

Question Number	Answer	Additional Guidance	Mark
1(a)(i)	<ol style="list-style-type: none"> a resource that can be { renewed / replaced } / not finite / will not run out ; idea that it is available to future generations ; 	1. IG RE regrown or replanted as this is not in the context of plants	(2)

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	<ol style="list-style-type: none"> idea that (starch comes from plants and) more plants can be grown (to replace those used) ; idea of crude oil { not being renewable / finite / eq } ; idea that using packaging pellets made from starch will allow crude oil supplies to last for longer ; 	<ol style="list-style-type: none"> IGNORE renewable DO NOT ACCEPT starch can be regrown ACCE will run out 	(2)

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	(pH) 9.0 or 9 AND 30 (°C) ;	IGNORE units	(1)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	<ol style="list-style-type: none"> idea of { increased breakdown / larger decrease in mass } at pH 7.5 { when temperature increased / at 40 °C } ; idea of { increased breakdown / larger decrease in mass } at pH 9.0 { when temperature decreased / at 30 °C } ; at { pH 7.5 there is 2% / pH 9.0 there is 23% } difference (between 30° - 40 °C) ; 		(3)

Question Number	Answer	Additional Guidance	Mark
1(b)(iii)	<ol style="list-style-type: none"> are of plastic sheet ; ickness of plastic sheet ; concentration of { enzyme / solution } ; zyme type ; volume of { enzyme / solution } ; 	<ol style="list-style-type: none"> IG RE size N amount 	(2)

Question Number	Answer	Additional Guidance	Mark
1(b)(iv)	<ol style="list-style-type: none"> idea that pH 11 is outside the range of data collected idea of insufficient data (to support prediction) / cannot extrapolate from two values of pH / no indication of a trend ; 	1. IG RE pH 11 not tested	(1)

Question Number	Answer	Additional Guidance	Mark
2(a)	1. (overall) increase in pollen count (as the layers get deeper) ; 2. by 28 (au) ; 3. idea that increase is {greater between 12.5 and 13 m / smaller between 13 and 13.5 m} ; 4. {22 compared to 6 / 18 compared to 10} ; 5. idea that fluctuations are {greater between 12.5 and 13 m / smaller between 13 and 13.5 m} ;	ACCEPT 12.9 as time of eruption 1 ACCEPT converse 3 ACCEPT increase is {greater after the eruption / smaller before the eruption} ACCEPT converse 5 ACCEPT fluctuations are {greater after the eruption / smaller before the eruption}	(3)

Question Number	Answer	Additional Guidance	Mark
2(b)	idea of layers being { destroyed / mixed together / eq } ;	ACCEPT area destroyed / layers are indistinct / not clear / no peat / rocks present	(1)

Question Number	Answer	Additional Guidance	Mark
2(c)	1. idea that at {higher / eq} temperature {ice melts / water expands} so level rises ; 2. idea that at { lower / eq} temperatures {ice forms /eq} so level falls ;	1 ACCEPT more evaporation (of water) with increase in temperature so level falls	(2)

Question Number	Answer	Additional Guidance	Mark
2(d)(i)	1. decrease in pollen count (in peat) after eruption / eq ; 2. decrease in sea level after eruption / eq ;		(2)

Number			
2(d)(ii)	<p>General point:</p> <p>1. idea of {fluctuations (in the data) /only a correlation} ;</p> <p>Pollen data:</p> <p>2. idea that other factors affected the {pollen / plants} ;</p> <p>OR</p> <p>idea that data only comes from one peat bog ;</p> <p>OR</p> <p>idea that the lowest values before the eruption are lower than the values after the eruption ;</p> <p>OR</p> <p>idea that there is data is missing so we {do not have the complete / are only assuming that values are lower} ;</p> <p>Sea level data:</p> <p>3. idea that the sea is in only one area ;</p> <p>OR</p> <p>idea that sea levels were already falling before eruption ;</p> <p>OR</p> <p>no evidence that drop in sea level is due to temperature decrease / eq;</p>	<p>1 ACCEPT in context of either graph</p> <p>2 ACCEPT idea that the highest values after the eruption are higher than the lowest values after the eruption ;</p>	(3)

Question Number	Answer	Additional Guidance	Mark
3(a)	1. (gradual) increase in {average / eq} temperature ; 2. (of earth's) {surface / atmosphere} (and oceans) ;	NB IGNORE any explanations as to the cause 1 IGNORE warming	(2)

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	Effects on plants: 1. { loss / eq } of (existing) species / extinction ; 2. idea of changes in distribution (of plants / species) ; 3. idea of changes in {numbers / size / growth / eq} (of plants / species) ; Explanations (max 3): 4. idea that there will be changes in rainfall patterns ; 5. idea of a change in growing seasons ; 6. idea that temperature may become too hot for some species OR credit a link made between temperature and enzyme activity ; 7. idea of increased carbon dioxide results in more {photosynthesis / GPP / NPP / biomass / eq} ; 8. idea of fall in pH in {oceans / rivers / eq} ;	NB any link to an affect must be correct 4 ACCEPT droughts 5 ACCEPT flowering times	(4)

Question Number	Answer	Additional Guidance	Mark
3(b) (ii)	<ol style="list-style-type: none"> 1. idea of reduction of {herbivore / primary consumer} ; 2. idea that this would result in a reduction of {predator / secondary consumer / tertiary consumers} ; 3. idea that a change in {distribution / numbers / types / eq} of plants could result in a change in distribution of {herbivores / eq} ; 4. idea of loss of {habitat / eq} decreasing {breeding rate / numbers / eq} ; 5. idea of loss of {shelter / camouflage / eq} provides more food for predators so they would increase in {size / number} ; 	<p>ACCEPT converse for increase in plant {number / size / eq}</p> <p>1 ACCEPT idea of loss of animals because of reduction in food supply</p> <p>2 ACCEPT idea of loss of animals that feed on the herbivores</p> <p>4 ACCEPT named example e.g. nesting place</p>	(3)

Question Number	Answer	Additional Guidance	Mark
3(c)	<ol style="list-style-type: none"> 1. idea that we can only {make predictions about the future / extrapolate data / work on correlations / eq} ; 2. idea that {scientists / industry / eq} are presenting {different views / insufficient evidence / eq} about global warming ; 3. idea that some people surveyed did not {understand / know about} global warming ; 4. idea that some people do not believe in {global warming / harmful effects of global warming} because they do not want it to affect their {lifestyle / named lifestyle / eq} ; 5. idea that some people think that a solution to global warming will be found ; 6. idea that some people do not want to think about the future ; 	<p>NB just a reference to do not believe is too vague</p> <p>1 ACCEPT it is due to natural cycle / normal fluctuations</p>	(3)

Question Number	Answer	Additional guidance	Mark
4(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. ACC T not finite ACCEPT references to either oil or plants not running out	(2)

Question Number	Answer	Additional guidance	Mark
4(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. ACCEP 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
4(c) (i)	A a negative correlation ;	(1)

Question Number	Answer	Additional guidance	Mark
4(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. $(30-2.40) \times 100 / 2.40$ ACCEPT (difference \div original value) \times 100 if incorrect values selected from graph	(3)

Question Number	Answer	Additional guidance	Mark
4(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. A EPT same area, location	(4)