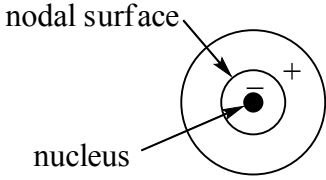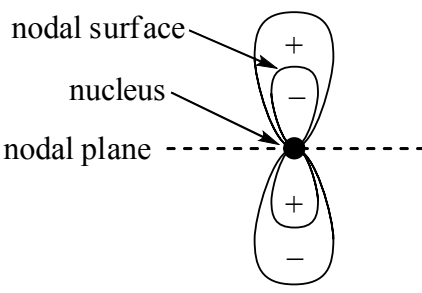|	**Marks**
• Sketch the following wavefunctions using lobe representations. Clearly mark all nodal surfaces, nuclear positions and the relative sign (+ or −) of the wavefunction within the lobes.	**5**

a 2s atomic orbital	a 3p atomic orbital
nodal surface, nucleus	nodal surface, nucleus, nodal plane

Explain the significance of (a) the lobes, (b) the nodes and (c) the sign of the wavefunction, in terms of the probability of finding an electron at a given point in space relative to the nucleus.

(a) The lobes define the volume within which there is a certain probability (*e.g.* 95 %) of finding the electron.

(b) The nodes represent surfaces where there is zero probability of finding the electron. Alternatively (and equivalently), they are the surfaces where the sign of the wavefunction changes.

(c) The sign of the wavefunction is not relevant to the probability of finding the electron. The probability distribution depends on the square of the wavefunction, which is always positive.