



# GCE

## Biology

Advanced Subsidiary GCE

Unit **F212**: Molecules, Biodiversity, Food and Health

# Mark Scheme for January 2012

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PO Box 5050  
Annesley  
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NG15 0DL

Telephone: 0870 770 6622  
Facsimile: 01223 552610  
E-mail: [publications@ocr.org.uk](mailto:publications@ocr.org.uk)

**Annotations**

<b>Annotation</b>	<b>Meaning</b>
	Correct answer
	Incorrect response
	Benefit of Doubt
	Not Benefit of Doubt
	Error Carried Forward
	Given mark
	Underline (for ambiguous/contradictory wording)
	Omission mark
	Ignore
	Correct response (for a QWC question)
	QWC* mark awarded

Question			Answer	Marks	Guidance
1	(a)	(i)	<u>N</u> ;	1	<b>IGNORE</b> nitrogen <b>DO NOT CREDIT</b> n or N <sub>2</sub>
1	(a)	(ii)	polypeptide / protein ;	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> peptide
1	(a)	(iii)	<p><i>name</i></p> <p><u>peptide</u> (bond / link) ;</p> <p><b>plus any two from ...</b> <i>description of formation</i></p> <p>between, amine group (of one amino acid) and carboxyl group (of another) ;</p> <p>H (from amine) combines with OH (from carboxyl) ;</p> <p>condensation (reaction)</p> <p><b>OR</b></p> <p>water, lost / eliminated / produced / created / AW ;</p>	3 max	<p>Maximum two marks for description. Name must be given to award 3 marks.</p> <p><b>ACCEPT</b> marking points from diagram where amine and carboxyl groups are clearly labelled.</p> <p><b>Mark writing first then look at diagram.</b></p> <p>If diagram contradicts creditable text award maximum one mark for description.</p> <p><b>DO NOT CREDIT</b> dipeptide</p> <p><b>ACCEPT</b> phonetic spellings of amine and carboxyl</p> <p><b>ACCEPT</b> 'carboxylic acid' and 'amino'</p> <p><b>DO NOT CREDIT</b> amide / carbonyl</p>

Question			Answer	Marks	Guidance
1	(b)	(i)	<p><b>V1</b> <u>high latent heat</u> of vaporisation / large amount of energy required to change from liquid to gas / AW ;</p> <p><b>V2</b> <u>evaporation</u> is (efficient) cooling mechanism / AW ;</p> <p><b>V3</b> example of cooling in living organism ;</p> <p><b>H1</b> high specific heat capacity / large amount of energy needed to, raise / change, temperature ;</p> <p><b>H2</b> (thermally) stable environment for, aquatic / named aquatic, organisms ;</p> <p><b>H3</b> (aquatic) organisms use less <u>energy</u> on temperature control ;</p> <p><b>H4</b> (internal) temperature of organisms changes only slowly ;</p> <p><b>H5</b> (biological) reactions / enzymes / metabolism, function(s) correctly ;</p> <p><b>F1</b> ice, is less dense than water / floats ;</p> <p><b>F2</b> (surface of) ice provides habitat for, organisms / named organism ;</p>	8 max	<p>Annotate property (number 1) marks with <input checked="" type="checkbox"/> 1 symbol to help distinguish marks for QWC</p> <p>All marks are stand alone</p> <p><b>V1 ACCEPT</b> 'large amount of heat needed...'</p> <p><b>V1 ACCEPT</b> 'high latent heat of evaporation'</p> <p><b>V2 ACCEPT</b> 'evaporation removes heat from body'</p> <p><b>V3</b> e.g. sweating, panting, transpiration (as cooling)</p> <p>'high latent heat of evaporation means sweat cools you down' = 3 marks</p> <p><b>H1 ACCEPT</b> 'water / it, is thermally stable'</p> <p><b>H1 ACCEPT</b> 'water is slow to change temperature'</p> <p><b>H1 CREDIT</b> 'the temperature of the sea does not change much'</p> <p><b>H2</b> 'thermally' can be inferred from previous statement</p> <p><b>H5 IGNORE</b> 'organisms function correctly'</p> <p><b>F1 ACCEPT</b> 'maximum density is at 4°C'</p> <p><b>F2</b> e.g. 'polar bears on ice'</p>

Question	Answer	Marks	Guidance
	<p><b>I1</b> water (beneath ice), insulated / remains liquid / doesn't freeze ;</p> <p><b>I2</b> (aquatic) organisms, do not freeze / can still swim ;</p> <p><b>S1</b> (effective) solvent ;</p> <p><b>S2</b> medium for reactions / (internal) transport medium / able to dilute toxic substances ;</p> <p><b>C1</b> cohesion / adhesion ;</p> <p><b>C2</b> example of cohesion / adhesion, in living organism ;</p> <p><b>T1</b> surface tension ;</p> <p><b>T2</b> habitat for (named) invertebrates ;</p> <p><b>P1</b> transparent ;</p> <p><b>P2</b> allows underwater photosynthesis ;</p> <p><b>D1</b> idea of high density ;</p> <p><b>D2</b> allows flotation / support ;</p> <p><b>U</b> organisms can still obtain, oxygen / (named) minerals / food / carbon dioxide, from water ;</p>		<p><b>I2 IGNORE</b> unqualified references to survival</p> <p><b>I2 ACCEPT</b> gametes / AW, can be dispersed</p> <p><b>C2</b> e.g. transpiration stream / apoplast movement</p> <p><b>C2 ACCEPT</b> descriptions</p> <p><b>T2 ACCEPT</b> insects <b>IGNORE</b> animals</p> <p><b>P2 ACCEPT</b> other example of transparency linked to survival, e.g. eyes</p> <p><b>D1 IGNORE</b> references to viscosity</p> <p><b>U</b> not linked to a single property and so cannot contribute to <b>QWC</b></p> <p><b>U IGNORE</b> nutrients / nutrition</p>

Question			Answer	Marks	Guidance
			<b>QWC:</b> a property mark (with number 1) and a survival mark with the same letter seen twice.	1	e.g. H1 and H3 <b>and</b> S1 and S2

Question			Answer	Marks	Guidance
1	(b)	(ii)	<p><b>1</b> protein <u>secondary</u> structure / <math>\alpha</math>-helix / <math>\beta</math>-pleated sheet ;</p> <p><b>2</b> (protein) <u>tertiary</u> structure ;</p> <p><b>3</b> between polypeptide chains in (named) quaternary structure ;</p> <p><b>4</b> (between chains of) cellulose ;</p> <p><b>5</b> (between, strands of / bases in) DNA ;</p> <p><b>6</b> AVP ; ; ;</p>	3 max	<p><b>Mark the first answer on each prompt line.</b></p> <p><b>3</b> e.g. between adjacent chains in collagen</p> <p><b>CREDIT</b> 'protein / named protein / enzyme' OR 'between amino acid R-groups' once <b>ONLY if <u>none</u> of mps 1-3 have been awarded</b></p> <p><b>4 IGNORE</b> microfibrils</p> <p><b>6</b> e.g. between mRNA and tRNA binding between enzyme and substrate (coiling of) amylose between DNA and mRNA during transcription</p>
			<b>Total</b>	<b>17</b>	



Question		Answer	Marks	Guidance
2	(a)	<p>1 nucleus / nuclei ;</p> <p>2 other named organelle / membrane bound organelles ;</p> <p>3 linear chromosomes ;</p> <p>4 DNA, associated with / AW, histones / protein ;</p> <p>5 80S / 22nm / large, ribosomes ;</p> <p>6 large cells / AW ;</p> <p>7 no cell wall ;</p>	2 max	<p><b>Mark the first answer on each prompt line.</b></p> <p><b>ACCEPT</b> ora throughout</p> <p><b>1 ACCEPT</b> 'DNA not free'</p> <p><b>2</b> e.g. mitochondria / Golgi / etc</p> <p><b>2 ACCEPT</b> compartmentalized organelles</p> <p><b>2 ACCEPT</b> don't have a mesosome</p> <p><b>4 ACCEPT</b> 'DNA not naked'</p>
2	(b)	<p>capital letter on, specific name / Vivax ;</p> <p>not italicised / not underlined ;</p>	1 max	<p><b>Mark the first answer</b></p> <p><b>ACCEPT</b> ora for what student should have typed</p> <p><b>ACCEPT</b> 'the parasite is Plasmodium falciparum / malariae / ovale' if candidate uses capital 'P' and lower case 'f / m / o'</p>
2	(c)	(i)	3 max	<p><b>IGNORE</b> references to stages of life-cycle</p> <p><b>Max 2 if virus / bacterium appears anywhere</b></p> <p><b>3 IGNORE</b> case of initial 'P'</p> <p><b>3</b> Must be in context of transmission from mosquito <b>to</b> human</p> <p><b>4</b> 'blood' can be inferred, e.g. from refs to anticoagulant</p> <p><b>4 IGNORE</b> ref to parasite in blood after liver</p>

Question			Answer	Marks	Guidance
2	(c)	(ii)	destruction of a species is, morally / ethically, wrong ; might cause unintended health problems in humans ; might harm, other / unintended, species ; <i>idea of bioaccumulation / biomagnification ;</i>	1 max	<b>Mark the first suggestion</b>  <b>IGNORE</b> 'might enter human food' unqualified Answers must imply idea of harm

Question			Answer	Marks	Guidance
2	(c)	(iii)	<p><i>Field investigation</i></p> <p><b>F1</b> (sampling) before and after insecticide treatment ;</p> <p><b>F2</b> <i>idea of</i> , unbiased / random, sampling of population ;</p> <p><b>F3</b> example of sampling technique ;</p> <p><b>F4</b> (sampling in) different, times / weather ;</p> <p><b>F5</b> <u>large</u> number of samples taken ;</p> <p><b>F6</b> <i>idea of</i> standardised sampling procedure ;</p> <p><b>F7</b> <i>idea of</i> preventing counting same individual more than once ;</p> <p><b>F8</b> <i>idea of</i> capture – recapture ;</p> <p><b>F9</b> calculate mean / calculate standard deviation / apply statistical test ;</p>	5 max	<p>Award marks for either a field or laboratory investigation – <b>must read whole answer before beginning to mark to decide if field or laboratory.</b></p> <p>If candidates answer in terms of incidence of malaria award no marks as question states population of mosquitoes but read whole question in case mosquito study described in addition.</p> <p>If the investigation is in the both field and laboratory mark the investigation which gives candidate most marks.</p> <p><b>F1 IGNORE</b> refs to treated and untreated areas as stem refers to ‘a population’</p> <p><b>F3</b> e.g. sweep net, pond net, light trap</p> <p><b>F3 ACCEPT</b> insect net</p> <p><b>F3 IGNORE</b> ‘net’ or ‘trap’ unqualified</p> <p><b>F4 IGNORE</b> intervals unqualified. Answers must refer to time or weather</p> <p><b>F5</b> Must imply large number or state five or more</p> <p><b>F6 ACCEPT</b> idea of counting by the <u>same method</u></p> <p style="text-align: right;"><b>Continued.....</b></p>

Question			Answer	Marks	Guidance
			<p><b>OR</b></p> <p><i>Laboratory investigation</i></p> <p><i>idea of:</i></p> <p><b>L1</b> with and without insecticide exposure ;</p> <p><b>L2</b> measuring <u>mosquito</u> survival / count surviving mosquitoes ;</p> <p><b>L3</b> controlling one named key variable ;</p> <p><b>L4</b> controlling second named key variable ;</p> <p><b>L5</b> <i>idea of using a range of insecticide <u>concentrations</u> ;</i></p> <p><b>L6</b> replicates ;</p> <p><b>L7</b> calculate <u>mean</u> / calculate standard deviation / apply statistical test ;</p>		<p>Laboratory investigation could be done outside</p> <p><b>L1</b> is for changing the independent variable</p> <p><b>L2</b> is for measuring the dependent variable <b>ACCEPT</b> count the number of dead ones</p> <p><b>L3 and L4</b> <i>award up to 2 marks for</i></p> <ul style="list-style-type: none"> <li>exposure time</li> <li>species of mosquito</li> <li>stage of mosquito life cycle</li> <li>sex of mosquito</li> <li>number of mosquitos</li> <li>insecticide type</li> <li>insecticide concentration</li> <li>volume of insecticide</li> <li>temperature</li> </ul> <p><b>L6</b> Minimum of 3 in total, i.e. original plus two</p> <p><b>L7 IGNORE</b> average</p>
			<b>Total</b>	<b>12</b>	

Question			Answer	Marks	Guidance
3	(a)		<p>regulates fluidity of / stabilises / AW, membranes / phospholipid bilayer ;</p> <p>(converted to) steroid / named steroid, hormone(s) ;</p> <p>waterproofing the skin ;</p> <p>making Vitamin D ;</p> <p>making bile (salts) ;</p>	2 max	<p><b>Mark the first answer on each prompt line.</b></p> <p><b>ACCEPT</b> decreases / maintains, fluidity</p> <p><b>ACCEPT</b> supports structure of membranes</p> <p><b>DO NOT CREDIT</b> makes membrane rigid</p> <p><b>DO NOT CREDIT</b> allows / increases fluidity</p>
3	(b)	(i)	<p>contains C and H and O ;</p> <p>has, OH / hydroxyl, groups ;</p> <p>hex / 6-membered, ring ;</p>	1 max	<p><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></p> <p><b>DO NOT CREDIT</b> C, H and O molecules</p> <p><b>DO NOT CREDIT</b> hexose</p> <p><b>ACCEPT</b> pent ring</p> <p><b>IGNORE</b> 6C ring</p> <p><b>IGNORE</b> branched</p>
3	(b)	(ii)	<p>(saturated) lipids / fats / triglycerides ;</p> <p>protein / polypeptide ;</p>	2	<p><b>Mark the first two suggestions</b></p> <p><b>DO NOT CREDIT</b> unsaturated (fats)</p> <p><b>IGNORE</b> fatty acids / glycerol</p> <p><b>IGNORE</b> amino acids / peptides</p>

Question	Answer	Marks	Guidance
	<p>(iii)</p> <p><i>LDL</i></p> <p><b>L1</b> (carry cholesterol) from liver to, tissues / cells ;</p> <p><b>L2</b> receptors on (tissue) <u>cells</u> ;</p> <p><b>L3</b> raise / AW, <u>blood</u> cholesterol ;</p> <p><b>L4</b> increase / cause, deposition of, fats / lipids / triglycerides / cholesterol, <u>in</u> artery wall / under endothelium ;</p> <p><b>L5</b> form, plaques / atheromas ;</p> <p><i>HDL</i></p> <p><b>H1</b> (carry cholesterol) from, tissues / body / blood, to liver ;</p> <p><b>H2</b> receptors on, hepatocytes / liver <u>cells</u> ;</p> <p><b>H3</b> lower / reduce / decrease, (blood) cholesterol ;</p> <p><b>H4</b> reduce deposition, of fats / lipids / triglycerides / cholesterol ;</p> <p><b>H5</b> decrease, formation / risk, of, plaques / atheromas ;</p>	<p>6 max</p>	<p>If it is clear that candidates get LDL and HDL the wrong way round do not award L1 or H1 or QWC and then apply <b>ECF</b></p> <p><b>L3 IGNORE</b> deposits cholesterol</p> <p><b>L4 IGNORE</b> LDL / fatty acids <b>L4 ACCEPT</b> under epithelium</p> <p><b>H1 ACCEPT</b> back to liver</p> <p><b>H3 ACCEPT</b> remove from blood</p> <p><b>H4 IGNORE</b> LDL / fatty acids</p> <p><b>H5 IGNORE</b> removing atheromas</p>
	<p><b>QWC</b> – Award if you award an L mark and an H mark with the same number twice</p>	<p>1</p>	<p>e.g. L1 and H1, <b>and</b> L3 and H3</p>

Question		Answer	Marks	Guidance
	(c) (i)	(red) meat <u>contains</u> (large amounts of) <u>saturated</u> , fat / fatty acids ;  (meat / saturated fat) associated with / leads to, increased / large amounts of, LDLs ;	2	<b>ACCEPT</b> ora throughout for consequences of non-red meat diet No <b>ECF</b> from 3 (b) (iii) <b>ACCEPT</b> animal fat is saturated fat  <b>CREDIT</b> high LDL/HDL ratio <b>IGNORE</b> makes LDLs unqualified answer must imply increased amount
	(ii)	(type 2) diabetes ; angina / coronary heart disease / CHD / stroke / hypertension / high blood pressure / obesity ;	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> type 1 diabetes <b>IGNORE</b> conary <b>DO NOT CREDIT</b> chronic
		<b>Total</b>	<b>15</b>	

Question		Answer	Marks	Guidance
4	(a)	taxonomy / taxonomic ; hierarchy ; phylogeny / phylogenetic ;	3	<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>ACCEPT</b> phonetic spelling throughout <b>ACCEPT</b> hierarchical system
	(b)	(i)	2 max	<b>Mark the first answer on each prompt line.</b>  <b>1 DO NOT CREDIT</b> absence of a qualified cell wall, e.g. 'no cellulose cell wall' <b>2 ACCEPT</b> phonetic spelling  <b>3 ACCEPT</b> named eukaryotic cell feature  <b>4 IGNORE</b> references to tissues  <b>6 DO NOT CREDIT</b> unqualified references to movement <b>ACCEPT</b> refs to mobility during part of life cycle <b>IGNORE</b> cilia / flagella
		(ii)	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> case of initial letter
		Eukaryota(e) / Eukarya / eukaryote(s) ;		



Question		Answer	Marks	Guidance
	(iii)	<p>1 <u>all</u> are in same <u>family</u> as all, are closely related ;</p> <p>2 kea and kaka are both, same genus / <i>Nestor</i> ; <b>ora</b> for kakapo</p> <p>3 kea and kaka, are more closely related / share more recent common ancestor, (than with kakapo) ;</p> <p>4 kea and kaka have <u>more</u> genes in common / AW (than with kakapo) ;</p> <p>5 example of genetic similarity (between kaka and kea) evident from Fig 4.1 ;</p> <p>6 differences between, kea and kaka / all three, are great enough for each to be described as a different <u>species</u> ;</p>	4 max	<p><i>Candidates may refer to individual species using common or scientific names. <b>ACCEPT</b> use of either or both. <b>IGNORE</b> case of initial letter</i></p> <p>1 idea of link between family and close relationship must be made</p> <p><b>3 ACCEPT</b> ora for less close relationship between kakapo and others</p> <p><b>4 ACCEPT ora</b></p> <p>4 Answers must refer to genes / genetics / DNA</p> <p><b>4 IGNORE</b> cytochrome c</p> <p>5 E.g. kaka and kea both brown / kaka and kea both have similar shaped beaks</p> <p><b>5 IGNORE</b> unqualified references to appearance</p>
(c)	(i)	<p>differences ;</p> <p><u>in / within / between</u>, species ;</p>	2	<b>ACCEPT</b> within a population

Question		Answer	Marks	Guidance
(c)	(ii)	genetic differences / different alleles / inherited differences ;  environment / diet / disease ;	2	<b>Mark the first suggestion on each prompt line.</b> <b>ACCEPT</b> different genes <b>ACCEPT</b> mutation <b>ACCEPT</b> sex <b>IGNORE</b> 'different habitat'
(c)	(iii)	only small number have been sampled / AW ;  <i>idea that</i> individuals sampled may not be representative of population ;  data collected when population was larger / smaller population may mean range has changed ;	2	<b>Mark the first two reasons – ignore prompt lines.</b> <b>ACCEPT</b> 'whole population has not been sampled'  <b>IGNORE</b> rare unqualified <b>ACCEPT</b> larger ones more likely to be caught / measured  <b>ACCEPT</b> individuals sampled from one area might be different from average of whole population

Question		Answer	Marks	Guidance
4	(d)	<p><i>Name</i></p> <p><b>1</b> <u>speciation</u> ;</p> <p><i>Mechanism – max 2 marks</i></p> <p><b>2</b> <u>isolation / separation</u>, (of populations) ;</p> <p><b>3</b> further detail of isolating mechanism ;</p> <p><b>4</b> mutation / genetic variation ;</p> <p><b>5</b> natural selection / description of natural selection ;</p> <p><b>6</b> different <u>selection pressure</u>(s) (in different environment) ;</p> <p><b>7</b> (enough) time to allow changes in population to prevent interbreeding / AW ;</p>	3 max	<p><b>1 IGNORE</b> ‘natural selection’ on name line</p> <p><b>2 IGNORE</b> barrier</p> <p><b>3</b> e.g. river, mountain, reproductive, geographical, temporal, polyploidy, qualified barrier</p> <p><b>3 IGNORE</b> allopatric / sympatric unqualified</p> <p><b>5</b> description must mention differential survival <b>and</b> genes being passed on</p> <p><b>6 IGNORE</b> selection pressure unqualified</p> <p><b>6</b> ‘different’ can be described using an example</p>
		<b>Total</b>	<b>19</b>	

Question		Answer	Marks	Guidance
5	(a)	41 667 ; ;	2	<p>Award 2 marks for a correct answer, even if no working shown.</p> <p><b>ALLOW</b> 1 mark for 41 666.666', 41 666.7, 41 666.67, 41 666.667, 41 670, 41 700, 41 666, 41668 or 42 000.</p> <p>If the answer is incorrect <b>ALLOW</b> 1 mark for <math>\frac{2500 \times 100}{6}</math></p>
	(b)	<p><b>1</b> part of <u>ecosystem</u> / <u>habitat</u> for other organisms ;</p> <p><b>2</b> part of food, chain / web ;</p> <p><b>3</b> wood useful for specific purpose ;</p> <p><b>4</b> (potential) source of medicine ;</p> <p><b>5</b> genetic resource ;</p> <p><b>6</b> aesthetic value / give pleasure / beautiful trees ;</p> <p><b>7</b> ethical reason / moral responsibility ;</p> <p><b>8</b> resource for (non-medical) scientific research ;</p>	3	<p><b>Mark the first three reasons regardless of lines</b></p> <p><b>1 IGNORE</b> maintains biodiversity</p> <p><b>2 ACCEPT</b> food source</p> <p><b>2 IGNORE</b> home</p> <p><b>3</b> e.g. making , fences / furniture / boundary marker</p> <p><b>5 ACCEPT</b> description or example but must refer to genes</p> <p><b>6 ACCEPT</b> tourism</p> <p><b>7 ACCEPT</b> <i>idea that</i> they have a right to existence</p> <p><b>7 DO NOT CREDIT</b> 'playing God'</p>

Question		Answer	Marks	Guidance	
	(c)	(i)	not in, natural / normal, <u>habitat</u> / <u>environment</u> ;	1	
		(ii)	<p><b>1</b> most plants produce an excess ;</p> <p><b>2</b> (so) can be collected (from wild) without damaging (wild) , plants / organisms / population / habitat ;</p> <p><b>3</b> take up little space ; <b>ora</b></p> <p><b>4</b> able to store, large numbers / more species ; <b>ora</b></p> <p><b>5</b> easy / cheaper, to transport / AW ; <b>ora</b></p> <p><b>6</b> <i>idea of remaining viable</i> for long periods ; <b>ora</b></p> <p><b>7</b> less susceptible to, disease / pests / environmental change ; <b>ora</b></p>	4 max	<p><b>5 ACCEPT</b> can easily be sent where wanted</p> <p><b>6</b> Answers must have some reference to survival, not just 'can be stored for a long time'</p> <p><b>7 IGNORE</b> recovery / survival , from disease</p> <p><b>7 CREDIT</b> answers that describe (greater) disease resistance as a property of the seeds themselves</p> <p><b>or</b> that the seed bank is a (more) protected environment for the seeds</p> <p><b>IGNORE</b> cheaper unqualified</p>

Question			Answer	Marks	Guidance
5	(c)	(iii)	<p><b>1</b> (maintain / increase) genetic variation / <u>gene pool</u> ;</p> <p><b>2</b> reduced chance of (future), disease / environmental change, affecting (whole) population ;</p> <p><b>3</b> reduces chance of <u>inbreeding</u> ;</p> <p><b>4</b> maintain, <u>geographical</u> variation / <u>varieties</u> / races / strains / subspecies ;</p>	3 max	<p><b>1 ACCEPT</b> different alleles</p> <p><b>1 DO NOT CREDIT</b> different genes</p> <p><b>2 ACCEPT</b> 'so if one dies from a disease some might survive'</p> <p><b>2 ACCEPT</b> 'to get some plants that are resistant to different diseases'</p> <p><b>4 IGNORE</b> variation unqualified</p>
			<b>Total</b>	<b>13</b>	

Question		Answer	Marks	Guidance	
6	(a)		3	<p><b>DO NOT CREDIT</b> if letter is unclear</p> <p><b>DO NOT CREDIT</b> if more than one letter is given</p> <p><b>DO NOT CREDIT</b> if an incorrect letter is given</p> <p><b>DO NOT CREDIT</b> if an incorrect letter is given</p>	
		Characteristics are passed on to the next generation			W ;
		There is a struggle for existence			Y and Z ;
		Individuals with beneficial characteristics are among the few who survive			X and Y and Z ;
	(b)	<p>MRSA / it, is harder to treat / may become untreatable ;</p> <p>potential for, disease outbreak / epidemic / pandemic / killing many people ;</p> <p>developing new / more powerful, <u>antibiotics</u>, is expensive / takes time ;</p>	2 max	<p><b>ACCEPT</b> MRSA / it, can't be killed (by antibiotics)</p> <p><b>ACCEPT</b> antibiotics will no longer work on, MRSA / it</p> <p><b>IGNORE</b> new antibiotics are hard to discover</p>	

Question			Answer	Marks	Guidance
6	(c)	1	fossils show that organisms have changed over time ;	3	<b>1 CREDIT</b> many fossil organisms dissimilar from modern organisms
		2	<i>idea that</i> fossils or rocks can be dated ;		<b>2 ACCEPT</b> idea of fossils in chronological order
		3	<i>idea of</i> fossils showing intermediate forms / sequences ;		<b>3</b> e.g. <i>Archaeopteryx / Tiktaalik / horse</i> <b>3</b> general trend from, small / simple, to, large / complex
			<b>Total</b>	<b>8</b>	



Question		Answer	Marks	Guidance	
7	(a)	form part of cellular response	<i>both</i>	5	
		mature in thymus	(only) T (lymphocytes) ;		
		secrete substances which kill infected cells	(only) T (lymphocytes) ;		
		manufacture antibodies	(only) B (lymphocytes) ;		
		undergo clonal expansion	both / B and T ;		
		activate other lymphocytes	(only) T (lymphocytes) ;		
	(b) (i)	no antibodies detected before 4 days / antibodies appear at 4 days ;  increase then decrease / peak ;  figures for peak with time <b>and</b> antibody concentration ;  decrease less steep than increase / AW ; <b>ora</b> antibody concentration returns to zero <u>at 27</u> days ;	3 max	<b>ACCEPT</b> 'around 4 days' <b>ACCEPT</b> upper limit of 4.5 days for first appearance of antibodies <b>IGNORE</b> 'before 5 days' <b>IGNORE</b> references to increase at 4 days, answers must imply none to begin with  <b>ACCEPT</b> 13 days $\pm$ 0.5 day, 25 units $\pm$ 0.5 units <b>ACCEPT</b> 25 au $\pm$ 0.5 au 9 days $\pm$ 0.5 day after initial appearance	

F212

Mark Scheme

January 2012

Question			Answer	Marks	Guidance												
7	(b)	(ii)	<p><i>the drawn line should show</i></p> <p>higher peak <b>and</b> steeper initial increase ;</p> <p>antibodies appear between days 30 and 34 <b>and</b> concentration at 60 days above peak for primary response ;</p>	2	<p>Peak must be at least 30 au</p> <p>Compare gradient with initial increase up to day 10</p> <p><b>NBOD</b> if gradients are similar</p> <p><b>ACCEPT</b> ruled line close to vertical</p> <p><b>DO NOT CREDIT</b> vertical</p> <p><b>ACCEPT</b> a line that starts to rise at 30 or 34 days</p>												
7	(c)		<table border="1"> <thead> <tr> <th>region</th> <th>name</th> <th>function</th> </tr> </thead> <tbody> <tr> <td><b>A</b></td> <td>hinge (region) ;</td> <td>flexibility / binding of <u>more than one</u> antigen ;</td> </tr> <tr> <td><b>B</b></td> <td><u>constant</u> / Fc (region) ;</td> <td>attachment / binding , to phagocytes ;</td> </tr> <tr> <td><b>C</b></td> <td>variable / hypervariable / Fab (region) ;</td> <td>binding / attachment , to <u>antigens</u> ;</td> </tr> </tbody> </table>	region	name	function	<b>A</b>	hinge (region) ;	flexibility / binding of <u>more than one</u> antigen ;	<b>B</b>	<u>constant</u> / Fc (region) ;	attachment / binding , to phagocytes ;	<b>C</b>	variable / hypervariable / Fab (region) ;	binding / attachment , to <u>antigens</u> ;	6	<p><b>Marks for name and function should be awarded independently.</b></p> <p><b>DO NOT CREDIT</b> if incorrect answer appears in same box</p> <p><b>ACCEPT</b> hinges / hinged</p> <p><b>ACCEPT</b> neutrophils / macrophages / granulocytes</p> <p><b>ACCEPT</b> monocytes</p> <p><b>IGNORE</b> recognise antigens</p>
region	name	function															
<b>A</b>	hinge (region) ;	flexibility / binding of <u>more than one</u> antigen ;															
<b>B</b>	<u>constant</u> / Fc (region) ;	attachment / binding , to phagocytes ;															
<b>C</b>	variable / hypervariable / Fab (region) ;	binding / attachment , to <u>antigens</u> ;															
<b>Total</b>				<b>16</b>													

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**1 Hills Road**  
**Cambridge**  
**CB1 2EU**

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**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

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