



THE PUZZLING SIDE OF CHESS

Jeff Coakley

LOOPOLOGY IV

Multi-Piece Double Loops

number 160

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This column features double loops with four or five piece-types. Each of the four problems has a different set of pieces.

As noted previously, knights can never be part of a multi-piece double loop. Pawns can be included, but the only four-piece double loops with pawns and an equal number of each piece are KQBP and KRBP. Both include the subset KBP.

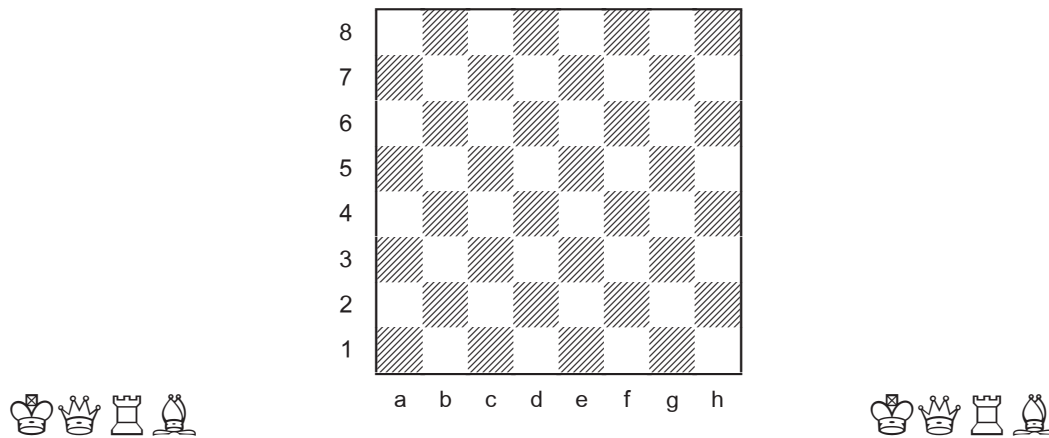
Thanks to François Labelle for providing optimal solutions to all the puzzles. His program also determined the number of different solutions.

The record positions are not easy to achieve. But please don't let that stop you from trying.



*No beginning, no end.
The geometric charm of circular continuity.*

Double KQRB Loop



Place an equal number of kings, queens, rooks, and bishops on the board so that every piece is defended exactly twice and every piece defends exactly two others. The chain of defence must form a continuous loop.

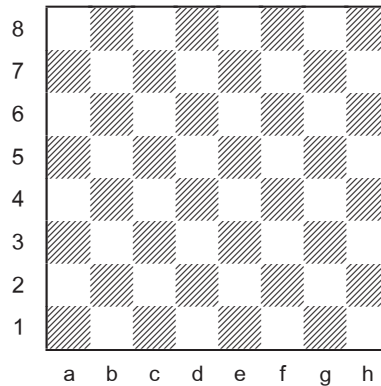
What is the maximum number of pieces?

In double loops, it is not necessary to have a repeating sequence of pieces. For example, in this task, the order K-R-Q-B-Q-R-K-B is possible. As experienced loopers know, rooks and bishops cannot be linked together in a double loop.



The Ultimate Cul-de-Sac

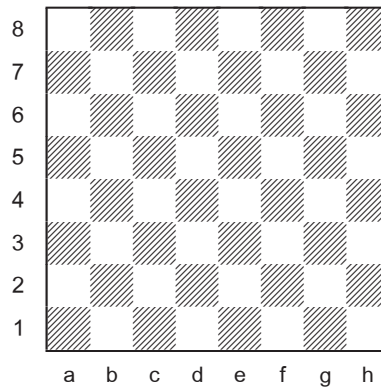
Double KQBP Loop



Place an equal number of kings, queens, bishops, and pawns on the board so that every piece is defended exactly twice and every piece defends exactly two others. The chain of defence must form a continuous loop. Pawns may not be placed on the 1st rank.

What is the maximum number of pieces?

Double KRBP Loop

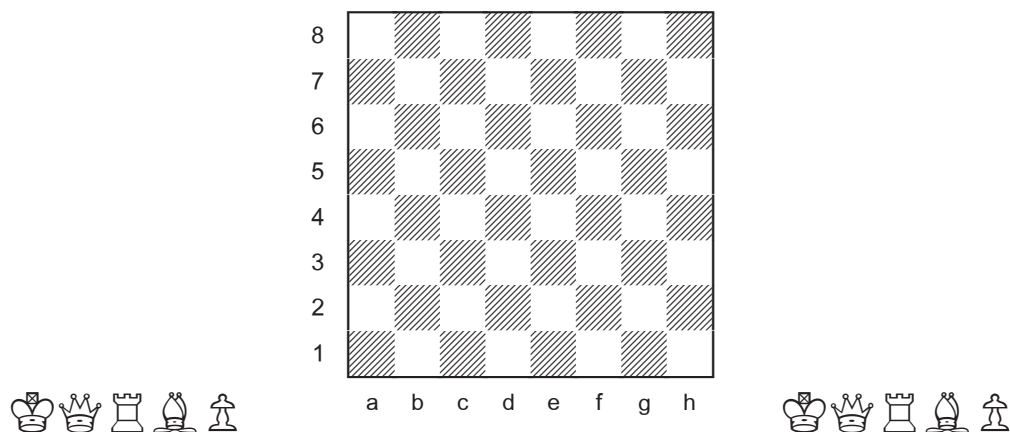


Place an equal number of kings, rooks, bishops, and pawns on the board so that every piece is defended exactly twice and every piece defends exactly two others. The chain of defence must form a continuous loop. Pawns may not be placed on the 1st rank.

What is the maximum number of pieces?

The final puzzle contains all five double-loopable pieces. It also concludes our coverage of double loop problems. In Loopology V, the focus turns to single loops.

Double KQRBP Loop



Place an equal number of kings, queens, rooks, bishops, and pawns on the board so that every piece is defended exactly twice and every piece defends exactly two others. The chain of defence must form a continuous loop. Pawns may not be placed on the 1st rank.

What is the maximum number of pieces?

An updated table showing the maximum values for double loops with equal numbers of each piece is given at the end of the solutions.



Back to where you started.

SOLUTIONS

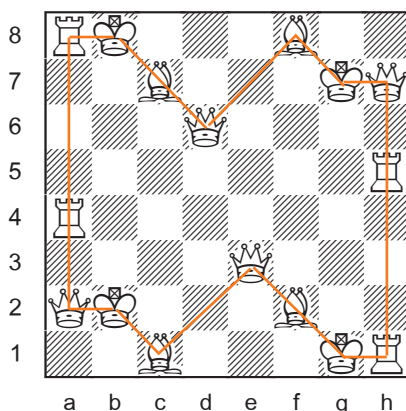
PDF hyperlinks. You can advance to the solution of any puzzle by clicking on the underlined title above the diagram. To return to the puzzle, click on the title above the solution diagram.

Archives. Past columns and a detailed index of problem-types and composers are available in the *Puzzling Side of Chess* archives.

Double KQRB Loop

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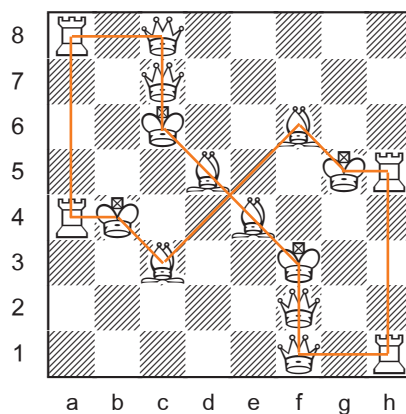


4 kings, 4 queens, 4 rooks, 4 bishops
each defended twice in a continuous chain

There are 2214 solutions. This total does not include positions with the same pattern that are reflections or rotations of a previously counted solution, a convention used for all problems in the column.

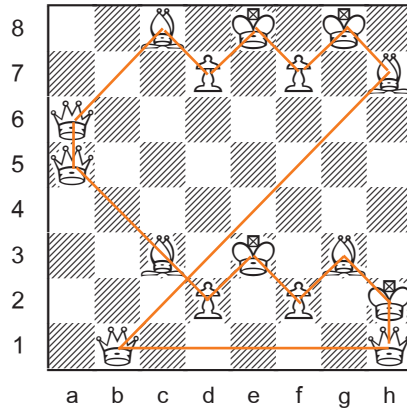
The diagrams* show two of the four symmetrical patterns.

Bc1 Kb2 Qa2 Ra4 Ra8 Kb8 Bc7 Qd6 Bf8 Kg7 Qh7 Rh5 Rh1 Kg1 Bf2 Qe3*
Bc1 Kb2 Ra2 Qa4 Ra8 Kb8 Bc7 Qd6 Bf8 Kg7 Rh7 Qh5 Rh1 Kg1 Bf2 Qe3
Qf1 Qf2 Kf3 Be4 Bd5 Kc6 Qc7 Qc8 Ra8 Ra4 Kb4 Bc3 Bf6 Kg5 Rh5 Rh1*
Rf1 Kf2 Be3 Bd2 Kc3 Qb3 Qa4 Ra8 Rc8 Kc7 Bd6 Be7 Kf6 Qg6 Qh5 Rh1



Double KQBP Loop

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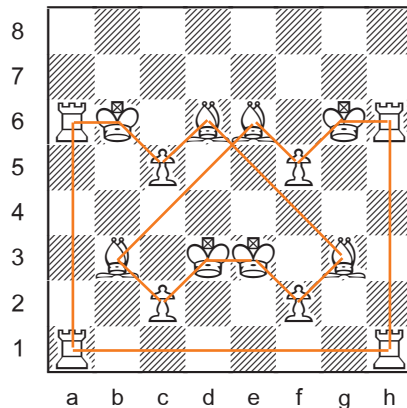


4 kings, 4 queens, 4 bishops, 4 pawns
each defended twice in a continuous chain

There are 163 solutions. None are symmetrical.

Double KRBP Loop

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4 kings, 4 rooks, 4 bishops, 4 pawns
each defended twice in a continuous chain

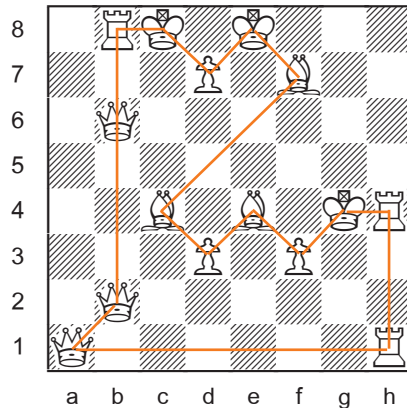
There are 12 solutions. These seven are symmetrical.

Ra1 Ra6 Kb6 Pc5 Bd6 Bg3 Pf2 Ke3 Kd3 Pc2 Bb3 Be6 Pf5 Kg6 Rh6 Rh1*
Ra1 Ra7 Kb7 Pc6 Bd7 Bg4 Pf3 Ke4 Kd4 Pc3 Bb4 Be7 Pf6 Kg7 Rh7 Rh1
Ra1 Ra8 Kb8 Pc7 Bd8 Bg5 Pf4 Ke5 Kd5 Pc4 Bb5 Be8 Pf7 Kg8 Rh8 Rh1
Ra2 Ra7 Kb7 Pc6 Bd7 Bg4 Pf3 Ke4 Kd4 Pc3 Bb4 Be7 Pf6 Kg7 Rh7 Rh2
Ra2 Ra8 Kb8 Pc7 Bd8 Bg5 Pf4 Ke5 Kd5 Pc4 Bb5 Be8 Pf7 Kg8 Rh8 Rh2
Pc2 Bb3 Be6 Pf5 Kg6 Rh6 Rh8 Ra8 Ra6 Kb6 Pc5 Bd6 Bg3 Pf2 Ke3 Kd3
Ra3 Ra8 Kb8 Pc7 Bd8 Bg5 Pf4 Ke5 Kd5 Pc4 Bb5 Be8 Pf7 Kg8 Rh8 Rh3

Double KQRBP Loop

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3 kings, 3 queens, 3 rooks, 3 bishops, 3 pawns
each defended twice in a continuous chain

There are 1184 solutions. None are symmetrical.

Maximum Pieces in Double Loop

Values for multi-piece loops are with an equal number of each piece.

N	32	KB	26	KBP	21	KQRB	16
K	31	KR	22	KQR	18	KQBP	16
R	16	KQ	16	KQB	18	KRBP	16
Q	14	QR	16	KRB	18		
B	12	QB	14	QRB	12	KQRBP	15



Until next time!

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