

## Problem

### Have you got change for a loonie?

A penny, a nickel, a dime, and a quarter are in a row in front of you. Your goal is to reverse the order of the coins, using ONLY the following moves:

- a coin may be placed on an adjacent coin (on either side) of greater value (e.g., a nickel can be placed on an adjacent dime or quarter, but not on top of a penny);
- a coin may be moved to an adjacent box if it is empty;
- coins may be moved only one at a time (i.e., no moving stacks).



Note: A single coin can move more than one box if, for example, two or more adjacent boxes are empty, or contain coins of greater value. For instance, a legitimate first set of 3 moves would be for the penny to go 3 boxes right, over the nickel and dime onto the quarter.



**Hints**

**Hint 1** - Which coin is easiest to move?

**Hint 2** - Which coin is hardest to move?

*Suggestion:* This is a 'guess and check' activity. Substitutes for the coins could be used, or the images cut out from the given problem, in order for each student to be able to give it a try.

### Solution

The steps of one possible solution are shown in the sequence of diagrams below, with the coins indicated by their numeric values in cents. Stacks of two coins are shown as fractions. Each grid gives moves for only one coin; the number of moves is shown above the arrow (e.g., the penny moves 3 to the right at first). There may be more efficient solutions.

