

THEMATIC KNIGHT'S TOUR QUOTES

PHILIP M. COHEN
Aliquippa, Pennsylvania

Knight's Tour Quotes (KTQs), also called Knight's Tour Crypts, are a word puzzle enjoying a new vogue in the National Puzzlers' League since David Silverman reintroduced them in 1973. Dmitri Borgmann presented some examples in "Chesswords" in the May 1974 Word Ways. A KTQ is a quote written out along a knight's tour. It is a form, usually rectangular, with each square containing a single letter or punctuation mark. Stepping from letter to letter by knight's moves (two squares horizontally or vertically, then one square perpendicular to that), visiting all letters once, one can spell out a message. To reduce the task from drudgery to pleasure, the starting letter is underlined and the word lengths and punctuation of the message are given. A small example ("Even paranoids can have real enemies." 4 9 3 4 4 7) is given at the right.

```

A A E E . E N R
R D V N E A S N
C H O A V I A E
I E S M N L P E

```

KTQs are fun to solve, but they are trivial to compose. Simply take a knight's tour from a book and replace the numbers in order with the characters of the quote. If none is available, one can very easily be constructed. The simplest way is to use Warnsdorf's rule: always move the knight to the cell from which there are the fewest exits to unoccupied cells. If there is a choice, it can generally be made at random, except sometimes near the end of the tour. (It may seem odd to always minimize one's choices, but this rule avoids the commonest error in constructing tours: absent-mindedly blocking all approaches to a square.)

To add interest, and to challenge the constructor, I suggest adding the requirement that a line of the array spell out a word or words. Among other things, this can be used to produce personalized puzzles. I once sent a newlywed couple, both in the National Puzzlers' League, a wedding card on which an epithalamial jingle was turned into a KTQ spelling out their NPL pseudonyms.

It is easy to blunder in producing a thematic TKQ; it took me hours to do my first few. I therefore show how to construct one, so that those interested will not have to reinvent the wheel.

Step 1 Get a sheet of graph paper and a pencil with a good eraser.

Step 2 Given the word that will appear in the final KTQ, you must choose or write a quotation that includes the needed letters, properly

Now recheck the inserted numbers against the original quote! It is heartbreaking to complete a KTQ and then find it doesn't spell out what it was supposed to.

Step 6 Start connecting the numbers into a knight's tour. Pencil in lines b3-a1-c2 and f2-h1-g3 as a reminder that these knight moves must be part of the final tour. Thus only 38 and 40 can go in b3/c2; decide which goes where later. 26 and 28 can only be connected by a 27 at c3, so put that in; similarly, 2 must be at f3. 48 can be connected to 51 via f2/d3 or g3/e2; let's try the former. With 49 at f2, 47 must be at g3. Now look at a2. It has access to only 2 squares, c1 and b4. If we're not to cut it off from the tour, we must connect it to c1 (51); put 52 in a2, 53 in b4. Similarly for h2. 53 can now be connected to 56 in only one way. This leaves 28 only one exit, so put 29 at b2.

				54				
		53					58	
			27	50	55	2	<u>47</u>	
	52	29				49		57
	<u>39</u>	<u>26</u>	51	28	1	56	<u>3</u>	48

The first connections are done, and appear in the above array. Now underline all active numbers -- those still lacking at least one connection. Run through the fragments of the tour thus far (1-3, 26-29, 47-58) for errors, and make sure no active number is walled in. Make such checks frequently, or you will make errors, and waste a lot of time.

It looks OK, so save this diagram for reference (in case later mistakes force us to retrace our steps) and copy it elsewhere.

Step 7 Continue to connect the scattered chains. In doing so, there are three important principles to follow:

(1) The still-unused squares must always be kept in as neat and rectangular a group as possible, to ease later work. Here, the isolated squares in the second row and the protrusion at a4/a3/b3 should be filled in as soon as possible.

(2) Keep an eye on all active numbers to make sure they are never cut off. If you fill in the next-to-last exit on an active square, like 28 in Step 6, immediately extend its portion of the tour to the last exit, and circle the extension to mark it as a new active number.

(3) Watch for squares with only two exits; new ones will constantly be formed as you go. It is a good idea to mark a two-exit square by pencilling in lines from it to its exits, as was done at the corners in Step 6. Otherwise you will forget, block one off, and have to retrace.

Suppose we connect 39 to 47 first. Observe how 40-44 fill in the second row. Note that placing 42 forces us to extend 3 to 4, and 43 forces extension of this to 5. 38 must go in b3. Now extend the 26-29 and 38-58 chains to smooth out the left side. Now check once again: are all active squares marked and not blocked? Are all chains legal

				54		46	5	
	<u>30</u>	53	24	41	36	43	<u>58</u>	45
	<u>25</u>	38	27	50	<u>55</u>	2	<u>47</u>	4
	52	29	40	37	42	49	44	57
	39	26	51	28	1	56	3	48

so far? All is well, so save this and copy it over elsewhere.

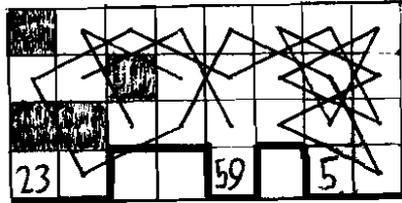
Step 8 With just a little practice -- and care -- the above steps go quickly. We now approach the blood-sweat-and-tears stage: making the last connections in a small remaining area that leaves little maneuvering room. With properly-bunched numbers at the start, we should reach this stage with only two connections to interweave, but here we have three: 5-23, 30-36, 58-64. The quote was not obliging.

32									
								33	
								34	31
								23	35 54 59 46 5
								<u>30</u>	53 24 41 36 43 <u>58</u> 45
								25	38 27 50 55 2 <u>47</u> 4
								52	29 40 37 42 49 44 57
								39	26 51 28 1 56 3 48

It's hard to juggle three chains in this tight space; it seems best to get one out of the way somehow and put most effort into filling whatever space this leaves. The clear choice is the 30-36 connection. It's short, leaving more room to work with than 5-23 would, and both its ends are constrained. We'd rather save 58-64 for the final crunch, because only the 58 end is tied down; the 64 can stop anywhere.

At this stage, two-exit squares grow thick, and the lines from them spiderweb the edges. In connecting 30 to 36, we can try to keep the remaining area rectangular by hugging the edges, or charge in and remove a few two-exit squares at any cost. Here we try the latter. We also extend 58 to 59 to smooth out the outline.

Step 9 At this stage, I generally draw the outline of the remaining squares separately for greater clarity, and work with that. No numbers are written except the active numbers (to show where connecting chains must attach). Now it's trial-and-error time. "Well, this is a dead end, but suppose I link this square to this one instead, erase this other link, and draw this new one -- oops, that's a dead end, too".



To put some system in the trials, I generally ignore the connections for awhile and try to link all the unfilled squares in a single closed knight's tour (a closed tour is one in which the start and end squares can be connected by a knight move to form a closed loop). This requires an even number of squares. We have 22 here; otherwise we'd have to backtrack or advance a bit. When the loop is done, choose one active number and try to connect it to another along the tour. In our 5-23 case, we would enter from 23, put a 22 on the tour, and move along it (trying both directions) to 21, 20, 19, ... and hope that, at 6, we would find ourselves a knight's move away from 5. In the present case -- two entry points for 23, three for 5 -- we could expect one or two successes. For each, see if the remaining portion of the loop can serve as a connection for the remaining number(s). If not, tinker with the tour and try again. It may be necessary to go back to Step 8, or even Step 7, and rearrange things a bit.

In this case, luckily, the answer comes with a bit less work. At the stage shown, with a closed tour and two left-over three-square chains, I noticed that one of the left-overs could be eliminated by moving from 59 to c6-b8-d7. From there I tried moving to f6 and h5 (Warnsdorf's rule). Could the tour of the remainder be juggled into a route from 5 to 23? It could! I was done in forty minutes, well under par.

Step 10 Run through the whole chain. If it's correct, replace numbers with quote letters, and feel a glow of satisfaction. If not, groan and backtrack.

32	61	14	21	18	7	12	9	C	T	K	S	R	T	I	E
15	22	33	62	13	10	19	6	E	T	A	E	C	C	O	D
34	31	60	17	20	63	8	11	U	E	I	C	S	S	H	H
23	16	35	54	59	46	5	64	H	N	S	G	R	N	I	.
30	53	24	41	36	43	58	45	B	N	E	S	E	D	T	I
25	38	27	50	55	2	47	4	R	E	A	E	L	H	I	D
52	29	40	37	42	49	44	57	I	?	A	H	A	T	M	S
39	26	51	22	1	56	3	48	W	O	R	D	W	A	Y	S

READ READ

In the late 1920s, Allen Walker Read (now professor emeritus of English at Columbia) collected graffiti from the walls of rural outhouses in the western United States and Canada, later employing these as citations to illustrate the usages of various scatological and obscene words (in the spirit of the Oxford English Dictionary). His work was privately published in Paris in 1935, in an edition of only 75 copies. In 1977, Maledicta Press (331 S. Greenfield Avenue, Waukesha, WI 53186) reprinted it as Classic American Graffiti, an 83-page paperback for \$6.00. Scanning Professor Read's several hundred examples, one is struck by how little the words and their usages have changed over the past half-century. Since he was not privy to the inscriptions in outhouses used exclusively by women, his work is necessarily biased; would different emphases have been revealed in those pre-women's-lib days? Despite the gamy nature of his material, Professor Read has written a text of impeccable scholarship and dignity.