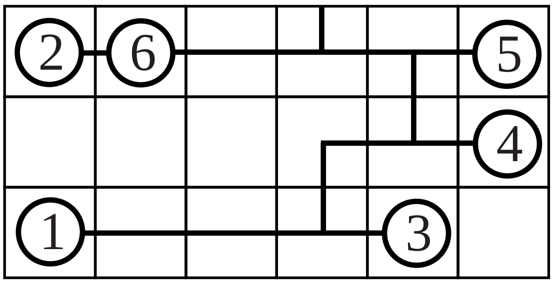
PUZZLE DESIGN TOURNAMENT 2004

PUZZLE 01

Alan O'Donnell aod@webtribe.net

Design a balanced set of scale within a rectangular area using weights 1-12, rods and strings. A scale is balanced when the torque on either side of a balance point is equal. The torque of each weight is its weight times its distance from the fulcrum. All distances must be whole units. The strings and rods have negligible weight. Minimize “Width x (Height + 2)” of your rectangular area.

Example:



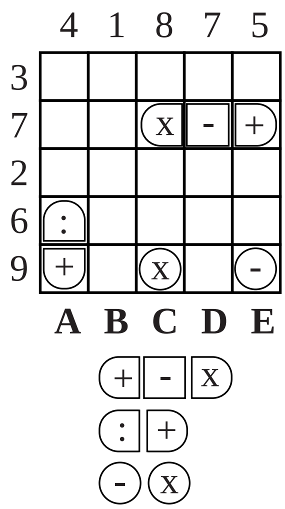
Answer key: Write your score first. Then write the contents of your balanced diagram row by row using 0 for blank spaces; using A for 10, B for 11 and C for 12. For the example, the answer key would be: 30: 260005, 000004, 100030

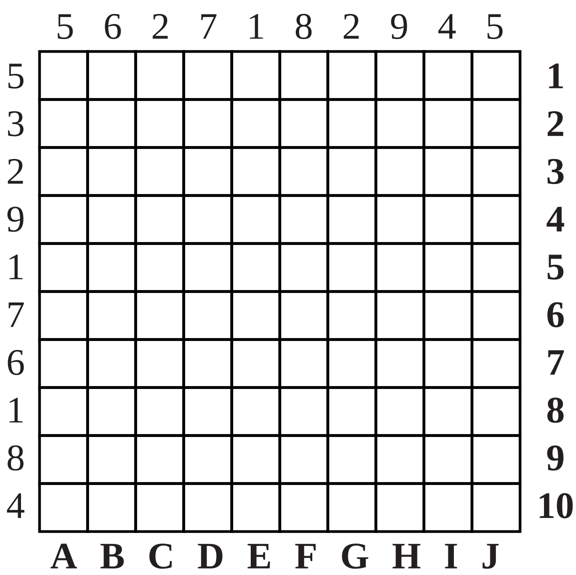
PUZZLE 02

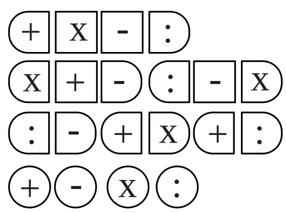
Alberto Fabris alberto.fa03@libero.it

In the 10x10 grid below, every cell corresponds to a couple of digits, one to the left of the row and one on the top of the column. Every segment of the ships represents a single operation. Locate the whole fleet into the grid and calculate every single score between the two digits and the symbol for the occupied cells. Ships can not touch each other, not even diagonally. For every operation the first number is the greater, the second is the smaller, and the result is calculated up to the second decimal digit. Maximize your total score.

Example:







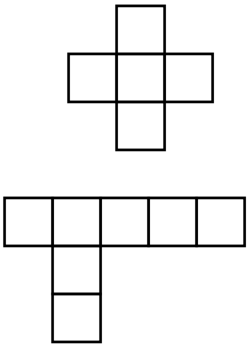
Answer key: Write your score first. Then enter the coordinates of the occupied cells together with the respective sign, row by row. For the example, the answer key would be: 158.50: C2x, D2-, E2+, A4:, A5+, C5x, E5-

PUZZLE 03

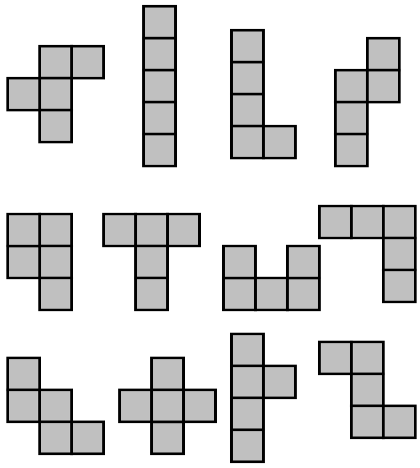
Alexandre Owen Muniz munizao@xprt.net

Find a set of polyominoes into which each one of the 35 hexominoes can be put in exactly one place. This set is called a succinct cover. The hexominoes may be rotated and/or reflected when they are placed. Minimize the total area of the polyominoes forming your cover.
To illustrate, the set of four polyominoes below is a succinct cover of the 12 pentominoes with a total area of 24.
35 hexomino shapes can be found on the errata page.

Example:



Pentominoes:



Answer key: Write your score first. Then define each one of your polyominoes giving a number to each of them and using # for a cell of the polyomino and points (".") for empty cells on the smallest rectangle they can fit. For the example, the answer key would be: 24: 1:.#.,###,.#. 2:.##,##.,##. 3: #####,.#...,.#... 4:##.#,.###

PUZZLE 04

Andreas Bolota andreas@campeuronet.com

In a game of "Four-in-a-row" two players take turns in placing 'X' (1st player) and 'O' (2nd player) in the cells of a 10x10 grid. Players can not pass or place multiple times, so it's one symbol per grid cell per turn. It's not required to completely fill in the grid. The game can stop at any time after any player has placed a symbol. It's not allowed to repeat any 3x3 cell-combination of symbols (not even rotated or mirrored). Only nonempty 3x3 areas are considered for this rule.
One point will be given for each horizontally, vertically or diagonally adjacent 4-in-a-row symbols for the respective player. Overlapping 5/6/7-in-a-row only score once, but 8/9/10-in-a-row scores twice. Final score is the number of points for the winner minus the number of points for the other player with a 10% penalty. That is "Max - (1.1 x Min)". Maximize this score.

Example:

X	X	X	X	O
X	O	O	O	O
X	X	O	.	O
X	O	X	O	O
.	X	X	X	O

The nine 3x3 combinations (all different):

X	X	X
X	O	O
X	X	O

X	X	X
O	O	O
X	O	.

X	X	O
O	O	O
O	.	O

X	O	O
X	X	O
X	O	X

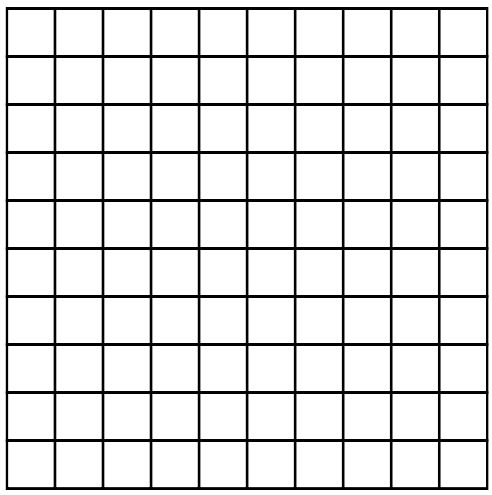
O	O	O
X	O	.
O	X	O

O	O	O
O	.	O
X	O	O

X	X	O
X	O	X
.	X	X

X	O	.
O	X	O
X	X	X

O	.	O
X	O	O
X	X	O



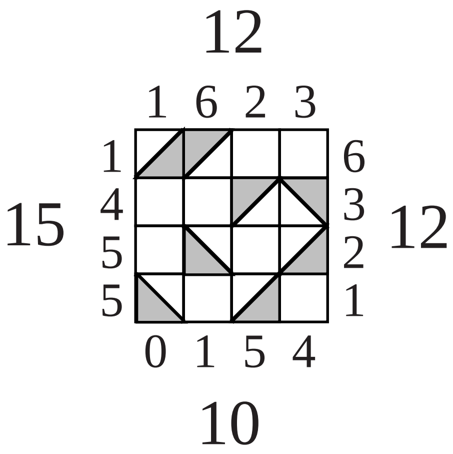
Answer key: Write your score and the points for each player first. Then write the contents of the grid row by row, using capital letters for the symbols and points (".") for empty cells. For the example, the answer key would be: 0.7, X=3, O=4: XXXXO,XOOOO,XXO.O,XOXOO,.XXXO

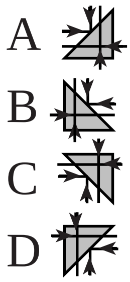
PUZZLE 05 Aziz Ates azizates@yahoo.com

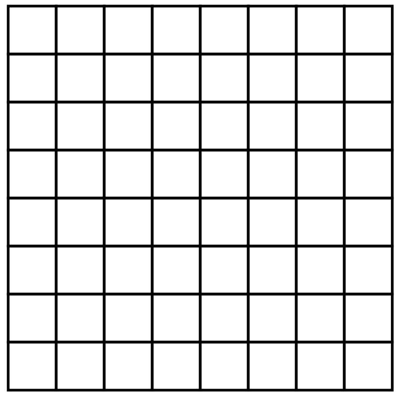
PUZZLE 05

Place 16 mirrors into the 8x8 grid so that in each row and each column there are exactly two mirrors. All mirrors have only one side reflecting. At the begining and ending of each row and column write a number representing the number of mirrors a light -entering from that side- reflects from, until it's out of the grid. Take the total of the numbers on each side of the grid individually. Take the difference of the totals of the opposite sides. Minimize the minimum of these two numbers.

Example:







Min [(12-10),(15-12)] = 2

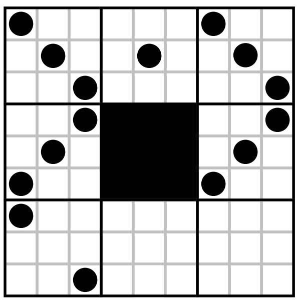
Answer key: Write your score first. Then write the contents of the grid row by row, using A, B, C, D for mirrors and points (".") for blank cells. For the example, the answer key would be: 2: AD.., ..DC, .B.A, B.A.

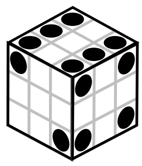
PUZZLE 06 Cihan Altay cihan@otuzoyun.com

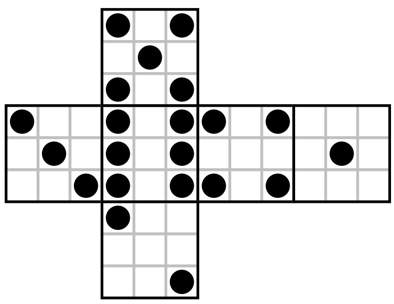
PUZZLE 06

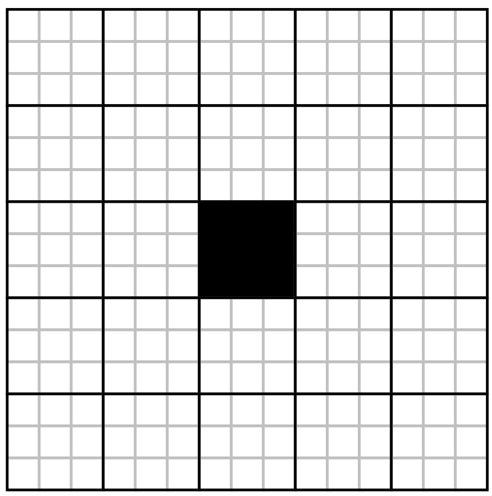
There is a dice on the center square of a 5x5 grid, number 6 facing up and number 5 facing north. On the center square -where the dice is on its number 1 face- there is ink to paint the dots. Each move consists of rolling the dice to a neighbouring square, and a move takes 1 second. Painted dots dry in 10 seconds. Roll the dice for 50 moves to maximize the black dots seen on the grid when you're finished.

Example (of 20 moves):









Start: #1 is painted
SENW: #2 is painted
NESW: #3 is painted
NE(#1 dries)SSWW
(#2 dries)NE:#1 is
painted again
NW(#3 dries)SS
Total: 15 black dots

Answer key: Write your score first. Then write your 50 moves in order, using N for north, S for south, W for west and E for east. For the example, the answer key would be: 15: SENWNESWNESSWWNENWSS

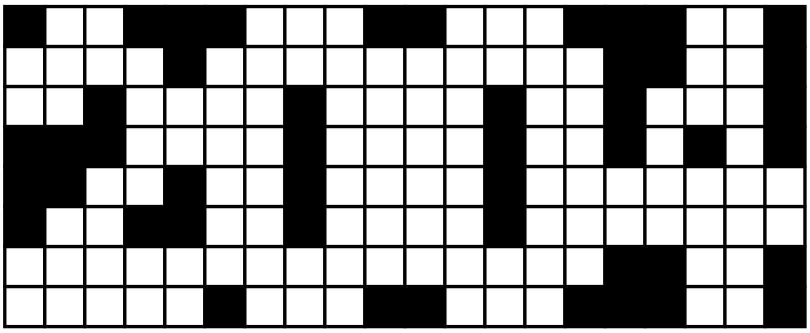
PUZZLE 07

Joseph DeVincentis devjoe@bellatlantic.net

Choose a polyomino containing no more than 10 squares. Place copies of the polyomino into the grid. They can not overlap and can not cover the black cells. You can rotate and/or reflect the polyomino. Maximize the product of "(The area of one polyomino) x (The perimeter of one polyomino) x (The number of polyominoes used)". If there is a hole in your polyomino, perimeter of the hole counts towards the perimeter of the polyomino.

Example:

If you chose the domino and fit 50 of them into the grid, your score would be 2x6x50=600.



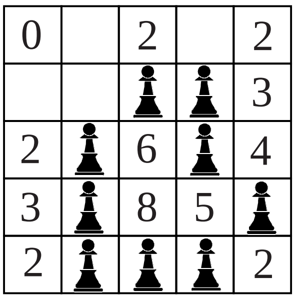
Answer key: Write your score first. Then enter the contents of the grid row by row using a different letter (CAPITAL or lower case) for each copy of your polyomino and # for holes and uncovered sections of the grid. For the example, the answer key would be: 600: #AA###BBC##DDE###FF#, GGHH#IJJCKKLLEM###N#, ...

PUZZLE 08

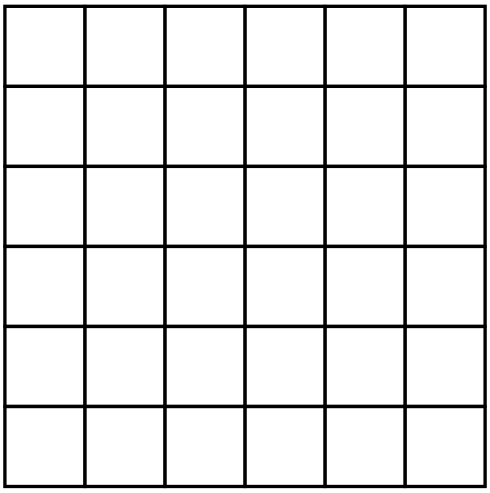
Ken Duisenberg kduis@yahoo.com

Into each square of a 6x6 grid, place a pawn, a digit from 0 to 8, or nothing (leaving it blank). Each digit represents the number of pawns which can be attacked by a chess queen from that square. Identical digits can not be on neighboring squares, not even diagonally. Maximize the product of "(Sum of all digits in the grid) x (Number of different digits)".

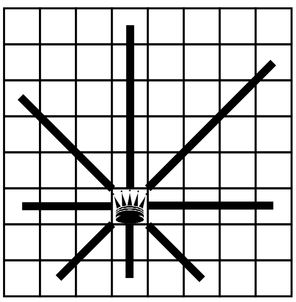
Example (using 7 different digits):



39x7 = 273 points



Chess queen:



Answer key: Write your score first. Then write the contents of the grid row by row, using "p" for pawns and points (".") for empty squares. For the example, the answer key would be: 273: 0.2.2, ..pp3, 2p6p4, 3p85p, 2ppp2

PUZZLE 09

Koksal Karakus karakusk@yahoo.com

In the diagram below we have two knights at squares d4 and e4. The numbers in the other squares show the number of diamonds in those squares. There are no diamonds in the squares d4 and e4. Each knight will make an errand consisting of eight moves in the diagram. A knight moves drawing an L-shape. When a knight moves into a square it collects all the diamonds in that square, so that the number of diamonds for that square for the rest of the time is set to 0. First the black knight will make eight moves, and then the white knight will do so. Maximize the total number of diamonds collected by both of the knights.

Example:

	a	b	c	d	e	f	g	h
8	6	1	3	8	4	8	3	9
7	1	4	1	5	9	2	6	5
6	8	4	5	1	1	9	5	2
5	4	9	6	6	10	2	8	8
4	9	10	10	♘	♞	4	7	9
3	2	2	8	5	5	1	5	1
2	2	1	10	1	5	10	7	10
1	5	10	8	2	10	8	8	7

	a	b	c	d	e	f	g	h
8	6	1	3	8	4	8	3	9
7	1	4	1	5	9	2	6	5
6	8	4	5	1	1	9	5	2
5	4	9	6	6	10	2	8	8
4	9	10	10	♘	♞	4	7	9
3	2	2	8	5	5	1	5	1
2	2	1	10	1	5	10	7	10
1	5	10	8	2	10	8	8	7

Answer key: Write your score first. Then list the squares visited by the black knight in the order they are visited. And then list the squares visited by the white knight in the order they are visited. For the example, the answer key would be: 88: f6 g4 f2 d3 b2 d1 e3 g2, c6 e7 c8 a7 b5 a3 c4 b6

PUZZLE 10

Luke Pebody ltp1000@cam.ac.uk

Black out some squares of the grid, so as to minimize the total of the numbers written on the blacked-out squares so that there is precisely one closed loop going through the remaining squares.

Example:

	A	B	C	D	E	F
a	2	7	1	8	2	8
b	1	8	2	8	4	5
c	9	0	4	5	2	3
d	5	3	6	0	2	8
e	7	4	7	1	3	4
f	3	6	2	4	3	6

Total: 34

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
a	3	1	4	1	5	9	2	6	5	3	5	8	9	7	9	3	2	3	8	4
b	6	2	6	4	3	3	8	3	2	7	9	5	0	2	8	8	4	1	9	7
c	1	6	9	3	9	9	3	7	5	1	0	5	8	2	0	9	7	4	9	4
d	4	5	9	2	3	0	7	8	1	6	4	0	6	2	8	6	2	0	8	9
e	9	8	6	2	8	0	3	4	8	2	5	3	4	2	1	1	7	0	6	7
f	9	8	2	1	4	8	0	8	6	5	1	3	2	8	2	3	0	6	6	4
g	7	0	9	3	8	4	4	6	0	9	5	5	0	5	8	2	2	3	1	7
h	2	5	3	5	9	4	0	8	1	2	8	4	8	1	1	1	7	4	5	0
i	2	8	4	1	0	2	7	0	1	9	3	8	5	2	1	1	0	5	5	5
j	9	6	4	4	6	2	2	9	4	8	9	5	4	9	3	0	3	8	1	9
k	6	4	4	2	8	8	1	0	9	7	5	6	6	5	9	3	3	4	4	6
l	1	2	8	4	7	5	6	4	8	2	3	3	7	8	6	7	8	3	1	6
m	5	2	7	1	2	0	1	9	0	9	1	4	5	6	4	8	5	6	6	9
n	2	3	4	6	0	3	4	8	6	1	0	4	5	4	3	2	6	6	4	8
o	2	1	3	3	9	3	6	0	7	2	6	0	2	4	9	1	4	1	2	7
p	3	7	2	4	5	8	7	0	0	6	6	0	6	3	1	5	5	8	8	1
q	7	4	8	8	1	5	2	0	9	2	0	9	6	2	8	2	9	2	5	4
r	0	9	1	7	1	5	3	6	4	3	6	7	8	9	2	5	9	0	3	6
s	0	0	1	1	3	3	0	5	3	0	5	4	8	8	2	0	4	6	6	5
t	2	1	3	8	4	1	4	6	9	5	1	9	4	1	5	1	1	6	0	9

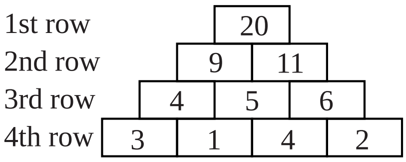
Answer key: Write your score first. Then write the coordinates of the blacked-out squares. For the example, the answer key would be: 34: Bb, Eb, Bc, Ec, Bd, Ed, Be, Ce, De, Ee

PUZZLE 11

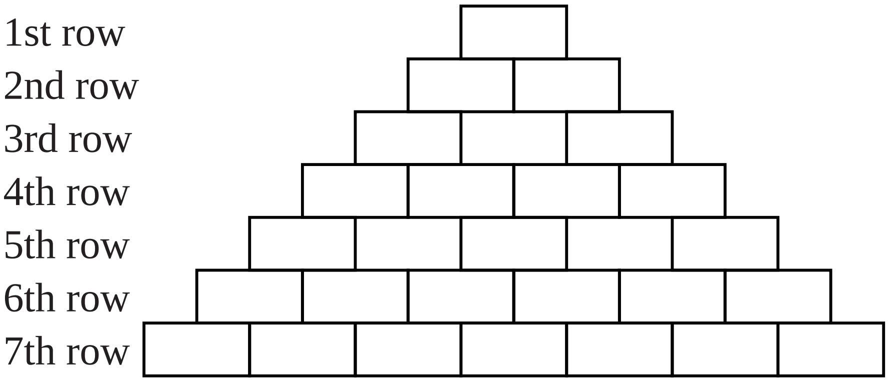
Nuri Yilmaz nbouny@yahoo.com

In the number pyramid a number in a rectangle is equal to the sum of the two rectangles under it. Place digits (0-9) into the rectangles at the bottom row. Same numbers can not be in the same row. Additionally, at the bottom row adjacent numbers can not be on adjacent rectangles. For each row after the first take the difference of the biggest number and the smallest number on that row. Your score is the number on the first row plus the total of all these differences. Maximize this score.

Example:



Score:
20 +
(11-9) +
(6-4) +
(4-1)
= 27



Answer key: Write your score first. Then write the digits at the bottom row from left to right. For the example, the answer key would be: 27: 3142

PUZZLE 12

Ronald Stewart ronaldastewart@hotmail.com

Code the 26 letters of the English alphabet using the numbers 1 through 26 once each in any order. In this code a word will be encoded by the sum of the values of each letter in that word. For example, if you choose to code the letters in alphabetical order (A=1, B=2, ..., Z=26) then FOX will be encoded as 45 (6+15+24). Encode the following phrase: QUICK BROWN FOX JUMPS OVER THE LAZY DOG, and maximize "(5xMin) - Max" where Min is the smallest number in your encoded message, and Max is the biggest number in your encoded message.

Example:

A=1, B=2, ..., Z=26

QUICK	BROWN	FOX	JUMPS	OVER	THE	LAZY	DOG
61	72	45	79	60	33	64	26

Score: (5x26) - 79 = 51

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

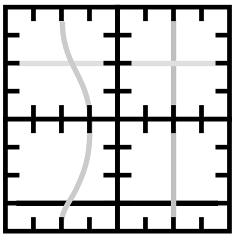
Answer key: Write your score first. Then write the numbers representing the 26 letters in order. For the example, the answer key would be: 51: 1,2,3,4,5,6,...,26

PUZZLE 13

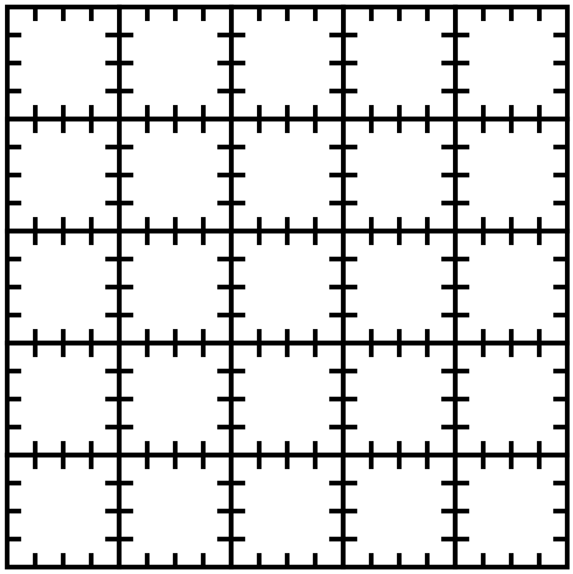
Scott Sheehan fractaled@hotmail.com

Choose 25 square tiles to place in a 5x5 grid that is on a torus (left edge wraps to the right, and top to bottom). The shapes to be chosen are defined by two lines connecting distinct sockets (There are 3 sockets per edge). There are 212 of these shapes (can be seen on the errata page). You must place the tiles so that there are no free ends. You can not use a tile (or any of its reflections or rotations) more than once. Maximize the total of "(Number of loops) + (Sum of the number of distinct loops that each loop intersects)".

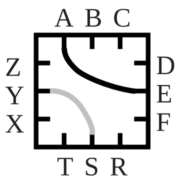
Example:



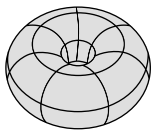
There are 4 loops. Each loop intersects 2 other loops.
Score: 4 + (2+2+2+2) = 12



A square tile:



Torus shape:



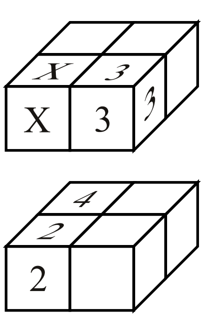
Answer key: Write your score first. Describe each tile by the 4 letters that define the two lines in order (For the example tile above: AE-SY. Then write the tiles you used row by row. For the example, the answer key would be: 12: BR-EY, BS-EY, CS-FX, BS-FX

PUZZLE 14

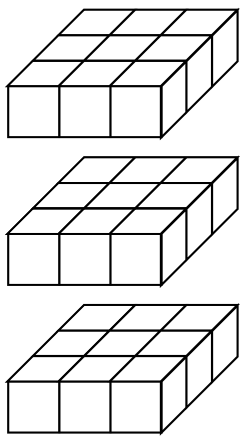
Tigin Kaptanoglu mu_zok@yahoo.com

You have a 3x3x3 cube consisting of 27 small cubes. Place numbers into some of these small cubes by starting from any one of them and continuing in a non-decreasing order, that is each new number must be greater than or equal to the previous number. You can not use the same number more than three times. Each number will indicate the length of a path from itself to the next number you'll place. A path can be drawn by going from one cube to an adjacent cube (Two cubes are adjacent only if they share a face). The path doesn't have to be the shortest way between the two cubes. A path can not cross itself. When you place a number in a cube you can not pass through it later. Place X into the last cube you've reached. There are a total of 9 "layer"s in a 3x3x3 cube, each is a 3x3 square. None of these nine layers are allowed to be totally occupied after you're finished. Maximize the product of the numbers you've placed.

Example:



Score: 2x3x4=24



Answer key: Write your score first. Then write the contents of the square layers row by row and in order. For the example, the answer key would be: 24: 00X3, 4020

www.otuzoyun.com/puzzledesign
Errata page: www.otuzoyun.com/puzzledesign/errata2004.html