

Question Number	Answer	Acceptable answers	Mark
<b>1a(i)</b>	$\frac{(49 + 64 + 58)}{3}$ or $171 / 3 (1)$ $= 57$	Correct bald answer award 2 marks ecf applies if incorrect total is calculated but divided correctly by 3 for 1 mark	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1a(ii)</b>	An explanation to linking four of the following points:  nitrates leaked/leached into river (between the two sites) (1)  causing eutrophication (1)  algae block light to underwater plants / underwater plants cannot photosynthesise (1)  (dead plants / algae) broken down by microorganisms (1)  microorganisms respire (1)  causing oxygen depletion / less oxygen available for the fish (1)	accept fertiliser for nitrates     allow bacteria/decomposers	<b>(4)</b>

Question Number	Indicative Content	Mark
<b>QWC</b>	<b>1(b)</b>	
	<p>A description to include some of the following points</p> <ul style="list-style-type: none"> <li>indicator species used</li> <li>number of indicator used as an assessment of pollution level</li> </ul> <p>Water pollution – polluted</p> <ul style="list-style-type: none"> <li>bloodworms / sludgeworms /other named species</li> <li>their presence signify high water pollution</li> <li>they can survive in low oxygenated waters</li> </ul> <p>Water pollution – clean</p> <ul style="list-style-type: none"> <li>freshwater shrimp / stonefly (larvae) / other named species</li> <li>their presence signify low water pollution</li> <li>they can only survive in areas of high oxygen (thus low pollution)</li> </ul> <p>Air pollution</p> <ul style="list-style-type: none"> <li>blackspot fungus found on roses</li> <li>blackspot fungus grows on roses in unpolluted areas because it is killed by the presence of sulfur dioxide that would be found in polluted air.</li> <li>lichen – certain types of lichen can survive in polluted areas – so depending on the type of lichen found will be used to assess the pollution level of air</li> </ul>	<b>(6) Exp</b>
<b>Level</b>		No rewardable content
<b>1</b>	<b>1 – 2</b>	<ul style="list-style-type: none"> <li>a limited description of the use of indicator species no names of species needed</li> <li>the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>spelling, punctuation and grammar are used with limited accuracy</li> </ul>
<b>2</b>	<b>3 – 4</b>	<ul style="list-style-type: none"> <li>a simple description of the assessment of air or water pollution and the name/s of the species used with some idea of the level of pollution they respond to</li> <li>the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>spelling, punctuation and grammar are used with some accuracy</li> </ul>
<b>3</b>	<b>5 – 6</b>	<ul style="list-style-type: none"> <li>a detailed description of the assessment of both air and water pollution and the names of indicator species with clear indication of polluted water and/or unpolluted water organisms as well as the response of lichen or blackspot fungus to sulphur dioxide</li> <li>the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>spelling, punctuation and grammar are used with few errors</li> </ul>

**(Total for question 1 = 12 mark)**

Question Number	Answer	Acceptable answers	Mark
<b>2a(i)</b>	<b>A</b> ☒ living indicators		(1)

Question Number	Answer	Acceptable answers	Mark
<b>2a(ii)</b>	<p>An explanation linking the correct species with the reason:</p> <ul style="list-style-type: none"> <li>• species 2 (1) reason</li> <li>• coal powered power stations produce sulfur dioxide gas (1)</li> <li>• species 2 is tolerant of sulfur (1)</li> </ul>	<p>Accept sulphur for sulphur dioxide</p> <p>Note mark points are independent 1 mark can be attained for candidate stating that sulphur dioxide gas is produced by coal powered power stations</p>	(2)

Question Number	Answer	Acceptable answers	Mark
<b>2(b)</b>	<p>An explanation linking three of the following:</p> <ul style="list-style-type: none"> <li>• plants use /nitrogen taken in as nitrates (1)</li> <li>• fertilisers / compost (1)</li> <li>• nitrogen fixation / nitrogen fixing bacteria / lightning (1)</li> <li>• nitrification /nitrifying bacteria (1)</li> <li>• absorption through the roots (1)</li> <li>• by active transport (1)</li> </ul>	Accept nitrates in the correct context	(3)

Question Number	Indicative Content	Mark
<b>QWC</b>	<p><b>*2(c)</b> A explanation to include some of the following</p> <p>Air pollution</p> <ul style="list-style-type: none"> <li>• Humans burn more fossil fuels coal/oil/gas</li> <li>• nitrogen oxides in car exhausts</li> <li>• Releasing sulfur dioxide</li> <li>• Which causes acid rain</li> <li>• carbon dioxide gas</li> <li>• causes climate change</li> <li>• deforestation causing increase in carbon dioxide</li> <li>• increased population – increased respiration more carbon dioxide</li> </ul> <p>Water pollution</p> <ul style="list-style-type: none"> <li>• Humans produce sewage</li> <li>• Sewage contains phosphates</li> <li>• Phosphates are water pollutants</li> <li>• Nitrate pollution can be caused by the overuse of fertilisers</li> <li>• Nitrate pollution causes eutrophication</li> </ul>	(6)
<b>Level</b>	<b>0</b>	No rewardable content
<b>1</b>	<b>1 - 2</b>	<ul style="list-style-type: none"> <li>• a limited explanation of how humans effect pollution – increasing pollution in either air or water</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>
<b>2</b>	<b>3 - 4</b>	<ul style="list-style-type: none"> <li>• a simple explanation of both air and water pollution including the effects of one air and one water pollutant or a detailed explanation of either air or water pollution</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>
<b>3</b>	<b>5 - 6</b>	<ul style="list-style-type: none"> <li>• a detailed explanation of the effect of humans on both air and water pollution including the role of sulphur dioxide or carbon dioxide and nitrates or phosphates</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>

**Total for question 2 = 12 marks**

Question number	Answer	Additional guidance	Mark
3(a)(i)	An answer that combines knowledge (1 mark) and understanding (1 mark) to provide a logical description: <ul style="list-style-type: none"> <li>• (scientists might look for) differences in the structural features of the fossil (1)</li> <li>• and <i>Ardipithecus ramidus</i> would be deeper in the rock layer than <i>Homo {habilis/stone tools}</i> (1)</li> </ul>	e.g. <i>Ardipithecus ramidus</i> smaller cranial capacity	(2)

Question number	Answer	Additional guidance	Mark
3(a)(ii)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): <ul style="list-style-type: none"> <li>• likely to be out-competed by <i>Homo erectus</i> (1)</li> <li>• {for resources essential for survival/du e to the presence of a new selection pressure} (1)</li> </ul>	accept: named resources accept: named selection pressure, e.g. climate change, environmental change, disease	(2)

Question number	Answer	Additional guidance	Mark
3(a)(iii)	An explanation that combines identification via a judgement (1 mark) to reach a conclusion via justification/reasoning (1 mark): <ul style="list-style-type: none"> <li>• stone tool B because it is more {sophisticated/worked} (1)</li> <li>• and <i>Homo erectus</i> lived more recently than <i>Homo habilis</i> (1)</li> </ul>	accept: data quoted from the timeline	(2)

<b>Question number</b>	<b>Answer</b>	<b>Mark</b>
<b>3(b)</b>	An answer that combines the following points of application of knowledge and understanding to provide a logical description: <ul style="list-style-type: none"><li>• genetic variation means that some plants will be tolerant of drought conditions and these can be selected (1)</li><li>• cross-pollinate these plants and grow the seeds under drought conditions (1)</li><li>• select offspring and repeat over several generations (1)</li></ul>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(a)(i)</b>	<b>D</b> <input checked="" type="checkbox"/> positive phototropism		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(a)(ii)</b>	An explanation to include the following linked points  (auxins) move to the shaded side of a shoot (1)  causing cells on the shaded side to <u>elongate</u> (1)	accept move to the side opposite the light  accept get longer for elongate Ignore references to cell division	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(i)</b>	there is an increase in the % of bananas that ripen as the ethylene concentration increases	Ignore positive effect	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(ii)</b>	An explanation to include two of the following points <ul style="list-style-type: none"> <li>• concentration of ethylene to use is 3% (1)</li> <li>• would be more expensive to increase the ethylene concentration above 3%</li> <li>• when there is no added ripening benefits past 3%(1)</li> <li>• below 3% not all bananas are ripe (1)</li> </ul>	Do not credit ideas related to longer shelf life as the question asks about ripening	<b>(2)</b>

Question Number	Indicative Content	Mark
<b>QWC</b>	<b>*4(c)</b>	
	<p>A description to include some of the following points</p> <ul style="list-style-type: none"> <li>• selective weedkillers</li> <li>• allows broad-leaved plants to grow uncontrollably and die</li> <li>• narrower-leaved plants and crops left unaffected</li> <li>• auxins and or gibberellins are used</li> </ul> <ul style="list-style-type: none"> <li>• rooting powders</li> <li>• plant cuttings are dipped into rooting powder</li> <li>• roots develop rapidly</li> <li>• large number of plants can be produced from the same plant</li> <li>• no need to wait for plants to grow from seeds</li> <li>• auxins are used</li> </ul> <ul style="list-style-type: none"> <li>• seedless fruit production</li> <li>• the fruit will develop but the seeds inside will not</li> <li>• fruits are able to grow larger (larger biomass)</li> <li>• gibberellins are used</li> </ul>	<b>(6)</b>
<b>Level</b>	<b>0</b>	No rewardable content
<b>1</b>	<b>1 - 2</b>	<ul style="list-style-type: none"> <li>• a limited description of at least one use of plant hormones</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>
<b>2</b>	<b>3 - 4</b>	<ul style="list-style-type: none"> <li>• a simple description of two or more uses of plant hormones</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>
<b>3</b>	<b>5 - 6</b>	<ul style="list-style-type: none"> <li>• a detailed description of two or more uses of plant hormones with at least auxin, gibberellins or other relevant hormone in the correct context</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>

Total for question 4 = 12 marks