

Question Number	Answer	Mark
1(a)(i)	<ol style="list-style-type: none"> <li>(rate of) {production of / energy incorporated into / eq} {biomass / organic material / organic molecules / tissue} ;</li> <li>reference to {losses in respiration / GPP- R } ;</li> <li>in {producers / plants / eq } ;</li> </ol>	(2)

Question Number	Answer	Mark
1(a)(ii)	<ol style="list-style-type: none"> <li>correct readings from graph indicated e.g. (11 and 1)</li> <li>correct subtraction e.g. (11-1 / 10) ;</li> <li>correct division (by 1) x 100/1 to give 1000% ;</li> </ol> <p>[correct answer = 3 marks]</p>	(3)

Question Number	Answer	Mark
1(b)	<ol style="list-style-type: none"> <li>idea that the rate of {(bio)chemical / metabolic / photosynthetic / named} reactions increases ;</li> <li>idea of increase in {movement / kinetic energy} of {enzyme / substrate / molecules / particles} / eq ;</li> <li>idea of (increase in reaction rate) because of more enzyme substrate interaction ;</li> </ol>	(2)

Question Number	Answer	Mark
1(c)	<ol style="list-style-type: none"> <li>1. (between January and April) NPP increases as light increases ;</li> <li>2. idea of a correlation between NPP and light ;</li> <li>3. idea that the changes in NPP are occurring after the changes in light / peak light is April and peak NPP is May ;</li> <li>4. reference to increase in light increases {(rate of) photosynthesis / (ATP) energy available for Calvin Cycle / eq} ;</li> <li>5. credit correct details of photosynthesis e.g. light results in excitation of electrons ;</li> <li>6. idea that there is no real correlation between temperature and NPP / reference to temperature fluctuating ;</li> <li>7. idea that the temperature affects how quickly enzymes work ;</li> <li>8. reference to NPP falling (from May) but temperature remaining high ;</li> <li>9. reference to (light / temperature) limiting factor ;</li> </ol>	(4)

Question Number	Answer	Mark
1(d)	<p>Any two biotic factors e.g.</p> <ol style="list-style-type: none"> <li>1. grazing / {consumers / herbivores / named herbivore} / eq ;</li> <li>2. trampling / eq ;</li> <li>3. shading by {plants / named plant} / eq ;</li> <li>4. competition from other plants / eq ;</li> <li>5. disease / eq ;</li> </ol>	(2)

Question Number	Answer	Mark
2(a)	<ol style="list-style-type: none"> <li>1. reference to {carbon / organic / eq} compounds in plant material ;</li> <li>2. idea that digestion provides respiratory substrates ;</li> <li>3. carbon dioxide released (from respiration) ;</li> <li>4. (this carbon dioxide is) available for photosynthesis ;</li> <li>5. reference to woodlice {eaten / decompose} ;</li> </ol>	max (3)

Question Number	Answer	Mark
2(b)(i)	A ;	(1)

Question Number	Answer	Mark
2(b)(ii)	<ol style="list-style-type: none"> <li>1. {wavelength / colour / frequency} of light ;</li> <li>2. light intensity / shading ;</li> <li>3. temperature ;</li> <li>4. moisture content of {air / substratum / eq} / humidity ;</li> <li>5. {pH / chemical composition / eq} of {substratum / eq} ;</li> <li>6. air currents / wind / eq ;</li> <li>7. texture of substratum / eq ;</li> <li>8. reference to {oxygen / carbon / methane} ;</li> </ol>	max (2)

Question Number	Answer	Mark						
2(c)(i)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">8</td> <td style="width: 50px;"></td> </tr> <tr> <td style="text-align: center;">9</td> <td></td> </tr> <tr> <td style="text-align: center;">10</td> <td></td> </tr> </table> <p>All three answers correct to 1 significant figure ;</p>	8		9		10		(1)
8								
9								
10								

Question Number	Answer	Mark
2(c)(ii)	<ol style="list-style-type: none"> <li>1. woodlice move about / eq ;</li> <li>2. (therefore) difficult to count / eq ;</li> <li>3. some might be {counted more than once / missed out} / eq ;</li> </ol>	<p><b>max</b> <b>(2)</b></p>

Question Number	Answer	Mark
2(c)(iii)	<ol style="list-style-type: none"> <li>1. for results to be (scientifically) valid ;</li> <li>2. only one factor needs to be varied / eq ;</li> <li>3. other factors need to be kept constant / eq ;</li> <li>4. reference to {many / biotic / eq} factors (in a garden) ;</li> <li>5. (these factors are) {difficult to control / eq} ;</li> <li>6. reference to difficult to set test factor values ;</li> </ol>	<p><b>max</b> <b>(3)</b></p>

Question Number	Answer	Mark
3(a)(i)	1. hydrogen ; 2. glycosidic ;	(2)

Question Number	Answer	Mark
3(a)(ii)	sclerenchyma (fibres) ; xylem (vessels) ; cellulose (fibre) ;	maximum (2)

Question Number	Answer	Mark
3(b)	1. ref to {microorganisms / microbes / bacteria / fungi / eq} ; 2. ref to respiration of (microorganisms / bacteria / fungi / eq) ; 3. ref to aerobic / anaerobic (respiration) ; 4. converts {organic compounds / eq} to carbon dioxide / eq ; 5. converts {nitrogen compounds / proteins / amino acids/ urea} to ammonia / eq ;	maximum (4)

Question Number	Answer	Mark
3(c)	<ol style="list-style-type: none"> <li>1. correct ref to temperature effect ;</li> <li>2. correct ref to water availability ;</li> <li>3. correct ref to waterlogging reduces oxygen availability ;</li> <li>4. correct ref to frozen water ;</li> <li>5. ref to more {insects / decomposers / eq} in summer ;</li> <li>6. correct ref to rate of growth of {microorganisms / eq} ;</li> <li>7. ref to rate of {metabolism / enzyme reactions} ;</li> <li>8. use of manipulated figures to support above points e.g. {50 / 60} days faster in late summer ;</li> </ol>	<p>maximum (3)</p>

Question Number	Answer	Mark
<b>4(a)</b>	B – forensic entomology ;	<b>(1)</b>

Question Number	Answer	Mark
<b>4(b) (i)</b>	D – temperature ;	<b>(1)</b>

Question Number	Answer	Mark
<b>4(b) (ii)</b>	<ol style="list-style-type: none"> <li>1. idea that the body has been dead for a while ;</li> <li>2. (because) more than one species of insect present / eq ;</li> <li>3. reference to succession (of insect species) ;</li> <li>4. idea that life cycle {times / stages} of the insects are {known / used / eq} ;</li> <li>5. idea that life cycle times depend on (environmental) temperature ;</li> <li>6. credit specific ref to information in table e.g. blowfly cycle complete ;</li> </ol>	<b>(3)</b>

Question Number	Answer	Mark
<b>4(c) (i)</b>	<ol style="list-style-type: none"> <li>1. idea that a drop in body temperature is linked to time after death e.g. algor mortis ;</li> <li>2. idea that factors affect temperature drop e.g. environmental temperature, body size, clothing ;</li> <li>3. (useful because ) time of death can be calculated if (ambient) temperature known / eq ;</li> <li>4. only useful for short period of time following death e.g. 24 hours, a day ;</li> </ol>	<b>(2)</b>

Question Number	Answer	Mark
<b>4(c)(ii)</b>	<ol style="list-style-type: none"><li>1. idea that body decomposes in a specific sequence (with time) ;</li><li>2. idea that factors affect decomposition e.g. environmental temperature, wounds ;</li><li>3. (not useful) if all the body has decomposed / eq ;</li></ol>	<b>(2)</b>