	Answers					Marks	Guidance for Exami
l (a)	group of vertebrates	scaly skin	external ear (pinna)	feathers	glands		
	birds	√	*	✓	*		
	bony fish	√	×	×	× ;		
	amphibians	×	×	×	× ;		
	reptiles	√	×	×	*;		
	mammals	×	√	×	✓;	F 43	
(b)	o ith o u	Fur .it is soft				[4]	
(b)	 either fruit is soft or seeds, are hard / thick / have a hard / thick / protective covering 						I refs to teeth
	<i>or</i> testa ; ● no enz	ymes to dige	est, testa / seed	I coat / seed ;		[2]	

1	Ans	swers	Marks	Guidance for Examiners
(c)	1 2 3 4 5 6	wind (dispersal); 'hairs' / wing(s), on seed / fruit, to aid dispersal; self- (dispersal); explosive, pods / fruits; water (dispersal); float / buoyant;		A parachute / light I fur I pollination
			[max 2]	
(d)	oxygen; warmth / warm temperature; water;		[max 2]	A suitable quoted warm temp, 15–30°C I humidity
(e)	1 2 3 4 5	(cassowaries are large birds) so need large, territory / habitat / feeding area / lots of space; cannot fly so cannot move easily from one area to another; need many trees to produce enough fruit; cassowaries are dependent on many (tree) species; need suitable nesting areas;	[max 3]	
			[Total: 13]	

Question		answers	Mark	Additional Guidance	
2	(a)	A – excretion / egestion / defaecation ; B – nitrification / oxidation ;	[2]	R death A 'nitrify' / <i>ignore</i> bacteria	
	(b) 1 2 3 4 5 6 7 8	root nodules contain, bacteria / Rhizobium; (bacteria) fix nitrogen / nitrogen fixation / nitrogen fixing; form, ammonia / ammonium (ions); provide, fixed nitrogen / ammonia / amino acids, to rest of, plant; R via soil (fixed nitrogen etc) needed for growth; used to make, amino acids / proteins / DNA / RNA / chlorophyll / AW; (so) nitrogen made available to, animals / other organisms; AVP; only for detail of any of the points above	[max 4]	ignore incorrect name or type of bacteria R if root nodules fix nitrogen ignore nitrate / R if occurs in soil ignore 'useful' nitrogen A useable nitrogen ecf provide nitrate to plant if penalised in MP3 R chloroplast do not allow anything for events that occur after bacteria or plants die	
	(c) 1 2 3 4 5 6 7 8 9 10 11 12 13	proteins in cells enzymes; control / catalyse, reactions / AW; e.g. respiration / photosynthesis; A ref. to any specific reaction(s) (part of cell) membranes; carrier proteins / description of role allowing movement in and out of cell; haemoglobin; transport of, oxygen / carbon dioxide / gases; making cytoplasm / (cell) growth; AVP; e.g. chloroplast / named organelle / providing energy DNA in cells ref. to, genes / alleles / genetic information / genetic code; control functions of the cell; code for proteins; AVP; e.g. a specific feature of cells / cell division / mitosis / meiosis	[max 3]	R digestion unless clearly inside cell, e.g. in a phagocy A protein pumps R antibodies / hormones / collagen / keratin ignore repair R produce / make energy R hereditary material / AW A 'sends messages to the cytoplasm' / 'tells the cells what to do' A ref. to mRNA	

Question	answers	Mark	Additional Guidance
2 (d) 1 2 2 3 4 5 6	<pre>eutrophication ; growth of algae / algal bloom / weed growth ; reduces light reaching other plants ; algae / plants, die ; bacteria, decompose / feed on, dead plants ; A dead animals / 'eat' aerobic respiration ; A aerobic bacteria</pre>		e.g. from lack of light / no resourc A decomposers / fungi / microorganisms for bacteria
7	(bacteria cause) oxygen (concentration in water) to decrease;		R decrease in oxygen if linked to less photosynthesis
8	(so) fish / invertebrates / animals, suffocate / die / migrate;		R change in pH / toxins as cause of death
9	AVP; e.g. any further detail or consequence of any of the above marking points, e.g. reduces biodiversity / destroys food chains	[max 4]	must be linked to shortage of oxygen (however caused)
	רן	Гotal: 15]	

Que	Question		Answers	Marks	R 'people'	
3	(a)	group of organisms / individuals, of same species; can interbreed; live in same area / habitat (at same time);		max 2		
	(b)	2 3 4	numbers of brown plant hoppers remain low, up to 40 days / day 40; low numbers when spraying occurs (days 15 to 38); rapid increase when spraying stopped / AW; then, crash / decrease; any population figure with unit; e.g. to maximum of over 1000 per m ²	max 3	ignore ref. to resistance	
	(c)		ticide absorbed by the plants; sported through the plant in the phloem; ested / AW, by insect when it, eats / sucks; c / poisonous, to insect;	max 2	A 'eats the plant'	
	(d)	2 3 4 5 6 7 8	no population explosion / AW; effective at reducing the numbers / AW; ref. to comparative figures from the graph; no pollution / damage to environment; no killing of harmless species; no concentration of pesticide in food chain; no pesticide left in foods / no harm to humans from the spray; no development of resistance to pesticide; less cost / economic benefits; AVP; e.g. accept part of natural food chain	max 3		

Que	Question		Answers	Marks	Additional Guidance	
3	(e)	3 4 5 6 7 8 9 10	decreased rainfall; flooding; erosion / loss of (top)soil; desertification; silting of rivers; loss of (plant) nutrients / soil fertility; disruption to food chain; loss of habitat; extinction / loss of biodiversity; effect on carbon dioxide in the atmosphere; justification for effect; A unproductive forest / productive crop AVP;	max 4	A species become, rare / endangered A increase or decrease if justified e.g. leading to global warming	
				[Total : 14	1	

Question	Answers amylase; prote(in)ase; lipase;		Additional Guidance R carbohydrase R trypsin / pepsin / peptidase R 'protase', A 'proteas'		
4 (a)					
(b)	prevents spread of (named) disease / AW ora; avoids pollution / removes harmful substances; makes, water / sewage / effluent, safe / AW; avoids smells; recycling of water; AVP; e.g. ref. to eutrophication	[max 1]	A removes harmful microbes / bacteria R 'germs' A examples no need to specify for whom or what it is safe, but R 'safer' unqualified, treat 'marine organisms' as 'aquatic'		
(c)	mixes microorganisms with sewage; good contact between microorganisms and solids; more collisions; (aerobic) respiration; R if anaerobic respiration microorganisms produce carbon dioxide; gain / release / transfer, energy; (for) growth; (for) reproduction; to make enzymes; A ref. to digestion	[max 4]	A microbes / bacteria		
(d)	to start the breakdown of the sewage quickly; continuous process; do not have to, breed / buy, the microorganisms; idea of without waiting for the lag phase;		A 'the right organisms to digest the sewage' A ref. to cost / less wastage of microbes A keeps the population of microbes constant idea R 'to save time' unqualified R 'to use over and over again'		
(e)	destroys / kills, bacteria / microorganisms; prevents spread of, disease / pathogens;		R disinfection R 'removes bacteria'		