of state</p>
<b>b</b> 1/2j 3/1a	1		* 0 °C	accept 'zero'	do <b>not</b> accept 'nothing'
<b>c</b> 3/1a 1/2j	1		* it decreased	accept 'it got colder'	'it dropped to below 0°C' is insufficient any references to time are insufficient
<b>d</b> 3/1a 4/2d	2		* Sand increases friction between car tyres and the road. ✓ * Salt makes ice melt. ✓		if more than two boxes are ticked, deduct a mark for each incorrect box minimum of zero
<b>Total</b>	<b>7</b>				

Tier 3–6	Q No 5				
Part	Mark	Answer	Accept	Additional guidance	
<p><b>a</b> 2/1a BS/2b</p>	1	<p>* brain</p>	<p>accept 'skull' accept 'ears' accept 'eyes'</p>	<p>do <b>not</b> accept 'head' or 'teeth' or 'mouth' 'skin' is insufficient</p>	
<p><b>b</b> 2/4b</p>	1	<p>any <b>one</b> from * they have hair * they produce milk * they give birth</p>	<p>accept 'they have fur'  accept 'they have external ears'</p>	<p>'it has a tail' is insufficient</p>	
<p><b>c</b> 2/2i 2/2j</p>	1	 <p>* heart lung</p>		<p>both lines are required for the mark if more than one line is drawn from any organ, do not award the mark</p>	

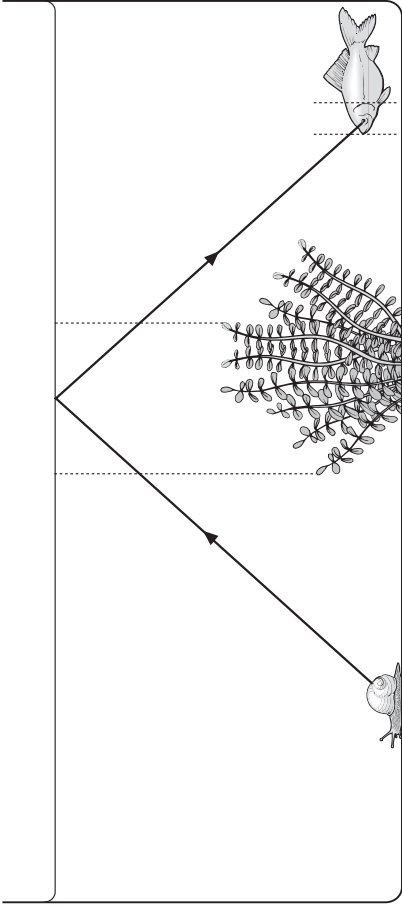
Tier 3–6	Q No 5	Mark	Answer	Accept	Additional guidance
d i 2/4b	2		* They have a segmented body. ✓ They have six legs. ✓ They have two pairs of wings. ✓		<b>all three</b> answers are required for both marks award one mark for any <b>two</b> correct answers if more than three boxes are ticked, deduct a mark for each incorrect box minimum mark zero
d ii 2/5e	1		* <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">herbivore</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">carnivore</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">producer</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">prey</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">female horsefly</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">male horsefly</div> </div>		both lines are required for the mark if more than one line is drawn from either fly, do not award the mark
<b>Total</b>	<b>6</b>				

Tier 3–6	Q No 6	Answer	Accept	Additional guidance
<b>Part</b>	<b>Mark</b>	<b>Answer</b>	<b>Accept</b>	<b>Additional guidance</b>
<b>a i</b> 1/2/	1	* 8		
<b>a ii</b> 1/2/	1	* 17 °C		
<b>a iii</b> 1/2/	1	* 18		
<b>a iv</b> 1/2/	1	* no ✓ any <b>one</b> from * 18 seeds germinated at both temperatures * the number that germinated was the same	accept 'the results were the same' accept 'the bars are the same height'	if more than one box is ticked, award no mark <b>both</b> the answer and the correct explanation are required for the mark
<b>a v</b> 1/2/	1	any <b>one</b> from * all the seeds germinated <b>or</b> grew * 20 seeds germinated <b>or</b> grew * the most <b>or</b> more seeds germinated <b>or</b> grew	accept 'they all germinated <b>or</b> grew' accept 'the bar is higher'	
<b>b</b> 1/2d	1	any <b>one</b> from * he used the same number of seeds * he counted them after two days <b>or</b> after the same time * he used the same type of seeds <b>or</b> they were all cress seeds * he used filter paper to grow all the seeds on * he used 5 cm <sup>3</sup> of water each day	accept 'the same amount of seeds' accept 'the same amount of water'	'number of seeds' is insufficient 'he counted the seeds' is insufficient  'he used the same sized dishes' is insufficient
<b>Total</b>	<b>6</b>			

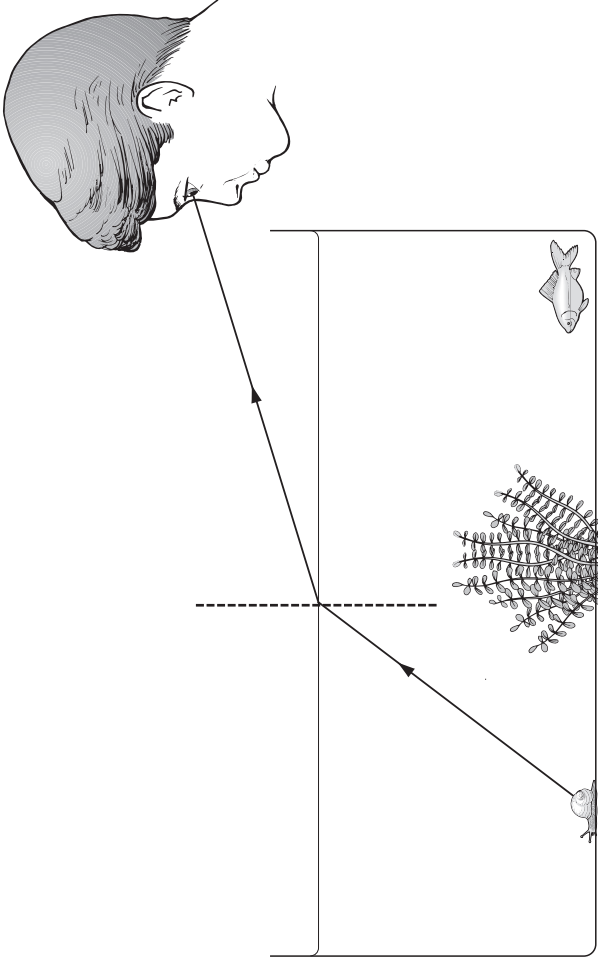
Tier 3–6	Q No 7	Mark	Answer	Accept	Additional guidance
a	2/5c	1	any <b>one</b> from * it has large <b>or</b> wide hands <b>or</b> paws * it has a pointed head <b>or</b> face <b>or</b> nose * it has strong <b>or</b> big claws	accept 'its paws are like shovels' accept 'big <b>or</b> strong feet' accept 'it has a long nose' accept 'it is streamlined' accept 'it has sharp <b>or</b> long claws <b>or</b> nails' accept 'eyes protected by fur' <b>or</b> 'eyes deep in fur'	'claws' is insufficient 'it has small eyes' is insufficient
b i	2/5e	1	* worm		
b ii	2/5e	1	* owl	accept 'bird'	
c i	4/5a	1	* the Sun	accept 'light'	'solar' <b>or</b> 'solar panel' <b>or</b> 'solar energy' are insufficient
c ii	4/5a	1	any <b>one</b> from * batteries have to be replaced * solar power is free * solar power does not run out * it is cheaper to run	accept 'it is a renewable source of power' accept 'it is cheaper'	'it is environmentally friendly' is insufficient
c iii	2/5a 2/5f	1	any <b>one</b> from * it does not kill the moles * it does not harm other animals * poison kills <b>or</b> hurts moles * poison kills <b>or</b> hurts owls <b>or</b> predators <b>or</b> other living things * poison enters food chains	accept 'it is humane' accept 'it does not harm humans'	'it is friendlier' <b>or</b> 'it is nicer' are insufficient 'poison is dangerous' is insufficient  'you do not have to get rid of dead moles' <b>or</b> 'you can leave them in the tunnel' are insufficient 'you have to keep adding poison' is insufficient 'so they do not become extinct' is insufficient
<b>Total</b>		<b>6</b>			

Tier 3–6 5–7	Q No 8 1	Mark	Answer	Accept	Additional guidance
<b>a i</b> 1/2m 4/3j	1		* A and C  their amplitudes are the same	accept 'the waves are the same height' accept 'they are equally tall'	letters may be in either order <b>both</b> the letter and the correct explanation are required for the mark 'the height of the waves' is insufficient 'they are big <b>or</b> tall' is insufficient 'taller waves are louder' is insufficient <b>do not accept</b> 'they are equally long'
<b>a ii</b> 1/2m 4/3k	1		* B and C  their frequencies are the same	accept 'the waves are the same distance apart'  accept 'the wave lengths are the same' accept 'there are the same number of waves'	letters may be in either order <b>both</b> the letter and the correct explanation are required for the mark 'the distance apart of the waves' is insufficient 'the less spaced out the waves, the higher the pitch' is insufficient 'they are the same length <b>or</b> thickness <b>or</b> width' is insufficient
<b>a iii</b> 1/2m 4/3k	1		* its pitch becomes higher	accept 'the frequency gets higher'	'it gets higher' is insufficient 'it becomes high' is insufficient
<b>b</b> 1/2j	1		* any number between 4.5 and 7.5 hours (inclusive)		
<b>c</b> 4/3g	1		any <b>one</b> from * it vibrates with a greater amplitude * it has larger vibrations	accept 'it moves more' accept 'burst ear drum'	'it vibrates harder' and 'it vibrates more' are insufficient responses <b>do not accept</b> 'it vibrates faster'
<b>Total</b>	<b>5</b>				

Tier 3–6 5–7	Q No 9 2	Part	Mark	Answer	Accept	Additional guidance						
<b>a</b> 1/2i	1	*		<table border="1"> <tr> <td>2</td> <td>20</td> </tr> <tr> <td>3</td> <td>45 or 46</td> </tr> <tr> <td>4</td> <td>80</td> </tr> </table>	2	20	3	45 or 46	4	80		<b>all three</b> answers are required for the mark
2	20											
3	45 or 46											
4	80											
<b>b</b> 1/2i	1			<p>any <b>one</b> from</p> <ul style="list-style-type: none"> <li>* the height for 4 cm is 4 times the height for 2 cm</li> <li>* the graph is a curve</li> <li>* the height for 2 cm is not twice the height for 1 cm</li> <li>* the height should have been 40 cm when he pressed it down 4 cm</li> </ul>	<ul style="list-style-type: none"> <li>accept 'for 2 cm it went 20 cm but for 4 cm it went 80 cm'</li> <li>accept 'if I double the distance it goes four times as high'</li> <li>accept 'the graph is not a straight line'</li> <li>accept 'if it goes from 2 to 3 cm, the height more than doubles'</li> <li>accept appropriate arguments for other values</li> </ul>	a mark may be awarded for other correct figures 'when she doubled the distance it did not double the height' is insufficient						
<b>c i</b> 4/5e	1			* some some		both answers are required for the mark						
<b>c ii</b> 4/5e	1			* most least		both answers are required for the mark answers must be in the correct order						
<b>c iii</b> 4/5e	1			* least least		both answers are required for the mark						
<b>Total</b>	<b>5</b>											

Tier 3–6 5–7	Q.No 10 3	Mark	Answer	Accept	Additional guidance
a 4/3c	1	1	* a straight line from the snail to the surface and from the surface to the fish		the line must reach the fish within the tolerance shown below
			* the angle of incidence should be approximately equal to the angle of reflection		the ray must be continuous
			* arrow pointing towards the fish or away from the snail	accept a single arrow in the correct direction on either the incident or the reflected ray	ignore an incident ray towards the snail ignore rays refracted at the surface
					the line must reach the surface of the water within the tolerance shown below
					if two arrows are drawn, they must both be in the correct direction
					



Tier 3–6 5–7	Q.No 10 3	Mark	Answer	Accept	Additional guidance
<b>b i</b> 4/3d	1	1	* a ray from the snail to Andrew's eye bending at the surface		both parts of the ray must be straight and must slope upwards and to the right the ray must be continuous ignore any incident rays drawn towards the snail the ray must bend further away from the normal at the surface as it goes from water to air
		1	* an arrow pointing towards Andrew on any part of the ray		if two arrows are drawn, they must both be in the correct direction
					
<b>b ii</b> 4/3d	1	1			* refraction
<b>Total</b>		<b>6</b>			

Tier 3–6 5–7	Q.No 11 4	Mark	Answer	Accept	Additional guidance
<b>a i</b> 3/3d	1	1	* It is neutral ✓		if more than one box is ticked, award no mark
<b>a ii</b> 3/3d	1	1	* any number less than 7		
<b>a iii</b> 3/3f	1	1	any <b>one</b> from * they are alkaline <b>or</b> an alkali  * they react with the acid	accept 'a soluble base' accept 'it has a pH above 7'	specific pH values such as 'its pH is 8.5' are insufficient
<b>b</b> 1/2i 3/3d	3	3	* <input type="text" value="copper sulphate"/>  * <input type="text" value="citric acid"/>  * <input type="text" value="indigestion tablet"/> * <input type="text" value="sugar"/>	accept 'copper sulfate' accept 'the sulphate' for 'copper sulphate'  accept 'acid' for 'citric acid'  accept 'tablet' for 'indigestion tablet'	if <b>all four</b> answers are correct, award three marks if <b>two or three</b> answers are correct, award two marks if <b>one</b> answer is correct, award one mark
<b>Total</b>	<b>6</b>	<b>6</b>			

Tier 3–6 5–7	Q No 12 5	Mark	Answer	Accept	Additional guidance
<b>a i</b> 3/2f	1	1	* metamorphic		
			<b>a ii</b> 3/2f	* igneous	
<b>b</b> 3/2e	1	1	* when magma cools more quickly the crystals are smaller	accept the converse accept 'in magma which cools faster the crystals are small'	answers must include a comparison do <b>not</b> accept 'crystals are bigger when the rock cools slowly'
<b>c i</b> 3/1c	1	1	* oxygen		'O <sub>2</sub> ' is insufficient
<b>c ii</b> 3/1f	1	1	* aluminium oxide	accept 'aluminium trioxide'	
<b>c iii</b> 3/1f 3/1c	1	1	* 5		
<b>d i</b> 3/3c	1	1	any <b>one</b> from		'less reactive' is insufficient
			* at the bottom		
			* below copper		
<b>d ii</b> 3/1f 3/3a	1	1	* zinc chloride	accept 'ZnCl <sub>2</sub> '	answers can be in either order
			* hydrogen	accept 'H <sub>2</sub> '	'H' is insufficient
<b>Total</b>		<b>9</b>			



Tier 3–6 5–7	Q No 13 6	Part	Mark	Answer	Accept	Additional guidance
e 1/2i BS/2a	1			any <b>one</b> from * vitamin C is given in mg, protein is given in g  * mg are smaller than g * 1.1 g is equal to 1100 mg * 3.8 mg is equal to 0.0038 g * 1.1 g is greater than 3.8 mg	accept 'vitamin C is in mg' accept 'the units are different' accept 'one was measured in grams, the other in milligrams' accept 'g are bigger than mg'	
<b>Total</b>	<b>6</b>					

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Tier 3–6 5–7	Q.No 14 7	Mark	Answer	Accept	Additional guidance								
<b>a</b> 2/1e	1	1	* leaf	accept 'stem' or 'stalk'									
<b>b i</b> 2/1b	1	1	* it controls the cell or cell's activities	accept 'it tells the cell what to do' accept 'it contains or passes on (genetic) information or genes or DNA'	'it is the brain of the cell' is insufficient								
<b>b ii</b> 2/1b	1	1	any <b>one</b> from * absorbs light or Sun's energy * photosynthesis	accept 'traps or catches light' accept 'it makes food or glucose or sugar or starch or carbohydrate'	<i>do not accept</i> 'it attracts light' 'it produces oxygen' is insufficient								
<b>b iii</b> 2/1b	1	1	any <b>one</b> from * gives the cell its shape * supports the cell		'it protects the cell' is insufficient								
<b>c</b> 2/1b	2	2	any <b>two</b> from * cell wall * vacuole * chloroplast	accept 'wall'									
<b>d</b> 2/3a 2/3e 2/2j	2	2	* <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">photosynthesis</td> <td style="width: 50%; text-align: center;">respiration</td> </tr> <tr> <td style="text-align: center;">✓</td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="text-align: center;">✓</td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="text-align: center;">✓</td> <td style="text-align: center;">✓</td> </tr> </table>	photosynthesis	respiration	✓	✓	✓	✓	✓	✓		if <b>all four</b> answers are correct, award two marks if <b>two or three</b> answers are correct, award one mark if more than one box is ticked in any row, do not credit that row
photosynthesis	respiration												
✓	✓												
✓	✓												
✓	✓												
<b>Total</b>		<b>8</b>											

Tier 5–7	Q No 8	Mark	Answer	Accept	Additional guidance
<b>a</b> 4/1e 4/1f	1	1	* the core becomes magnetised	accept 'the disc becomes magnetised' accept 'there is a magnetic field' accept 'it becomes an (electro)magnet' accept 'the stronger the current the stronger the magnet'	<i>do not accept</i> 'the iron core becomes magnetic' <i>do not accept</i> 'the magnet gets stronger'
			any <b>one</b> from * the core attracts the iron disc * there is more force on the iron disc	accept 'the disc is pulled down' accept 'the magnet exerts a force on the disc'	'the disc moves down' is insufficient as it does not imply that a force is exerted 'there is a force on the disc' is insufficient as it does not refer to the origin of the force
<b>b</b> 3/2c 4/1c	1	1	any <b>one</b> from * it would melt * it would get too hot	accept 'it would fuse' accept 'it could catch fire' accept 'it would blow'	'the coil would break' is insufficient 'it would get hot' is insufficient
			* the greater the current, the greater the force <b>or</b> field * the more turns, the greater the force <b>or</b> field	accept the converse accept the converse accept 'the more turns, the more powerful <b>or</b> stronger the magnet' accept 'the electromagnet with 200 turns is stronger' accept 'doubling the turns more than doubles the force'	answers must refer to a pattern describing a continuous variable <i>do not accept</i> 'it becomes more magnetic' answers must include a comparison 'the more turns, the more powerful it is' is insufficient award one mark if the answer refers to a number of coils rather than number of turns
<b>Total</b>		<b>5</b>			



Tier 5–7	Q No 9	Mark	Answer	Accept	Additional guidance
a i 1/2d	1	1	* mass of salt dissolved in water	accept 'the mass or amount of salt'	'salt' is insufficient do <b>not</b> accept 'the type of salt used'
			* boiling point of salt solution	accept 'boiling point'	
			any <b>one</b> from * starting temperature of the water * temperature of the laboratory		'temperature' is insufficient
b i 1/2k 3/1a	1	1	* the boiling point with no salt or at the start was 100 °C	accept 'the water's boiling point was 100 °C' accept 'the boiling point of water is 100 °C' accept 'it boiled at 100 °C'	<b>answers must refer to the boiling point</b> '0 g of salt added' is insufficient 'the graph starts at 100 °C' is insufficient
			any <b>one</b> from * there is only one point above the line in Neera's graph * there should be a similar number of points above and below the line	accept 'most points are below the line in Neera's graph' accept 'Tom's goes near more points' or 'Tom's points are nearer to the line' accept 'Neera just joined the first and last points'	
<b>Total</b>		<b>5</b>			

Tier 5–7	Q No 10	Answer	Accept	Additional guidance
a i 3/1b	1	* (molecules) are far apart <b>or</b> not touching each other	accept 'only gases can be compressed' accept 'they are randomly arranged'	'the gas can be compressed' is insufficient as it is given in the question
	a ii 1/2m 3/1g	* there is only one type of molecule <b>or</b> compound <b>or</b> substance	accept 'there is one type of particle'	<i>do not accept</i> 'there is only one type of atom <b>or</b> element'
b 1/2m 3/1b	1	any <b>one</b> from * the space <b>or</b> distance between the molecules <b>or</b> particles is smaller * the particles <b>or</b> they are closer together * more particles are touching the sides	accept 'the volume is less'  accept 'particles hit the sides more often'	accept 'atoms' for 'particles'  'the particles are hitting the sides' is insufficient  'if the gas is compressed the pressure rises' is insufficient

Tier 5–7	Q.No 10	Mark	Answer	Accept	Additional guidance						
<b>c i</b> 3/1e	1		any <b>one</b> from * new <b>or</b> different compounds have formed * there is more than one compound	accept 'they are now joined in threes' accept 'new combinations of particles <b>or</b> atoms' accept 'the compounds are different' accept 'there is no longer a pure substance'							
<b>c ii</b> 3/2a	1		any <b>one</b> from * the same number of atoms are present * nothing has been added to <b>or</b> lost	accept 'mass is conserved'	'the mass stays the same' is insufficient 'the same atoms are present' is insufficient 'nothing changed' is insufficient 'the amount of gas stays the same' is insufficient						
<b>c iii</b> 3/1f	1		* <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td style="text-align: center;">●○</td> <td style="text-align: center;">NO</td> </tr> <tr> <td style="text-align: center;">●●○</td> <td style="text-align: center;">N<sub>2</sub>O</td> </tr> <tr> <td style="text-align: center;">●○○</td> <td style="text-align: center;">NO<sub>2</sub></td> </tr> </tbody> </table>	●○	NO	●●○	N <sub>2</sub> O	●○○	NO <sub>2</sub>	accept 'ON' accept 'ON <sub>2</sub> ' accept 'O <sub>2</sub> N'	<b>all three</b> answers are required for the mark
●○	NO										
●●○	N <sub>2</sub> O										
●○○	NO <sub>2</sub>										
<b>c iv</b> 3/1f	1		* nitrogen oxide	accept 'nitrogen monoxide' accept 'nitric oxide'							
<b>Total</b>	<b>7</b>										

Tier 5–7	Q No 11	Part	Mark	Answer	Accept	Additional guidance
a 1/2k	1		1	* the more cigarettes smoked, the greater the number <b>or</b> percentage that die	accept 'smoking 5 cigarettes a day is less harmful than smoking 20'	<b>one conclusion should relate to the number of cigarettes and the other to the effect of age</b>  statements that do not make a generalisation, such as 'nearly 1% of men aged 55–64 who smoke 20 cigarettes a day will die of heart disease' are insufficient
			1	* the risk increases with age <b>or</b> is greater in older men	accept statements such as '20 cigarettes a day is worse when you are 45–64 than under 45' accept the converse	
b 2/2l	3		any <b>three</b> from * it causes a blood clot * the arteries become narrower <b>or</b> blocked <b>or</b> less <b>or</b> no blood to heart (muscle) * less <b>or</b> no oxygen to the heart (muscle) * less <b>or</b> no food <b>or</b> glucose <b>or</b> nutrients <b>or</b> minerals to the heart (muscle) * less <b>or</b> no carbon dioxide <b>or</b> waste removed * may cause a heart attack * cells cannot respire (properly)	accept 'fat clogs the arteries'  accept, for one mark, 'the heart muscle needs oxygen <b>or</b> glucose to work properly' even though it does not include a comparison  accept 'it may raise the blood pressure'	'the heart muscle cannot work properly' is insufficient as it is given in the question	

Tier 5–7	Q No 11	Mark	Answer	Accept	Additional guidance
c i 2/1c	1	1	* <i>mucus</i> traps bacteria <b>or</b> dust <b>or</b> particles	accept 'cilia remove bacteria <b>or</b> dust <b>or</b> particles'	'cell produces mucus' is insufficient
			* <i>cilia</i> move the mucus (towards the throat)		
			* it paralyses them <b>or</b> they stop moving		
c ii 2/2i	1	1	accept 'it clogs the cilia' accept 'they stick together'	<i>do not accept</i> 'it kills <b>or</b> burns cilia' 'damages <b>or</b> removes cilia' is insufficient	
<b>Total</b>		<b>8</b>			

Tier 5–7	Q No 12	Mark	Answer	Accept	Additional guidance
<b>a i</b> 4/2e 4/2f	1		* 240	accept '0.8 x 300'	<i>do not accept 'mN'</i> <i>do not accept 'n' for 'N'</i>
	1		* Nm	accept '24 000 Ncm' for two marks	
	1		any <b>one</b> from * 150	accept $\frac{300}{2}$ or $\frac{240}{1.6}$	
<b>a ii</b> 4/2f 4/2e			* half the force needed at 0.8 m		accept the numerical answer to <b>a i</b> ÷ 1.6 'half' is insufficient
	<b>b</b> 4/2g	1	* 600	accept $\frac{120}{0.2}$	
		1	* N/m <sup>2</sup> or Pa	accept '0.06 N/cm <sup>2</sup> ' for two marks	
<b>Total</b>		<b>5</b>			

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