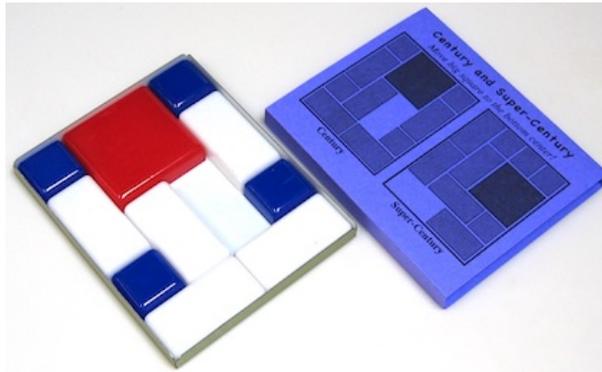
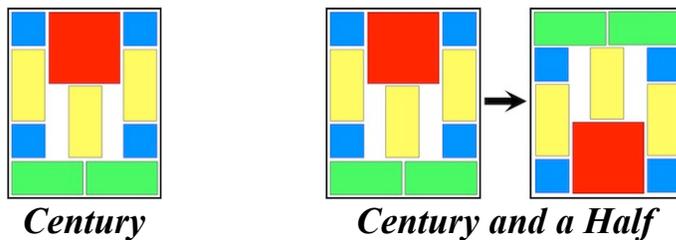


Century Puzzles

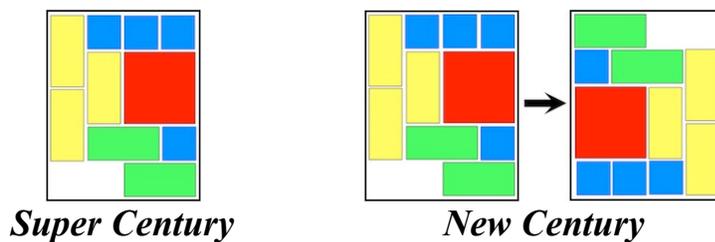


Century by J. H. Conway 1975, *Super Century* by Gil Dogon 2004;
 this puzzle formed from two 1961 Adams Co. Dad's Puzzles,
 with cardboard sleeve by J. A. Storer 2007.
 (cardboard sleeve, metal tray, and 10 plastic pieces, 3.75 x 3 x 5/16 inches)

The *Century* puzzle is to move the 2x2 piece to the bottom center without regard to where the remaining pieces go. *Century* is discussed in the *Winning Ways* book vol. 2 and shown on a chart on *Baxter's Page*. Its name reflects a minimal solution of exactly 100 rectilinear moves formed by an initial 1/2 unit move of the central 2x1 piece followed by exactly 99 moves that end with a move of a 2x1 piece back to the middle. It is natural to consider a puzzle where the last position is fully specified; *Century and a Half* (also discussed in *Winning Ways* vol. 2) makes a vertical mirror of the start position, where its name reflects its solution of exactly 150 rectilinear moves formed by an initial 1/2 unit move of the central 2x1 piece followed by exactly 149 moves that end with a move of a 2x1 piece back to the middle.

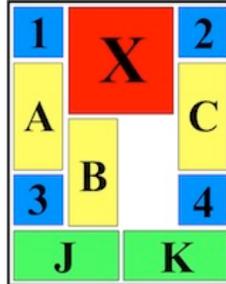


The *Super Century* puzzle, using the same set of pieces as *Century*, is also to move the 2x2 piece to the bottom center without regard to where the remaining pieces go. *Super Century* is discussed in an article by E. Pegg and shown on a chart on *Baxter's Page*. It has a minimal solution of 138 rectilinear moves. Again, it is natural to consider a puzzle where the last position is fully specified. We refer to *New Century* as making a vertical + horizontal mirror of the start position; it has a minimal solution of 230 rectilinear moves.



A Century Solution

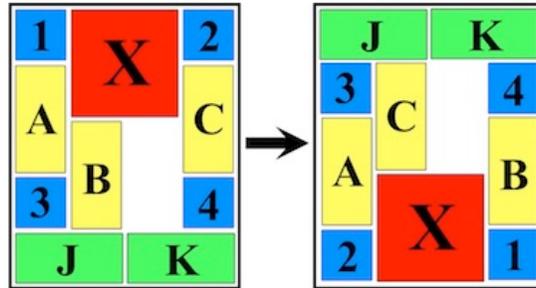
Here are every 3 steps of a 99 rectilinear steps solution (which can be converted to 111 straight-line steps by replacing with two steps each of steps 1, 4, 15, 18, 22, 25, 46, 48, 51, 77, 78, 98). This represents exactly 100 rectilinear steps when the initial 1/2 unit move is included.



Step 0: 1 X X 2 A X X C A B C 3 B 4 J J K K	Step 3: 1 X X 2 A X X C A B 4 C 3 B K K J J	Step 6: X X 2 X X C 1 B 4 C A B K K A 3 J J	Step 9: X X 2 C X X C 1 B 4 A B K K A 3 J J	Step 12: X X C X X C 1 B 2 4 A B K K A 3 J J	Step 15: 1 X X C A X X C A B 2 4 B K K J J
Step 18: 1 X X C A X X C A B 2 3 B 4 J J K K	Step 21: 1 B X X A B X X A 2 C 3 4 C J J K K	Step 24: 1 B X X A B X X A 3 2 C J J 4 C K K	Step 27: 1 B X X A B X X A 3 2 C J J C K K 4	Step 30: X X X X 1 3 2 C A J J C A K K 4	Step 33: 3 X X B X X B 1 2 C A J J C A K K 4
Step 36: 3 X X C B X X C B 1 2 A J J A K K 4	Step 39: 3 X X C B X X C B 2 A 1 J J A K K 4	Step 42: 3 X X C B X X C B 2 J J A 1 4 A K K	Step 45: 3 X X C X X C 2 J J B A 1 4 B A K K	Step 48: 3 X X C 2 X X C J J 4 B A 1 B A K K	Step 51: 3 2 X X X X J J 4 C B A 1 C B A K K
Step 54: 3 2 X X J J X X B A 4 C B A 1 C K K	Step 57: 3 2 X X J J X X B A C B A 4 C K K 1	Step 60: 3 2 J J X X B A X X B A 4 C K K 1 C	Step 63: J J 3 2 A X X B A X X B 4 C K K 1 C	Step 66: J J 3 2 A X X B A X X B 4 1 C K K C	Step 69: J J 3 2 A X X A X X B 4 1 C B K K C
Step 72: J J 3 A X X 2 A X X C B 4 1 C B K K	Step 75: A J J 3 A X X 2 B X X C B 4 1 C K K	Step 78: A J J 3 A X X 2 B X X C B C 4 1 K K	Step 81: A J J A 2 3 B X X C B X X C 4 1 K K	Step 84: B A J J B A 2 3 X X C X X C 4 1 K K	Step 87: B A J J B A 3 X X 2 C X X C 4 1 K K
Step 90: B A J J B A 3 C X X 2 C X X K K 4 1	Step 93: B A J J B A 3 C 2 C X X K K X X 4 1	Step 96: B J J C B A 3 C 2 A X X K K X X 4 1	Step 99: B J J C B A 3 C 2 A K K X X 4 X X 1		

A Century and a Half Solution

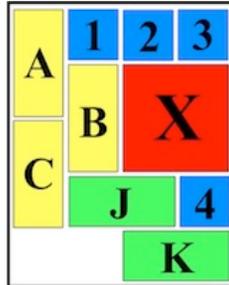
Here are every 5 steps of a 149 rectilinear steps solution (which can be converted to 170 straight-line steps by replacing with two steps each of steps 1, 4, 15, 18, 20, 23, 30, 37, 41, 49, 71, 72, 98, 101, 103, 123, 127, 131, 134, 145, 148). This represents exactly 150 rectilinear steps when, as previously discussed, the initial 1/2 unit move at the start is taken into account.



Step 0: 1 X X 2 A X X C A B C 3 B 4 J J K K	Step 5: 1 X X 2 X X C B 4 C A B K K A 3 J J	Step 10: X X 2 C X X C 1 B 4 A B K K A 3 J J	Step 15: 1 X X C A X X C A B 2 4 3 B K K J J	Step 20: 1 X X C A X X C A 3 B 4 B 2 J J K K	Step 25: 1 X X C A X X C A 3 B J J B K K 2 4
Step 30: 1 X X C 3 X X C 2 B A J J B A K K 4	Step 35: 1 X X C 3 X X C A 2 A J J B K K 4 B	Step 40: 1 X X C 3 X X C J J 2 A 4 B A K K B	Step 45: 1 X X C 3 X X C J J B A 2 B A 4 K K	Step 50: 1 3 X X J J X X B C A 2 B C A 4 K K	Step 55: 1 3 X X J J X X A 2 C A 4 B C K K B
Step 60: J J 1 3 X X A 2 X X A 4 B C K K B C	Step 65: J J 1 3 A X X C A X X C 4 2 B K K B	Step 70: J J 1 3 A C A X X C 2 X X B 4 K K B	Step 75: J J C A 1 3 C A X X B 2 X X B 4 K K	Step 80: A J J C A 1 3 C X X B X X B 2 4 K K	Step 85: A 1 J J A 3 C X X B C X X B 2 4 K K
Step 90: A 1 J J A 3 B C B C X X K K X X 2 4	Step 95: J J B A 1 B C A 3 C X X K K X X 2 4	Step 100: J J B C 1 B C 3 K K A X X 2 A X X 4	Step 105: J J B 3 1 B K K 2 C A X X C A X X 4	Step 110: 3 J J B K K 1 B 2 C A X X C A X X 4	Step 115: 3 J J B A K K B A 2 C X X C X X 1 4
Step 120: 3 J J B A K K B A 2 4 X X C X X C 1	Step 125: J J A 3 K K A 2 4 B X X C B X X C 1	Step 130: J J K K 3 C 4 2 C B A X X B A X X 1	Step 135: K K 4 B J J C B 3 2 C A X X A X X 1	Step 140: K K 4 B J J C B A 3 C 1 A X X 2 X X	Step 145: K K J J C 4 A 3 C B A X X B 2 X X 1
Step 149: J J K K 3 C 4 A C B A X X B 2 X X 1					

A Super Century Solution

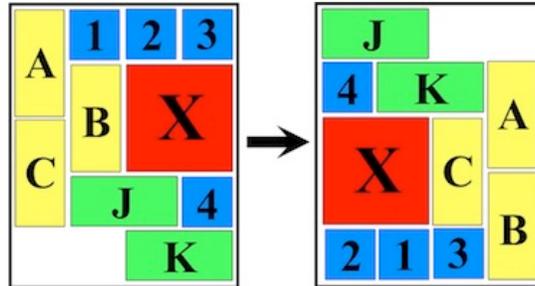
Here are every 4 steps of a 138 rectilinear steps solution (which can be converted to 150 straight-line steps by replacing with two steps each of steps 26, 28, 51, 53, 56, 65, 85, 87, 90, 116, 117, 137).



Step 0: A 1 2 3 A B X X C B X X C J J 4 K K	Step 4: 1 2 3 A B X X A B X X C J J C K K 4	Step 8: 2 3 A 1 X X A B X X C B J J C K K 4	Step 12: 2 3 X X A 1 X X A B J J C B 4 C K K	Step 16: 2 X X A 3 X X A 1 J J C B 4 C B K K	Step 20: A 2 X X A 3 X X 1 B J J C B 4 C K K
Step 24: A 2 A 3 X X 1 B X X C B J J C K K 4	Step 28: A B 3 2 A B X X X X C 1 J J C K K 4	Step 32: 3 2 A B X X A B X X C 1 J J C K K 4	Step 36: 3 2 X X A B X X A B J J C 1 4 C K K	Step 40: 3 2 A B X X A B X X C 4 J J C 1 K K	Step 44: A B 3 2 A B X X X X C 4 J J C 1 K K
Step 48: A B 3 2 A B X X C 4 X X C 1 J J K K	Step 52: A 3 2 A X X C B X X C B 4 1 K K J J	Step 56: A 2 X X A 3 X X C B 4 C B 1 K K J J	Step 60: 2 X X A 3 X X A C B 4 C B 1 K K J J	Step 64: 2 3 X X A C X X A C B 4 K K B 1 J J	Step 68: 2 3 X X A C X X A C 1 B K K B J J 4
Step 72: 2 3 X X C X X C 1 B A K K B A J J 4	Step 76: 2 X X B C X X B C 3 1 A K K A J J 4	Step 80: 2 X X B C X X B C 1 K K A 3 A J J 4	Step 84: 2 X X B X X B 1 K K C A 3 4 C A J J	Step 88: 2 X X 1 X X K K 4 B C A 3 B C A J J	Step 92: 2 1 X X K K X X A 4 B C A 3 B C J J
Step 96: 2 1 X X K K X X C A B C A 4 B J J 3	Step 100: 2 1 K K X X C A X X C A 4 B J J 3 B	Step 104: K K 2 1 A X X C A X X C 4 3 B J J B	Step 108: K K 2 1 A X X A X X C 4 3 B C J J B	Step 112: K K 2 A X X 1 A X X B C 4 3 B C J J	Step 116: A K K 2 A X X 1 C X X B C 3 B 4 J J
Step 120: A K K A 1 2 C X X B C X X B 4 3 J J	Step 124: C A K K C A 1 2 X X B X X B 4 3 J J	Step 128: C A K K C A 2 B X X 1 B X X J J 4 3	Step 132: C A K K C A 2 B 1 B X X J J X X 4 3	Step 136: C K K B C A 2 B 1 A J J X X X X 4 3	Step 138: C K K B C A 2 B 1 A J J X X 4 X X 3

A New Century Solution

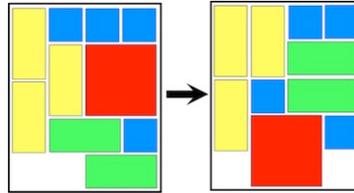
Here are every 7 steps of a 230 rectilinear steps solution (which can be converted to 254 straight-line steps by replacing with two steps each of steps 28, 51, 53, 56, 70, 75, 79, 83, 86, 88, 91, 111, 114, 115, 141, 144, 146, 166, 175, 178, 180, 203, 205).



Step 0: A 1 2 3 A B X X C B X X C J J 4 K K	Step 7: 2 3 A 1 X X A B X X C B J J C K K 4	Step 14: 2 3 X X A 1 X X A J J C B 4 C B K K	Step 21: A 2 X X A 3 X X 1 B J J C B 4 C K K	Step 28: A B 3 2 A B X X X X C 1 J J C K K 4	Step 35: 3 2 X X A B X X A B J J C 1 4 C K K
Step 42: 3 2 A B X X A B X X C 4 J J C 1 K K	Step 49: A B 3 2 A B X X C 4 X X C 1 K K J J	Step 56: A 2 X X A 3 X X C B 4 C B 1 K K J J	Step 63: C A X X C A X X 2 B 4 3 B 1 K K J J	Step 70: C X X 4 C X X 1 2 3 A B A B K K J J	Step 77: C X X 4 C X X B 2 3 1 B K K A J J A
Step 84: C X X 4 C X X B K K 2 B 3 1 A J J A	Step 91: X X 2 4 X X C 3 K K C 1 A B J J A B	Step 98: X X 2 4 X X K K A B C 3 A B C 1 J J	Step 105: 2 4 K K X X A X X A B C 1 3 B C J J	Step 112: 2 4 K K C X X A C X X A 3 B 1 J J B	Step 119: C K K A C 2 4 A X X B 3 X X B 1 J J
Step 126: C K K C 2 4 A X X B A X X B 3 1 J J	Step 133: C 2 K K C 4 B A B A X X J J X X 3 1	Step 140: K K B A C 2 B A C 4 J J X X X X 3 1	Step 147: K K B 4 2 B J J 3 A C X X A C X X 1	Step 154: 4 K K B J J B 3 2 A C X X A C X X 1	Step 161: 4 K K C J J C 3 A B X X A B X X 2 1
Step 168: K K J J 3 C 4 C A B X X A B X X 2 1	Step 175: K K J J 3 4 C A C A X X 2 B X X 1 B	Step 182: J J K K 3 A X X 4 A X X C B 1 2 C B	Step 189: J J 3 A K K 4 A X X C B X X C B 1 2	Step 196: 4 J J A 3 A K K C B X X C B X X 1 2	Step 203: 4 J J A K K A X X 3 X X C B 1 2 C B
Step 210: J J A 4 C A K K C 3 X X 2 B X X 1 B	Step 217: J J A 4 C A K K C B X X 3 B X X 2 1	Step 224: 4 J J A K K C A X X C B X X B 2 1 3	Step 230: J J 4 K K A X X C A X X C B 2 1 3 B		

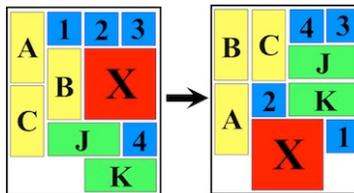
Super Century 198

New Century does not end with the 2x2 piece centered at the bottom (since it produces a vertical + horizontal mirror of a start position that does not have the 2x2 piece centered at the top). However, it is natural to consider a "nice" fully specified ending position that does. One idea is ending with the two 1x2 pieces replacing the 2x2 piece:



Super Century 198

Here are every 10 steps of 198 rectilinear steps for Super Century 198 (which can be converted to 217 straight-line steps by replacing with two steps each of steps 26, 28, 51, 53, 56, 65, 85, 87, 90, 110, 113, 114, 140, 143, 145, 165, 173, 178, 189):



Step 0: A 1 2 3 A B X X C B X X C J J 4 K K	Step 10: 2 3 X X A 1 X X A B C B J J C K K 4	Step 20: A 2 X X A 3 X X 1 B J J C B 4 C K K	Step 30: 3 2 A B X X A B X X C 1 J J C K K 4	Step 40: 3 2 A B X X A B X X C 4 J J C 1 K K	Step 50: A B 3 2 A B X X C 4 X X C 1 K K J J
Step 60: 2 X X A 3 X X A C B 4 C B 1 K K J J	Step 70: 2 3 X X A C X X A C 1 B K K B J J 4	Step 80: 2 X X B C X X B C 1 K K A 3 4 A J J	Step 90: 2 1 X X X X K K 4 B C A 3 B C A J J	Step 100: 2 1 K K X X C A X X C A 4 B J J 3 B	Step 110: K K 2 1 A X X B A X X B C 4 C J J 3
Step 120: A K K B A 2 1 B C X X C X X 4 J J 3	Step 130: K K 1 B A C 2 B A C X X J J X X 3 4	Step 140: A C K K A C 1 B J J 2 B 4 X X 3 X X	Step 150: C K K 2 C 1 A 4 J J A X X B 3 X X B	Step 160: K K 2 J J B C A 4 B C A X X 3 1 X X	Step 170: J J K K C B 4 C A B 2 3 A X X 1 X X
Step 180: B J J B K K C 3 4 2 C A X X 1 A X X	Step 190: B 2 3 B J J C K K 4 C A X X 1 A X X	Step 198: C B 2 3 C B J J A 1 K K A X X 4 X X			

Further reading:

Pegg's Page, from: http://www.maa.org/editorial/mathgames/mathgames_12_13_04.html

Baxter's Page, from: <http://www.puzzleworld.org/SlidingBlockPuzzles/4x5.htm>