

Sc

KEY STAGE

3

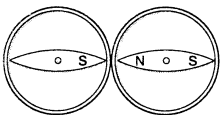
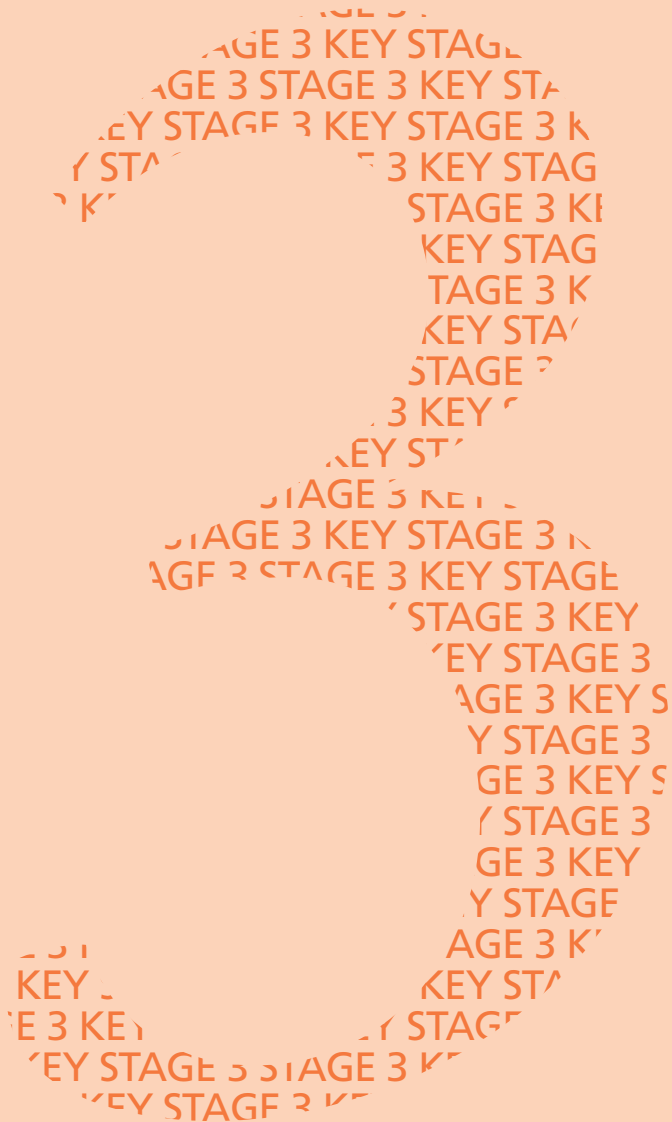
LEVELS

3-7

2002

Science test

Mark scheme for Papers 1 and 2



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 mark scheme for the extension paper is printed separately.

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

The mark scheme for each question shows:

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

When a question appears in an identical form in both tiers, the answers to the question are given only once in the mark scheme. For clarity, both question numbers are given. The following example, from tier 3–6 paper 2 question 12 and from tier 5–7 paper 2 question 3, illustrates this.

Tier 3–6 5–7	Q No 12 3	3/3b 3/3e 3/3f	to use indicators to classify solutions as acidic, neutral or alkaline, and to use the pH scale as a measure of the acidity of a solution how metals and bases, including carbonates, react with acids, and what the products of these reactions are about some everyday applications of neutralisation, <i>for example, the treatment of indigestion, the treatment of acid soil, the manufacture of fertilizer</i>	Tier 3–6 5–7	Q No 12 3									
Part	Mark	Answer	Additional guidance											
(a)	1 1	<table border="1"> <thead> <tr> <th></th> <th><i>acidic or alkaline</i></th> <th><i>colour of universal indicator paper</i></th> </tr> </thead> <tbody> <tr> <td>* <i>bee sting (ph 2)</i></td> <td>acidic</td> <td>red</td> </tr> <tr> <td>* <i>wasp sting (ph 10)</i></td> <td>alkaline</td> <td>blue accept 'purple'</td> </tr> </tbody> </table>		<i>acidic or alkaline</i>	<i>colour of universal indicator paper</i>	* <i>bee sting (ph 2)</i>	acidic	red	* <i>wasp sting (ph 10)</i>	alkaline	blue accept 'purple'	award one mark for each correct row		
	<i>acidic or alkaline</i>	<i>colour of universal indicator paper</i>												
* <i>bee sting (ph 2)</i>	acidic	red												
* <i>wasp sting (ph 10)</i>	alkaline	blue accept 'purple'												
(b) (i)	1	any one from * bicarbonate toothpaste * washing soda	accept 'bicarbonate' or 'toothpaste' or 'hydrogencarbonate'											
(ii)	1	any one from * vinegar * lemon juice												
Total	4													

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

In the following example from part (b) of tier 3–6 paper 2 question 14 and tier 5–7 paper 2 question 5, an answer giving ‘they gained energy’ and ‘they hit the lid more often’ will be awarded two marks. However, an answer which gives ‘they gained energy’ and ‘they move more quickly’ will be given only one mark, as both points are correct answers for the same mark.

Part	Mark	Answer	Additional guidance
(b)	2	any two from * they gained energy * they hit the lid with greater force * they hit the lid more often	accept 'they move more quickly' accept 'they hit the lid harder' accept 'the pressure inside the tin increased' accept 'the molecules are closer together' accept 'more molecules are present'

In the following example, from part (a) of tier 3–6 paper 2 question 10 and tier 5–7 paper 2 question 1, the statement in **bold type** is given in order to indicate the general requirements of that part of the question.

Part	Mark	Answer	Additional guidance
(a)	1	Both the correct ball and the correct reason are required for the mark. * the bowling ball because it has the greatest mass or is the heaviest	<i>do not accept</i> 'because it is bigger' 'the bowling ball because it is bigger' is insufficient

The ‘**Additional guidance**’ can contain six kinds of information to assist the marker when professional judgement is required:

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

Marking

The number of marks available for each part of a question and the maximum number of marks for the question as a whole are shown on the question paper. Every part of a question which has been attempted by a pupil will be marked and an indication given where every mark has been awarded. 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. This is the only number that markers will write on a pair of facing pages. In many instances, this will be the sum of marks awarded for two questions. The total number of marks obtained on the paper will be recorded on the front of the test paper.

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

Using professional judgement in marking

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

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

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

Marking misspellings of words

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

- if it is clear that the pupil has made a simple error, eg ‘tow’ for ‘two’ or ‘Son’ for ‘Sun’, then the incorrect spelling will be accepted and the mark awarded;
- if a pupil misspells a word copied from the text of the question or from a selection given, and the new word does not have any inappropriate meaning, the incorrect spelling will be accepted and the mark awarded;
- if specific scientific vocabulary is required in the answer, a creditworthy misspelling must be a phonetic equivalent of the required word, with the major syllables of the correct word represented in the answer.

Marking lists of alternative answers

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

Marking questions containing calculations

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

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

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

Marking answers given in the wrong place

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

Awarding levels

The sum of the marks gained on both papers determines the level awarded. A copy of the level threshold tables which show the mark ranges for the award of different levels will be sent to each school by QCA in July 2002.

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

The 2002 key stage 3 science tests and mark schemes were developed by the University of Cambridge Local Examinations Syndicate on behalf of QCA

TIER 3–6 Paper 1

Q	Sc1	Sc2	Sc3	Sc4
1		5		
2	3	4		
3		5		
4			6	
5			5	
6	3		1	
7				4
8				4
9				5
10		7		
11		8		
12	1	1	3	
13			6	
14			6	
15	3			2
16				5
17				3
Total	10	30	27	23

TIER 3–6 Paper 2

Q	Sc1	Sc2	Sc3	Sc4
1				5
2			1	3
3				5
4				4
5			4	
6	1	1	3	
7	4		1	
8		7		
9		6		
10	3			3
11				7
12			4	
13			6	
14			4	4
15		9		
16		5		
Total	8	28	23	31

Total P1 + 2	18	58	50	54	Overall
					180

TIER 5–7 Paper 1

Q	Sc1	Sc2	Sc3	Sc4
1		7		
2		8		
3	1	1	3	
4			6	
5			6	
6	3			2
7				5
8				3
9		7		
10			8	
11			5	
12				6
13				3
Total	4	23	28	19

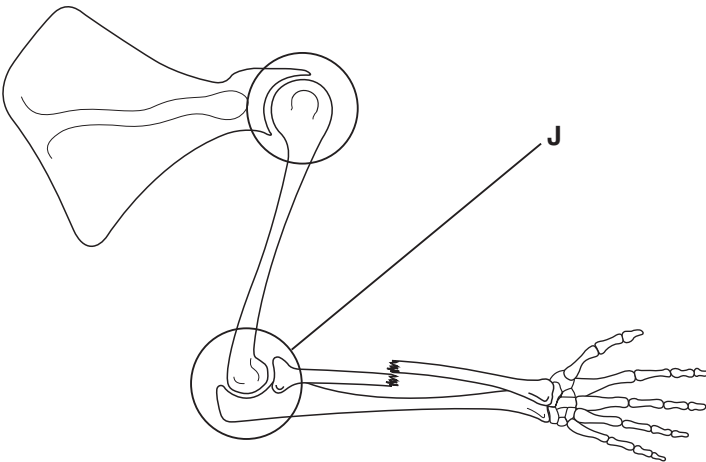
TIER 5–7 Paper 2

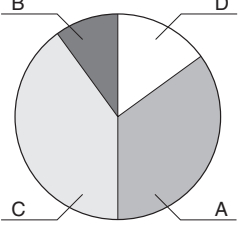
Q	Sc1	Sc2	Sc3	Sc4
1	3			3
2				7
3			4	
4			6	
5			4	4
6		9		
7		5		
8				6
9	1			4
10			7	
11		8		
12		5		
Total	4	27	21	24

Total P1 + 2	8	50	49	43	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 questions in relation to Sc1, Sc2, Sc3 and Sc4.

Tier 3–6	Q No 1	2/2e	the role of the skeleton and joints and the principle of antagonistic muscle pairs, <i>for example, biceps and triceps</i> , in movement	Tier 3–6	Q No 1
Part	Mark	Answer	Additional guidance		
(a)	1	* bone	accept 'calcium'		
(b)	1	any one from * a bone is broken * it is broken	accept 'fractured' or 'snapped'		
(c) (i)	1	* a line to the elbow or shoulder within the areas circled below 	accept a line to the wrist accept a line which ends on a finger joint accept a letter J written on a joint		
(ii)	1	* so that it can move or bend	accept 'to hold the bones together'		
(iii)	1	* muscles ✓	if more than one box is ticked, award no mark		
Total	5				

Tier 3–6	Q No 2	1/2i 2/5b 2/5d	use a wide range of methods, including diagrams, tables, charts, graphs and ICT, to represent and communicate qualitative and quantitative data that habitats support a diversity of plants and animals that are interdependent how predation and competition for resources affect the size of populations, <i>for example, bacteria, growth of vegetation</i>	Tier 3–6	Q No 2
Part	Mark	Answer	Additional guidance		
(a)	3	* 	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 accept the names of insects instead of letters accept numbers written by the correct sectors		
(b) (i)	1	any one from * plenty of dung or food * cows produce dung			
(ii)	1	* plenty of dung beetles or food	accept 'dung beetles will be there' or 'they eat dung beetles'		
(c) (i)	1	* it will decrease			
(ii)	1	any one from * change in climate or weather * increase or decrease in predators * disease * habitat or roosting sites destroyed * increase in food supply * insecticides not used anymore * insects become resistant to insecticides	accept suitable examples of a change in climate accept 'nesting sites destroyed' accept 'fewer places to live' accept 'fewer cows' or 'less food for insects' or 'less dung' accept 'concentration of insecticide in the food chain' <i>do not accept</i> 'they could die'		
Total	7				

Tier 3–6	Q No 4	3/1a 3/2a 3/3c	how materials can be characterised by melting point, boiling point and density that when physical changes, <i>for example, changes of state, formation of solutions</i> , take place, mass is conserved how a reactivity series of metals can be determined by considering these reactions, and used to make predictions about other reactions	Tier 3–6	Q No 4
Part	Mark	Answer	Additional guidance		
(a) (i)	1	* iron	<i>do not accept '1540°C'</i>		
(ii)	1	* mercury	<i>do not accept '-37°C'</i>		
(b)	1	* solid to a liquid	answers must be in the correct order both answers are required for the mark		
(c)	1	* 5			
(d) (i)	1	* sodium			
(ii)	1	* gold			
Total	6				

Part	Mark	Answer	Additional guidance
(a) (i)	1	any one from * the sea is nearer the church * part of the church has gone * part of the cliff has gone	accept 'it has worn away' or 'it has been eroded' or 'it has collapsed'
(ii)	1	* the sea ✓	
(b)	1	any one from * they are rolled around on the beach * they rub against each other * they collide with each other	accept 'the corners get knocked off' accept 'they are eroded'
(c) (i)	1	* weathering ✓	if more than one box is ticked, award no mark
(ii)	1	* acid rain	accept 'acid' or 'rain' or 'water' or 'carbon dioxide' or 'sulphur dioxide' or 'soot' <i>do not accept</i> 'greenhouse gases'
Total	5		

Tier 3–6	Q No 6	1/2j 1/2k 1/2m 3/2c	use diagrams, tables, charts and graphs, including lines of best fit, to identify and describe patterns or relationships in data use observations, measurements and other data to draw conclusions use their scientific knowledge and understanding to explain and interpret observations, measurements or other data, and conclusions to relate changes of state to energy transfers	Tier 3–6	Q No 6
Part	Mark	Answer	Additional guidance		
(a)	1	* 20			
(b)	1 1	sensor Q: any one from * it goes down * it goes to 17°C sensor R: any one from * it goes down and comes up * it goes to 12°C and back up to 20°C	accept 'it levels out at 17°C' <i>do not accept</i> 'it levels out' accept 'it comes back up'		
(c)	1	* it had evaporated	accept 'it had gone into the air' 'it had dried up' is insufficient		
Total	4				

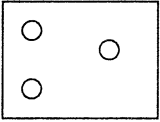
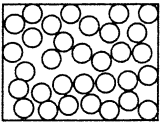
Tier 3–6	Q No 7	4/1b	that the current in a series circuit depends on the number of cells and the number and nature of other components and that current is not 'used up' by components	Tier 3–6	Q No 7
Part	Mark	Answer	Additional guidance		
(a)	1	* there is a wire missing between the battery and the bulb	accept 'there is a wire missing' or 'the bulb is not connected to the battery' accept 'it is not a complete circuit' or 'the circuit is broken'		
(b)	1	* two wires are connected to one end of the battery	accept 'the battery is wrongly connected' accept 'the battery is not in the circuit' accept 'the circuit is wrongly connected' <i>do not accept</i> 'there is an incomplete circuit'		
(c)	1	* the bulb is broken or blown	<i>do not accept</i> 'the circuit is not complete' <i>do not accept</i> 'because the light is not on'		
(d)	1	* the circuit is connected correctly	accept 'it is set up right' accept 'there is a current' accept 'there is a complete circuit or path'		
Total	4				

Part	Mark	Answer	Additional guidance
(a) (i)	1	* ice skate	accept 'skate'
(ii)	1	* Tom's weight on the footwear ✓	if more than one box is ticked, award no mark
(b)	1	any one from * they do not sink in * they have a big surface	accept 'they are wide' or 'they are big' accept 'they spread out your weight' <i>do not accept</i> 'you won't get your feet stuck in the snow' accept 'they reduce the pressure' <i>do not accept</i> 'they spread out your pressure'
(c)	1	* friction	
Total	4		

Tier 3–6	Q No 9	4/3g 4/3h 4/3j BS/2b	that sound causes the eardrum to vibrate and that different people have different audible ranges some effects of loud sounds on the ear, <i>for example, temporary deafness</i> the relationship between the loudness of a sound and the amplitude of the vibration causing it recognise that there are hazards in living things, materials and physical processes, and assess risks and take action to reduce risks to themselves and others	Tier 3–6	Q No 9
Part	Mark	Answer	Additional guidance		
(a)	1	* the balloon vibrates	accept 'by vibrations' accept 'it moves'		
(b)	1	* it vibrates more strongly	accept 'bigger vibrations' accept 'it moves more' accept 'it vibrates more' <i>do not accept 'more vibrations'</i>		
(c)	1	* 60–120 decibels ✓	if more than one box is ticked, award no mark		
(d) (i)	1	* burst ear drum	accept 'the cochlea or nerve endings or inner ear or middle ear is damaged' accept 'it makes you deaf' accept 'tinnitus' or 'ringing in the ear'		
(ii)	1	any one from * wear ear defenders * use ear plugs	accept any appropriate alternative method		
Total	5				

Tier 3–6 5–7	Q No 10 1	2/5b	that food is used as a fuel during respiration to maintain the body's activity and as a raw material for growth and repair	Tier 3–6 5–7	Q No 10 1
Part	Mark	Answer	Additional guidance		
(a) (i)	1	* one is more active	accept 'one does sport or plays football' accept 'they have different metabolic rates' accept 'one works harder or does more work'		
(ii)	1	* carbohydrates	answers may be in either order accept a named carbohydrate, eg 'sugar' or 'glucose' or 'starch'		
	1	* fats			
(b) (i)	1	* 300	accept '15 year-old male is growing or still developing' accept '30 year-old male has stopped growing'		
(ii)	1	any one from * a boy's bones or teeth are still growing * by 30 the bones have already developed			
(c)	1	any one from * a pregnant female supplies the baby with protein * a pregnant female needs protein for herself and the baby * the baby needs protein	accept 'she supplies the baby' accept 'she needs it for herself and the baby'		
(d)	1	any one from * a 15 year-old female menstruates * a 15 year-old female has periods			
Total	7				

Tier 3–6 5–7	Q No 11 2	2/2g 2/2h	about the human reproductive system, including the menstrual cycle and fertilisation how the foetus develops in the uterus, including the role of the placenta	Tier 3–6 5–7	Q No 11 2
Part	Mark	Answer	Additional guidance		
(a) (i)	1	any one from * every month or once a month * every four weeks * every 28 days	accept answers from 26 days to 30 days		
(ii)	1	* oviduct or fallopian tube			
(b)	1 1	* foetus * 9	answers must be in the correct order		
(c) (i)	1	any one from * it cushions the baby * it protects the baby against shocks or bumps * it absorbs shocks	accept 'it protects the baby' <i>do not accept 'keeps it warm' or 'keeps it moist'</i>		
(ii)	1	* placenta			
(iii)	1	* alcohol	accept 'drugs' or a named drug accept a named toxin accept 'viruses' or a named virus or a named viral disease		
(d)	1	* muscles contract	accept 'contractions'		
Total	8				

Part	Mark	Answer	Additional guidance
(a)	1	* tar	
(b) (i)	1	any one from * to cool the vapour * to condense the vapour	accept 'energy is transferred from the water vapour to the ice'
(ii)	2	*  a random arrangement of particles most of which do not touch	*  a random arrangement of particles most of which touch each other
(c)	1	* carbon dioxide	accept 'CO ₂ '
Total	5		

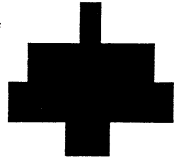
Part	Mark	Answer	Additional guidance
(a)	1	any one from * it would be fizzing * there would be effervescence * bubbles would be given off	accept 'gas or carbon dioxide would be given off' accept 'there was a rise in temperature' accept 'there was a loss of mass'
(b)	1	any one from * carbon dioxide was lost * the carbon dioxide had mass	accept 'carbon dioxide was produced' accept 'gas was given off' accept 'the gas also weighed something'
(c)	1	* green	
(d)	1 1	* limestone ✓ * marble ✓	if more than two boxes are ticked, deduct one mark for each incorrect tick minimum mark zero
(e)	1	* hydrogen	
Total	6		

Tier 3–6 5–7	Q No 14 5	3/1b 3/1e 3/1h 3/2b 3/3a	how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion how elements combine through chemical reactions to form compounds, <i>for example, water, carbon dioxide, magnesium oxide, sodium chloride, most minerals</i> , with a definite composition how to separate mixtures into their constituents using distillation, chromatography and other appropriate methods about the variation of solubility with temperature, the formation of saturated solutions, and the differences in solubility of solutes in different solvents how metals react with oxygen, water, acids and oxides of other metals, and what the products of these reactions are	Tier 3–6 5–7	Q No 14 5
Part	Mark	Answer	Additional guidance		
(a)	1	* copper oxide			
(b)	1	* compound ✓	if more than one box is ticked, award no mark		
(c) (i)	1	* less solution or liquid or water	answers may be in either order accept 'no liquid' or 'the liquid had gone' or 'liquid had evaporated'		
	1	* crystals formed	accept 'solid copper sulphate formed' or 'a blue solid appeared'		
(ii)	1	any one from * there would be more of the solution left * there would be fewer crystals	accept 'the solution would still be there' accept 'no crystals' accept 'no change in dish B'		
	1	any one from * it prevented the evaporation * less water would have evaporated or gone	accept 'it stopped the water leaving the dish'		
Total	6				

Part	Mark	Answer	Additional guidance
(a)	1	any one from * to see how much the temperature went up * to work out the temperature rise	<i>do not accept</i> 'to make it a fair test'
(b)	1	any one from * yes because the smaller the volume the greater the rise in temperature * yes because the greater the volume the smaller the rise in temperature	
(c)	1	any one from * it distributed the hot water throughout the beaker * it made sure the water was heated evenly * to make sure the temperature of the water was the same throughout	<i>do not accept</i> 'the water heats up more quickly'
(d)	1	* The same amount of energy went into all three beakers. ✓	if more than one box is ticked, award no mark
(e)	1	any one from * it decreased or got less * it was transferred to the surroundings	accept 'it leaked out' or 'it was lost' accept 'it evaporated some of the water' accept 'it heated up the air'
Total	5		

Tier 3–6 5–7	Q No 16 7	1/2k 4/4c	use observations, measurements and other data to draw conclusions about the movements of planets around the Sun and to relate these to gravitational forces	Tier 3–6 5–7	Q No 16 7
Part	Mark	Answer	Additional guidance		
(a)	1	* a letter E to show that the Earth has travelled through 90° of its orbit	the letter E must be on the Earth's orbit		
(b) (i)	1	* a letter M to show that Mars has travelled through less than 90° of its orbit	the letter M must be on the orbit of Mars		
(ii)	1	any one from * outer planets move more slowly * it moves more slowly * outer planets take longer to orbit * Mars has a longer year	accept 'the orbit of Mars is longer' or 'the outer planets have further to go' accept 'because Mars takes 1.9 Earth years to orbit the Sun'		
(c) (i)	1	* a letter V to show that Venus has travelled through more than 90° of its orbit and less than 180°	the letter V must be on the orbit of Venus		
(ii)	1	any one from * inner planets move more quickly * it moves more quickly * inner planets take less time to orbit' * Venus has a shorter year	accept 'the orbit of Venus is shorter' or 'the inner planets have less far to go' accept 'because Venus takes 0.6 Earth years to orbit the Sun'		
Total	5				

Tier 3–6 5–7	Q No 17 8	4/2d ways in which frictional forces, including air resistance, affect motion, <i>for example, streamlining cars, friction between tyre and road</i> 4/5e ways in which energy can be usefully transferred and stored 4/5g that although energy is always conserved, it may be dissipated, reducing its availability as a resource	Tier 3–6 5–7	Q No 17 8
Part	Mark	Answer	Additional guidance	
(a)	1	* friction		
(b) (i)	1	any one from * energy stored in the rubber band gets less * the tension in the rubber band decreased * the force exerted by the rubber band gets less	accept 'the rubber band unwound'	
(ii)	1	any one from * give the band more turns * twist the rubber band more	accept 'friction' accept 'wind up the rubber band more' accept 'put it on a slope'	
Total	3			

Tier 5–7	Q No 9	1/2j 2/5b 2/5d 2/5e 2/5f	use diagrams, tables, charts and graphs, including lines of best fit, to identify and describe patterns or relationships in data that habitats support a diversity of plants and animals that are interdependent how predation and competition for resources affect the size of populations, <i>for example, bacteria, growth of vegetation</i> about food webs composed of several food chains, and how food chains can be quantified using pyramids of numbers how toxic materials can accumulate in food chains	Tier 5–7	Q No 9
Part	Mark	Answer	Additional guidance		
(a)	2	* 	one mark should be awarded if the second layer is wider than the first the second mark should be awarded if the top three layers gradually reduce in width		
(b) (i)	2	any two from * sparrowhawks eat great tits which contain insecticide * great tits eat insects which contain insecticide * a sparrowhawk eats lots of great tits or each great tit eats lots of caterpillars * the insecticide is concentrated at each level in the food chain * insecticide is not easily eliminated from an animal's body or sparrowhawk's body * the insecticide is persistent			
(ii)	1	any one from * disease * climate change * lack of food or water * reduced habitat * fewer great tits	accept 'new predators' accept 'increase in predators'		
(c) (i)	1	either * 1961 because the number of great tits was highest	accept '1960' or '1962' for 1961 both the date and the evidence are required for the mark		
(ii)	1	* fewest great tits were eaten			
(i)	1	or * 1976 because the number of great tits was lowest	accept '1975' or '1977' for 1976 both the date and the evidence are required for the mark		
(ii)	1	* not enough food for the sparrowhawks			
Total	7				

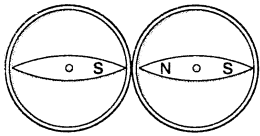
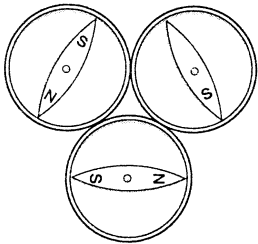
Tier 5–7	Q No 10	3/1a 3/1b 3/1c 3/1g	how materials can be characterised by melting point, boiling point and density how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion that the elements are shown in the periodic table and consist of atoms, which can be represented by symbols that mixtures, <i>for example, air, sea water and most rocks</i> , are composed of constituents that are not combined	Tier 5–7	Q No 10
Part	Mark	Answer	Additional guidance		
(a) (i)	1	* helium is less dense than air	accept 'helium is lighter than air' accept 'the upthrust on the helium balloon is greater than the weight of the balloon'		
(ii)	1	any one from * the air in the balloon is denser than the air in the room * the rubber has weight	accept 'the air in the balloon is compressed' accept 'rubber is heavier than air' accept 'the rubber is denser than air' accept 'the upthrust on the air balloon is less than the weight of the balloon'		
(b)	1	any one from * air is a mixture * air is not a single element or compound	accept 'air contains different gases' 'air is not a single substance' is not sufficient		
(c) (i)	1	* B			
(ii)	1	* C			
(iii)	1	* G			
(d) (i)	1	any one from * helium particles are smaller * helium particles move faster	accept 'molecules' or 'atoms' for particles		
(ii)	1	any one from * aluminium particles or atoms are closer together * rubber particles or molecules are further apart	accept 'rubber particles or molecules have bigger gaps between them'		
Total	8				

Tier 5–7	Q No 11	3/1c 3/1f 3/3f 3/3h	that the elements are shown in the periodic table and consist of atoms, which can be represented by symbols to represent compounds by formulae and to summarise reactions by word equations about some everyday applications of neutralisation, <i>for example, the treatment of indigestion, the treatment of acid soil, the manufacture of fertilizer</i> to identify patterns in chemical reactions	Tier 5–7	Q No 11
Part	Mark	Answer	Additional guidance		
(a)	1	* it neutralises it	accept 'neutralisation' accept 'it produces heat'		
(b) (i)	1	* 3			
(ii)	1	* 9			
(c)	2	* nitric acid → * water	answers must be in the correct order		
Total	5				

Tier 5–7	Q No 12	4/2e 4/2f	that forces can cause objects to turn about a pivot the principle of moments and its application to situations involving one pivot	Tier 5–7	Q No 12
Part	Mark	Answer	Additional guidance		
(a) (i)	1	* it increases			
(ii)	1	any one from * it should be moved to the left * it should be moved away from the support * it should be moved away from the pivot * it should be moved outwards	accept 'move it to the back' or 'move it back' accept 'increase it'		
(b) (i)	1	* 40 000			
	1	* Nm	accept 'mN' <i>do not accept 'Joules' or 'J'</i>		
(ii)	1	* 4	consequential marking applies accept the numerical answer to part (i) ÷ 10 000		
(iii)	1	* 3750			
Total	6				

Tier 5–7	Q No 13	4/2g	the quantitative relationship between force, area and pressure and its application, <i>for example, the use of skis and snowboards, the effect of sharp blades, hydraulic brakes</i>	Tier 5–7	Q No 13
Part	Mark	Answer	Additional guidance		
(a)	1	* 25	accept '175 ÷ 7'		
(b)	1	any one from * greater than 27 N/cm ² * greater than the pressure in the tyre	the unit is required for the mark <i>do not accept '27 N/cm²'</i> accept any answer greater than 27 N/cm ²		
(c)	1	* 2850			
Total	3				

Tier 3–6	Q No 1	4/2b 4/2c 4/2d	that the weight of an object on Earth is the result of the gravitational attraction between its mass and that of the Earth that unbalanced forces change the speed or direction of movement of objects and that balanced forces produce no change in the movement of an object ways in which frictional forces, including air resistance, affect motion, <i>for example, streamlining cars, friction between tyre and road</i>	Tier 3–6	Q No 1
Part	Mark	Answer	Additional guidance		
(a)	1	* ↓ ✓	if more than one box is ticked, award no mark		
(b)	1	* an arrow pointing down, labelled F	accept a correct arrow without a label		
(c) (i)	1	* arrow pointing up, labelled M	accept a correct arrow without a label		
(ii)	1	any one from * an upward force * the spring	accept 'tension' <i>do not accept 'upthrust'</i>		
(d)	1	* Air resistance slows it down. ✓	if more than one box is ticked, award no mark		
Total	5				

Tier 3–6	Q No 2	3/1d 4/1d	how elements vary widely in their physical properties, including appearance, state at room temperature, magnetic properties and thermal and electrical conductivity, and how these properties can be used to classify elements as metals or non-metals about magnetic fields as regions of space where magnetic materials experience forces, and that like magnetic poles repel and unlike poles attract	Tier 3–6	Q No 2
Part	Mark	Answer	Additional guidance		
(a)	1	* N at top and S at bottom	both poles are required for the mark		
(b)	1	* 	all three poles are required for the mark		
(c)	1	* 	all five poles are required for the mark		
(d)	1	* steel	accept 'iron' accept 'nickel' accept 'cobalt'		
Total	4				

Tier 3–6	Q No 3	4/5e 4/5g	ways in which energy can be usefully transferred and stored that although energy is always conserved, it may be dissipated, reducing its availability as a resource	Tier 3–6	Q No 3
Part	Mark	Answer	Additional guidance		
(a) (i)	1	* 5			
(ii)	1	* 60			
(iii)	1	* thermal	accept 'heat'		
(b)	1	* radio			
(c)	1	* light bulb	accept 'bulb' or 'light' or 'lamp'		
Total	5				

Tier 3–6	Q No 4	BS/2b 4/3a 4/3c	recognise that there are hazards in living things, materials and physical processes, and assess risks and take action to reduce risks to themselves and others that light travels in a straight line at a finite speed in a uniform medium how light is reflected at plane surfaces	Tier 3–6	Q No 4
Part	Mark	Answer	Additional guidance		
(a) (i)	1	* a straight line from the torch to the mirror			
(ii)	1	* a straight ray which reflects off the mirror with the angle of reflection approximately equal to the angle of incidence	<i>do not accept</i> dotted lines the incident ray must be continuous with the reflected ray		
	1	* an arrow on either the incident ray or the reflected ray pointing in the correct direction			
(b)	1	* the eye	accept any named part of the eye		
Total	4				

Tier 3–6	Q No 5	3/1a 3/1b 3/1d	how materials can be characterised by melting point, boiling point and density how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion how elements vary widely in their physical properties, including appearance, state at room temperature, magnetic properties and thermal and electrical conductivity, and how these properties can be used to classify elements as metals or non-metals	Tier 3–6	Q No 5
Part	Mark	Answer	Additional guidance		
(a)	1	* very high melting point	answers may be in either order		
	1	* good conductor of heat	<i>do not accept</i> 'good conductor'		
(b) (i)	1	* good conductor of electricity	<i>do not accept</i> 'good conductor'		
(ii)	1	* can be compressed			
Total	4				

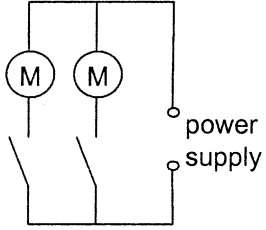
Part	Mark	Answer	Additional guidance
(a)	1	* bubbles are formed	accept 'fizzing' accept 'effervescence'
(b) (i)	1	* It does not dissolve in the water. ✓	if more than one box is ticked, award no mark
(ii)	1	* it goes down	<i>do not accept</i> 'it goes up the test-tube'
(c) (i)	1	* oxygen	
(ii)	1	* water vapour	accept 'water' or 'steam' <i>do not accept</i> 'condensation'
Total	5		

Tier 3–6	Q No 7	1/2j 1/2l 3/3a	use diagrams, tables, charts and graphs, including lines of best fit, to identify and describe patterns or relationships in data decide to what extent these conclusions support a prediction or enable further predictions to be made how metals react with oxygen, water, acids and oxides of other metals, and what the products of these reactions are	Tier 3–6	Q No 7
Part	Mark	Answer	Additional guidance		
(a)	1	* cast iron	<i>do not accept '4.5'</i>		
(b) (i)	1	* 0.8			
(ii)	1	* high carbon steel			
(c) (i)	1	any one from * for buildings * for bridges	accept any other reasonable answer, for example 'street lights' or 'fence posts'		
(ii)	1	any one from * oxygen * water	accept 'air' accept 'moisture'		
Total	5				

Part	Mark	Answer	Additional guidance
Tier 3–6	Q No 8	2/2a about the need for a balanced diet containing carbohydrates, proteins, fats, minerals, vitamins, fibre and water, and about foods that are sources of these 2/2b the principles of digestion, including the role of enzymes in breaking down large molecules into smaller ones 2/2i the role of lung structure in gas exchange, including the effect of smoking 2/2m that the abuse of alcohol, solvents, and other drugs affects health	Tier 3–6 Q No 8
(a)	1	* stomach <i>and</i> intestine	answers may be in either order both answers are required for the mark accept 'oesophagus' or 'gullet'
(b)	2	any two from * to make it easy to swallow * to digest food or break it down * to soften the food	accept 'so that it will go down easily' accept 'to stop you choking' accept 'to break it into smaller pieces' accept 'it dissolves it'
(c) (i)	1 1 1	* drinking too much alcohol * not eating enough fibre * smoking cigarettes	award one mark for each correct line if more than one line is drawn from any habit, award no mark for that habit
(ii)	1	* heart ✓	if more than one box is ticked, award no mark
Total	7		

Tier 3–6	Q No 9	2/4b to classify living things into the major taxonomic groups	Tier 3–6	Q No 9
Part	Mark	Answer	Additional guidance	
(a)	1 1 1 1	* A: insects * B: amphibians * C: molluscs * D: reptiles		
(b)	1 1	* A * C	answers may be in either order accept 'fly' or 'insect' accept 'snail' or 'mollusc'	
Total	6			

Tier 3–6 5–7	Q No 10 1	1/1b that it is important to test explanations by using them to make predictions and by seeing if evidence matches the predictions about the ways in which scientists work today and how they worked in the past, including the roles of experimentation, evidence and creative thought in the development of scientific ideas 1/1c 1/2h make sufficient relevant observations and measurements to reduce error and obtain reliable evidence 4/2b that the weight of an object on Earth is the result of the gravitational attraction between its mass and that of the Earth 4/2d ways in which frictional forces, including air resistance, affect motion, <i>for example, streamlining cars, friction between tyre and road</i>	Tier 3–6 5–7	Q No 10 1
Part	Mark	Answer	Additional guidance	
(a)	1	Both the correct ball and the correct reason are required for the mark. * the bowling ball because it has the greatest mass or it is the heaviest	<i>do not accept</i> 'because it is bigger' 'the bowling ball because it is bigger' is insufficient	
(b)	1	any one from * they are the same diameter * they produce the same air resistance or friction	accept 'they are the same size'	
(c) (i)	1	* they would both reach the ground at the same time		
(ii)	1	* air resistance	accept 'friction'	
(iii)	1	either * the feather and the hammer landed at the same time		
	1	* there is no atmosphere or air resistance or air on the moon		
	1	or * they would take longer to fall on the moon		
	1	* because there is lower gravity than on the Earth	<i>do not accept</i> 'there is no gravity on the moon'	
Total	6			

Tier 3–6 5–7	Q No 11 2	4/1a	how to design and construct series and parallel circuits, and how to measure current and voltage	Tier 3–6 5–7	Q No 11 2
Part	Mark	Answer	Additional guidance		
(a)	1	* pick-up wire * metal wheel	answers must be in the correct order both answers are required for the mark		
(b)	2	<p>One mark is for drawing the two motors connected in parallel. One mark is for drawing one switch in series with each motor. Both marks should only be awarded if the circuit is correct.</p> <p>* </p>	the switches may be drawn either side of the motors		
(c)	1	any one from * it completes the circuit * it acts as a switch	accept 'because the circuit is not complete' 'the pedal connects the motor' is insufficient accept 'the pedal connects the motor to the power supply'		
(d)	1	any one from * he does not complete a circuit * he does not connect the floor and wire mesh ceiling	accept 'the circuit is not complete' accept 'he is not touching the ceiling' accept 'he wears trainers' or 'he has rubber shoes'		
(e) (i)	1	* it stops			
(ii)	1	* it is not affected or it keeps going	accept 'it goes slightly faster'		
Total	7				

Part	Mark	Answer	Additional guidance									
Tier 3–6 5–7	Q No 12 3	3/3d 3/3e 3/3f	to use indicators to classify solutions as acidic, neutral or alkaline, and to use the pH scale as a measure of the acidity of a solution how metals and bases, including carbonates, react with acids, and what the products of these reactions are about some everyday applications of neutralisation, <i>for example, the treatment of indigestion, the treatment of acid soil, the manufacture of fertilizer</i>									
Tier 3–6 5–7	Q No 12 3											
(a)	1 1	<table border="1"> <thead> <tr> <th></th> <th><i>acidic or alkaline</i></th> <th><i>colour of universal indicator paper</i></th> </tr> </thead> <tbody> <tr> <td>* <i>bee sting (ph 2)</i></td> <td>acidic</td> <td>red</td> </tr> <tr> <td>* <i>wasp sting (ph 10)</i></td> <td>alkaline</td> <td>blue accept 'purple'</td> </tr> </tbody> </table>		<i>acidic or alkaline</i>	<i>colour of universal indicator paper</i>	* <i>bee sting (ph 2)</i>	acidic	red	* <i>wasp sting (ph 10)</i>	alkaline	blue accept 'purple'	award one mark for each correct row
	<i>acidic or alkaline</i>	<i>colour of universal indicator paper</i>										
* <i>bee sting (ph 2)</i>	acidic	red										
* <i>wasp sting (ph 10)</i>	alkaline	blue accept 'purple'										
(b) (i)	1	any one from * bicarbonate toothpaste * washing soda	accept 'bicarbonate' or 'toothpaste' or 'hydrogencarbonate'									
(ii)	1	any one from * vinegar * lemon juice										
Total	4											

Part	Mark	Answer	Additional guidance
(a)	1	any one from * pieces are broken off * the cliff is worn away * it crumbles	accept 'erosion'
(b) (i)	1	any one from * remains or impressions of plants or animals which are very old * remains or impressions of plants or animals in a rock	accept 'a plant or animal buried for thousands of years' accept 'remains or impressions of plants or animals or living things'
(ii)	1	* sedimentary	
(c) (i)	1	* cooling of or crystallisation from magma or lava or molten rock	accept 'from magma or lava' accept 'from volcanoes' 'by heating' is insufficient
(ii)	1	any one from * they were formed in conditions where plants or animals or living things could not exist * magma is too hot for plants or animals to survive	
(iii)	1	any one from * larger in granite * smaller in basalt	accept 'larger' or 'bigger'
Total	6		

Part	Mark	Answer	Additional guidance
(a)	1	* chemical	accept 'potential' or 'stored'
	2	any two from * sound * thermal * kinetic * light	accept 'heat' accept 'movement'
(b)	2	any two from * they gained energy * they hit the lid with greater force * they hit the lid more often	accept 'they move more quickly' accept 'they hit the lid harder' accept 'the pressure inside the tin increased' accept 'the molecules are closer together' accept 'more molecules are present'
(c) (i)	1	* oxygen	accept 'O ₂ '
(ii)	1	any one from * carbon dioxide * water vapour	accept 'CO ₂ ' accept 'H ₂ O' accept 'carbon monoxide'
(d)	1	any one from * it was quieter * the lid didn't move as high * less energy released	accept 'the lid was not pushed off' accept 'it does not work'
Total	8		

Tier 3–6 5–7	Q No 15 6	2/1b the functions of chloroplasts and cell walls in plant cells and the functions of the cell membrane, cytoplasm and nucleus in both plant and animal cells 2/3a that plants need carbon dioxide, water and light for photosynthesis, and produce biomass and oxygen 2/3b to summarise photosynthesis in a word equation 2/5c how some organisms are adapted to survive daily and seasonal changes in their habitats	Tier 3–6 5–7	Q No 15 6										
Part	Mark	Answer	Additional guidance											
(a)	1	* glucose	accept 'sugar' or 'carbohydrate'											
(b) (i)	1	* to absorb enough or more light	accept 'to absorb as much light as possible' accept 'to absorb lots of light' accept 'more photosynthesis takes place'											
(ii)	1	* chloroplasts	accept 'chlorophyll'											
(c) (i)		<table border="1"> <thead> <tr> <th><i>part</i></th> <th><i>letter of part</i></th> </tr> </thead> <tbody> <tr> <td><i>cell wall</i></td> <td>D</td> </tr> <tr> <td><i>cytoplasm</i></td> <td>F</td> </tr> <tr> <td><i>nucleus</i></td> <td>A</td> </tr> <tr> <td><i>vacuole</i></td> <td>C</td> </tr> </tbody> </table>	<i>part</i>	<i>letter of part</i>	<i>cell wall</i>	D	<i>cytoplasm</i>	F	<i>nucleus</i>	A	<i>vacuole</i>	C		
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<i>vacuole</i>	C													
(ii)	2	any two from * A * E * F												
Total	9													

Part	Mark	Answer	Additional guidance
(a)	1	any one from * there were not enough bacteria in the food or body * the bacteria multiplied by the next day	accept 'the bacteria had to grow first'
(b)	1	* the antibiotic or medicine killed all the bacteria	accept 'the antibiotics got rid of all the bacteria' or 'there were no bacteria left'
(c)	1	any one from * antibiotic or medicine had not killed all the bacteria * there were still bacteria left alive	accept 'not all the bacteria had gone'
	1	* the bacteria multiplied	accept 'the population rose again' accept 'they could grow again' accept 'they reproduced again'
(d)	1	any one from * it slows down reproduction * it is too cold for the bacteria to divide or reproduce	accept 'it stops them reproducing' or 'it stops them breeding' or 'it stops them multiplying' accept 'it stops them growing' accept 'slows down growth' <i>do not accept</i> 'they are dormant' <i>do not accept</i> 'it freezes them'
Total	5		

Tier 5–7	Q No 8	4/3f	the effect of colour filters on white light and how coloured objects appear in white light and in other colours of light	Tier 5–7	Q No 8
Part	Mark	Answer	Additional guidance		
(a) (i)	1	* only red light passes through the red filter	accept 'the green light is absorbed or stopped or filtered out by the red filter'		
	1	* the red light is absorbed or stopped by the green filter	accept 'red light is filtered by the red filter' accept 'only green light can pass through the green filter'		
	1	* a circle of red light	accept 'red light'		
(b) (i)	1	* red	<i>do not accept 'dark red' or 'brownish red' or 'greeny red'</i>		
	1	* the green light is absorbed			
	1	* the red light is scattered	accept 'the red light is reflected' accept for both of the explanation marks 'only the red light is reflected' or 'all except the red light is absorbed'		
Total	6				

Tier 5–7	Q No 9	1/2j 4/4b 4/4d	use diagrams, tables, charts and graphs, including lines of best fit, to identify and describe patterns or relationships in data the relative positions of the Earth, Sun and planets in the solar system that the Sun and other stars are light sources and that the planets and other bodies are seen by reflected light	Tier 5–7	Q No 9
Part	Mark	Answer	Additional guidance		
(a) (i)	2	any two from * light from the Sun * reflected from the moons' surfaces * travels from the moons to the eyes	<i>do not accept</i> 'light from the Sun and stars' <i>do not accept</i> 'the Sun reflects off the surface' accept 'they reflect sunlight' for both marks		
(ii)	1	any one from * they reflect different amounts of light * they are not the same size	accept 'they have different albedos' accept 'some are dark' or 'they are different colours' accept 'one could be partly in the shadow of Jupiter or another moon'		
(b)	1	* 0.68	the unit is not required for the mark accept answers from 0.65 to 0.70		
(c)	1	* the Sun planets	both answers are required for the mark		
Total	5				

Tier 5–7	Q No 10	3/3a 3/3b 3/3c 3/3h	how metals react with oxygen, water, acids and oxides of other metals, and what the products of these reactions are about the displacement reactions that take place between metals and solutions of salts of other metals how a reactivity series of metals can be determined by considering these reactions, and used to make predictions about other reactions to identify patterns in chemical reactions	Tier 5–7	Q No 10																																		
Part	Mark	Answer	Additional guidance																																				
(a) (i)	1	* magnesium zinc iron copper	all four metals must be in the correct order for the mark																																				
(ii)	2	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">*</th> <th style="text-align: center;">*</th> </tr> <tr> <th></th> <th style="text-align: center;">copper</th> <th style="text-align: center;">iron</th> </tr> </thead> <tbody> <tr> <th style="text-align: center;">copper sulphate</th> <td style="background-color: black;"></td> <td style="background-color: black;"></td> </tr> <tr> <th style="text-align: center;">iron sulphate</th> <td style="background-color: black;"></td> <td style="background-color: black;"></td> </tr> <tr> <th style="text-align: center;">magnesium sulphate</th> <td style="background-color: black;"></td> <td style="text-align: center;">X</td> </tr> <tr> <th style="text-align: center;">zinc sulphate</th> <td style="background-color: black;"></td> <td style="background-color: black;"></td> </tr> </tbody> </table>		*	*		copper	iron	copper sulphate			iron sulphate			magnesium sulphate		X	zinc sulphate			<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">*</th> <th style="text-align: center;">*</th> </tr> <tr> <th></th> <th style="text-align: center;">magnesium</th> <th style="text-align: center;">zinc</th> </tr> </thead> <tbody> <tr> <th style="text-align: center;">copper sulphate</th> <td style="background-color: black;"></td> <td style="text-align: center;">✓</td> </tr> <tr> <th style="text-align: center;">iron sulphate</th> <td style="background-color: black;"></td> <td style="background-color: black;"></td> </tr> <tr> <th style="text-align: center;">magnesium sulphate</th> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <th style="text-align: center;">zinc sulphate</th> <td style="background-color: black;"></td> <td style="background-color: black;"></td> </tr> </tbody> </table> <p>award one mark for each correct column</p>		*	*		magnesium	zinc	copper sulphate		✓	iron sulphate			magnesium sulphate	X	X	zinc sulphate		
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(b) (i)	2	* copper nitrate + * silver	the products may be in either order																																				
(ii)	1	* copper silver platinum																																					
(c)	1	* iron because it is more reactive	both the metal and the reason are required for the mark accept 'iron because copper does not react'																																				
Total	7																																						

Tier 5-7	Q No 11	2/1c 2/2d 2/2f 2/2g	ways in which some cells, including ciliated epithelial cells, sperm, ova, and root hair cells, are adapted to their functions that food is used as a fuel during respiration to maintain the body's activity and as a raw material for growth and repair about the physical and emotional changes that take place during adolescence about the human reproductive system, including the menstrual cycle and fertilisation	Tier 5-7	Q No 11
Part	Mark	Answer	Additional guidance		
(a) (i)	1	any one from * it controls the activities of the sperm or cell * it carries or passes on genetic information * it contains the genes * fertilisation	accept 'passes on information' accept 'it contains chromosomes' <i>do not accept</i> 'it carries all the genetic information of the baby'		
(ii)	1	Both the adaptation and the reason are required for the mark. any one from * streamlined or has a pointed head to help it swim or penetrate the egg * it produces a chemical to help it penetrate the egg * very little cytoplasm so it swims faster			
(b)	1	* the best temperature for making sperm is lower than body temperature	accept 'a lower temperature is needed for producing sperm' accept 'at higher temperatures sperm might be defective'		
(c) (i)	1	* in the testes or testis			
(ii)	1	any one from * body hair or pubic hair or hairy armpits * facial hair or beard * breaking or lowering of the voice * growth of the penis or testes * body becomes more muscular * sperm production begins * growth spurt	<i>do not accept</i> 'acne or spots' <i>do not accept</i> 'the testes drop' accept 'shoulders broaden' or 'muscles develop' <i>do not accept</i> 'grows taller'		
(d) (i)	1	any one from * to increase the chance of one reaching the egg or the oviduct * most sperm die before reaching the egg or oviduct	accept 'to make sure an egg is fertilised' accept 'most do not reach the egg' 'most sperm die' is insufficient		
(ii)	1	* for respiration	accept 'for energy' <i>do not accept</i> 'for food'		
	1	* for movement or for swimming	accept 'to reach the egg'		
Total	8				

Tier 5–7	Q No 12	1/2j 2/2h 2/2i 2/2m	use diagrams, tables, charts and graphs, including lines of best fit, to identify and describe patterns or relationships in data how the fetus develops in the uterus, including the role of the placenta the role of lung structure in gas exchange, including the effect of smoking that the abuse of alcohol, solvents, and other drugs affects health	Tier 5–7	Q No 12
Part	Mark	Answer	Additional guidance		
(a) (i)	1	* accept any number from 38 to 47 minutes			
(ii)	1	any one from * the body gets used to the nicotine * more nicotine is needed to get the same effect * the body develops tolerance	accept 'he gets used to it' accept 'his body will adapt to the nicotine' accept 'more nicotine is needed'		
(b)		The first mark is for a consequence. The second mark is for an explanation. Examples are either 1 * people will smoke more 1 * to maintain the nicotine level in their blood above the craving threshold or 1 * increased risk of lung cancer or other smoking-related disease 1 * more cigarettes will be smoked or 1 * people will smoke fewer cigarettes 1 * lower nicotine level causes less addiction	accept 'cigarette companies will make more money'		
(c)	1	any one from * less oxygen in the mother's blood * less oxygen passes through the placenta * less oxygen in the baby's blood * smaller baby or brain damaged baby * baby may be premature	<i>do not accept</i> 'no oxygen' <i>do not accept</i> 'only carbon dioxide passes through the placenta' accept 'less oxygen for the baby' accept 'the red blood cells of the baby or foetus will combine with carbon monoxide' 'carbon monoxide passes through the placenta' is insufficient accept 'baby's heart beat rises' or 'baby's blood pressure goes up'		
Total	5				

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