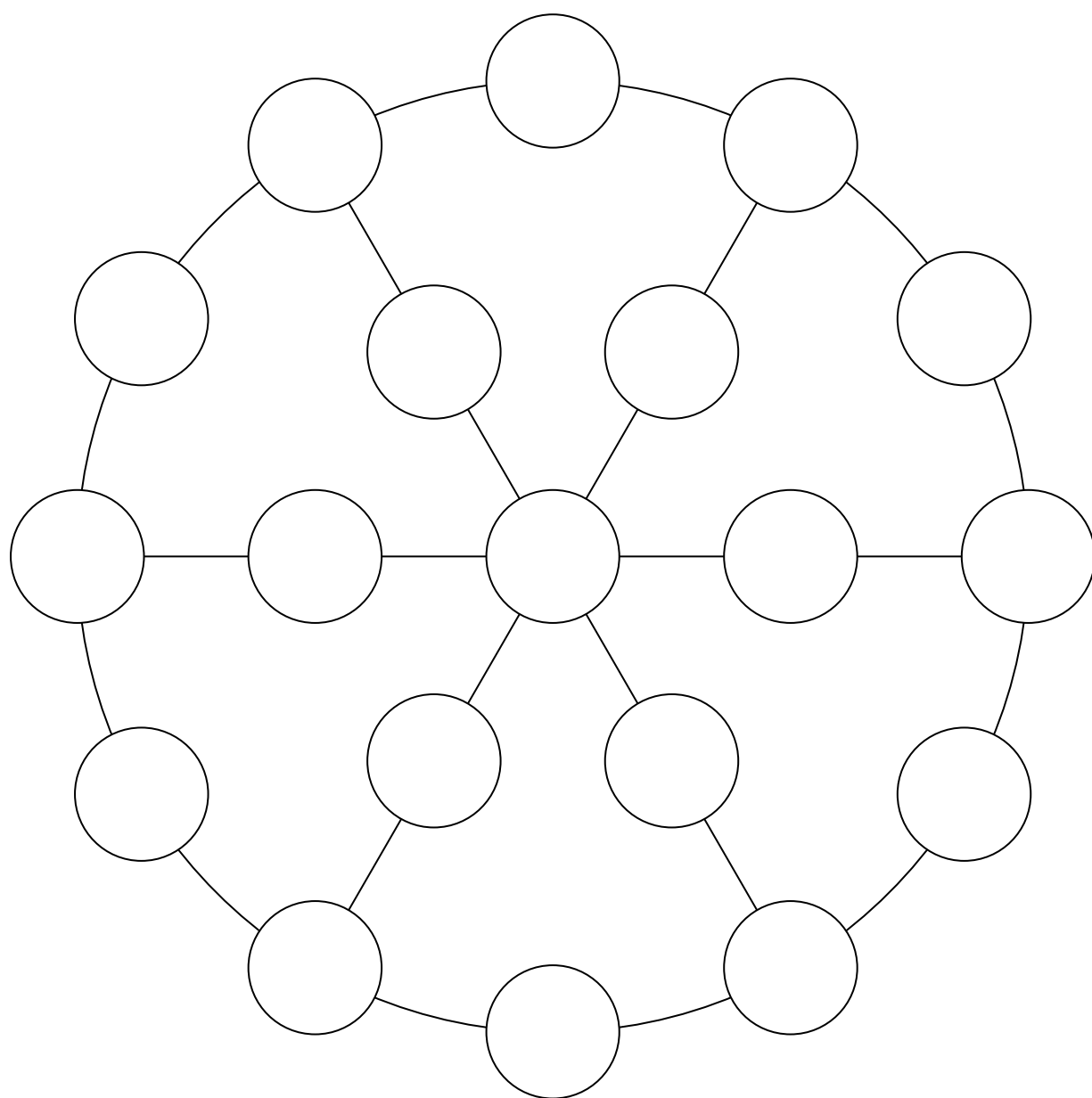# CLOCK SOLITAIRE

Clock Solitaire

John Beasley, originally posted October 2014, additions to Jone 2017

Earlier this year (2014), James Dalgety of The Puzzle Museum (http://puzzlemuseum.com) sent me a picture of a circular board laid out as shown below. It had been pressed or stamped from sheet brass, the "holes" being shallow bowls or pits, the holes were relatively much larger, and there were neither joining lines nor accompanying instructions. He said that Len Gordon had thought in 1985 that a similar item in Jerry Slocum's collection, with clay balls in addition to the board, might have been a solitaire game, and he wondered what my own opinion was.
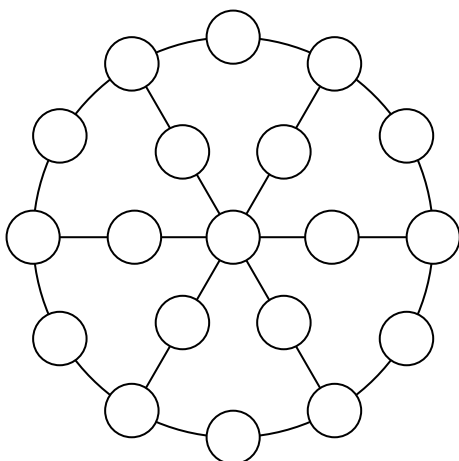
Well, in the absence of any accompanying documentation it might have been almost anything from an objet d'art to a miscellaneous container for small objects, but it is certainly possible to play peg solitaire (or, more precisely, marble solitaire) on it, and if we allow jumps around the edge and also along the diameters (in other words, along the lines shown) it turns out to be rather a good game. Let us therefore call it **Clock Solitaire** (American readers are asked to note that the name "solitaire" was in use in England for the peg-board game long before it crossed the Atlantic and was filched by card players). Len Gordon had suggested more generous rules, allowing an inner man also to jump over an adjacent inner man into the outer hole almost in line, but these make the game rather too easy.

A set of 36 problems follows. Six are "basic" problems, in which one hole is left empty at the start and the task is to end with a single survivor either in this same hole or in some other hole specified; twelve are "pattern" problems, where the central hole is left empty and the task is to reach the position specified; twelve are "reversal" problems, where two or more holes are left empty and the task is to play to leave men in these holes and in no other; six are "marked man" problems, where not only are the destination holes specified but also the men to finish there. Specimen solutions are on pages 7 and 8.

In so far as I have any rights in the matter, I am very happy for people to make realisations of this game in wood, plastic, or anything else, but anyone doing so for sale is asked please to include either a copy of this document or a reference saying where it is to be found. And of course the cover page of the document may be printed off separately, and used as a board with coins, counters, small chessmen, draughtsmen (checkers), or anything else that may be to hand.
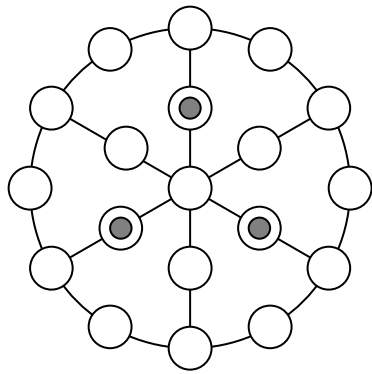
1. Basic Problems

In these problems, the board starts full apart from one hole, and the task is to leave a single man either in this hole or in some other hole specified.

1.1 Leave the centre empty, and play to finish there.

1.2 Leave the North Pole empty, and play to finish there.

1.3 Leave the hole at one end of the equator empty, and play to finish there.

1.4 Leave one of the inner holes on the equator empty, and play to finish there.

1.5 Leave the North Pole empty, and play to finish at the South Pole.

1.6 Leave the hole at one end of the equator empty, and play to finish at the other end.
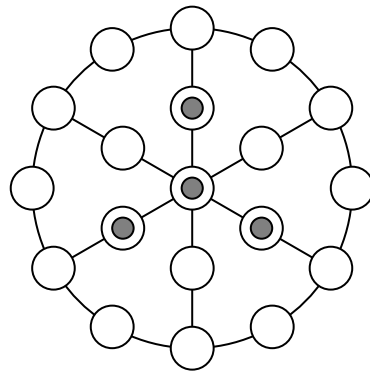
The rest of the board is to be cleared in each case.
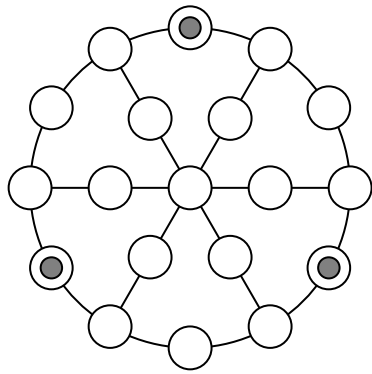
2. Pattern Problems

In these problems, the board starts full apart from the central hole, and the task is to play to the position specified. Note that in some cases the board has been turned so that the centre line is vertical instead of horizontal.
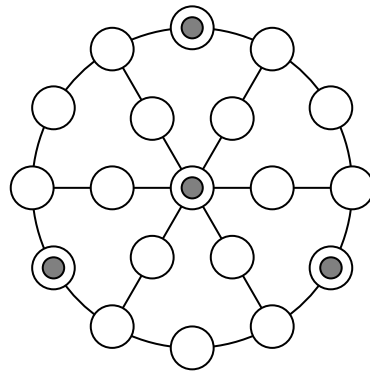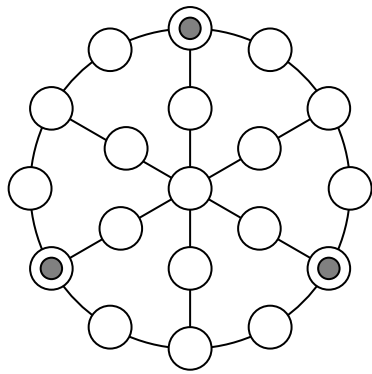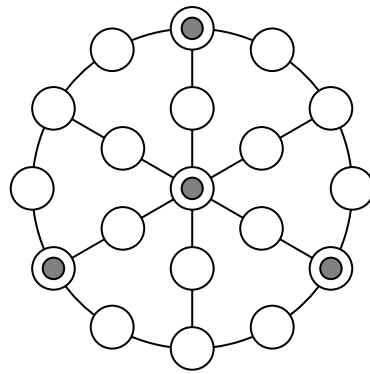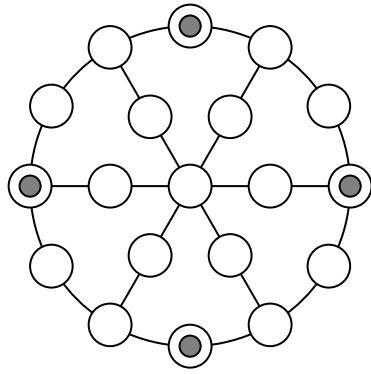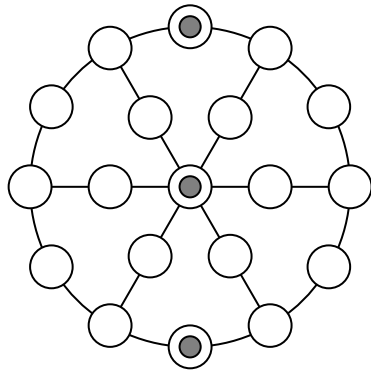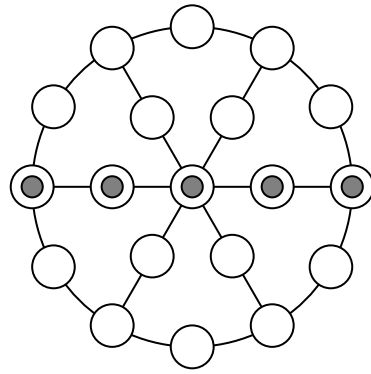

2.1

2.2

2.3

2.4

2.5

2.6

(continued)

2.7
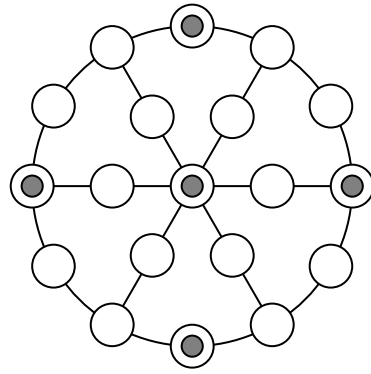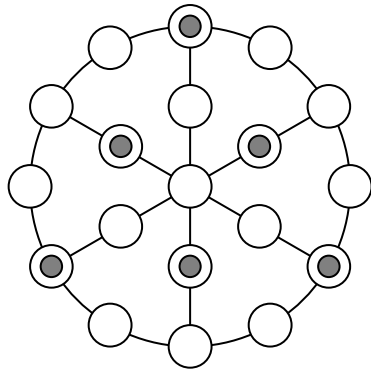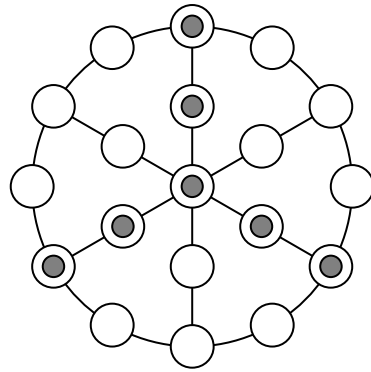

2.8

2.9

2.10

2.11
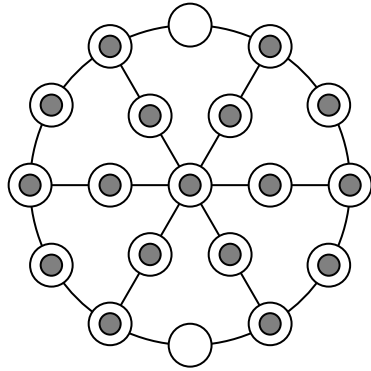

2.12
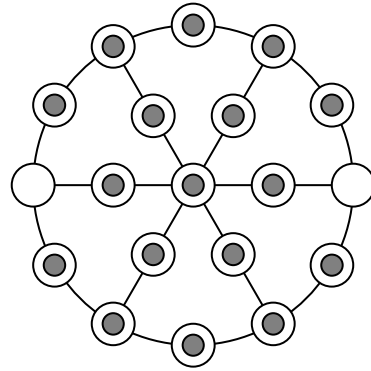
3. Reversal Problems

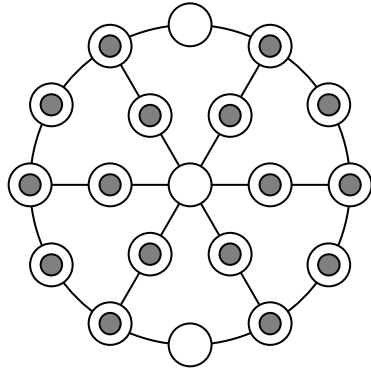In these problems, the task is to leave men in the holes initially empty, all the holes initially occupied being cleared. Basic problems **1.1** to **1.4** were of this kind. In the problems that follow, two or more holes are initially empty.
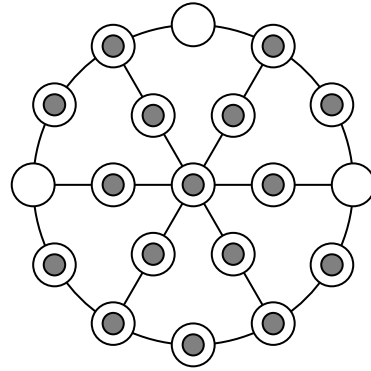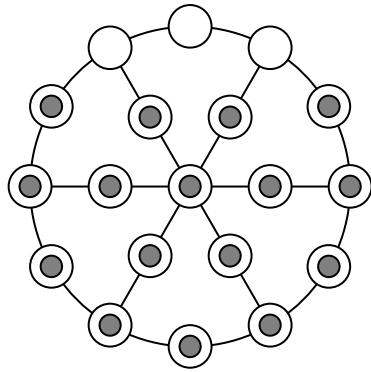
3.1

3.2

3.3
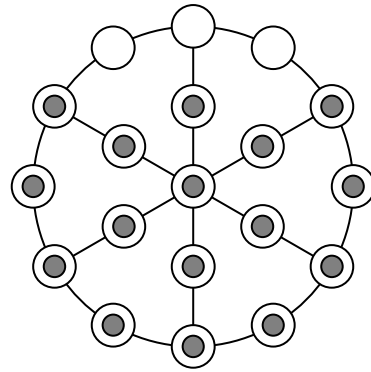
3.4

3.5

3.6

(continued)
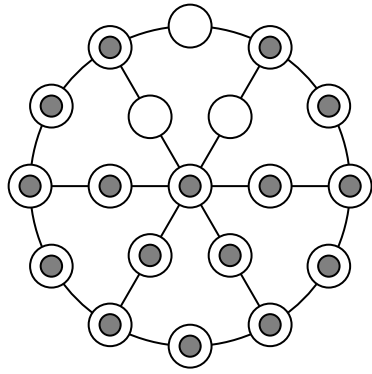
3.7
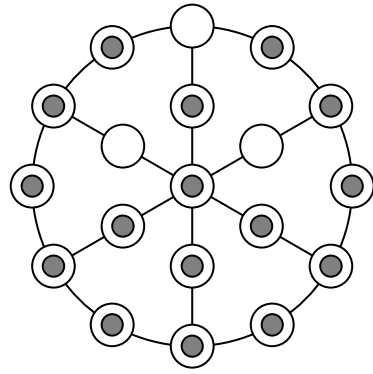
3.8
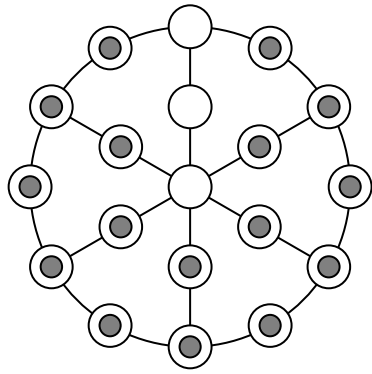
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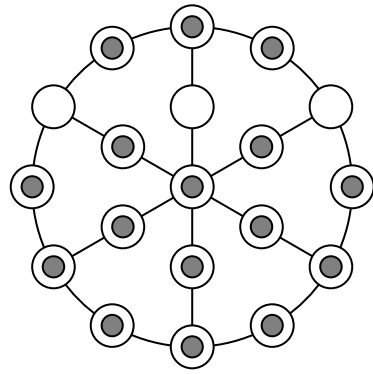
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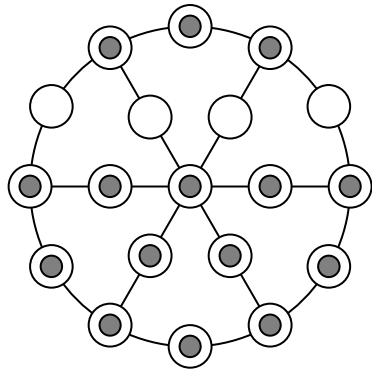
3.11
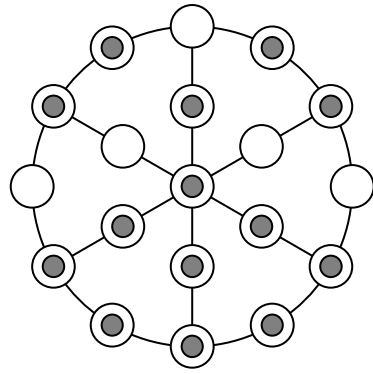
3.12

4. "Marked Man" Problems

In these problems, not only are the destination holes specified, but also the men to finish there. The diagrams specify the starting positions, the marked men being shown in black. Problems **4.1**-**4.4** are reversal problems, the marked men having to finish in the holes initially vacant. In problems **4.5** and **4.6**, the marked men are to change places. In each case, the rest of the board is to be left clear.

All except **4.5** can be solved as "man on the watch" problems, the marked men remaining motionless until the very end, when they sweep off the last remaining ordinary men and take up their positions. In the case of problem **4.2**, this sweep can be made to remove nine men.
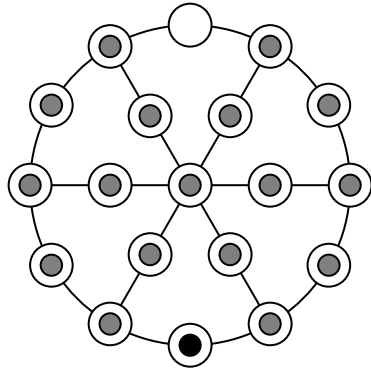
4.1
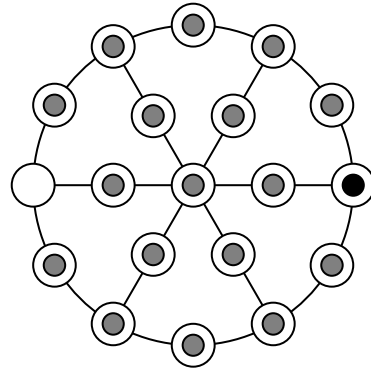
4.2
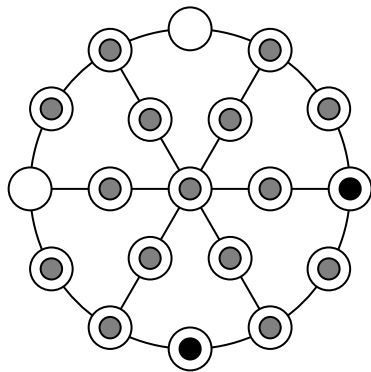
4.3
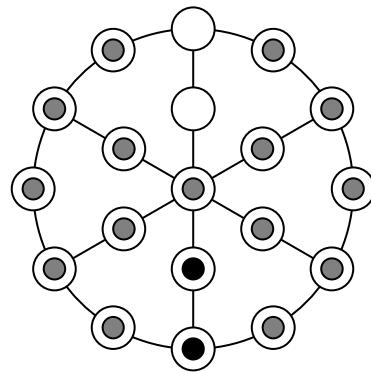
4.4
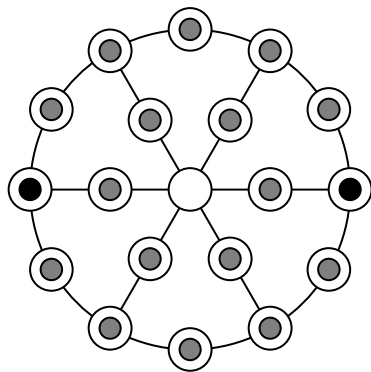
4.5
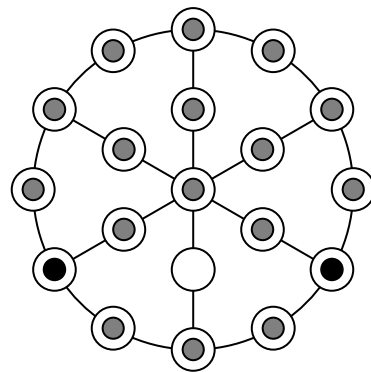
4.6

Specimen solutions

Solutions to Clock Solitaire problems are normally not unique, and those that follow are merely specimens. We use the notations shown in the diagrams below:
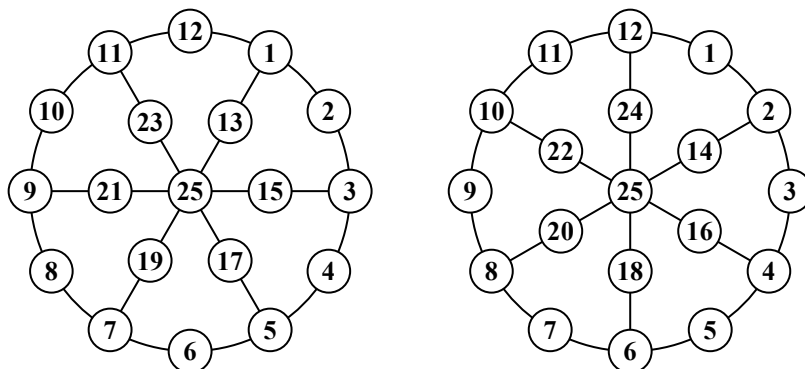
The outer holes are numbered as around a clock face, the inner holes are numbered as they would be on a 24-hour clock, and the centre is numbered 25. When the centre line is horizontal, as on the left, the inner holes take the odd numbers, and only the men in the odd-numbered outer holes can jump to the centre; when the centre line is vertical, as on the right, the inner holes take the even numbers, and only the men in the even-numbered outer holes can jump to the centre.

1. Basic Problems

1.1 (25 left empty): 11-25, 17-23, 7-25; 1-11, 10-12; 9-7, 6-8, 4-6, 2-4; 25-11-1-25-3-5-7-9-25. This solution, with its elegant eight-sweep finish, was drawn to my attention by George Bell. Alternatively, 9-25, 15-21, 7-9, 10-8, 5-7-9, 12-10-8, 2-12, 3-5-25-11-1-25-7-9-25, taking only eight moves but with a less elegant final sweep.

1.2 (12 left empty): 10-12, 25-11, 9-25; 15-21, 1-25, 21-15; 7-25, 12-10, 17-23, 5-7-9-11-25; 3-1, 25-3, 4-2-12. We shall see a more ambitious solution in section 4, but this solution is given here because it lends itself to simple modifications which solve other problems.

1.3 (supposing 9 left empty): 25-9; 11-25, 15-21, 1-25, 21-15, 5-25, 15-21; 3-5, 6-4, 8-6; 9-11-1-3-5-7-25-9. Again we shall see a more ambitious solution in section 4, but the present solution is given here because it is so easily modified to solve problem **1.4**.

1.4 (supposing 15 left empty): play the solution to **1.3** with the first and last jumps 25-9 replaced by 21-15. If it is preferred to start with 21 left empty, reflect everything left to right.

1.5 (12 left empty): play the solution to **1.2** up to the last three moves (the men are now at 2/3/4/15/25), then finish 3-5, 25-3, 2-4-6.

1.6 (supposing 9 left empty): 25-9, 11-25, 17-23, 7-25; 9-11, 12-10, 2-12; 5-7-9-11-1, 4-2-12, 25-1-11-25-3.

Some other basic problems can be solved, but there are restrictions. If we leave the centre empty, the final survivor must finish there. The other holes divide into three six-hole sets, one set consisting of holes 3/6/9/12/15/21 and the others being the similar sets at 60 degrees to this, and a problem can be solved if and only if the hole initially left empty and the hole which is to receive the final survivor are in the same set. The board having been turned so that these holes are in set 3/6/..., in most cases the problem can be solved by modifying the start and finish of solution **1.2**, coupled as necessary with a reflection and a reversal of the order of jumps (if we have a solution to "Leave X empty and finish at Y", we can solve "Leave Y empty and finish at X" by playing the jumps in the reverse order). After the first three moves of solution **1.2**, the empty holes are 9/10/21/23, and we can reach this position if any of 9/12/15 is initially empty; with three moves to go, the men are at 2/3/4/15/25, and we can play to finish at any of 12/3/6. This deals with everything except for some cases where both the hole initially empty and the destination hole are on the centre line, and in those cases we can use or modify solution **1.3** or **1.6**.

2. Pattern Problems

2.1: 4-25, 22-16; 8-25, 14-20; 6-8, 9-7, 11-9, 1-11, 2-4-6-8-10-12-25, 18-24.
2.2: 10-25, 16-22; 2-25, 22-16; 12-2, 3-1, 5-3, 7-5, 8-10-12-2-4-6-25.

2.3: 3-25, 1-3, 25-1; 7-25, 5-7, 25-5; 11-25, 9-11, 25-9; 12-2, 8-10-12, 4-6-8, 2-4.
2.4: 3-25, 21-15, 7-25, 13-19, 11-25, 17-23; 5-7-25, 15-21, 9-11-25, 21-15, 1-3-25.

2.5: 4-25, 2-4, 5-3, 25-2-4; 8-25, 6-8, 9-7, 25-6-8; 12-25, 10-12, 1-11, 25-10-12.
2.6: 6-25, 24-18, 4-6, 7-5, 2-4-6-25-4; 12-2, 10-12; 8-10-25-8; 2-25.

2.7: 3-25, 1-3, 4-2, 25-1-3; 6-4, 7-25-5, 4-6; 9-25, 11-9, 8-10, 25-11-9.
2.8: 11-25, 17-23, 1-25, 19-13; 3-25, 21-15, 9-11-25-1-3-25; 7-9, 5-3.

2.9: 11-25, 17-23, 9-11, 12-10, 2-12, 4-2; 7-25-1-3-25-9-11-25; 5-7, 8-6.
2.10: 5-25. 23-17, 1-25, 11-1, 2-12, 4-2, 9-11-1-3; 7-9; 25-5-7-25.

2.11: 6-25, 24-18, 10-25, 16-22, 2-25, 20-14; 12-2, 8-10-12, 4-6-8, 2-4.
2.12: 6-25, 24-18, 10-25, 18-24, 2-25; 12-2, 8-10-12, 4-6-8, 2-4.

3. Reversal problems

3.1: 10-12, 25-11, 1-25, 11-1, 2-12; 17-23, 8-10, 4-6-8, 3-25-9-11-25-7, 8-6.
3.2: 25-9, 11-25, 17-23, 9-11-25, 7-9; 5-3, 2-4, 12-2, 25-1-3-5-7-25-3.

3.3: 10-12, 1-25-11-1, 2-12; 8-10, 7-25, 17-23, 3-25-9-11-25; 4-6.
3.4: 10-12, 25-11, 1-25, 11-1, 2-12; 25-3, 7-25, 5-7-9; 21-15, 3-5-25-3.

3.5: 25-11, 10-12; 8-10, 7-25, 13-19, 5-7-25-9-11; 3-25-5-3-1.
3.6: 25-12; 8-25, 14-20, 10-25-8-10, 6-8, 4-25-6, 5-7-9-11; 3-1.

3.7: 17-23; 9-25, 15-21, 7-9, 10-8, 5-7-9-25, 19-13; 2-12, 11-1, 4-2-12.
3.8: 20-14; 6-25, 24-18, 4-6, 7-5, 2-4-6-25, 16-22; 10-12, 1-11, 8-10-12.

3.9: 10-25, 8-10-12; 18-24; 4-25, 6-4, 3-5, 1-3, 25-2-4-6-8-25.
3.10: 18-24; 8-10, 6-8, 11-9-7, 4-25-2-4-6-8-25-10; 12-2.

3.11: 12-2; 8-10, 11-9, 6-8-10; 19-13; 3-25, 21-15, 5-3-25, 17-23.
3.12: 20-14; 6-25, 24-18, 4-6-25, 16-22; 7-9, 10-12, 1-3.

4. "Marked Man" Problems

4.1: 10-12, 1-11; 8-10, 25-9, 10-8, 7-9; 5-25, 23-17, 3-5-25-1-3-25-7; **6-8-10-12**.
4.2: 11-9, 8-10, 6-8; 4-6, 25-5, 6-4; 1-25, 23-17; **3-25-7-9-11-1-3-5-25-9**.

4.3: 10-12, 1-11, 7-9, 25-7; 5-25, 23-17; **6-8-10-12**, **3-5-25-1-3-25-9**.
4.4: 10-12, 1-11, 8-10-12, 3-1-11; 5-3; **18-24, 6-8-25-2-4-25-10-12**. This is the second solution to **1.1**, shorn of its first and last jumps 9-25, turned through 90 degrees, and with the moves slightly reordered.

4.5: 11-25, **9-11**; 17-23, 7-25, 23-17; 1-25-9-7, 6-8, 4-6; **3-25-5-7-9**, **11-1-3**.
4.6: 24-18, 10-25, 16-22, 6-25, 22-16; 2-25, 20-14; 12-2, 3-1; **4-6**, **8-10-12-2-25-4**, **6-8**.