Question 1 : N/A

Question Number	Answer	Mark
2(a)(i)	between 7 and 8 <u>hours</u> / 8 <u>hours</u> ;	(1)

Question Number	Answer	Mark
2(a)(ii)	1. idea of not enough time (in the dark) ; 2. idea that {Pfr /active phytochrome} levels remain too high ; 3. reference to threshold e.g. once Pfr below a certain level (flowering happens) ; 4. flowering {stimulated / eq} (by fall in Pfr) ;	max (2)

Question Number	Answer	Mark
2(b)	1. reference to control ; 2. idea of comparison e.g. to show that flowering would not happen (without the cover) / eq ;	(2)

Question Number	Answer	Mark
2(c)	1. six hours too short (to cause flowering in plant E) / eq ; 2. eight hours {is long enough / causes flowering / eq} ; 3. idea of enough stimulus if part of the plant is in the dark for {8 hours / long time / enough time / eq} ; 4. leaf is (photo) receptor / eq ; 5. {phytochrome / Pfr / Pr} in leaves ; 6. signal must be passed to {growing points/site of flower production} from leaves / eq ;	max (4)

Question Number	Answer	Mark
2(d)	1. idea of {flowering / development /eq} happens at the right time ;	
	2. therefore flowers when insects available / leaf fall in autumn / same species flower at the same time / seeds germinate at the right time / eq ;	
	3. idea that day length changes to a set pattern e.g. always {short days in winter / long days in summer} ;	
	4. comparison with other less regular stimuli e.g. temperature ;	max (3)

Question Number	Answer	Mark
3(a)	1. (L-Dopa) can reach brain / unlike dopamine treatment / eq; 2. converted to dopamine (in brain) / eq ; 3. increases dopamine levels in the brain / eq ; 4. Parkinson's disease has low dopamine levels / reduces symptoms of Parkinson's disease / eq ;	**max (2)**

Question Number	Answer	Mark
3(b)	1. reference to {higher levels of / more} serotonin / eq ; 2. reference to synapse / eq ; 3. {inhibits / eq} reabsorption (into neurone) / eq ; 4. may reverse pumps to release more serotonin / eq ;	**max (3)**

Question Number	Answer	Mark
3(c)(i)	to mimic Parkinson's disease / Parkinson's disease has low dopamine levels / eq ;	(1)

Question Number	Answer	Mark
3(c)(ii)	1. (rationalist view) overall good should outweigh harm (to animals) ; 2. (absolutist view) all use (of animals) unacceptable ; 3. idea of as few animals as possible used in the trial ; 4. welfare of animals should be important / eq ;	**max (3)**

Question Number	Answer	Mark
3(d)	1. test {small sample / eq} {for safety / of healthy individuals} / eq ; 2. large sample of {patients / tested for effectiveness} / eq ; 3. reference to clinical trials on {1000s / larger sample} ; 4. reference to double blind {trials /tests} ; 5. reference to placebo ; 6. idea of representative sample e.g. take into account sex, age ;	**max (3)**

Question 4 & 5: N/A

Question Number	Answer	Mark
6(a)	1. idea that stimulation generated from within (muscle) e.g. no external stimulation ;	
	2. idea of brings about depolarisation ;	(2)

Question Number	Answer	Mark
*6(b) QWC	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence)	
	1. reference to {*Sinoatrial node / SAN*} ;	
	2. initiates *depolarisation* / eq ;	
	3. passes through (wall of) *atria* / eq ;	
	4. causes *atrial* {*systole* / eq} ;	
	5. *AVN* conducts to *ventricles* / eq ;	
	6. reference to {*Purkyne* fibres / bundle of *His*} ;	
	7. ventricular {*systole* / eq} follows (from apex) / eq ;	
	8. atrioventricular valves closed (and prevent flow to atria) ;	
	9. *semilunar* valves opened by pressure / eq ;	
	10. blood forced into *arteries* / eq ;	max (6)
	11. changed pressure in {*diastole* / eq} closes *semilunar* valves ;	

Question Number	Answer	Mark

7(a)	1. rhodopsin / iodopsin ;
	
	Any one from:
	
	2. broken down by light /
	
	   / generates {action potentials / nerve impulses} /
	
	   / appropriate reference to {black and white / monochromatic / colour / trichromatic} vision ;
		max (2)

Question Number	Answer	Mark
7(b)	1. sequencing of human DNA / eq ; 2. {provides knowledge / eq} of human genetics / eq ;	(2)

Question Number	Answer	Mark
7(c)	1. lifestyle / environmental factors / eq ; 2. such as {carcinogens / eq} ; 3. such as {diet / obesity / inactivity} / eq ; 4. such as infections / eq ; 5. genes may make it more likely / eq ;	max (3)

Question Number	Answer	Mark
7(d)	1. gene {needs to be switched on / expressed / eq} ; 2. by transcription factors / eq ; 3. in order to produce {mRNA / protein / CFTR} ; 4. (transcription factors) might not be present / eq ;	max (3)

Question Number	Answer	Mark
*7(e) QWC	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence) 1. triplet code / eq ; 2. represents amino acid (sequence) / eq ; 3. (mRNA) binds to ribosome / eq ; 4. reference to {anticodon / codon} ; 5. tRNA decodes mRNA / provides correct amino acid / eq ; 6. idea of two tRNA sites in the ribosome ; 7. two amino acids brought together / eq ; 8. joined with peptide bond / eq ; 9. reference to peptidyl transferase ; 10. idea that sections of DNA are {templates for / transcribed into} RNA ;	**max (6)**

Question Number	Answer	Mark
7(f)	1. bonds to DNA / eq ; 2. idea of sequence of bases recognised ; 3. (sequence of bases) has unique shape / eq ; 4. idea of bonding in DNA recognised ;	**max (2)**

Question Number	Answer	Mark
7(g)	1. accumulation of small mutations / eq ;	
	2. changes existing genes / eq ;	
	3. idea of gene duplication and one mutates ;	
	4. which allows mutation without losing function ;	
	5. (subfunctionalism) separates functions into separate genes / eq ;	
	6. (retroposition) produces DNA {without introns / from mRNA} / eq ;	
	7. idea of (frameshift) reads genetic code from new starting point ;	
	8. idea that junk DNA can become an active gene ;	max (5)

Question Number	Answer	Mark
7(h)	1. causes inflammation / eq ;	
	2. atheroma can lead to atherosclerosis / eq ;	max (2)

Question Number	Answer	Mark
7(i)	1. idea of non-overlapping code ;	
	2. reference to {start codon / there is a frame / RNA polymerase binding site} / eq ;	
	3. only one {template / eq} strand / eq ;	
	4. reference to direction of reading of strand e.g. 5'-3' ;	max (2)

Question Number	Answer	Mark
8(a)	1. idea of the {role / purpose / interaction / eq} of {organism / sea anemone / species / eq} ; 2. reference to trophic level(s) ; 3. it is a predator/ controls population of prey / eq ; 4. it is prey / provides food for other animals / eq ; 5. provide {shelter / home /eq} for some animals / eq ;	**(3)**

Question Number	Answer	Mark
8(b)	1. idea of reduces surface area (to volume) ; 2. idea of less water loss e.g. dehydration, drying out ; 3. idea of reduces visibility (to predators) ; 4. idea of protection from {predators / carnivores / named eg} ; 5. idea that there is no need for the tentacles to be exposed ; 6. energy {will be conserved /will not be wasted/ eq} ;	**(3)**

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

Question Number	Answer	Mark
8(c)(ii)	1. idea of no indication that temperature has an effect e.g. little variation, only 2°C ; 2. idea that distribution is influenced by height (above low water mark) ; 3. idea of more likely to dry out at higher levels ; 4. idea of food availability differs e.g. less at higher levels, more at lower levels ; 5. idea of more likely to be eaten at lower levels ;	**(3)**

Question Number	Answer	Mark
8(c)(iii)	1. plot graph(s) of numbers of anemones against {height and temperature / abiotic factors / eq} ; 2. reference to correlation ; 3. idea of using statistical analysis ; 4. named appropriate statistical test ;	**(2)**

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

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

Question Number	Answer	Mark
9(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
9(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
* 9 (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)**

Question Number	Answer	Mark
10(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
10(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
10(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)**