# Fidelity Movement Puzzle

We would like to thank you for your interest in our Fidelity Technology Puzzle Contest, hopefully it will be a lot of fun! There will be many prizes given out with the top winners being invited to lunch with Jorge. The Source Code and e-mail with the solutions need to be sent to Louis Mancini and Sean Riggle by December 6th at 11:59pm(subject: Fidelity Movement Puzzle). Your chances for winning the contest increase with how fast you submit your solution. For every correct solution each individual gets 250 tickets (chances) to possibly win. For every hour the puzzle is turned in before the deadline, each individual is given an additional 5 tickets.

The problem can be solved utilizing whichever language you are most comfortable. Solutions must be runnable on either Windows, Linux or the MainFrame platform (for non-programmers or people that love excel that want to participate, this problem can be solved in Excel and will be accepted). We expect a zip file of the source code as well as a README file for how to run and compile your code.

The Question:

Below is a fictional keypad that consists of letters and numbers.

```
 1   A   B   C   3

 D   2   E   4   F

 G   H   I   J   K

     L   M   N
```
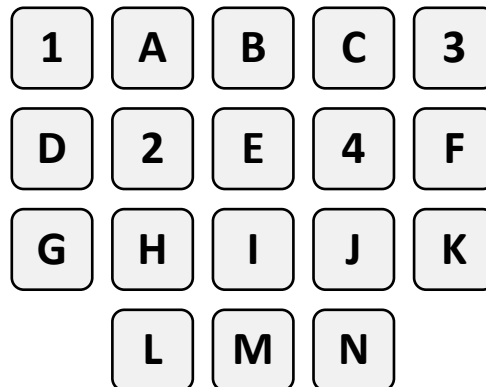
The goal of this puzzle is to find all of the sequences of length n that can be keyed into the keypad in the following manner.

- Any random key can be the initial key press, all keys must be used to start sequences
- Each subsequent key press must be a "Fidelity Move" from the previous key.
- There can be at most 2 number keys pressed in each sequence
- We will attempt to run your solution with $n=10$, $n=12$, $n=16$ and $n=32$, your solution must return an answer for all of these. Please put all of your solutions to the problem in your e-mail. Entrants without solutions in the e-mail for all of these n values will be discarded.
- It is ok for a key to be used multiple times in a sequence, subject to the length and number constraints.
- The only requirement for the output is the number of sequences, this problem can be solved in many ways and we want as little constraint as possible.

A "Fidelity Move" is a non-wrapping(Can never leave the board) move that can be made in any of the following ways:

- 2 Keys North, 1 key West
- 2 Keys North, 1 key East
- 2 Keys East, 1 key North
- 2 Keys East, 1 key South
- 2 Keys South, 1 key East
- 2 keys South, 1 key West
- 2 Keys West, 1 key North
- 2 Keys West, 1 key South

Hints:

- the above are the <u>ONLY</u> possible fidelity moves, meaning that any other move is invalid. Meaning 1 key East, 2 keys south is invalid. i.e. You cannot make a Fidelity Move to get from D → L
- The answers should be a <u>NUMBER</u>. To make sure everyone is clear on the answers here is how it should look. I have put the answer for n=2 to help you validate your solution.
  - n = 2, Answer = 56
  - n = 10, Answer = ?
  - n = 12, Answer = ?
  - n = 16, Answer = ?
  - n = 32, Answer = ?

The following are examples of a "Fidelity Move":

Grid 1

1	A	B	C	3
D	2	E	4	F
G	H	I	J	K
	L	M	N	

Grid 2

1	A	B	C	3
D	2	E	4	F
G	H	I	J	K
	L	M	N	

Grid 3

1	A	B	C	3
D	2	E	4	F
G	H	I	J	K
	L	M	N	

Grid 4

1	A	B	C	3
D	2	E	4	F
G	H	I	J	K
	L	M	N	