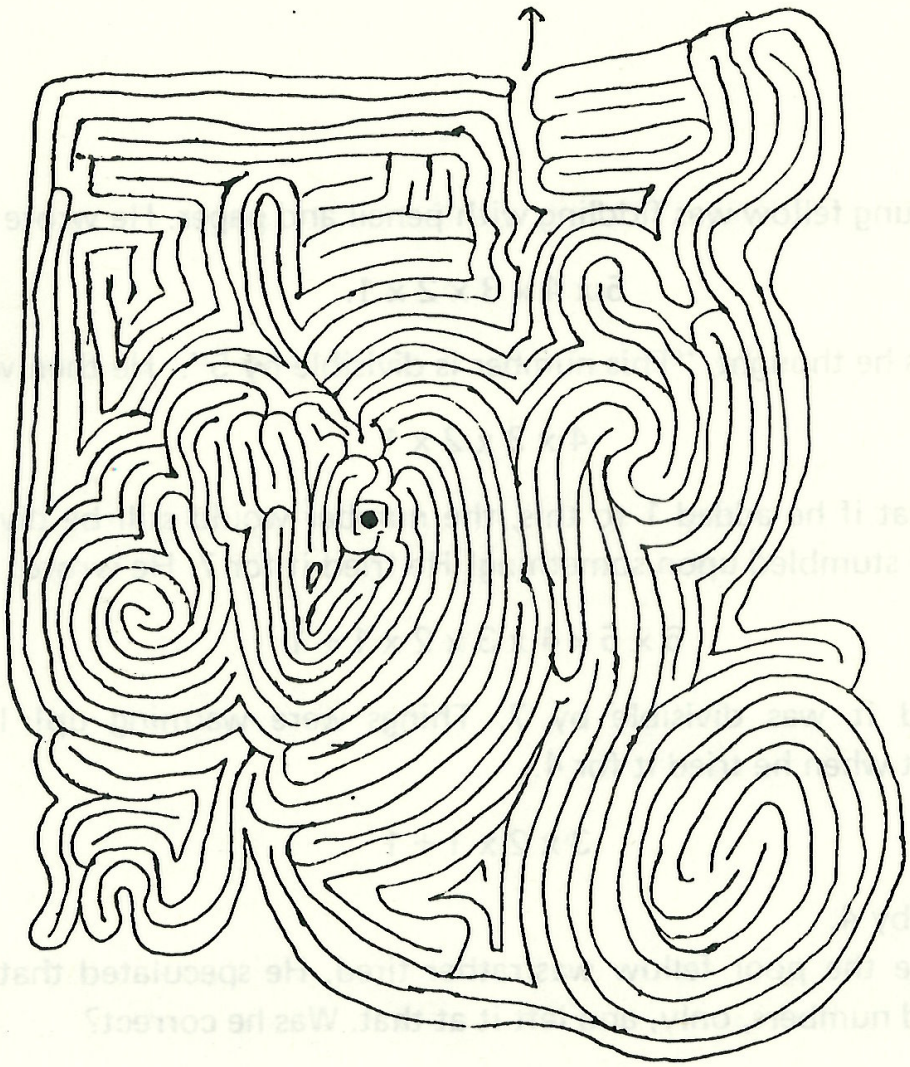
Mazes

For a change this time, we present to you something which is strictly not a game (but is an interesting challenge).

The object of most mazes is to get from one point to another along a series of pathways that have been deformed by a sadist. When one has examined several of these mazes it becomes clear that there are three basic types, viz:

1) from one point outside the maze to reach another point outside the maze.
2) from one point outside the maze to reach a point inside the maze.
3) from one point inside the maze to reach another point inside the maze.

The one you see below is for the second case; it is dated to within the period of this decade, but the first mazes are dated from the dawn of man's history.



Start at dot in middle and emerge at arrow. (Answer next issue)

Nowadays, mathematicians have found a theory (called network theory) which predicts a way for getting out of any maze.

See if you can find a theory to get out of this maze and any other like it.

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Black

This game was described in the last issue where you were asked to discover the strategy. This strategy allows the first player to win on a board with an odd number of squares and second player to win on a board with an even number of squares (provided the board is larger than 2 x 2).

First consider the strategy for a board with an odd number of squares. The first two plays will cover two squares with an adjacent side, which will be called a domino. The first player now imagines the board (except the bottom right hand corner) to be covered with dominoes, one of these dominoes covering the first two plays. The first player always uses the first square of a domino and ensures that the second player uses the other square in the same domino by leading the line to the middle of the domino. The second player then always must lead the line into a new domino, out over the edge or into the bottom right square, thus ensuring a win to the first player.

On a board with an even number of squares the second player wins with a similar strategy. The only trouble arises when we try to cover with dominoes the board with the bottom right square and top left square uncovered. (The first square played is left uncovered so that the second player takes the first square of each of the dominoes.) We find that this region cannot be covered with dominoes. This is easily seen by considering the area coloured as a chessboard. The two squares that are not to be covered are both black and so the region has two more white squares than black. A domino will cover one white square and one black square and so cannot completely cover this region. Two white squares will always be left.

To fix this as far as the strategy is concerned, the second player ensures on his first go that the first player must use the second square on the diagonal (see diagrams). The unconnected portion of the first player's move connects two white squares. The second player now imagines the remainder of the board (excluding the squares used, the two marked white squares and the bottom right corner) covered with dominoes, and the strategy now works.