

Question Number	Answer	Additional Guidance	Mark
1(a)	<ol style="list-style-type: none"> cellulose (molecule) is a { polymer / chain / eq } of β-glucose / eq ; cellulose molecules held together { by hydrogen bonds / as microfibrils } ; idea of arrangement of microfibrils in { parallel / net / mesh / criss cross / eq } ; reference to { matrix / hemicelluloses / pectin / eq } ; 	<ol style="list-style-type: none"> CCEPT many β-glucose IGNORE lignin 	(3)

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	<ol style="list-style-type: none"> { group of / many / several / eq } cells ; idea that the cells in a tissue { work together / eq } for a common function ; 		(2)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	<ol style="list-style-type: none"> idea that lignin holds the { fibres / microfibrils } together ; lignin keeps { fibres / microfibrils } parallel / eq ; 		(2)

Question Number	Answer	Additional Guidance	Mark
1(c)(i)	<ol style="list-style-type: none"> { hollow / no cytoplasm / eq } ; idea that vessels { have no end walls / are open at the ends } ; vessels { have pits / are strong so that they do not collapse } ; lignin makes the walls waterproof / eq ; 	<ol style="list-style-type: none"> IGNORE dead, tube ACCEPT has a lumen ACCEPT strong to keep tube open 	(2)

Question Number	Answer	Additional Guidance	Mark
1(c)(ii)	<ol style="list-style-type: none"> nitrate for production of { amino acids / protein / DNA / nucleic acids / bases / eq } ; calcium for { pectate / pectin / middle lamella } ; magnesium for chlorophyll ; 	<ol style="list-style-type: none"> CCEPT chlorophyll, enzymes 	(3)

Question Number	Answer	Additional guidance	Mark
2(a)	1. renewable / eq ; 2. resources can be made available for future generations / will not run out / eq ; 3. more (Canola) plants can be grown / eq ;	2. ACCEPT not finite ACCEPT references to either oil or plants not running out	(2)

Question Number	Answer	Additional guidance	Mark
2(b)	1. amino acids OR proteins ; 2. idea of used in synthesis of { nucleic acids / DNA / ATP} ; 3. idea of how this organic compound is used in growth;	2. ACCEPT RNA, NAD, NADP, ADP, chlorophyll 3. amino acids) for the synthesis of proteins, (proteins) as enzymes, (nucleic acids) for cell division, (ATP) as an energy source	(2)

Question Number	Answer	Mark
2(c) (i)	A a negative correlation ;	(1)

Question Number	Answer	Additional guidance	Mark
2(c)(ii)	1. correct values from graph, i.e. 2.40 and 3.30 ; 2. difference divided by 2.4, e.g. $(0.9 \div 2.4) \times 100$; 3. 37 (%) ;	Correct answer gains 3 marks 1. 2.4 and 3.3 2. $(3.3 - 2.4) \times 100 / 2.4$ ACCEPT $(\text{difference} \div \text{original value}) \times 100$ if incorrect values selected from graph	(3)

Question Number	Answer	Additional guidance	Mark
2(c)(iii)	1. idea of using genetically similar plants e.g. raised from seeds from same plant, clones ; 2. idea of repeats {at each level of nitrate fertiliser / used to produce mean data / to identify outliers or anomalies} ; 3. environmental variable related to soil controlled e.g. soil pH, concentration of other mineral ions ; 4. another environmental variable controlled e.g. temperature, light (intensity), water ; 5. idea of control described, e.g. no nitrate/ soil with no extra nitrate ; 6. idea of same method of extraction of oil used ;	IGNORE reference to time as the investigation is measuring seed production 1. ACCEPT cuttin 3. ACCEPT same area, location	(4)

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

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

Question Number	Answer	Mark
4(b)	D ;	(1)

Question Number	Answer	Mark
*4(c) QWC	<p>(QWC - Spelling of technical terms (<i>shown in italics</i>) must be correct and the answer must be organised in a logical sequence)</p> <p>succession described:</p> <ol style="list-style-type: none"> 1. reference to lichens and mosses as <u>pioneer</u> community ; 2. able to grow in {little / no} soil / eq ; 3. (that) breaks up (rock) fragments / forms {thin / shallow / eq} soil; 4. reference to {plants / eq} with {small / short / eq} roots ; 5. (able to) grow in {thin / shallow / eq} soil / eq ; 6. idea that changes in soil structure enable {trees / shrubs} to grow / eq ; <p>general points:</p> <ol style="list-style-type: none"> 7. reference to soil able to {hold / retain / contain / eq} {water / minerals} ; 8. as plants {lose leaves / die / decay / eq} ; 9. reference to {organic matter / humus / eq} {increases / released / eq} ; 10. reference to competition effects ; 	(5)

Question Number	Answer	Mark
4 (d)	<p>1. climax (community) ;</p> <p>Any three from:</p> <p>2. includes (both) animals and plants / has many species / has high biodiversity / eq ;</p> <p>3. reference to {interaction / eq} between species / eq ;</p> <p>4. idea of balanced equilibrium of species ;</p> <p>5. reference to {dominant / codominant} (plant or animal) species ;</p> <p>6. reference to stable if no {change to environment / human influence} ;</p>	(4)