SMORGASBORD XXXVII The Cutting Edge
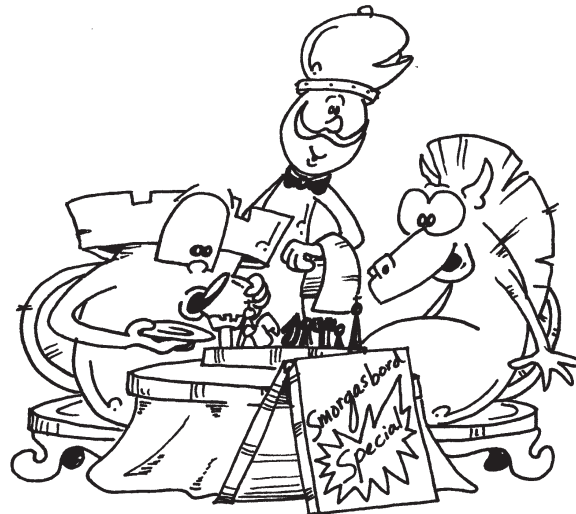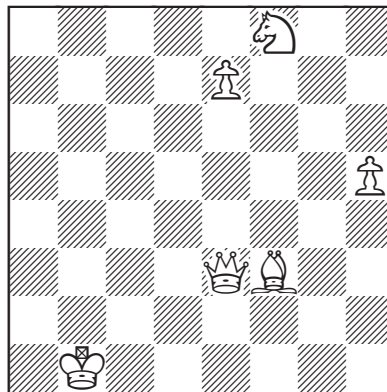
number 232   February 24, 2024

This column presents the usual assortment of smorgasbord puzzles, plus a baffling geometric enigma by the Puzzle King himself, Sam Loyd.
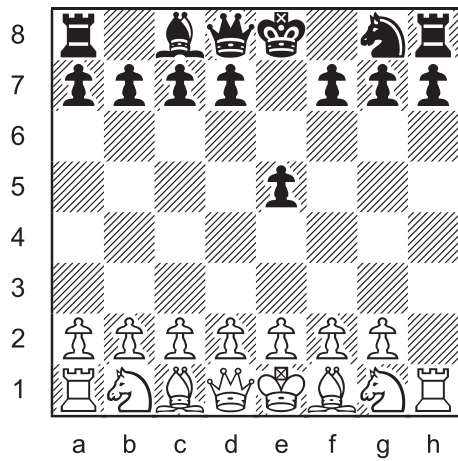
Triple Loyd 91

Place the black king on the board so that:
- A. Black is in checkmate.
- B. Black is in stalemate.
- C. White has mate in 1.
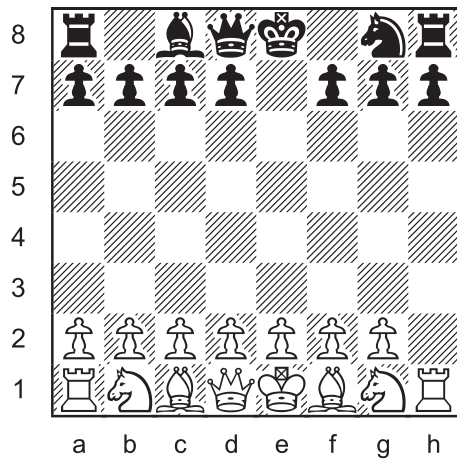
Longer Proof Game 119
(5.5 moves)

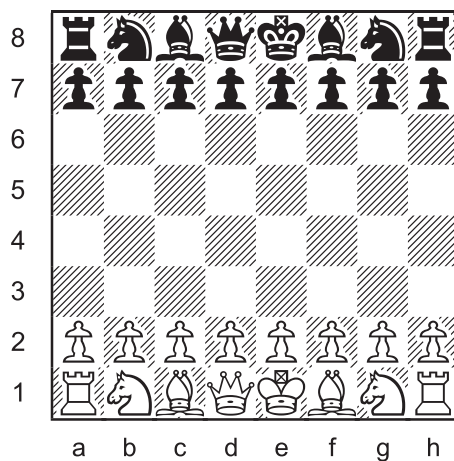## Longer Proof Game 120
(5.5 moves)

These positions were each reached after
White's <u>sixth</u> turn. What were the moves?

Synthetic Game 54

Compose a game that ends with 5.d6#.

The next position is illegal. It cannot be reached in an actual game.

The solution to this kind of puzzle is a logical argument that proves a contradiction. Identifying a particular piece as the "goof" is not usually possible. But normally there is one feature of the position that underlies any explanation of illegality.

Who's the Goof? 40
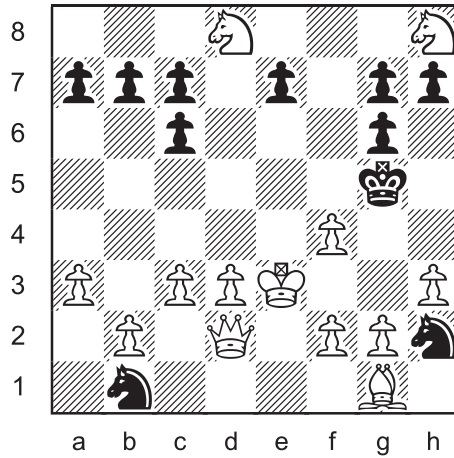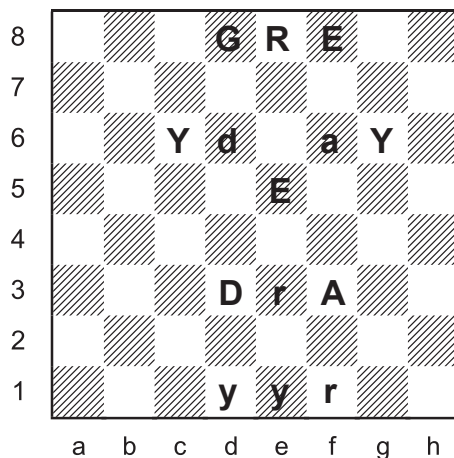

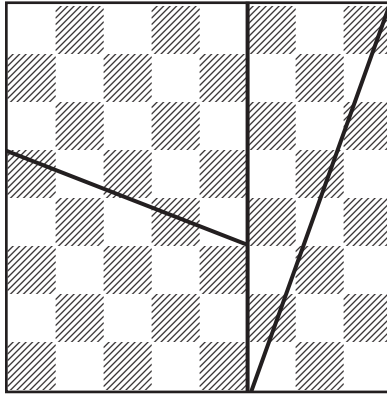Why is this position illegal?


Rebus 106
"grey day"

Each letter represents a different type of piece.
Uppercase is one colour, lowercase is the other.
Determine the position and, if possible, the last move.

The Extra Square

A paradox that has boggled many a mind.

A chessboard is cut into four parts. Two triangles with sides of 3 and 8 squares, and two trapezoids with sides of 3 and 5. The parts are then put back together to form a 5 by 13 board.
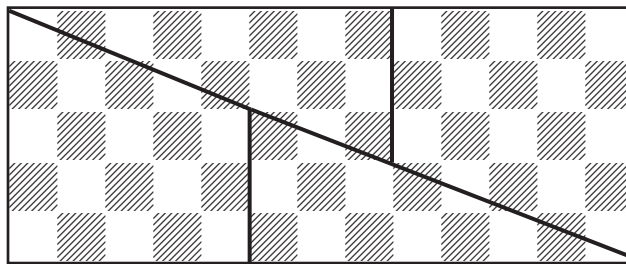
A normal chessboard has 64 squares. The new 5 by 13 board has 65! Somehow, an extra square has been created! Can you explain it?

The Missing Square

The same four parts of the chessboard can also be reassembled to form an odd-shaped board of 63 squares! Do you see how?

Counting squares and fingers.

SOLUTIONS

All problems except *extra square* are by J. Coakley, *Puzzling Side of Chess* (2024). Rebus 106 is a joint composition with Andrey Frolkin.

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.

Archives. Past columns are available in the *Puzzling Side* archives.

Triple Loyd 91
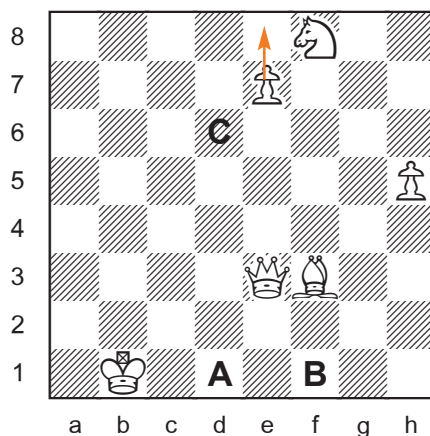
A. Kd1#
B. Kf1=
C. Kd6 (e8=N#)

Understated promotion.

Longer Proof Game 119   (5.5 moves)
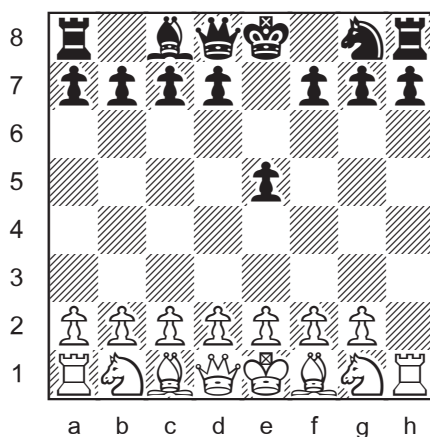
1.h4 e5 2.Rh3 Ba3 3.Rxa3 Na6 4.Rxa6 Qxh4 5.Rh6 Qd8 6.Rh1

Merry-rook-go-round.

Longer Proof Game 120   (5.5 moves)
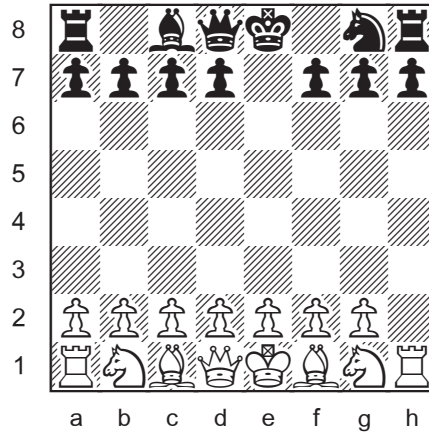
1.Nf3 e5 2.Nxe5 Nc6 3.Nxc6 Bd6 4.Nd4 Bxh2 5.Nf3 Bg1 6.Nxg1
Merry-knight-go-round.

Synthetic Game 54

1.d4 Nf6 2.Bf4 e6 3.Bxc7 Ke7 4.d5 Qe8 5.d6#

The moves can be played in different orders. Another solution by
Yakov Konoval is 1.d4 e5 2.Qd3 Ke7 3.Qg6 f5 4.d5 c6 5.d6#.

Who's the Goof? 40

The position is illegal because the first capture by a pawn could only be the capture of a knight. And all four knights are still on the board.

All 16 pawns are on the board so there are no promoted pieces.

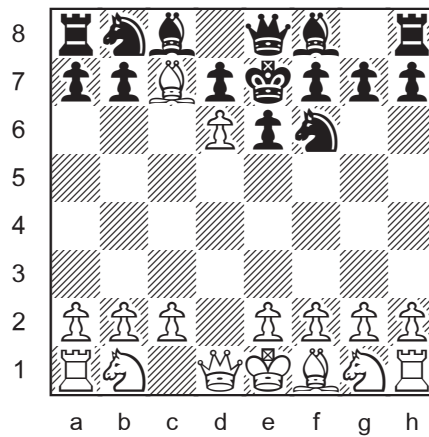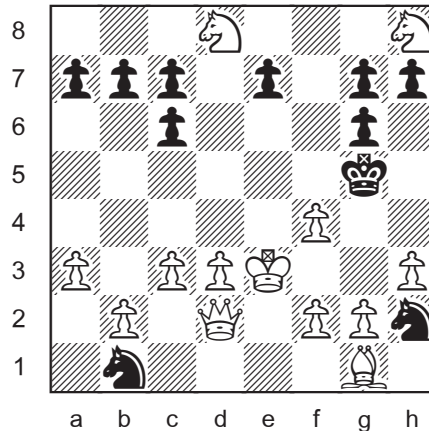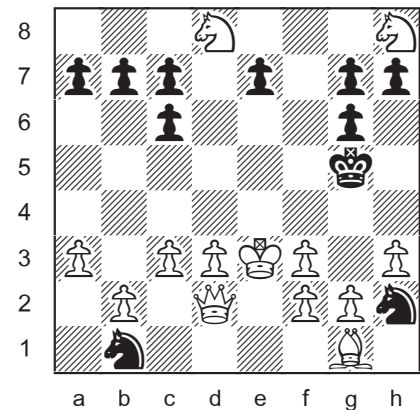Black is in check by the pawn on f4. So the last move was 1.f3-f4+. Here is the position before that move.

Black has made two captures by pawns, ...d7xc6 and ...f7xg6.

White is missing 3 pieces: two rooks and a light-square bishop. None of them could exit from behind the white pawns to be captured by a black pawn until after a white pawn made a capture to open a line (cxd3, dxc3, or exf3).

Black is missing 5 pieces: queen, two rooks, two bishops. None of them could exit from behind the black pawns to be captured by a white pawn until after a black pawn made a capture to open a line (...dxc6 or ...fxg6).

We face a *time loop* conundrum. Which side made the first capture with a pawn? A white pawn could only make a capture after a black pawn captured. A black pawn could only make a capture after a white pawn captured. Both possibilities must precede and follow the other. Therefore the position is illegal.

So who is the goof? As often happens, there are many individual pieces that we could lay the blame on. For example, any pawn could be shifted to a different square to make things right. Or how about the white king? If he stood somewhere else, then the last move could be the capture 1.e3xf4+, with a legal position.

[*March 2024 correction: Black pawn on h7 instead of h6 as originally posted. Thanks, Kato.*]
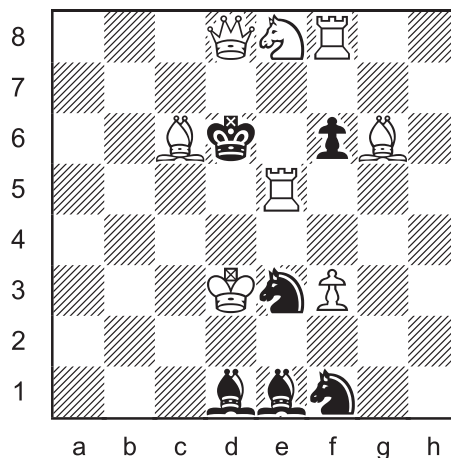
Rebus 106

Andrey Frolkin & Jeff Coakley

"grey day"
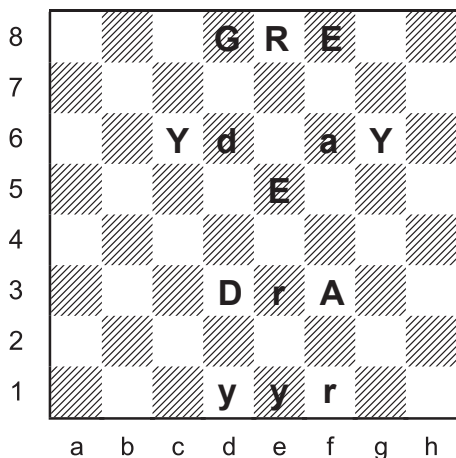
G = queen
R = knight
E = rook
Y = bishop
D = king
A = pawn

caps = white

last move:
1.d7xe8=N++

♔ = (AD)   Letters with one uppercase, one lowercase.

♙ = (AD)   GREY ≠ ♙   On 1st or 8th rank.

GREY = (♕♖♗♘)

REY ≠ ♕	If A = ♔	R ≠ ♕	Impossible double check (e3 f1).
		E ≠ ♕	Impossible double check (e5 f8).
		Y ≠ ♕	Both kings in check (d1 g6).
	If D = ♔	R ≠ ♕	Impossible double check (e3 f1).
		E ≠ ♕	Both kings in check (e5 f8).
		Y ≠ ♕	Both kings in check (d1 c6).

G = ♕   One king (d6 or f6) is in <u>check</u> by the queen on d8.

Y = ♗	Y ≠ ♘	Both kings in check (e1).
	Y ≠ ♖	Impossible double check (c6 or g6).

D = ♔   A ≠ ♔   Both kings in check (d1).

A = ♙

E = ♖   R ≠ ♖   Both kings in check (d3).

R = ♘   The king on d6 is in <u>check</u> by the knight on e8.
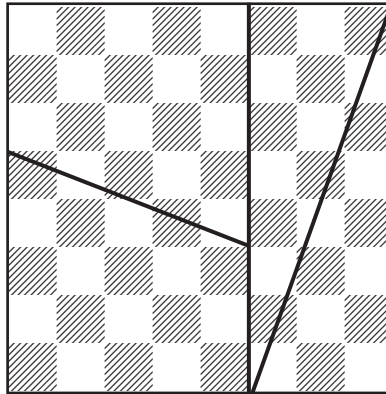
Last move: 1.d7xe8=N+   Only way to explain double check.
                             The type of piece captured is unknown.
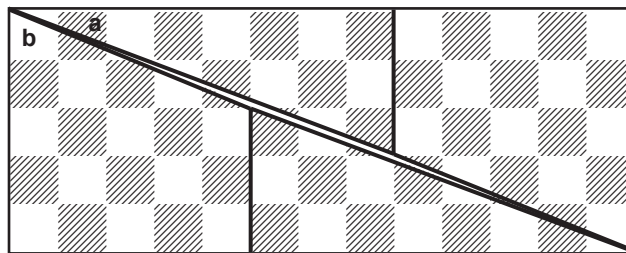
caps = white   Uppercase promotion on 8th rank.

The Extra Square

Sam Loyd 1858

American Chess Congress

The apparent paradox is based on an optical illusion. The 5 x 13 board was not drawn accurately. It should have looked like this:

The four pieces from the 8 x 8 board do not fit together exactly to make a 5 x 13 board. There is a slight gap between the four pieces along the diagonal. The area of this long skinny *parallelogram* is equal to the area of one square.

The angles of the trapezoids do not match the angles of the triangles. We can calculate the angles using trigonometry.

The *tangent* of an angle in a right triangle is equal to the *opposite side* divided by the *adjacent side*. In this case, the tangent of 'angle a' is 3/8 or .3750. A "trig table" shows that 'angle a' is 20.6 degrees.

In the trapezoid, the tangent of 'angle b' is 5/2 or 2.500. Which means that 'angle b' is 68.2 degrees.

The two angles add up to 88.8 degrees. To fit together smoothly, the sum must equal exactly 90.
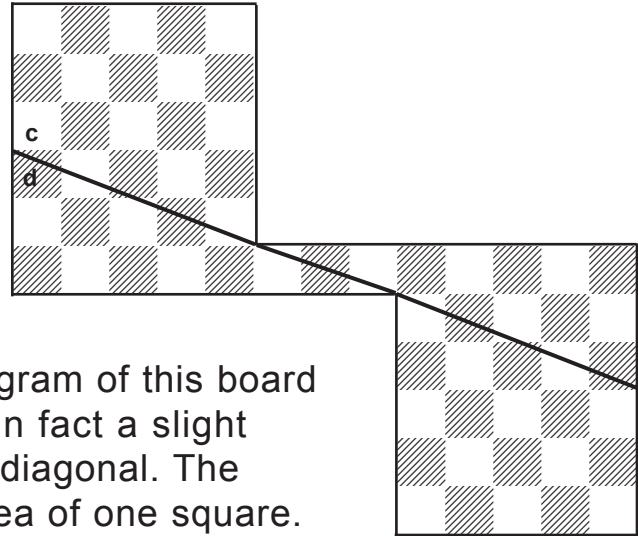
In case anyone was wondering, a *trapezoid* is a four-sided shape with two parallel sides. It can be split into a rectangle and a right triangle. In this calculation, a 3 x 5 rectangle and 2 x 5 triangle.

<u>The Missing Square</u>

Sam Loyd 1858
American Chess Congress

There are 63 squares in this arrangement of the four parts. Two 5 x 6 rectangles connected by 3 intervening squares.

As with the "extra square", the diagram of this board is not drawn accurately. There is in fact a slight overlapping of the parts along the diagonal. The overlapped area is equal to the area of one square.

Specifically, 'angle c' is 111.8 degrees and 'angle d' is 69.4 degrees. A total of 181.2 which exceeds a smooth 180 degree coupling. Not readily apparent to the casual eye.

Sam Loyd usually presented puzzles in the form of fictional stories. Below is what he wrote about this problem in *Sam Loyd's Cyclopedia of 5000 Puzzles, Tricks, & Conundrums* (1914). It involves a solving competition organised by the king of Puzzleland. Italics show my edits.

Tommy Riddles tells us that we need know nothing about checkers or chess to solve *this puzzle*. We are told that the first checkerboard ever constructed, which was made by a man by the name of Siesa, and is still preserved in the British Museum, is made of four pieces, as *shown here*. Now the four pieces of this board can be rearranged together so as to make three different puzzles: a square board of 64 squares, an oblong one of 65, or an odd-shaped one of but 63. It is said that Dr. Slasher won the championship by this marvelous coup of arranging the four pieces so as to reduce the board to 63 squares. See if you are able to do it. There has been so much discussion regarding this paradoxical problem that occasion is taken to say that Mr. Loyd presented it before the first American Chess Congress in 1858.

Until next time!