



THE PUZZLING SIDE OF CHESS

Jeff Coakley

LOOPOLOGY VI

Three Piece Single Loops, Part 1

number 164

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Our journey through the land of loops continues with three-piece single loops. This column features “peace groups” without pawns.

The groups KQR, KQB, QRB cannot form a single loop because any piece guarding a queen would be reciprocally defended. The seven loopable trios are KQN, KRB, KRN, KBN, QRN, QBN, RBN. The last of which appeared in column 147.

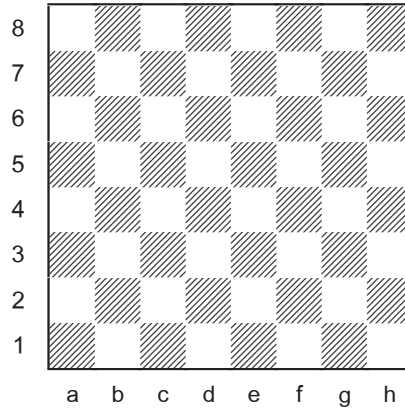
François Labelle has kindly provided optimal solutions to all the puzzles and determined the number of solutions. A table showing the maximum piece count for two- and three-piece single loops is given at the end.



Looping Overhead Railways

Chicago Transit Authority

Single QRN Loop



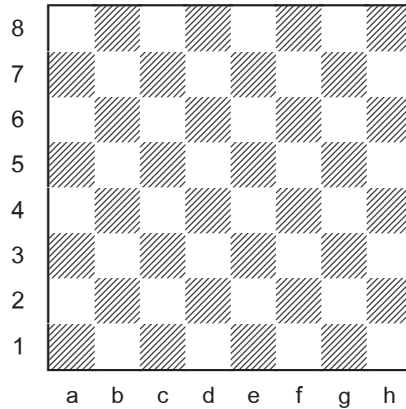
Place three queens, three rooks and three knights so that every piece is defended exactly once and every piece defends exactly one other. The chain of defence must form a continuous loop.

For all six problems in this column, the stipulated number of pieces is the maximum possible in a single loop with an equal number of each piece.



Chicago, Illinois, the third largest city in the United States, is located on the southern shores of Lake Michigan. Famous for skyscrapers, music, and museums, its downtown area is known as “the Loop”.

Single QBN Loop



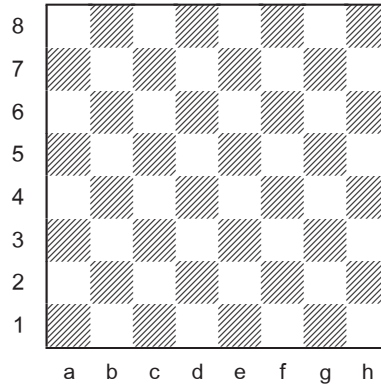
Place four queens, four bishops, and four knights so that every piece is defended exactly once and every piece defends exactly one other. The chain of defence must form a continuous loop.



Loop Reflections

A popular tourist attraction in the Chicago Loop is *Cloud Gate*, a large stainless steel sculpture in Millenium Park. Sometimes referred to as “The Bean”, it was constructed in 2006 by British artist Anish Kapoor.

Single KQN Loop

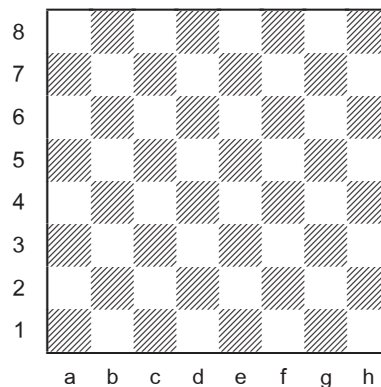


Place four kings, four queens, and four knights so that every piece is defended exactly once and every piece defends exactly one other. The chain of defence must form a continuous loop.

In the previous tasks, with queens and knights on the board, there was necessarily a consistent repeating sequence of pieces. Each knight defended a queen, and each queen defended a third type of piece.

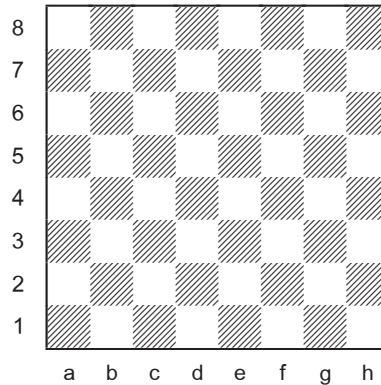
For the remaining tasks, without queens, a repeating sequence of pieces is not necessary. For example, the defensive chain in the next problem could start R-B-R-K-B-K.

Single KRB Loop



Place five kings, five rooks, and five bishops so that every piece is defended exactly once and every piece defends exactly one other. The chain of defence must form a continuous loop.

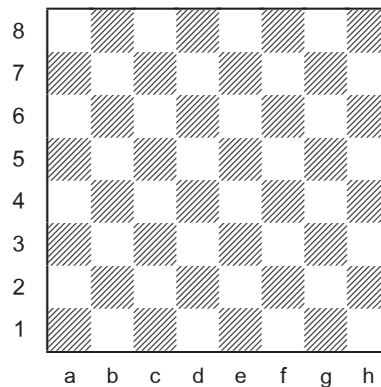
Single KRN Loop



Place five kings, five rooks, and five knights so that every piece is defended exactly once and every piece defends exactly one other. The chain of defence must form a continuous loop.

The final problem, with seven of each piece, may drive you loopy. Even a position with six each is quite challenging. Good luck!

Single KBN Loop



Place seven kings, seven bishops, and seven knights so that every piece is defended exactly once and every piece defends exactly one other. The chain of defence must form a continuous loop.

Three-piece single loops that include pawns will be covered two weeks from now in Loopology VII.

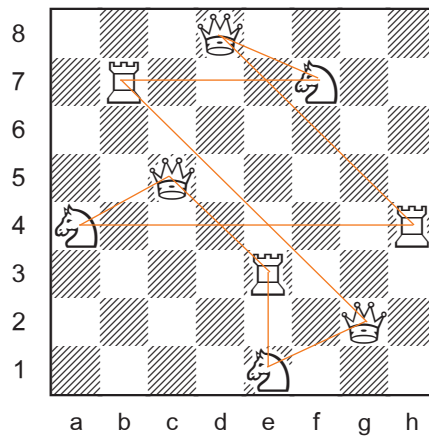
SOLUTIONS

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.

Single QRN Loop

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Puzzling Side of Chess



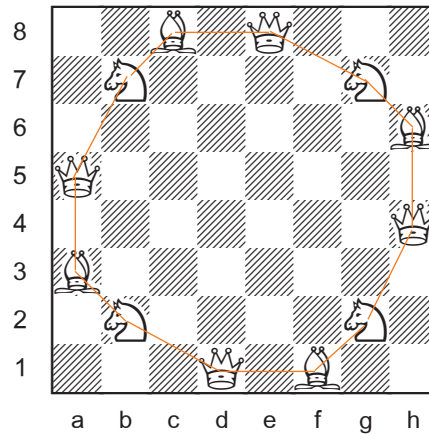
9 pieces, 3 each

There are 71 solutions, none symmetrical. 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.



Single QBN Loop

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12 pieces, 4 each

There are 85 solutions. Nine, including the diagram*, are symmetrical.

Qd1 Bf1 Ng2 Qh4 Bh6 Ng7 Qe8 Bc8 Nb7 Qa5 Ba3 Nb2 *
Ng1 Qe2 Bc2 Nh7 Qg5 Bg3 Nb8 Qd7 Bf7 Na2 Qb4 Bb6
Qe1 Bg1 Nc5 Qa6 Ba2 Nf7 Qd8 Bb8 Nf4 Qh3 Bh7 Nc2
Qf1 Bf7 Na2 Qb4 Bb6 Na7 Qc8 Bc2 Nh7 Qg5 Bg3 Nh2
Qf1 Bf7 Nh5 Qg3 Ba3 Ne7 Qc8 Bc2 Na4 Qb6 Bh6 Nd2
Bg1 Nf2 Qh3 Bh7 Nc2 Qb4 Bb8 Nc7 Qa6 Ba2 Nf7 Qg5
Qc2 Bd2 Na5 Qb7 Bd7 Nh3 Qf2 Be2 Nh5 Qg7 Be7 Na3
Qb3 Bd3 Nh7 Qf8 Be8 Nh5 Qg3 Be3 Na7 Qc8 Bd8 Na5
Qc3 Bd3 Na6 Qb8 Bd8 Nh4 Qf3 Be3 Nh6 Qg8 Be8 Na4

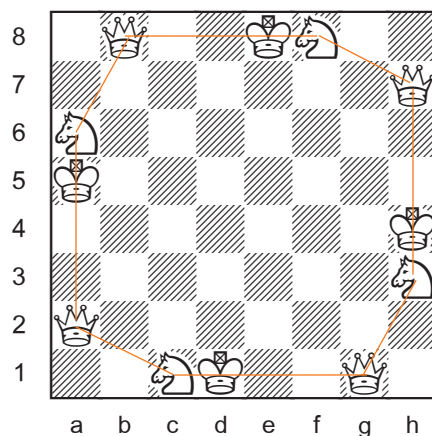


The “Chicago Loop” got its name because of the cable car turning loops at the end of the downtown railway lines.

Single KQN Loop

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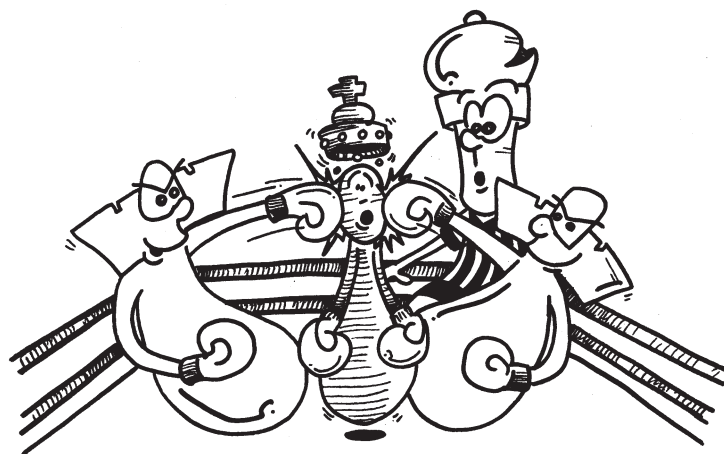
Puzzling Side of Chess



12 pieces, 4 each

There are 101 solutions. including 13 symmetrical.

Nc1 Qa2 Ka5 Na6 Qb8 Ke8 Nf8 Qh7 Kh4 Nh3 Qg1 Kd1 *
Qd1 Kf1 Ng2 Qh4 Kh6 Ng7 Qe8 Kc8 Nb7 Qa5 Ka3 Nb2
Qd1 Kg1 Ng2 Qh4 Kh7 Ng7 Qe8 Kb8 Nb7 Qa5 Ka2 Nb2
Qe1 Kc3 Nb2 Qa4 Kc6 Nb7 Qd8 Kf6 Ng7 Qh5 Kf3 Ng2
Qg1 Kg4 Ng5 Qh7 Ke7 Nd7 Qb8 Kb5 Nb4 Qa2 Kd2 Ne2
Qc1 Kh1 Nh2 Qg4 Kg6 Nh7 Qf8 Ka8 Na7 Qb5 Kb3 Na2
Qd1 Kg1 Ng2 Qh4 Kh6 Ng7 Qe8 Kb8 Nb7 Qa5 Ka3 Nb2
Qd1 Kh1 Ng2 Qf4 Kh6 Ng7 Qe8 Ka8 Nb7 Qc5 Ka3 Nb2
Qe1 Kc3 Nb2 Qa4 Ka6 Nb7 Qd8 Kf6 Ng7 Qh5 Kh3 Ng2
Qe1 Kc3 Nb2 Qa4 Ka7 Nb7 Qd8 Kf6 Ng7 Qh5 Kh2 Ng2
Ng1 Qe2 Kc2 Nb3 Qa5 Ka8 Nb8 Qd7 Kf7 Ng6 Qh4 Kh1
Ng1 Qe2 Kb2 Nb3 Qa5 Ka8 Nb8 Qd7 Kg7 Ng6 Qh4 Kh1
Kh1 Ng2 Qe3 Kc3 Nb2 Qa4 Ka8 Nb7 Qd6 Kf6 Ng7 Qh5

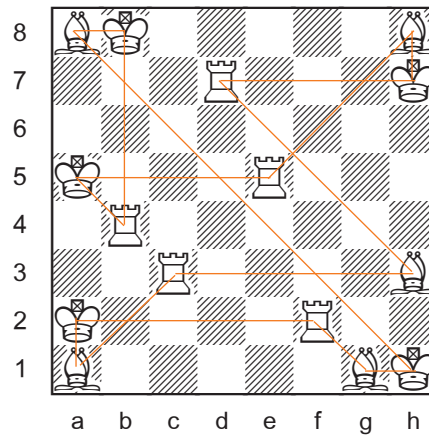


Knocked for a loop.

Single KRB Loop

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Puzzling Side of Chess



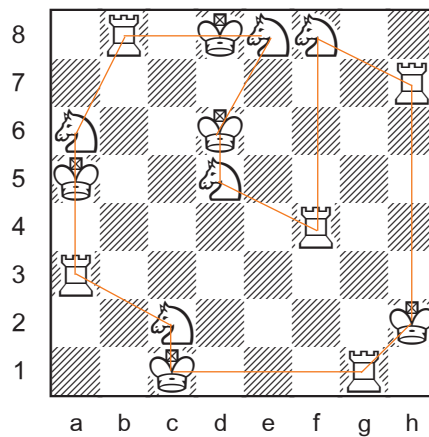
15 pieces, 5 each

12,244 solutions, none symmetrical.

Single KRN Loop

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Puzzling Side of Chess



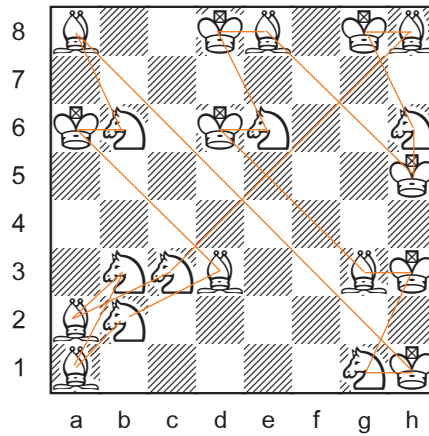
15 pieces, 5 each

1078 solutions, none symmetrical.



Single KBN Loop

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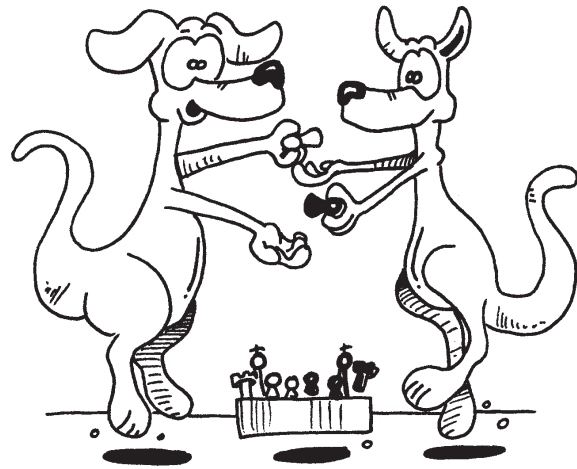
21 pieces, 7 each

538 solutions, none symmetrical.

Maximum Pieces in Single Loop

Equal Number of Each Piece

BN	20	KBN	21
KB	20	RBN	18
KN	20	KRB	15
RN	16	KRN	15
RB	14	KQN	12
QN	12	QBN	12
KR	12	QRN	9
RP	10		
NP	8		



Until next time!

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