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 *into* sound' **or** 'kinetic *into* thermal'	
b *4/5a*	1	*advantage* * 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'	 *do **not** accept* 'can be used again'
	1	*disadvantage* * 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**			

Tiers 3–6 5–7	Q No 9 2

Part	Mark	Answer	Accept	Additional guidance
a *4/1a* *4/1b*				award a mark for each correct row

	A	B	C	D
	off	*off*	*off*	*off*
1 *	off	off	off	off
1 *	on	on	on	on
1 *	on	on	off	off

Part	Mark	Answer	Accept	Additional guidance
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**			

Tiers 3–6 5–7	Q No 10 3

Part	Mark	Answer	Accept	Additional guidance
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		*do **not** accept* 'they are close' *do **not** accept* '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'	*do **not** accept* '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><tr><th>*liquid*</th><th>*acidic*</th><th>*neutral*</th><th>*alkaline*</th></tr><tr><td>alcohol</td><td></td><td>✔</td><td></td></tr><tr><td>*dilute hydrochloric acid*</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></table>		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
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'	'to make it a fair test' is insufficient
b ii *3/3d*	1	* alcohol	accept 'the first **or** top one'	

Tiers 3–6 5–7	Q No 11 4

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'	*do **not** accept* 'the magnesium had dissolved'
Total	**9**			

Tiers 3–6 5–7	Q No 12 5

Part	Mark	Answer	Accept	Additional guidance
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'	*do **not** accept* '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**			

Tiers 3–6 5–7	Q No 13 6

Part	Mark	Answer	Accept	Additional guidance
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'	 *do **not** accept* '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'	 *do **not** accept* 'it gets food from the blood'
Total	**5**			

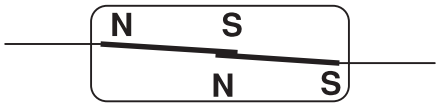
Tiers 3–6 5–7	Q No 14 7

Part	Mark	Answer	Accept	Additional guidance
a i *2/1b*	1 1	* *name:* nucleus * *function:* 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**			

Tiers 3–6 5–7	Q No 15 8

Part	Mark	Answer	Accept	Additional guidance
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'	*do **not** accept* '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**			

Tier 5–7	Q No 9

Part	Mark	Answer	Accept	Additional guidance
a i *4/1f*	1 1	* add more coils **or** turns * increase the current	accept 'put coils **or** turns closer together' accept 'increase the number of cells **or** batteries' accept 'increase the voltage **or** power'	*do **not** accept* 'move it closer'
a ii *4/1f*	1	* 		**all four** poles must be correct for the mark
b i *4/1f*	1	any **one** from * steel stays magnetised * iron loses its magnetism * the switch would stay closed * the switch would not spring open		
b ii *4/1b*	1	* copper is a better conductor than iron	accept the converse accept 'copper has a lower resistance' accept 'iron **or** the reed switch has a greater resistance'	
Total	**5**			

Tier 5–7	Q No 10

Part	Mark	Answer	Accept	Additional guidance
a *1/2i*	1 1 1 1	* X-axis: time (minutes) Y-axis: temperature (°C) * appropriate scales such as 2 cm represents 10°C, 2 cm represents 1 minute * 11 points plotted to within half a small square * a smooth curve of best fit (not dot-to-dot)		**pupils can gain credit for correct responses to other parts if the axes are wrongly labelled** **both** answers are required for the mark units are required for the mark at least one zero must be included at the origin
b *1/2k*	1	* an answer consistent with the drawn curve	accept a tolerance of one small square	
Total	**5**			

Tier 5–7	Q No 11

Part	Mark	Answer	Accept	Additional guidance
a *3/3b*	1	* magnesium displaces copper from the copper sulphate * copper is replaced by magnesium	accept 'magnesium has taken the sulphate' accept 'copper and magnesium change places'	
b *3/3b* *3/3c*	1 1	* *iron + sodium chloride* — no — iron is below sodium (in the reactivity series) **or** sodium is above iron (in the reactivity series) * *magnesium + lead nitrate* — yes — magnesium is above lead (in the reactivity series) **or** lead is below magnesium (in the reactivity series)	accept 'iron is less reactive' **or** the converse accept 'magnesium is more reactive' **or** the converse	**both** the answer and the correct reason are required for each mark
c i *3/3c*	1	any **one** from * add zinc to a solution of a salt of each of the other metals * add each of the other metals to a solution of a zinc salt	accept 'add zinc to copper chloride and if it reacts add it to a solution of a salt of the next metal up and so on' accept 'add the other metals to zinc chloride' accept any named zinc salt	**parts c i and c ii should be marked together** *do* ***not*** *accept* 'test the other metals with zinc to see if they react'
c ii *3/3c*	1	any **one** from * place zinc between the metal in the salt which does react and the metal in the salt which does not react * place zinc between the metal which does react and the metal which does not react	accept 'whatever zinc displaced should be below zinc' accept 'put zinc below all the metals that react'	
Total	**5**			

Tier 5–7	Q No 12

Part	Mark	Answer	Accept	Additional guidance
a *3/2h*	2	any **two** from * they change colour **or** turn less green because chlorophyll breaks down * they become sweeter because glucose is formed * they become softer because cells break apart without pectin	accept 'it turned red **or** yellow **or** orange' accept any suitable colour for a ripe apple accept 'because pectin breaks down' **or** 'the cells are not held together'	the change and the explanation should be marked together **both** the answer and the reason are required for each mark *do **not** accept* 'the cells break down'
b *3/1b*	1	* diffusion	accept 'convection'	
c *3/1f*	1 1	* carbon dioxide CO_2 * water H_2O	accept 'carbon monoxide' accept 'CO'	answers may be in either order **both** the name and formula are required for each mark
Total	**5**			

Tier 5–7	Q No 13

Part	Mark	Answer	Accept	Additional guidance
a i *2/2j*	1	* respiration		
a ii *2/2j*	1	* carbon dioxide is produced	accept 'maggots breathe out carbon dioxide'	
b i *2/3a*	1	* photosynthesis		
b ii *2/3a*	1	any **one** from * carbon dioxide is used up * carbon dioxide reacts with water in the plant	 accept 'the carbon dioxide reacts with water'	 'carbon dioxide is absorbed' is insufficient *do **not** accept* 'the carbon dioxide reacts with water in the tube'
c *2/3a* *2/3e*	1	any **one** from * carbon dioxide produced by respiration was used up in photosynthesis * carbon dioxide produced by the maggots is used in photosynthesis * carbon dioxide produced by the maggots was used by the leaves		answers must refer either to respiration **or** maggots **and** photosynthesis or leaves 'the concentration of carbon dioxide remains unchanged' is insufficient
Total	**5**			

Tier 5–7	Q No 14

Part	Mark	Answer	Accept	Additional guidance
a *1/2k*	1	* they have only investigated British women	accept 'it is only one country' accept 'diet differences elsewhere' accept 'stress may be different elsewhere' accept 'different lifestyles elsewhere' accept 'they have only investigated women in the 60 to 79 age group'	
b *1/2h*	1	* they used a large sample	accept 'they used 4286 women'	
c *1/1a* *1/2k* *1/2o*	1	any **one** from * no data refers only to older women * no if you include all women the rate could be up **or** down		
	1	any **one** from * no no evidence of the impact of treatment	accept 'no mention of treatment'	
		* no previous research could have underestimated the proportion	accept 'it does not tell you'	
	1	* yes data suggests only 1 in 5 showed signs of heart disease so 4 out of 5 are unlikely to suffer	accept 'data shows 1 in 5 had signs of heart disease'	
Total	**5**			