



THE PUZZLING SIDE OF CHESS

Jeff Coakley

THE HUNDRED MOVE RULE

number 100

March 19, 2016

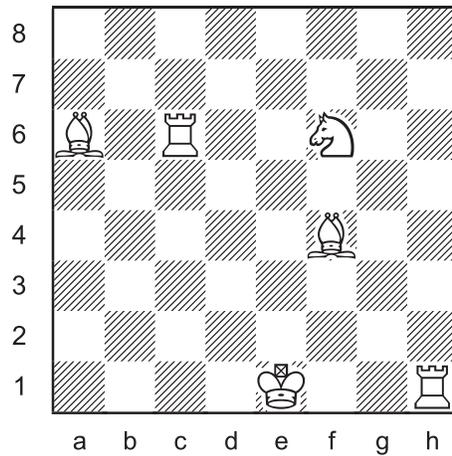
Hey friends, lift your mugs. It's *Puzzling Side* column 100!

Besides a good excuse for toasting longevity, we have several special "100 theme" puzzles. Including construction tasks, a marathon direct mate, and detailed analysis of the longest possible game of chess.



I don't think anyone will be surprised if we start things off with a *triple lloyd*. Over two hundred of them have been published so far.

Triple Loyd 48



Place the black king on the board so that:

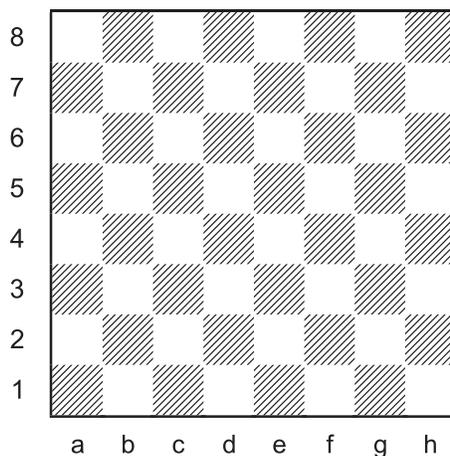
- A. Black is in checkmate.
- B. Black is in stalemate.
- C. White has a mate in 1.



Sculpture commemorating city centennial.
Vancouver, British Columbia
(Stonecoat 1986)

Time now for some construction tasks. Is your hard hat handy?
Chess safety is always a priority.

Queenfest 23



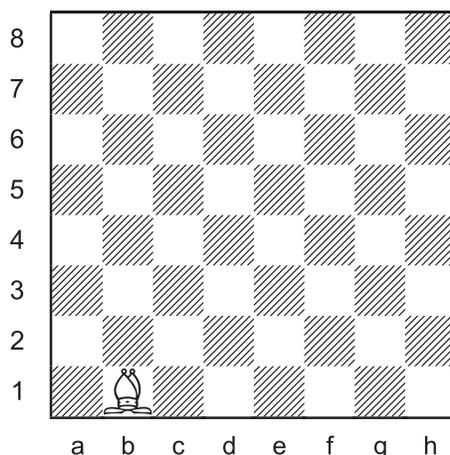
Place four queens on the board so that they have a total of 100 possible moves.



Deciphering cloud patterns.

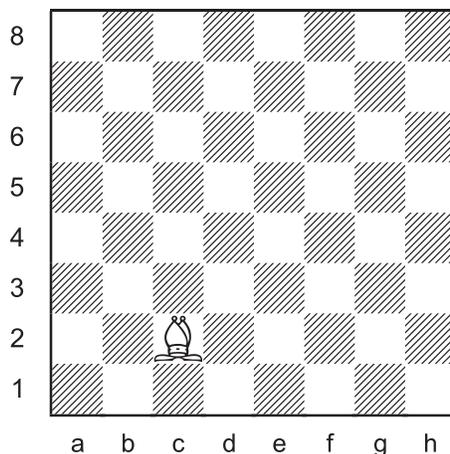
The following trio of tasks is an original “100” contribution by my friend Adrian Storisteanu of Toronto. I’d like to take this opportunity to thank him for the many ways he has helped make *The Puzzling Side of Chess* whatever it is. His knowledge of problem composition and computer wizardry are of constant benefit.

Queenfest 24a



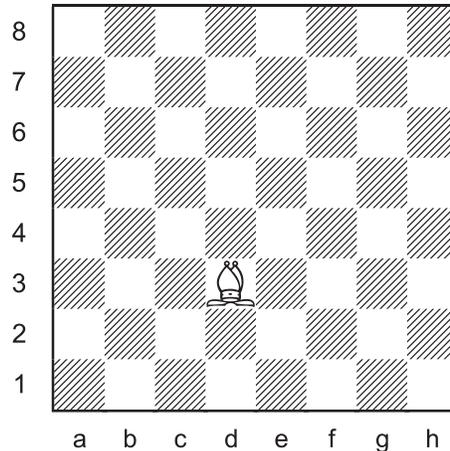
Add four queens **on light squares** so that the five pieces (QQQQB) have a total of 100 possible moves.

Queenfest 24b



Add four queens **on light squares** so that the five pieces (QQQQB) have a total of 100 possible moves.

Queenfest 24c



Add four queens **on light squares** so that the five pieces (QQQQB) have a total of 100 possible moves.



The number 100 is a natural milestone in life. A hundred times this and a hundred times that. Light up the candles.

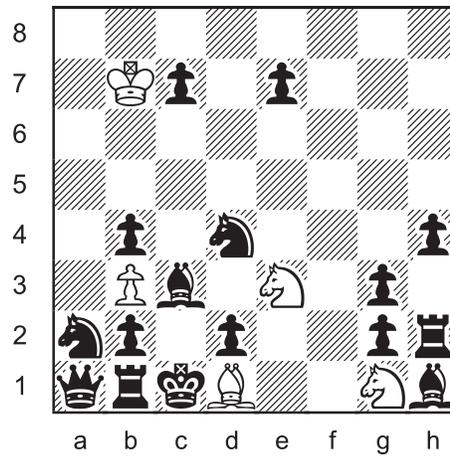
Do you know any *centenarians*? According to the United Nations, there are currently more than 300,000 people over the age of 100. That's .004% of the world's seven billion humans.

The oldest person on the planet today is Susannah Mushatt Jones of Brooklyn, New York. She is 116 years old, born in Alabama on July 6, 1899. Cheers.

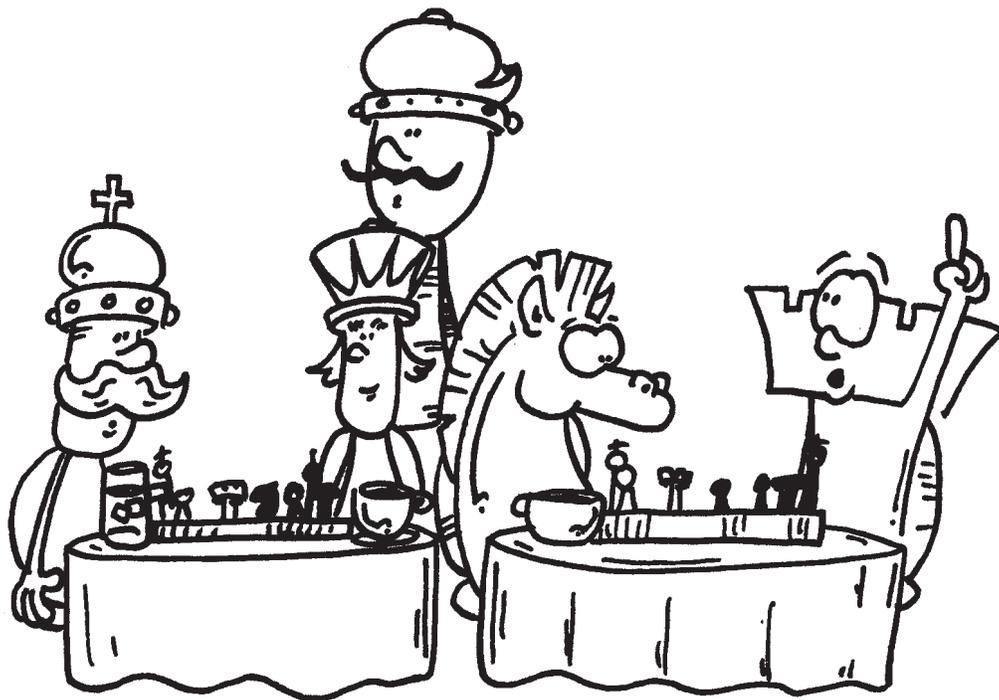
For our next adventure in the realm of 100's, we cross over temporarily to "the normal side of chess". It's a direct mate problem by renowned German composer Karl Fabel (1905-1975).

The *grotesque* setting pits a handful of white pieces against the entire black army. The solution resembles a series-mate in which Black's moves are limited to delaying tactics. Happy hunting.

Mate in 100



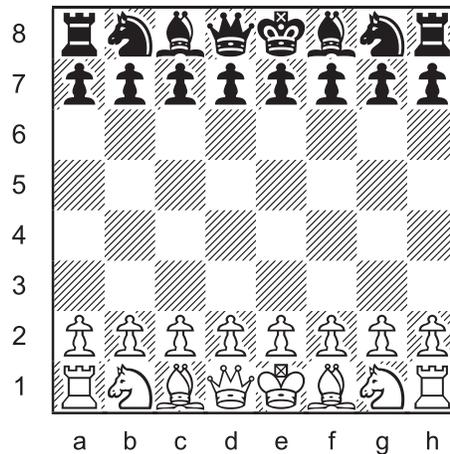
White to mate in 100 moves



"Excuse me, I didn't order a 100 move problem."

After that brief excursion “across the border”, we come to our final puzzle. It’s a question that’s been asked by many people over the years. What is the . . .

Longest Possible Game of Chess



part A

What is the longest possible game of chess based on the 50 move rule?

Assume that a draw will be claimed if fifty moves are made by each side without a capture or a pawn move.

It’s surprising how many different answers there are to this question on the internet. Let’s do *multiple choice* using the numbers I’ve seen.

The longest possible game of chess is:

- a) 5842 moves
- b) 5870.5 moves
- c) 5898 moves
- d) 5899 moves
- e) 5900 moves
- f) 5949 moves
- g) 5950 moves

Did you know that the 50 move rule was introduced in 1561 by the Spanish bishop Ruy Lopez? In his book *Libro de la invención liberal y arte del juego del Axedrez*. Impressive title.

But it wasn’t until the London tournament of 1883 that fifty moves “without a capture or pawn move” was specified.

The current FIDE rule (2014) is article 9.3 of the *Laws of Chess*.

9.3 The game is drawn, upon a correct claim by a player having the move, if he writes his move, which cannot be changed, on his scoresheet and declares to the arbiter his intention to make this move which will result in the last 50 moves by each player having been made without the movement of any pawn and without any capture, or the last 50 moves by each player have been completed without the movement of any pawn and without any capture.

That's quite a mouthful. Perhaps their rules committee has been infiltrated by long-winded lawyers. The tendency is for each new edition of the FIDE laws to become wordier and wordier. Shorter and to the point would be much clearer. For example, where would a player write his move if not "on his scoresheet"?

If you've ever taught chess to young kids or been a referee at scholastic tournaments, then you know the confusion that the 50 move rule can cause. In some of my classes, I told the students that it was actually "the hundred move rule", 50 moves by each player. That is one reason for the title of this column, but not the only one.

Beginning in 1928, FIDE has had various versions of the 50 move rule in which the number of moves is extended for "certain endgames". From 1952 until 1989, this number was 100 moves. But it wasn't until 1984 that specific endings were listed.

FIDE reduced the number of extra moves in 1989, allowing 75 moves for these six endings:

R + B vs. R

N + N vs. P

Q vs. N + N

Q vs. B + B

B + B vs. N

Q + p (on 7th) vs. Q

Finally in 1992, the silliness ended. Since then, there are no more exceptions to the 50 move rule.

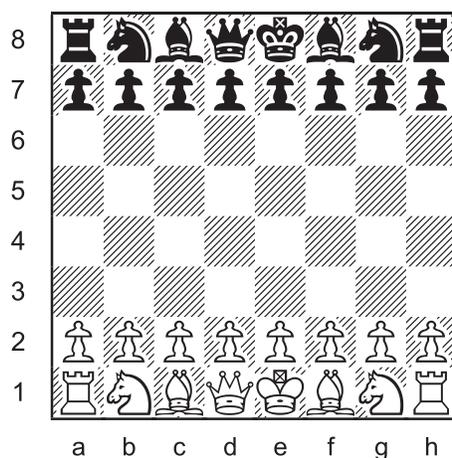
However, FIDE is never satisfied with their rule book. In 2014, they introduced a new *75 move rule*. Article 9.6b states that the game is automatically drawn if 75 moves are made without a capture or a pawn move. A claim by one of the players is not necessary.

Presumably, the purpose of this rule is to prevent little kids from playing on indefinitely. Perhaps they don't know how to checkmate with K + Q vs. K. Perhaps they don't realize the position is a dead draw. Perhaps they don't know the 50 move rule.

But do we really need a special rule for this situation? And why 75 moves? Why not 64? Or 100? Wouldn't it be simpler to just say that organizers of youth events may declare a game drawn by the 50 move rule without a claim by one of the players, if this is announced before the tournament?

Anyhow, I digress. We're here for the puzzles. And the 75 move rule provides us with a new twist on the same old question.

Longest Possible Game of Chess



part B

What is the longest possible game of chess based on the 75 move rule?

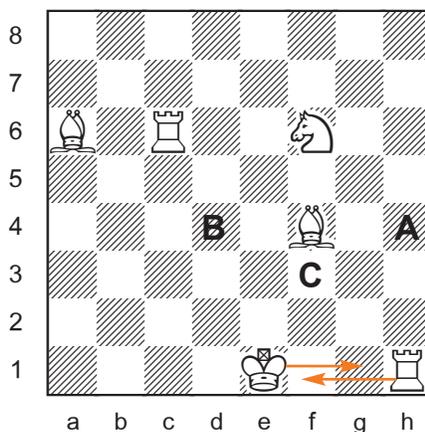


SOLUTIONS

Triple loyd 48 and original analysis of the *longest game* by J. Coakley.
Puzzling Side of Chess (2016)

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.

Triple Loyd 48

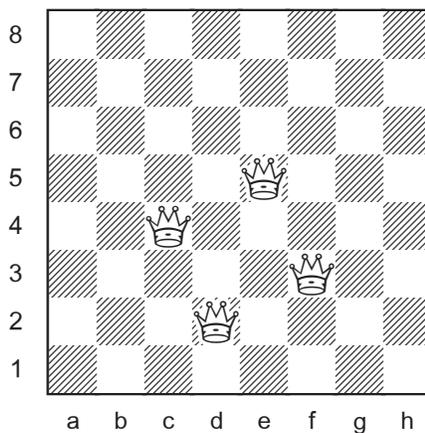


- A. Kh4#
- B. Kd4=
- C. Kf3 (0-0#)

The mating move is **1.0-0.**

Queenfest 23

Bernd Schwarzkopf 1979
feenschach



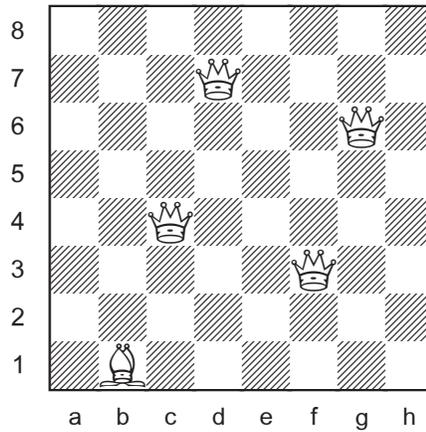
The four queens have 100 possible moves.

$$27(e5) + 25(c4) + 25(f3) + 23(d2)$$

The queen on d2 could also be on b6, d7, or g6. With the usual reflections and rotations, a total of 32 solutions.

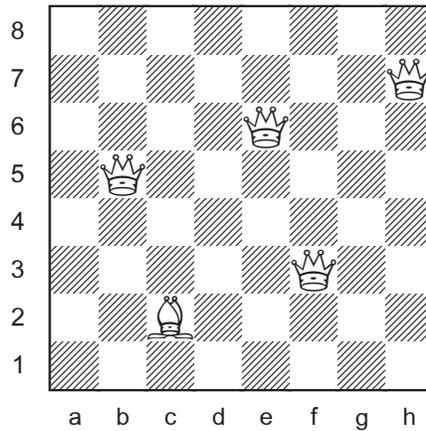
Queenfest 24a

Adrian Storisteanu 2016
Puzzling Side of Chess



The five pieces have 100 possible moves.
 $5(b1) + 25(c4) + 25(f3) + 23(d7) + 22(g6)$

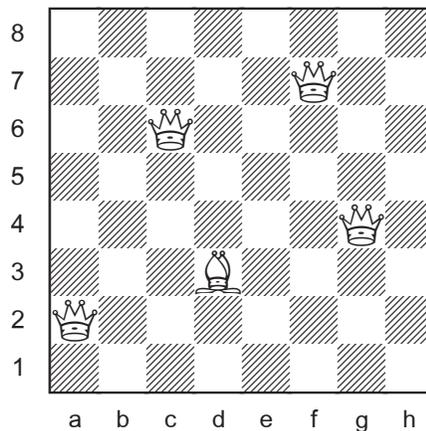
Queenfest 24b



The five pieces have 100 possible moves.
 $8(c2) + 25(e6) + 25(f3) + 23(b5) + 19(h7)$



Queenfest 24c



The five pieces have 100 possible moves.
 $11(d3) + 25(c6) + 23(g4) + 22(f7) + 19(g6)$

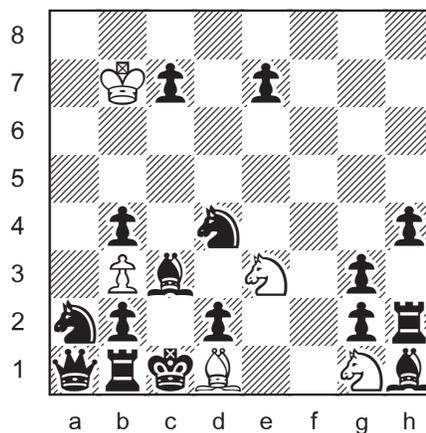
The solutions to all three parts of this problem are unique.

With the bishop on e4, a total of 100 moves is impossible with the queens on light squares. It is possible in many ways if there is no light square restriction. For example, Be4 Qc3 Qd6 Qg2 Qh5.

Mate in 100

Karl Fabel 1951

Die Schwalbe



As a bit of staring at the position will reveal, Black has very few mobile pieces. Even the centralized knight on d4 is stuck there on guard duty. If it moves away, White mates with Ng1-e2#. Besides several pawn moves, Black has nothing better to do than shuffle their rook between h2 and h3.

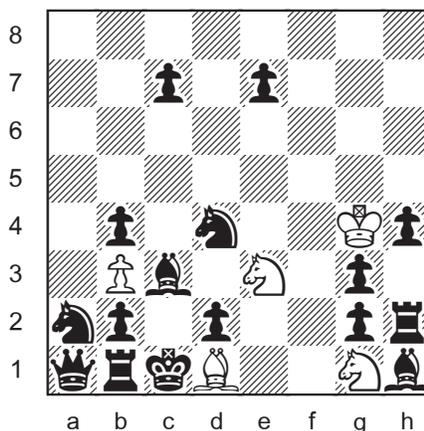
White will win by eventually forcing the black knight to leave d4. That only takes 99 moves, all by the king! To accomplish this lengthy task, the black pawn moves must be exhausted.

The white king can force Black to move a pawn by going to g4 when the black rook is on h2. Let's see how that works one time.

1.Kc8! The first thing to notice is that 1.Kxc7? loses to 1...Ne6+ 2.Kd7 Nf4!, which allows the black knight to shift its duty station, freeing the bishop on c3 and soon thereafter the whole black army.

Throughout the course of the king's long journey ahead, he must avoid knight checks which permit this manoeuvre. That means staying off the dark squares c7, d8, f8, g7, g5. He must also stay off the dark squares e5, f6, g7, h8 because of the discovered check ...Ne2+. And the dark squares d6, e7, h6 are off limits because of ...Nf5+. In other words, the white king needs to stay on light squares.

- 1...Rh3
- 2.Kd7 Rh2
- 3.Ke8 (3.Kxe7? Nf5+ 4.Nxf5 Kxd1 or 4.Kf7 Nxe3)
- 3...Rh3
- 4.Kf7 Rh2
- 5.Kg6 Rh3
- 6.Kh5 Rh2
- 7.Kg4



7...Rh3? 8.Kxh3 leads to a fairly quick mate for White, so it's time to move a pawn.

7...c6

That was easy enough. Now the white king just has to repeat the process seven more times. But the tricky part is getting back to g4 when the black rook is on h2. 8.Kh5 Rh3 9.Kg4 Rh2 doesn't work. This is the crux of the problem. The king cannot lose the necessary tempo if he stays on light squares!

In order to reach g4 again with the black rook on h2, the king must find a safe dark square. Guess what. It's b8!

8.Kh5 (8.Kf4? Ne6+ 9.Kf5 Nf4 10.Kxf4 Be5+! 11.Kxe5 Nc3)

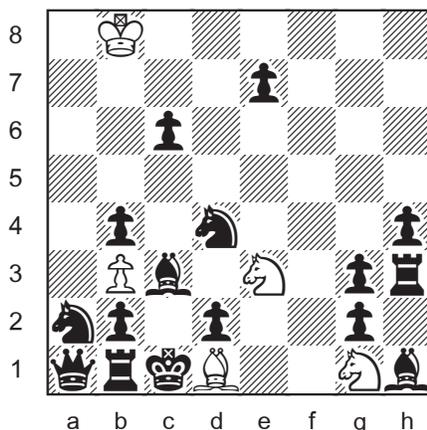
To save space, many of the following move sequences are given in paragraph style rather than in a column.

8...Rh3 9.Kg6 Rh2 10.Kf7 Rh3 11.Ke8 Rh2 12.Kd7 Rh3 13.Kc8 Rh2

14.Kb7 (14.Kb8 Rh3 15.Kb7 Rh2 16.Kc8 transposes.)

14...Rh3

15.Kb8!



15...Rh2 Now the white king takes the light square route back to g4.

16.Kc8 Rh3 17.Kd7 Rh2 18.Ke8 Rh3 19.Kf7 Rh2 20.Kg6 Rh3 21.Kh5 Rh2 22.Kg4

22...c5 A second pawn move is forced. And it's back to b8!

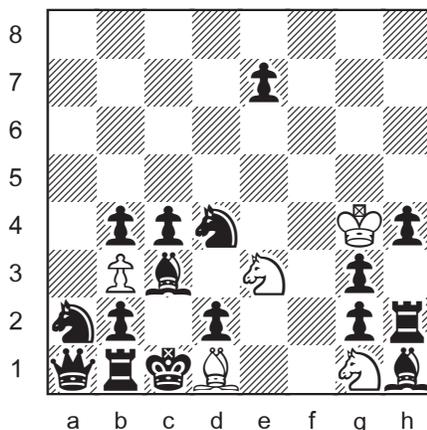
23.Kh5 Rh3 24.Kg6 Rh2 25.Kf7 Rh3 26.Ke8 Rh2 27.Kd7 Rh3 28.Kc8 Rh2 29.Kb7 Rh3 30.Kb8!

30...Nc6+ (30...Rh2 31.Kc8 Rh3 32.Kd7 transposes.)

31.Kc8 Nd4 The black knight must return to his post.

32.Kd7 Rh2 33.Ke8 Rh3 34.Kf7 Rh2 35.Kg6 Rh3 36.Kh5 Rh2

37.Kg4 c4 You can see why this takes 100 moves!



I think it's safe to speed ahead now.

38.Kh5 Rh3 39.Kg6 Rh2 40.Kf7 Rh3 41.Ke8 Rh2 42.Kd7 Rh3 43.Kc8 Rh2 44.Kb7 Rh3 45.Kb8

45...Nc6+ 46.Kc8 Nd4 47.Kd7 Rh2 48.Ke8 Rh3 49.Kf7 Rh2 50.Kg6 Rh3 51.Kh5 Rh2 52.Kg4

52...cxb3 53.Kh5 Rh3 54.Kg6 Rh2 55.Kf7 Rh3 56.Ke8 Rh2 57.Kd7 Rh3 58.Kc8 Rh2 59.Kb7 Rh3 60.Kb8

60...Nc6+ 61.Kc8 Nd4 62.Kd7 Rh2 63.Ke8 Rh3 64.Kf7 Rh2 65.Kg6 Rh3 66.Kh5 Rh2 67.Kg4

67...e6 68.Kh5 Rh3 69.Kg6 Rh2 70.Kf7 Rh3 71.Kg8 Rh2

72.Kf8 With a black pawn on e6, the dark square f8 is safe.

72..Rh3 73.Kf7 Rh2 74.Kg6 Rh3 75.Kh5 Rh2 76.Kg4

76...e5 77.Kh5 Rh3 78.Kg6 Rh2

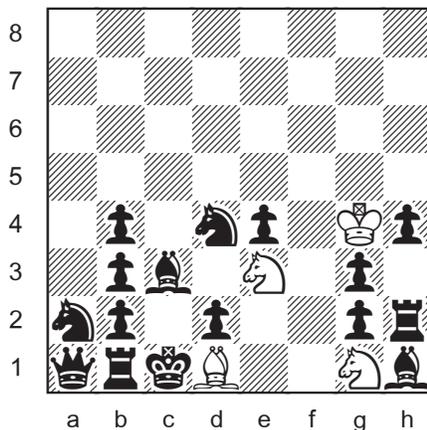
79.Kf6 With a black pawn on e5, the dark square f6 is safe.

79...Rh3 80.Kf7! (not 80.Kg6 Rh2 81.Kh5 Rh3 82.Kg4 Rh2)

80...Rh2 81.Kg6 Rh3 82.Kh5 Rh2 83.Kg4

83...e4

The end is in sight. Back to b8 one last time.

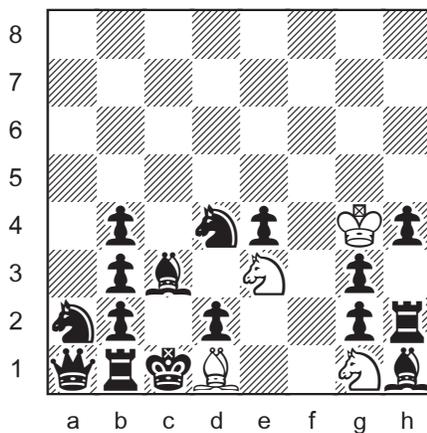


84.Kh5 Rh3 85.Kg6 Rh2 86.Kf7 Rh3 87.Ke8 Rh2 88.Kd7 Rh3 89.Kc8 Rh2 90.Kb7 Rh3 91.Kb8

91...Nc6+ 92.Kc8 Nd4 93.Kd7 Rh2 94.Ke8 Rh3 95.Kf7 Rh2 96.Kg6 Rh3 97.Kh5 Rh2

98.Kg4

Same position as in the previous diagram, but Black to move.



98...h3

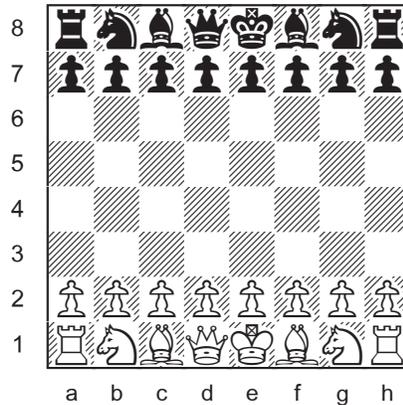
(98...Rh3 99.Kxh3 Nc6 100.Ne2#)

99.Kh5 Nc6

100.Ne2#

Well, I'm ready for another mug. Let's salute Karl Fabel this round!

Longest Possible Game of Chess



part A

Based on the 50 move rule.

The correct answer is 5898.5 moves.

[October 2023: The solution given here is a correction to the answer of 5898 as was originally published in the March 2016 column. The changes occur in the analysis after move 5000 on page 20.]

In the longest possible game of chess, a capture or a pawn move is only made every 50th turn.

The maximum number of captures in a game is 30, leaving king vs. king.

The maximum number of pawn moves in a game is 96. However, in order for all the pawns to get by each other, 8 pawn moves must also be captures. So for this calculation, we count 88 pawn moves ($96 - 8 = 88$).

Using these values, the maximum number of moves would be:

$$(50 \times 30) + (50 \times 88) = 1500 + 4400 = 5900$$

However, we must still subtract a certain number of moves because not all the captures and pawn moves can be made by Black (on their 50th, 100th, ..., 5850th move).

At some point, White will have to make a capture, let's say on move 150. Then, if Black makes the following capture, it would have to be on move number 199 (not 200). If White captures next after that, it would be move 249. And if Black makes the next capture, it would have to be on move number 298 (not 299 or 300).

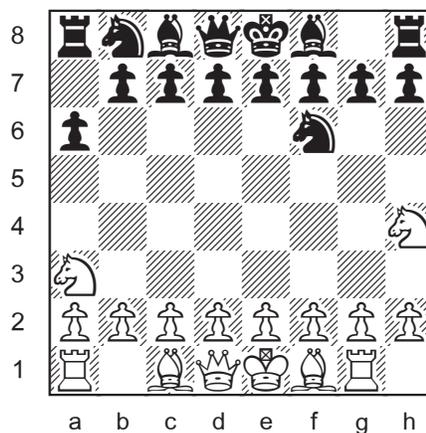
So each time the colour of the capturer (or pawn mover) changes from white to black, or vice versa, the maximum number of moves must be reduced by "one half move".

It is possible to play the longest game by only “changing colours” three times, twice to White, and once to Black. Those three switches equate to the loss of 1.5 moves. Subtracting this amount from 5900 gives us 5898.5, which means that the last move of the longest game would be on White’s 5899th move.

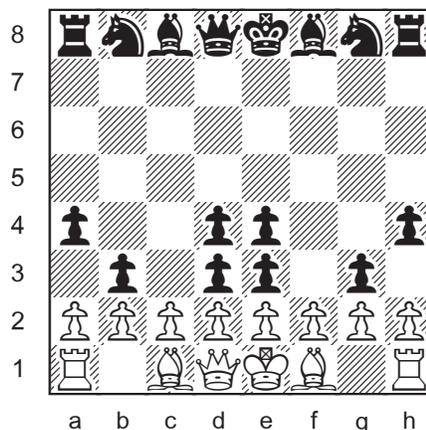
However, something strange happens when we get to the final moves. But first, let’s see how we get there.

1.Nf3

The game starts with 49.5 moves (50 by White, 49 by Black) in which the pawns remain stationary. The knights hop around and the rooks shuffle back and forth in their corners. Then, Black plays 50...a6.



Black continues to make a pawn move every 50th turn. On move numbers 100, 150, 200, etc. White only moves knights and rooks. After 1400...h4, the following position is reached. Black has made 28 pawn moves, two of which were captures.

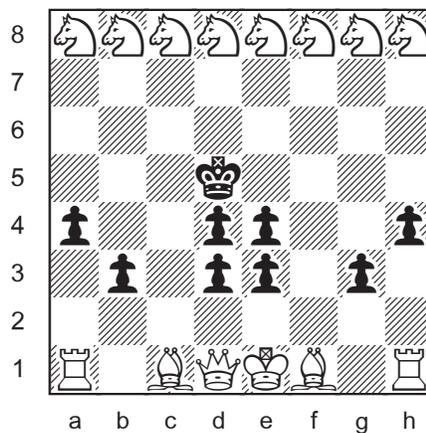


This brilliant position was given by Karl Fabel, Eero Bonsdorff, and Olavi Riihimaa in their excellent 1966 book *Schach und Zahl* (Chess and Numbers).

The important feature of this pawn formation is that now White will be able to promote all of their pawns before the “colours shift” again. That is, before Black is the player who makes a capture or pawn move.

As you can see, each of the white pawns will be able to pass by the black pawns. The c-pawn and f-pawn can pass without a capture. The other six pawns will need to make a capture.

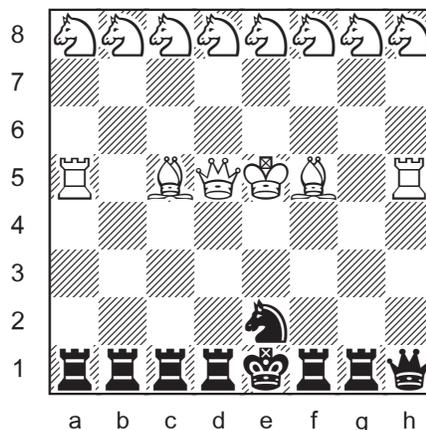
So White makes 48 pawn moves, one every 50 turns, six of which are captures. The first white pawn move is 1450.a3. The 48th pawn move is 3800.g8=N. Black still has one piece (besides the king and 8 pawns) on the board. So the next capture is 3850.Nxa8, reaching this diagram.



Of course, the promoted pieces do not need to be knights, and the white pieces can be on different squares. The main thing is that all of the white pawns have promoted.

Now the colours shift a second time. Black will be the one moving pawns and making captures. Black will make 20 moves to promote all eight pawns. None of those moves are captures.

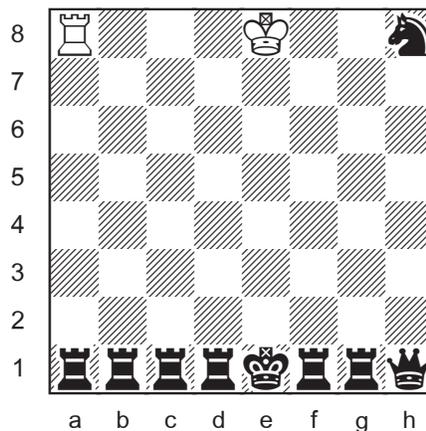
The first black pawn move in this phase of the game is 3899...a3. The last promotion will be 4849...h1=Q. Giving us the next diagram.



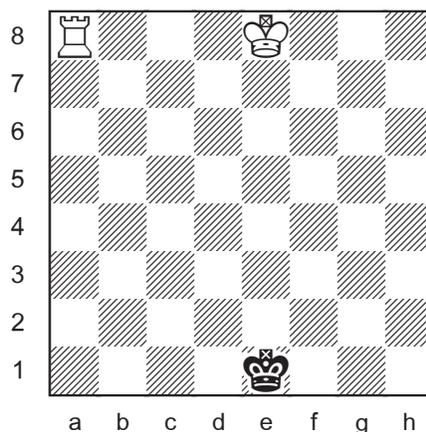
[October 2023: Here is where the 2016 solution is improved. In the next phase, Black leaves one white rook on the board. This allows White to make the last move of the game, thereby extending the marathon by a half move.]

White has 13 pieces on the board, not counting the king. Black will capture one every 50th turn, until White only has a king and a rook. The first capture is 4899...Qxh5. The 12th capture is 5449...Nxb8.

[In the original solution, Black captured all 13 pieces. The remaining diagrams are different now with corresponding changes to the text.]



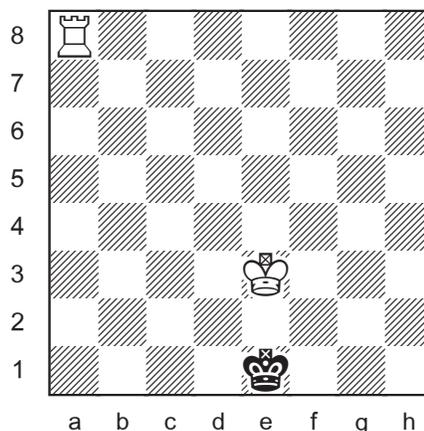
A white king and rook versus the black king and 8 pieces. The colours now shift for the third and last time. White will capture a black piece every 50 turns. The first will be 5499.Kxd8. The eighth capture will be 5849.Kxe8. Reaching this endgame.



The battle rages on until Black plays 5898...Ke1, with the following extremely interesting position.

[2023: *The remaining text is mostly new.*]

The next white move will end the game. Either mate by 5899.Ra1# or a draw by the 50 move rule with any other 5899th move. It is essential that White have the option of mating with the final move, otherwise the position would already be drawn by the “dead position” rule. (This is the *something strange* that happens when we get to the final moves.)



The grand conclusion is: The longest possible game based on the 50 move rule is **5898.5** moves, ending with White’s 5899th move, as given by Karl Fabel in 1966.

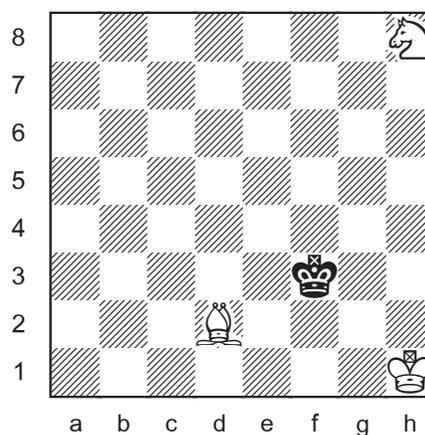
Concerning the possibility of a dead position, FIDE article 9.7 states:
The game is drawn when a position is reached from which a checkmate cannot occur by any possible series of legal moves. This immediately ends the game.

Therefore White must be able to mate with their 5899th move. If not, the position is already drawn because no mate is possible before the 50 move rule ends the game. However, the application of dead reckoning to this puzzle is debatable because in a normal game, a draw by the 50 move rule is not automatic. It must be claimed by one of the players, so the dead position rule would not apply.

On the other hand, the 75 move rule is automatic, in which case dead reckoning does evidently apply.

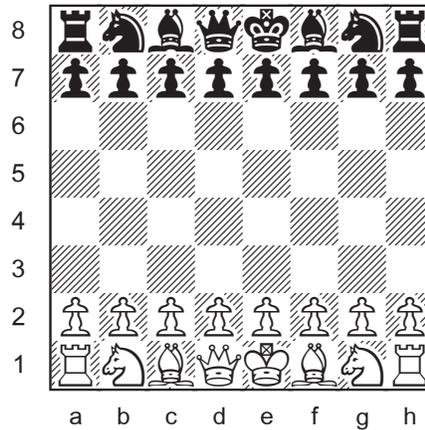
Imagine the following weird situation in a tournament game.

In this position, with Black to play, say that 10 moves have been made without a capture or pawn move. The game is already drawn because the quickest possible checkmate takes 66 moves, which exceeds the 75 move limit. But how would the players or arbiter know?



This sort of analysis, arising from FIDE rule 9.7, is known as *dead reckoning*. British composer Andrew Buchanan is the originator and leading authority on chess problems involving “DR”.

Longest Possible Game of Chess



part B

Based on the 75 move rule.

[October 2023: The solution given here is a correction to the answer of 8848 as originally published in the March 2016 column.]

One shortcoming of part A was that in a game of chess, the players are not required to claim a draw by the 50 move rule. Theoretically the game could go on forever.

Not so with the 75 move rule. The draw happens automatically. There is no need for a claim by one of the players. Thanks to the new FIDE laws, we now have a definitive solution to our puzzle. Perhaps this is why they made the rule?!

All calculations in part B are the same, except we multiply by 75 instead of 50.

$$(75 \times 30) + (75 \times 88) - 1.5 = 2250 + 6600 - 1.5 = 8848.5$$

The longest game of chess is 8848.5 moves.

There it is, folks. The new number that answers the old question.

8848.5

Until next time!

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