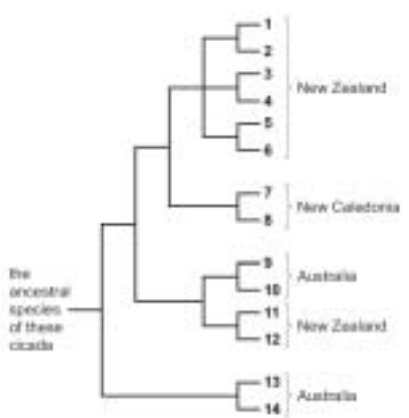
| Question | | Marks | Additional Guidance |
|---|---|---|---|
| 1 (a) | nucleus:<br>**1** controls (activities in) the cell / AW;<br>**2** contains, chromosomes / genes / alleles / genetic information / DNA;<br>**3** controls how cells, develop / divide / reproduce / grow;<br><br>**4** cell membrane:<br>**5** forms a barrier / separates a cell from surroundings;<br>**6** allows / controls, movement of (named) substance(s), across / in / out; keeps contents of cell inside / keeps cytoplasm intact / AW; | **max 4** | **I** 'brain' of cell / 'tells cell what to do'<br>**MP1 A** ref to making proteins<br>**A** makes ribosomes<br><br>e.g. $O_2$ / $CO_2$ / nutrients<br>**I** ref to shape / 'covers cell' / protects cell |
| (b) | a group of cells, same type / do the same function; | **1** | cells are in the same place = group |
| (c) | **1** mucus traps, particles / any example;<br>**2** mucus protects lining;<br>**3** (cilia) beat / create wave motion / wafting;<br>**4** move, mucus / fluid away;<br>**5** reduce risk of / stop, (named) pathogens entering lungs; | **max 3** | e.g. dust / bacteria / spores / virus<br>**I** 'collects' particles |
| | | **[Total: 8]** | |

<table>
<tr><th>Question</th><th></th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>2 (a)</td><td>A – (waxy) cuticle;<br>B – palisade mesophyll / palisade layer / palisade cell;<br>C – (lower) epidermis / epidermal layer;<br>D – stoma / stomata / guard cell(s);<br>E – air / gas, space;</td><td>5</td><td>I outer layer / AW<br>R mesophyll / palisade unqualified<br><br>R (spongy) mesophyll</td></tr>
<tr><td>(b)</td><td><table>
<tr><th>function</th><th>letter from Fig. 1.2</th></tr>
<tr><td>controls movement of substances into and out of the cell</td><td>G</td></tr>
<tr><td>creates a pressure to maintain the shape of the cell</td><td>K</td></tr>
<tr><td>produces sugars using light as a source of energy</td><td>L</td></tr>
<tr><td>withstands the internal pressure of the cell</td><td>J</td></tr>
<tr><td>controls all the activities of the cell</td><td>F</td></tr>
</table></td><td>5</td><td></td></tr>
</table>

| Question | | Marks | Guidance for Examiners |
|---|---|---|---|
| 2 (c) (i) | volume of, oxygen / gas, increases (with time);<br>levels off / reaches a plateau / AW;<br>increases rapidly at start and then slows down**;**<br>use of data; | **max 3** | **I** 'reaction stops'<br><br>e.g. levels off at 6.2 $cm^3$ of oxygen at 90 seconds<br>data quotes must have units |
| **(ii)** | substrate / hydrogen peroxide / reactant / AW, fits into enzyme;<br>active site;<br>shape is, complementary / AW;<br>any reference to lock and key;<br>product(s) / oxygen and water, formed and leaves the enzyme;<br>AVP; | **max 3** | **A** answers in the context of catalase<br>**I** 'speeds up the reaction'<br>**R** if shape is the same<br><br>**A** product and enzyme separate<br>e.g. enzyme can work again / enzyme not used up / enzyme is not changed during reaction / lowers activation energy |
| | | **[Total: 16]** | |

<table>
<tr><th>Question</th><th></th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>3 (a)</td><td>
<table>
<tr><th>structural feature</th><th>animal cell</th><th>plant cell</th></tr>
<tr><td>cell wall</td><td>×</td><td>✓</td></tr>
<tr><td>nucleus</td><td>✓</td><td>✓;</td></tr>
<tr><td>(cell) membrane</td><td>✓</td><td>✓;</td></tr>
<tr><td>cytoplasm</td><td>✓</td><td>✓;</td></tr>
<tr><td>chloroplast</td><td>×</td><td>✓;</td></tr>
<tr><td>(large) vacuole</td><td>×</td><td>✓;</td></tr>
<tr><td>vacuolar sap</td><td>×</td><td>✓;</td></tr>
<tr><td>vacuolar membrane / tonoplast</td><td>×</td><td>✓;</td></tr>
<tr><td>nuclear membrane</td><td>✓</td><td>✓;</td></tr>
<tr><td>nucleolus</td><td>✓</td><td>✓;</td></tr>
</table>
</td><td>max 4</td><td>mark nucleus and next 3 answers<br><br>R chlorophyll</td></tr>
</table>

| | | | |
|---|---|---|---|
| 3 **(b)** | water moves (in) by <u>osmosis</u>;<br>down a water <u>potential</u> gradient / from high water <u>potential</u> to low water <u>potential</u>;<br>through partially permeable membrane;<br>(both cells / vacuole) enlarge / swell / increase in volume;<br><u>animal</u> cell bursts;<br><u>plant</u> cell becomes turgid / AW; | **max 4** | **I** water concentration<br>**A** semi / selectively<br>**A** cell wall prevents bursting |
| **(c) (i)** | phloem; | **1** | |
| **(ii)** | (transport of sucrose out of the leaves) is low(er) in, **B** / magnesium-deficient plants; **ORA**<br>any data quote about **B**;<br><br>(sucrose concentration in the leaves) is high(er) in, **B** / magnesium-deficient plants; **ORA**<br>any data quote about **B**; | **4** | assume "it" refers to B<br>A – B = 2.4 – 2.6, A is 3 – 4 times more<br>B > 100, A – B = approx 90, A approx 10 times more |
| **(iii)** | max 2 for symptoms<br>yellowing leaves / chlorosis / necrosis;<br>less / stunted, growth;<br>more sugar in leaves**;**<br><br>max 2 for explanation<br>plants that are deficient in magnesium make, less / no, chlorophyll;<br>less photosynthesis;<br>less (named) sugar available to plant (due to reduce photosynthesis / reduced sucrose transport); | **max 3** | **I** stunted roots<br>**A** magnesium is part of chlorophyll<br>**I** energy / food (for sugar) |
| | | **[Total: 16]** | |

| Question | | E | Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 4 | **(a)** | | body divided into/segmented three parts / head, thorax and abdomen<br>(one pair of) antennae / feelers<br>wings<br>three pairs / 6 legs<br>compound eyes | [max 3] | **R** segmented body unqualified<br>*do not accept arthropod features* |
| | **(b)** | | arthropod / Arthropoda | [1] | **must have** arthr<br>so accept arthropod but reject anthropod |
| | **(c)** | | chromosome<br>nucleus<br>mitochondria<br>chloroplast<br>plasmid<br>nucleolus | | Note: Apply list rule |
| | **(d)** | **1**<br>**2**<br>**3**<br>**4**<br><br><br>**5** | two groups: 1 – 6 and 11 & 12 migrate to New Zealand<br>1 – 6, New Caledonia / indirect / migration A<br>11&12, direct (Australia) / migration B<br>correct example of (evolutionary) relationship / DNA similarity, e.g. 13 & 14 most distantly related from others / 9 & 10 most closely related to each other<br>ref to, clade(s) / cladogram | [max 3] |  |

| | | | | | |
|---|---|---|---|---|---|
| 4 | (e) | **1**<br><br>**2**<br>**3**<br>**4**<br>**5**<br>**6**<br>**7**<br>**8**<br>**9** | adapt to environment / conditions in new places are different<br>competition between individuals<br>struggle for existence<br>ref to variation<br>survival of fittest / those that are better adapted<br>survive<br>reproduce, pass on their alleles; **A** genes **I** traits<br>mutations / changes in DNA<br>change in the gene pool / AW<br>changes to physical / behaviour (of species), e.g. mating behaviour | [max 4] | **A** conditions on different islands are different<br><br>Mpt 9 **R** changes of individuals |
| | | | **[Total: 13]** | | |