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Rules for playing Mix-Up!

Mix-up! is a puzzle game of 15 numbered squares which can move around in a 4 x 4 box, so that there is always one blank space. The object of the game is to rearrange the numbered squares so that they are in numerical order from 1 through 15, with the blank



space in the lower right corner, as shown:

How to start a new game:

Click on the Mix-Up! button located next to the timer, or, from the menu bar, select **Puzzle > Mix-up!**

The timer will start when you make the first move of a numbered square.

How to move the numbered squares:

Use the mouse to point at any numbered square which is **next to** the blank space; click the left mouse button and the numbered square will slide into the blank space, creating a new blank space in the position it just vacated.

NOTE: only horizontal and vertical moves are permitted, not diagonal moves.

How to see the fastest times so far:

From the menu bar, select **Options > Best Times**. A window will appear showing the 5 fastest solvers of the puzzle so far, with their times. If you keep playing, perhaps your name will be in that box some day!

How to reset, or clear, the list of fastest times:

From the menu bar, select **Options > Clear Best Times**. You will be asked to confirm that this is what you want to do, and if you answer yes, all the existing scores will be cleared.

The Puzzle Story

The original '15 Puzzle' was invented by Sam Loyd in 1878. It quickly spread throughout the United States and Europe and was immensely popular. It was also known by the names 'Boss Puzzle' and 'Jeu de Taquin' ('Teasing Game').

The puzzle was made originally of wood and could be held in one hand. It was a common practice to start with the pieces in numerical order (the ending position in this computerized version) and try to manipulate them to achieve a desired pattern. Sam Loyd and others offered prizes for solutions to specific problems, that is, to arrange the numbered blocks into a specific order. **No one ever won any of these prizes!**

In an article which appeared in 1879 in the *American Journal of Mathematics*, it was proved that (a) there exist positions which are impossible to achieve, and (b) exactly 50% of all positions are possible, and 50% are impossible.

Obviously, then, those offering prizes were requiring that only impossible positions be achieved!



Here is an example of an impossible position: It is not possible to move the number 15 square around to the other side of the number 14 square in this position, and still end up with all the other squares in numerical order. In this computerized version of the puzzle, no impossible positions are used, so don't give up!

