



THE PUZZLING SIDE OF CHESS

Jeff Coakley

LOOPOLOGY II

Two Piece Double Loops

number 156

June 23, 2018

This column continues our series on defensive loops. Today's menu features *two-piece double loops*. Each of the five problems involves a different pair of piece-types.

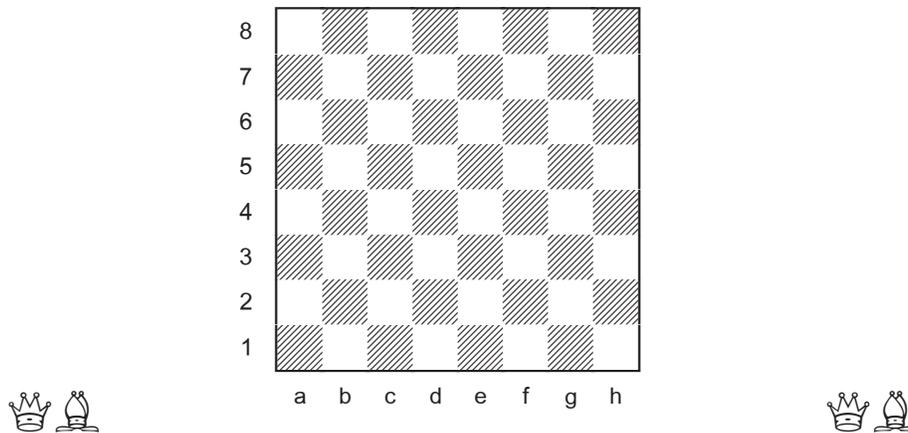
To be "double-loopable", two pieces must be able to move in the same direction. For this reason, knights are excluded. Less obviously, it is also impossible for pawns to be part of a two-piece double loop in which there are equal numbers of each piece.

The five double-loopable pairs are QB, QR, KQ, KR, KB. Which do you think can make the longest loop?



"I wonder if they have any fruit loops."

Double Queen & Bishop Loop



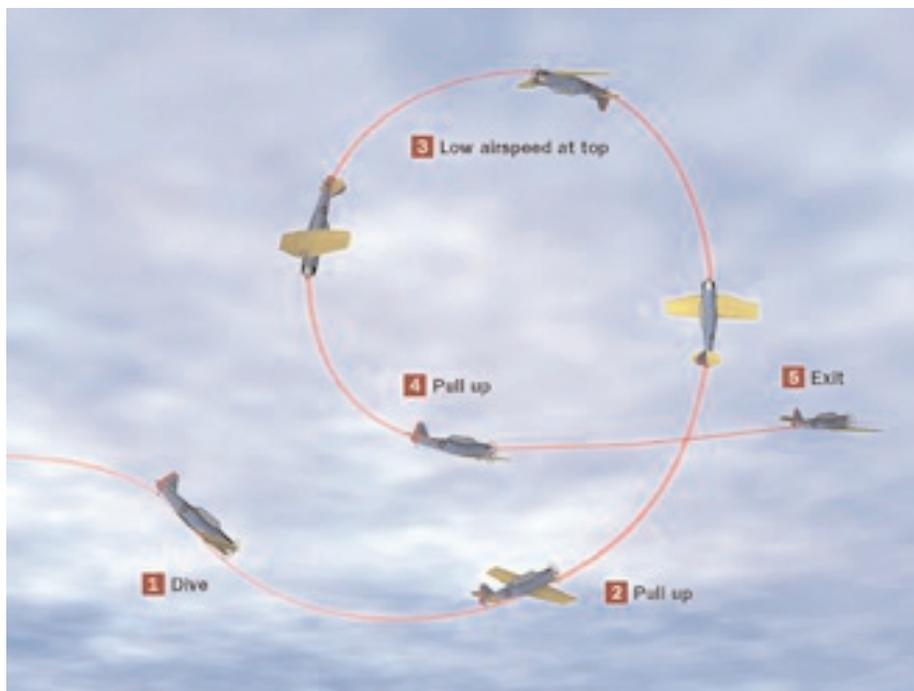
Place an equal number of queens and bishops on the board so that every piece is defended exactly twice and every piece defends exactly two other pieces. The chain of defence must form a continuous loop.

What is the maximum number of pieces?

It is not necessary to alternate pieces in a double loop. For example, instead of Q-B-Q-B-Q-B, the sequence could go Q-Q-B-B-Q-B.

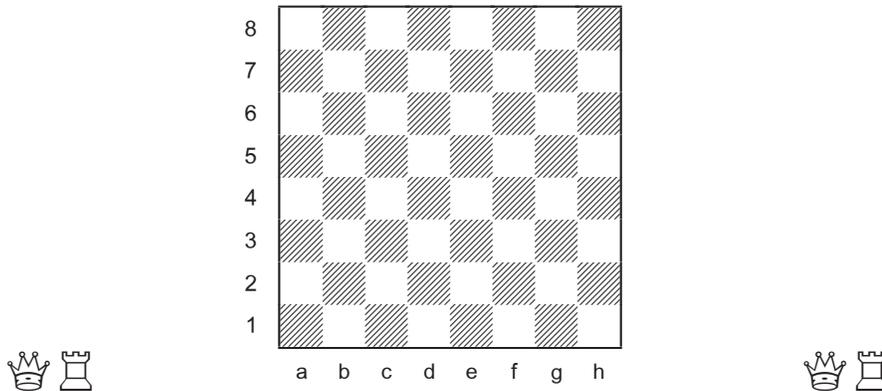
Thanks to François Labelle for providing optimal solutions to all the puzzles. His program also determined the number of different solutions.

The record positions are hard to match. How close can you get?



Five Steps to Aerial Looping

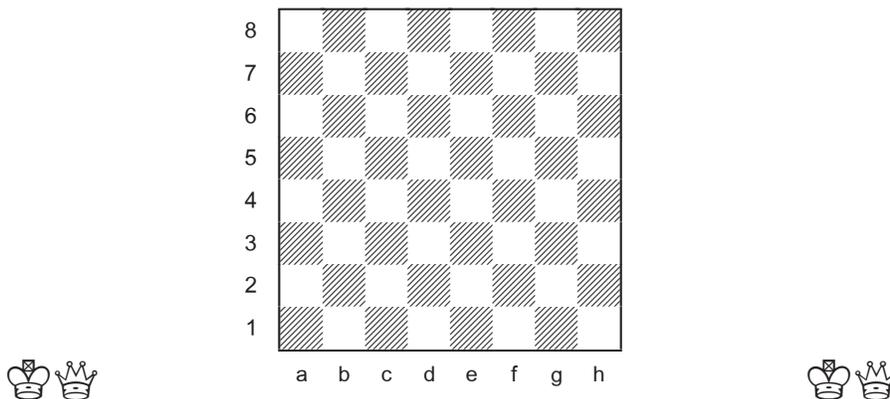
Double Queen & Rook Loop



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

What is the maximum number of pieces?

Double King & Queen Loop

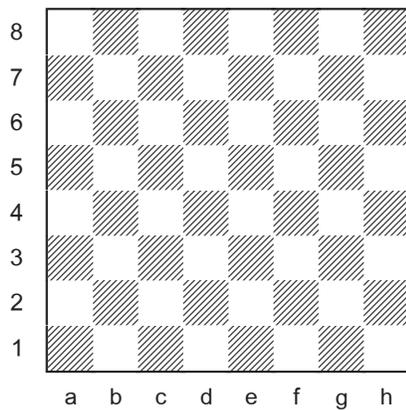


Place an equal number of kings and queens on the board so that every piece is defended exactly twice and every piece defends exactly two other pieces. The chain of defence must form a continuous loop.

What is the maximum number of pieces?



Double King & Rook Loop



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

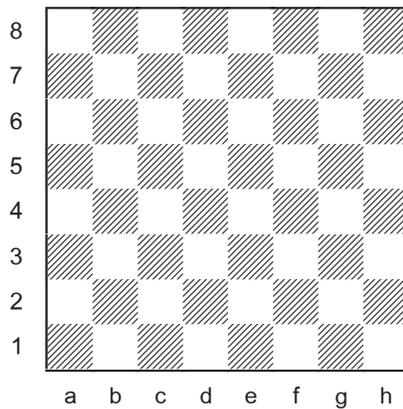
What is the maximum number of pieces?

For a comparison of the maximum values for two-piece double loops with equal numbers of each piece, see the table at the end of the solution section.



Two-Plane Double Loop

Double King & Bishop Loop



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

What is the maximum number of pieces?



The Fine Art of Looping

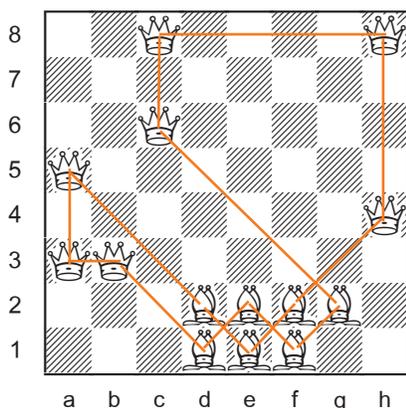
SOLUTIONS

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 Queen & Bishop Loop

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Puzzling Side of Chess



7 queens and 7 bishops
each defended twice in a continuous chain

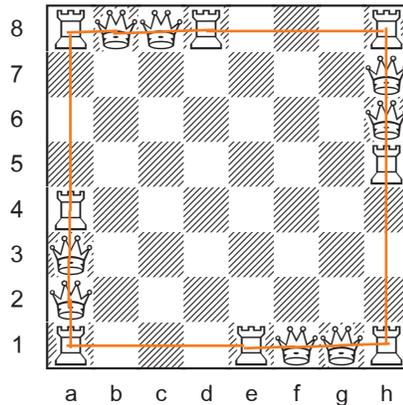
There are 114 solutions. This total does not include positions with the same pattern that are reflections or rotations of a previously counted solution. This convention is used for all problems in the column.



Round and round and round.

Double Queen & Rook Loop

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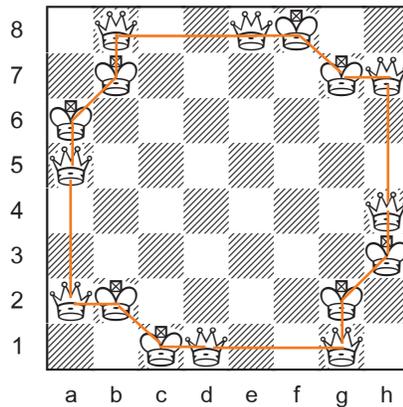


8 queens and 8 rooks
 each defended twice in a continuous chain

There are 4600 solutions.
 The diagram shows one of the many symmetrical patterns.

Double King & Queen Loop

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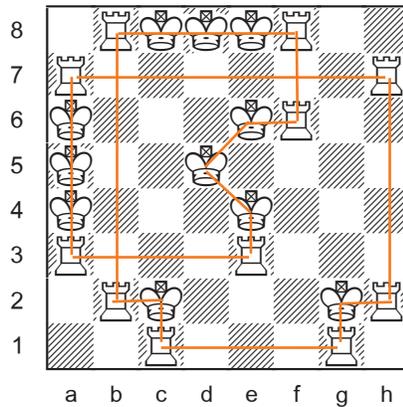
8 kings and 8 queens
 each defended twice in a continuous chain

There are only 6 solutions. The symmetrical diagram is first in the list.

Kc1 Kb2 Qa2 Qa5 Ka6 Kb7 Qb8 Qe8 Kf8 Kg7 Qh7 Qh4 Kh3 Kg2 Qg1 Qd1
 Qd1 Kc2 Kb3 Qa3 Qa5 Kb6 Kc7 Qc8 Qe8 Kf7 Kg6 Qh6 Qh4 Kg3 Kf2 Qf1
 Qd1 Kc2 Kb3 Qa3 Qa5 Ka6 Kb7 Qb8 Qe8 Kf7 Kg6 Qh6 Qh4 Kh3 Kg2 Qg1
 Qd1 Kd2 Kc3 Kb2 Qa2 Qa6 Kb7 Qb8 Qe8 Kf8 Kg7 Qh7 Qh4 Kh3 Kg2 Qg1
 Qe1 Kd2 Qc2 Qa4 Ka5 Ka6 Kb7 Qb8 Qg8 Kg7 Kf6 Kg5 Qh5 Qh3 Kg2 Qg1
 Qe1 Kd2 Qd3 Qa3 Qa4 Ka5 Kb6 Ka7 Kb8 Qc8 Qg8 Kg7 Kf6 Kg5 Qh5 Qh1

Double King & Rook Loop

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11 kings and 11 rooks
each defended twice in a continuous chain

There are 85 solutions.



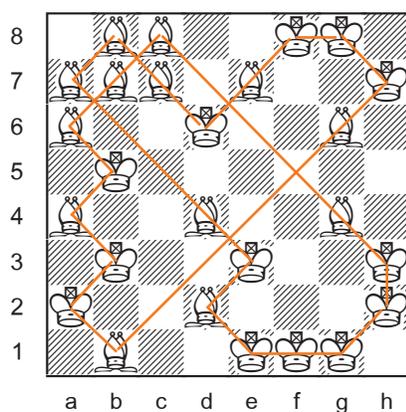
Bright Breakfast?

*Fruit loops are 40% sugar by weight.
The ingredients also include red 40, blue 2, yellow 6.
And no fruit, only chemical flavouring.
Every loop tastes the same, regardless of colour!*

Double King & Bishop Loop

François Labelle 2018

Puzzling Side of Chess



13 kings and 13 bishops
each defended twice in a continuous chain

Well placed kings allow the bishops to be on both colour squares.

There are 491 solutions.

Maximum Pieces in Double Loop

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

8 x 8 board.

| | | | | | | | | | | |
|----|----|----|----|----|--|----|----|----|----|----|
| QB | QR | KQ | KR | KB | | B | Q | R | K | N |
| 14 | 16 | 16 | 22 | 26 | | 12 | 14 | 16 | 31 | 32 |

Until next time!

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