

Question			Answer	Mark	Guid
1	(a)	(i)	larger territory / greater distance between neighbours = lower predation ;	1	ACCEPT ora - smaller territory / smaller distance = higher predation DO NOT CREDIT descriptions wrong way round
		(ii)	1 great tit numbers, oscillate / rise and fall ; 2 (weasel predation) helps keep great tit numbers stable ; 3 predation (by weasels) is <u>density-dependent</u> ;	2 max	IGNORE weasel population size ACCEPT keeps great tit numbers moderate
	(b)	(i)	<i>two areas</i> as a control / for comparison / to see the effect of removal of starfish ; <i>same size</i> to make test, valid / fair / unbiased ;	2	IGNORE reliable, precise, accurate CREDIT 'as a valid control' = 2 marks
		(ii)	<u>interspecific</u> competition ; (competition from) , barnacles / mussels ; for, algae / space ; barnacles / mussels , no longer eaten by starfish ;	2 max	IGNORE intraspecific competition ACCEPT description e.g. barnacles / mussels, eat food of, limpets / chitons IGNORE food
		(iii)	sponges outcompeted (by , barnacles / mussels) ; less, prey / food / sponges, for nudibranchs to eat ; <i>idea of specialist feeder</i> ;	2 max	IGNORE 'sponge population decreases' alone (as given in question) CREDIT nudibranchs only feed on sponges
			Total	9	

Question			Answer	Mark	Guidance
2	(a)	(i)	polar and brown bear ;	1	
		(ii)	<i>no because</i> one, more closely related to / in same group as , raccoons and one , to / with, bears / AW ;	1 max	DO NOT CREDIT answer if in context of yes
	(b)	(i)	knowledge , tentative / uncertain / subject to change ; to re-test / check, hypotheses / results ;	2	IGNORE incomplete, new technology IGNORE to validate
		(ii)	<p>1 <i>idea that</i> haemoglobin could be , an <u>adaptation</u> (to the environment) / an <u>adaptive</u> feature ;</p> <p>2 <i>idea that</i> low oxygen partial pressure is selective agent or both subject to the same selection pressure ;</p> <p>3 (haemoglobin of both) has high oxygen affinity / dissociation curve shifted to left ;</p> <p>4 convergence / similarity not due to shared ancestry ;</p>	3 max	<p>3 ACCEPT haemoglobin can uptake O₂ at low partial pressure</p> <p>4 ACCEPT description e.g. "changes happen to both independently" IGNORE "red and giant panda may not be closely related" (as given in question)</p>

Question		Answer	Mark	Guid
	(c)	<p>step 2 PCR / polymerase chain reaction ;</p> <p>step 3 genetic modification / genetic engineering ;</p> <p>step 4 electrophoresis ;</p>	3	<p>FA on each line</p> <p>ACCEPT gene cloning / transformation</p> <p>ACCEPT (gel) chromatography</p>
	(d)	<p>triplet code or 3 bases = 1 amino acid ;</p> <p>525 ;</p> <p>3 bases are , stop / (chain) termination , codon ;</p>	3	DO NOT CREDIT triplet makes amino acid
	(e)	(ox ;	1	FA
	(ii)	<p>1 genetic code is degenerate ;</p> <p>2 more than 1, triplet / codon, for same amino acid ;</p> <p>3 silent / neutral, mutations ;</p> <p>4 <i>idea that</i> DNA, changes more than / is more different to, protein ;</p>	3 max	<p>1 ACCEPT redundant</p> <p>2 DO NOT CREDIT 'make' the same amino acid</p> <p>4 ACCEPT polypeptide / amino acid sequence</p> <p>ACCEPT nucleotide sequence for DNA</p>
		Total	17	

Question			Answer	Marks	Guidance
3	(a)	(i)	<u>ecology</u> ;	1	First Answer
		(ii)	abiotic ;	1	First Answer
		(iii)	<u>ecosystem</u> ;	1	First Answer
	(b)		<p>(interspecific) <u>competition</u> ; species 1 <u>and</u> species 2 named ; description of interaction ;</p> <p><u>trophic</u> / predator-prey / predation / parasitism / grazing / herbivory ;</p> <p>species 1 <u>and</u> species 2 named ; description of interaction ;</p> <p>mutualistic / mutualism ; species 1 <u>and</u> species 2 named ;</p> <p>description of interaction ;</p>	6	<p>Mark the first suggestion on each numbered line only, max 3 for each, therefore max 6 overall. ACCEPT English or scientific names for species (genus name alone acceptable and does not need capital letter) and accept phonetic spelling. DO NOT ACCEPT intraspecific</p> <p>eg eat, same / named, food OR occupy same niche '<i>Red and grey squirrels compete for the same food</i>' = 3 marks</p> <p>IGNORE grass, worms,</p> <p>ACCEPT symbiosis / symbiotic / commensalism IGNORE legumes and nitrogen-fixing bacteria if no species identified eg could include pollination, seed dispersal</p>

Question		Answer	Marks	Guidance
	(c) (i)	<p>auxin / IAA ;</p> <p>(positive) <u>phototropism</u> ;</p> <p>plants / shoots, bend towards light ;</p> <p>etiolation / plants grow taller ;</p> <p>climbing plants climb, up / over, other plants ;</p> <p>(positive) thigmotropism / sense of touch ;</p> <p>grow roots towards, water / minerals ;</p> <p>allelopathy / description ;</p>	4 max	<p>IGNORE other named hormones</p> <p>IGNORE apical dominance</p> <p>DO NOT ACCEPT phototropic / thigmotropic (but penalise once)</p> <p>IGNORE move, grow</p> <p>IGNORE nutrients</p>
	(ii)	<p>less auxin / auxin production stopped ;</p> <p><u>apical dominance</u>, stopped / removed ;</p> <p>side shoots grow / lateral buds develop / ora ;</p> <p>plant becomes bushy ;</p>	3 max	<p>CREDIT axillary buds</p> <p>IGNORE side leaves</p>

Question		Answer	Marks	Guidance
	(d)	<p>1 tape measure / rope, laid ;</p> <p>2 line / belt, <u>transect</u> ;</p> <p>3 continuous / interrupted / AW ;</p> <p>4 (use quadrat to) record percentage cover of plants ;</p> <p>5 (use quadrat with) ACFOR scale ;</p> <p>6 point quadrat use described ;</p> <p>7 use of key to identify species ;</p> <p>8 data recording sheets prepared in advance ;</p> <p>QWC – sequencing of steps in procedure ;</p>	<p>5 max</p> <p>1</p>	<p>3 record all species touching line = continuous line quadrats end to end = continuous belt OR at selected intervals only = interrupted</p> <p>4 ACCEPT description = number of squares with species (>half covered) 5 DO NOT ACCEPT record abundance</p> <p>One point from 1 - 3 before a point from 4 to 8</p>
		Total	22	