Question Number	Answer	Additional Guidance	Mark
1(a)	1. idea that as the {distance from the front edge of the glacier / time} increases, the {complexity / biodiversity / size / eq } of the organisms increases ; 2. reference to (primary) succession ; 3. idea that {algae / lichens / pioneer species} are (the first) organisms to colonise bare rock / eq; 4. idea that {algae / lichen / pioneer species} improve conditions for plants ; 5. idea of competition (limiting species present) ;	1. ACCEPT idea that climax community only reached at distance from glacier edge 2. OT secondary succession 4. including e.g. change rock into soil / increase humus content of soil / increase water content 5. e.g. newer species outcompete previous species	**(3)**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	1. the {role / interaction / eq} of an { *Epilobium latifolium* / organism / species} within its { ecosystem / habitat / environment } ; 2. (*Epilobium latifolium*) is a producer ; 3. idea that *Epilobium latifolium* provides {food / energy} for other organisms (herbivores / primary consumers / decomposers) ; 4. idea that *Epilobium latifolium* improves soil e.g. holds soil structure together, increases nutrients ; 5. idea that *Epilobium latifolium* provides {shelter / (micro) habitat} for organisms ;	1. IGNORE community 3. OT prey 4. IGNORE food in soil ACCEPT adds organic matter, humus 5. ACCEPT named organism e.g. insects	**(3)**

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	1. idea of using a transect (from front edge of glacier); 2. credit method of sampling (along transect) ; 3. credit appropriate method of selecting sample sites (along transect) ; 4. description of estimate of abundance e.g. number of plants, percentage cover 5. idea of using more than one transect ; 6. credit appropriate method of recording quantitative data ;	2. e.g. clumps touching transect, quadrat (on transect), number of plants along perpendicular 3. .g. set distance, regular, systematic, flip-flop quadrats NOT random 5. IGNORE references to repeating investigation 6. .g. tally chart, table, graph	(4)

Question Number	Answer	Additional Guidance	Mark
1(b)(iii)	1. credit appropriate named abiotic factor; 2. credit appropriate method of measurement of factor ; 3. credit appropriate description of where reading should be taken ; 4. idea of taking several readings and getting an average / eq ;	1. e.g. light, soil pH, water content, mineral content, temperature, salinity, wind IGNORE CO_2 , O_2, rainfall, humidity 2.CE applied e.g. light {probe / sensor / meter / data logger}, {water gauge / drying out soil samples} 3. CE applied e.g. reading taken at height of plant, soil sample around roots, quadrat	(3)

Question Number	Answer	Additional Guidance	Mark
2(a)	idea of a series of changes (that occur to the composition of species in the community) of organisms (present in an area) over a period of time ;		**(1) RAD**

Question Number	Answer	Additional Guidance	Mark
2(b)	Five years before: 1. idea that there are more { algae / lichens / mosses } present ; 2. because these are {simpler organisms / early colonisers / pioneer species / eq} ; 3. less *H. pebloides* present / eq ; 4. because recently colonised area / eq ; **max 3 marks** Five years after: 5. more *H. pebloides* present / eq ; 6. because had a longer period of time to become established / eq ; 7. idea that {grasses / ferns / small shrubs / eq} present ; 8. because these are {higher organisms / next group of colonisers} / eq OR idea of improvement in soil structure ; **max 3 marks**	1. CCEPT no large plants 2. CCEPT because only bare rock / don't need soil? 7. ACCEPT large plants	**(4) XP**

Question Number	Answer	**Additional Guidance**	Mark
2(c)(i)	1. idea of measuring off two areas of the same size ; 2. use of a {quadrat / eq} ; 3. use of random {coordinates / sampling / eq} ; 4. method of generating random coordinates ; 5. description of estimate of abundance e.g. number of plants, percentage cover 6. indication that several sample sites used ; 7. appropriate method of recording quantitative data ;	7. e.g. tally chart, table, graph	**(4)EXP**

Question Number	Answer	**Additional Guidance**	Mark
2(c)(ii)	1. idea of {using a moisture probe / drying out soil samples / eq} ; 2. idea of testing soil around plants ; OR 3. idea of using rain gauge / eq ; 4. idea of collecting water over a period of time ;		**(2)GRAD**

Question Number	**Answer**	**Additional Guidance**	**Mark**
2(d)	1. idea that birds brought seeds with them ; 2. idea of bird droppings ; 3. adding nutrients to soil / eq ; 4. (therefore) supporting growth of {more / different} plants ; 5. idea that faeces will help maintain soil structure ;		**(2)EXP**

Question Number	Answer	Additional guidance	Mark
3(a)(i)	1. idea of (a sequence of) changes in {a community / organisms / species / plants} ; 2. over a period of time / eq ;	**1. Accep** the idea of species replacing or succeeding each other **2. Acce** gradually	**(2)**

Question Number	Answer	Additional guidance	Mark
3(a)(ii)	1. idea of final {stage / sere / community} ; 2. feature of community described e.g. self-sustaining , stable, one dominant species, a few codominant species ;	**1. Accep** at the end of succession **2. Ignor** named example	**(2)**

Question Number	Answer	Additional guidance	Mark
3(b)(i)	1. idea of conservation of {genetic diversity / genetic variation / biodiversity} ; 2. idea of extinction ; 3. idea of aesthetic reasons ; 4. idea that these plants may be useful e.g. as medicines ; 5. idea that other animals depend on these plants as a {source of food / habitat} ;	**1. Acce** gene pool **5. Acce** part of a food chain **Ignore** survival	**(2)**

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	grazing / remove saplings / mowing / eq ;	**Accept** burning	**(1)**

Question Number	Answer	Mark
3(c)(i)	C systematic ;	**(1)**

Question Number	Answer	Additional guidance	Mark
3(c)(ii)	1. comparison (of the value) to the critical value indicates no significance / stronger correlation the nearer the value is to 1.0 / 0.565 is too low / eq ; 2. idea that sample size too small ; 3. idea that {there is no correlation between height and width / other factors affect height / other factors affect width / eq} ;	**1. Ignor** plus and minus numbers **2. Accep** not enough data	**(2)**

Question Number	Answer	Mark
4(a)	1. idea of taller (growing) plants could {develop / grow} in the clear areas ; 2. idea of loss of {low-growing plants / clear zones} ; 3. idea that different animals appear ; 4. reference to (secondary) succession ; 5. reference to climax community (of the taller plants) ;	**(3)**

Question Number	Answer	Mark
4(b)(i)	1. named abiotic factor ; 2. appropriate description of how named factor affects the {number / distribution / growth / eq} of these plants ; 3. appropriate explanation ;	**(3)**

Question Number	Answer	Mark
4(b)(ii)	1. idea of no {(inter) breeding / reproduction / mating / eq} (between the *B. Selene*); 2. (because) {geographical / physical} barrier / eq ; 3. idea of different behaviour ; 4. idea of incompatible genitalia ; 5. idea of each population having a {discrete / eq} gene pool e.g. restricted gene flow, different mutations, different alleles ;	**(3)**

Question Number	Answer	Mark
4(b)(iii)	1. {low-growing plants would die out / eq } / {taller plants would outgrow the low-growing plants / eq} ; 2. idea of (*B. Selene*) unable to feed e.g. no nectar (for the adults) ; 3. (*B.selene*) unable to lay eggs / eq ; 4. no suitable plants for {caterpillars / eq } to feed on / eq ; 5. idea of very little {variation / genetic diversity / eq} in a small population ;	**(3)**