ADVANCED STRATEGY

I had researched many advanced strategies in order to find the best and most efficient way to solve the code in as less moves as possible. I had come across Donald Knuth's algorithm, this would enable the machine to guess in five moves or less and although there are variations of the algorithm I chose to stick to the original algorithm as it'd simpler to implement within Java. (See reference of Knuth's algorithm within footer).

There are eight steps in order to achieve / break the code using Knuth's (1977) algorithm, these are:

Steps:

1. A set of N must be made that will contain a maximum of 1296 possible combinations.
2. An initial guess must be made, preferably two of the same colour, for example two reds on the left-hand side of board and two blues on the right-hand side.
3. Enter/submit the initial guess.
4. The algorithm will then be terminated and the game is won if and only if the 4 colours entered happen to be in the correct positions / correct colours.
5. If else the algorithm takes out the incorrect guess combination from the set N made in step 1.
6. The minimax technique then must be used in order to make the next guess more accurate than the previous. The minimax technique uses probability to find the minimum score (minimum probability of possibilities) of the set N. The initial combination then provides a minimum score for each of the 1296 combinations, this then gives each combination a probability. The highest score of a combination would then be used to eliminate the fewest possibilities of a combination occurring. To calculate this score, we simply take the minimum of the eliminated, to get the minimum of the eliminated you take the count of elements in the set N and subtract it from the highest score.
7. From the set of guesses with the highest score, one is selected and played choosing a combination from the set N. The best way to choose this would be to get the combination with the lowest value for example it's better to choose 1234 than 4321.

8. If the above steps fail to guess the combination successfully then step 3 shall be repeated until successful.