

Tier 3–6	Q No 1		
Part	Mark	Answer	Additional guidance
a i 4/4b	1	* A	
a ii 4/4b	1	* D	
a iii 4/4b	1	* E	
a iv 4/4b	1	* G	
		accept 'Jupiter'	
b i 1/2i	1	* a bar drawn to 12 N/kg	the top of the bar must be in the middle third between 10 and 15
b ii 1/2k	1	any one from * Jupiter * Saturn * Neptune	
b iii 1/2k	1	* Jupiter	
Total	7		

Tier 3–6	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
a 4/2b 4/2c 4/2d	1	* the weight of the buggy	A	if more than one line is drawn from any one force award no mark for that force
	1	* the force pulling the buggy along	B	
	1	* the friction between the skis and the snow	C D	
b 4/2a	1	* 800	accept '80 x 10'	
c 4/2g	1	any one from * it weighed more * the mass was greater * it weighed less at the end	accept 'it was heavier' accept 'it only weighed 130 at the end' accept 'there was more food or fuel or supplies' accept 'more pressure'	

Tier 3–6	Q No 2			
Part	Mark	Answer	Accept	Additional guidance
d 4/2g	1	any one from * they spread out the weight * they have a bigger surface or area * they can slide easily	accept 'they do not sink into the snow' accept 'wheels sink' accept 'they reduce the pressure' accept 'less friction'	'they are bigger' is insufficient 'it can slide' is insufficient
e 4/2c	1	any one from * there is a bigger surface or area * there is a bigger force * it catches more air or wind		<i>do not accept</i> 'there is more air resistance'
Total	7			

Tier 3–6	Q No 3			
Part	Mark	Answer	Accept	Additional guidance
a i 1/2k	1	* 35		
a ii 2/2n	1	* 37°C ✓		if more than one box is ticked, award no mark
a iii 1/2e BS/2b	1	any one from * less chance of micro-organisms being passed on or spread * glass could break * mercury or alcohol or liquid could spill (if the glass thermometer broke) * mercury is poisonous * you could choke	accept 'less chance of germs being passed on' accept 'might pass on disease' accept 'a child might bite or swallow the thermometer'	
b 2/2n	1	any one from * bacteria * fungi * protozoa	accept a named non-viral pathogenic micro-organism such as 'salmonella'	<i>do not accept</i> names of diseases <i>do not accept</i> 'germs'
c i 1/2f	1	any one from * so that alcohol can be seen * alcohol is difficult to see * you cannot easily see a colourless liquid * to make it easier to read the thermometer	accept 'so you can see it' accept 'you cannot see a colourless liquid' accept 'so you can read it'	
c ii 3/1a 3/2c	1 1	* gas * liquid		answers must be in the correct order
Total	7			

Tier 3–6	Q No 4		
Part	Mark	Answer	Accept Additional guidance
a i 3/3d	1	any one from * lemonade * fruit juice	accept 'fruit or juice'
a ii 3/3d	1	any one from * milk * water	
b i 3/3d	1	any one from * blue * dark blue * purple	
b ii 1/2k	1	any one from * it bubbled * bubbles were formed	accept 'it fizzed' accept 'bubbles' accept 'effervescence'
c 3/3e	1	* neutralisation ✓	if more than one box is ticked, award no mark
Total	5		

Tier 3–6		Q No 5	
Part	Mark	Answer	Accept Additional guidance
a i 3/2b	1	* the water or it went blue	accept 'it changed colour' accept 'it got darker' accept 'there were fewer crystals' accept 'some of the crystals or copper sulphate disappeared'
a ii 3/2b	1	any one from * stir it * heat it * use hotter water * grind up or crush the crystals	accept 'use warm water'
b 3/2c	1	any one from * crystals * copper sulphate	accept 'solid'
c i 1/2k 3/2b	1	* 10	
c ii 1/2k 3/2b	1	* Q	
c iii 1/2j 3/2b	1	* P <i>and</i> Q	answers may be in either order both answers are required for the mark
Total	6		

Tier 3–6	Q No 6			
Part	Mark	Answer	Accept	Additional guidance
a i 2/2b	1	* D		
a ii 2/2b	1	* E		
a iii 2/2c	1	any one from * blood * blood vessels	accept 'plasma' accept a named blood vessel accept 'arteries' accept 'veins'	a mark should be awarded for 'red or white blood cells' as knowledge of the function of blood cells is not expected at this level the mark is awarded for the reference to blood
b 2/2d	1	* to provide energy ✓		if more than one box is ticked, award no mark
c i 2/2a	1	* Clare	accept 'lemonade and jam or doughnut'	
c ii 2/2a	1	* Nadia	accept 'cheeseburger and chips' or 'burger and chips'	
c iii 2/2a	1	any one from * it causes heart disease * it could give you a heart attack * it clogs your arteries or blood vessels	accept 'it is bad for your heart' accept 'it might give you a stroke' accept 'it makes you fat' accept 'it is bad for the liver'	
Total	7			

Tier 3–6	Q No 7			
Part	Mark	Answer	Accept	Additional guidance
a 1/2k	1	* a male has antlers	accept 'the males have horns' accept 'it was bigger than others' accept 'it has a beard or hair around the neck'	
b 1/2o	1	* they all have these characteristics	accept 'all deer have these things' accept 'all young deer look the same' accept 'they all have spots or skinny legs' accept 'an adult fallow deer has spots'	'an adult female has spots' is insufficient
c 1/2k	2	any two from * (adult) red deer does not have spots * the shape of the antlers or horns * the red deer has hair round its neck	accept the converse accept 'the spots' accept 'the things on its head are too wide' accept 'the red deer is hairy'	'it looks like a fallow deer' or 'it is a fallow deer' are insufficient
d 1/2k	2	any two from * beard or hair under neck * the shape of the antlers * rounder nose	accept 'too hairy' accept 'different kind of fur' accept 'the shape of the horns' accept 'horns' accept 'it has more than two antlers' accept 'the head or face is a different shape or size' accept 'the face looks different' accept 'bigger feet' or 'different hooves'	<i>do not accept</i> 'it has a hump'
Total	6			

Tier 3–6 5–7	Q No 8 1			
Part	Mark	Answer	Accept	Additional guidance
a i 4/5e	1	* electrical		
a ii 4/5e	1	* kinetic	accept 'movement'	
a iii 4/5e	1	* gravitational potential	accept 'gravitational' or 'potential'	answers must be in the correct order
	1	* kinetic or sound or thermal	accept 'heat' for thermal accept for two marks 'kinetic <i>into</i> sound' or 'kinetic <i>into</i> thermal'	
b 4/5a	1	<i>advantage</i> * the energy will always be replaced * it is renewable * it is free to run * a battery might leak	accept 'it will not run out' accept 'it does not use fuel or mains electricity' accept 'it is cheap' accept 'no pollution with a solar cell'	<i>do not accept</i> 'can be used again'
	1	<i>disadvantage</i> * if the Sun goes in the pump will stop * it will not work at night or in the dark	accept 'it must be in the Sun to work' accept 'it is not sunny all the time'	
Total	6			

Part	Mark	Answer	Accept	Additional guidance																				
<table border="1"> <tr> <td>Tiers</td> <td>Q No</td> </tr> <tr> <td>3–6</td> <td>9</td> </tr> <tr> <td>5–7</td> <td>2</td> </tr> </table>		Tiers	Q No	3–6	9	5–7	2																	
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a 4/1a 4/1b	1 1 1	* * *	<table border="1"> <tr> <td>A</td> <td>B</td> <td>C</td> <td>D</td> </tr> <tr> <td>off</td> <td>off</td> <td>off</td> <td>off</td> </tr> <tr> <td>off</td> <td>off</td> <td>off</td> <td>off</td> </tr> <tr> <td>on</td> <td>on</td> <td>on</td> <td>on</td> </tr> <tr> <td>on</td> <td>on</td> <td>off</td> <td>off</td> </tr> </table>	A	B	C	D	off	off	off	off	off	off	off	off	on	on	on	on	on	on	off	off	award a mark for each correct row
			A	B	C	D																		
			off	off	off	off																		
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b 4/1a 4/1b	1	any one from * close S ₄ and S ₅ * only leave S ₃ open	accept 'close 4 and 5' accept 'only leave 3 open'	'leave switch 3 or 3 open' is insufficient																				
Total	4																							

Part	Mark	Answer	Accept	Additional guidance
Tiers 3–6 5–7	Q No 10 3			
a i 3/1b	1	* five circles not touching and randomly arranged	accept at least three circles accept pairs of similar atoms	
a ii 3/1b	1	* they are closer		<i>do not accept</i> 'they are close' <i>do not accept</i> 'they move faster'
b 3/1b	1	* greater than	accept 'greater'	
c i 4/3j	1	* the amplitude gets smaller	accept 'the height of the waves gets less' accept 'the waves get shorter or smaller'	<i>do not accept</i> 'it vibrates less'
c ii 4/3k	1	any one from * the peaks or troughs are equally spaced * the frequency is constant or does not change	accept 'the waves are the same distance apart' accept 'there are four peaks or waves or troughs between the lines' accept 'the width of each wave is the same' accept 'the lines are equally spaced' accept 'the wavelength is the same'	
Total	5			

Tiers 3–6 5–7	Q No 11 4																												
Part	Mark	Answer	Accept	Additional guidance																									
a 3/3d	2	* <table border="1"> <thead> <tr> <th><i>liquid</i></th> <th><i>acidic</i></th> <th><i>neutral</i></th> <th><i>alkaline</i></th> </tr> </thead> <tbody> <tr> <td>alcohol</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td><i>dilute hydrochloric acid</i></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>distilled water</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>vinegar</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>sodium hydroxide solution</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>	<i>liquid</i>	<i>acidic</i>	<i>neutral</i>	<i>alkaline</i>	alcohol		✓		<i>dilute hydrochloric acid</i>	✓			distilled water		✓		vinegar	✓			sodium hydroxide solution			✓		award one mark for a correct tick for both alcohol and distilled water award one mark for a correct tick for both vinegar and sodium hydroxide solution if more than one column is ticked for any liquid award no mark for the corresponding pair of liquids	
<i>liquid</i>	<i>acidic</i>	<i>neutral</i>	<i>alkaline</i>																										
alcohol		✓																											
<i>dilute hydrochloric acid</i>	✓																												
distilled water		✓																											
vinegar	✓																												
sodium hydroxide solution			✓																										
b i 1/2f	1	any one from * to clean the probe or it * to prevent contamination * to get an accurate reading * so the liquids do not get mixed up * it is neutral	accept 'to neutralise the probe' or 'so that it does not affect the other liquids' or 'to make it pH 7'																										
b ii 3/3d	1	* alcohol	accept 'the first or top one'	'to make it a fair test' is insufficient																									

Part	Mark	Answer	Accept	Additional guidance
c i 3/3d	1	* hydrochloric acid has a lower pH or is more acidic	accept the converse accept 'vinegar is a weaker acid'	'vinegar is a weak acid' is insufficient
c ii 1/2k	1	any one from * more bubbles would be given off * bubbles would be given off more rapidly * there would be a bigger rise in temperature * the magnesium would be used up more quickly	accept 'more bubbles' or 'more fizzing' accept 'there would be a rise in temperature' or 'the test-tube would get hot'	
d i 3/1f 3/3e	1 1	* magnesium chloride + * hydrogen		answers may be in either order
d ii 3/3e	1	any one from * the acid was used up * the magnesium was used up	accept 'there were no reactants left' accept 'one of the reactants has been used up' accept 'the reaction was complete'	<i>do not accept</i> 'the magnesium had dissolved'
Total	9			

Part	Mark	Answer	Accept	Additional guidance
Tiers 3–6 5–7	Q No 12 5			
a 1/2d	1	any one from * size of pieces of tablet * surface area of the tablet	accept 'size of tablet' accept 'whether the tablet is whole or crushed' accept 'form of the tablet' accept 'particle size' accept 'mass of each piece' accept 'number of pieces'	<i>do not accept</i> 'mass of tablet'
b 1/1b	1	any one from * crushed tablets will dissolve more quickly than whole tablets * a whole tablet will take longer to dissolve * the bigger the surface or area the faster it dissolves	accept 'the finer the tablet the quicker it dissolves' accept 'the smaller the pieces the faster it dissolves'	answers must include a comparison award a mark for an answer in the past tense if a comparison is included
c 1/2d	1	* temperature of the water	accept 'temperature'	
d 1/2j	1	any one from * the higher the temperature the quicker the tablet dissolves * the lower the temperature the longer it takes to dissolve		answers must include a comparison 'at the lowest temperature it takes a long time to dissolve' is insufficient 'at the highest temperature it dissolves quickly' is insufficient
e 1/2j	1	* 40	accept a temperature from 38 to 44	
Total	5			

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<table border="1"> <tr> <td>Tiers 3–6 5–7</td> <td>Q No 13 6</td> </tr> </table>		Tiers 3–6 5–7	Q No 13 6			
Tiers 3–6 5–7	Q No 13 6					
a 2/2g	1	* oviduct ✓		if more than one box is ticked, award no mark		
b 2/2g	1	any one from * some eggs or sperm might be eaten or lost * eggs or sperm are not protected inside the body * to increase the chance of an egg being fertilised * some eggs might not be fertilised * some are washed away * some of the offspring might be eaten	accept 'to make fertilisation more likely' accept 'some die' accept 'more tadpoles'			
c i 2/2j	1	any one from * to let oxygen or air into the egg * to let carbon dioxide or waste gases out * to allow gas exchange	accept 'for respiration'	<i>do not accept</i> 'to let waste out'		
c ii 2/5c	1	any one from * for protection * to stop the egg drying out * it stops infection or disease	accept 'it stops it drying out' accept 'it stops micro-organisms or bacteria or viruses or germs getting in' accept 'to retain the contents'	'it stops infection getting in' is insufficient		
d 2/2h	1	any one from * food passes from the mother to the embryo or baby * the embryo is fed through the placenta * it gets food from the mother's blood	accept 'the mother provides food' accept 'it is fed through the umbilical cord'	<i>do not accept</i> 'it gets food from the blood'		
Total	5					

Part	Mark	Answer	Accept	Additional guidance
Tiers 3–6 5–7	Q No 14 7			
a i 2/1b	1 1	* <i>name</i> : nucleus * <i>function</i> : it controls the cell	accept 'nuclei' accept 'it contains genetic information' accept 'contains chromosomes'	'it is the brain of the cell' is insufficient
a ii 2/1a	1	* tissue ✓		if more than one box is ticked, award no mark
b i 2/2c	1	any one from * to push food or waste along * to break up large pieces of food * to churn food	accept 'for peristalsis' accept 'mechanical digestion' accept 'to mix in enzymes'	'to digest food' is insufficient
b ii 2/2b	1	* they speed up digestion	accept 'they digest them' accept 'they break them down' accept 'they turn it into amino acids'	
b iii 2/2a	1	* fibre ✓		if more than one box is ticked, award no mark
Total	6			

Part	Mark	Answer	Accept	Additional guidance		
<table border="1"> <tr> <td>Tiers 3–6 5–7</td> <td>Q No 15 8</td> </tr> </table>		Tiers 3–6 5–7	Q No 15 8			
Tiers 3–6 5–7	Q No 15 8					
a 1/2e	1	any one from * to make sure the water in the boiling tube had reached the required temperature * to make sure the rate stabilised or adjusted to the new temperature	accept 'time for the water in the test-tube to heat up' accept 'let it settle first' accept 'the bubbles reach a steady pace' accept 'to get rid of bubbles from the liquid' accept 'to get rid of trapped bubbles'			
b i 1/2i	1	* a smooth curve through all six points				
b ii 1/2k	1	* a temperature from 32 to 38	accept any reading consistent with the maximum point on the drawn curve			
c 1/2l	1	any one from * A, B, C * the first three readings * between 10°C and 30°C * between A and C	accept 'A, B, C and D' accept 'between 10°C and 40°C' accept '10°C, 20°C and 30°C' or '10, 20, 30' accept 'between A and B' or 'between A and D' or 'between B and D'	<i>do not accept</i> 'between C and D'		
d 1/2p	1	any one from * use smaller intervals of measuring the temperature * use temperatures between 30°C and 40°C	accept an example of specific intervals such as 'do it at intervals of 2°C' accept 'take more measurements' accept 'take a reading at 35°C'	answers must refer to the collection of data rather than to the presentation of data 'repeat the test' is insufficient but may be accepted with additional measurements		
Total	5					