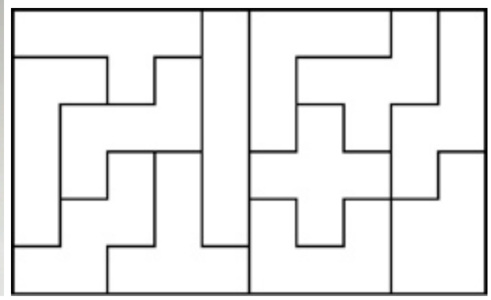
Pentominoes

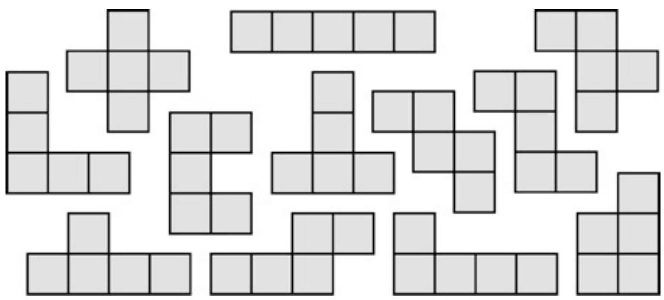
 

a.k.a. ***Polyominoes***

Old puzzle, this one made by Yasumi, 1995.

(wood, box and 12 pieces based on 0.75" inch cubes)

The 12 distinct shapes formed from 5 connected squares are the *pentominoes* (called *polyominoes* by Solomon W. Golomb, Charles Scribner's Sons, NY, 1965):



Total area is 60, and sizes 6 x 10, 5 x 12, 4 x 15, and 3 x 20 can be formed. There are known to be 2,339 distinct ways to form a 6 x 10 rectangle, excluding rotations and reflections. In contrast, there are 1,010 solutions for 5x12, 368 solutions for 4x15, and 3 x 20 has a unique solution except for rotating a central portion by 180 degrees.

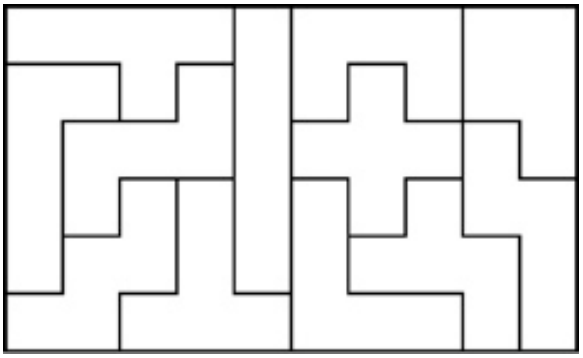
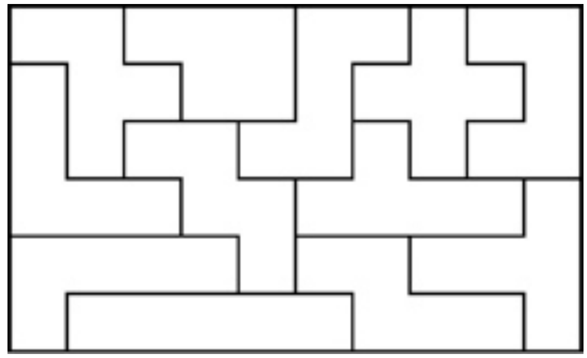
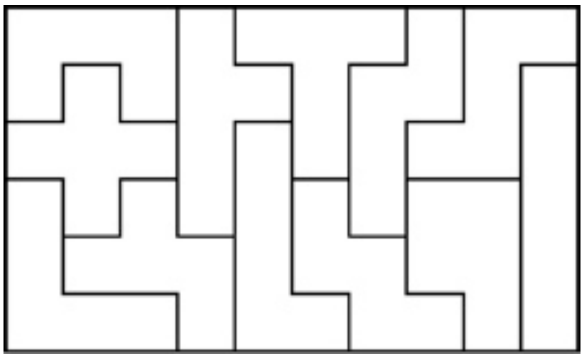
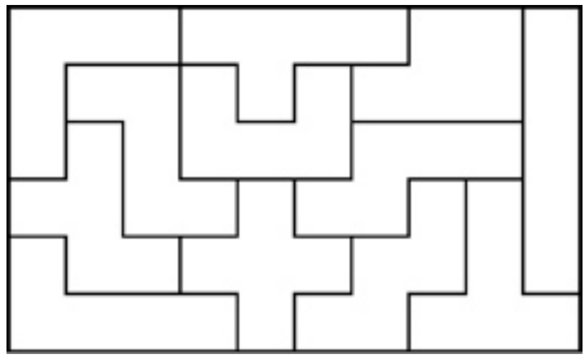
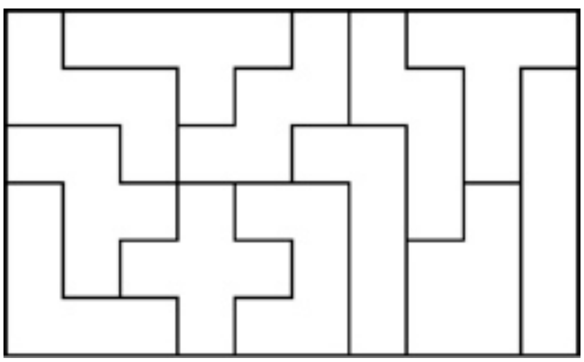
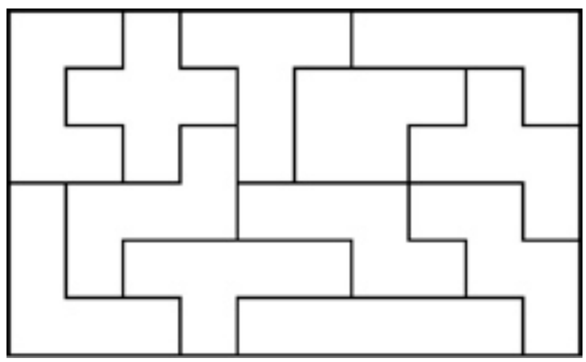
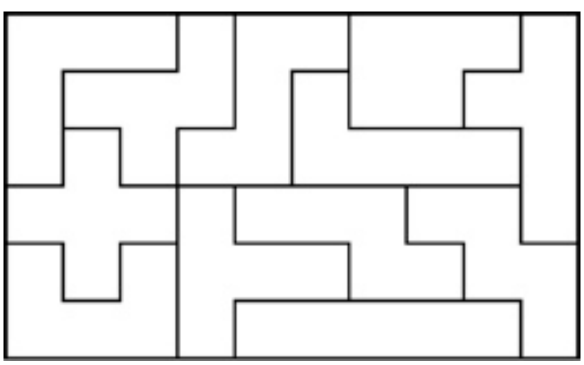
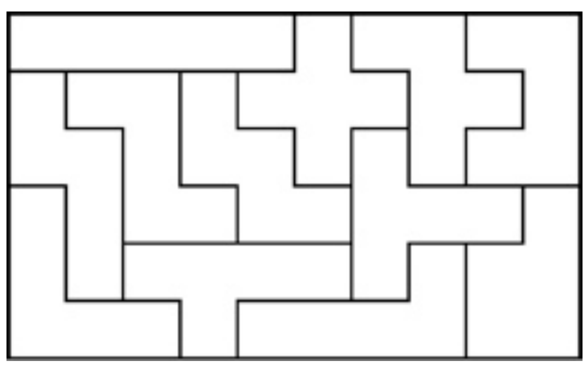
A piece is *landlocked* if it does not touch one of the borders of the rectangle. Eric Harshbarger has determined that there are no 6x10 rectangle solutions with 5 or more landlocked pieces, but there can be solutions with 0, 1, 2, 3, or 4 landlocked pieces (e.g., there are 207 solutions of the 6x10 rectangle with four landlocked pieces, 1,111 with three, 864 with 2, 155 with one, and only a couple with zero).

R. M. Robinson of the University of California at Berkeley proposed the "triplication problem": Given a pentomino, use 9 of the other pentominoes to construct a scale model, 3 times as wide and 3 times as high as the given piece (all 12 are possible).

Pentominoes are traditionally flat pieces that can be arranged to form 2-dimensional patterns. However, if the pieces are made to be 1-unit thick, then fun 3-dimensional patterns can also be made, including a 3 x 4 x 5 solid, and stairs that are 6 wide by 4 deep by 4 high.

Copyright J. A. Storer

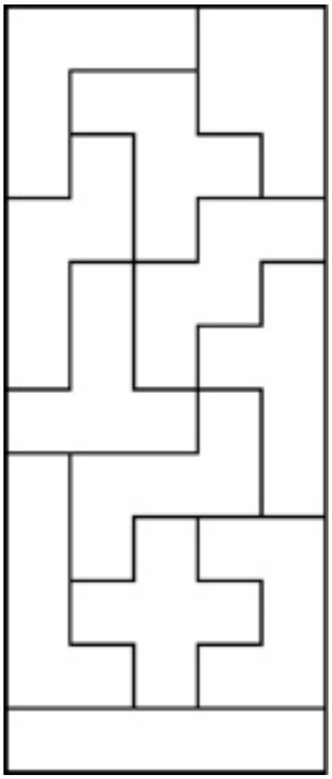
Some Other Pentominoes 6x10 Solutions

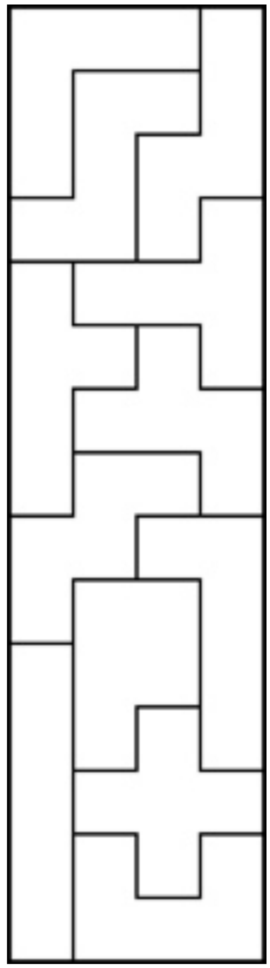









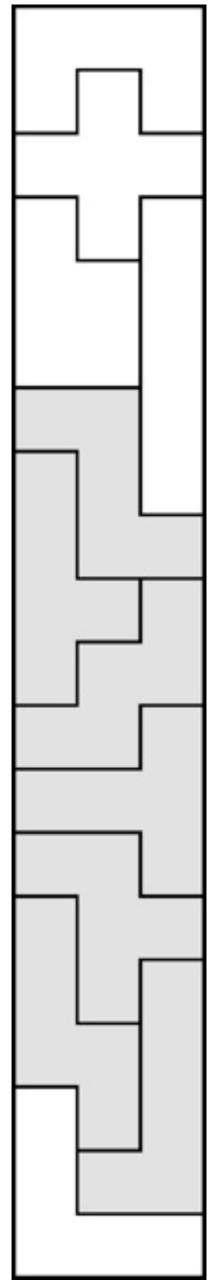
Copyright J. A. Storer

Example Pentomino Solutions That Are Not 6x10

(The shaded area of the 3x20 solution may be rotated by 180 degrees.)



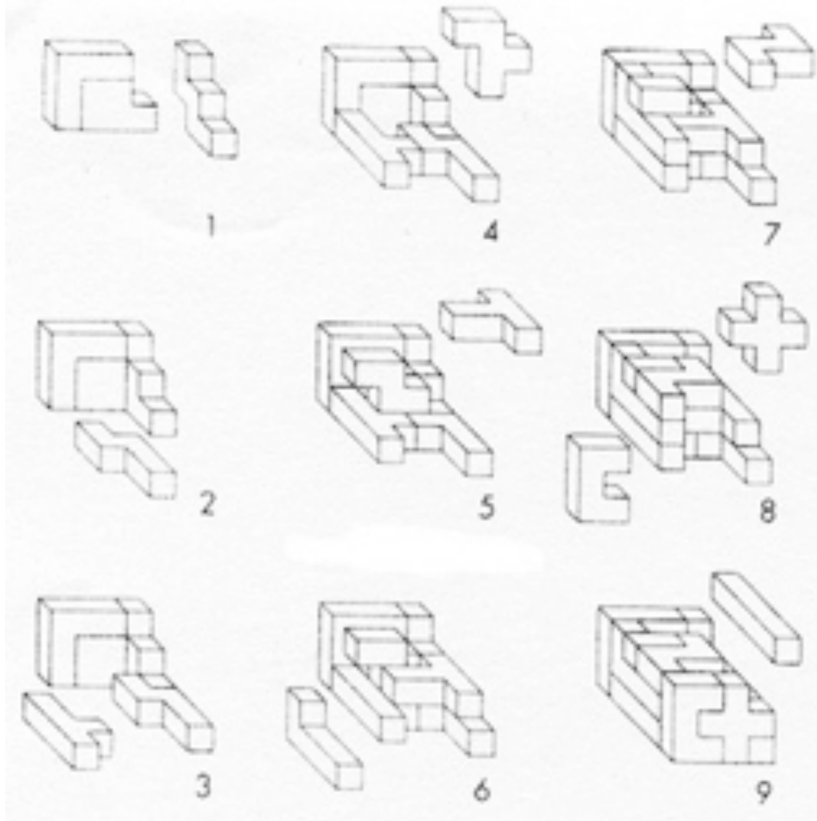




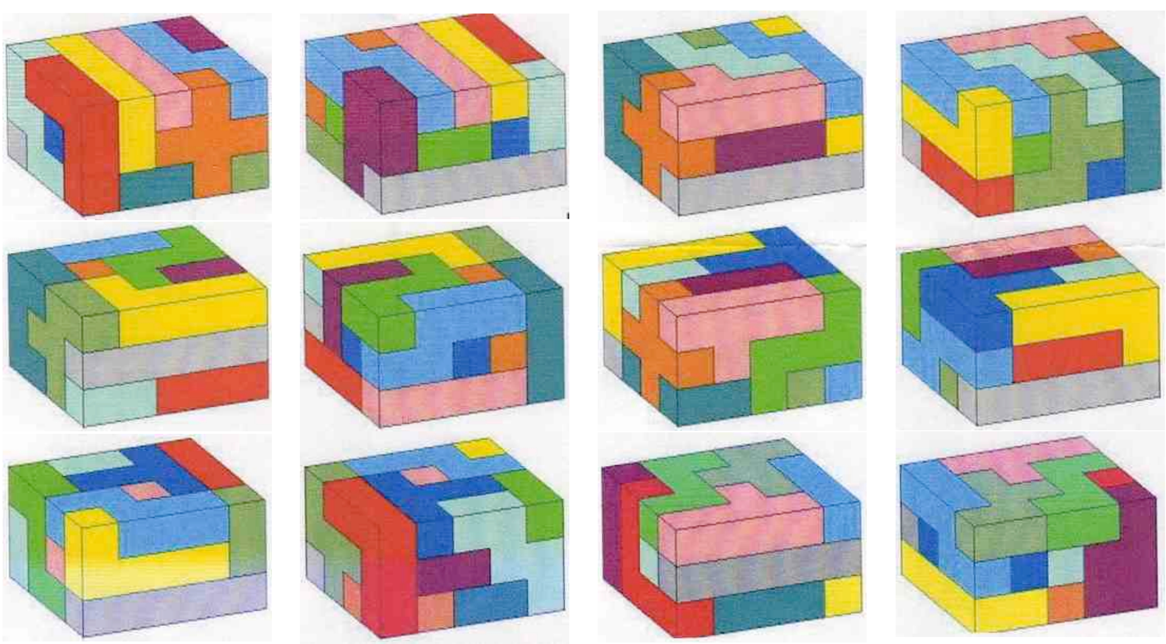
Copyright J. A. Storer

Some Pentomino 3x4x5 Solutions

From the directions sold with the *Yasumi* version:

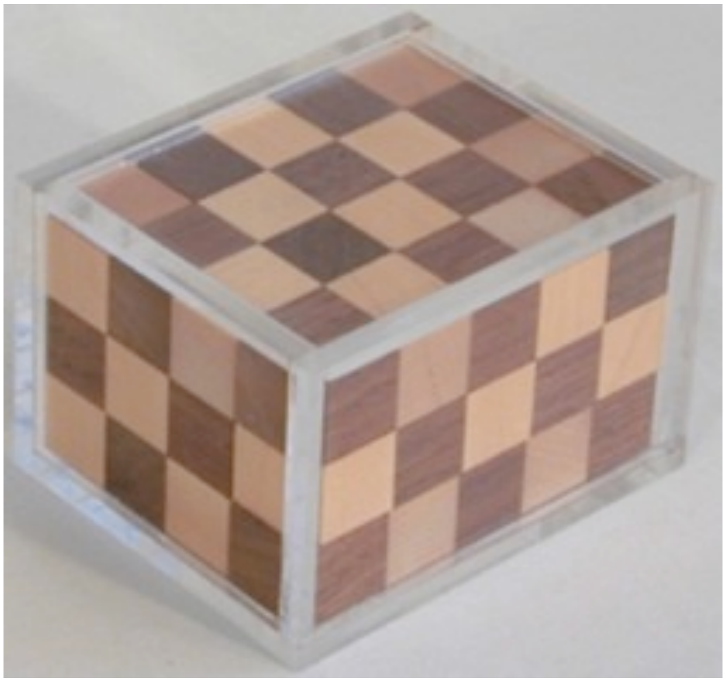


From the directions sold with the *Interlocking Puzzles* version:



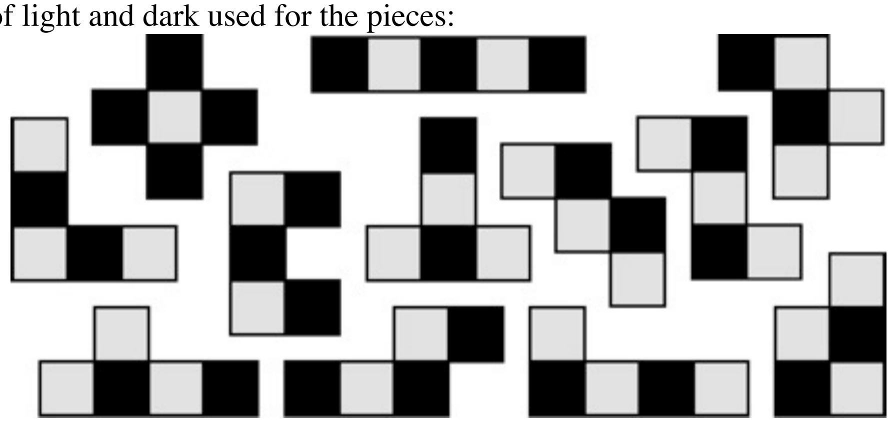
Copyright J. A. Storer

Pentomino Checkerbox:




Made By B. Cutler, 1989.
(3.25" x 4" x 2.375" clear plastic box and 12 two-color wood pieces with 3/4" cubes)

Can be used like any other pentominoes set. In addition, it is made from light and dark woods so that it can be solved in a 3x4x5 box where colors have a checkerboard pattern on all sides. Here is the patten of light and dark used for the pieces:

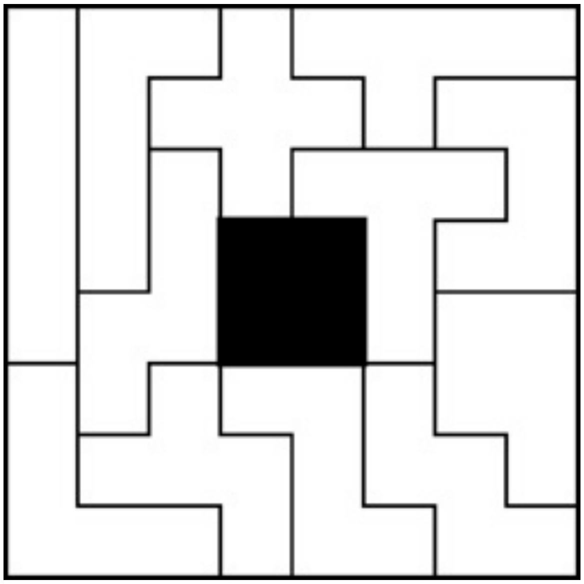


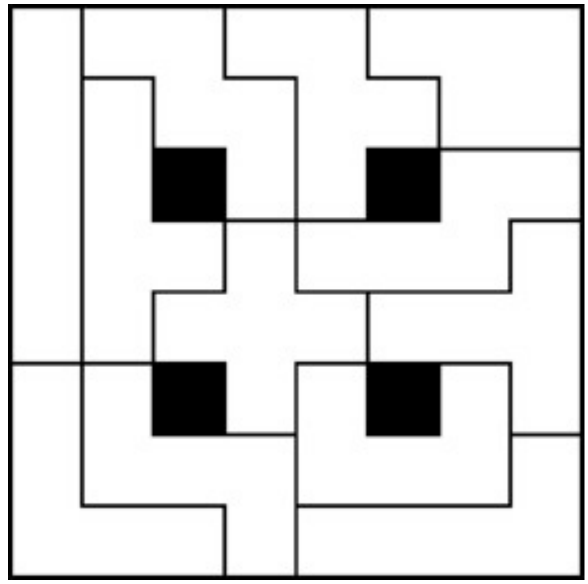
Sold with this puzzle was printout of a number of solutions. Here is the one suggested; the pieces have the names 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, and this figure shows the three planes of the checkerbox:

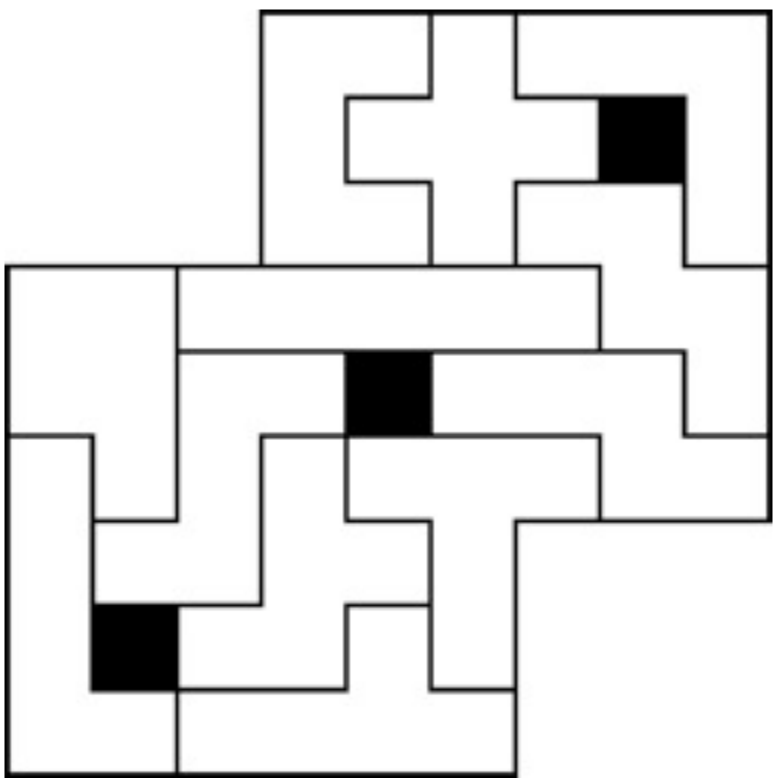
```
ABB5C  A666C  A636C
BB555  A7778  3333C
B9958  A9778  9944C
11111  22228  44428
```

Copyright J. A. Storer

Pentomino Rectangular Shapes With Holes



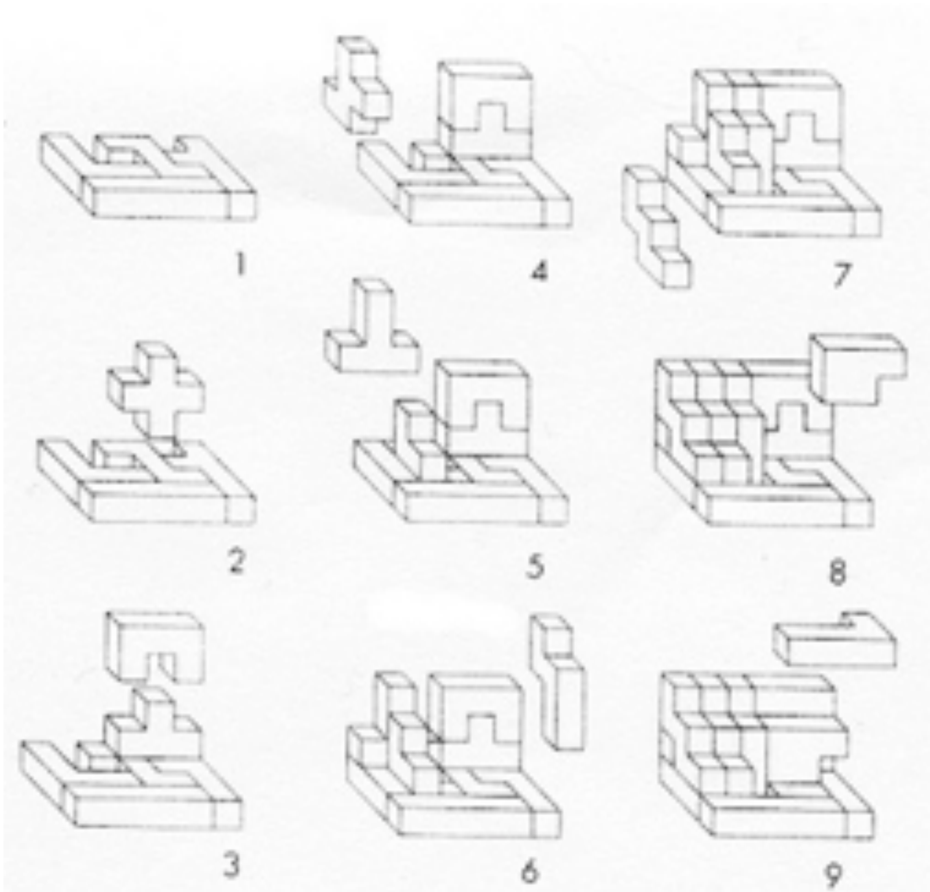




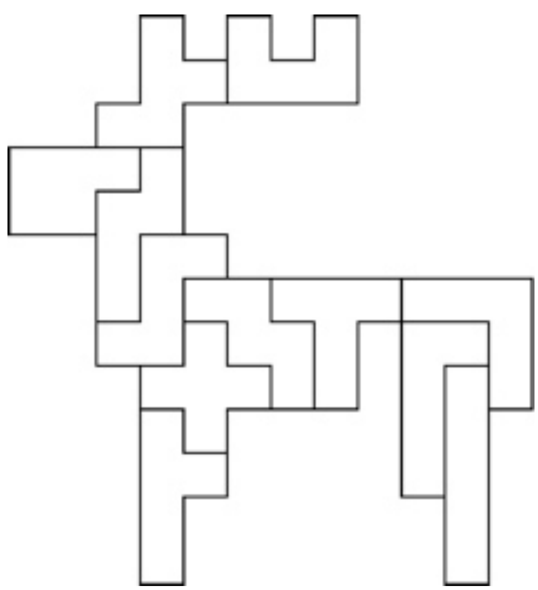
Copyright J. A. Storer

Other Fun Pentominoes Shapes

From the directions sold with the *Yasumi* version:



Shown on *Nivasch's Page*:



Copyright J. A. Storer

Further reading:

Harshbarger's page, from: http://www.ericharshbarger.org/pentominoes
Mathworld page, from: http://mathworld.wolfram.com/Pentomino.html
CIMT page, from: http://www.cimt.plymouth.ac.uk/resources/puzzles/pentoes/pentoint.htm
Gerard's page, from: http://www.xs4all.nl/~gp/pentomino.html
Huttlin's page, from: http://members.aol.com/huttlin/pentominoes.html
Nivasch's page, from: http://yucs.org/~gnivasch/pentomino
Mark's page, from: http://mathsevangelist.wordpress.com/2012/08/24/packing-pentominoes
Jankok's page, from: http://homepages.cwi.nl/~jankok/etc/Polyomino.html
Pentominos Infor. page, from: http://www.theory.csc.uvic.ca/~cos/inf/misc/PentInfo.html
Gottfriedville page, from: http://www.gottfriedville.net/puzzles/colorgame/solutions.htm
Belgium Pentominoe page, from: http://home.scarlet.be/~demeod/indexe.html
Puzzle Will Be Played page, from: http://www.asahi-net.or.jp/~rh5k-isn/Puzzle
Bhat & Fletcher article, from: http://www.andrews.edu/~calkins/math/pentos.htm
Wikipedia page, from: http://en.wikipedia.org/wiki/Pentomino
Negahban design patent, from: www.uspto.gov - patent no. 385,311

Further reading about some related puzzles:

Lester patent, from: www.uspto.gov - patent no. 1,290,761
Wadsworth patent, from: www.uspto.gov - patent no. 3,964,749
Sakar patent, from: www.uspto.gov - patent no. 5,544,882

Copyright J. A. Storer