

10. For a given quantum number  $n$  there are  $n$  possible values of  $l$ , ranging from 0 to  $n - 1$ . For each  $l$  the number of possible electron states is  $N_l = 2(2l + 1)$  (see problem 2). Thus the total number of possible electron states for a given  $n$  is

$$N_n = \sum_{l=0}^{n-1} N_l = 2 \sum_{l=0}^{n-1} (2l + 1) = 2n^2 .$$

Thus, in this problem, the total number of electron states is  $N_n = 2n^2 = 2(5)^2 = 50$ .