

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 one from * they are alkaline or 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 two from * smoother or rounder * broken or crumbled or crushed or it was smaller pieces * powder or dust formed	accept ‘it was more like a pebble’ accept ‘it eroded’ or ‘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				one conclusion should relate to the number of cigarettes and the other to the effect of age
	1	* the more cigarettes smoked, the greater the number or 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 or 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 from 23 June 2008.

The 2008 key stage 3 science tests and mark schemes were developed by the National Foundation for Educational Research (NFER) on behalf of QCA.

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
Total	42	17	13	18

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		
Total	29	20	21	20

Total P1 + 2	71	37	34	38
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Overall

180

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
Total	38	13	13	11

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
Total	24	16	18	17

Total P1 + 2	62	29	31	28
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Overall

150

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
a i 1/2k	1		* A and C any one from * grass has germinated or grown * seeds did not germinate or 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 or more grass' accept 'B has no hair'	answers may be in either order both 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
a ii 1/2c 2/3a	1		any one from * it would have longer grass * the grass would have grown more	accept 'it had more grass or more hair' accept 'it grew more or 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 2/3a	1		any one from * it grew towards the light * that is where the light is coming from	accept 'it grew towards the Sun' accept 'to get light or sunlight' accept 'plants or grass need light' accept 'to get more Sun'	'because of the sunlight' is insufficient 'to get more heat' is insufficient
c i 2/1c	1		* B ✓		if more than one box is ticked, award no mark
c ii 2/3d	2		any two from * water * oxygen * minerals	accept 'moisture' or 'dampness' accept a named mineral accept 'nutrients' or 'salts' accept, for two marks, two named minerals such as 'nitrates' and 'phosphates'	do not accept 'plant food' or 'food' or 'nutrition'
Total	6				

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>		award two marks for all three lines correct award one mark for any two lines correct if more than one line is drawn from any box, do not credit either line
a ii 2/2m	1	*	reactions are slower	accept 'activity of the brain slows down'	
b i 2/2h	1	*	placenta	accept 'umbilical cord' or 'cord'	
b ii 2/2h	1	*	amniotic fluid	accept 'fluid' accept 'uterus'	

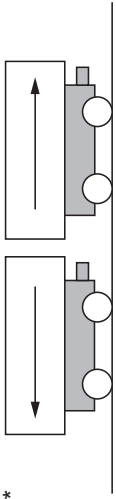
Tier 3–6	Q No 2	Answer	Accept	Additional guidance
c i 1/2i BS/2a	1 1	* toxic * flammable	accept 'inflammable'	answers must be in the correct order
c ii 2/2m BS/2b	1	any one from * they can cause brain damage * it makes you less co-ordinated	accept 'it makes you dizzy or light-headed' accept 'you can hallucinate' accept 'they affect the brain or liver' accept 'they damage your lungs' accept 'it burns your throat'	'it damages or harms your body or makes you ill' are insufficient as they are equivalent to <i>dangerous</i>
Total	8		accept 'it is poisonous' or '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
a 1/2e	1	* a ruler	accept 'a metre rule' accept 'a tape measure'	'cm' is insufficient 'a measuring stick' is insufficient
b i 1/2j	1	* 30		<i>do not accept</i> '30 seconds'
b ii 1/2j	1 1	* A to B: any number from 5 to 15 * 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'	
c 1/2e	1	any one 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 or 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 or smaller spaces or smaller segments' accept 'more sections or rings'	'it is easier to read' is insufficient 'the lines are smaller' is insufficient
Total	5			

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

Tier 3–6	Q No 5	Answer	Accept	Additional guidance
a i 1/2g	1	* 60 cm ³		
a ii 1/2k	1	* 10 cm ³	accept '60 – 50'	
b i 1/2j	1	* lead weight	accept 'lead' or 'weight'	'800 g' is insufficient
b ii 1/2j	1	* wood puzzle	accept 'wood' or 'puzzle'	'500 cm ³ ' is insufficient
c i 3/1a 3/3a	1	any one 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'
c ii 4/2d	1	* friction	accept 'it does not bend' accept 'it is strong'	
Total	6			

Tier 3–6	Q No 6	Answer	Accept	Additional guidance
a i 4/2b	1	* C	accept 'down'	
a ii 4/2c	1	* A	accept 'up'	
b i 1/2m 4/2b	1	* increases ✓		if more than one box is ticked, award no mark
b ii 4/2b	1	any one from * there are two people on the same or 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
c 4/2b	1	* it decreases	accept 'it is less' accept 'there is less weight on it' accept 'there is no force' or 'it becomes zero'	'it springs back up' is insufficient
Total	5			

Tier 3–6	Q No 7	Answer	Accept	Additional guidance
a 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 4/1d	1	* repel attract		answers must be in the correct order both answers are required for the mark
c 4/1d 4/2c	1	* 		both arrows are required for the mark
d i 3/1d 4/2c	1	* it is attracted	accept 'it gets faster'	'they stick together' is insufficient
d ii 3/1d	1	* nothing	accept 'it is not attracted or repelled' accept 'it is not attracted' accept 'it is not repelled'	do not accept 'it repels'
Total	6			

Tier 3–6	Q No 8	Answer	Accept	Additional guidance
a i 1/2e	1	any one 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 not award a mark for answers implying the use of a different ramp
a ii 1/2j	1	* E		
a iii 1/2h 1/2j	1	any one 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 not accept '34' 'because there was no pattern' is insufficient do not accept 'to make it a fair test'
b i 1/2j	1	* 26 cm		
b ii 1/2k 1/2j	1	* increases	accept 'goes up'	
Total	5			

Tier 3–6 5–7	Q No 9 1	Mark	Answer	Accept	Additional guidance
a i 1/2j	1		* more fishing boats	accept 'more people were fishing' accept 'more fishing' accept 'more boats'	'more being caught' is insufficient
a ii 1/2m 1/2k	1		any one 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
a iii 2/5a	1		any one from * to allow numbers to recover or increase * to allow more herring to breed * to allow more herring to mature	accept 'so the herring would be old enough or 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 i 2/5d	1		any one 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 ii 2/5d	1		any one from * there would be more animal plankton * fewer cod	accept 'more plankton'	'they will have more to eat or more food' is insufficient 'the animal plankton would get bigger' is insufficient 'less food for cod' is insufficient
Total	5				

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

Tier 3–6 5–7	Q.No 11 3	Mark	Answer	Accept	Additional guidance
a 1/2m 2/5a	1	1	any two from * less or no competition for food * plenty of food or water or they get fed * they have shelter * veterinary or medical treatment * they are less likely to be injured or killed or there is no hunting of lions	accept 'good or balanced diet' accept 'protected from bad weather' accept 'they are vaccinated' accept 'they are kept healthier' accept 'they do not fight as much' accept 'there are no predators of lions'	both 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 do not accept 'they are less likely to get a disease' 'they are healthier' is insufficient
b i 1/2j	1	1	* an appropriate line of best fit		accept a curved or straight line
b ii 1/2j	1	1	any one 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

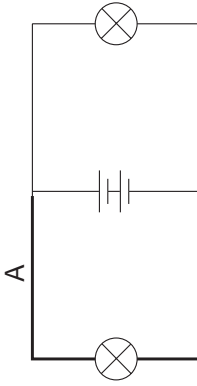
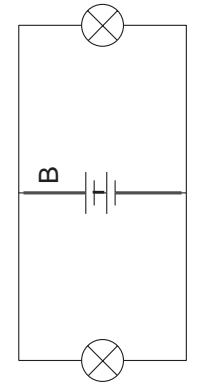
Tier 3–6 5–7	Q. No 11 3	Answer	Accept	Additional guidance
c i 1/2i	2	* all three points plotted correctly	accept a tolerance of \pm half a small square	if all three points are correct, award two marks if one or two points are correct, award one mark
c ii 1/2i	1	* no <input checked="" type="checkbox"/> any one 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 or 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 both the answer and the correct explanation are required for the mark
Total	6			

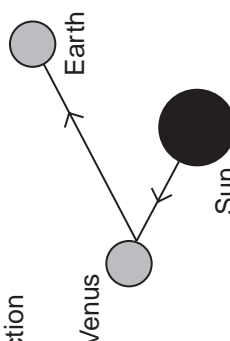
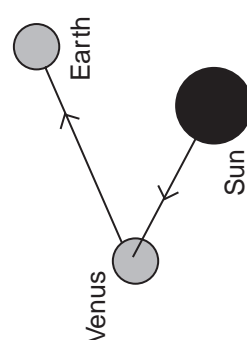
Tier 3–6 5–7	Q No 12 4	Mark	Answer	Accept	Additional guidance
a i 1/2k 3/1a	1		* mercury	accept 'Hg'	
a ii 1/2k 3/1a	1		* iron	accept 'Fe'	
a iii 1/2k 3/1a	1		* mercury	accept 'Hg'	
a iv 1/2k 3/1a	1		* aluminium	accept 'Al'	
b i 3/1a 1/2i	1		* an arrow drawn at 0°C	accept any unambiguous indication	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

Tier 3–6 5–7	Q No 13 5	Part	Mark	Answer	Accept	Additional guidance
	1	a i 3/1h BS/1b	1	any one from * to stop water vapour or steam escaping * to stop lavender oil vapour escaping * to reduce heat loss	accept 'gas or vapour or particles could escape' accept 'to stop oil escaping' accept 'to make sure the oil goes down the tube' accept 'the oil or vapours could not be collected' accept 'to stop heat loss' or 'to keep heat in' accept 'to stop the heat escaping' accept 'to maintain the pressure'	'to stop water escaping or spilling out' is insufficient 'to stop the smell escaping' is insufficient
	1	a ii 1/2f 3/1b	1	any one 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
	1	b i 3/2c	1	* <i>from</i> gas to liquid		both answers are required for the mark answers must be in the correct order
	1	b ii 3/1a	1	any one 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
	1	c 3/1b	1	* B		if more than one letter is identified, award no mark
Total	5					

Tier 3–6 5–7	Q No 14 6	Answer	Accept	Additional guidance
a 1/2c 4/5f	1	* African its ears have a larger surface area	accept 'larger surface area' accept 'larger ears'	both the answer and the correct explanation are required for the mark 'they have large ears' is insufficient
b i 1/2d	1	any one 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 or 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 ii 1/2i	1	any one from * the pattern or relationship can be seen more easily or more quickly * anomalous results can be seen more quickly or easily	accept 'the pattern or 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 or more quickly'	'the pattern or the way the temperature changes can be seen' is insufficient 'it is clearer' is insufficient 'to see them better' is insufficient do not accept 'a graph is more accurate'

Tier 3–6 5–7	Q No 14 6	Mark	Answer	Accept	Additional guidance
b iii 1/2/	1	1	* yes ✓ the greater the surface area of metal the greater the heat loss or 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 or surface of the strips to the size or surface of the ears accept 'no' and a relevant supporting explanation only if '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 both the answer 'yes' and the correct explanation are required for the mark do not accept 'can B was a better insulator'
c 1/2g	1	1	any one from * it reduces error * readings are continuous * it can draw a graph	accept 'it is more accurate' accept 'less human error' or '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
Total		5			

Tier 3–6 5–7	Q.No 15 7	Mark	Answer	Accept	Additional guidance
a i 4/1a	1	*	 <p>A</p>	accept a switch drawn and labelled A marked on any part of the circuit highlighted	do not accept a switch at either junction the switch must be labelled for the mark
a ii 4/1a	1	*	 <p>B</p>	accept a switch drawn and labelled B marked on any part of the circuit highlighted	do not accept a switch at either junction the switch must be labelled for the mark
b 4/3f	1		* they are absorbed	accept 'they are blocked or filtered out'	'they are filtered' is insufficient
c 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
Total	7				

Tier	Q No	Answer	Accept	Additional guidance
3–6 5–7	16 8			
Part	Mark	Answer	Accept	Additional guidance
a 1/2m 4/4c	1	any one from * Venus is nearer to the Sun * the Sun's gravity on Venus is greater * it travels faster * it has a smaller orbit	accept 'it does not have as far to go'	a comparative statement is needed 'it is closer' is insufficient
b 4/3b 4/4d	1 1	* a straight line from the Sun to Venus and a straight line from Venus to Earth * arrows drawn on both rays in the correct direction 	accept two discontinuous straight lines that touch the Sun, Venus and the Earth 	do not accept a line from the Sun which touches the Earth
c i 1/1a 1/1c	1	any one from * they had not been discovered * they had not been seen	accept 'he did not know they existed' accept 'they could not be seen'	do not accept 'they did not exist' 'they are too far away' is insufficient
c ii 1/2m 4/4b	1	any one from * the Earth is not at the centre * the planets do not go round the Earth or the planets orbit the Sun * the Earth goes round the Sun * the Sun is in the middle	accept answers which give the correct order of the planets in the solar system	answers must refer to the arrangement and not to missing planets 'there are more planets' is insufficient
Total	5			

Tier 5–7	Q No 9	Mark	Answer	Accept	Additional guidance
a i 1/2d	1		any one 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' or 'to see if the treatment made a difference' accept 'to get a baseline or standard' or 'to make a comparison'	'to make it a fair test' or 'for a control' are insufficient responses
a ii 1/2e	1		* so the water fleas could adjust to the solution or 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 or kava affects the heart rates or water fleas	accept 'it shows alcohol alone increases or affects the heart rate' accept 'to see what effect alcohol has' accept 'to show it is the kava that affects or reduces the heart rate of fleas' accept 'to show it is not alcohol that affects or reduces the heart rate' accept '(it acts) as a control'	'as a comparison' is insufficient

Tier 5–7	Q No 9	Answer	Accept	Additional guidance
b ii 1/2k	1	any one from * take the average heart rate resulting from kava in alcohol away from the average heart rate resulting from alcohol * take the difference between kava in alcohol and alcohol only * look at the difference between group 1 and group 2 after treatment	accept 'add the increase with alcohol to the decrease with kava and alcohol' accept 'subtract 35 from 41 or 42'	
c 1/2o	1	any one from * there may be side effects * the effect could be different in humans * it has not been tested on humans * human hearts are different from fleas' hearts	accept 'humans are bigger or from a different group or species' accept 'we do not know anything about the dose or amount given'	'they are not the same' or 'they are different animals' are insufficient responses
Total	6			

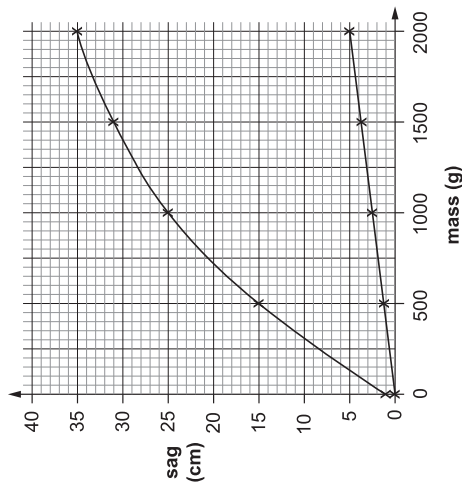
Tier 5–7	Q No 10	Mark	Answer	Accept	Additional guidance
a 2/1b	1	1	* genetic material or genes or DNA	accept 'nucleus' accept 'chromosomes'	
b 2/2n	1	1	method * touch or contact prevention any one from * wash hands before or after touching a patient or before or after touching surfaces or articles *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

Tier 5–7	Q No 10	Answer	Accept	Additional guidance
c 2/2n	3	any three from * vaccine contains a dead or weakened form of the bacterium or virus * antibodies or antitoxins (are produced) * (made by) white blood cells * further infections are prevented or bacteria or viruses or toxins are destroyed	accept 'inject with protein from the bacterium or virus' accept 'white cells' accept 'kills the bacteria or viruses'	'it contains a small amount of bacteria or 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
Total	6			

Tier 5–7	Q.No 11	Part	Mark	Answer	Accept	Additional guidance
		a i 1/2a 4/2a	1	* 0.75s	'1.5', '3', accept $\frac{2}{2}$ or $\frac{3}{4}$	
		a ii 1/2a 1/2h 1/2e	2	any two 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 or use the same force or 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 or change the depth and do it again' accept 'repeat with different volumes of water'	
		b 1/2j	1	* A to B : decreases or slows down * B to C : remains constant or stays the same		<i>do not accept 'gets slower'</i>
		Total	6			

Tier 5–7	Q No 12	Mark	Answer	Accept	Additional guidance
a i 3/1f 3/3e	2		* sodium chloride + * water	accept 'hydrogen oxide' for water	answers must be in the correct order
		a ii 3/1f	* H ₂ O		
b 3/2g	1		any one 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 or 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'
c i 3/3e 3/1f	1		* sodium chloride carbon dioxide water		answers may be in any order all three answers are required for the mark
		c ii 3/2g 3/3e	any one from * carbon dioxide or gas escapes * carbon dioxide is a gas * one of the products is a gas or escapes		'mass is lost' is insufficient as it is given in the question
Total	6				

Tier 5–7	Q No 13	Mark	Answer	Accept	Additional guidance
a 1/2e	1		any one 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 i 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 ii 4/2b	1		any one from * the weight or mass of the (wooden) plank * the (larger) overhang		'the weight or mass' is insufficient



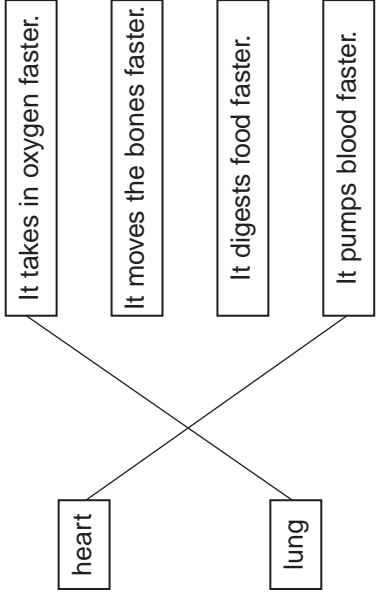
Tier 5–7	Q No 13	Answer	Accept	Additional guidance
Part	Mark	Answer	Accept	Additional guidance
c i 1/2]	1	* as the mass increases the sag increases	accept the converse accept 'the lines both went up' accept 'sag increases in both'	
c ii 1/2]	1	any one from * there is more sag for each mass * the increase 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
Total	6			

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

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

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

Tier 3–6	Q No 4	Mark	Answer	Accept	Additional guidance
a 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>		award three marks for all four correct lines award two marks for any three correct lines award one mark for any two correct lines if more than one line is drawn from any change of state, do not credit that change of state
b 1/2j 3/1a	1		* 0 °C	accept 'zero'	do not accept 'nothing'
c 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
d 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
Total	7				

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

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. ✓		all three answers are required for both marks award one mark for any two 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; align-items: center;"> <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;">herbivore</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">male horsefly</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">carnivore</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; 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>		both lines are required for the mark if more than one line is drawn from either fly, do not award the mark
Total	6				

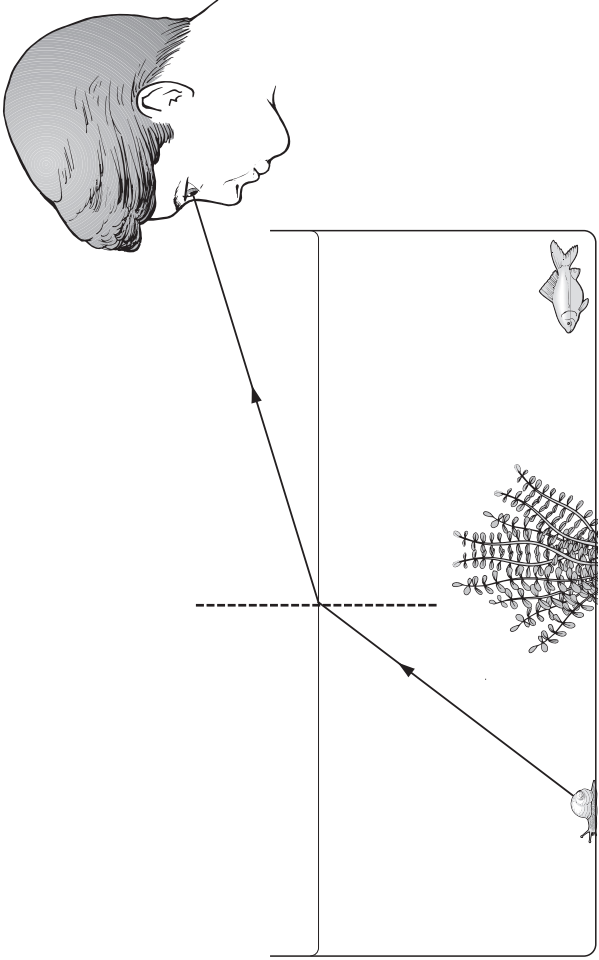
Tier 3–6	Q No 6	Answer	Accept	Additional guidance
Part	Mark	Answer	Accept	Additional guidance
a i 1/2/	1	* 8		
a ii 1/2/	1	* 17 °C		
a iii 1/2/	1	* 18		
a iv 1/2/	1	* no ✓ any one from * 18 seeds germinated at both temperatures * the number that germinated was the same	accept 'the results were the same'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

Tier 3–6	Q No 7	Answer	Accept	Additional guidance
a 2/5c	1	any one from * it has large or wide hands or paws * it has a pointed head or face or nose * it has strong or big claws	accept 'its paws are like shovels' accept 'big or strong feet' accept 'it has a long nose' accept 'it is streamlined' accept 'it has sharp or long claws or nails' accept 'eyes protected by fur' or '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' or 'solar panel' or 'solar energy' are insufficient
c ii 4/5a	1	any one 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 one from * it does not kill the moles * it does not harm other animals * poison kills or hurts moles * poison kills or hurts owls or predators or other living things * poison enters food chains	accept 'it is humane' accept 'it does not harm humans'	'it is friendlier' or 'it is nicer' are insufficient 'poison is dangerous' is insufficient 'you do not have to get rid of dead moles' or '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
Total	6			

Tier 3–6 5–7	Q No 8 1	Part	Mark	Answer	Accept	Additional guidance
	1	a i 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 both the letter and the correct explanation are required for the mark 'the height of the waves' is insufficient 'they are big or tall' is insufficient 'taller waves are louder' is insufficient do not accept 'they are equally long'
	1	a ii 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 both 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 or thickness or width' is insufficient
	1	a iii 1/2m 4/3k	1	* its pitch becomes higher	accept 'the frequency gets higher'	'it gets higher' is insufficient 'it becomes high' is insufficient
	1	b 1/2j	1	* any number between 4.5 and 7.5 hours (inclusive)		
	1	c 4/3g	1	any one 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 do not accept 'it vibrates faster'
Total	5					

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

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

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

Tier 3–6 5–7	Q.No 11 4	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 one from * they are alkaline or 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 1/2i 3/3d	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 all four answers are correct, award three marks if two or three answers are correct, award two marks if one answer is correct, award one mark
Total	6			

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

Tier 3–6 5–7	Q No 13 6	Answer	Accept	Additional guidance
e 1/2i BS/2a	1	any one 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'	
Total	6			

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Tier 3–6 5–7	Q.No 14 7	Answer	Accept	Additional guidance										
a 2/1e	1	* leaf	accept 'stem' or 'stalk'											
b i 2/1b	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 ii 2/1b	1	any one 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 iii 2/1b	1	any one from * gives the cell its shape * supports the cell		'it protects the cell' is insufficient										
c 2/1b	2	any two from * cell wall * vacuole * chloroplast	accept 'wall'											
d 2/3a 2/3e 2/2j	2	* <table border="1" style="margin-left: 20px; width: 100%;"> <thead> <tr> <th>photosynthesis</th> <th>respiration</th> </tr> </thead> <tbody> <tr> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="text-align: center;">✓</td> <td></td> </tr> </tbody> </table>	photosynthesis	respiration		✓	✓			✓	✓			if all four answers are correct, award two marks if two or three answers are correct, award one mark if more than one box is ticked in any row, do not credit that row
photosynthesis	respiration													
	✓													
✓														
	✓													
✓														
Total	8													

Tier 5–7	Q No 8	Mark	Answer	Accept	Additional guidance
a 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 one 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 3/2c 4/1c	1	1	any one 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 or field * the more turns, the greater the force or field	accept the converse accept the converse accept 'the more turns, the more powerful or 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
Total	5				

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 <i>do not accept</i> 'the type of salt used'
			* boiling point of salt solution	accept 'boiling point'	
			any one 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'	answers must refer to the boiling point '0 g of salt added' is insufficient 'the graph starts at 100°C' is insufficient
			any one 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'	
Total		5			

Tier 5–7	Q No 10	Mark	Answer	Accept	Additional guidance
a i 3/1b	1		* (molecules) are far apart or 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	1	* there is only one type of molecule or compound or substance	accept 'there is one type of particle'	<i>do not accept</i> 'there is only one type of atom or element'
b 1/2m 3/1b	1		any one from * the space or distance between the molecules or particles is smaller * the particles or 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						
c i 3/1e	1		any one from * new or different compounds have formed * there is more than one compound	accept 'they are now joined in threes' accept 'new combinations of particles or atoms' accept 'the compounds are different' accept 'there is no longer a pure substance'							
c ii 3/2a	1		any one from * the same number of atoms are present * nothing has been added to or 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						
c iii 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;">N₂O</td> </tr> <tr> <td style="text-align: center;">●○</td> <td style="text-align: center;">NO₂</td> </tr> </tbody> </table>	●○	NO	●●○	N ₂ O	●○	NO ₂	accept 'ON' accept 'ON ₂ ' accept 'O ₂ N'	all three answers are required for the mark
●○	NO										
●●○	N ₂ O										
●○	NO ₂										
c iv 3/1f	1		* nitrogen oxide	accept 'nitrogen monoxide' accept 'nitric oxide'							
Total	7										

Tier 5–7	Q No 11	Answer	Accept	Additional guidance
a 1/2k	1	* the more cigarettes smoked, the greater the number or percentage that die * the risk increases with age or is greater in older men	accept 'smoking 5 cigarettes a day is less harmful than smoking 20' accept statements such as '20 cigarettes a day is worse when you are 45–64 than under 45' accept the converse	one conclusion should relate to the number of cigarettes and the other to the effect of age 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
b 2/2l	3	any three from * it causes a blood clot * the arteries become narrower or blocked or less or no blood to heart (muscle) * less or no oxygen to the heart (muscle) * less or no food or glucose or nutrients or minerals to the heart (muscle) * less or no carbon dioxide or 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 or 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 or dust or particles	accept 'cilia remove bacteria or dust or particles'	'cell produces mucus' is insufficient
			* <i>cilia</i> move the mucus (towards the throat)		
			* it paralyses them or 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 or burns cilia' 'damages or removes cilia' is insufficient	
Total		8			

Tier 5–7	Q No 12	Answer	Accept	Additional guidance
a i 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 one from * 150	accept $\frac{300}{2}$ or $\frac{240}{1.6}$	
a ii 4/2f 4/2e		* half the force needed at 0.8 m		accept the numerical answer to a i ÷ 1.6 'half' is insufficient
b 4/2g	1	* 600	accept $\frac{120}{0.2}$	
	1	* N/m ² or Pa	accept '0.06 N/cm ² ' for two marks	
Total	5			

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