### B1 Summary questions

<table>
<thead>
<tr>
<th>Question number</th>
<th>Answer</th>
<th>Marks</th>
<th>Guidance</th>
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</table>
| 1               | Without microscopes we cannot see most cells.  
**Light microscopes**  
show cellular structure of living organisms and some subcellular structures (e.g., nucleus and chloroplasts)  
allow observation of living cells and staining of cells to show different features  
**Electron microscopes**  
enable examination of cells in great detail  
help determine what goes on within individual body cells  
can only be used for dead specimens in a vacuum | 1 | 1 | 1 | 1 |
| 2 a             | A: genetic material  
B: cytoplasm  
C: cell membrane  
D: cell wall  
E: plasmids  
F: flagella | 1 | 1 | 1 | 1 | 1 |
| 2 b             | Labelled diagram of an animal or plant cell.  
size range 10–100 µm | 5 | Diagram should include at least four labelled features. |
| 2 c             | **Similarities**  
• cell walls  
• cell membrane  
• cytoplasm  
**differences**  
Any three from:  
• bacteria cells much smaller than plant cells  
• chloroplasts present in some plant cells  
• permanent vacuoles present in plant cells | 6 | Maximum 3 marks for similarities. Maximum 3 marks for differences.  
Credit any other sensible answers. |
### B1 Summary questions

- **slime capsules present in some bacteria cells**
- **flagella present in some bacteria cells**
- **genetic material contained in chromosomes in a nucleus in plant cell, single DNA loop found free in the cytoplasm with additional small loops of DNA known as plasmids in bacterial cell**

2 d. **bacteria are 1–2 orders of magnitude smaller than eukaryotic cells**  
contain free genetic material  
can reproduce  
mitochondria and chloroplasts are similar in size to bacteria  
contain genetic material so they can reproduce independently of the cell dividing  

3 a. **similarities**  
Any one from:  
- random movement of particles  
- takes place down concentration gradient  
- no energy from respiration involved  
**differences**  
Any one from:  
- only water moves in osmosis  
- movement is across partially permeable membrane in osmosis  

3 b. **similarities**  
both are mechanisms for moving substances in and out of cells  
**differences**  
only specific substances are moved by active transport  
active transport takes place against concentration gradient  
active transport uses energy from cellular respiration  

3 c. Water will move into both A and B by osmosis  
as inside of bag is hypertonic to outside.   
Water will move into bag B faster than into bag A due to higher temperature.
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<tbody>
<tr>
<td><strong>Increased temperature gives increased rate of random particle movement.</strong></td>
<td>1</td>
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<tr>
<td><strong>Increasing the rate at which water particles would pass through the partially permeable membrane and speeding up osmosis.</strong></td>
<td>1</td>
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<td><strong>3 d i</strong> useful model though effects of active transport are not demonstrated</td>
<td>1</td>
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<td><strong>3 d ii</strong> shows what happens inside the cell but does not model effect of cell wall (very important in osmotic events in plant cells)</td>
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<td><strong>4 a</strong> <em>Amoeba</em> is single-celled organism with large surface area to volume ratio.</td>
<td>1</td>
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<tr>
<td>It is able to get sufficient oxygen through diffusion across the cell membrane.</td>
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<tr>
<td>Stickleback is larger, more complex multicellular organism with lower surface area to volume ratio.</td>
<td>1</td>
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<td>Diffusion cannot provide sufficient oxygen for each cell, so a more effective exchange system (gills) is required.</td>
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<td><strong>4 b</strong> Thin filament structure of gills greatly increases surface area available for exchanging gases.</td>
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<td>Pushing water across gills increases rate of oxygen absorption by maintaining steep concentration gradient between water and blood.</td>
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<td>Circulating blood delivers oxygen to cells.</td>
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<td>Removes metabolic waste.</td>
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<td>Maintaining steep concentration gradient at exchange surfaces in gills to increase diffusion further.</td>
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<td><strong>5 a</strong> Any <strong>two</strong> from:</td>
<td>2</td>
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<tr>
<td>• large surface area</td>
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<td>• thin membrane/being thin</td>
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<tr>
<td>• efficient blood supply</td>
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<tr>
<td>• being ventilated</td>
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5 b  | Large surface area provides greater area over which exchange can take place (e.g., villi in small intestine, alveoli in lungs, plant root hair cells).
     | Thin membrane/being thin provides short diffusion path/increased efficiency (e.g., thin leaves, stomata, proximity of alveolar air and blood in lungs, proximity of inside of gut and blood vessels in villi in small intestine).
     | Efficient blood supply maintains steep concentration gradient (e.g., alveoli, gills).
     | Being ventilated maintains steep concentration gradient (e.g., breathing, moving water over gills).

6   | Explanation must match adaptations given in 5 b.
    | 3 marks for each adaptation.