

MATHCOUNTS[®] Problem of the Week Archive

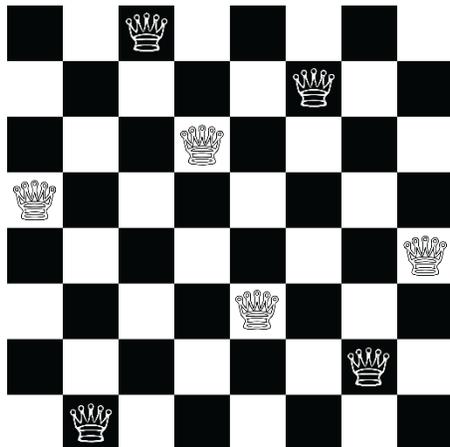
National Chess Day! – October 17, 2022

Problems & Solutions

Did you know that October 8 was National Chess Day? Try out these Chess puzzles to celebrate! Thank you to the folks at [ChessKid.com](https://www.chesskid.com) for sharing these great problems with us and supporting kids' love of chess with their great resources!

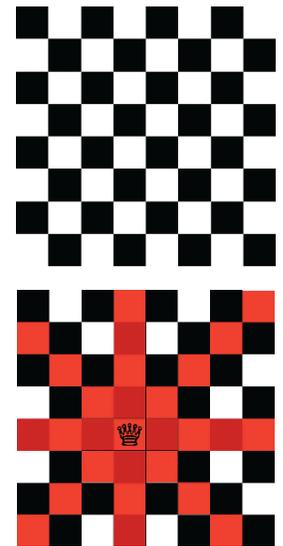
*In the game of Chess, the **queen** can move any number of spaces vertically, horizontally or diagonally in each turn.* Find at least one arrangement of 8 white queens on an empty chessboard so that no two queens aim at each other (i.e. so that no two queens would bump into each other by moving). For example, if you were to place a queen in the square shown, no queen could be placed in any of the orange squares, as it would be directly in one of the first queen's possible paths.

There are many different possible solutions to this problem! Here is one such solution:



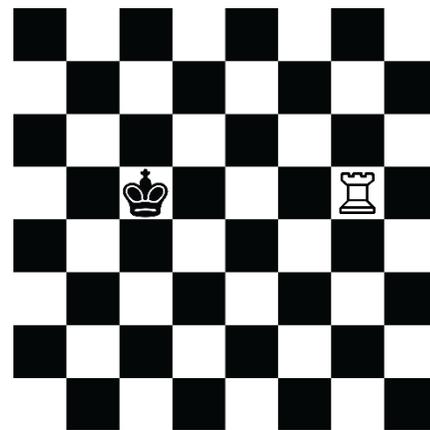
For a demonstration of this puzzle being solved by FunMasterMike from ChessKid.com, [watch this YouTube video](#).

For further explanation of this puzzle, called the Eight Queens Puzzle, visit [this Wikipedia page](#).

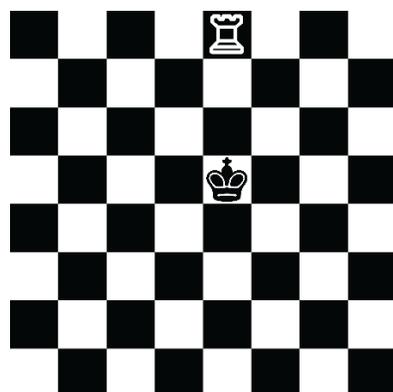


In the game of Chess, the **king** can move one square in any direction in each turn. The **rook** can move any number of spaces vertically or horizontally in each turn. (The rook cannot move diagonally.) The term **check** means that the king is under threat and could be captured on the opponent's next turn. For example, in the board below to the right, the rook (right) has the king (left) "in check" because in the rook's next turn, it could move horizontally to capture the king. A king must use its next move to get out of check/out from under this threat. **Checkmate** means that there are no moves the king could make to get out of check – if a king is in checkmate, the game is over. Place the black king on space e5. Place one white rook on the board, and it must "give check". Black's king will then move out of check. Place the second white rook, and you must give check again. Black's king gets out of check. And the same for the third and fourth rooks -- you place them one at a time, and you must give check. How can you ensure that after the fourth white rook is placed, the black king is in checkmate?

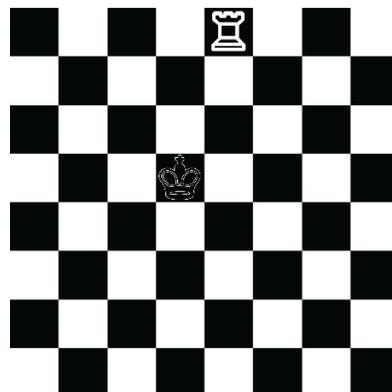
8	a8	b8	c8	d8	e8	f8	g8	h8
7	a7	b7	c7	d7	e7	f7	g7	h7
6	a6	b6	c6	d6	e6	f6	g6	h6
5	a5	b5	c5	d5	e5	f5	g5	h5
4	a4	b4	c4	d4	e4	f4	g4	h4
3	a3	b3	c3	d3	e3	f3	g3	h3
2	a2	b2	c2	d2	e2	f2	g2	h2
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	a	b	c	d	e	f	g	h



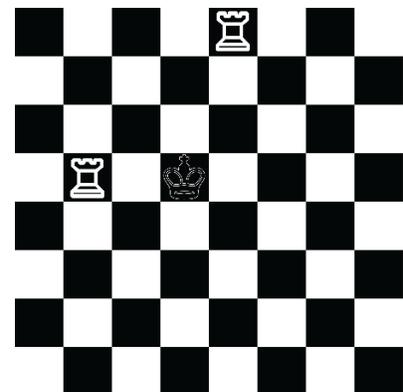
There are multiple ways to solve this problem. Here is one example. First, place a white rook on e1. The black king should move to the "bigger" side of the board, so move the black king to d5. Next, the second white rook is placed on b5. Note that it is two squares away from the black king and checking the king from the side, not the bottom. The black king can move to c4, for example, to get out of check. The third white rook is placed on c5, which guards the second rook from being captured by the king. You can now see the "pattern" -- the first rook created the right-hand "wall" and the second rook created the left-hand "wall" (column b to column e). The third and fourth rooks "fill in" this box on column c and column d. After the black king moves to column d, either d4 or d3, the final white rook can be placed nearly anywhere on column d (where it can't be captured) for checkmate.



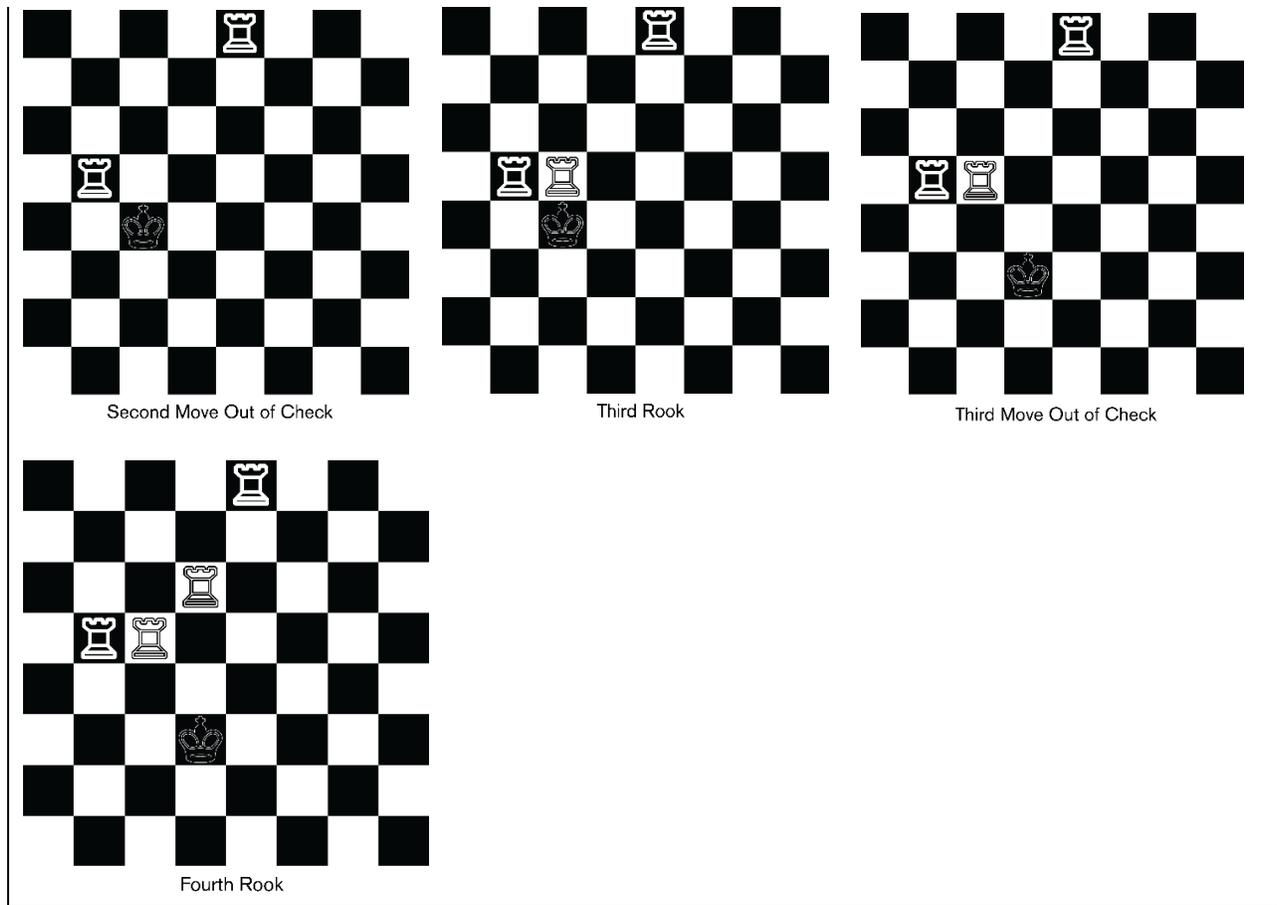
First Rook



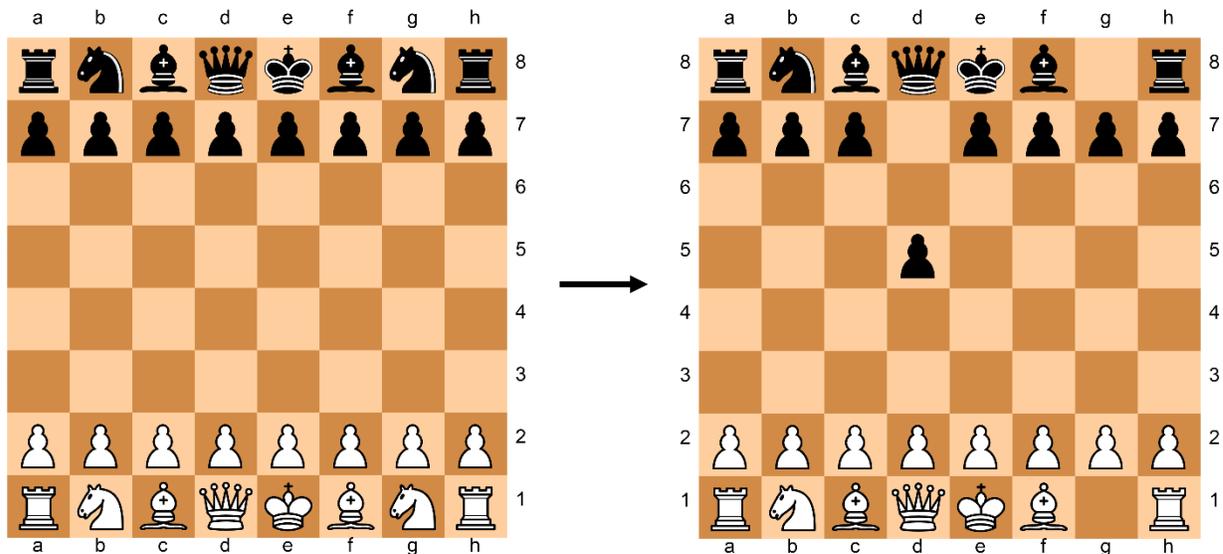
First Move Out of Check



Second Rook



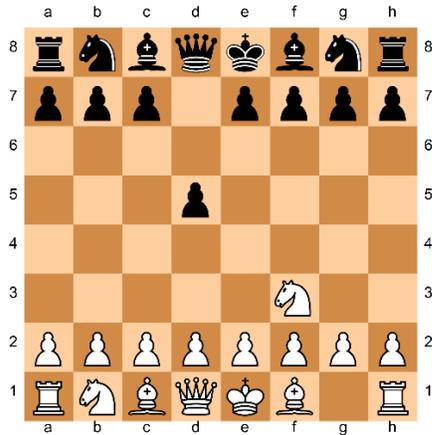
This one is an **extra challenge**! On the board at left below, all of the Chess pieces are set up in a normal starting position. Remove the white knight on g1 and the black knight on g8. Move the black pawn from d7 to d5. How can this EXACT position be reached in EXACTLY four moves for each side (eight moves in total)? Assume this is a normal game of chess, with alternating moves and white moves first. The moves must be legal, and you must reach this exact position after black's fourth move (no more moves, and no fewer).



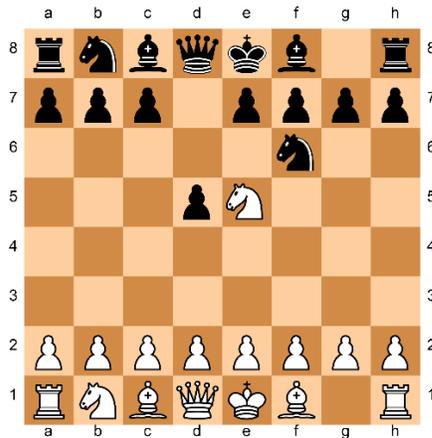
For details on how all of the different pieces can move, visit <https://www.chesskid.com/terms/chess-pieces>.

In four moves from each of white and black, we can get to this position as follows.

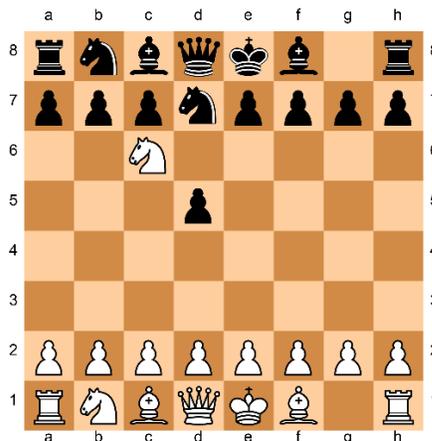
The white knight from g1 goes to f3; then the black pawn from d7 goes to d5:



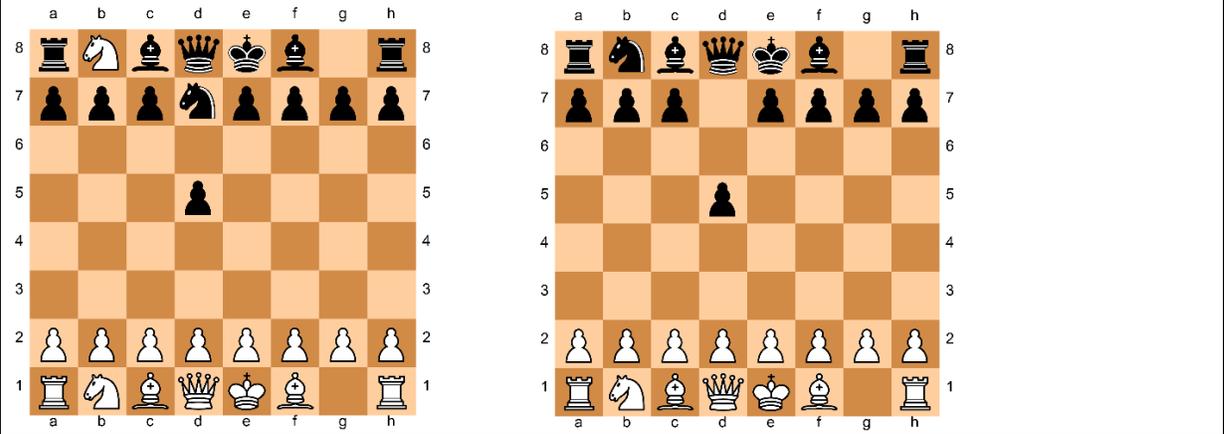
The white knight from f3 goes to e5; then the black knight from g8 goes to f6:



The white knight from e5 goes to c6; then the black knight from f6 goes to d7:



The white knight from c6 goes to b8 and captures the black knight there (shown in the image to the left); then the black knight from d7 goes to b8 (shown in the image to the right).



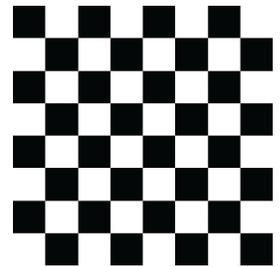
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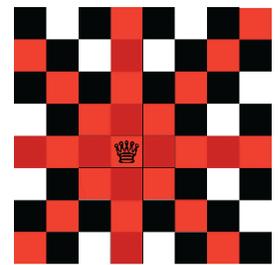
Problems

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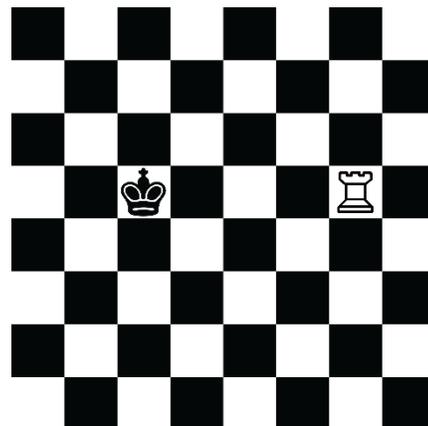
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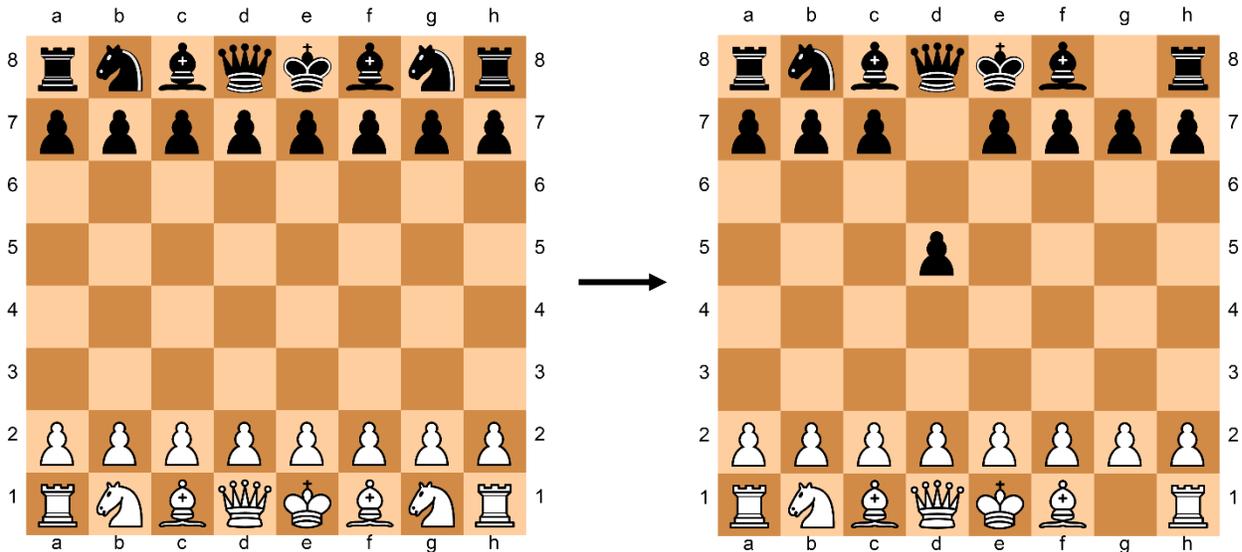
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