



# GCE

## Biology

Advanced GCE

Unit **F214**: Communication, Homeostasis & Energy

# Mark Scheme for January 2011

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F214

Mark Scheme

January 2011

Question		Expected Answers		Marks	Additional Guidance	
1	(a)	<b>Award 1 mark per correct row</b>		3	<p><b>Mark the first answer in each box.</b> If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = <b>0 marks</b></p> <p><b>ACCEPT</b> phonetic spelling <b>except for</b> ethanal and ethanol</p> <p><b>ACCEPT</b> pyruvic acid (instead of pyruvate)  <b>ACCEPT</b> acetaldehyde (instead of ethanal)  <b>IGNORE</b> formulae                      The spelling of ethanal must be unambiguous</p> <p><b>ACCEPT</b> 2 molecules for yeast                      (from 1 glucose molecule)</p> <p><b>ACCEPT</b> lactic acid (instead of lactate)  <b>ACCEPT</b> ethyl alcohol (instead of ethanol)  <b>IGNORE</b> alcohol  <b>IGNORE</b> formulae                      The spelling of ethanol must be unambiguous</p>	
			<i>mammal</i>			<i>yeast</i>
		<i>name of hydrogen acceptor after glycolysis</i>	pyruvate			ethan <u>a</u> l ;
		<i>is CO<sub>2</sub> produced?</i>	no / ✘ / none / no molecules			yes / ✓ / some / one molecule ;
	<i>name of final product</i>	lactate	ethan <u>o</u> l ;			

F214

Mark Scheme

January 2011

Question		Expected Answers		Marks	Additional Guidance
1	(b)	1	<i>idea that</i> ATP produced / energy released ;	1 max	<p><b>IGNORE</b> ref to specific metabolic reactions other than glycolysis (mp 3)</p> <p><b>IGNORE</b> ref to respiration without oxygen</p> <p><b>1</b> <b>DO NOT CREDIT</b> this mark point with any ref to energy , generated / produced / made [eg energy made in the form of ATP = 0 ATP (energy) is produced = 0]</p> <p><b>2</b> <b>ACCEPT</b> 'reoxidises red NAD' (as implies recycling)</p> <p><b>CREDIT</b> NADH / NADH<sup>+</sup> / NADH<sub>2</sub> for red NAD</p> <p><b>DO NOT CREDIT</b> 'oxidises red NAD' without further qualification</p> <p><b>3</b> If glycolysis used as a term, the spelling of 'glyco' must be correct.</p>
		2	<i>idea that</i> recycles NAD / NAD can be used again ;		
		3	allows , <b>glycolysis</b> / description of glycolysis , to take place / to continue ;		
		<b>TOTAL</b>		<b>4</b>	

F214

Mark Scheme

January 2011

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	1 structure A / Schwann cell / it , produces <b>myelin</b> ;	3 max	1 Needs the idea of production rather than simply stating 'it is a myelin sheath'
			2 (electrical) <u>insulation</u> / <u>insulates</u> ;		2 <b>CREDIT</b> insulate or derived term. <b>IGNORE</b> impermeable <b>DO NOT CREDIT</b> <i>idea of thermal insulation</i>
3 prevents movement of ions , into / out of , neurone / axon <b>or</b> prevents <b>depolarisation</b> ;	3 <b>CREDIT</b> 'across membrane' instead of , in / out, of axon <b>IGNORE</b> ion exchange <b>IGNORE</b> impermeable <b>DO NOT CREDIT</b> ions moving , into / out of , membrane <b>DO NOT CREDIT</b> movement of ions without qualification				
4 speeds up , <b>conduction</b> / transmission / passage , of , <b>impulse</b> / action potential ;	4 Statement must be comparative eg <u>faster</u> <b>DO NOT CREDIT</b> message / signal / wave of depolarisation				
5 <b>action potentials</b> / <b>local circuits</b> / depolarisation / only occur at , gaps / <b>nodes</b> (of Ranvier) ;	5 <b>ACCEPT</b> longer local circuits <b>ACCEPT</b> 'local currents' instead of local circuits				
6 <b>saltatory</b> conduction / described ;	6 eg • impulse jumps from , node to node / gap to gap <b>Note:</b> 'saltatory conduction' = 2 QWC terms				
			QWC – technical terms used appropriately with correct spelling ;	1	Correct use and spelling of 3 terms from: <b>myelin,</b> <b>depolarisation (or other derived term),</b> <b>impulse,</b> <b>conduct (or other derived term),</b> <b>action potential,</b> <b>local circuit,</b> <b>node,</b> <b>saltatory</b>  You should use the GREEN DOT to identify the QWC terms that you are crediting.  Please insert a QWC symbol next to the PENCIL ICON, followed by <b>a tick (✓) if QWC has been awarded</b> <b>or a cross (×) if QWC has not been awarded</b>

F214

Mark Scheme

January 2011

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(ii)	<u>exocytosis</u> ;	1	<b>Mark the first answer.</b> If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = <b>0 marks</b>  <b>IGNORE</b> bulk transport
2	(a)	(iii)	<u>diffusion</u> ;	1	<b>Mark the first answer.</b> If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = <b>0 marks</b>  <b>DO NOT CREDIT</b> facilitated diffusion
2	(a)	(iv)	<p>1 <i>idea that only</i> the <u>presynaptic</u> neurone , produces / releases / contains , acetylcholine / ACh / (neuro)transmitter ;</p> <p>2 only the <u>presynaptic</u> membrane has , Ca<sup>(2+)</sup> / calcium (ion) , channels ;</p> <p>3 <i>idea that only</i> the <u>postsynaptic</u> , membrane / neurone , has (ACh) receptors ;</p> <p>4 ACh broken down at <u>postsynaptic</u> membrane ;</p>	1 max	<p><b>IGNORE</b> ref to refractory period (as not a feature of synapse)</p> <p><b>ACCEPT</b> ACH / ach throughout</p> <p>1 <b>CREDIT</b> knob / terminal bouton / bulb (instead of neurone)</p> <p>2</p> <p>3 <b>DO NOT CREDIT</b> ref to bouton / bulb / etc</p> <p>4 <b>IGNORE</b> ref to (acetyl)cholinesterase without ref to action at postsynaptic membrane</p>

F214

Mark Scheme

January 2011

Question			Expected Answers	Marks	Additional Guidance
2	(b)	(i)	<p><b>1</b> <i>idea that</i> atropine , binds to / occupies / competes for , (ACh) <u>receptor</u> on postsynaptic , membrane / neurone ;</p> <p><b>2</b> <i>idea that</i> prevents ACh binding / blocks binding site / blocks receptor ;</p> <p><b>3</b> ion gates / ion channels / sodium channels / protein channels , do not open / remain closed ;</p> <p><b>4</b> Na<sup>+</sup> cannot enter / K<sup>+</sup> cannot leave , neurone / (nerve) cell ;</p> <p><b>5</b> no / insufficient , depolarisation / postsynaptic potential / excitatory postsynaptic potential / epsp / generator potential ;</p> <p><b>6</b> (so) does not reach threshold (value / potential) ;</p>	<b>3 max</b>	<p><b>IGNORE</b> ref to atropine and ACh having similar shapes (as given in Q)</p> <p><b>ACCEPT</b> ACH / ach throughout</p> <p><b>Only credit ORA for the mark points if candidate clearly states that these events do <u>NOT</u> take place with atropine.</b></p> <p><b>1</b> <b>IGNORE</b> ref inhibition <b>DO NOT CREDIT</b> active site <b>DO NOT CREDIT</b> ref to bouton / bulb / etc</p> <p><b>2</b></p> <p><b>3</b> <b>CREDIT</b> fewer ion channels open</p> <p><b>4</b> <b>CREDIT</b> sodium ions / potassium ions <b>DO NOT CREDIT</b> Na / K <b>DO NOT CREDIT</b> ions entering the membrane</p> <p><b>5</b> <b>IGNORE</b> action potential (as given in Q)</p> <p><b>6</b></p>

F214

Mark Scheme

January 2011

Question			Expected Answers	Marks	Additional Guidance
2	(b)	(ii)	<p><b>1</b> <i>idea that</i> will , bind to / occupy / compete for / block , (some of ACh) receptors ;</p> <p><b>2</b> so acetylcholine / ACh , cannot bind / less likely to bind (to receptor / to postsynaptic membrane) ;</p> <p><b>3</b> prevents / reduces , constant stimulation / overstimulation / constant depolarisation , of postsynaptic neurone  <b>or</b> prevents / reduces , constant firing of action potentials / tetanus / (muscle) spasm ;</p> <p><b>4</b> AVP ;</p>	<p><b>2 max</b></p>	<p><b>ACCEPT</b> ACH / ach throughout</p> <p><b>1</b> <b>DO NOT CREDIT</b> ref to active site</p> <p><b>2</b> <b>ACCEPT</b> <i>idea that</i> ACh remains in synaptic cleft</p> <p><b>3</b></p> <p><b>4</b> eg</p> <ul style="list-style-type: none"> <li>• effective if administered soon after exposure</li> <li>• cannot counteract inhibition of acetylcholinesterase</li> </ul>
			<b>TOTAL</b>	<b>12</b>	



F214

Mark Scheme

January 2011

Question			Expected Answers		Marks	Additional Guidance
3	(a)	(i)	W	glycolysis ;	3	<p><b>Mark the first answer for each letter.</b> If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = <b>0 marks</b></p> <p><b>W</b> : <b>CREDIT</b> glycolytic pathway  <b>ACCEPT</b> phonetic spelling but must have 'glycol'  <b>IGNORE</b> respiration</p> <p><b>X</b> : <b>IGNORE</b> dark reaction / photosynthesis  <b>ACCEPT</b> phonetic spelling</p> <p><b>Y</b> : <b>ACCEPT</b> citric acid cycle / TCA cycle / (tri)carboxylic acid cycle  <b>ACCEPT</b> phonetic spelling  <b>IGNORE</b> respiration / link reaction</p>
			X	Calvin cycle / light-independent stage (of photosynthesis) ;		
			Y	Krebs cycle ;		
3	(a)	(ii)	1	take place in different , parts / organelles , of the cell <b>or</b> compartmentalisation / reactions separated by membranes ;	3 max	<p><b>1</b> Must be a clear statement and not implied from others.  <b>DO NOT CREDIT</b> different parts of the leaf  <b>DO NOT CREDIT</b> no interference between pathways (as rephrasing the Q)</p> <p><b>2</b></p> <p><b>3</b> <b>DO NOT CREDIT</b> if thylakoid / membranes stated or implied</p> <p><b>4</b> <b>DO NOT CREDIT</b> if cristae / membranes stated or implied</p> <p><b>5</b> eg <ul style="list-style-type: none"><li>• different enzymes for each pathway</li><li>• different conditions for each pathway</li></ul></p>
			2	W / glycolysis , in cytoplasm ;		
			3	X / Calvin cycle , in , chloroplast / stroma (of chloroplast) ;		
			4	Y / Krebs cycle , in , mitochondrion / matrix (of mitochondrion) ;		
			5	AVP ;		

F214

Mark Scheme

January 2011

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(iii)	X ;  W and Y ;	2	<p><b>IGNORE</b> names. The question has asked for letters.</p> <p><i>photosynthesis</i>  <b>Mark the first answer.</b> If the answer is correct and an additional letter is given then = <b>0 marks</b></p> <p><i>aerobic respiration</i>  <b>Mark the first two answers.</b> If these answers are correct and an additional letter (ie 3<sup>rd</sup> etc) is given then = <b>0 marks</b></p> <p><b>Both letters required for this mark, in any order.</b></p>
3	(a)	(iv)	ATP / adenosine triphosphate ; water / H <sub>2</sub> O ; (oxidised) NAD / FAD ;	2	<p><b>If any answer(s) incorrect then Max 1</b></p> <p><b>IGNORE</b> energy / heat  <b>IGNORE</b> numbers</p> <p>eg oxygen (×) and ATP (✓) and water = max 1  oxygen (×) and energy (<i>ignore</i>) = 0  ATP (✓) and energy (<i>ignore</i>) and H<sub>2</sub>O (✓) = 2  reduced NAD (×) and ATP (✓) and energy (<i>ignore</i>) and H<sub>2</sub>O = max 1</p>

F214

Mark Scheme

January 2011

Question		Expected Answers	Marks	Additional Guidance	
3	(b)	1	NAD / FAD / NADP , can , accept hydrogen / accept H / be reduced ;	1	<b>DO NOT CREDIT</b> hydrogen ions / protons , unless there is an electron as well <b>DO NOT CREDIT</b> accepts hydrogen molecules /H <sub>2</sub> <b>CREDIT</b> equation showing the reduction <b>ACCEPT</b> eg NAD converted to NADH <b>IGNORE</b> 'carries hydrogen'
		2	reduced , NAD / FAD , supplies / carries , electrons , to the electron transport chain / for oxidative phosphorylation ;	2	Must refer to <i>reduced</i> NAD <b>or</b> <i>reduced</i> FAD <b>or</b> NADH / NADH <sup>+</sup> / NADH <sub>2</sub> / FADH / FADH <sup>+</sup> / FADH <sub>2</sub>
		3	reduced , NAD / FAD , supplies / carries , hydrogen ions for , chemiosmosis / oxidative phosphorylation ;	3	Must refer to <i>reduced</i> NAD <b>or</b> <i>reduced</i> FAD <b>or</b> NADH / NADH <sup>+</sup> / NADH <sub>2</sub> / FADH / FADH <sup>+</sup> / FADH <sub>2</sub>
		4	reduced NADP , supplies / carries , hydrogen to , light independent stage / Calvin cycle / X ;	4	Must refer to <i>reduced</i> NADP <b>or</b> NADPH / NADPH <sup>+</sup> / NADPH <sub>2</sub>
		5	coenzyme A / CoA , carries , <u>acetate</u> / <u>ethanoate</u> / <u>acetyl group</u> , to , Krebs cycle / Y ;	5	<b>DO NOT CREDIT</b> acetyl CoA carries acetate
		6	AVP ;	6	eg • co-enzyme(s) / cytochrome(s) , transfer / accept and release , electrons along the electron transport chain • can be , recycled / oxidised <b>and</b> reduced
<b>TOTAL</b>			<b>3 max</b>	<b>13</b>	

F214

Mark Scheme

January 2011

Question		Expected Answers		Marks	Additional Guidance
4	(a)	1	<u>water potential</u> / $\Psi$ , of plasma / outside cells , would be higher than that of the (blood) cells ;	2 max	1 Must be a clear comparative statement relating to outside and inside cells <b>CREDIT</b> ora <b>IGNORE</b> water concentration
		2	water would enter (blood) <u>cells</u> ;		2 <b>IGNORE</b> osmosis / down water potential gradient
		3	blood cells , swell / (might) burst / lyse ;		3 <b>CREDIT</b> haemolysis / haemolysed <b>DO NOT CREDIT</b> plasmolysis / turgid <b>Note:</b> 'cells become turgid and burst' = 0 'cells swell and become turgid' = 0
4	(b)	<p><i>type of monomer</i> amino acid ;</p> <p><i>name of bond</i> peptide / amide ;</p>		2	<p><b>Mark the first answer on each prompt line.</b> If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = <b>0 marks</b></p> <p><b>DO NOT CREDIT</b> amine</p> <p><b>IGNORE</b> covalent <b>DO NOT CREDIT</b> dipeptide / polypeptide</p>

F214

Mark Scheme

January 2011

Question		Expected Answers		Marks	Additional Guidance
4	(c)	1	osmoreceptor / neurosecretory ;	<b>8</b>	<p><b>Mark the first answer on each prompt line in the passage.</b> If the answer is correct and an additional answer is given for that 'gap' that is incorrect or contradicts the correct answer then = <b>0 marks</b></p> <p><b>ACCEPT</b> phonetic spelling throughout</p> <p><b>1</b> : <b>ACCEPT</b> osmotic receptor</p> <p><b>2</b> :</p> <p><b>3</b> :</p> <p><b>4</b> : <b>DO NOT CREDIT</b> 'pituitary' without correct qualification</p> <p><b>5</b> : <b>ACCEPT</b> distal (convoluted) tubule / second convoluted tubule</p> <p><b>6</b> :</p> <p><b>7</b> : <b>DO NOT CREDIT</b> aqua pores</p> <p><b>8</b> :</p>
		2	hypothalamus ;		
		3	axon(s) ;		
		4	posterior pituitary ;		
		5	collecting duct ;		
		6	(plasma / cell) membrane(s) ;		
		7	aquaporins(s) ;		
		8	osmosis ;		

F214

Mark Scheme

January 2011

Question		Expected Answers	Marks	Additional Guidance
4	(d)	1 <i>how ADH is dealt with as a protein</i> in , liver / hepatocytes ;	3 max	1 <b>DO NOT CREDIT</b> if linked directly to excretion eg 'excreted by the liver'
		2 hydrolysis / acted on by protease ;		2 'broken down' is not quite enough
		3 deamination / amine group removed / formation of ammonia / formation of NH <sub>3</sub> ;		3 <b>DO NOT CREDIT</b> 'amine group deaminated'
		4 ornithine cycle / formation of urea / formation of CO(NH <sub>2</sub> ) <sub>2</sub> ;		4 <b>DO NOT CREDIT</b> 'amino acid enters ornithine cycle'
		5 amino acids / keto acids , used in (named) metabolic pathway ;		5 eg <ul style="list-style-type: none"> <li>• amino acids used for protein synthesis</li> <li>• keto acids used in , Krebs cycle / respiration</li> <li>• used in gluconeogenesis</li> </ul>
		6 <i>how ADH or urea is dealt with as a small molecule</i> in kidney ;		6
		7 (ultra)filtered from blood / moves from blood into nephron ;		7
		8 (because) small molecule ;		8
		9 urea not (all) reabsorbed / ADH not reabsorbed / (ADH or urea) present in urine ;		9 <b>DO NOT CREDIT</b> 'removed as urine'
		10 <u>excreted</u> ;		10 <b>DO NOT CREDIT</b> if linked directly to the liver eg 'excreted by the liver'
<b>TOTAL</b>			<b>15</b>	

F214

Mark Scheme

January 2011

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	<p><i>2<sup>nd</sup> messenger</i> cAMP / cyclic AMP / cyclic adenosine monophosphate ;</p> <p><i>1<sup>st</sup> messenger</i> adrenaline / adrenalin ;</p>	2	<p><b>Mark the first answer on each prompt line.</b> If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = <b>0 marks</b></p> <p><b>ACCEPT</b> CAMP / camp <b>DO NOT CREDIT</b> adenine monophosphate</p> <p><b>IGNORE</b> chemicals not named in Fig. 5.1</p>
5	(a)	(ii)	<p><b>1</b> <u>glycogen</u> → <u>glucose</u> / <u>glycogenolysis</u> ;</p> <p><b>2</b> by <u>hydrolysis</u> ;</p> <p><b>3</b> <i>correct ref to</i> protein kinase / glycogen phosphorylase kinase (activates glycogen phosphorylase) <b>or</b> glycogen phosphorylase (stimulates conversion of glycogen) <b>or</b> inhibition of glycogen synthase (preventing glucose conversion to glycogen) ;</p>	1 max	<p><b>1</b> <b>DO NOT CREDIT</b> gluconeogenesis / glycogenesis</p> <p><b>2</b> This term must be used, or a derived term.</p> <p><b>3</b></p>

F214

Mark Scheme

January 2011

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(iii)	<p>1 different tissues have different (types of adrenaline) receptors ;</p> <p>2 (causing) cAMP concentration to increase or decrease ;</p> <p>3 second messenger (may be) different ;</p> <p>4 cAMP / second messenger , activates , different / other , enzymes / enzyme reactions (in different target cells) ;</p>	<p>2 max</p>	<p><b>IGNORE</b> reasons not related to adrenaline (as Q specifies 'how the adrenaline molecule can cause ...')</p> <p><b>IGNORE</b> descriptions of stated effects in different tissues as Q asks <i>how</i> adrenaline causes these different effects</p> <p>1</p> <p>2 <b>ACCEPT</b> adenylyl cyclase / cAMP , inhibited</p> <p>3</p> <p>4</p>



F214

Mark Scheme

January 2011

Question		Expected Answers	Marks	Additional Guidance
5	(b)	<p>1 <b>adrenalin(e)</b> increases , heart rate / stroke volume / cardiac output ;</p> <p>2 <b>cardiovascular centre</b> in <b>medulla oblongata</b> ;</p> <p>3 <i>idea of</i> nervous connection to , <b>SAN / sino-atrial node</b> ;</p> <p>4 (which) controls frequency of waves of , excitation / depolarisation ;</p> <p>5 <b>vagus / parasympathetic</b> , nerve decreases heart rate ;</p> <p>6 <b>accelerator / sympathetic</b> , nerve increases heart rate ;</p> <p>7 high blood pressure detected by , stretch receptors / baroreceptors ;</p> <p>8 low blood pH / increased levels of blood CO<sub>2</sub> , detected by <b>chemoreceptors</b> ;</p> <p>9 (receptors) in , aorta / <b>carotid</b> sinus / carotid arteries ;</p>	4 max	<p>1</p> <p>2 <b>ACCEPT</b> 'cardiac' instead of cardiovascular but not for QWC</p> <p>3 <b>ACCEPT</b> SAN for mp 3 but not for QWC</p> <p>4 <b>CREDIT</b> in relation to mp 2 or mp 3</p> <p>5 <b>ONLY CREDIT</b> vagus <b>or</b> parasympathetic for QWC</p> <p>6 <b>ONLY CREDIT</b> accelerator <b>or</b> sympathetic for QWC <b>ACCEPT</b> phrenic nerve</p> <p>7 <b>DO NOT CREDIT</b> proprioceptor</p> <p>8</p> <p>9</p>
		<p><b>QWC</b> – technical terms used appropriately with correct spelling ;</p>		<p>1</p> <p>Correct use of <b>adrenalin(e)</b> (<b>Identify using the tick 1 <input checked="" type="checkbox"/> 1</b> AND MUST BE INCLUDED FOR QWC TO BE AWARDED)</p> <p><b>plus</b> use of 2 terms from:  <b>cardiovascular centre,</b>                    <b>medulla oblongata,</b>  <b>sino-atrial node,</b>                         <b>vagus or parasympathetic,</b>  <b>carotid,</b>                                         <b>accelerator or sympathetic,</b>  <b>chemoreceptor</b></p> <p><b>You should use the GREEN DOT to identify the remaining QWC terms that you are crediting.</b></p> <p><b>Please insert a QWC symbol next to the PENCIL ICON, followed by a tick (✓) if QWC has been awarded or a cross (x) if QWC has not been awarded</b></p>
<b>TOTAL</b>			<b>10</b>	

F214

Mark Scheme

January 2011

Question		Expected Answers	Marks	Additional Guidance
6	(a)	124 (%) / 123.7 (%) ; ;	2	<ul style="list-style-type: none"> <li>• Correct answer = 2 marks <math>(208 - 93) \div 93 \times 100</math></li> <li>• <b>ACCEPT</b> 55 (%) / 55.3 (%) for 2 marks <math>(208 - 93) \div 208 \times 100</math></li> <li>• Correct numerical answer but inappropriate units (eg 124 <math>\mu\text{m}</math>) = 1 mark</li> <li>• If answer not rounded correctly (to nearest whole number or to 1 dp) or if answer incorrect, then allow 1 mark for seeing <b>either</b> 115 <b>or</b> (208 – 93)</li> </ul>

F214

Mark Scheme

January 2011

Question		Expected Answers	Marks	Additional Guidance
6	(b)	<p><b>1a</b> <i>benefit</i> allows entry of <b>more</b> CO<sub>2</sub> ;</p> <p><b>2a</b> <i>explanation</i> (CO<sub>2</sub>) for , light-independent reaction / Calvin cycle <b>or</b> <b>2b</b> light-dependent reaction is taking place quickly / reduced NADP building up / ATP building up <b>or</b> <b>2c</b> CO<sub>2</sub> not as limiting (than when there are fewer stomata) <b>or</b> <b>2d</b> <i>idea that</i> increases access to air spaces for distribution of CO<sub>2</sub> ;</p> <p><b>OR</b></p> <p><b>1b</b> <i>benefit</i> reduces transpiration ;</p> <p><b>2e</b> <i>explanation</i> <i>idea of</i> stomata sheltered from , air currents / heat (when on lower surface) <b>or</b> <b>2f</b> <i>idea that</i> diffusion shells maintained ;</p>	2	<p>Read through complete answer. Award 2 marks if a benefit and explanation <u>are</u> correctly linked.</p> <p>If benefit and explanation <u>are not</u> correctly linked: Award Max 1 for <u>either</u> a benefit <u>or</u> an explanation.</p> <p><b>1a</b> Must indicate the idea of <b>more and imply going in</b> eg 'allows more gas exchange so that there is more CO<sub>2</sub> for photosynthesis' the mention of gas exchange implies that the CO<sub>2</sub> must be going in</p> <p><b>2a</b> <b>DO NOT CREDIT</b> 'CO<sub>2</sub> fixed' without further qualification (eg ref to Rubisco / GP formation)</p> <p><b>2b</b></p> <p><b>2c</b> <b>CREDIT</b> with fewer stomata CO<sub>2</sub> is limiting</p> <p><b>2d</b></p> <p><b>1b</b> <b>DO NOT CREDIT</b> description of transpiration <b>ACCEPT</b> 'plant less likely to wilt'</p> <p><b>2e</b></p> <p><b>2f</b></p>

F214

Mark Scheme

January 2011

Question		Expected Answers	Marks	Additional Guidance
6	(c)	<p><b>1</b> equal sample size for sun and shade leaves / increase sample size of shade leaves / greater numbers of sun and shade leaves ;</p> <p><b>2</b> measure thickness of cuticle / make cuticle observations quantitative ;</p> <p><b>3</b> record range / calculate SD / calculate SE / (named) statistical analysis ;</p> <p><b>4</b> record data on leaf, length / width / area / colour / chlorophyll content ;</p> <p><b>5</b> record data on , size of stomata / stomatal count on upper surface ;</p> <p><b>6</b> define what is a sun or shade leaf / measure light levels to classify type of leaf ;</p> <p><b>7</b> repeat / replicate , the (whole) experiment / using other plants of the same species ;</p>	<p><b>2 max</b></p>	<p><b>DO NOT CREDIT</b> refs to controlling temperature or light or wind or time</p> <p><b>1</b> .....</p> <p><b>2</b> .....</p> <p><b>3</b> .....</p> <p><b>4</b> .....</p> <p><b>5</b> .....</p> <p><b>6</b> .....</p> <p><b>7</b> <b>IGNORE</b> ref to other species <b>DO NOT CREDIT</b> 'repeats' unqualified or implying the same individual plant</p>
		<b>TOTAL</b>	<b>6</b>	

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