Answer 1a

(a) Three structural features of guard cells are...

Any **three** of the following:

- Thick cell walls facing the air outside the leaf and the stoma and thin cell walls facing adjacent epidermal cells; [1 mark]
- Cellulose microfibrils arranged in bands around the cell; [1 mark]
- Cell walls have no plasmodesmata; [1 mark]
- Cell surface membrane is often folded and contains many channel and carrier proteins; [1 mark]
- Cytoplasm has a high density of chloroplasts and mitochondria; [1 mark]
- Several small vacuoles rather than one large vacuole; [1 mark]

[Total: 3 marks]

The question stem asked specifically about the structure features of the guard cells, so although the chloroplasts and mitochondria are adapted within the guard cells, you would not achieve marks for including them in your answer.

Answer 1b

(b) The steps in the correct order are..

- C, F, D, B, E, A; [1 mark]

[Total: 1 mark]

This is an important process so make sure you are able to describe it confidently. It is the increase in turgor pressure that causes the cell to distort its shape. It's a bit like sticking a piece of Sellotape to a water balloon and then filling it; the balloon will curve around the place where the Sellotape is stuck.

Answer 1c

(c) The process by which water enters the cell as described in step B in part (b) is...

- Osmosis; [1 mark]

[Total: 1 mark]

Answer 1d

(d) The completed sentences are as follows:

[1 mark] for each correct sentence:

- ABA binds with ABA **receptors** on the cell surface membrane of guard cells; [1 mark]
- This inhibits the **proton** pumps and **hydrogen** ions are no longer actively transported out of the cell; [1 mark]
- **Calcium** ions also move into the guard cells which stimulates the opening of further channel proteins that allow **potassium** ions to leave the guard cells; [1 mark]
- Water potential inside the cell **increases** and so water leaves the cell by osmosis. The guard cells become **flaccid** and the stomata close; [1 mark]

[Total: 4 marks]