



# THE PUZZLING SIDE OF CHESS

Jeff Coakley

## QUEENFEST III: We Will Rock You

number 63

July 26, 2014

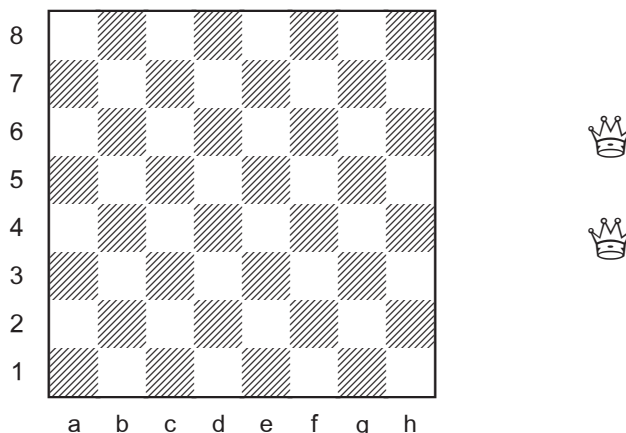
This edition of *The Puzzling Side of Chess* returns to a theme from several months ago, with more puzzles involving multiple queens. The task is to arrange the queens on the board to achieve certain goals.

The column concludes with a solution for the ultimate problem in our series of “longest perpetual checks”.

### Queenfest 07 (two queens)

One queen can attack twenty-seven squares by herself. Or as few as twenty-one on an open board. What about two queens?

It is probably a needless reminder, but a piece does not attack the square it stands on.

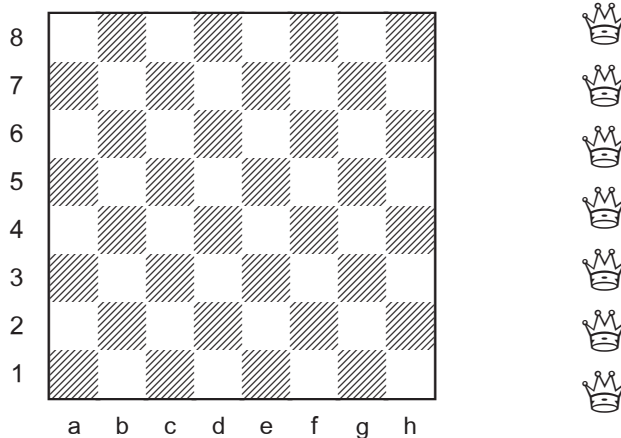


Place two queens on the board so that ...

- the most squares are attacked.
- the fewest squares are attacked.
- the fewest squares are attacked and the queens do not guard each other.

Those two queen problems were included for the sake of completeness. Similar puzzles with three, four, five, and six queens can be found in columns 59 and 60. Now we jump ahead to seven queens.

### Queenfest 08 (seven queens)



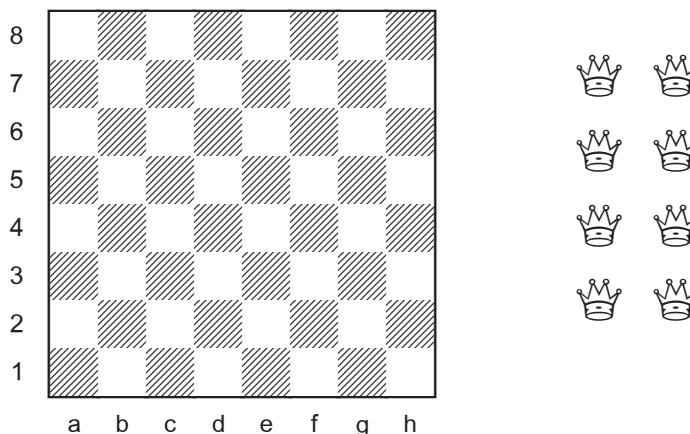
Place seven queens on the board so that the fewest squares are attacked.

The solution to this puzzle is unique. That usually means that it's harder to find. Is your lucky number odd?



The third part of the next problem is one of the most famous chess puzzles ever. Have you tried it lately?

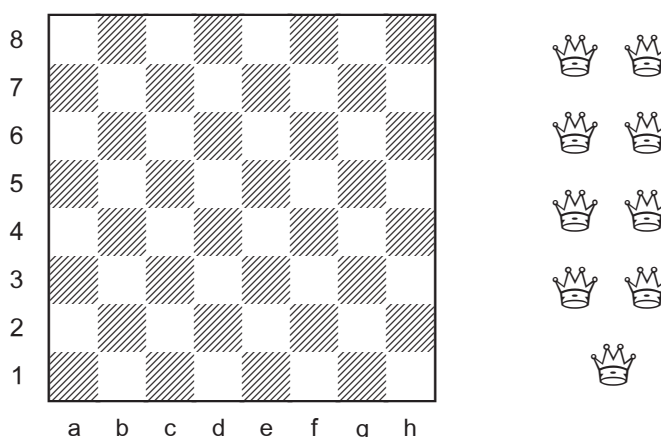
**Queenfest 09** (eight queens)



- 9a. Place eight queens on the board so that none of the four centre squares are attacked.
- 9b. Place eight queens on the board so that the fewest squares are attacked.
- 9c. Place eight queens on the board so that none of the queens are guarded.

But we're not finished yet. There is one interesting puzzle with nine queens. And here it is.

**Queenfest 10** (nine queens)

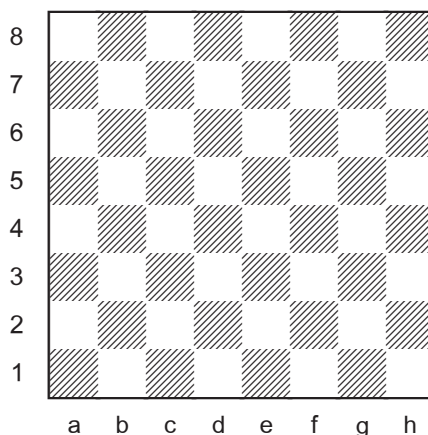


Place nine queens on the board so that the fewest squares are attacked.

Haven't had your fill of queens? Don't worry. *Queenfest IV* is not far away!

Our final column from “season one” ended with this construction task concerning the ultimate perpetual check.

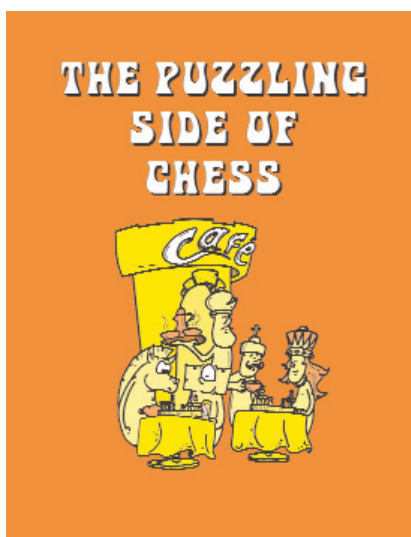
**12e Longest Perp**  
(with all standard rules in effect)



*Construct a position in which White draws by perpetual check and which maximizes the number of moves that must be played before Black has to concede a draw, either by threefold repetition or by the fifty move rule.*

The side playing for the draw (White) must make their best moves, aiming for the shortest draw. Black’s goal is to avoid a draw as long as possible. An additional stipulation is that Black must have a winning advantage if White does not force a draw.

It’s taken six months for a solution to appear. But the wait is over, thanks to the *undisputed king of perpetual checks*, IM Geir Sune Tallaksen Østmoe of Norway. His solution is an astounding 375 moves long! Try breaking that record.



## SOLUTIONS

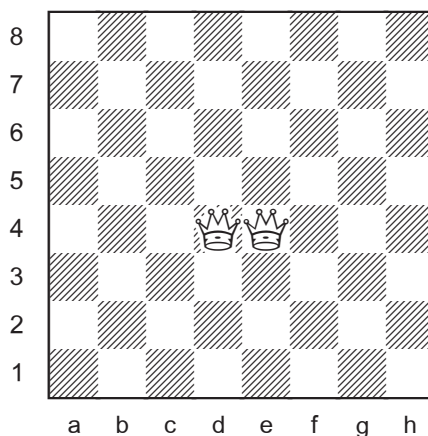
All *queenfest puzzles*, except 9bc, are by J. Coakley, *ChessCafe.com* (2014). In most cases, the optimal solutions were discovered with the assistance of Caisay 4.1.1, a computer program written by Adrian Storisteanu of Toronto.

*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 07 (two queens)

7a

(most squares attacked)



44 squares are attacked.

This unique pattern can be rotated for a total of four different solutions.

Problems of this type can also be posed as a double negative: “Place two queens on the board so that the fewest squares are not attacked.” In this case, there are 20 unattacked squares.

If the queens do not guard each other, then the maximum number of attacked squares is 42. There are six patterns:

Qb2 Qd5

Qb2 Qe6

Qc2 Qe5

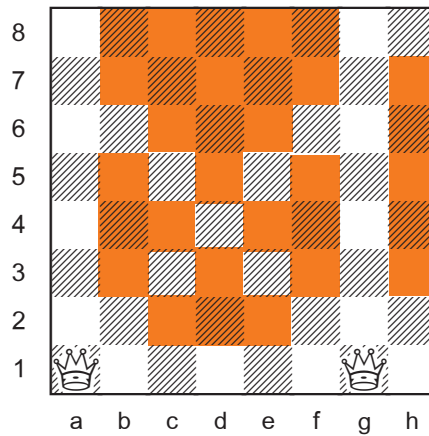
Qc2 Qf6

Qc3 Qd5

Qd3 Qe5

### 7b

(fewest squares attacked)



33 squares are attacked.

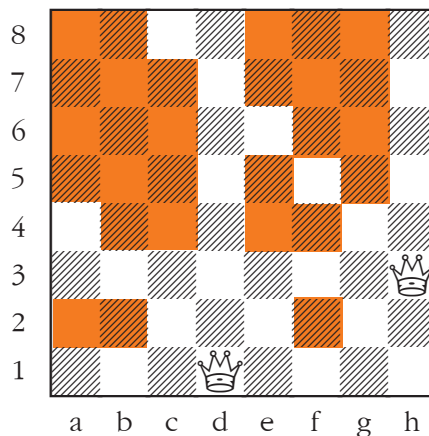
The 31 squares coloured in orange are not attacked.

In each of the six patterns, both queens are on the same colour squares along the first rank.

Qa1 Qc1	Qc1 Qe1
Qa1 Qe1	Qc1 Qg1
Qa1 Qg1 (shown above)	Qe1 Qg1

### 7c

(no queen guarded, fewest squares attacked)



34 squares are attacked.

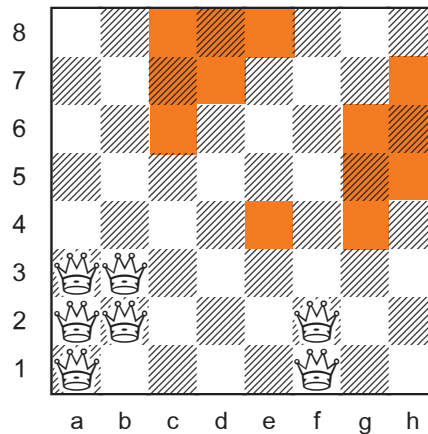
The 28 orange squares (plus d1 and h3) are not attacked.

There are three patterns.

Qd1 Qh3 (shown above)
Qd1 Qa2
Qf1 Qa2

### Queenfest 08 (seven queens)

(fewest squares attacked)



51 squares are attacked.

The 13 squares coloured in orange are not attacked.

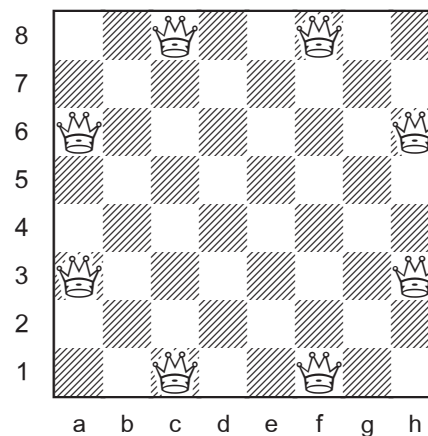
The pattern is unique. It can be rotated and reflected for a total of eight solutions.

An alternative wording for this problem is: "Place seven queens on the board so that the most squares are not attacked."

### Queenfest 09 (eight queens)

**9a**

(no centre square attacked)

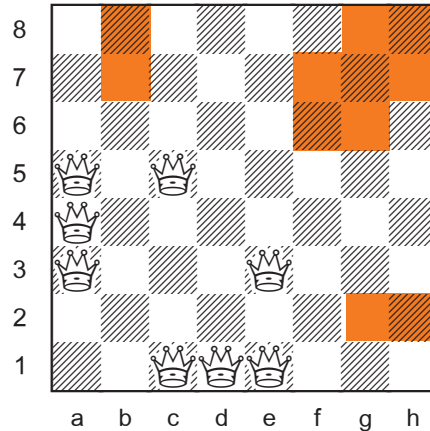


Every square is attacked except d4, d5, e4, e5.

Eight queens in classic octagonal formation.

## 9b

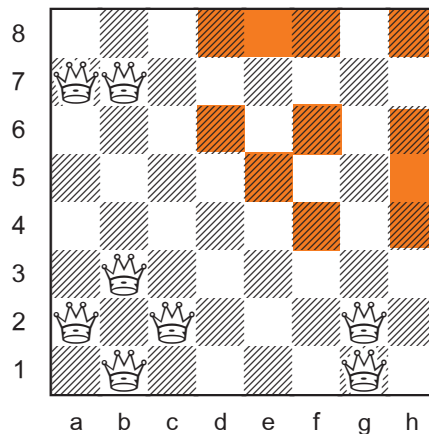
(fewest squares attacked)



53 squares are attacked.

The 11 squares coloured in orange are not attacked.

There are seven patterns. The position shown above is symmetrical around the a1-h8 diagonal. German composer Karl Fabel gave this solution in the 1966 book *Schach und Zahl*. The following arrangement is also symmetrical.



Qa3 Qa4 Qa5 Qc1 Qc5 Qd1 Qe1 Qe3 (first diagram)

Qa3 Qa4 Qa5 Qb1 Qb4 Qb5 Qd1 Qd3

Qa2 Qa7 Qb1 Qb3 Qb7 Qc2 Qg1 Qg2 (second diagram)

Qa1 Qa2 Qa3 Qb2 Qb3 Qb4 Qf1 Qf2

(same as seven queen solution plus Qb4)

Qa1 Qa2 Qa3 Qb2 Qb3 Qe1 Qf1 Qf2

(same as seven queen solution plus Qe1)

Qa1 Qa3 Qb2 Qb4 Qe1 Qe2 Qf1 Qf2

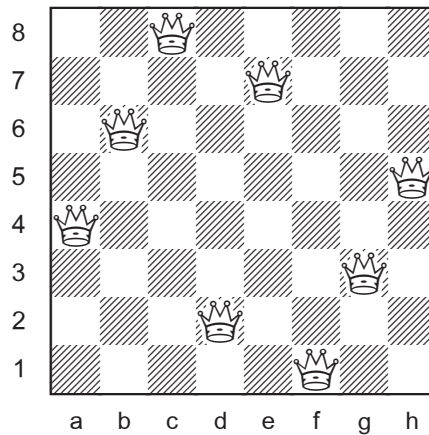
Qa2 Qa3 Qb3 Qb4 Qe1 Qe2 Qf1 Qf2

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The *Oxford Companion to Chess* gives this problem (9b) in its entry for *Eight Queens Puzzle*. The 1984 edition said that there “seems to be” **five** patterns, “but this has not been demonstrated mathematically”. The 1992 edition says the same thing but increases the number to **six**. With the help of *Caisay 4.1*, we now know that there are **seven** patterns. I wonder which one they missed!?

**9c**  
(no queen attacked)



This puzzle has fascinated chess players and mathematicians for more than a century and a half. The task was originally posed in 1848 by German composer Max Bezzel (1824-1871).

There are twelve patterns. The position given here is the only symmetrical arrangement. With rotation and reflection, there are ninety-two different solutions.

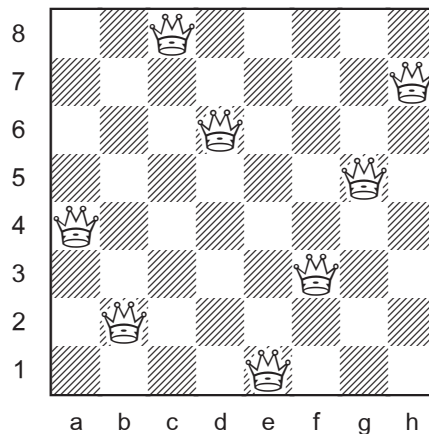
$$(11 \times 8) + (1 \times 4) = 92$$

- Qa4 Qb1 Qc5 Qd8 Qe2 Qf7 Qg3 Qh6
- Qa4 Qb1 Qc5 Qd8 Qe6 Qf3 Qg7 Qh2
- Qa4 Qb2 Qc5 Qd8 Qe6 Qf1 Qg3 Qh7
- Qa4 Qb2 Qc7 Qd3 Qe6 Qf8 Qg1 Qh5
- Qa4 Qb2 Qc7 Qd3 Qe6 Qf8 Qg5 Qh1
- Qa4 Qb2 Qc7 Qd5 Qe1 Qf8 Qg6 Qh3
- Qa4 Qb2 Qc8 Qd5 Qe7 Qf1 Qg3 Qh6
- Qa4 Qb2 Qc8 Qd6 Qe1 Qf3 Qg5 Qh7 (shown below)
- Qa4 Qb6 Qc1 Qd5 Qe2 Qf8 Qg3 Qh7
- Qa4 Qb7 Qc5 Qd2 Qe6 Qf1 Qg3 Qh8
- Qa4 Qb8 Qc1 Qd5 Qe7 Qf2 Qg6 Qh3
- Qa4 Qb6 Qc8 Qd2 Qe7 Qf1 Qg3 Qh5 (shown above)

Note that every pattern has a queen on a4.

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Another pleasing diagram.

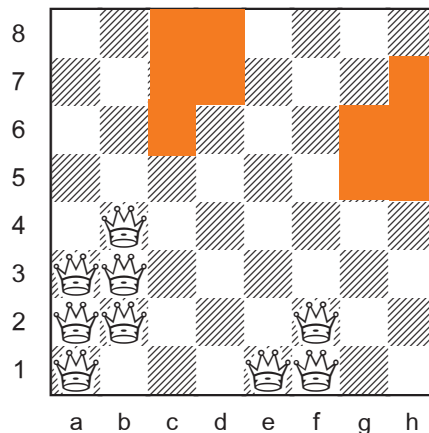


In case you were wondering, eight queens can be arranged on a chessboard in 4,426,165,368 ways.

For other examples of queen domination and independence, see column 6.

**Queenfest 10** (nine queens)

(fewest squares attacked)



54 squares are attacked.

The 10 squares coloured in orange are not attacked.

There are three patterns. The first, shown in the diagram above, is the same as the seven queen solution plus Qb4 and Qe1.


Qa1 Qa2 Qa3 Qb2 Qb3 Qb4 Qe1 Qf1 Qf2

Qa1 Qa2 Qb1 Qb2 Qb3 Qc2 Qc3 Qg1 Qg2

Qa2 Qa3 Qb3 Qb4 Qe1 Qe2 Qf1 Qf2 Qf3

(same as the last solution for eight queens plus Qf3)

To summarize some of the results from our Queenfest adventure, we have this handy chart. Asterisks indicate a unique pattern.

	SQUARES ATTACKED			
	number of queens	most	most <i>Qs unguarded</i>	fewest
1	27*	27*	21	21
2	44*	42	33	34
3	54	52	39	43
4	61	58	40*	48
5	64	59	47	52*
6			49	54
7			51*	56
8			53	56
9			54	

Solutions for three queen independence were not given previously. Here are the missing problems.

### 1e

Place three queens on the board so that none of them guard each other and the most squares are attacked.

**Solution:** 52 attacked squares. Eleven patterns.

Qa1 Qb8 Qe4	Qa1 Qb8 Qf5	Qa1 Qc6 Qf4
Qa1 Qd5 Qf4	Qa1 Qd6 Qf5	Qa1 Qd6 Qg4
Qb1 Qc8 Qf4	Qb1 Qd6 Qg4	Qc1 Qd5 Qh4
Qb2 Qc6 Qg5	Qb2 Qd7 Qg5	

### 1f

Place three queens on the board so that none of them guard each other and the fewest squares are attacked.

**Solution:** 43 attacked squares. Ten patterns.

Qa4 Qb1 Qc8	Qb1 Qe2 Qh3	Qb1 Qg2 Qh5
Qa4 Qb6 Qc1	Qa5 Qb3 Qc1	Qa6 Qb3 Qc1
Qa6 Qb4 Qc1	Qb4 Qc1 Qd8	Qa5 Qb2 Qd1
Qa5 Qc4 Qd1		

### *Seven Queen Independence.*

As you may have noticed, in each of the patterns for *eight queen independence* (problem 9c), all of the empty squares are attacked. So the fewest squares attacked by eight queens with no queen guarded is 56. The 8 occupied squares are not attacked.

Surprisingly, 56 attacked squares is also the fewest for seven queens. If seven queens are placed on the board so that none are guarded, there will be one rank without a queen, and one file without a queen. At most there will be one empty square that is not attacked (the square where the empty rank and file intersect).

### **Longest Perp**

The solution given here is the current record for the *longest perpetual check with all standard rules in effect*. The starting position and the first 175 moves are the same as the composer's earlier solution for problem 12d, but the play after that point is altered based on the new stipulation.

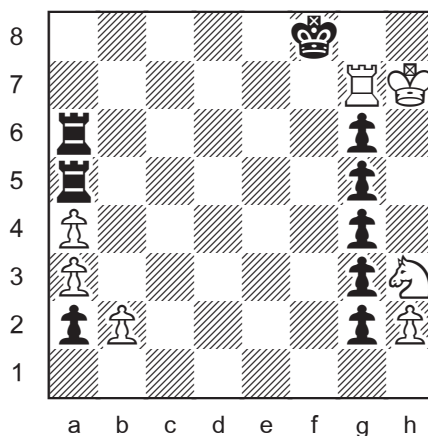
The "matrix" for the position is derived from a 1972 endgame study by Dragutin Djaja. A diagram is given after each capture during the long journey.

### **12e**

Geir Sune Tallaksen Østmoe 2014

*ChessCafe.com*

*Construct a position in which White draws by perpetual check and which maximizes the number of moves that must be played before Black has to concede a draw, either by threefold repetition or by the fifty move rule.*



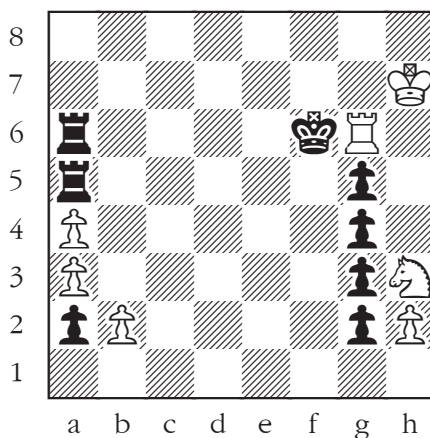
White to play and draw

The solution is **375 moves** long. Here we go!

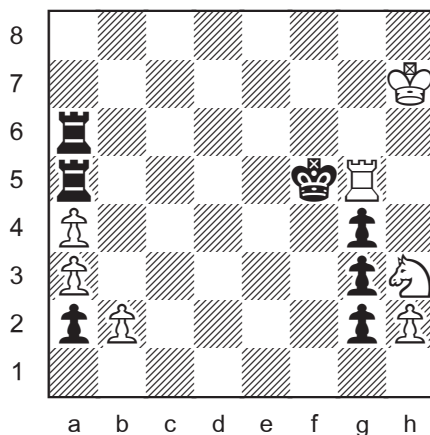
Black has a big material advantage and is threatening, among other things, to promote the a-pawn.

1.Rg8+ Kf7 2.Rg7+ Ke8 3.Rg8+ Ke7 4.Rg7+ Kd8 5.Rg8+ Kd7  
6.Rg7+ Kc8 7.Rg8+ Kc7 8.Rg7+ Kb8 9.Rg8+ Kb7 10.Rg7+ Ka8  
11.Rg8+ Ka7 12.Rg7+ Ka8 13.Rg8+ Ka7 14.Rg7+ Kb8  
15.Rg8+ Kb7 16.Rg7+ Kc8 17.Rg8+ Kc7 18.Rg7+ Kd8  
19.Rg8+ Kd7 20.Rg7+ Ke8 21.Rg8+ Ke7 22.Rg7+ Kf8  
23.Rg8+ Kf7 24.Rg7+ Kf6 25.Rxg6+

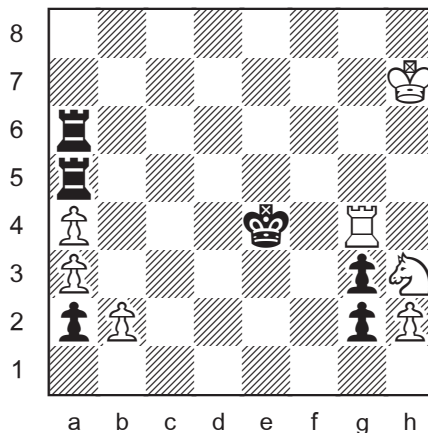
Every capture ensures that no previous position can be repeated.



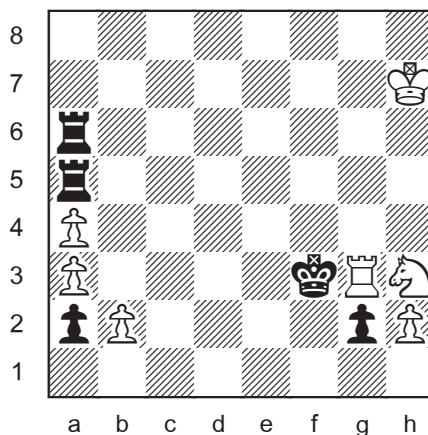
25...Kf7 26.Rg7+ Kf8 27.Rg8+ Ke7 28.Rg7+ Ke8  
29.Rg8+ Kd7 30.Rg7+ Kd8 31.Rg8+ Kc7 32.Rg7+ Kc8  
33.Rg8+ Kb7 34.Rg7+ Kb8 35.Rg8+ Ka7 36.Rg7+ Ka8  
37.Rg8+ Ka7 38.Rg7+ Ka8 39.Rg8+ Kb7 40.Rg7+ Kb8  
41.Rg8+ Kc7 42.Rg7+ Kc8 43.Rg8+ Kd7 44.Rg7+ Kd8  
45.Rg8+ Ke7 46.Rg7+ Ke8 47.Rg8+ Kf7 48.Rg7+ Kf6  
49.Rg6+ Kf5 50.Rxg5+



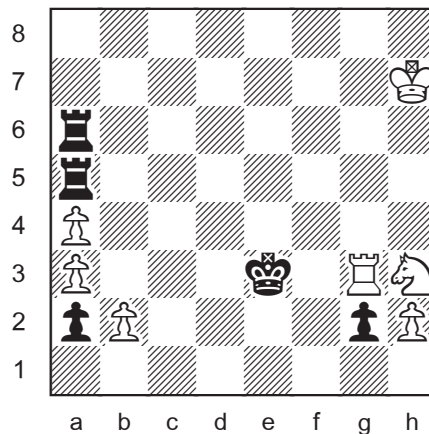
50...Kf6 51.Rg6+ Ke5 52.Rg5+ Ke6 53.Rg6+ Kd5 54.Rg5+ Kd6  
 55.Rg6+ Kc5 56.Rg5+ Kb6 57.Rg6+ Ka7 58.Rg7+ Ka8 59.Rg8+ Kb7  
 60.Rg7+ Kb8 61.Rg8+ Kc7 62.Rg7+ Kc8 63.Rg8+ Kd7 64.Rg7+ Kd8  
 65.Rg8+ Ke7 66.Rg7+ Ke8 67.Rg8+ Kf7 68.Rg7+ Kf8 69.Rg8+ Kf7  
 70.Rg7+ Kf8 71.Rg8+ Ke7 72.Rg7+ Ke8 73.Rg8+ Kd7 74.Rg7+ Kd8  
 75.Rg8+ Kc7 76.Rg7+ Kc8 77.Rg8+ Kb7 78.Rg7+ Kb8 79.Rg8+ Ka7  
 80.Rg7+ Kb6 81.Rg6+ Kc5 82.Rg5+ Kc6 83.Rg6+ Kd5 84.Rg5+ Kd6  
 85.Rg6+ Ke5 86.Rg5+ Ke6 87.Rg6+ Kf5 88.Rg5+ Ke4 89.Rxg4+



89...Ke5 90.Rg5+ Kd4 91.Rg4+ Kd5 92.Rg5+ Kc4 93.Rg4+ Kc5  
 94.Rg5+ Kb6 95.Rg6+ Ka7 96.Rg7+ Ka8 97.Rg8+ Kb7 98.Rg7+ Kb8  
 99.Rg8+ Kc7 100.Rg7+ Kc8 101.Rg8+ Kd7 102.Rg7+ Kd8  
 103.Rg8+ Ke7 104.Rg7+ Ke8 105.Rg8+ Kf7 106.Rg7+ Kf8  
 107.Rg8+ Kf7 108.Rg7+ Kf8 109.Rg8+ Ke7 110.Rg7+ Ke8  
 111.Rg8+ Kd7 112.Rg7+ Kd8 113.Rg8+ Kc7 114.Rg7+ Kc8  
 115.Rg8+ Kb7 116.Rg7+ Kb8 117.Rg8+ Ka7 118.Rg7+ Kb6  
 119.Rg6+ Kc5 120.Rg5+ Kc6 121.Rg6+ Kd5 122.Rg5+ Kd6  
 123.Rg6+ Ke5 124.Rg5+ Ke6 125.Rg6+ Kf5 126.Rg5+ Ke4  
 127.Rg4+ Kf3 128.Rxg3+

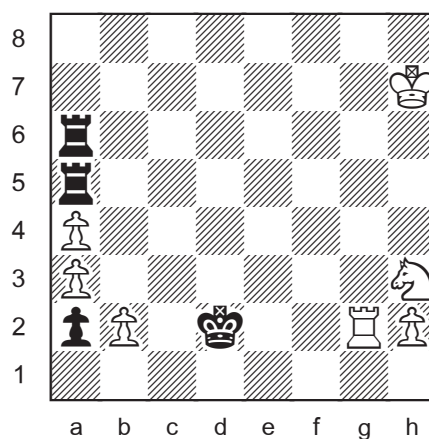


128...Ke4 129.Rg4+ Ke3 130.Rg3+ Kd4 131.Rg4+ Kd3  
 132.Rg3+ Kc4 133.Rg4+ Kc5 134.Rg5+ Kc6 135.Rg6+ Kd5  
 136.Rg5+ Kd6 137.Rg6+ Ke5 138.Rg5+ Ke6 139.Rg6+ Kf5  
 140.Rg5+ Kf6 141.Rg6+ Kf7 142.Rg7+ Kf8 143.Rg8+ Ke7  
 144.Rg7+ Ke8 145.Rg8+ Kd7 146.Rg7+ Kd8 147.Rg8+ Kc7  
 148.Rg7+ Kc8 149.Rg8+ Kb7 150.Rg7+ Kb8 151.Rg8+ Ka7  
 152.Rg7+ Ka8 153.Rg8+ Ka7 154.Rg7+ Ka8 155.Rg8+ Kb7  
 156.Rg7+ Kb8 157.Rg8+ Kc7 158.Rg7+ Kc8 159.Rg8+ Kd7  
 160.Rg7+ Kd8 161.Rg8+ Ke7 162.Rg7+ Ke8 163.Rg8+ Kf7  
 164.Rg7+ Kf6 165.Rg6+ Kf5 166.Rg5+ Ke6 167.Rg6+ Ke5  
 168.Rg5+ Kd6 169.Rg6+ Kd5 170.Rg5+ Kc6 171.Rg6+ Kc5  
 172.Rg5+ Kc4 173.Rg4+ Kd3 174.Rg3+ Kd4 175.Rg4+ Ke3  
 176.Rg3+



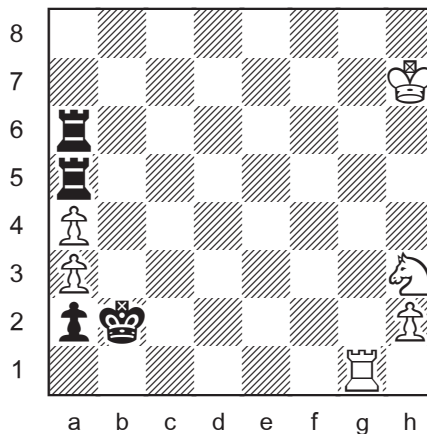
Here is where the play deviates from problem 12d.  
 As Geir Sune notes: "A good example of a position  
 where Black must be careful: 176...Ke2? 177.Nf4+!  
 Kd2 178.Rd3+ and fifty moves have passed."

176...Kd2! 177.Rxg2+



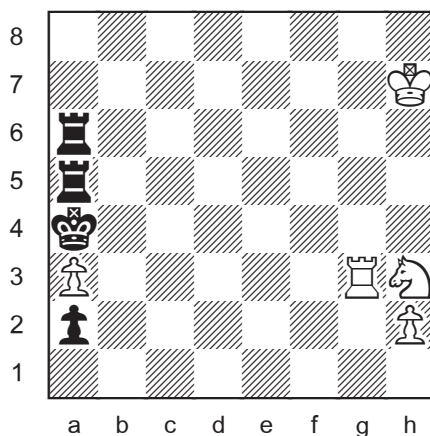
177...Ke3 178.Rg3+ Ke4 179.Rg4+ Kf5 180.Rg5+ Kf6  
 181.Rg6+ Ke5 182.Rg5+ Ke6 183.Rg6+ Kd5 184.Rg5+ Kd6  
 185.Rg6+ Kc5 186.Rg5+ Kb6 187.Rg6+ Ka7 188.Rg7+ Ka8  
 189.Rg8+ Kb7 190.Rg7+ Kb8 191.Rg8+ Kc7 192.Rg7+ Kc8  
 193.Rg8+ Kd7 194.Rg7+ Kd8 195.Rg8+ Ke7 196.Rg7+ Ke8  
 197.Rg8+ Kf7 198.Rg7+ Kf8 199.Rg8+ Kf7 200.Rg7+ Ke8  
 201.Rg8+ Ke7 202.Rg7+ Kd8 203.Rg8+ Kd7 204.Rg7+ Kc8  
 205.Rg8+ Kc7 206.Rg7+ Kb8 207.Rg8+ Kb7 208.Rg7+ Ka8  
 209.Rg8+ Ka7 210.Rg7+ Kb6 211.Rg6+ Kc5 212.Rg5+ Kc6  
 213.Rg6+ Kd5 214.Rg5+ Kd6 215.Rg6+ Ke5 216.Rg5+ Ke6  
 217.Rg6+ Kf5 218.Rg5+ Ke4 219.Rg4+ Kf3 220.Rg3+ Ke2  
 221.Rg2+ Ke1 222.Rg1+ Kd2 223.Rg2+ Kc1 224.Rg1+ Kc2  
 225.Rg2+ Kb1 226.Rg1+ Kxb2

Black must capture to avoid a draw by the fifty move rule.

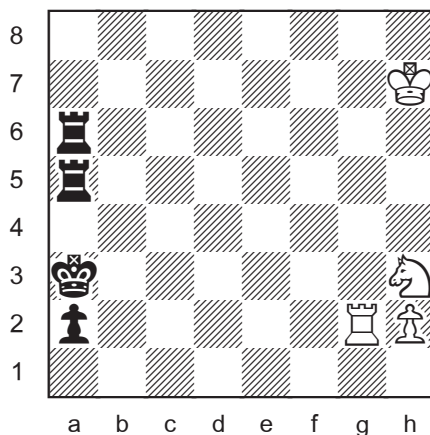


227.Rg2+ Kb1 228.Rg1+ Kc2 229.Rg2+ Kc1 230.Rg1+ Kd2  
 231.Rg2+ Kd1 232.Rg1+ Ke2 233.Rg2+ Ke1 234.Rg1+ Ke2  
 235.Rg2+ Kf3 236.Rg3+ Ke4 237.Rg4+ Ke3 238.Rg3+ Kd4  
 239.Rg4+ Kd3 240.Rg3+ Kc4 241.Rg4+ Kc5 242.Rg5+ Kc6  
 243.Rg6+ Kd5 244.Rg5+ Kd6 245.Rg6+ Ke5 246.Rg5+ Ke6  
 247.Rg6+ Kf5 248.Rg5+ Kf6 249.Rg6+ Kf7 250.Rg7+ Kf8  
 251.Rg8+ Ke7 252.Rg7+ Ke8 253.Rg8+ Kd7 254.Rg7+ Kd8  
 255.Rg8+ Kc7 256.Rg7+ Kc8 257.Rg8+ Kb7 258.Rg7+ Kb8  
 259.Rg8+ Ka7 260.Rg7+ Ka8 261.Rg8+ Ka7 262.Rg7+ Ka8  
 263.Rg8+ Kb7 264.Rg7+ Kb8 265.Rg8+ Kc7 266.Rg7+ Kc8  
 267.Rg8+ Kd7 268.Rg7+ Kd8 269.Rg8+ Ke7 270.Rg7+ Kf6  
 271.Rg6+ Ke5 272.Rg5+ Kd6 273.Rg6+ Kc5 274.Rg5+ Kc4  
 275.Rg4+ Kb3 276.Rg3+ Kxa4





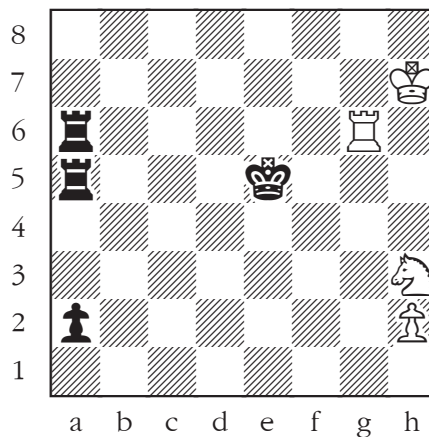
277.Rg4+ Kb5 278.Rg5+ Kb6 279.Rg6+ Ka7 280.Rg7+ Ka8  
 281.Rg8+ Kb7 282.Rg7+ Kb8 283.Rg8+ Kc7 284.Rg7+ Kc8  
 285.Rg8+ Kd7 286.Rg7+ Kd8 287.Rg8+ Ke7 288.Rg7+ Ke8  
 289.Rg8+ Kf7 290.Rg7+ Kf8 291.Rg8+ Kf7 292.Rg7+ Kf8  
 293.Rg8+ Ke7 294.Rg7+ Ke8 295.Rg8+ Kd7 296.Rg7+ Kd8  
 297.Rg8+ Kc7 298.Rg7+ Kc8 299.Rg8+ Kb7 300.Rg7+ Kb8  
 301.Rg8+ Ka7 302.Rg7+ Kb6 303.Rg6+ Kb5 304.Rg5+ Kc6  
 305.Rg6+ Kc5 306.Rg5+ Kd6 307.Rg6+ Kd5 308.Rg5+ Ke6  
 309.Rg6+ Ke5 310.Rg5+ Kf6 311.Rg6+ Kf5 312.Rg5+ Kf6  
 313.Rg6+ Kf5 314.Rg5+ Ke6 315.Rg6+ Ke5 316.Rg5+ Kd6  
 317.Rg6+ Kd5 318.Rg5+ Kc6 319.Rg6+ Kc5 320.Rg5+ Kc4  
 321.Rg4+ Kc3 322.Rg3+ Kd2 323.Rg2+ Kc1 324.Rg1+ Kb2  
 325.Rg2+ Kxa3



The last capture.

326.Rg3+ Ka4 327.Rg4+ Kb3 328.Rg3+ Kb4 329.Rg4+ Kc3  
 330.Rg3+ Kc4 331.Rg4+ Kd3 332.Rg3+ Kd4 333.Rg4+ Ke3  
 334.Rg3+ Ke4 335.Rg4+ Kf5 336.Rg5+ Kf6 337.Rg6+ Ke5  
 338.Rg5+ Ke6 339.Rg6+ Kd5 340.Rg5+ Kd6 341.Rg6+ Kc5

342.Rg5+ Kc6 343.Rg6+ Kb5 344.Rg5+ Kb6 345.Rg6+ Ka7  
 346.Rg7+ Ka8 347.Rg8+ Kb7 348.Rg7+ Kb8 349.Rg8+ Kc7  
 350.Rg7+ Kc8 351.Rg8+ Kd7 352.Rg7+ Kd8 353.Rg8+ Ke7  
 354.Rg7+ Ke8 355.Rg8+ Kf7 356.Rg7+ Kf8 357.Rg8+ Kf7  
 358.Rg7+ Kf8 359.Rg8+ Ke7 360.Rg7+ Ke8 361.Rg8+ Kd7  
 362.Rg7+ Kd8 363.Rg8+ Kc7 364.Rg7+ Kc8 365.Rg8+ Kb7  
 366.Rg7+ Kb8 367.Rg8+ Ka7 368.Rg7+ Kb6 369.Rg6+ Kb5  
 370.Rg5+ Kc6 371.Rg6+ Kc5 372.Rg5+ Kd6 373.Rg6+ Kd5  
 374.Rg5+ Ke6 375.Rg6+ Ke5 ½-½



In this position, White can claim a draw by the fifty move rule. A hard earned half point.

Until next time!

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