Number		
1(a)(i)	A ;	**(1)**

Question Number	Answer	Mark
1(a)(ii)	D ;	**(1)**

Question Number	Answer	Mark
1(a)(iii)	A ;	**(1)**

Question Number	Answer	Mark
1(b)	1. ref to thylakoids ; 2. (made of) membranes ; 3. (arranged as) {stacks / grana / eq} ; 4. contain {pigment / chlorophyll} / eq ; 5. (arranged as) quantasomes / photosystems ;	**maximum (3)**

Question Number	Answer	Mark
1(c)(i)	1. (62.4 / 162) x 100 ; [accept alternative correct working] 2. 38.5(%) ; [must be to 1 dp]	**(2)**

Question Number	Answer	Mark
1(c)(ii)	1. ref to different lighting has little effect / little variation in percentage grain yields ; 2. variation in percentage is less than 3 / eq ; 3. which is (probably) {not significant/ insignificant} ; 4. yield is {less / eq} for low pressure sodium lamps ; 5. the best yield is metal halide / eq ;	**maximum (3)**

Question Number	Answer	Mark
1(c)(iii)	Any **two** from 1. crops can be grown {out of season / all year round} / eq ; 2. plants photosynthesise 24 hours a day / eq ; 3. idea of less physical damage from {weather / animals / eq} ; 4. pest control easier / eq ; 5. ref to control of other named factor, eg CO_2, temperature, humidity, water supply ;	**maximum (2)**

Question Number	Answer	Mark
2(a)(i)	1. {carbon dioxide and methane / both / they / eq} are greenhouse gases ; 2. {trap / absorb} {heat / infra red / long wave radiation / eq} / eq ; 3. idea of reflected from Earth's surface / re-radiation ; 4. mean temperature of Earth's surface increases / eq ;	**maximum (3)**

Question Number	Answer	Mark
2(a)(ii)	appropriate comment on changes in production of gases e.g. higher estimate assumes no change in production of gases / lower estimate takes into account reduction in carbon emissions ;	**(1)**

Question Number	Answer	Mark
2(b)(i)	1. (in 2000) range of mean temp means that both males and females hatch / eq ; 2. as temperature rises {more males / fewer females} (will hatch) / eq ; 3. therefore reproduction rate falls ; 4. leading to {fall in population / extinction / eq} ; 5. if temperature rises above 22^{o}C {only males / no females} will hatch / eq ; 6. lower estimate never reaches point where only males hatch / eq ;	**maximum (4)**

Question Number	Answer	Mark
2(b)(ii)	1. fewer {prey / eq} eaten (by tuataras) / eq ; 2. {prey /eq} increase (in number) ; 3. other {carnivores / eq} may increase / eq ; 4. because less competition for food (from tuataras) / eq ; 5. predator of tuatara might {decrease / eat other prey / migrate} / eq ;	**maximum (2)**

Question 3) N/A

Question Number	Answer	Mark
4(a)(i)	<table><tr><th>Statement</th><th>TRUE</th><th>FALSE</th></tr><tr><td>This sequence of bases could be used as a template during translation</td><td></td><td>☒</td></tr><tr><td>A strand of mRNA could be synthesised using this sequence</td><td>☒</td><td></td></tr><tr><td>This sequence codes for 7 amino acids during protein synthesis</td><td>☒</td><td></td></tr></table> 1 mark each correct box ;;; [crosses in both boxes for a statement = 0]	**(3)**

Question Number	Answer	Mark
4(a)(ii)	1. ribosomes / RER / rough endoplasmic reticulum / poly(ribo)some ; 2. descriptive feature e.g. (for ribosome or polysome) {ribosomal RNA / rRNA} / protein component / {two sub-units / large and small sub-unit} (for RER) ribosome attached to membrane ;	**(2)**

Question Number	Answer	Mark
4(b)(i)	1. {change / eq} in DNA ; 2. ref to {change / deletion / addition / duplication / substitution / eq} of {bases / nucleotides} ;	**(2)**

Question Number	Answer	Mark
4(b)(ii)	1. correct reference to change in frequency of either allele e.g. mutant increases / normal decreases ; 2. idea of reproductive success of the {mutant / non-photosynthetic} individuals ; 3. (as trees develop) pond will be (more) shaded / eq ; 4. (less light means) less photosynthesis possible / eq ; 5. ref to photosynthetic individuals die / {non-photosynthetic / mutant} individuals survive ; 6. ref to pass on the {mutation / allele} (for using organic compounds) / eq ; 7. ref to more organic nutrients in pond ;	**maximum (4)**

Question Number	Answer	Mark
5(a)(i)	C ;	**(1)**

Question Number	Answer	Mark
5(a)(ii)	B ;	**(1)**

Question Number	Answer	Mark
5(a)(iii)	1. (S/ suspect) 3 ; 2. (S3) matches {all / 9 / eq} of the bands in the sample ; 3. DNA profiling assumes every individual's DNA is {unique / different} / eq ; 4. apart from identical twins / eq ; 5. ref to DNA profiling analyses the {introns / non-coding blocks / STR / short tandem repeats / eq} ; 6. non-coding DNA {very variable / hypervariable / eq} ; 7. large number of {introns / non-coding blocks / eq} ; 8. idea of many {combinations / eq} (at each locus) ;	**maximum (5)**

Question Number	Answer	Mark
5(b)	1. ref to DNA profiling has several stages ; 2. ref to {artefacts / contamination / eq} can arise at any stage ; 3. only {a few sequences / small portion } of DNA analysed / eq ; 4. ref to possibility of two identical profiles from unrelated individuals ; 5. {identical twins / closely-related individuals / eq} may show same profile / eq ;	**maximum (2)**

Question Number	Answer	Mark
5(c)	1. comparisons made between DNA from fossils and other organisms ; 2. to find genetic relationships / how closely related / eq ; 3. ref to used in {taxonomy / classification / eq} ; 4. to understand evolutionary lines / to determine common ancestor / eq ;	**maximum (2)**

Question Number	Answer	Mark
6(a)	1. RNA in HIV and DNA in {bacterium / eq} ; 2. comparative description of nucleic acid e.g. circular in bacterium and linear in HIV / eq ; 3. plasmids in {bacterium / eq} and no plasmids in HIV ;	**maximum (2)**

Question Number	Answer	Mark
6(b)	1. {keratin / protein} in skin {surface / epidermis} ; 2. idea of forms a {hard / impenetrable / physical / eq} barrier ;	**(2)**

Question Number	Answer	Mark
6(c)(i)	1. numbers decrease / eq ; 2. small decrease in {first week / between weeks {4 / 5} and 6} / eq ; 3. large decrease between weeks {1 / 2} to 3 / eq ; 4. credit use of manipulated figures ;	**maximum (2)**

Question Number	Answer	Mark
6* (c)(ii) QWC	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence) 1. {*glycoprotein* / gp120} on virus / eq ; 2. binds with {receptors / CD4} / eq ; 3. on (surface) membrane of *lymphocytes* / eq ; 4. viral RNA enters the *lymphocyte* / eq ; 5. viral RNA used to produce viral DNA (in *lymphocyte*) / eq ; 6. by action of *reverse transcriptase* ; 7. ref to formation of new viruses ; 8. *lymphocyte* destroyed when new viruses {bud out of / leave} the cell / eq ; 9. T killer {cells / *lymphocytes*} destroy T helper {cells / *lymphocytes*} / eq ;	**maximum (5)**

Question Number	Answer	Mark
6(c)(iii)	B {cells / lymphocytes} { not activated / not stimulated / are inhibited / eq} / fewer antibodies / T killer cells {increase / multiply / eq} ;	**(1)**

Question Number	Answer	Mark
7(a)(i)	1. hydrogen ; 2. glycosidic ;	**(2)**

Question Number	Answer	Mark
7(a)(ii)	sclerenchyma (fibres) ; xylem (vessels) ; cellulose (fibre) ;	**maximum (2)**

Question Number	Answer	Mark
7(b)	1. ref to {microorganisms / microbes / bacteria / fungi / eq} ; 2. ref to respiration of (microorganisms / bacteria / fungi / eq) ; 3. ref to aerobic / anaerobic (respiration) ; 4. converts {organic compounds / eq} to carbon dioxide / eq ; 5. converts {nitrogen compounds / proteins / amino acids/ urea} to ammonia / eq ;	**maximum (4)**

Question Number	Answer	Mark
7(c)	1. correct ref to temperature effect ; 2. correct ref to water availability ; 3. correct ref to waterlogging reduces oxygen availability ; 4. correct ref to frozen water ; 5. ref to more {insects / decomposers / eq} in summer ; 6. correct ref to rate of growth of {microorganisms / eq} ; 7. ref to rate of {metabolism / enzyme reactions} ; 8. use of manipulated figures to support above points e.g. {50 / 60} days faster in late summer ;	**maximum (3)**

Question Number	Answer	Mark
8(a)	1. idea of antibiotic is used to {control / kill / prevent reproduction of / eq} bacteria ; 2. bacteriostatic prevent {reproduction / division / multiplication / growth / eq} of bacteria; 3. bactericidal {destroy / kill / eq} bacteria ;	**(3)**

Question Number	Answer	Mark
8(b)	1. idea that both more or less the same at {start / end} ; 2. idea that B is higher than A most of the time ; 3. B rises and then falls and A falls and then rises / eq ; 4. ref to both falling after April 04 / eq ; 5. comparative use of figures ;	**maximum (3)**

Question Number	Answer	Mark
8(c)(i)	D {has the lowest rate of MRSA infection (throughout) / is consistent / has less fluctuation} / eq ;	**(1)**

Question Number	Answer	Mark
8(c)(ii)	1. D has {stricter / eq} hygiene practices / eq ; 2. ref to hand washing regimes for {doctors / nurses / medical staff / visitors} ; 3. particularly when dealing with open {wounds / eq} / eq ; 4. ref to wearing suitable clothing ; 5. ref to antiseptic (solutions) readily available ; 6. named antiseptic e.g. gels, pastes, alcohol rubs ; 7. ref to {isolation of suspected cases / screening of admissions} / eq ; 8. D {controls / monitors} use of antibiotics / eq ; 9. fewer {patients / visitors} passing in and out ;	**maximum (3)**