

# JOHN HORTON CONWAY

## A Puzzle Game

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There are 10 different letters in the name JOHN HORTON CONWAY and we use each of these exactly three times each to form the following ten words: JHC, COW, NYC, JAN, RON, WRY, RAT, JOT, HWT, HAY.

Puzzle 1: (easy) Place the ten words on the nodes of the Pentalpha Star so that each of the three instances of a given letter lies on a triangle.

Puzzle 2: (easy) Place the ten words on the nodes of Desargues' Mitre so that each of the ten lines contains a common letter.

Puzzle 3: Play the ancient game of Pentalpha on the star. That is, try to place nine coins on the star by starting on an empty node, jumping a node (empty or not) and placing a coin on an empty node in a straight line of three. After you have solved Puzzle 1, try to leave the tenth, empty node with the initials of our honoree JHC.

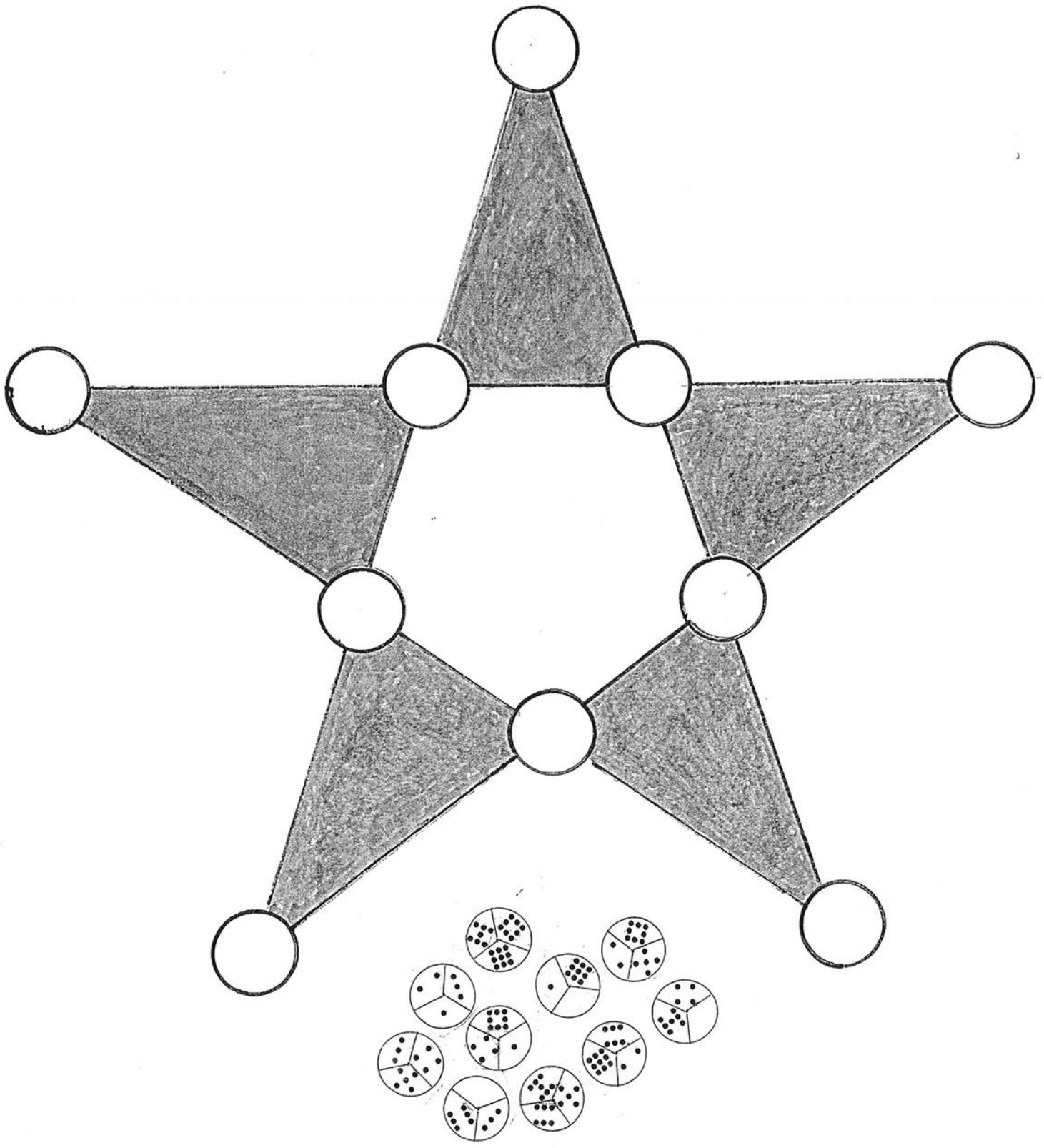
Puzzle 4: Use the ten "trimonos" to solve any of the three previous puzzles.

Puzzle 5: Use any set of ten pieces to play "Keep-Away" on the nodes of the Pedersen graph. That is, nodes joined by a line have no letter in common.

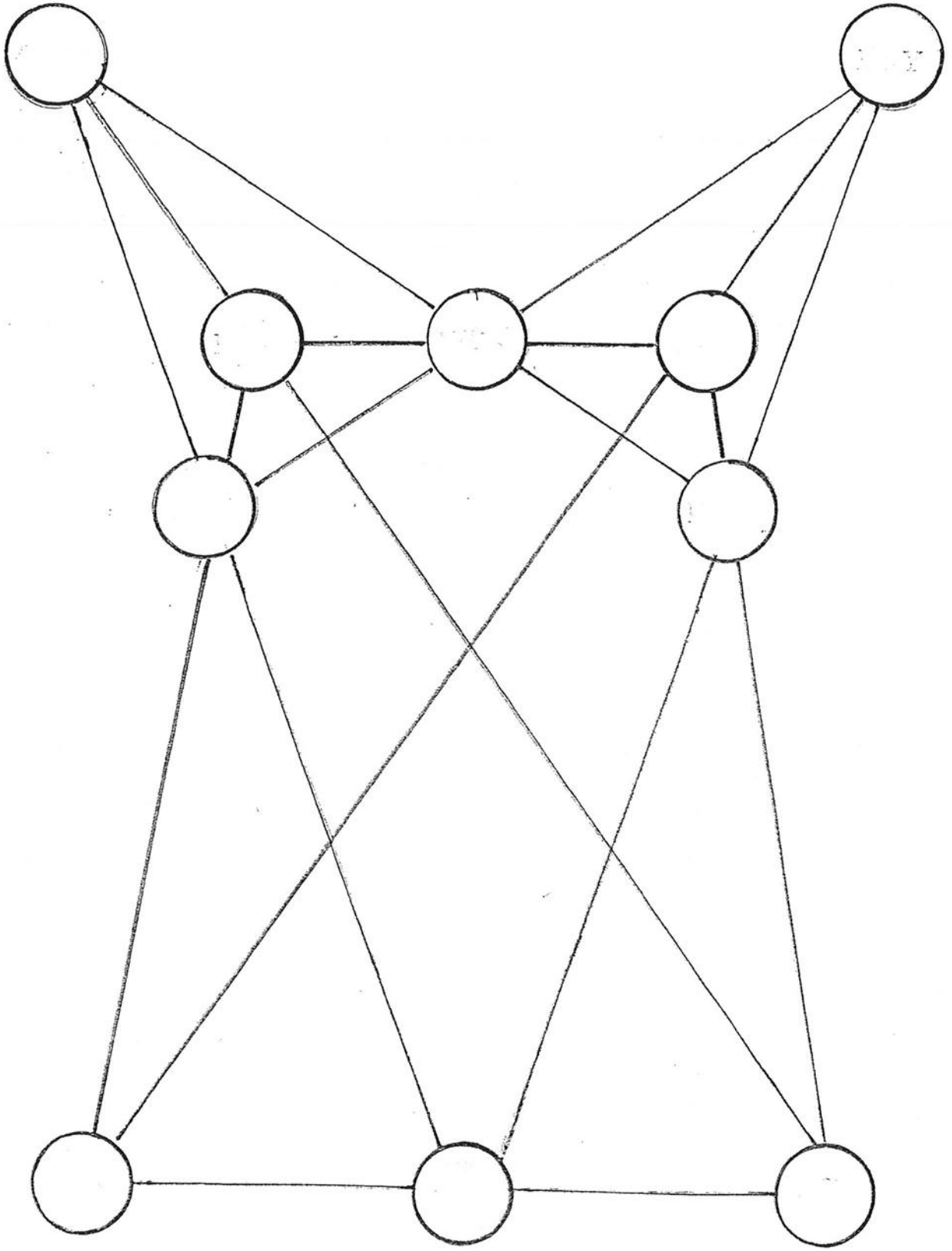
Games: Play Tic-Tac-Toe on Desargues' Mitre where the first to get three in a row wins. Also play Tic-Tac-Toe on Pentalpha, where the first to get a triangle wins. The two players could use pennies and nickels as their respective tokens.

A Magic Trick: Using, say, the ten trimonos, secretly palm one of them and arrange the other nine into a cycle so that adjoining pieces have no symbol in common. Then scramble the pieces and add the palmed tenth piece and ask the subject to find a cycle that completes what is known as a "Traveling Salesman" problem. The subject will not be able to do this.

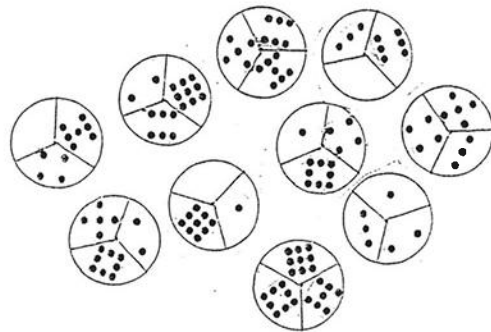
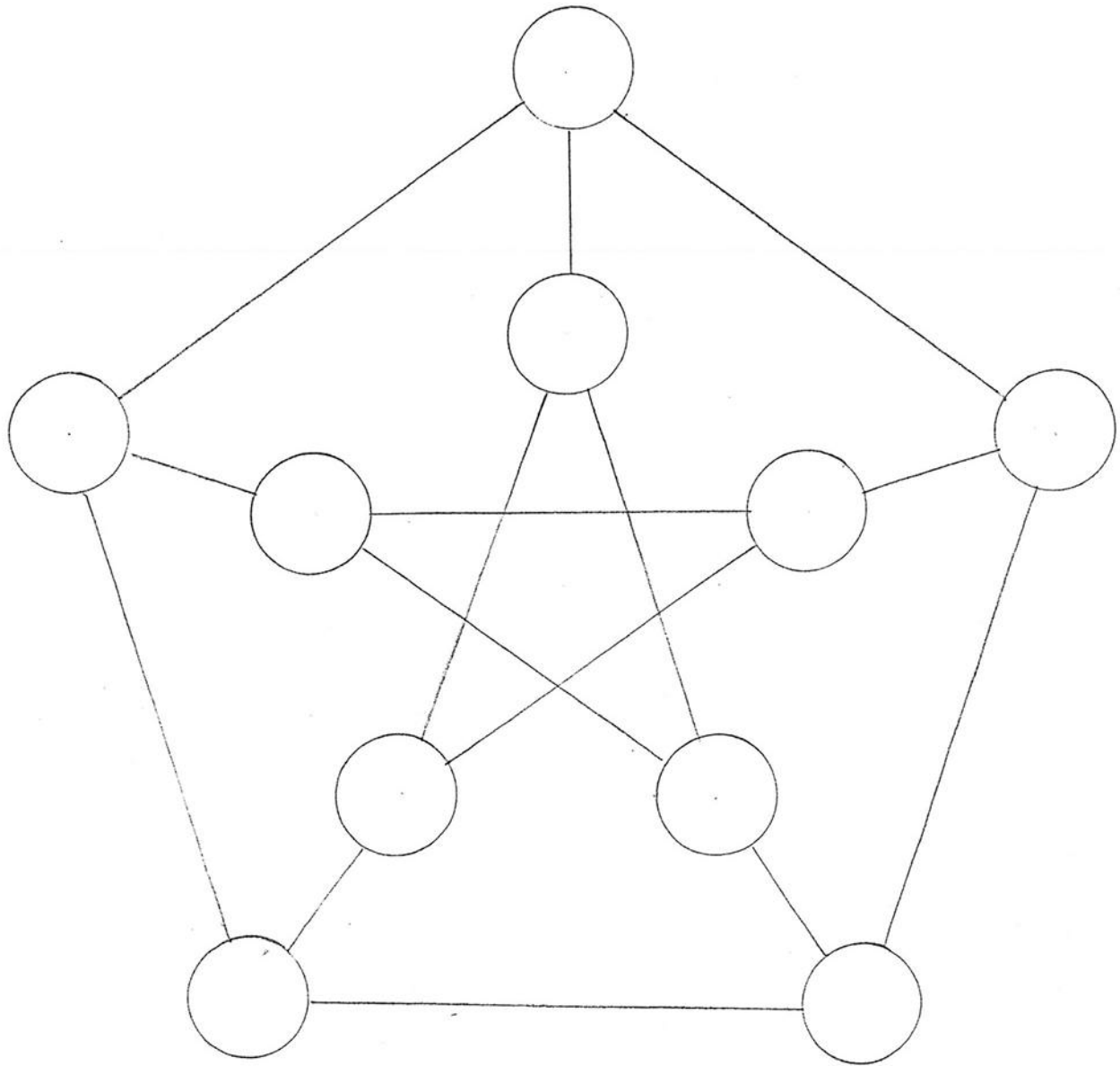
Remarks: There are 120 solutions to the first two puzzles and two solutions to the third. The Tic-Tac-Toe games are forced first-person wins from any start. The magic trick works since this "misgraph" uses the fundamental, non-Hamiltonian graph. For more details see "Configuration Games" by Jeremiah Farrell, Martin Gardner and Thomas Rodgers in *Tribute to a Mathemagician*, 2005, A.K. Peters, Ltd.



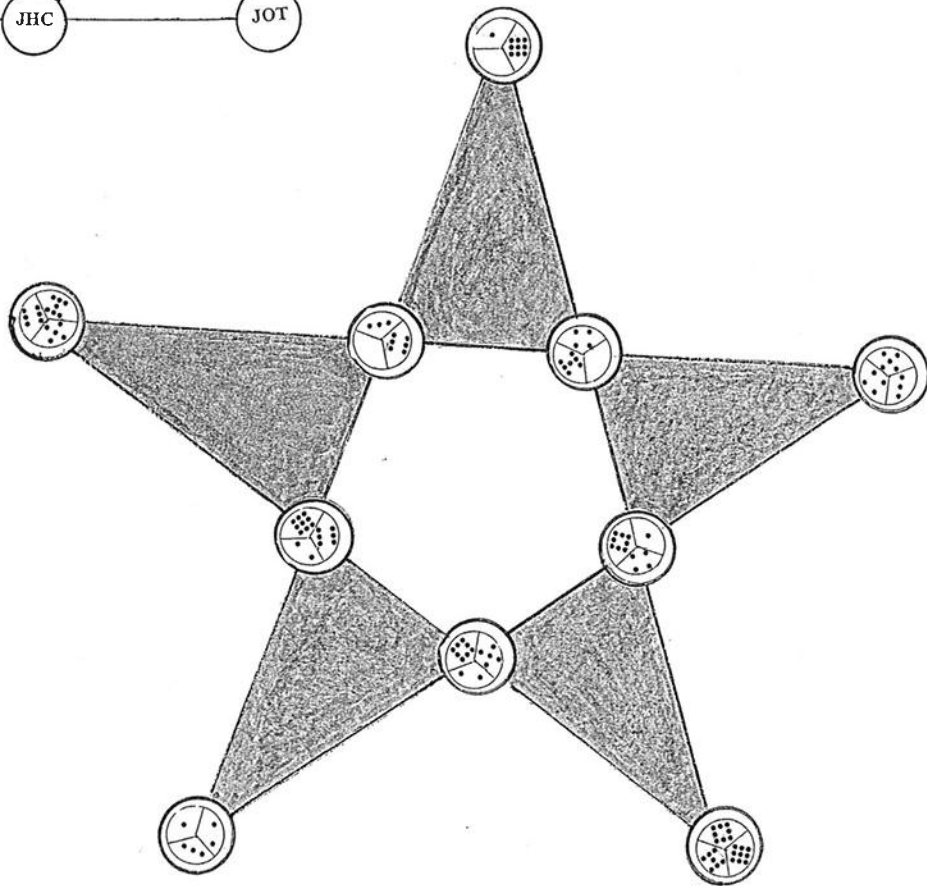
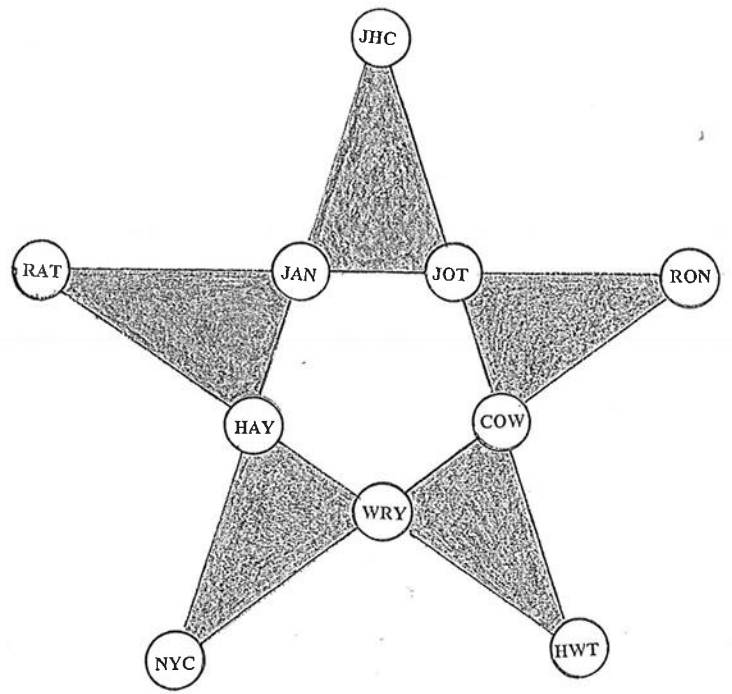
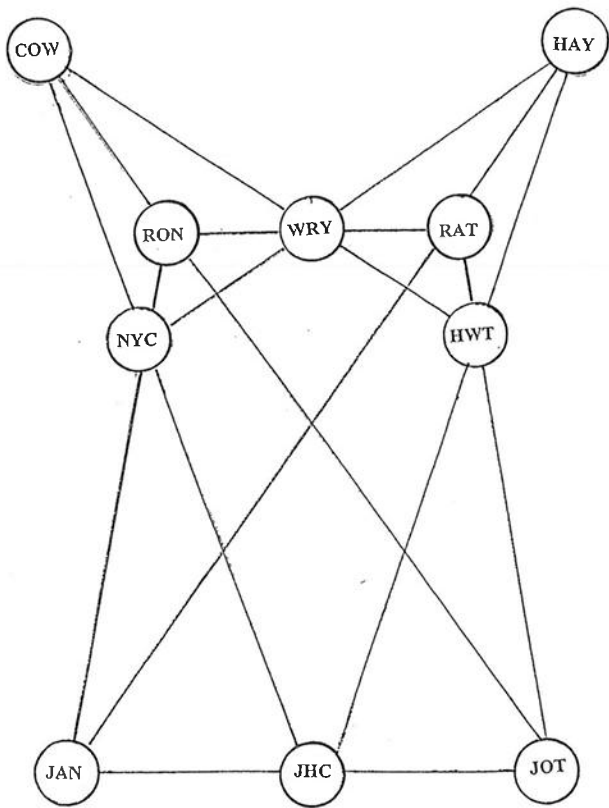
**PENTALPHA**



**DESARGUES' MITRE**



**KEEP-AWAY**



## SOME SOLUTIONS

(For Puzzle 3 use the order we gave the words as a hint as to how to obtain the 2 solutions.)