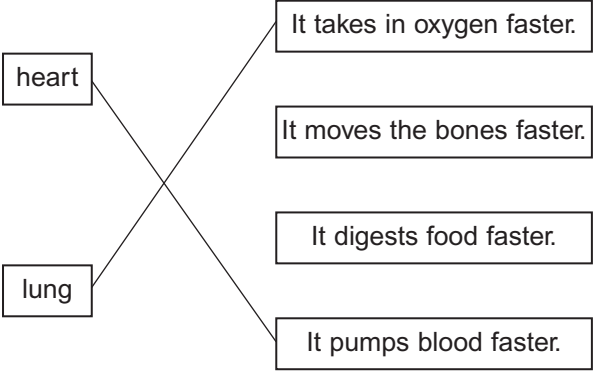


Tier 3–6	Q No 1			
Part	Mark	Answer	Accept	Additional guidance
<p><b>a</b> BS/2a 4/1a</p>	<p>2</p>	<p>*</p>		<p>award two marks for all <b>four</b> correct lines award one mark for any <b>two</b> or <b>three</b> correct lines if more than one line is drawn from any box, do not credit either line</p>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

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

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

Tier 3–6	Q No 4											
Part	Mark	Answer	Accept	Additional guidance								
<b>a</b> 3/2c	3	* <table border="0" style="margin-left: 20px;"> <tr> <td style="border: 1px solid black; padding: 2px;">solid to liquid</td> <td style="border: 1px solid black; padding: 2px;">evaporating</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">liquid to gas</td> <td style="border: 1px solid black; padding: 2px;">melting</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">gas to liquid</td> <td style="border: 1px solid black; padding: 2px;">condensing</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">liquid to solid</td> <td style="border: 1px solid black; padding: 2px;">freezing</td> </tr> </table>	solid to liquid	evaporating	liquid to gas	melting	gas to liquid	condensing	liquid to solid	freezing		award three marks for <b>all four</b> correct lines award two marks for any <b>three</b> correct lines award one mark for any <b>two</b> correct lines  if more than one line is drawn from any change of state, do not credit that change of state
solid to liquid	evaporating											
liquid to gas	melting											
gas to liquid	condensing											
liquid to solid	freezing											
<b>b</b> 1/2j 3/1a	1	* 0 °C	accept 'zero'	do <b>not</b> accept 'nothing'								
<b>c</b> 3/1a 1/2j	1	* it decreased	accept 'it got colder'	'it dropped to below 0°C' is insufficient any references to time are insufficient								
<b>d</b> 3/1a 4/2d	2	* Sand increases friction between car tyres and the road. ✓ * Salt makes ice melt. ✓		if more than two boxes are ticked, deduct a mark for each incorrect box minimum of zero								
<b>Total</b>	<b>7</b>											

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

Tier 3–6	Q No 5			
Part	Mark	Answer	Accept	Additional guidance
d i 2/4b	2	* They have a segmented body. ✓ They have six legs. ✓ They have two pairs of wings. ✓		<b>all three</b> answers are required for both marks award one mark for any <b>two</b> correct answers if more than three boxes are ticked, deduct a mark for each incorrect box minimum mark zero
d ii 2/5e	1	* <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">female horsefly</div> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">male horsefly</div> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">herbivore</div> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">carnivore</div> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">producer</div> <div style="border: 1px solid black; padding: 5px; width: 100px; 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
<b>Total</b>	<b>6</b>			

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

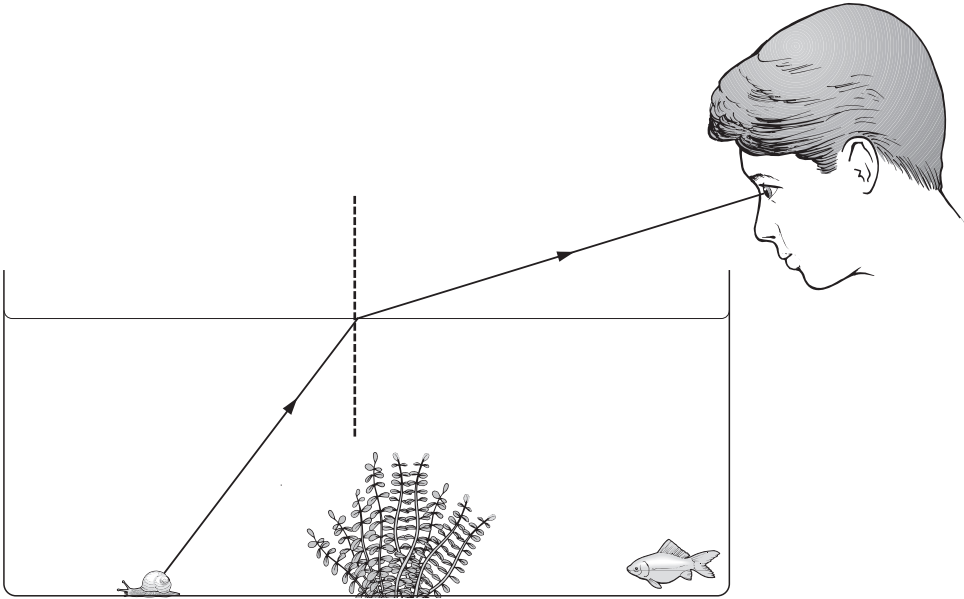
Tier 3–6	Q No 7			
Part	Mark	Answer	Accept	Additional guidance
<b>a</b> 2/5c	1	any <b>one</b> from * it has large <b>or</b> wide hands <b>or</b> paws  * it has a pointed head <b>or</b> face <b>or</b> nose  * it has strong <b>or</b> big claws	accept 'its paws are like shovels' accept 'big <b>or</b> strong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



Tier 3–6 5–7	Q No 8 1	Part	Mark	Answer	Accept	Additional guidance
		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 <b>both</b> the letter and the correct explanation are required for the mark 'the height of the waves' is insufficient 'they are big <b>or</b> tall' is insufficient 'taller waves are louder' is insufficient <i>do not accept</i> 'they are equally long'
		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 <b>both</b> the letter and the correct explanation are required for the mark 'the distance apart of the waves' is insufficient 'the less spaced out the waves, the higher the pitch' is insufficient 'they are the same length <b>or</b> thickness <b>or</b> width' is insufficient
		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
		b 1/2j	1	* any number between 4.5 and 7.5 hours (inclusive)		
		c 4/3g	1	any <b>one</b> from * it vibrates with a greater amplitude * it has larger vibrations	accept 'it moves more' accept 'burst ear drum'	'it vibrates harder' and 'it vibrates more' are insufficient responses <i>do not accept</i> 'it vibrates faster'
		<b>Total</b>	<b>5</b>			

Tier 3–6 5–7	Q No 9 2									
Part	Mark	Answer	Accept	Additional guidance						
<b>a</b> 1/2i	1	* <table border="1"> <tr> <td>2</td> <td>20</td> </tr> <tr> <td>3</td> <td>45 or 46</td> </tr> <tr> <td>4</td> <td>80</td> </tr> </table>	2	20	3	45 or 46	4	80		all three answers are required for the mark
2	20									
3	45 or 46									
4	80									
<b>b</b> 1/2l	1	<p>any <b>one</b> from</p> <p>* the height for 4 cm is 4 times the height for 2 cm</p> <p>* the graph is a curve</p> <p>* the height for 2 cm is not twice the height for 1 cm</p> <p>* the height should have been 40 cm when he pressed it down 4 cm</p>	<p>accept 'for 2 cm it went 20 cm but for 4 cm it went 80 cm'</p> <p>accept 'if I double the distance it goes four times as high'</p> <p>accept 'the graph is not a straight line'</p> <p>accept 'if it goes from 2 to 3 cm, the height more than doubles'</p> <p>accept appropriate arguments for other values</p>	<p>a mark may be awarded for other correct figures</p> <p>'when she doubled the distance it did not double the height' is insufficient</p>						
<b>c i</b> 4/5e	1	* some some		both answers are required for the mark						
<b>c ii</b> 4/5e	1	* most least		both answers are required for the mark answers must be in the correct order						
<b>c iii</b> 4/5e	1	* least least		both answers are required for the mark						
<b>Total</b>	<b>5</b>									

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

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

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

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

Tier 3–6 5–7	Q No 13 6	Part	Mark	Answer	Accept	Additional guidance
		<b>a</b> 1/2d	1	any <b>one</b> from * he used 100 cm <sup>3</sup> of each milk * he used the same volume	accept 'the same amount <b>or</b> mass'	<i>do not accept</i> 'he used the same milk'
		<b>b</b> 1/2k 2/2a	1	any <b>one</b> from * cows' milk has less carbohydrate * human milk <b>or</b> powdered milk has more carbohydrate * sugar is a carbohydrate	accept 'carbohydrates' accept 'they have more carbohydrate'  accept 'they have more than 5 (g)' accept 'they have 7.4 (g) and 7.2 (g)'	<i>do not accept</i> 'it has more vitamin C <b>or</b> iron'
		<b>c</b> 2/2a 2/2d	1	* for hard <b>or</b> strong bones <b>or</b> teeth	accept 'for (healthy) bones <b>or</b> teeth'	<i>do not accept</i> 'for strong nails'
		<b>d i</b> 1/2k	1	* baby-milk has more iron than cows' milk	accept 'baby-milk has more iron' accept 'cows' milk only has 0.05 mg'	<i>do not accept</i> 'baby-milk has more iron than cows' or human milk'
		<b>d ii</b> 2/2a	1	* to make blood <b>or</b> red blood cells	accept 'for blood' <b>or</b> 'for red cells' <b>or</b> 'for blood cells' accept 'for haemoglobin' <b>or</b> 'haemoglobin contains iron' accept 'to prevent anaemia' accept 'to replace iron lost in menstruation'	'to keep the blood flowing' is insufficient  'for energy' is insufficient

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



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