

Question 3 - What is the minimum number of moves required for a knight to cover the entire chess board? Write a program to prove it. Provide a graph with the move number on the x axis and the number of squares covered on the y axis.

It is impossible for the knight to cover the chessboard in fewer moves than 63, because there are 64 squares on the chessboard and the knight can only cover one additional square per move. Therefore, a program that can find at least one series of 63 knight moves that covers the chessboard effectively proves that the minimum number of moves required for a knight to cover the entire chess board is **63**.

The included code file 'KnightChessboardProgram.cs' uses an integer to represent each square, in which the tens digit represents the column and the ones digit represents the row (see Figure 1, below). The program steps through every possible starting square, and for almost every starting square it determines a series of subsequent squares that covers the entire chessboard with 63 knight moves. Figure 2 is a representation of the sequence of moves generated by the program that starts on square 15, with numbers from 1 to 64 representing the sequence of squares a knight would move to in order to cover the chess board in 63 moves.

Figure 3 is a graph with the number of moves on the x axis and the number of squares covered on the y axis.

Figure 1 – Square-Identifying Integers

70	71	72	73	74	75	76	77
60	61	62	63	64	65	66	67
50	51	52	53	54	55	56	57
40	41	42	43	44	45	46	47
30	31	32	33	34	35	36	37
20	21	22	23	24	25	26	27
10	11	12	13	14	15	16	17
00	01	02	03	04	05	06	07

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Figure 2 – Example Sequence of 63 Moves that Cover the Board

8	41	10	35	6	31	20	33
11	36	7	40	21	34	5	30
42	9	54	37	44	39	32	19
53	12	43	46	55	22	29	4
50	57	52	61	38	45	18	23
13	62	49	56	47	26	3	28
58	51	64	15	60	1	24	17
63	14	59	48	25	16	27	2

Figure 3 – Move Number vs. Number of Squares Covered

