

### Further Information 9.2 *The energy of spin-orbit interaction*

The energy of a magnetic moment  $\boldsymbol{\mu}$  in a magnetic field  $B$  is equal to their scalar product  $-\boldsymbol{\mu} \cdot \mathbf{B}$ . If the magnetic field arises from the orbital angular momentum of the electron, it is proportional to  $l$ ; if the magnetic moment  $\boldsymbol{\mu}$  is that of the electron spin, then it is proportional to  $s$ . It then follows that the energy of interaction is proportional to the scalar product  $s \cdot l$ :

Can you show why it follows that that the energy of interaction is proportional to the scalar product  $s \cdot l$ ?