Shuffling Coins

Problem 1

Arrange three pennies and two dimes in a row, alternating the coins as shown in the top of the figure below. The problem is to change their positions to those shown in the bottom of the figure in the fewest possible number of moves.

A move consists of placing the tips of the first and second fingers of any two touching coins, one of which must be a penny and the other a dime, then sliding the pair to another spot along the imaginary line shown in the figure. The two coins in the pair must touch at all times. The coin at the left in the pair must remain at the left; the coin at the right must remain at the right. Gaps in the chain are allowed at the end of any move except the final one. After the last move the coins need not be at the same spot on the imaginary line that they occupied at the start.

Problem 2

Six pennies are arranged on a flat surface as shown in the left figure below. The problem is to move them into the formation shown at the right below in the smallest number of moves. Each move consists of sliding a penny, without disturbing any others, to a new position in which it touches two others. The coins must remain flat on the surface at all times.