Problem 2

Each step involves a binary choice: the particle can move either to the right (R) or to the left (L). Since there are 4 steps, and each step is independent, the total number of possible outcomes is:

$$2^4 = 16$$

Explanation:

- For each step, there are 2 possible directions: R or L.
- The steps are independent, so the total number of possible sequences of 4 steps is:

$$2 \cdot 2 \cdot 2 \cdot 2 = 2^4$$

Thus, the sample space has **16 elements**.