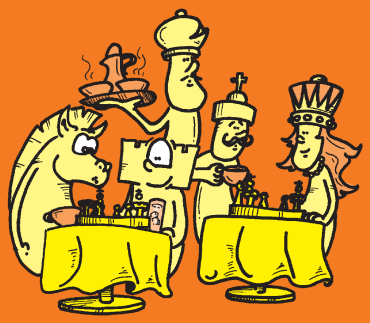


THE PUZZLING SIDE OF CHESS

Jeff Coakley

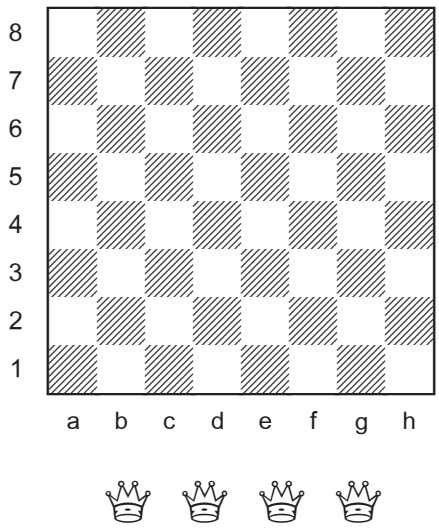
QUEENFEST V: HAREM SCARUM

number 90 April 24, 2015

Queenfest rolls on with more puzzles involving multiple queens. The task is to arrange the queens on the board to achieve certain goals.

The first part of the first puzzle is very easy, but figuring out the number of possible solutions is perhaps an interesting challenge.

Queenfest 16 (four queens)



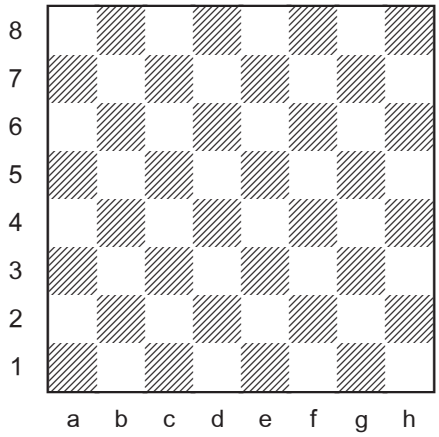
Place four queens on the board so that each queen is defended by every other queen.

How many solutions are there?

Earlier *Queenfests* can be found in the archives: A Royal Heyday (59), Second to None (60), We Will Rock You (63), Breaking Free (87).

The next puzzle explores the lower limits of queen mobility. Except for 17a, all parts of the problem have a unique solution.

Queenfest 17 (fewest moves)



Place the specified number of queens on the board so that they have the fewest total moves.

17a. two queens

17b. three queens

17c. four queens

17d. five queens

17e. six queens

17f. seven queens

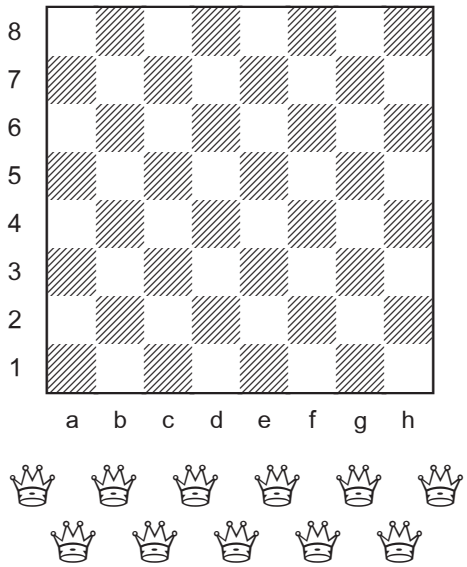
17g. eight queens

17h. nine queens

17i. ten queens

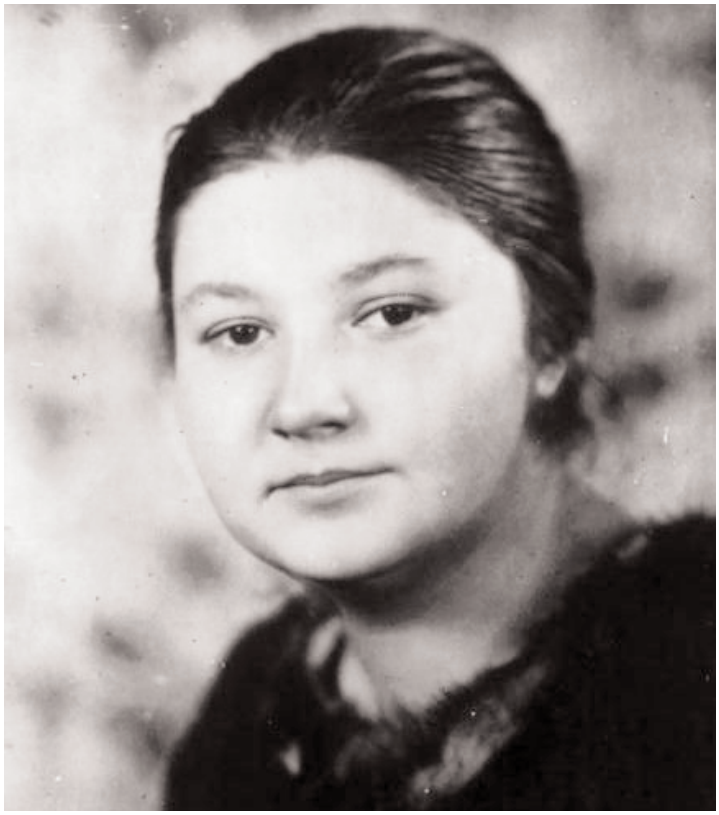
In previous columns, there were puzzles with up to ten queens in which the task was to attack the fewest squares. This time we raise the bar to eleven.

Queenfest 18 (fewest attacked squares)



Place eleven queens on the board so that the fewest squares are attacked.

Next month, *Queenfest VI*.



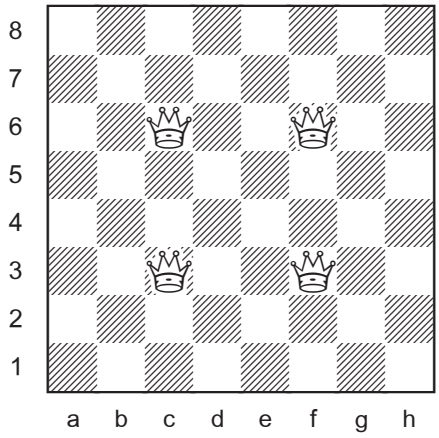
Vera Menchik (1906-1944), the first queen of chess.

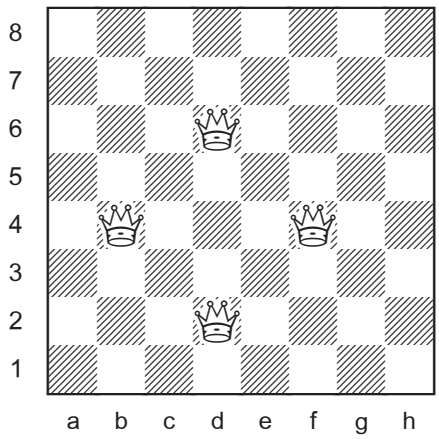
SOLUTIONS

All puzzles by J. Coakley, *ChessCafe.com* (2015). Solutions for problems 17 and 18 were verified with Caisay 4.1.

PDF hyperlinks. You can advance to the solution of any puzzle by clicking on the underlined title above the diagram. To return to the puzzle, click on the title above the solution diagram.

Queenfest 16 (four queens)

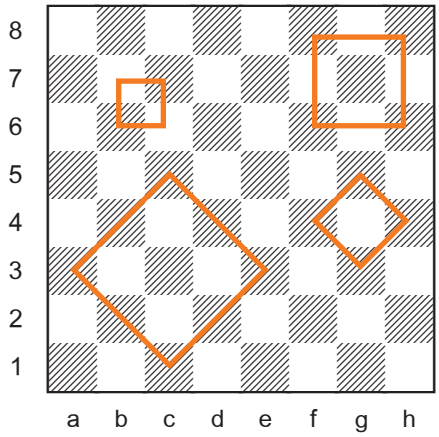




Each queen is defended by every other queen.

This type of “maximum security” results from any arrangement of the four queens that forms a square or diamond. See diagram on the next page.

For this task, a *diamond* is defined as a “tilted square”. Rhombic formations such as d2 c4 d6 e4 do not work.



To determine the total number of solutions, we only need to calculate how many “square” and “diamond” arrangements there are on a chessboard.

The number of square arrangements of various sizes (2x2, 3x3, etc.) is 140.

49	2x2
36	3x3
25	4x4
16	5x5
9	6x6
4	7x7
1	8x8
140	

The number of diamond arrangements of various sizes is 56.

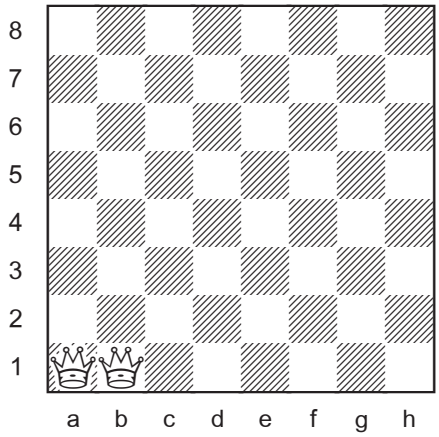
36	2x2
16	3x3
4	4x4
56	

The total number of solutions is **196**.
(140 + 56)

For a similar puzzle, see the bonus question in column 73.

Queenfest 17 (fewest moves)

17a

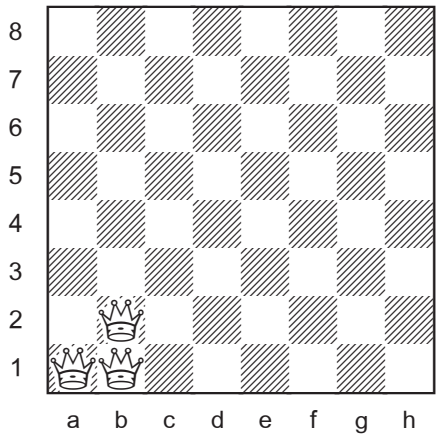


Two queens: 34 moves
(14 + 20)

There are four patterns.

Qa1 Qb1 (diagram)
Qb1 Qc1
Qc1 Qd1
Qd1 Qe1

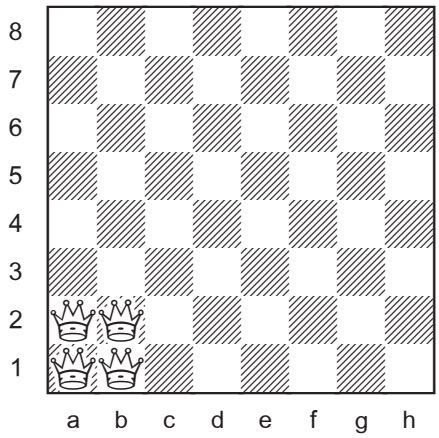
17b



Three queens: 41 moves
(7 + 13 + 21)

Unique pattern, rotatable and reflectible.

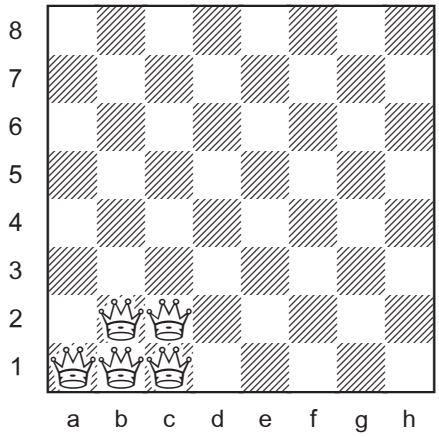
17c



Four queens: 44 moves
(0 + 12 + 12 + 20)

Unique symmetrical pattern, rotatable (four solutions).

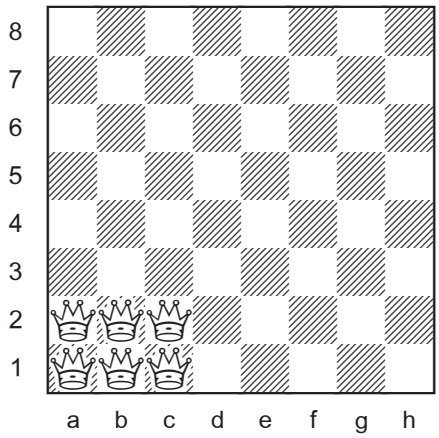
17d



Five queens: 51 moves
(7 + 1 + 14 + 10 + 19)

Unique pattern, rotatable and reflectible.

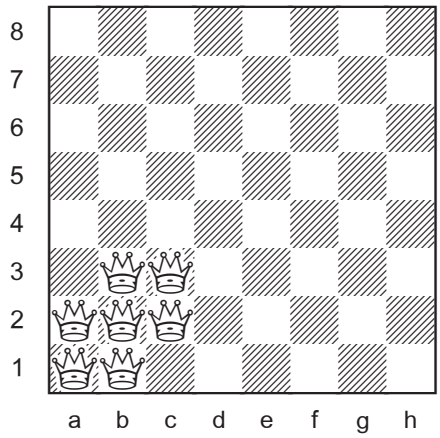
17e



Six queens: 54 moves
(0 + 12 + 0 + 13 + 10 + 19)

Unique pattern, rotatable and reflectible.

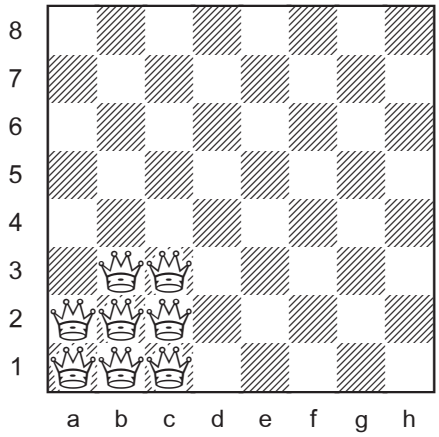
17f



Seven queens: 57 moves
(0 + 6 + 6 + 2 + 12 + 12 + 19)

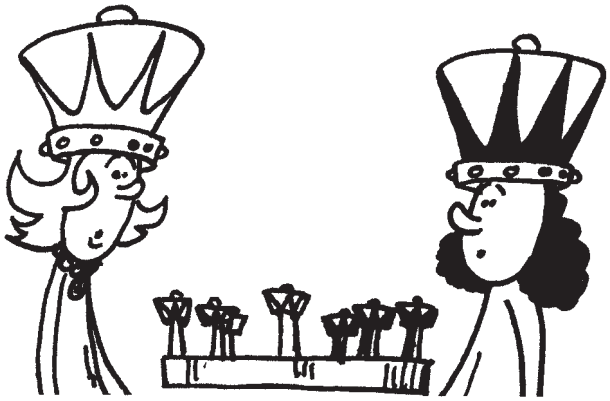
Unique symmetrical pattern, rotatable.

17g

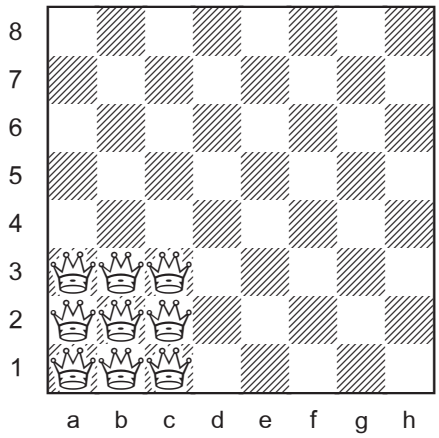


Eight queens: 59 moves
(0 + 6 + 0 + 1 + 12 + 10 + 11 + 19)

Unique pattern, rotatable and reflectible.



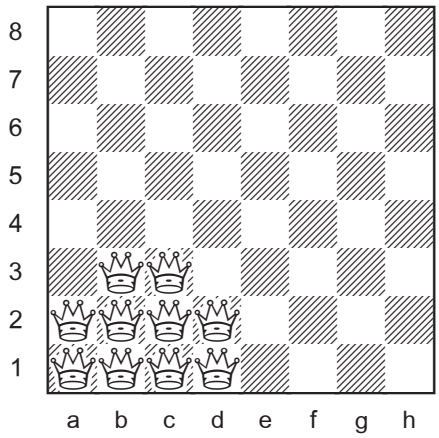
17h



Nine queens: 61 moves
(0 + 0 + 10 + 0 + 0 + 11 + 10 + 11 + 19)

Unique symmetrical pattern, rotatable.

17i

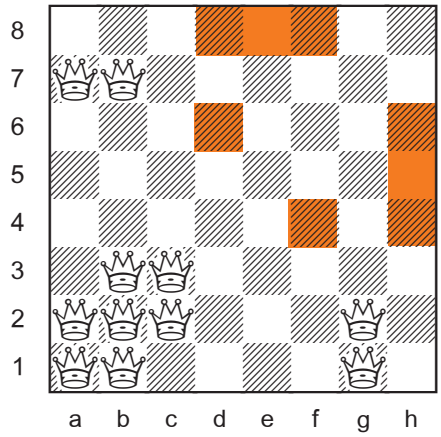


Ten queens: 64 moves
(0 + 6 + 0 + 1 + 12 + 0 + 5 + 17 + 8 + 15)

Unique pattern, rotatable and reflectible.

The queen in action.

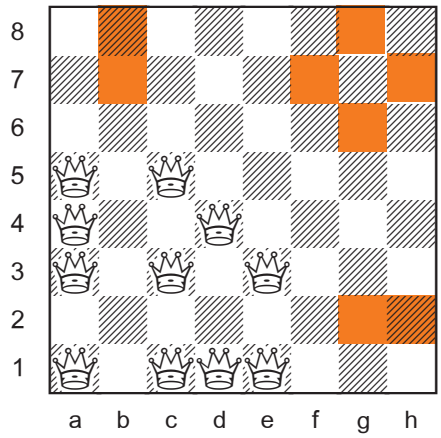
Queenfest #18 (fewest attacked squares)



Eleven queens, 56 squares attacked

The eight squares marked in orange are not attacked.

There are seven patterns. The two shown here are symmetrical.



Qa1 Qa2 Qa7 Qb1 Qb2 Qb3 Qb7 Qc2 Qc3 Qg1 Qg2 (first diagram)
Qa1 Qa3 Qa7 Qb1 Qb2 Qb7 Qc2 Qc3 Qc7 Qd3 Qf1
Qa1 Qa3 Qa4 Qa5 Qc1 Qc3 Qc5 Qd1 Qd4 Qe1 Qe3 (second diagram)
Qa2 Qa3 Qa4 Qb3 Qb4 Qd1 Qe1 Qe2 Qf1 Qf2 Qf3
Qa2 Qa3 Qa4 Qb3 Qb4 Qb5 Qe1 Qe2 Qf1 Qf2 Qf3
Qa2 Qa3 Qb1 Qb3 Qb4 Qe1 Qe2 Qe4 Qf1 Qf2 Qf3
Qa1 Qa2 Qa3 Qb2 Qb3 Qb4 Qe1 Qe2 Qf1 Qf2 Qf3

These positions (**eleven** queens, **eight** unattacked squares) exactly correspond to the seven patterns for **eight** queens with **eleven** unattacked squares. See *queenfest 09b* (column 63) Just place queens on the unattacked squares.

The updated chart. Asterisks indicate unique patterns.

♕	MOVES		SQUARES ATTACKED			
number of queens	most	fewest	most	most *Qs unguarded*	fewest	fewest *Qs unguarded*
1	27*	21	27*	27*	21	21
2	52	34	44	42	33	34
3	77*	41*	54	52	39	43
4	100	44*	61	58	40*	48
5	123	51*	64	59	47	52*
6	144	54*		58	49	54
7	163	57*		57	51*	56
8	182	59*		56	53	56
9	201	61*			54	
10	214*	64*			55	
11	225*	66			56	

For the sake of completeness, values for the most and fewest moves with eleven queens were added.

Eleven queens: 225 moves. Unique pattern.
Qa5 Qb2 Qb7 Qc4 Qd1 Qd6 Qe3 Qe8 Qf5 Qg2 Qh4
All queens are a knight-jump apart!?

Eleven queens: 66 moves. Two patterns.
Qa1 Qa2 Qa3 Qb1 Qb2 Qb3 Qc1 Qc2 Qc3 Qd1 Qd2
Qa1 Qa2 Qb1 Qb2 Qb3 Qc1 Qc2 Qc3 Qd1 Qd2 Qd3

Until next time!