

Question Number	Answer	Additional Guidance	Mark
1(a)	<ol style="list-style-type: none"> 1. protein coat / eq ; 2. no { cytoplasm / cell surface membrane present / eq } ; 3. contains { viral genetic material / eq } ; 4. very small / smaller than a bacterium / size stated ; 5. response to antivirals / eq ; 	<p>1. ACCEPT capsid</p> <p>2. ACCEPT no ribosomes, no organelles</p>	(2)

Question Number	Answer	Additional Guidance	Mark
*1(b)	<p>(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> 1. identify a gene that {provokes an effective immune response / codes for {antigen / eq} / inhibits <i>T. gondii</i> entering {brain/muscle} cells} ; 2. gene removed using a {restriction enzyme / endonuclease} ; 3. {same / this / eq} restriction enzyme used to open { <i>T. gondii</i> genome / eq} / eq ; 4. sticky ends {formed / eq} ; 5. ligase used to bind gene / eq ; 6. by forming phosphodiester bonds / eq ; 7. idea of method of introducing gene into pathogen ; 8. idea that gene needs to be expressed e.g. protein synthesised ; 9. idea of this protein in provoking an immune response ; 10. detail of immune response ; 	<p>QWC with emphasis on clarity of expression</p> <p>3. NOT plasmid cut open</p> <p>7. IGNORE plasmid</p> <p>8. ACCEPT synthesises antigen</p>	(6)

Question Number	Answer	Additional Guidance	Mark
1(c)	<ol style="list-style-type: none"> idea that it binds to wasp venom so it {is removed from / can no longer bind to} receptor ; idea that breaks down wasp venom so it leaves receptor ; idea that wasp venom binds more readily to it than to the receptor ; idea of the nature of the compound e.g. enzyme ; 		(2)

Question Number	Answer	Additional Guidance	Mark
1(d)	<ol style="list-style-type: none"> idea that mass of ants and mass other insects compared ; in a measured area / reference to quadrat ; samples taken from other habitats / eq ; reference to extrapolate to world scale ; 		(3)

Question Number	Answer	Additional guidance	Mark
1(e)	<ol style="list-style-type: none"> reference to transcription factors ; bind to promoter region / form a transcription initiation complex / eq ; RNA polymerase can bind /eq ; mRNA made ; idea of translation occurring ; at ribosomes / on the RER / in the cytoplasm ; idea of function of product e.g. inhibits normal ant behaviour / stimulates abnormal ant behaviour / description of abnormal behaviour given ; idea of product affecting nervous system ; 	<ol style="list-style-type: none"> ACCEPT gene switched on ACCEPT protein/polypeptide produced 	(5)

Question Number	Answer	Additional Guidance	Mark
1(f)	1. {sequence of bases / eq} on DNA that codes for a {polypeptide/protein/eq} ; 2. that regulates circadian rhythms / description given ;	2. ACCEPT idea that gene is activated at certain times of the day such as near noon	(2)

Question Number	Answer	Additional Guidance	Mark
1(g)	1. (signals are) {calcium ions / Ca ²⁺ } ; 2. less (Ca ²⁺) binding to troponin so less tropomyosin {displaced / eq} ; 3. so less myosin binding sites exposed (on actin) / less myosin binds (to actin) ; 4. so there is a lack of muscle use / eq ; 5. idea that muscle atrophy means muscle (mass) reduction	5. ACCEPT muscle wastage for muscle reduction	(4)

Question Number	Answer	Additional Guidance	Mark
1(h)	1. idea of unsuccessful breeding programme e.g.(fungi) unable to breed together / eq ; 2. could not produce sexually viable offspring / eq ; 3. they had {few (homologous) features in common / morphological differences / different chromosome number / eq} ; 4. { DNA / eq } compared ; 5. Use of electrophoresis ; 6. {banding / eq } did not match / eq;	1. ACCEPT cannot interbreed 4. ACCEPT DNA hybridisation, molecular phylogeny, proteomics 5. ACCEPT DNA profiling 6. ACCEPT converse	(4)

Question Number	Answer	Additional Guidance	Mark
1(i)	1. contains xylem / eq ; 2. idea that it is strong enough (to support the ant/fungus) ; 3. leaf supplies {a nutrient/named nutrient/water} to fungus ; 4. idea of enables effective spreading of fungal spores e.g. enables dispersal, effective reproduction ;		(2)

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2(a)	<table border="1"> <thead> <tr> <th></th> <th>Fibrous</th> <th>G</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>insoluble / large</td> <td>Soluble / small</td> </tr> <tr> <td>2.</td> <td>hydrophobic on outside</td> <td>hydrophilic on outside</td> </tr> <tr> <td>3.</td> <td>mainly secondary structure</td> <td>3D /folded / compact shape / tertiary / eq</td> </tr> <tr> <td>4.</td> <td>repeated amino acid sequences</td> <td>little repetition</td> </tr> <tr> <td>5.</td> <td>structural / eq</td> <td>enzymes / hormones / eq</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Fibrous	G	1.	insoluble / large	Soluble / small	2.	hydrophobic on outside	hydrophilic on outside	3.	mainly secondary structure	3D /folded / compact shape / tertiary / eq	4.	repeated amino acid sequences	little repetition	5.	structural / eq	enzymes / hormones / eq							<p>Do not piece together</p> <p>3 ACCEPT chains / straight proteins IGNORE quaternary</p>	(3)
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*2(b)	<p>(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> reference to { <i>post-transcriptional modification / splicing</i> } (of mRNA) ; reference to <i>spliceosomes</i> ; reference to {removal / eq} of <i>introns</i> ; idea that different {number / length} of <i>exons</i> are put together (in the different sexes) ; idea that the length of the <i>mRNA molecules</i> will be different (for males and females) ; idea that the longer mRNA will have more <i>codons</i> ; and therefore more <i>amino acids</i> will be coded for ; reference to (during) <i>translation</i> ; idea of removal of some amino acids post-translation ; 	<p>QWC emphasis is on correct spelling of biological terms</p> <p>1 ACCEPT post-transcriptional changes</p> <p>7 ACCEPT converse</p> <p>8 in the context of Mp7 ACCEPT converse</p>	(6)