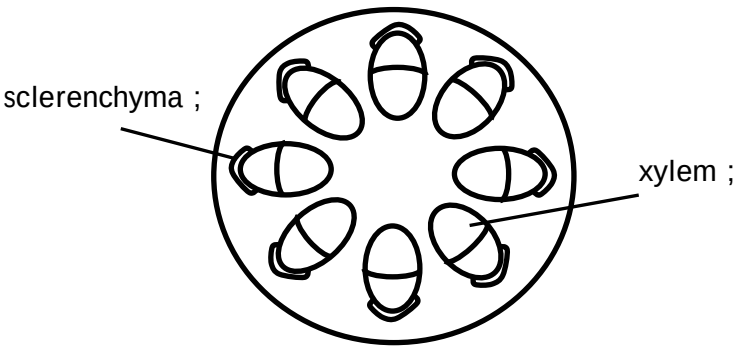
Question Number	Answer	Mark
1(a)	1. some people with (new) drug and some without (new) drug / eq ; 2. use placebo / description (e.g. sugar-coated dummy pill) /old drug ; 3. {doctors / eq} and {subjects / eq} do not know who is on (new) drug or who is not /eq ; 4. to see if new drug works better than {placebo / old drug}/eq ; 5. reduces bias /eq ;	**max (3)**

Question Number	Answer	Mark
1 (b)(i)	glycosidic ;	**(1)**

Question Number	Answer	Mark
1(b)(ii)	{ α / alpha} glucose ;	**(1)**

Question Number	Answer	Mark
1(b)(iii)	1. {bioplastic / starch} comes from {plants / eq} ; 2. {plants / starch} are renewable ; 3. oil-based plastic is from non-renewable resource / eq ;	**max (2)**

Question Number	Answer	Mark
1(b)(iv)	will not accumulate / not contribute to landfill / can be decomposed / eq ;	**(1)**

Question Number	Answer	Mark
1(c)		**(2)**

Question Number	Answer	Additional Comments	Mark
2 (a)	QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence) 1. idea that 18 individuals is a small population / small gene pool / low genetic diversity / may have been closely related / eq ; 2. captive breeding will increase population ; 3. studbooks /records kept of breeding programme / eq ; 4. (zoos) select mates ; 5. inter-zoo exchange of animals for breeding / eq ; 6. idea of the need to prevent inbreeding ; 7. idea of avoiding genetic drift ; 8. use of { IVF / AI / use of surrogates } ; 9. process for measuring genetic diversity described, e.g. DNA profiling / eq ;	QWC emphasis is clarity of expression ACCEPT reference to 'species' instead of ferret which may arise due to the wording of question. 4. ust refer to human intervention – not just the ferrets choosing their mates 6. NOT 'interbreeding' in place of 'inbreeding'. ACCEPT 'encourage outbreeding' e.g. ferrets not mated with closely related ferrets	**(5)**

Question Number	Answer	Additional Comments	Mark
2 (b)(i)	1. (captive) population not large enough / number of births is low / eq ; 2. individuals not mature enough / eq ; 3. zoos preparing ferrets for release / eq ; 4. idea of maintaining a population in zoos ;		**(2)**

Question Number	Answer	Additional Comments	Mark
2 (b)(ii)	1. number of <u>births</u> is rising / eq ; 2. increase in population : 3. idea that more are born than are released e.g. at least 200 births each year ; 4. identification of years when number of <u>births</u> fell, i.e. 1994 or 2000 ; 5. correct manipulation of data ;	3. Or som understanding that the increases outweigh the decreases, e.g. between 1991-1999 it increased by 230, but only fell by 170 to 2000 from 1999 5. Some examples ar shown below Year / fference / % *1991-2000 – mp3* / *(220-280) 60* / *(+) 27 / 27.3* 1991- 1999 / (220-450) 230 / (+) 105 / 104.5 1999-2000 / (450-280) 170 / (-) 38 / 37.8	**(2)**

Question Number	Answer	Additional Comments	Mark
2 (c)		Factors provided may either improve or reduce survival chances	
	1. idea of habitat as a factor, e.g. loss of habitat / wider range of habitats / eq ;	1. climate change n be accepted here as a factor affecting availability of suitable habitat
	2. availability of { prey / food / prairie dogs /eq } ;	ACCEPT description of human activity that could lead to loss or gain of habitat
	3. competition with other ferrets (for resources) ;	3. Intrasp ific competition
	4. competition with other species (for resources) / eq ;	4. Interspecific competiti
	5. effect of eating { poisoned prairie dogs / poison put out for prairie dogs } / eq ;	
	6. presence of { predators / hunters } / eq ;	
	7. preparation for living in the wild improves chance of survival / if reliant on humans would not survive ;	7. e.g. kept in semi-wi conditions initially and hunting behaviour encouraged
	8. idea of too few to be a viable breeding population ;	
	9. idea of presence of disease ;	**(3)**

Question Number	Answer	Additional guidance	Mark
3(a)	1. reference to increase in {metabolic rate / enzyme activity / eq} as temperature rises ; 2. reference to increase in {kinetic / eq} energy of molecules (as temperature rises) / eq ; 3. reference to increase in {enzyme-substrate complexes / energy of collisions / eq} (as temperature rises) ; 4. idea of {inactivation at lower temperatures/ denaturation at higher temperatures} of enzymes ; 5. idea that temperature affects {differentiation / growth /division / eq} ;	**1. Accep** converse argument for mp 1 – 3 **2. Acce** movement **4.Accept** the idea that enzyme-substrate complexes cannot be made if denaturing	**(3)**

Question Number	Answer	Additional guidance	Mark
3(b)	1. idea that temperature affects {survival / development / growth / metabolism / cell division / eq} ; 2. idea that enzymes affect {development / growth / metabolism / cell division/ eq} ; 3. idea that temperature affects enzymes ; 4. idea that different frogs have different enzymes ;		**(2)**

Question Number	Answer	Additional guidance	Mark
3(c)	*sylvatica*, *pipiens*, *palustris*, *clamitans* ; ;	if order correct but reversed = 1 mark	**(2)**

Question Number	Answer	Additional guidance	Mark
3(d)	1. idea that different species are reproductively isolated ; 2. idea of different breeding {times / seasons / eq} ; 3. idea of different {breeding / courtship / eq} {behaviour / rituals / displays / colour / songs / croaks / eq} ; 4. idea that population at {northerly / southerly} limit of range may not develop (to adulthood) ; 5. idea that breeding between different species results in infertile offspring ;	**3. Acce** idea of incompatible {genitalia / gametes}	**(3)**

Question Number	Answer	Additional guidance	Mark
3(e)	1. idea that global warming will increase the temperature (at the latitudes) ; 2. idea that temperatures (at these latitudes) may become too high for any of the species ; 3. idea that new temperature may be above the maximum to complete development or above the upper lethal limit ; 4. idea that species move {north / to cooler regions / eq} ; 5. ref to change in {food source / predators / competition / eq} ;	**2.Accept** become extinct	**(3)**

Question Number	Answer	Mark
4(a)(i)	C – hydrolysis ;	**(1)**

Question Number	Answer	Mark
4(a)(ii)	C – glucose ;	**(1)**

Question Number	Answer	Mark
4(b)	1. reference to {low pH / (hydrochloric) acid / HCl / eq} ; 2. idea that acid destroys bacteria ; 3. reference to {low / no} oxygen ; 4. reference to using anaerobic respiration ; 5. idea of resistant to {(stomach) enzymes / protease / named protease} ; 6. idea of bacterial cell resistant to digestion ; 7. ref to adaptation to cow's temperature ;	**(3)**

Question Number	Answer	Mark
4(c)(i)	1. group A = 720 and group B = {662 / 662.4} ; 2. units correct = {dm^3 day^{-1} / dm^3 per day} ;	**(2)**

Question Number	Answer	Mark
*** 4(c)(ii) QWC**	**Take into account quality of written communication when awarding the following points.** 1. reference to less {*greenhouse gas* / *methane* / *carbon dioxide*} ; 2. *carbon dioxide* and *methane* are (both) {*greenhouse gases* / cause *greenhouse effect*} ; 3. (that can) {*absorb* / trap / eq} {*heat* / *infra red* / longer *wavelengths*} (*radiation*) ; 4. {*reflected* / eq} from the Earth / eq ; 5. reference to decrease in {these gases / *carbon dioxide* / *methane*} leads to {reduced / eq} *greenhouse* effect ; 6. idea of *methane* having a greater *greenhouse* effect than *carbon dioxide* ; 7. idea of *temperature* of {Earth's surface / *atmosphere*} less likely to rise ; 8. reference to reduced possibility of *climate* change ; 9. description of example of effect of this (e.g. ice caps melting, crop failure) ;	**(5)**