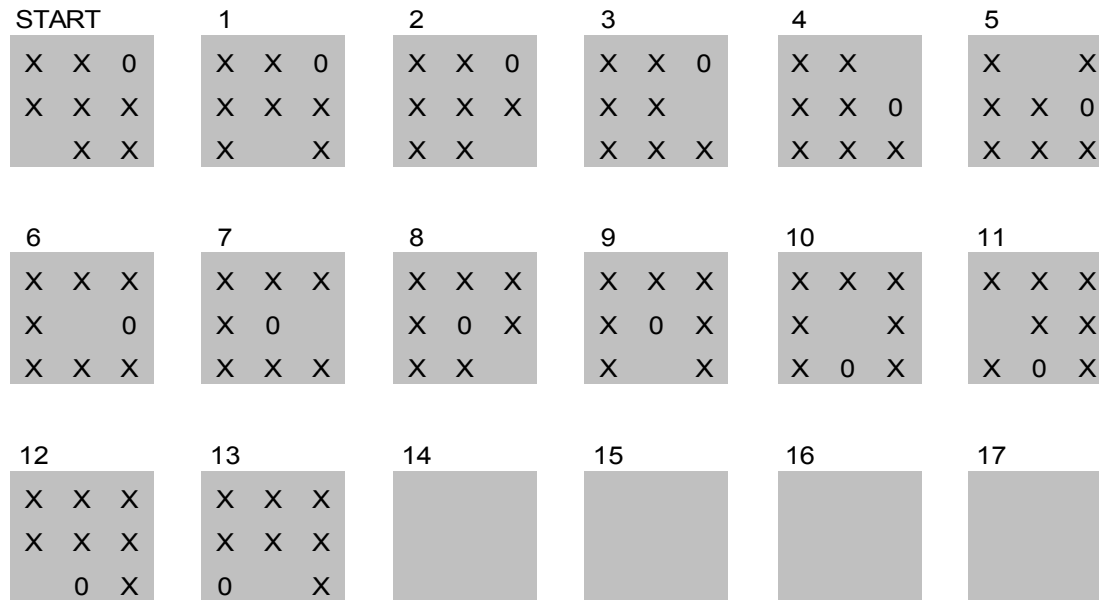


Moves: Solution

3x3: 13 moves:

**Path of the empty square,
& 'snail trail' of 0**



	5	4
11	6,10	3,7
12	1,9,13	2,8

		Start
	B	A
D	C	

Clearly, the above method of recording is pretty cumbersome!

The 'snail trail' for the 3x3 shows that since the 0 has to move 2 down & 2 across, it has to make a minimum of 4 moves. Between each of these, the Xs move twice. The first three X moves are to put the empty cell next to the 0 (two across, one up)

Here is another way of recording moves, with results for 2x2, 3x3, & 4x4

				1	2	3	4	5												
				X	0	X	X	0												
		1	2	3	4	5	6	7	8	9	10	11	12	13						
		X	X	X	0	X	X	0	X	X	0	X	X	0						
					A			B			C			D						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
X	X	X	X	X	0	X	X	0	X	X	0	X	X	0	X	X	0	X	X	0

And here is a table...(well, you can't have an investigation without a table, can you??)

Size of square, s	Initial number of X moves, m	Number of 0 moves, n	Number of paired X moves, 2(n-1)	Total number of moves T=(m+n+2(n-1))
2	1	2	2	5
3	3	4	6	13
4	5	6	10	21
s	2s-3	2s-2	4s-6	(2s-3)+(2s-2)+(4s-6)

And, of course, a formula: Total moves, T = (2s-3)+(2s-2)+(4s-6) = 8s-11

Hmmm; what next? Rectangles!!! Oh dear, I'm at the end of the page – you'll have to do that yourself ;-)