B3. (a) Determine the number of electrons in an atom of strontium that have the following quantum numbers. Justify your answer using the rules for quantum numbers.

(3 marks)

(i) $\ell = 1$

(ii) $m_\ell = -2$

(b) (i) Draw diagrams showing the shapes of the electron density for orbitals that have the quantum number $\ell = 1$

(1 mark)

(ii) Describe how these shapes change as the value of the principal quantum number n increases.

(1 mark)