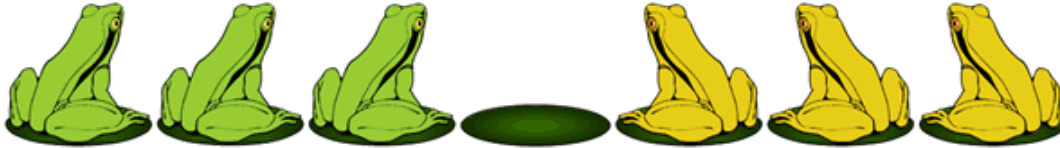


## The Greener Lily Pad

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Frogs have a saying: "The Other Lily Pad Is Always Greener". Some green and yellow frogs were arguing about this until they agreed that they should switch Lily Pads.



- The green frogs can only be moved to the right and the yellow frogs can only be moved to the left.
- A frog can jump onto an empty Lily Pad if it is beside it.
- A frog can also jump over a different coloured frog as long as there is an empty Lily Pad to land on.
- A frog cannot jump over two or more frogs.

Can the frogs switch Lily Pads?



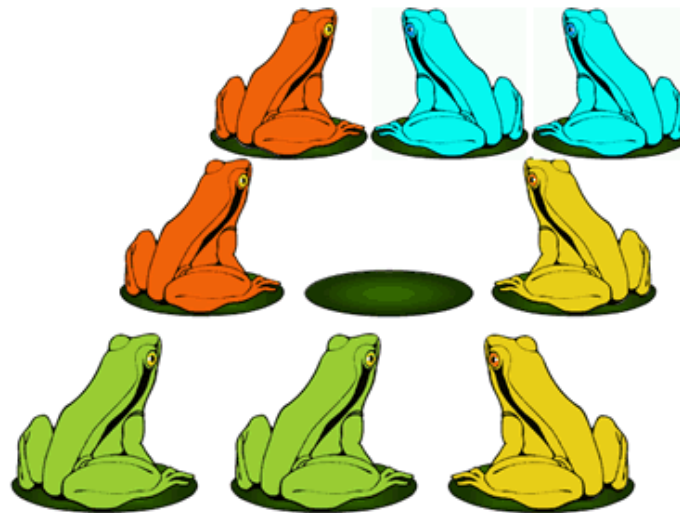
### Extensions:

- How many ways are there for the frogs to do this?
- How many moves does it take?
- What if there were four frogs on both sides?
- Can you find the formula that gives the number of moves if there are  $N$  frogs on both sides?
- Jillian and Amy from Bishop Pinkham found that it was still possible to solve if there were 2 frogs on one side and 3 frogs on the other side. How many ways are there to do this?



Same problem with jumping dogs and horses.

- Is it possible for all the frogs in the 3 by 3 square below to move to a different Lily Pad? Frogs can only jump or move horizontally or diagonally. Again frogs can jump over at most one frog of a different colour and only if there is a free Lily Pad to land on.



### The Math in This Problem:

The goal of this math puzzle is to swap the places of the green frogs with the yellow frogs. Since there are constraints when moving along the Lily pads, students must use strategic analysis when planning out the frog jumps. The goal of this game is to figure out whether or not this is even possible and if it is, they are challenged to formulate a solution to represent this scenario.