

Question Number	Answer	Mark
1(a)(i)	A carbon dioxide and methane	(1)

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	<ol style="list-style-type: none"> 1. idea that {using / burning} {fossil fuels / petrol / diesel} releases carbon dioxide ; 2. reference to {carbon dioxide / CO₂} as a greenhouse gas ; 3. idea that carbon dioxide is taken in for {photosynthesis / light-independent reaction / carbon fixation / eq} (during production of plants for biofuels) ; 4. idea of no net change of carbon dioxide in the atmosphere when biofuels are burnt / eq ; 	<ol style="list-style-type: none"> 1. NOT methane Ignore burning biofuels releases carbon dioxide 4. ACCEPT biofuels are carbon neutral 	(3)

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	(plant) fibres / woody parts / xylem (vessels / tissue) / sclerenchyma (fibres / tissue) / lignified tissue / eq ;	ACCEPT vascular bundles / tissue	(1)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	<ol style="list-style-type: none"> 1. idea that bacteria cannot breakdown cellulose fast enough ; 2. idea that {enzymes / cellulase} needed to break down cellulose into (β) glucose ; 3. by hydrolysing (1,4) glycosidic bonds / eq ; 4. idea of {respiration / fermentation} of {glucose / eq} (by bacteria) ; 	<ol style="list-style-type: none"> 2. NOT hydrogen bonds 3. ACCEPT breaking 	(2)

Question Number	Answer	Additional Guidance	Mark
1(c)	<ol style="list-style-type: none"> 1. idea that production of first generation biofuel increases until 2016 and then level off ; 2. idea that production of second generation biofuel will continue to increase ; <p>For second generation biofuels:</p> <ol style="list-style-type: none"> 3. idea that second generation biofuels do not affect food supply ; 4. idea that made using the non-edible components ; 5. cheaper ; 6. idea that people are becoming more responsible for their environment ; 	<p>Piece mp 1 and 2 together</p> <p>ACCEPT the converse of mps 3, 4 and 5 in context of first generation biofuel production</p> <p>4. CCEPT (cellulose and) lignin idea of less waste</p>	(4)

Question Number	Answer	Mark
2(a)	B 2	(1) COMP

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	<ol style="list-style-type: none"> (only) contain hydrogen, carbon and oxygen ; reference to fatty acids and glycerol {joined by / eq} ester{bonds / eq} ; idea of saturated and unsaturated (fatty acids /lipids) 		(2) RAD

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	<ol style="list-style-type: none"> uses less fertiliser / eq ; idea of not using more pesticides / eq ; idea that greenhouse gas emissions are not that different ; credit manipulation of figures to support marking point 3 ; 	<ol style="list-style-type: none"> 2. IGNORE comparisons between the different crops 3. ACCEPT less than corn but more than sugar cane 	(3)EXP

Question Number	Answer	Additional Guidance	Mark
2(b)(iii)	<ol style="list-style-type: none"> credit three correctly named ions ; nitrate for {protein / amino acids / nucleic acids / named nucleic acid} ; proteins used for growth ; calcium ions for {other nutrients uptake / promotes cell elongation / strengthen cell walls / enzyme function / protection against heat stress / protection against diseases / eq} ; magnesium ions for chlorophyll production ; for photosynthesis ; 	<ol style="list-style-type: none"> e.g. nitrate, calcium ions, magnesium ions, sulphate, potassium ions, phosphate <p>ACCEPT</p> <p>Sulphate for amino acids</p> <p>Potassium ions for stomata function</p>	(4)EXP

Question Number	Answer	Additional Guidance	Mark
3(a)	A ;		(1)

Question Number	Answer	Additional Guidance	Mark
3*(b)	<p>QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence</p> <ol style="list-style-type: none"> 1. idea that biofuel production may (overall) results in more carbon dioxide in the atmosphere ; <p>OR</p> <p>idea that carbon neutral means that the carbon dioxide produced equals the carbon dioxide used ;</p> <ol style="list-style-type: none"> 2. idea of forests as carbon {sinks / eq} ; 3. idea that {clearing land / deforestation} results in (net) increase in carbon dioxide (in atmosphere) ; 4. (less plants means) less carbon dioxide {removed / used / eq} by photosynthesis ; 5. {burning / eq} trees produces carbon dioxide ; 6. idea that (increased) decomposition produces carbon dioxide; 7. idea of using {(fossil) fuels / petrol / diesel} by {lorries / machinery / eq} produces carbon dioxide ; 8. {burning /eq} of biofuels produces carbon dioxide ; 	<p>QWC emphasis is clarity of expression</p> <p>Accept stores / sumps</p>	(5)

Question Number	Answer	Additional Guidance	Mark
3(c)	<ol style="list-style-type: none"> 1. reference to production of {greenhouse gases / named greenhouse gas} ; 2. idea that these gases {build up/ remain / form a layer} in (upper) atmosphere; 3. which {absorb / trap / eq} {heat energy / infra-red / IR / eq} ; 4. reflected from earth's surface ; 5. idea that increased levels of these gases increase the greenhouse effect ; 6. idea that (mean) temperature of earth's {surface / atmosphere} is increasing ; 	<p>Accept carbon dioxide, water vapour, sulphur dioxide, oxides of nitrogen Not methane</p> <p>Accept long wavelength light</p>	(4)

Question Number	Answer	Additional Guidance	Mark
4(a)(i)	C ; The number of fires in Mato Grosso each year is always higher than other areas ;		(1)

Question Number	Answer	Additional Guidance	Mark
*4(a)(ii)	<p>(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence</p> <ol style="list-style-type: none"> reference to {fires / burning / eq} produces carbon dioxide ; which is a greenhouse gas ; idea that these gases {build up / remain / form a layer / increase} in (upper) atmosphere ; which {absorb / trap / eq} {heat energy / infra red / IR / eq} ; reflected from earth’s surface ; idea that increased levels of these gases increase the greenhouse effect ; idea that (mean) temperature of earth’s {surface / atmosphere} is increasing ; idea that less carbon dioxide {removed / used / eq} by photosynthesis ; 	<p>QWC emphasis clarity of expression</p> <p>1. Accep carbon dioxide, water vapour, sulphur dioxide, oxides of nitrogen Not methane</p> <p>2. N do not penalise ref to methane twice</p> <p>4. Accep long wavelength light</p>	(5)

Question Number	Answer	Additional Guidance	Mark
4(b)(i)	<ol style="list-style-type: none"> 1. reference to biofuels being (possibly)carbon neutral ; 2. idea that {plants / crops} are used for biofuels ; 3. idea that carbon dioxide used for photosynthesis (by plants / in production of biofuels) ; 4. idea of using biofuels to replace fossil fuels ; 	<p>Ignore carbon unqualified</p> <p>1. Accept idea of no (net) change in carbon dioxide levels in atmosphere</p>	(3)

Question Number	Answer	Additional Guidance	Mark
4(b)(ii)	<ol style="list-style-type: none"> 1. land has to be cleared to grow plants for biofuels / eq ; 2. burning produces carbon dioxide / the plants growing there would have been {photosynthesising / using carbon dioxide} / machinery uses fossil fuels / loss of habitat ; <p>OR</p> <ol style="list-style-type: none"> 3. decomposition of dead plant material (after clearing) / eq ; 4. produces carbon dioxide / eq ; <p>OR</p> <ol style="list-style-type: none"> 5. idea that the land could have been used for food production ; 6. less food produced / eq ; <p>OR</p> <ol style="list-style-type: none"> 7. ref to use of fertilisers ; 8. idea of eutrophication OR use oil-based products ; 	<p>Mark as pairs</p> <p>1 Accept reference to deforestation of land to grow plants for biofuels</p> <p>6 Accept shortage of food, contributes to world hunger, idea of causing starvation</p>	(2)