
1-D Solitaire

One-dimensional solitaire is played on an infinite strip of ‘holes’ in which there are initially some pegs. A move is a hop of one peg over another (adjacent) peg into a hole; the peg that has been hopped over is removed. You win the game if you can remove all pegs but one. Some games are winnable and some are not.

For instance, with 7 pegs (pegs denoted by ●, and holes denoted by ○)

○ ○ ○ ● ● ● ● ● ○ ○ ○ ○

can be won but

○ ○ ○ ● ● ● ○ ○ ○ ● ● ● ○ ○ ○

cannot.

Task

By hand work out the number of distinct winnable starting positions with 7 pegs. By ‘distinct’ we mean that we regard a position and its mirror image as being the same, e.g. ● ● ● ○ ● ● ● is the same as ● ● ● ○ ● ● ●. Report on your methods and findings, and list the winnable starting positions.

Then:

1. Write a program to find the number of distinct winnable starting positions with 20 pegs.
2. Print out the winnable starting positions in an easily understandable way.

Standards

For an achieved standard the report must be correct and understandable and the program must operate as specified.

Merit criteria include a report that is free of typographical and grammatical errors, well-formatted, and easy to read and comprehend and a program that can handle an arbitrary number of pegs (within reason).

Excellence criteria include a report that is exceptionally clear, using descriptions or notation that make the solution immediately understandable, or an additional format for the presentation of the method, and a program that can handle a large number of pegs efficiently.

Objectives

1.2, 1.3, 2.1-2.5, 2.7, 2.9, 2.10, 3.3, 3.4, 4.1, 4.2, 4.7, 4.8

(Pair)