

PQRST 04 PUZZLE COMPETITION

PUZZLE 1 (10 points penalty for a wrong answer) 35 points

Always Balanced

The balance below has two supporting points. Put the weights from 1 gram to 10 grams into the baskets once at a time in increasing order, so that the balance is always at equilibrium. Difference of the neighbouring weights must at least be 4 grams. The system is not balanced if the total momentum of the free end of a support is more than the other end. You may neglect the mass of the beam.

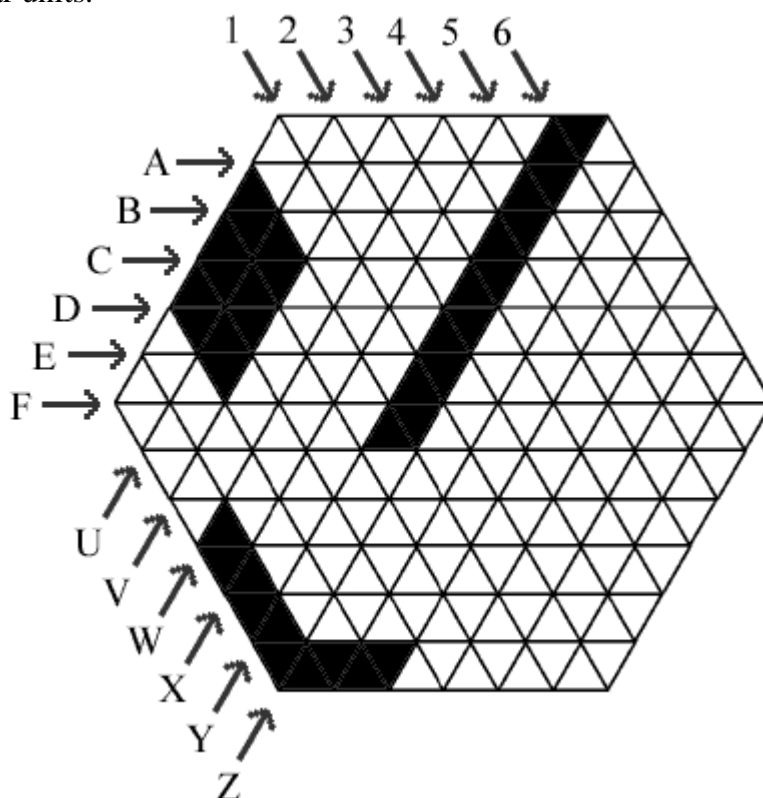


Answer key: Enter the ten weights at the final position in order from left to right.

PUZZLE 2 (10 points penalty for a wrong answer) 50 points

Hex Pie

Below is the diagram of a hexagonal pie with some parts, represented by black areas, taken out. Make three cuts, one from each side with arrows, so that there occur two groups of pieces, each having the same number of pieces, and all pieces of a group having the same area in triangular units.



Answer key: Enter the identifications of the three cuts you made, in the 1AU form.

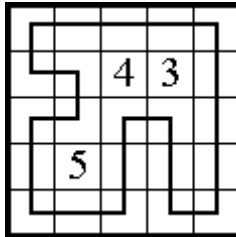
PUZZLE 3 (20+20 points penalty)

60+60 points

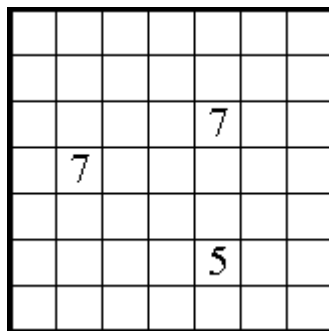
Looper

Connect all of the empty squares to form a loop. The loop cannot proceed diagonally, and cannot cross over itself. Numbers tell the number of turns in the vertical, horizontal and diagonal neighbouring squares.

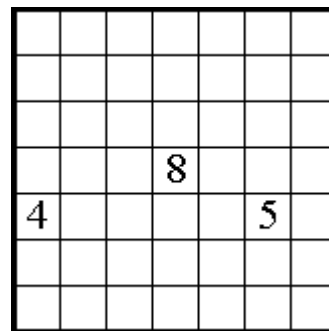
Example:



A.



B.



Answer key: Enter the number of total turns for each puzzle, in the A: 20, B: 20 form. There are 12 turns in the example.

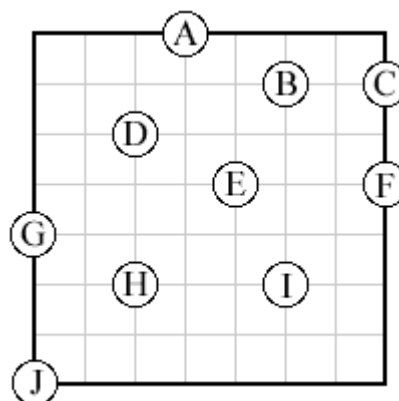
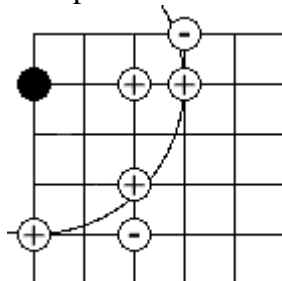
PUZZLE 4

80 points

Suspects

There are ten people in the grid represented by circles. Five of them are police officers and five of them are suspects. Identify the five police officers so that each suspect is watched by **exactly** two police officers. A police officer can watch a circular region with a 3-unit radius. In the example, the police officer, represented by a black circle, can watch the circles with a + sign, but can not watch the circles with a – sign.

Example:



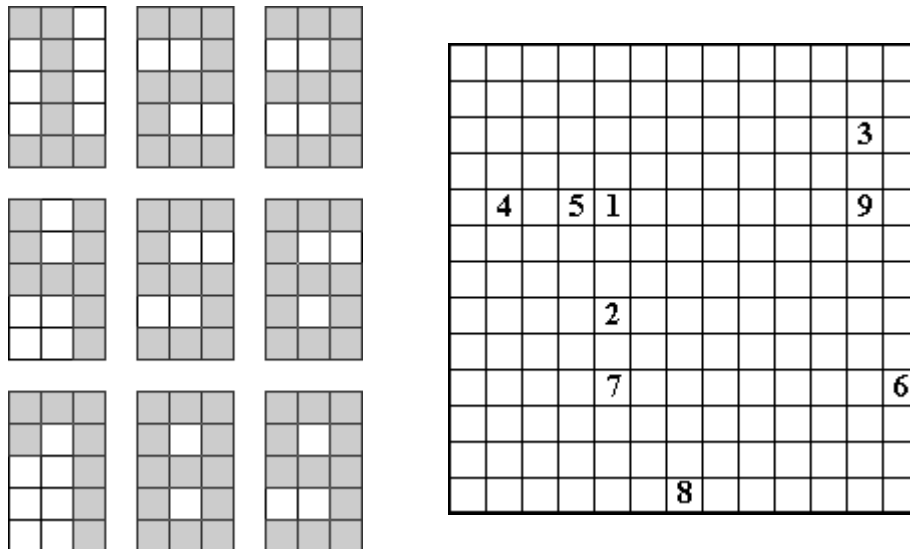
Answer key: Enter the letters representing the five police officers.

PUZZLE 5

70 points

Digitile

Locate the figures of the nine digits into the grid without overlapping each other. You can rotate the figures, but cannot reflect them. Each figure must contain its representing digit in the grid.



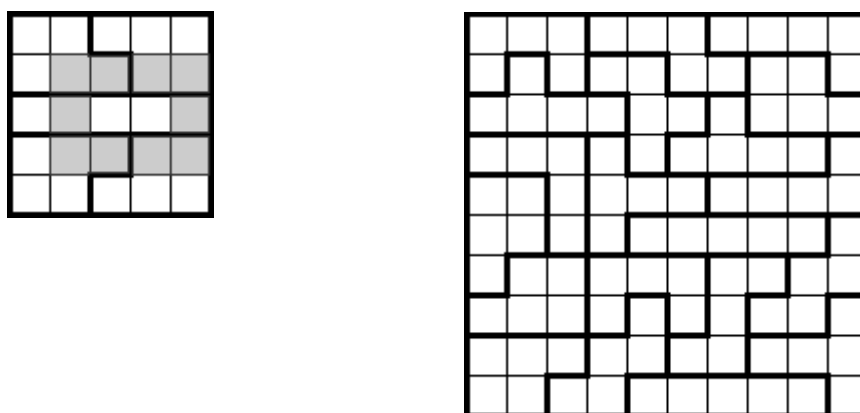
Answer key: Enter the 13 digits representing the squares of the south-west north-east diagonal of the grid from lower-left to upper-right. Use 0 for blank squares.

PUZZLE 6 (15 points penalty for a wrong answer) 70 points

Pentomino Path

Make a grey loop travelling the horizontal and vertical neighbours, so that there are exactly two grey squares in each pentomino. The loop never touches itself, not even diagonally.

Example:



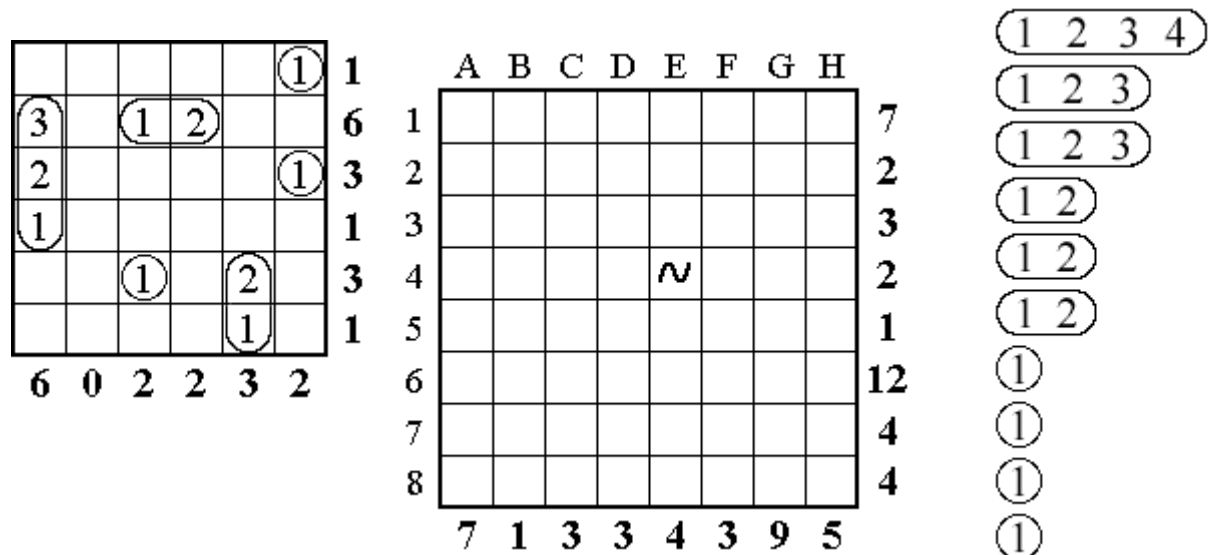
Answer key: Enter the identification of the 10 squares on the south-west north-east diagonal of the grid from lower-left to upper-right. Use 1 for grey squares and 0 for blank ones. For the example, the answer key would be 01010.

Ordered Battleships

90 points

In this Battleships variation, each ship's segments have ordered values according to the length of the ship. Locate the 10-ship fleet into the grid. Ships do not touch each other, not even diagonally. Numbers on the right and bottom of the grid reveal the sum of the values in each of the ship segments that appear in each respective row or column.

Example:

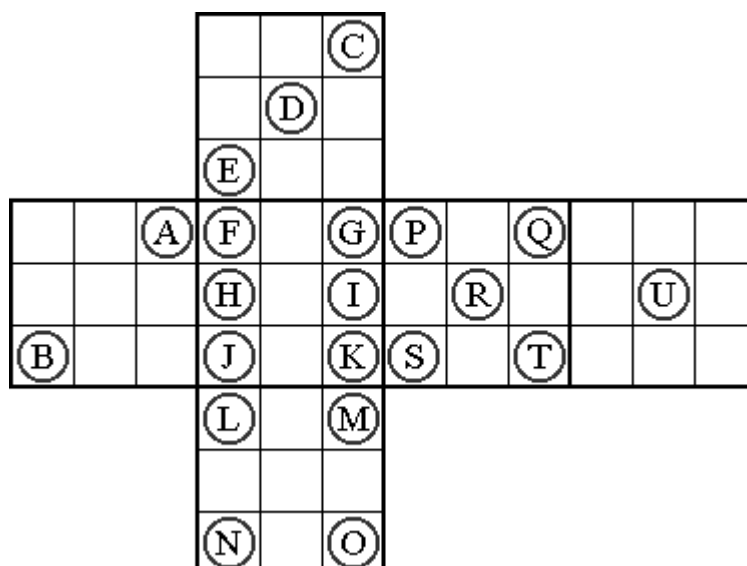


Answer key: Enter the coordinates of the four 1-unit submarines in the A1-H8 form.

PUZZLE 8 (20 points penalty for a wrong answer) 105 points

On the Dice

A dice is a cube with different number of dots (1-6) on its six faces, and dot numbers on opposite faces add up to 7. Below is the open configuration of a dice to help you. Start with dot 'A' and visit all of the 21 dots exactly once, travelling horizontally and vertically. You must keep your direction until you come across a dot. And you must turn left or right when you are on a dot. You can cross your path anytime. For example, AENBTO is a legal start.



Answer key: Enter the letters of the dots in order you visit them, starting with A.

PUZZLE 9

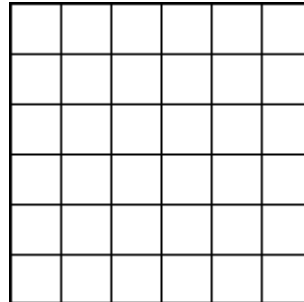
(8 x Evens) + (7 x odds) points

Odd Event

Locate digits bigger than 0 into the 6x6 grid below so that each even digit tells the number of odd digits in the neighbouring squares and each odd digit tells the number of even digits in the neighbouring squares. Two squares are neighbours if they share an edge or a corner.

Example:

2	1			1
	3			2
2		2		1
1		1		



Answer key: Enter your total score first. Then enter the content of the grid row by row, using X for blank squares. For the example, the answer key would be; 74: 21XX1, X3XX2, 2X2X1, 1X1XX.

PUZZLE 10

350 – (10 x pieces) – (4 x r. area) points

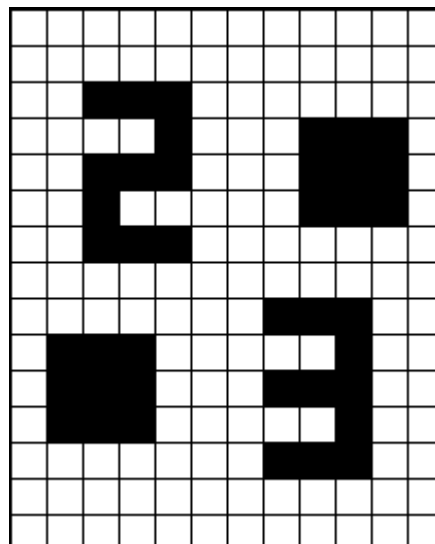
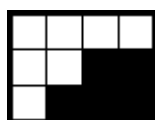
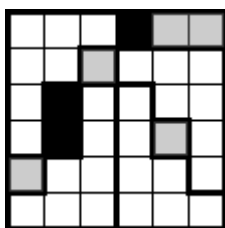
2003 Cover

Cover the grid below with 6 or more pieces of same size and shape following the grid lines. You can rotate or reflect your piece. Pieces must not overlap each other or the black squares. Ten times the number of pieces and four times the remaining area will be subtracted from 350 to make your score.

Example:

There are 4 pieces and a remaining area of 5 squares.

$$350 - (10 \times 4) - (4 \times 5) = 290 \text{ points}$$



Answer key: Enter your score and the number of pieces first. Then put your piece into the smallest rectangle and enter the contents of that rectangle row by row, using O for the squares of the piece and X for blanks. For the example, the answer key would be; 290: 4: OOOO, OOOX, OXXX.

END