Solitaire puzzles for POLYSSIMO CHALLENGE

A game by Alain Brobecker, edited by Djeco - **http://abrobecker.free.fr/**

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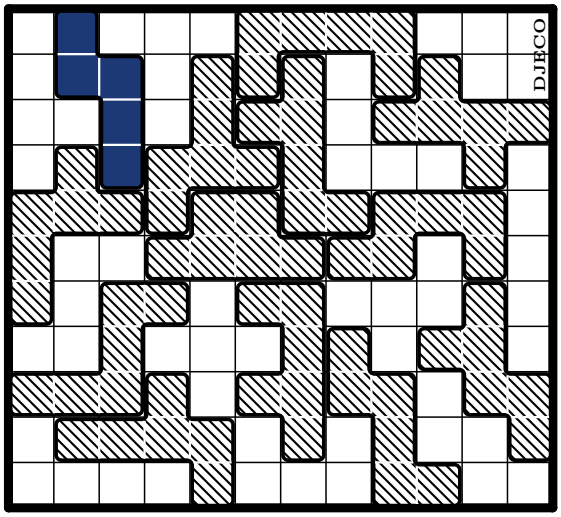
1



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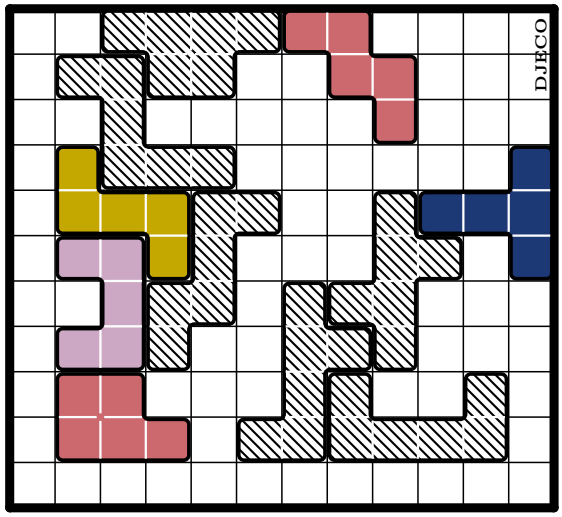

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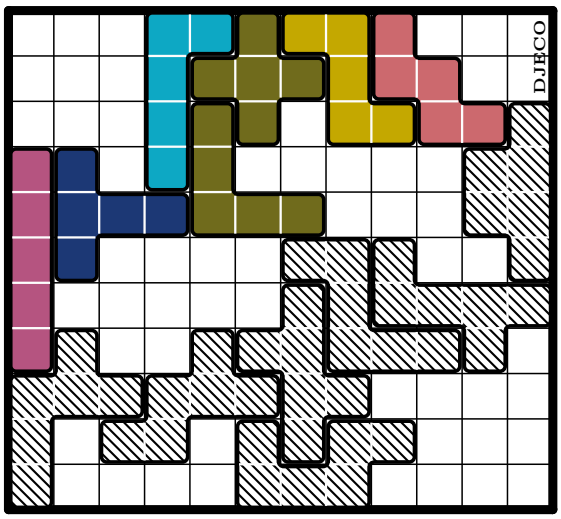

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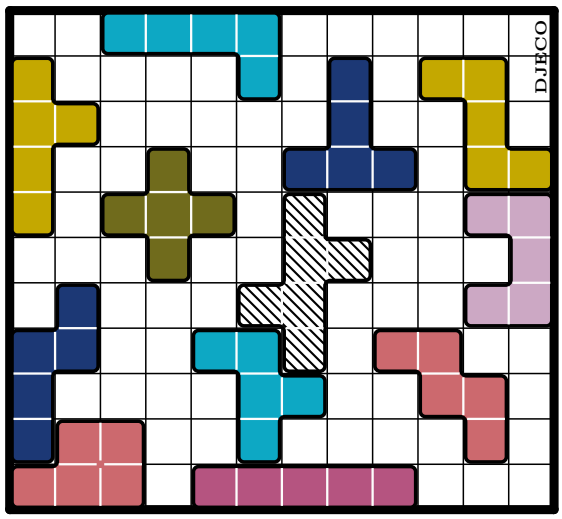

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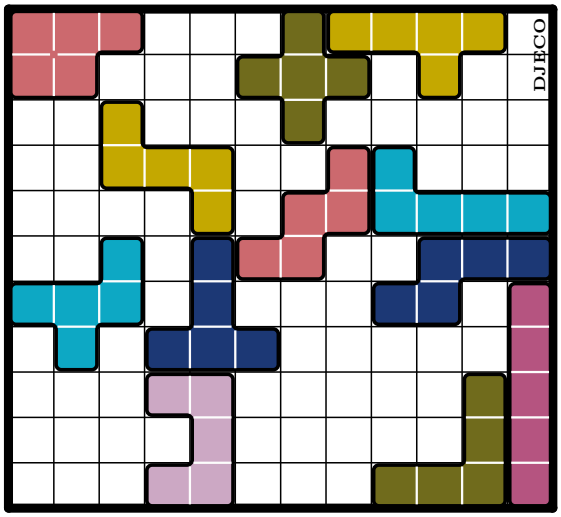

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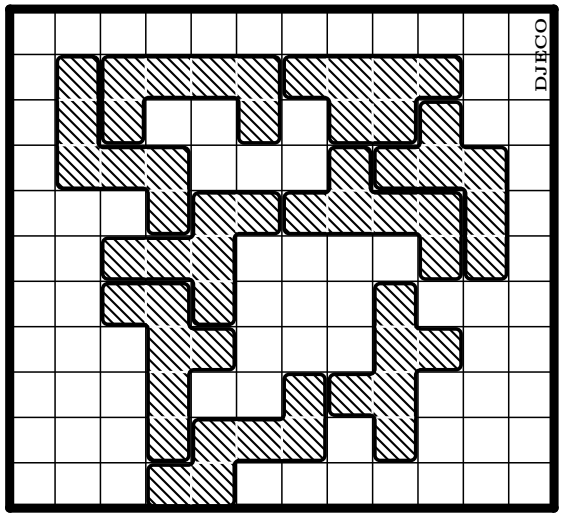

Solving hints in page 12. *Astuces de résolution en page 13.* Solutions in pages 15+.

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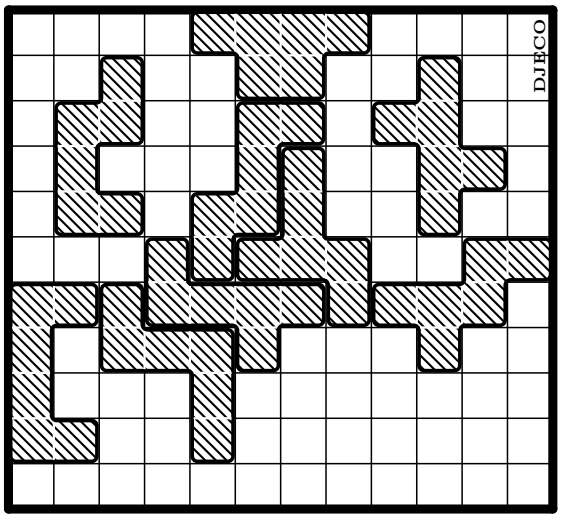

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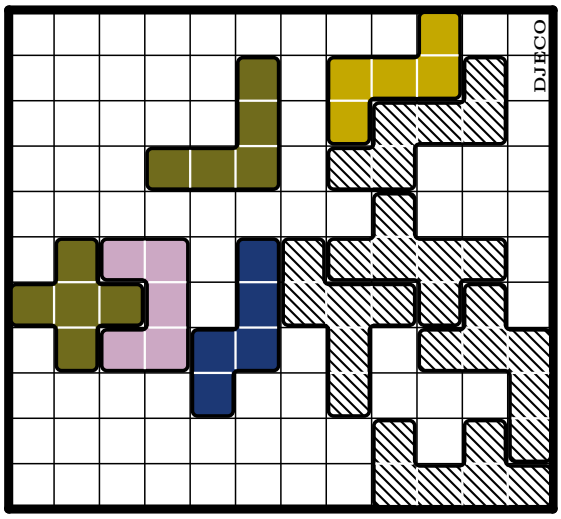

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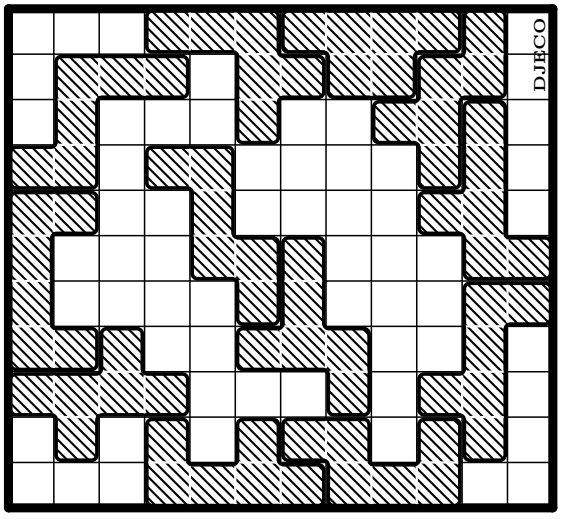

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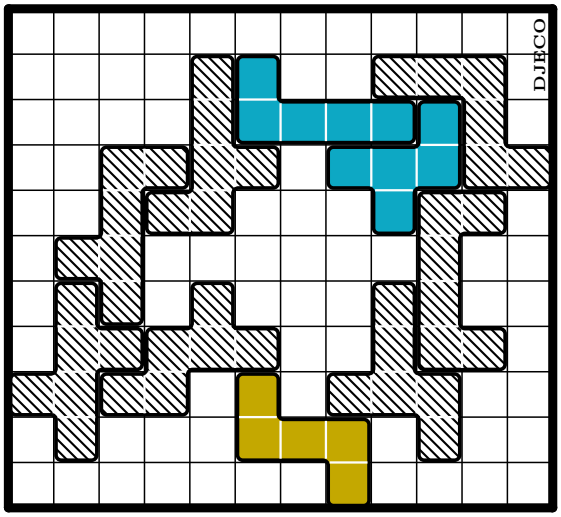

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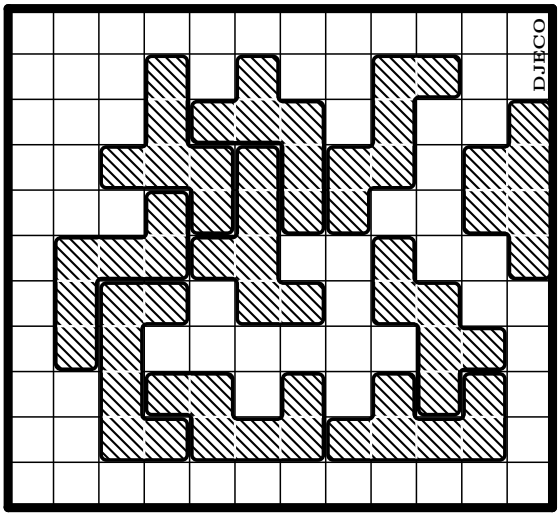

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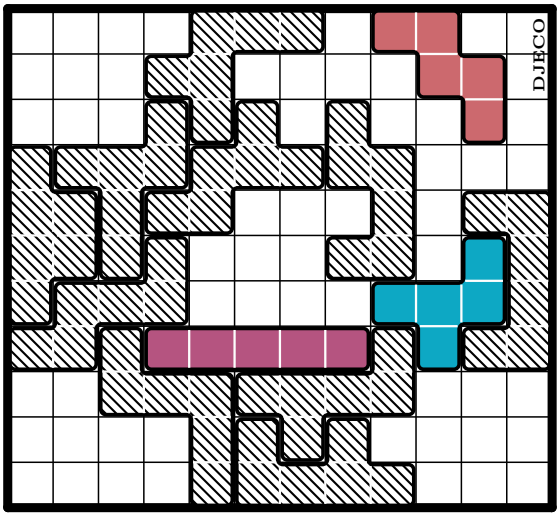

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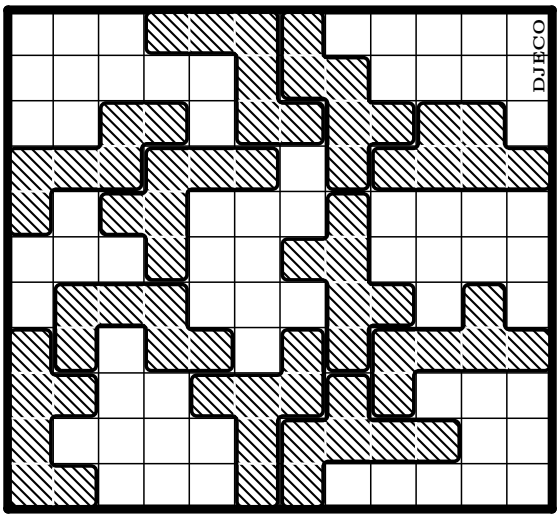
13



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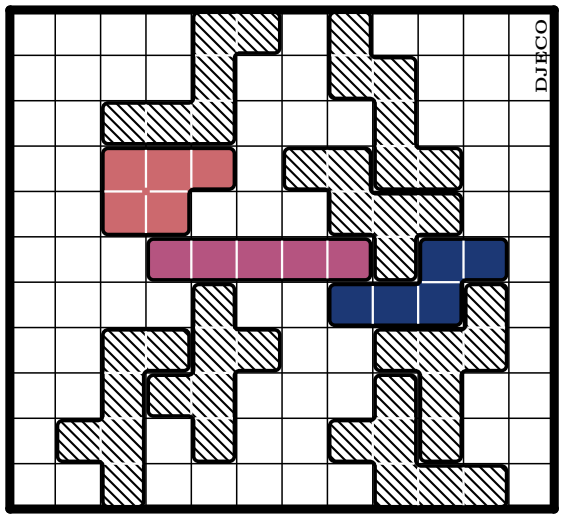

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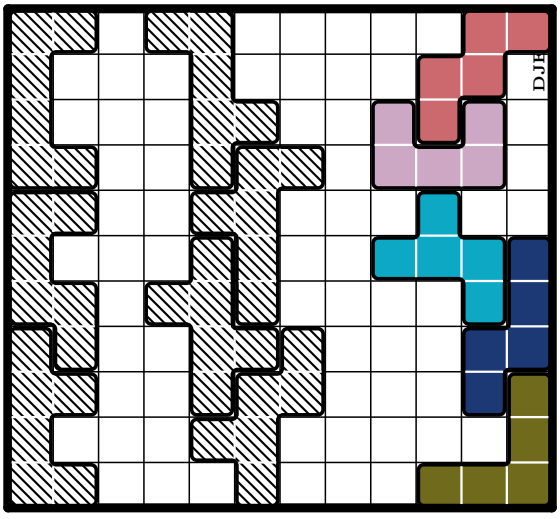

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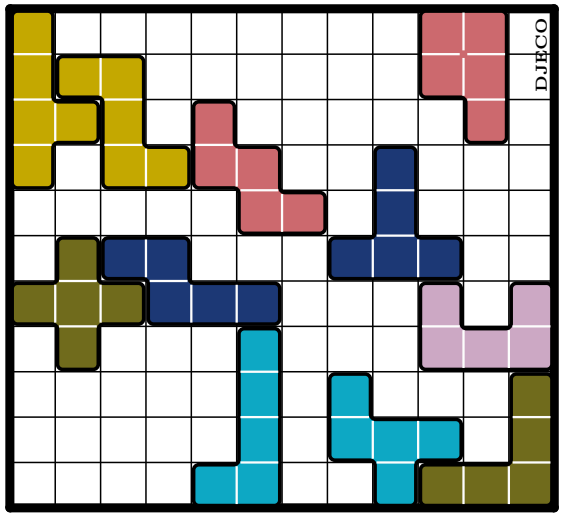

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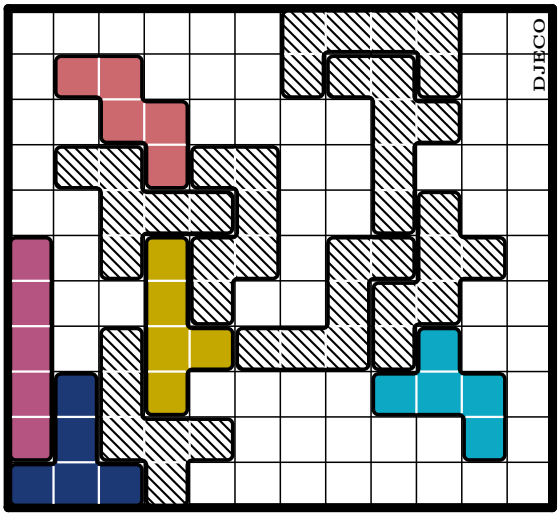

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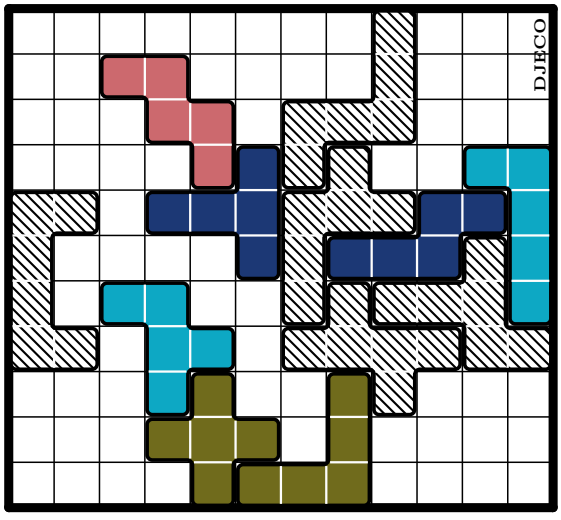

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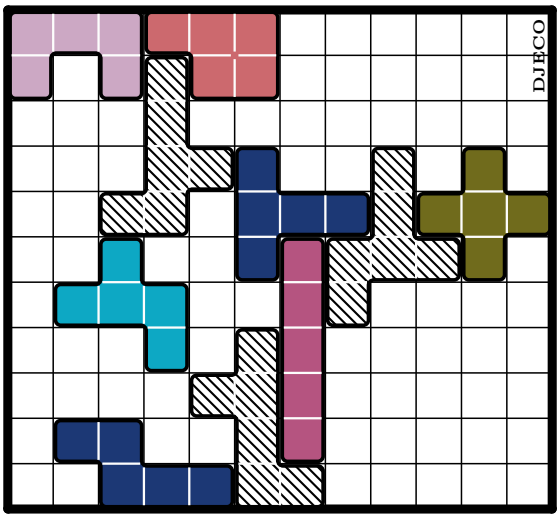
19



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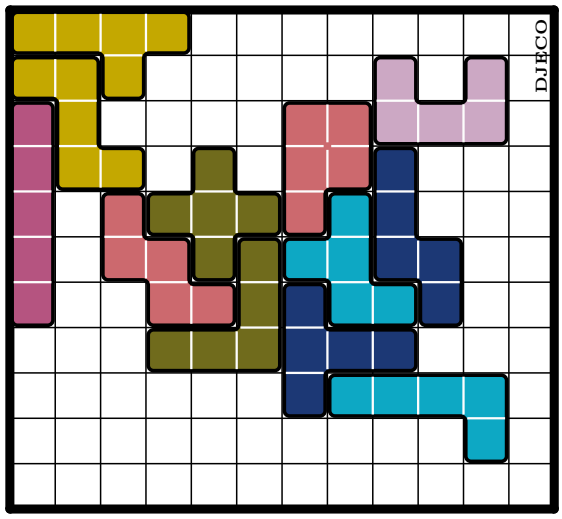

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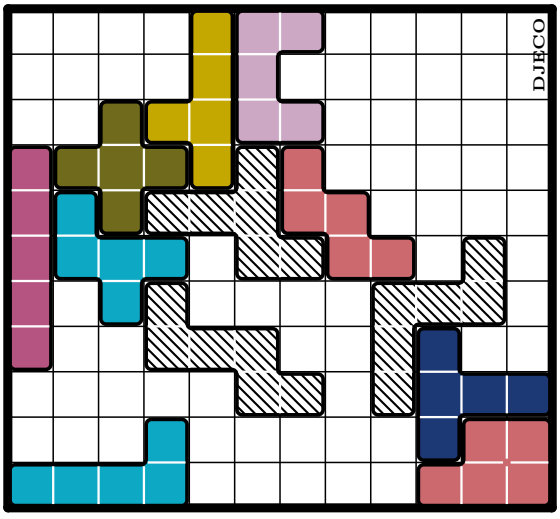

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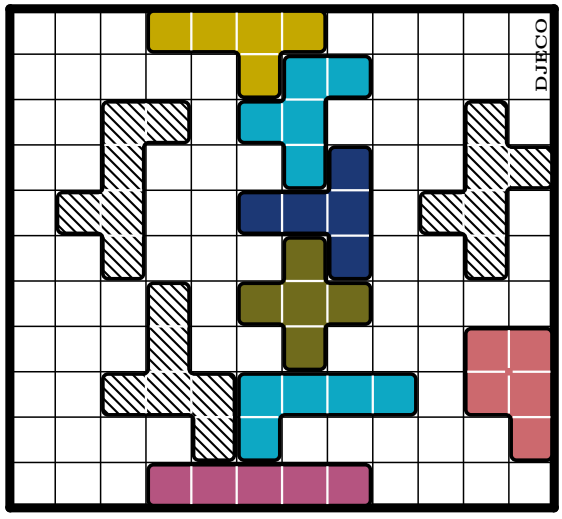

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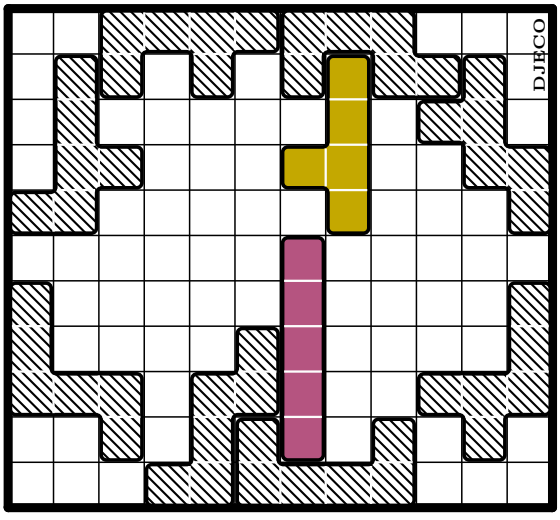

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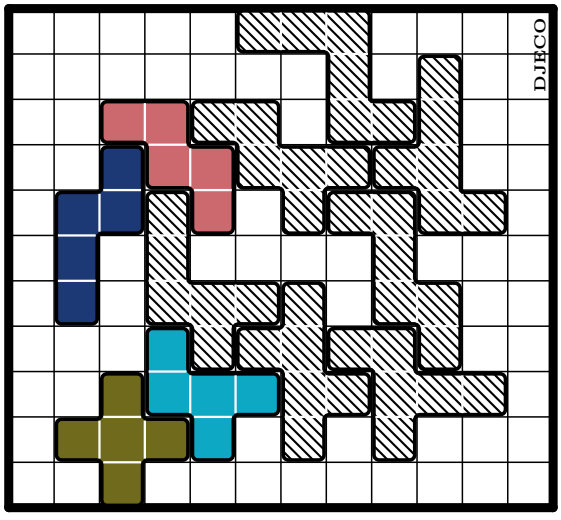

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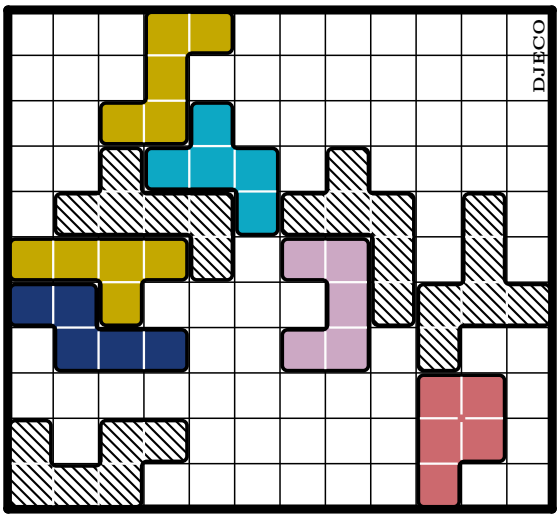
25



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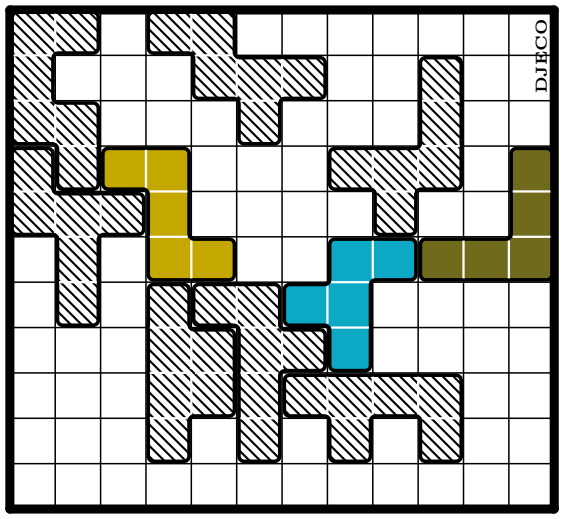

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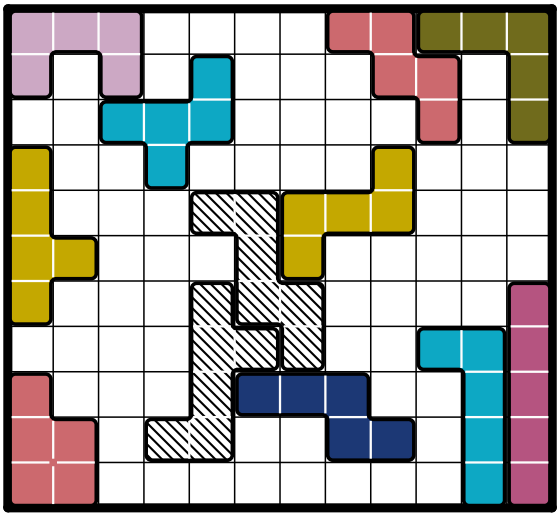

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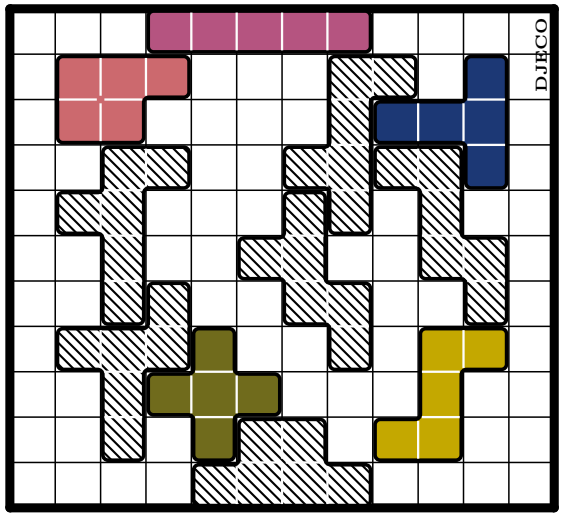

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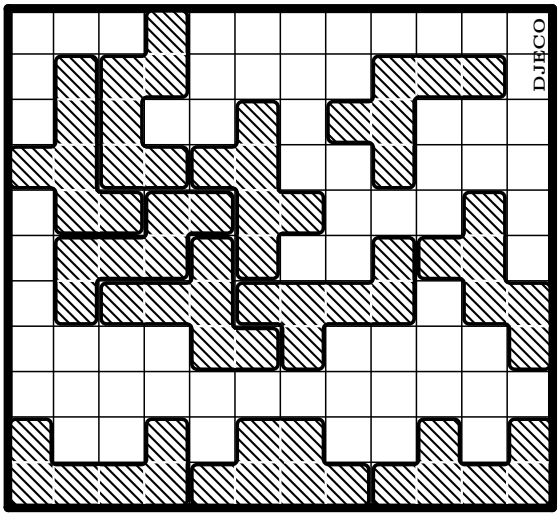

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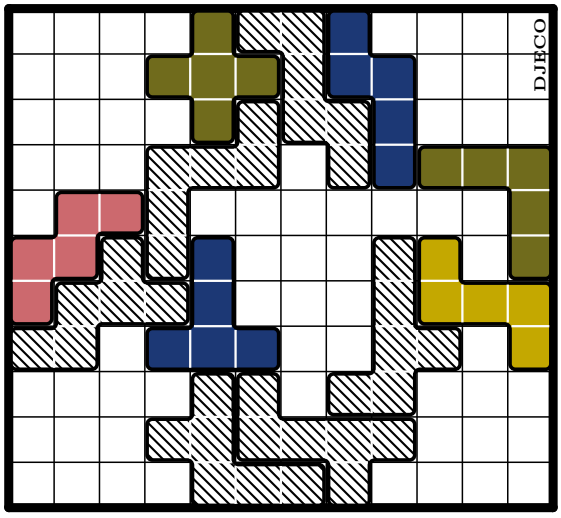

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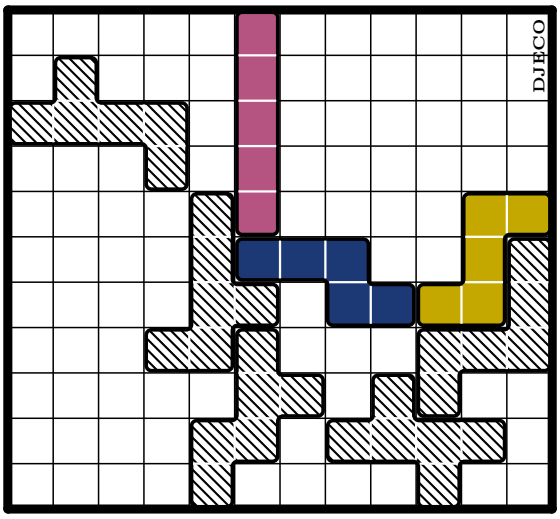

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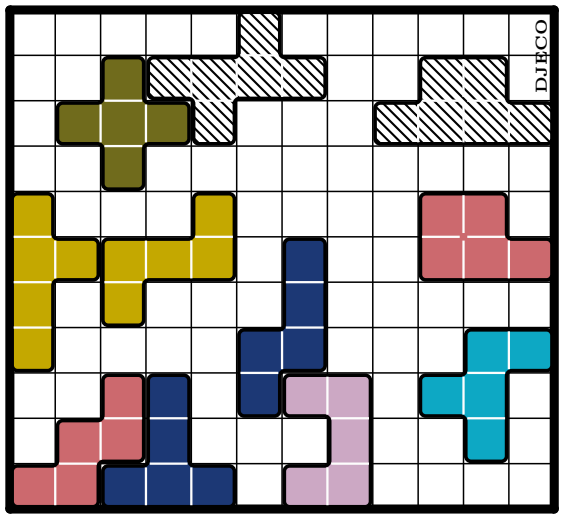

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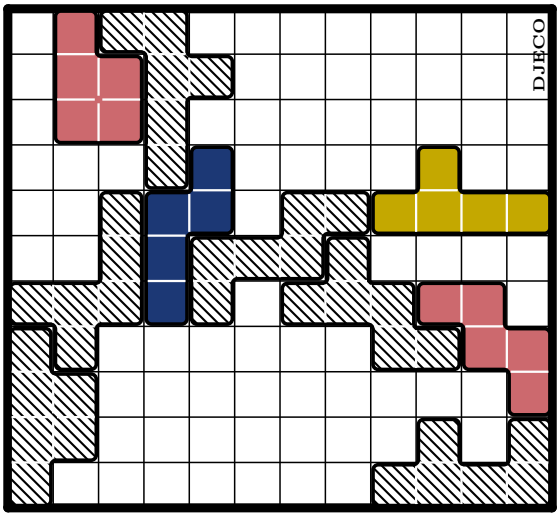

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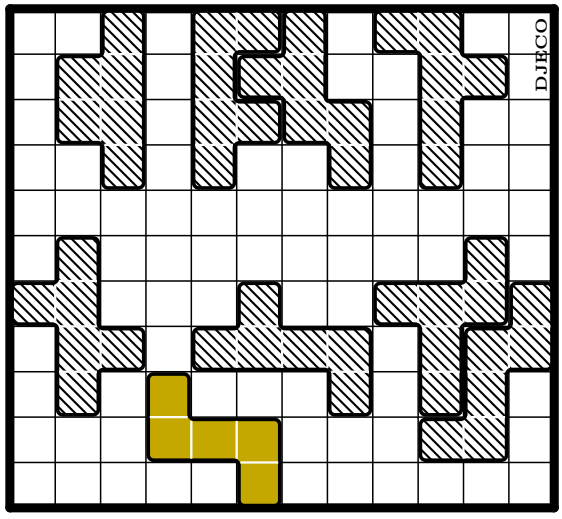

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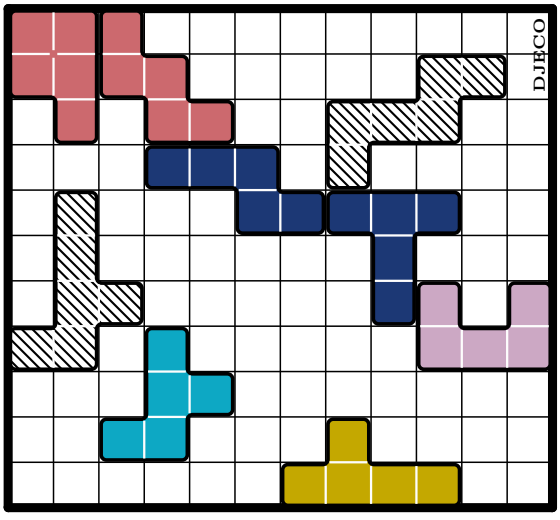

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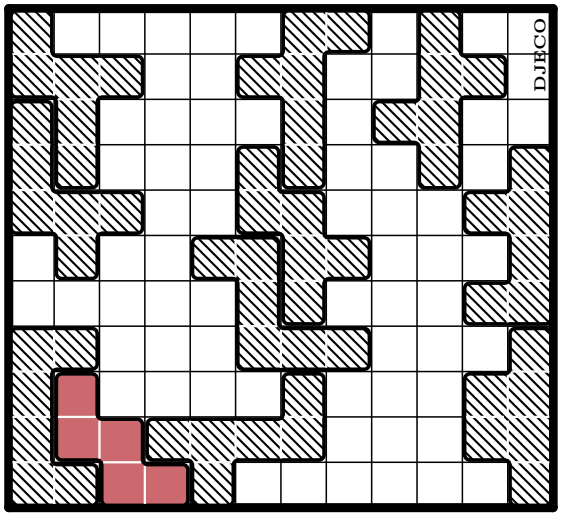

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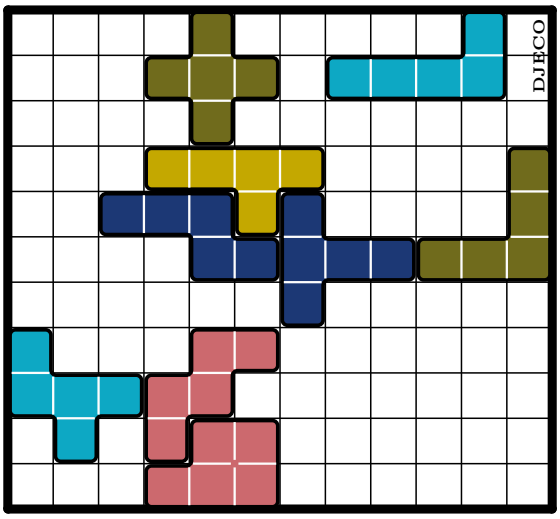

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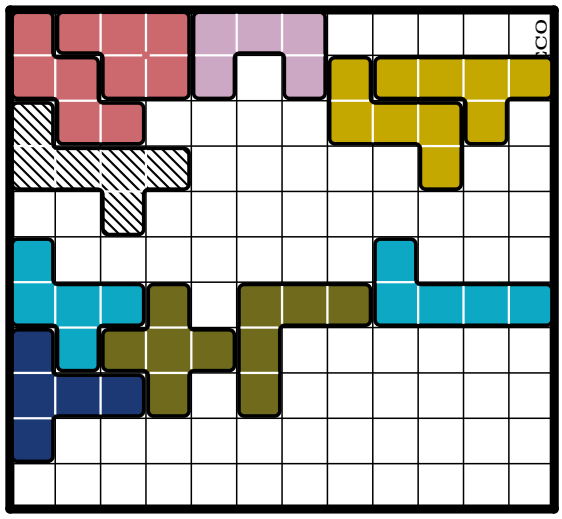

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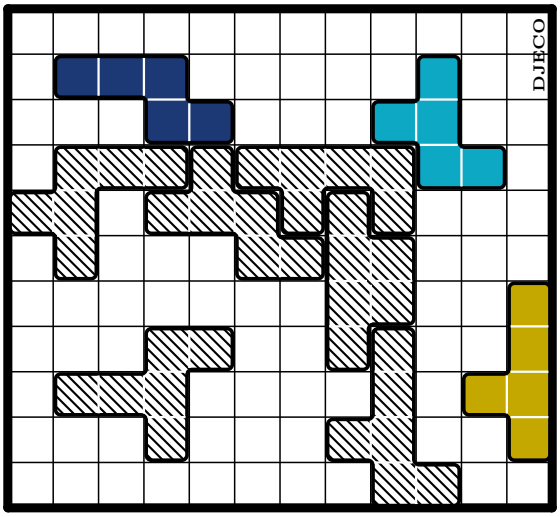

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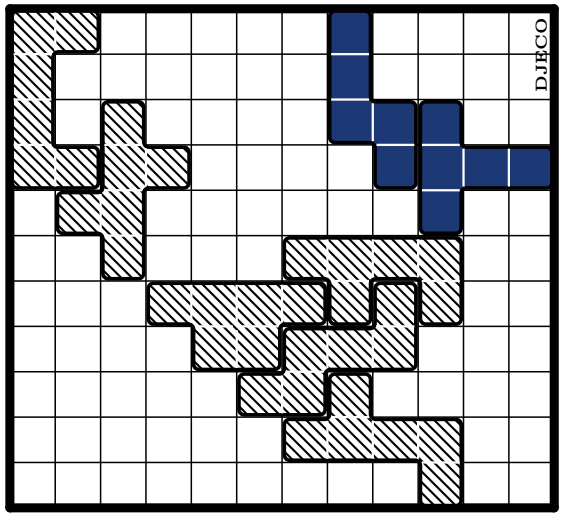

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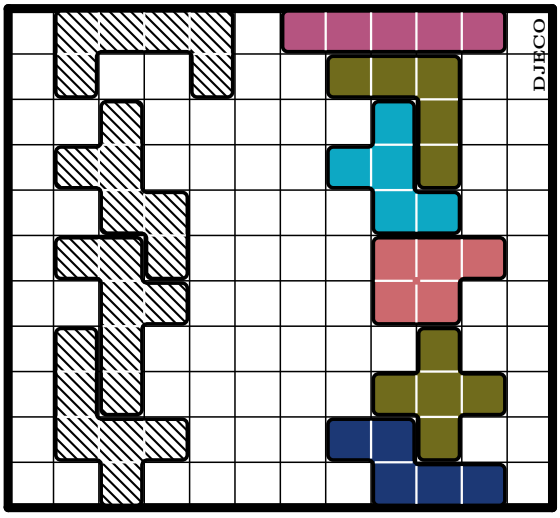

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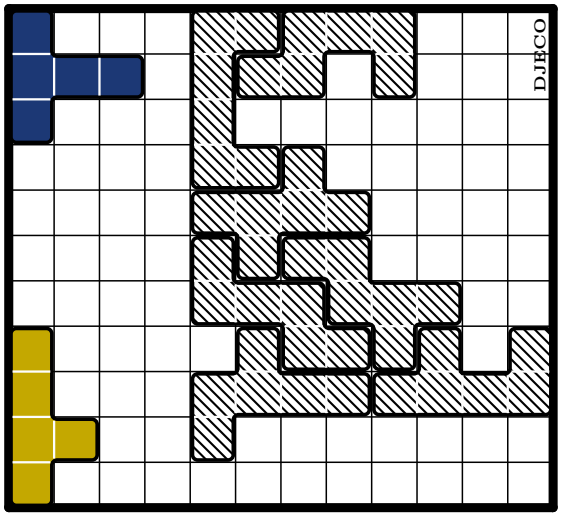

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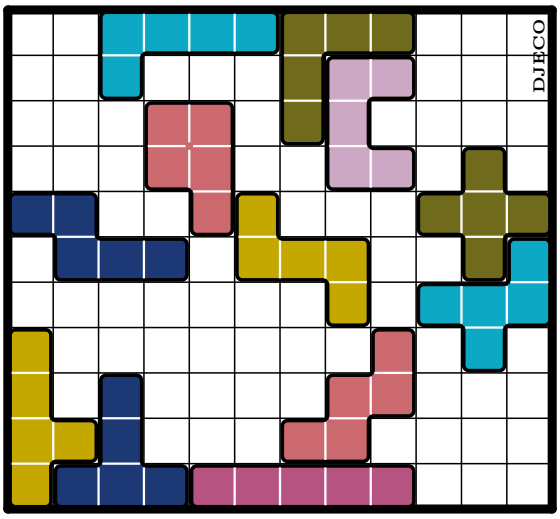
43



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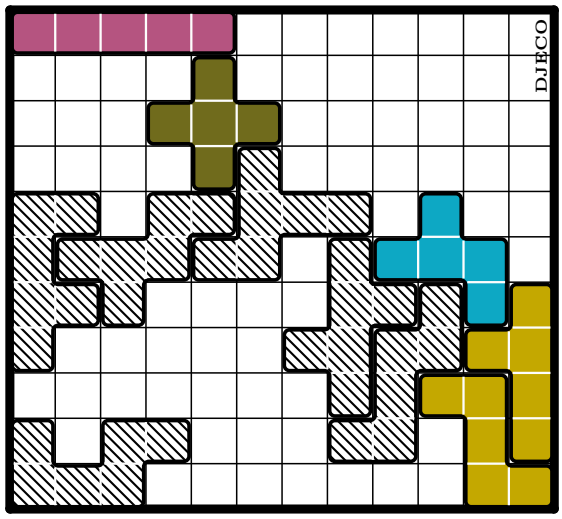

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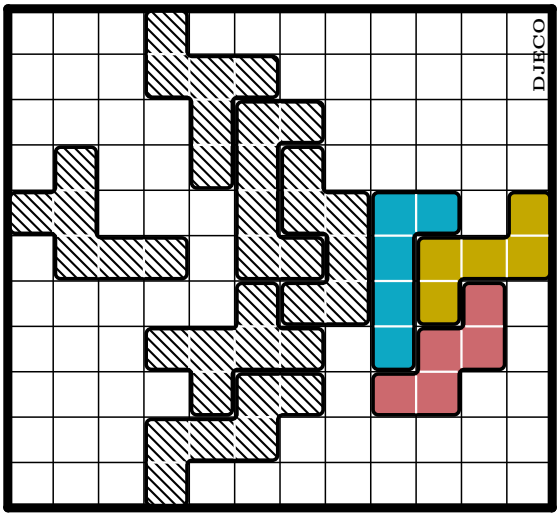

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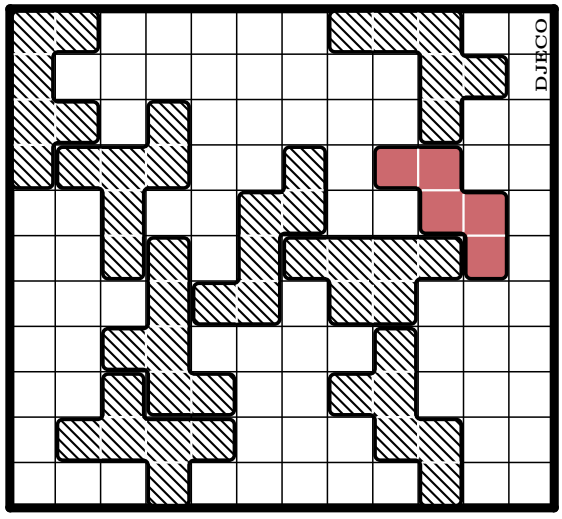

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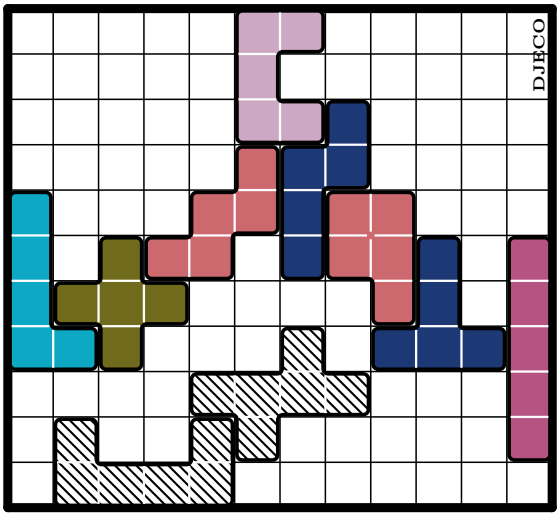

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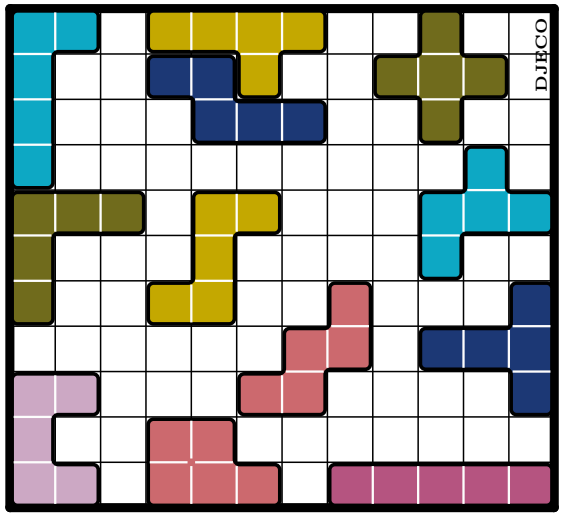

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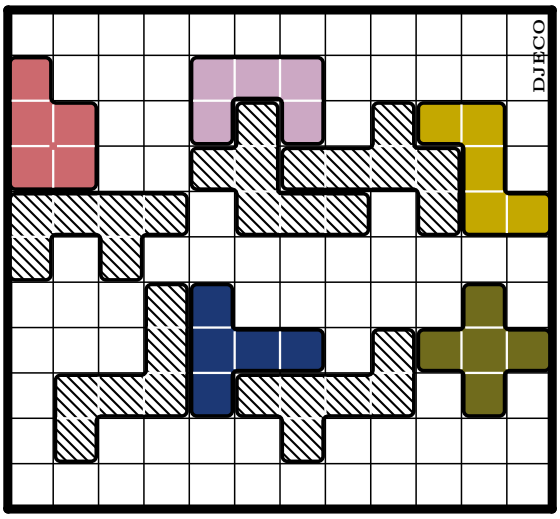
49



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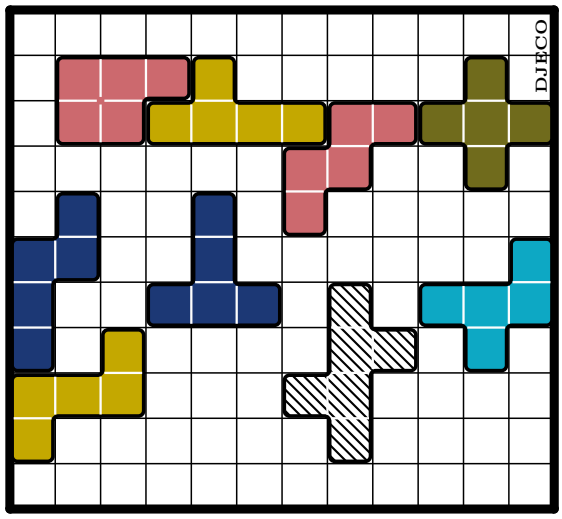

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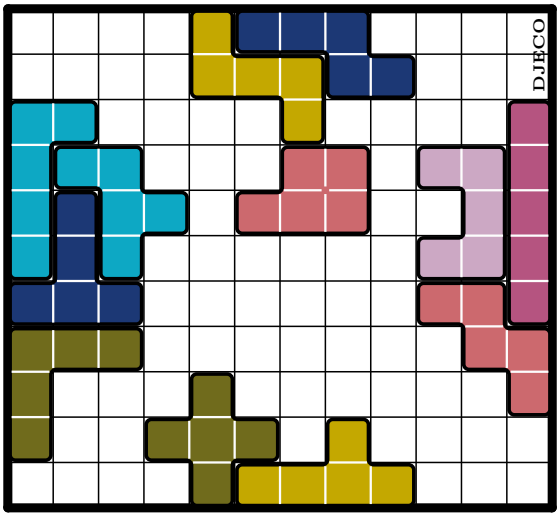

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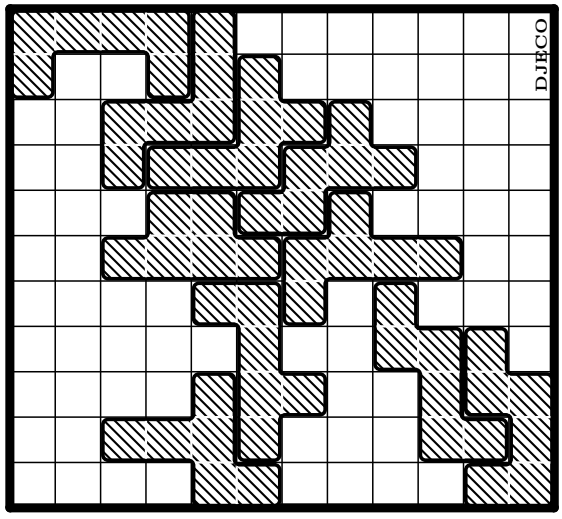

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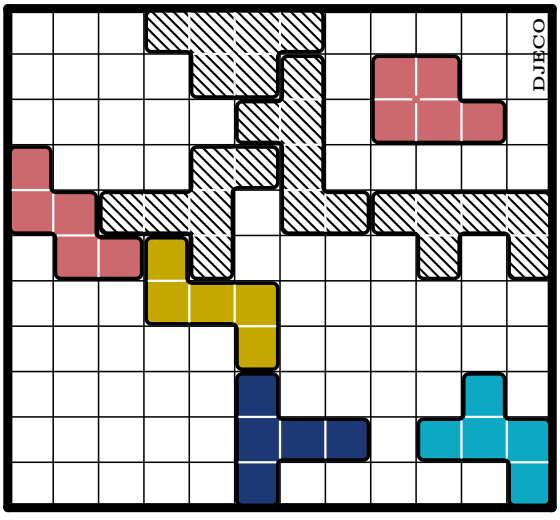

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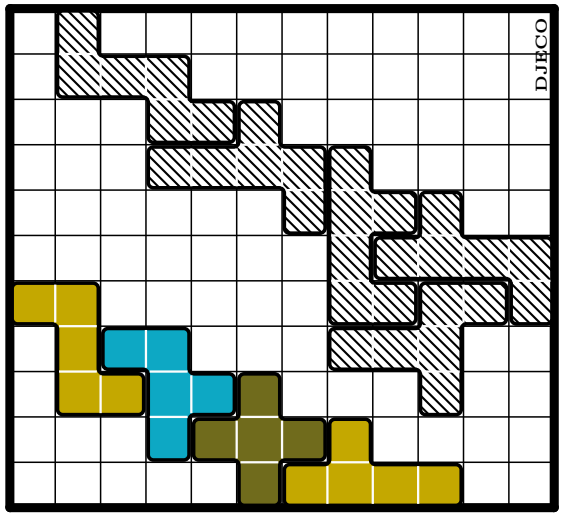

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Mettez la position comme indiqué, puis placez les pièces restantes. Chaque défi n'a qu'une solution.

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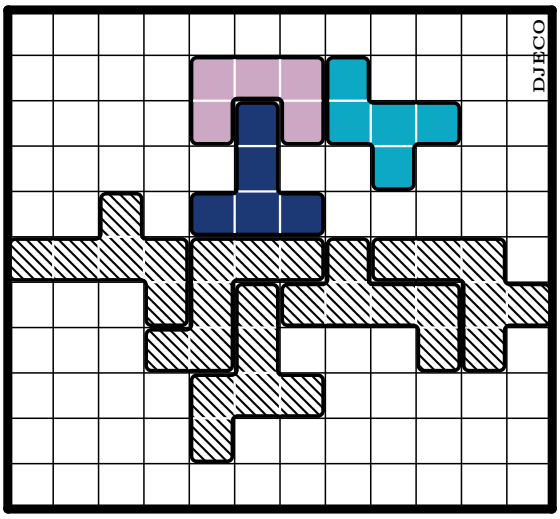

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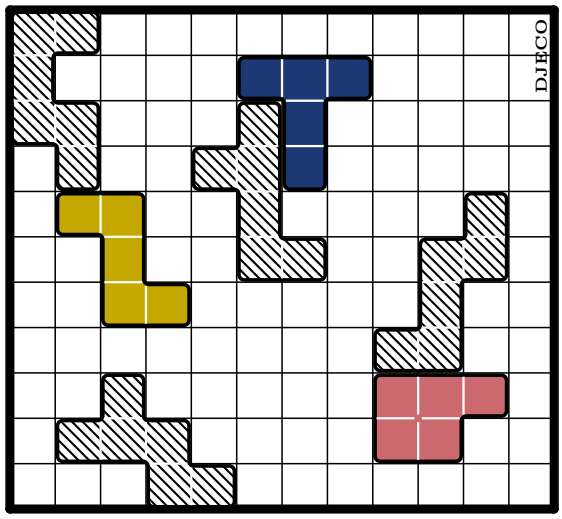

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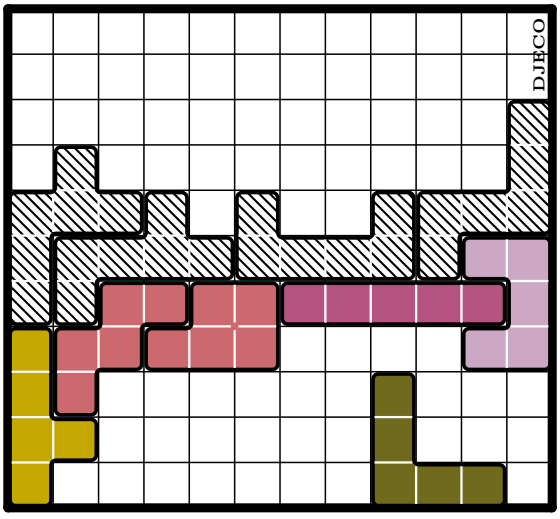

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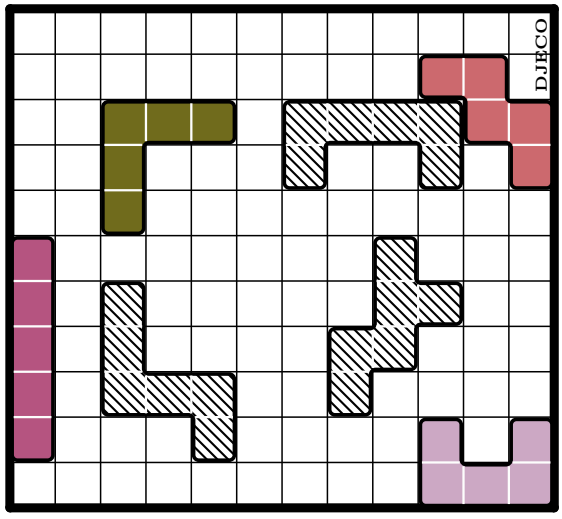

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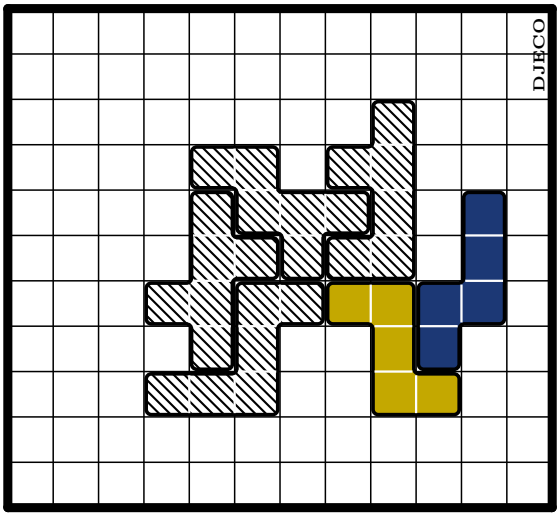

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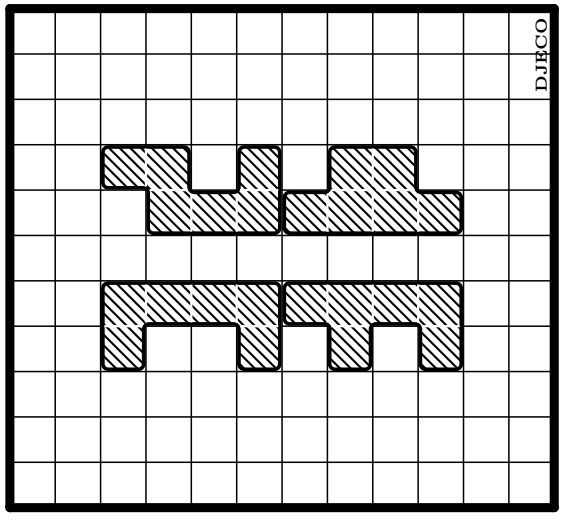
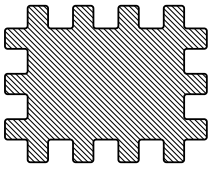
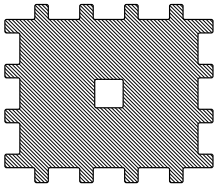
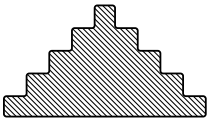


61 Try to make a HEART shape with all Polyssimo Challenge pieces.
Essayez de créer une forme de COEUR avec toutes les pièces de Polyssimo Challenge.

62 Challenges proposed by Tick Wang / *Défis proposé par Tick Wang*
62a Try to make a STAMP shape with as much Polyssimo Challenge pieces as possible.
Essayez de créer une forme de TIMBRE avec autant de pièces de Polyssimo Challenge que possible.
62b Try to make the precise holed STAMP shape depicted below and using all Polyssimo Challenge pieces.
Essayez de créer la forme TIMBRE trouée décrite ci-dessous avec toutes les pièces de Polyssimo Challenge.
62c Try to make a PYRAMID shape with as much Polyssimo Challenge pieces as possible.
Essayez de créer une forme de PYRAMIDE avec autant de pièces de Polyssimo Challenge que possible.
62d Try to make two similar shapes using the 12 hexominoes from Polyssimo Challenge.
Essayez de créer deux formes similaire eb utilisant les 12 hexaminos de Polyssimo Challenge.

62a 

62b 

62c 

63 What is the minimum number of pentominoes needed to surround the 12 hexominoes from Polyssimo Challenge ? (Question asked by Tick Wang)
Quel est le plus petit nombre de pentaminos nécessaires pour entourer les 12 hexaminos de Polyssimo Challenge ? (Question posée par Tick Wang)

64 What is the minimum number of Polyssimo Challenge hexominoes needed to surround the 12 pentominoes ?
Quel est le plus petit nombre d'hexaminos nécessaires pour entourer les 12 pentaminos ?

65 Try to find a perfect tiling of the 11×12 board using all Polyssimo Challenge pieces. Better, try to satisfy a foreplanned constraint, such as having all pentominoes in one group and all hexominoes in one group (the more regular the better), or to have all pentominoes (hexominoes) separated evenly in N groups... (see page 20)
Essayez de trouver un pavage du plateau de jeu 11×12 *utilisant toutes les pièces de Polyssimo Challenge. Mieux, essayez d'atteindre un objectif supplémentaire, comme d'avoir tous les pentaminos dans un groupe et tous les hexaminos dans un autre groupe (plus les groupes sont réguliers mieux c'est), ou d'avoir tous les pentaminos (hexaminos) séparés en N groupes équilibrés... (voir en page 20)*

Thanks to **Roman Ondrus** for insightful comments on the earlier challenges, to **Thierry Le Gleuher** and **Tick Wang** for finding and inspiring many cool positions !

Solving hints for POLYSSIMO CHALLENGE solitaire puzzles

A game by Alain Brobecker, edited by Djeco - **http ://abrobecker.free.fr/**

A **pentomino** is a piece made up of 5 squares joined together, colored in the game.
A **hexomino** is a piece made up of 6 squares joined together, black and white in the game.

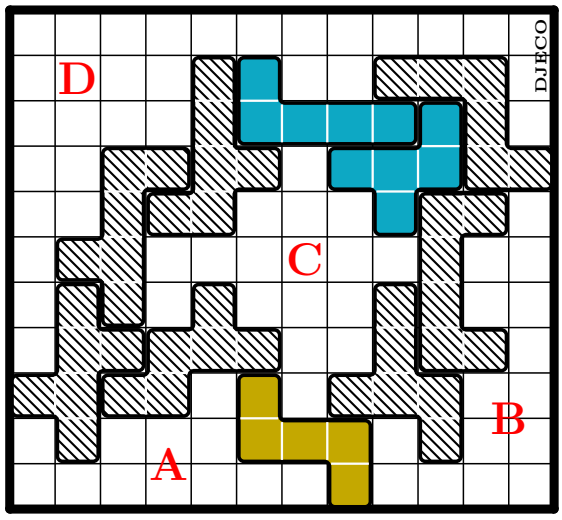
Hint 1 : Constraints. Usually start in a place where there are a lot of constraints. As an example in puzzle 2 it is advised to start on the upper left corner because the zone is narrow and quite irregular. In puzzle 10 depicted below there's no choice for the piece in upper right corner, and there are only two pieces that can fit in the bottom left part of area **D**, but one of those is already placed.

Hint 2 : Surfaces. In some puzzles you will see separated areas. My advice is then to count the number of squares in each of those areas (the surfaces), because this may help you know the pieces that will be in the area, eg an area of 10 squares can only contain two pentominoes, because $10 = 2 \times 5$. More subtle reasoning on the areas are possible and were already a part of my game **Polyssimo**, also by Djeco.
As a former Mathematics teacher I used **Polyssimo** to introduce surfaces, by asking students to separate polyominoes in two groups (they usually then spoke about the size) and then point out to a specific area (such as area **B** below) and ask them to tell me how many squares there is in it. It was usually enough to get them started understanding areas and using them as a tool... ☺Some clever students were of course not needing help to discover this by themselve!

As an example in puzzle 10 we see 4 distincts areas in this challenge. By counting the number of squares in each of those 4 areas, we have hints on the size of the pieces to fill them :

A : 12 squares → 2 hexominoes
B : 15 squares → 3 pentominoes
C : 17 squares → 2 hexominoes and 1 pentomino
D : 31 squares → the remaining pieces
1 hexomino and 5 pentominoes

In this challenge, and in general, it is advised to start with the smaller area (**A**) and/or the areas that are containing only one size of pieces (**A** and **B**).



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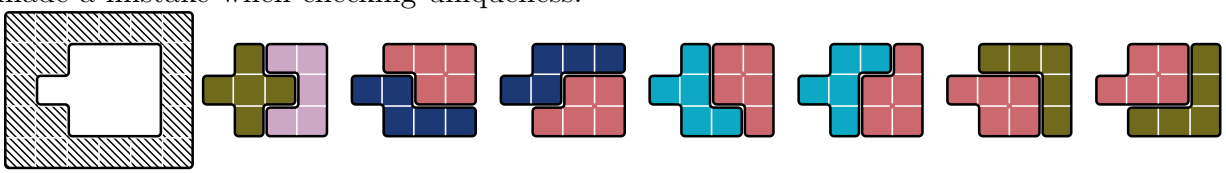
In page 14 you have a list of all puzzles and the sizes of areas in them.

Hint 3 : Uniqueness. The puzzles provided are guaranteed to have a unique solution, thus if at one point a set of pieces can be assembled in more than one way to fill the exact same shape, then you know it would lead to multiple solutions and thus this set of pieces is not suitable. In the example below (extracted from puzzle 12), only the first set of pieces assembles in a unique way, so it must be the solution.
Some solvers don't like this kind of reasoning because it assumes the author of the puzzle has not made a mistake when checking uniqueness.



Astuces de résolution pour les défis solitaires de POLYSSIMO CHALLENGE
Un jeu de Alain Brobecker, édité par Djeco - **http ://abrobecker.free.fr/**

Un **pentamino** est une pièce composée de 5 carrés accolés, en couleur dans le jeu.
Un **hexamino** est une pièce composée de 6 carrés accolés, en noir et blanc dans le jeu.

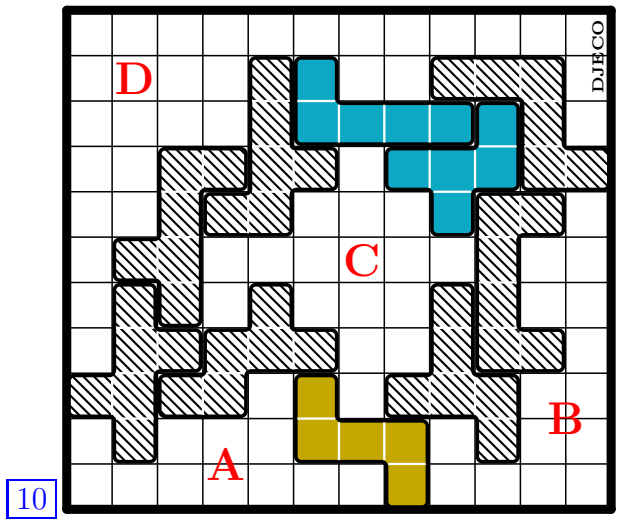
Astuce 1 : Contraintes. Généralement il est conseillé de commencer par un endroit dans lequel il y a beaucoup de contraintes de placement. Par exemple dans le défi 2 on voit que la zone située en haut à gauche est étroite et assez irrégulière, il est judicieux de commencer par là. Dans le défi 10 reproduit ci-dessous il n'y a qu'une possibilité pour la pièce qui doit aller en haut à droite, et seulement deux pièces pouvant aller dans la partie basse de la zone **D**, mais une de ces deux pièces est déjà placée.

Astuce 2 : Surfaces. Certains défis contiennent des zones séparées. Je conseille alors de compter le nombres de cases dans chacune de ces zones (leurs surfaces), cela peut parfois aider à savoir quelles pièces iront dans ces zones. Par exemple une zone de 10 cases ne pourra que contenir deux pentaminos puisque la seule décomposition en 5 ou 6 cases en $10 = 2 \times 5$. Des raisonnements plus subtils sur les surfaces sont possibles et étaient déjà présent dans mon jeu **Polyssimo**, aussi édité par Djeco.
Lorsque j'ensaignais les Mathématiques j'utilisais **Polyssimo** pour introduire la notion de surface, en demandant aux élèves de séparer les polyminos en deux groupes (ils remarquaient alors qu'il y en avait deux tailles) puis en leur demandant de compter le nombre de cases dans une zone bien choisie (comme la zone **B** ci-dessous). C'était en général suffisant pour qu'il commence à entrevoir la notion de surface et à l'utiliser comme un outil. ☺Certains élèves brillants n'avaient bien sur pas besoin d'aide pour découvrir cela !

En guise d'exemple on voit 4 zones distinctes dans le défi 10. En comptant le nombre de cases dans chacune de ces zones on a des indices sur les pièces nécessaires pour les remplir :

A : 12 cases → 2 hexaminos
B : 15 cases → 3 pentaminos
C : 17 cases → 2 hexaminos et 1 pentamino
D : 31 cases → les pièces restantes
1 hexamino et 5 pentaminos

Dans ce défi et en général il est conseillé de commencer pas les zones les plus petites (**A**) et/ou celles qui ne contiennent qu'une seule taille de pièces (**A** et **B**).



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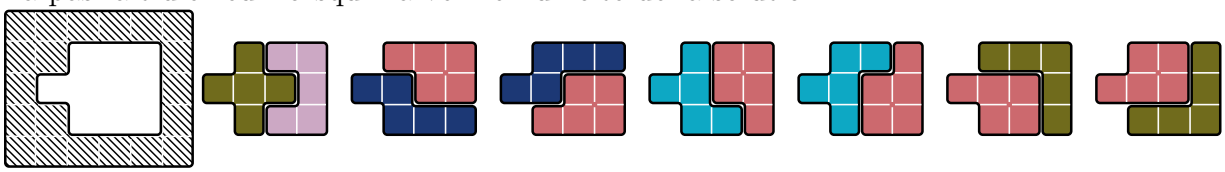
En page 14 vous avez une liste des défis et les tailles des zones qu'ils contiennent.

Astuce 3 : Unicité. Je garantis que les défis proposés n'ont qu'une seule solution, donc si à un moment un groupe de pièces peuvent être assemblées de plusieurs façons pour remplir la même forme, alors vous savez que cela amènerait à plusieurs solutions et donc que ce groupe de pièces ne convient pas. Dans l'exemple ci-dessous (tiré du défi 12) seul le premier ensemble de pièce s'assemble de manière unique, donc cela doit être la solution.
Certains solutionnistes n'aiment pas ce genre de raisonnement car il suppose que l'auteur des défis n'a pas fait d'erreur lorsqu'il a vérifié l'unicité de la solution.



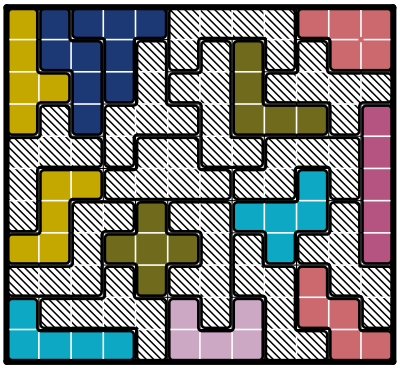
P/H/Σ : number of Pentominoes/Hexominoes/both left to place
A colored area size means that this area can contain only Pentominoes or only Hexominoes.

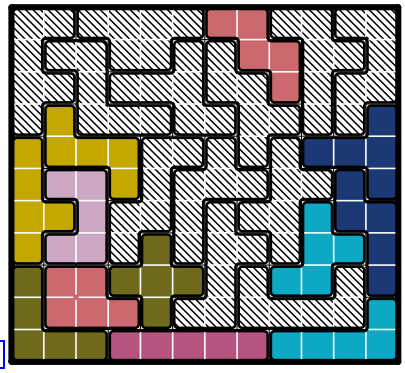
	P	H	Σ	NbAreas	Sizes of areas
1	11	0	11	11 areas	5 + ... + 5
2	7	6	13	1 area	71
3	5	5	10	6 areas	5 + 6 + 10 + 11 + 11 + 12
4	1	11	12	1 area	71
5	0	12	12	5 areas	12 + 12 + 12 + 12 + 24
6	12	3	15	3 areas	6 + 12 + 60
7	12	3	15	3 areas	20 + 20 + 38
8	7	7	14	4 areas	5 + 12 + 24 + 36
9	12	0	12	6 areas	5 + 5 + 5 + 5 + 20 + 20
10	9	5	14	4 areas	12 + 15 + 17 + 31
11	12	2	14	2 areas	12 + 60
12	9	2	11	5 areas	10 + 10 + 10 + 10 + 17
13	12	1	13	7 areas	5 + 10 + 10 + 10 + 10 + 10 + 11
14	9	5	14	4 areas	10 + 15 + 22 + 28
15	7	5	12	3 areas	5 + 25 + 35
16	1	12	13	3 areas	18 + 24 + 35
17	7	5	12	2 areas	30 + 35
18	5	7	12	4 areas	11 + 11 + 11 + 34
19	5	9	14	4 areas	6 + 24 + 24 + 25
20	0	12	12	1 area	72
21	3	9	12	3 areas	10 + 29 + 30
22	5	9	14	2 areas	37 + 42
23	10	4	14	6 areas	5 + 5 + 5 + 5 + 22+ 32
24	8	5	13	3 areas	6 + 30 + 34
25	6	8	14	4 areas	6 + 11 + 30 + 31
26	9	5	14	2 areas	35 + 40
27	2	10	12	2 areas	16 + 54
28	7	6	13	3 areas	21 + 22 + 28
29	12	1	13	3 areas	5 + 30 + 31
30	6	6	12	5 areas	10 + 11 + 12 + 15 + 18

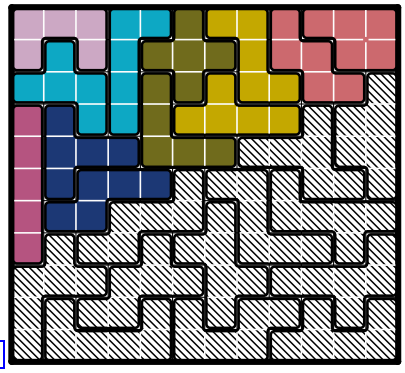
	P	H	Σ	NbAreas	Sizes of areas
31	9	7	16	6 areas	5 + 5 + 5 + 11 + 30 +31
32	3	10	13	1 area	75
33	8	6	14	4 areas	5 + 10 + 30 +31
34	11	4	15	3 areas	11 + 16 + 52
35	5	10	15	2 areas	30 + 55
36	11	2	13	3 areas	6 + 30 +31
37	3	12	15	4 areas	5 + 23 + 29 + 30
38	2	11	13	3 areas	5 + 35 + 36
39	9	6	15	2 areas	36 + 45
40	7	6	13	3 areas	12 + 29 + 30
41	6	8	14	3 areas	15 + 18 + 45
42	10	5	15	2 areas	30 + 50
43	0	12	12	5 areas	12 + 12 + 12 + 12 + 24
44	7	6	13	3 areas	12 + 29 + 30
45	9	6	15	3 areas	20 + 25 + 36
46	11	4	15	4 areas	15 + 15 + 22 + 27
47	4	10	14	4 areas	15 + 17 + 24 + 24
48	0	12	12	2 areas	6 + 66
49	7	7	14	3 areas	18 + 27 + 32
50	4	11	15	1 area	86
51	0	12	12	1 area	72
52	12	2	14	3 areas	12 + 30 + 30
53	7	8	15	4 areas	15 + 15 + 24 + 29
54	8	7	15	3 areas	10 + 30 + 42
55	9	7	16	2 areas	42 + 45
56	9	8	17	1 area	93
57	6	8	14	2 areas	30 + 48
58	8	9	17	1 area	94
59	10	8	18	1 area	98
60	12	8	20	1 area	108

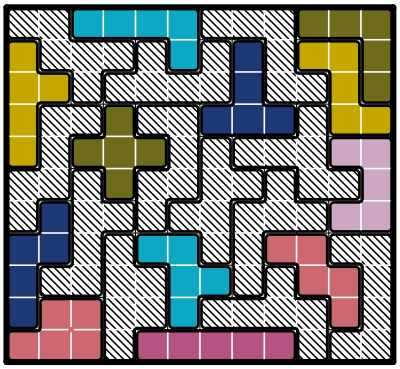
Solutions of puzzles for POLYSSIMO CHALLENGE

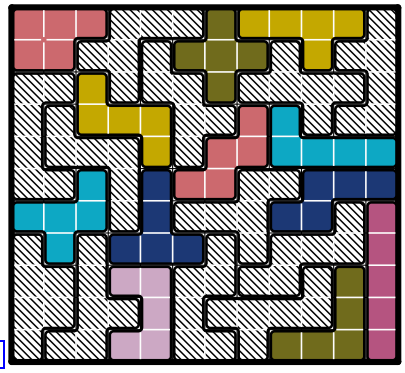
A game by Alain Brobecker, edited by Djeco - **http://abrobecker.free.fr/**

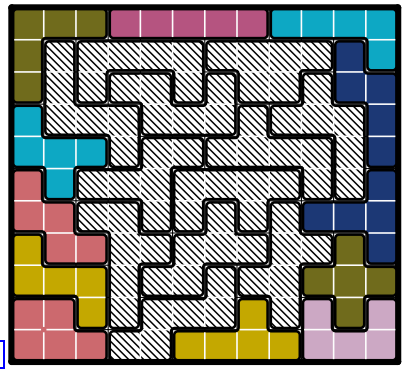
1 

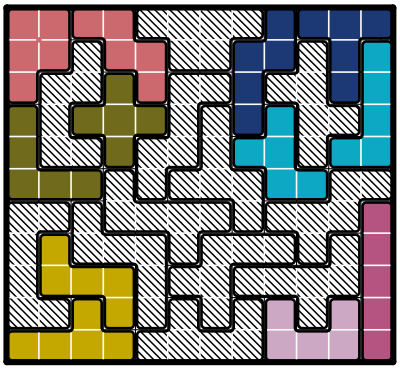
2 

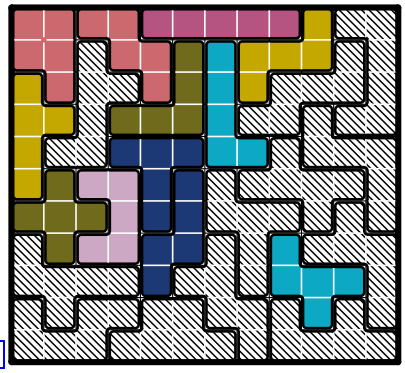
3 

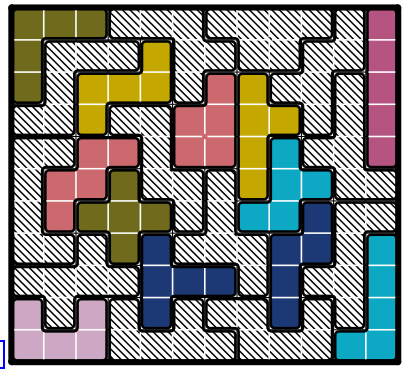
4 

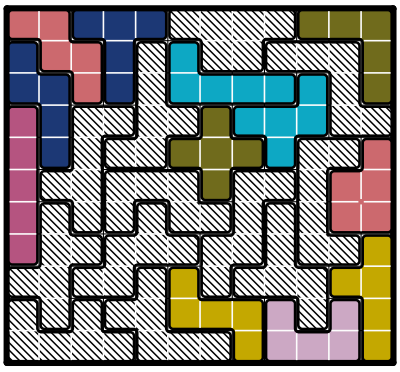
5 

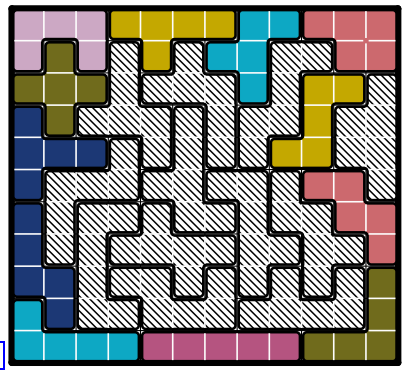
6 

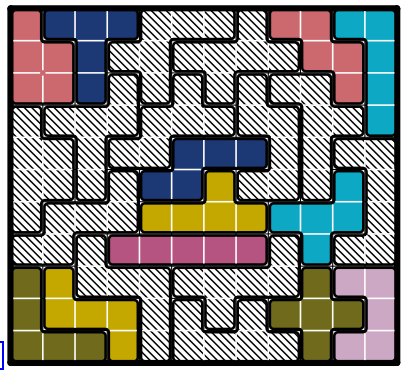
7 

8 

9 

10 

11 

12 

Solutions of puzzles for POLYSSIMO CHALLENGE

A game by Alain Brobecker, edited by Djeco - **http://abrobecker.free.fr/**

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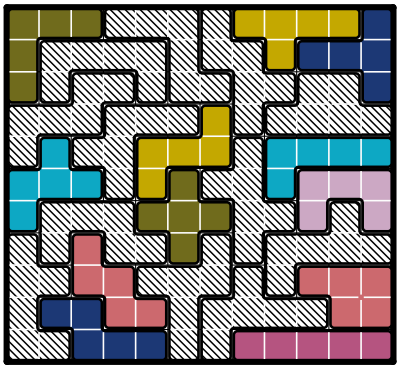

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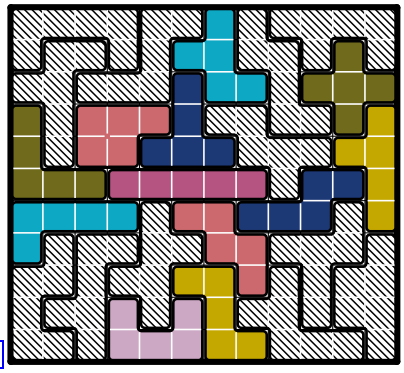

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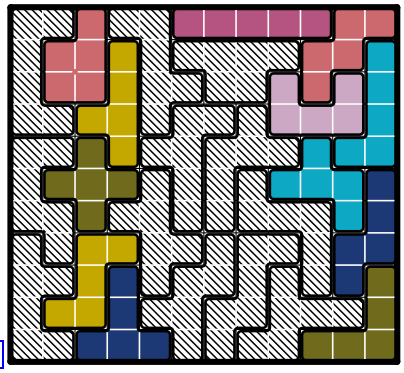

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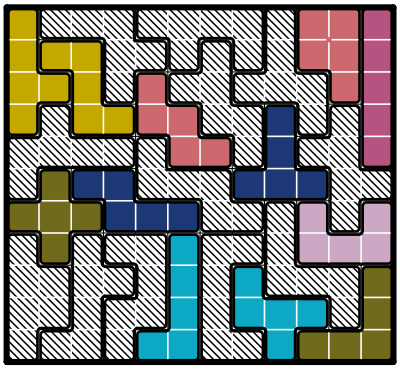

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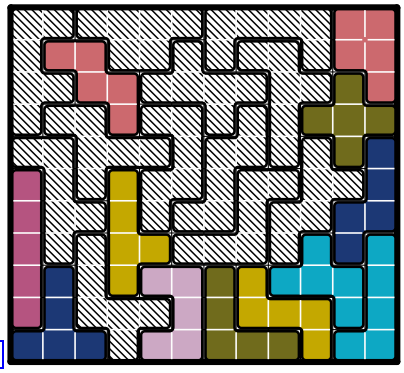

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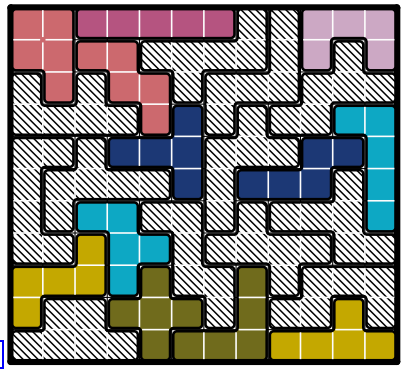

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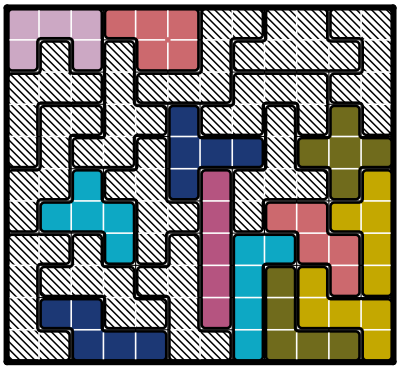

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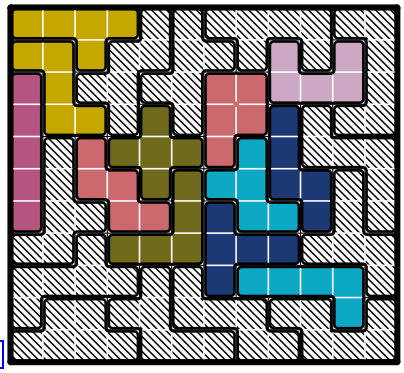

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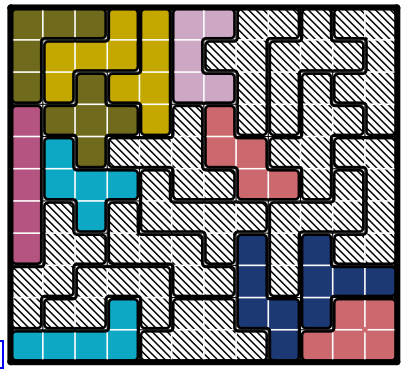

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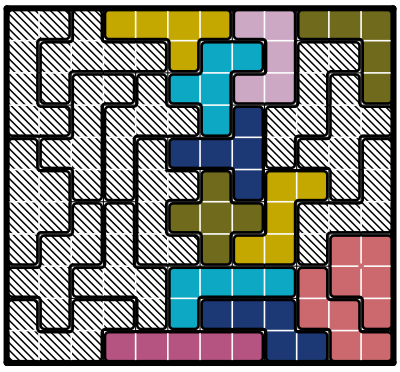

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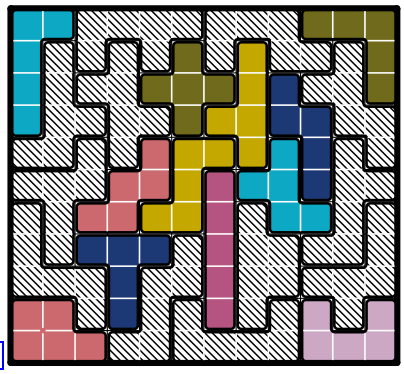

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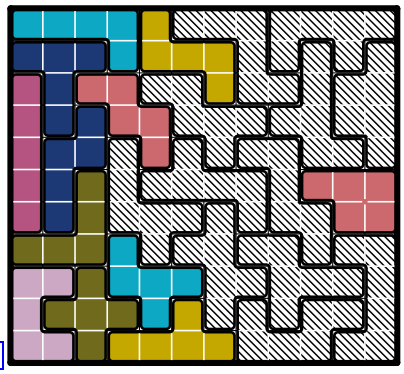

Solutions of puzzles for POLYSSIMO CHALLENGE

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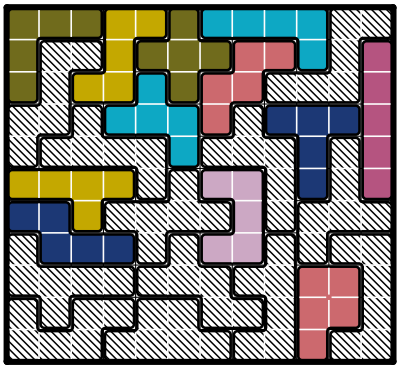
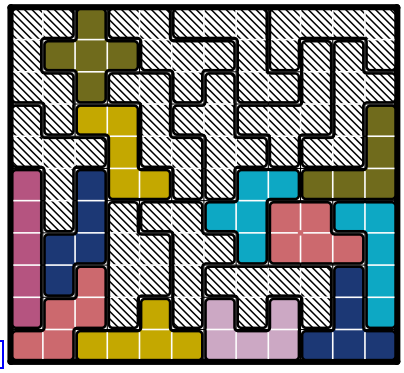
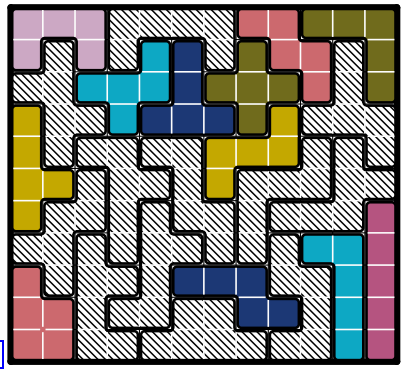
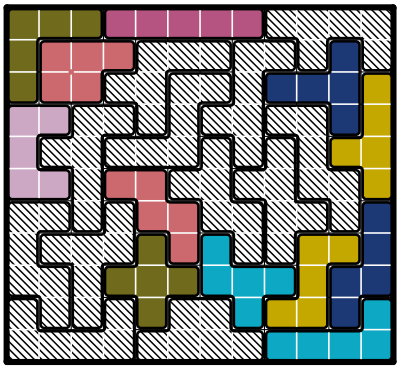
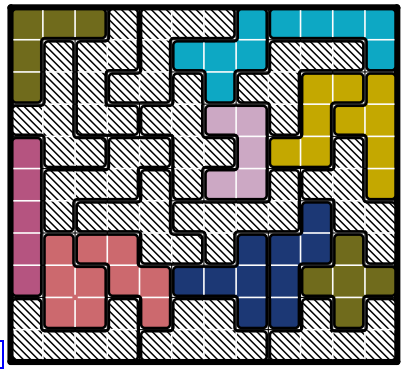
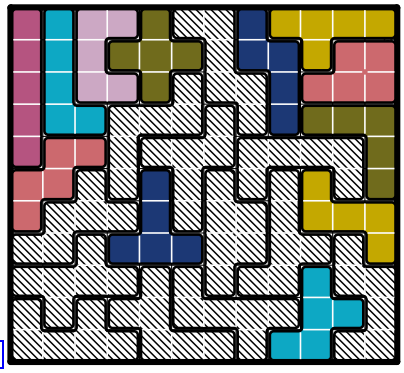
25 

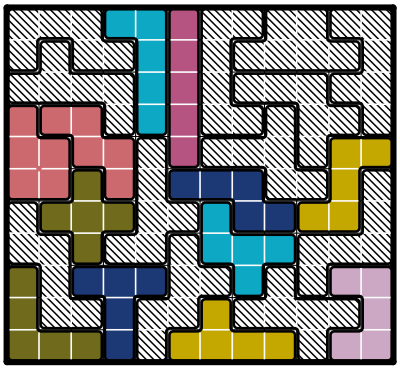
26 

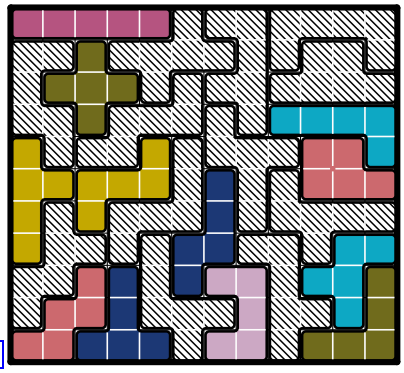
27 

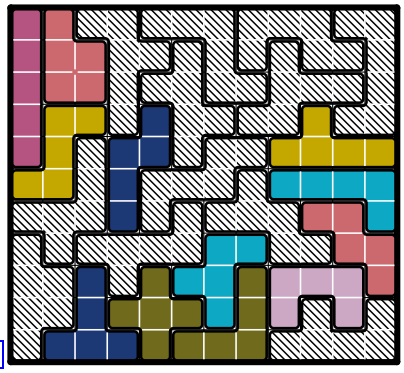
28 

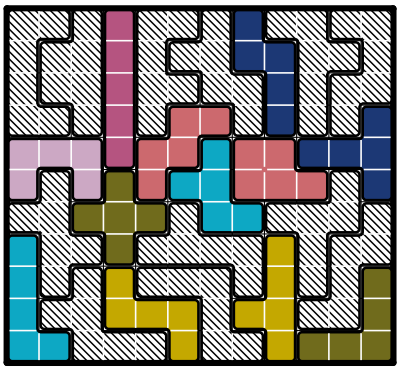
29 

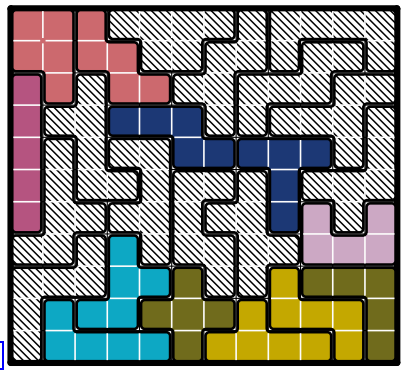
30 

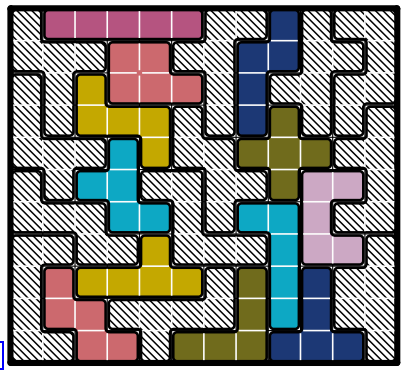
31 

32 

33 

34 

35 

36 

Solutions of puzzles for POLYSSIMO CHALLENGE

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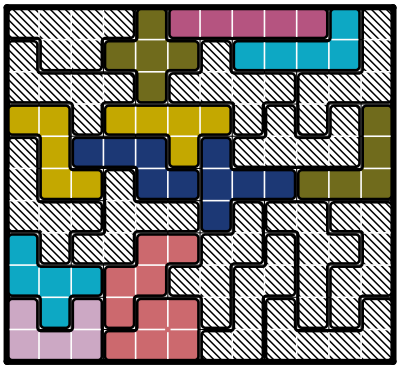
37



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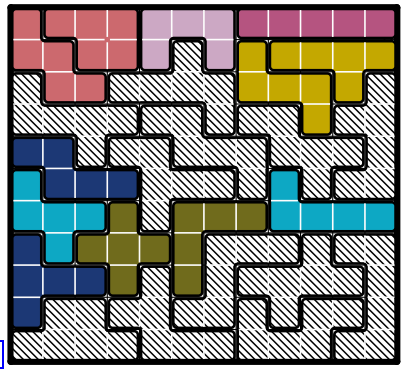

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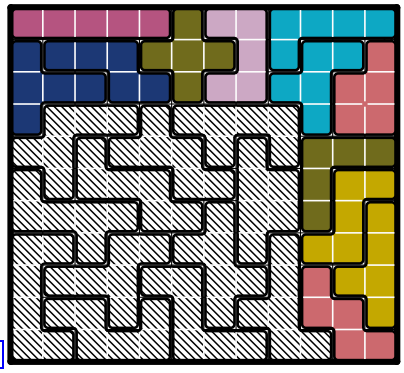

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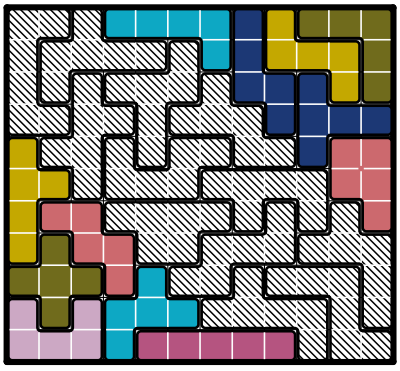

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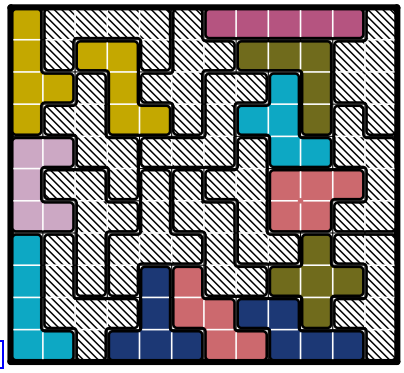

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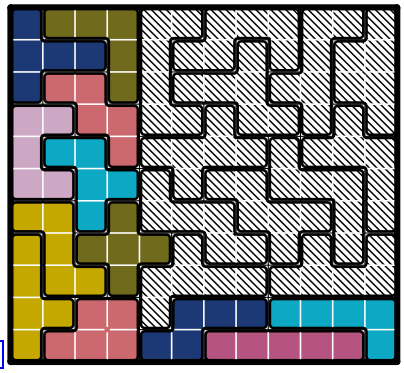

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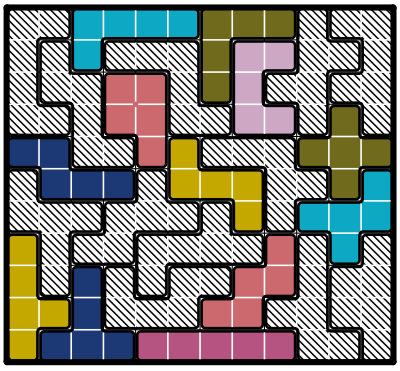

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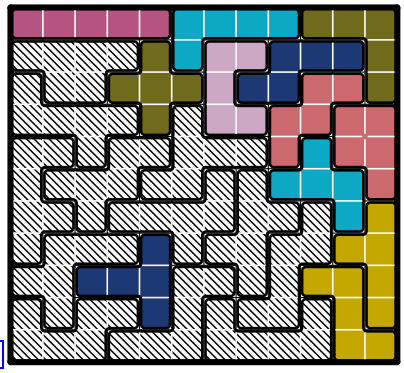

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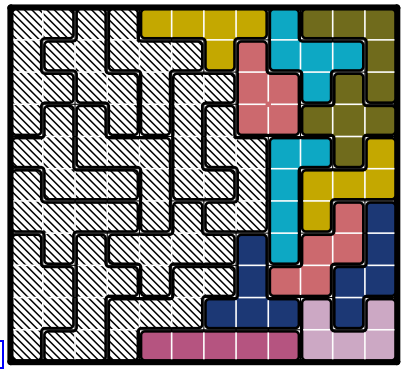

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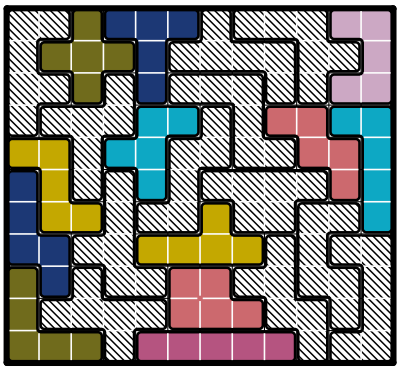

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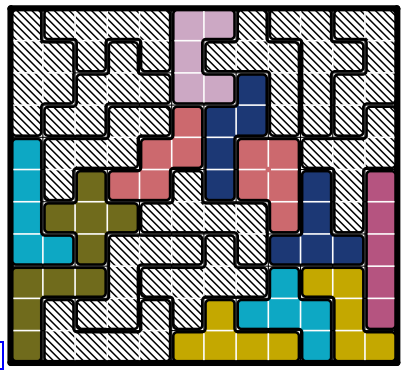

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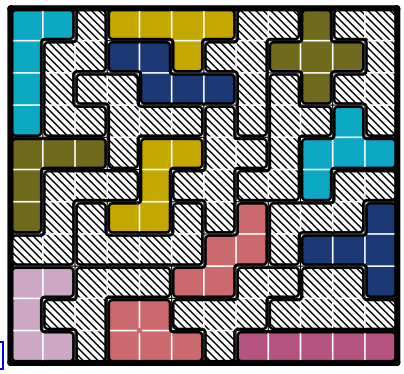

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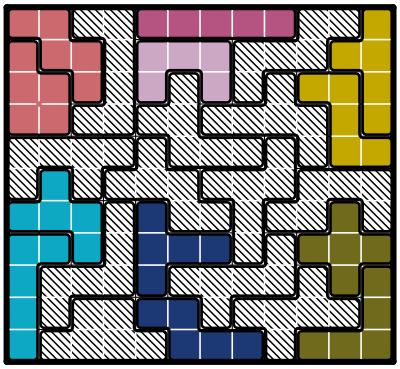
49



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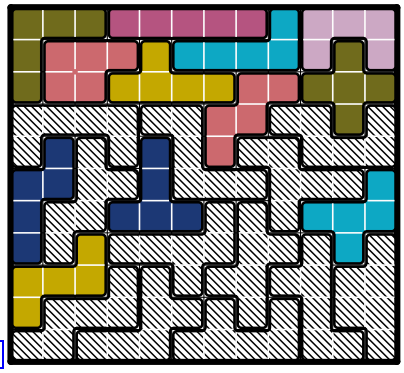

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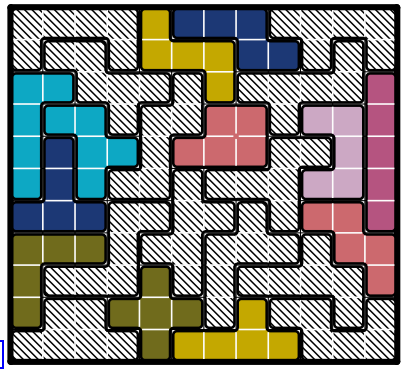

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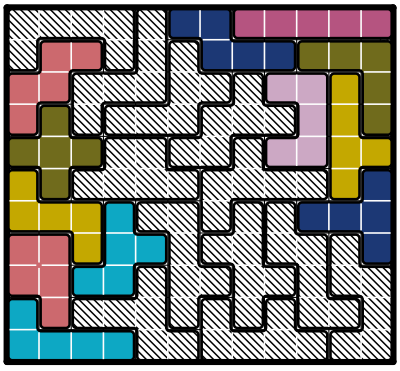

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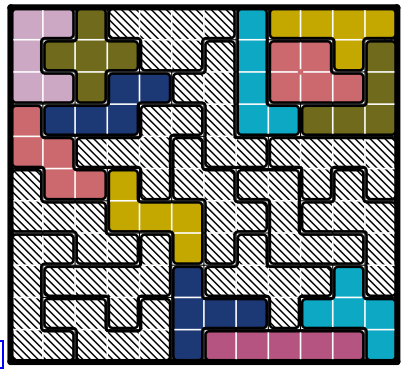

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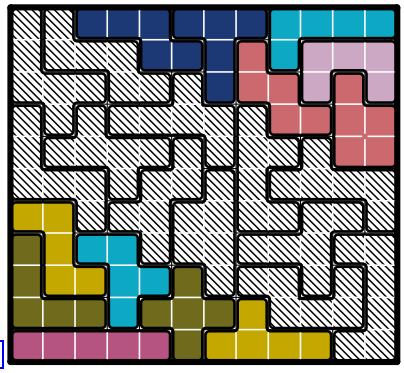

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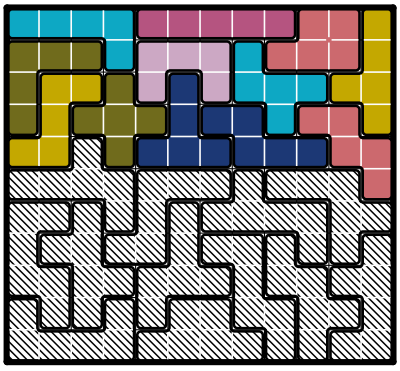

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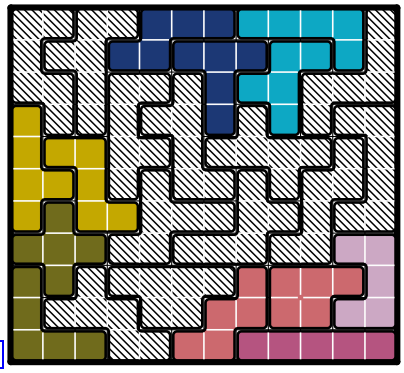

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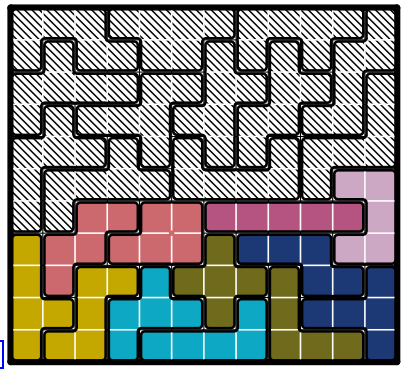

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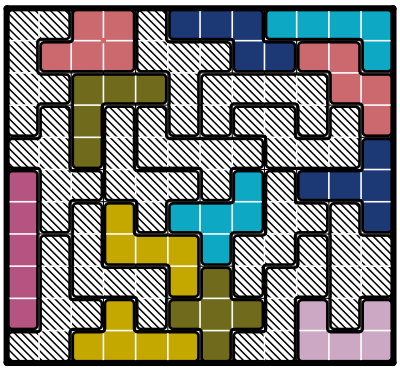

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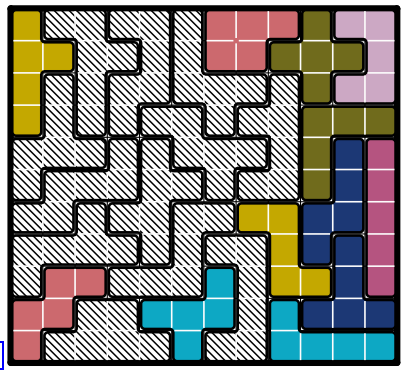

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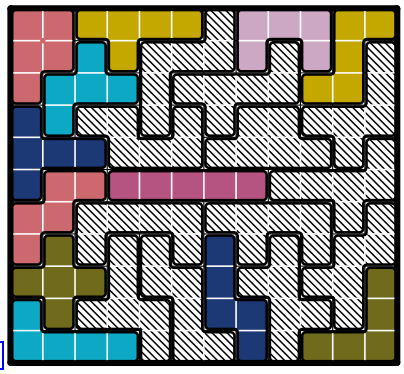

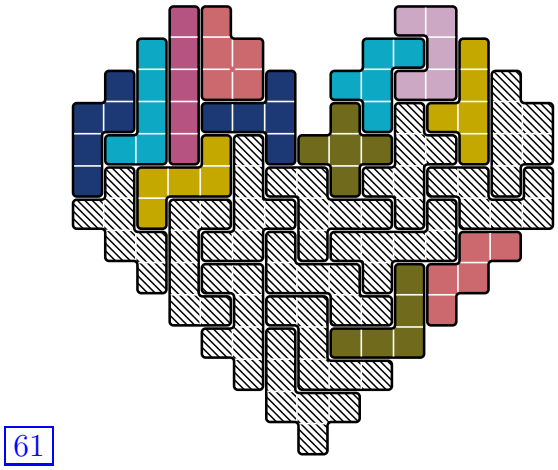

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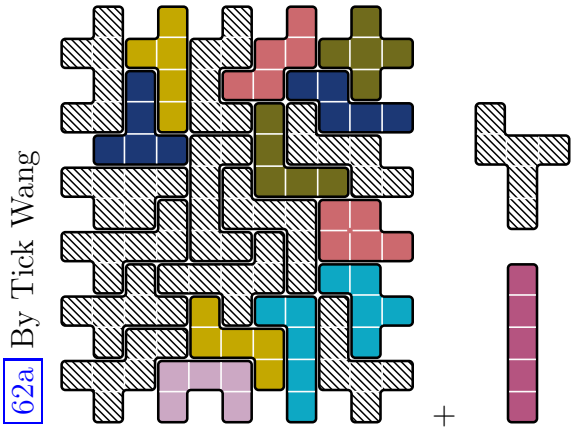
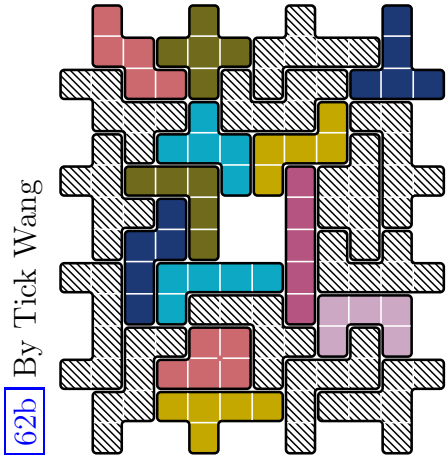
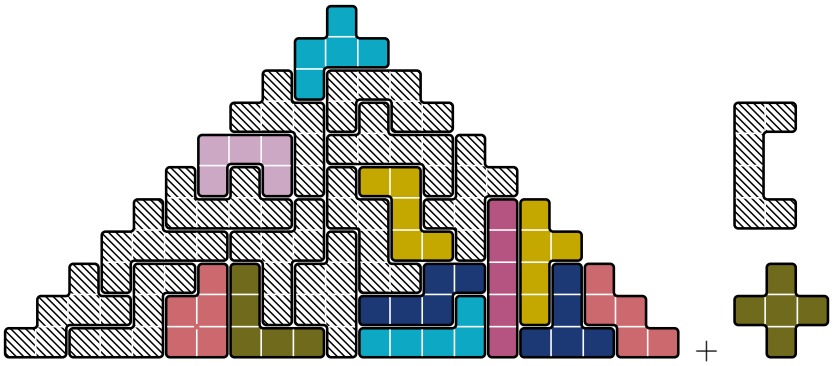


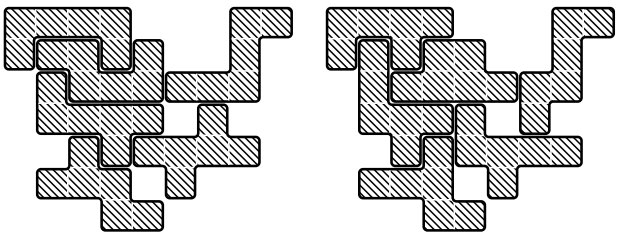
62a By Tick Wang



62b By Tick Wang



62c By Tick Wang

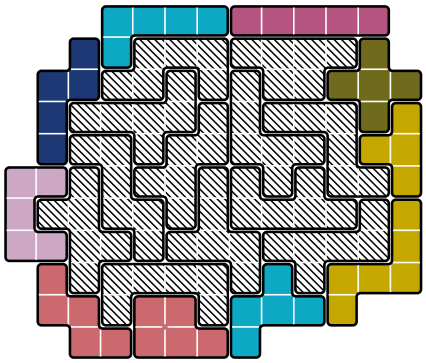


62d By Tick Wang

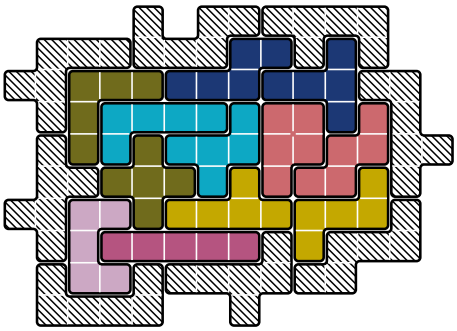
62a If we have m and n teeth on the edges of the stamp, then the inside contains $(2m-1)\times(2n-1)$ squares to which we must add $2m+2n$ squares for the teeth. Thus it's a total of $(2m-1)\times(2n-1)+2m+2n = 4mn+1$ squares which is odd. The Polyssimo Challenges pieces have a total of $12\times 11 = 132$ squares which is even, so we must remove an odd number of squares.
If we remove a pentomino then we have 127 squares, but this can not be written as $4mn+1$.
If we remove a pentomino and an hexomino then we have 121 squares which is $4\times 30+1$, which Tick Wang found by choosing a stamp with 5 and 6 teeth on the sides (and 9×11 squares inside).

62b A pyramid will have $1+3+5+\ldots+(2n-1) = n^2$ squares (this is the sum of odd numbers). Since $12^2 = 144 > 132$ then the best we can do is $11^2 = 121$ which means 11 squares will not be used, which is again one pentomino and one hexomino.

63 10 pentominoes By Tick Wang



64 8 hexominoes



65 Well, you have numerous tiling examples with all the puzzles here, but I would like to highlight some of them that were found or inspired by **Tick Wang** and **Thierry Le Gleuher**.

65.1 When you look at position 1, a legitimate question arising is wether a position in which all pentominoes are separated exists or not ! I've been searching quite hard for such a position, even with a dedicated program (that couldn't explore the whole possibilities) and didn't found one.
But with the help of **Tick Wang** (he found the positions marked with a star) we were able to find a lot of positions in which the pentominoes or hexominoes are separated in balanced groups. In the last update I even found some positions in which both the pentominoes and the hexominoes are in balanced groups (positions 36 and 38).

	2 groups of 6 ...	3 groups of 4 ...	4 groups of 3 ...	6 groups of 2 ...
... pentominoes	36, 38, 40, 52, 54	56	46*	32*, 49
... hexominoes	35, 38	36, 47*	14	34

65.2 **Tick Wang** was the first to propose a clear pentominoes/hexominoes separation and almost a rectangle ! With the help of my programs I modified it a bit to have the nice color scheme seen in challenge 57. Afterward I also found some nice oblique separations in challenges 3 and 54.

65.3 It is well known that you can assemble the 12 pentominoes in a 5×12 or in a 6×10 rectangle, but alas the hexominoes chosen in Polyssimo Challenge are not tamed as easily. Nonetheless we tried to find almost rectangular shapes in the following positions :
• The position 57 by **Tick Wang** was first.
• The nearest to a 6×12 rectangle that we can get with hexominoes is shown in 55.
• **Thierry Le Gleuher** searched for a 8×9 rectangle containing Polyssimo Challenge's hexominoes, it is again not possible, but it led to positions 39 and 42.

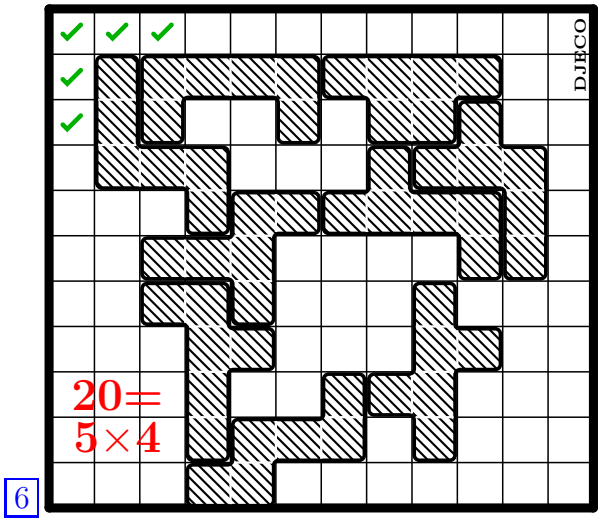
65.4 **Tick Wang** also found the interesting position 20 in which all hexominoes are touching the border. He was next aimed to do the same with pentominoes, but I found the idea very good and my program was faster than him to find problem 6 in which all pentominoes are touching the border.

65.5 **Tick Wang** was very motivated, and he searched a position in which all corners are containing an isolated pentomino, you can find it in position 9. I proposed an alternative version in position 23, the aim being to replace the long bar with the C which fits better the corner. But Tick's position has a better separation of pentominoes groups.

65.6 **Tick Wang** found position 8, in which a colored F is lost in a black and white area, while a black and white F is lost in a colored area. Looks a bit like a colourful Yin-Yang ! He also made position 22 (the left black and white part has an horizontal symmetry) and position 15.

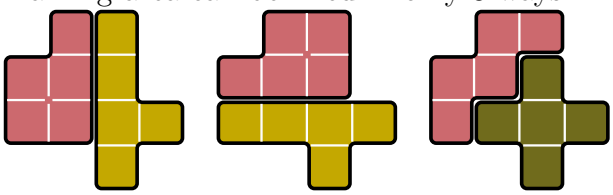
More specific solving hints

6 When I saw Tick Wang's position 20 in which all hexominoes are touching the border of the board, I used my program to search a position in which all pentominoes were touching the border of the board. The same kind of trick can be applied here.
We must place all 12 pentominoes in the outer area, but the upper part is quite narrow, so if we start counting the squares (here starting from bottom left) in multiples of 5, it will give us the beginning of the pentomino to place in the upper left corner.
Aside you can see green ticks giving the shape of the pentomino found by this method.

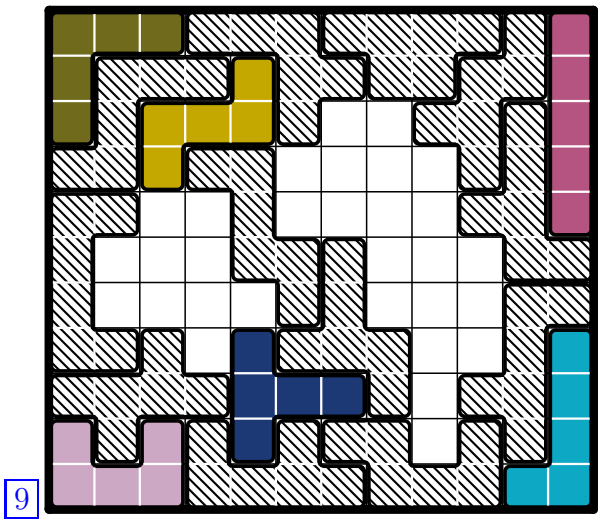


6

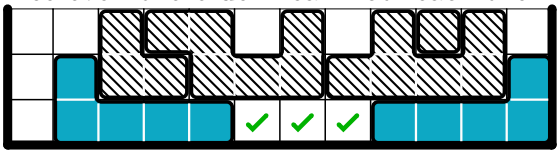
9 Of course you will start by placing the corners first. Then the easiest is to place the T and Z pentominoes which are forced. And now we can use the uniqueness of the solution to make some progress. The small remaining area can be filled in only 3 ways :



But the two first possibilities are using the same pieces and would lead to a double solution. Hence the correct solution is the one using the X and the W.


9

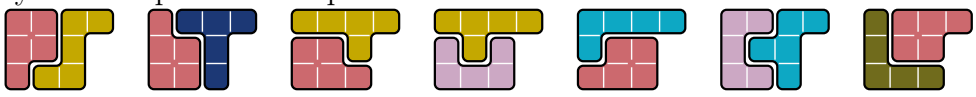
11 Once the two remaining hexominoes are placed in the smaller center area, we are left with the 12 pentominoes to place on the bigger area.
But using the method mentionned for challenges 6 or 20 won't work here because the bigger area, although narrow, makes a loop, so we don't know where to start counting.
One idea here is to notice that the long flat empty line in the bottom must contain the long pink bar ! More precisely, the 3 squares with a green tick in the following image can only contain the long pink bar, since even the blue L can not reach them :



The long pink bar then has 3 possible positions, two of them leading to an impossibility after some time, and one solving the challenge.

12 I tried to create a challenge in which the smaller areas are not the easiest ones to fill up. One can see that there are 4 areas of 10 squares, which will hence contain 2 pentominoes each. But there exist a lot of ways to fill up those 10 squares areas :

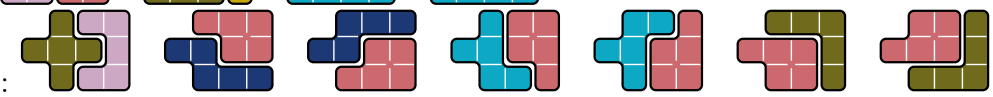
Upper left :



Center :

Bottom left :

Bottom right :

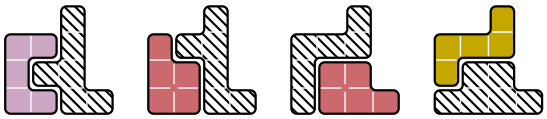


On the other hand the 17 squares area will contain the 2 remaining hexominoes and 1 pentomino, so there are less ambiguities to fill it up. Once done, since it does not contain the green cross, we will deduce the smaller areas.

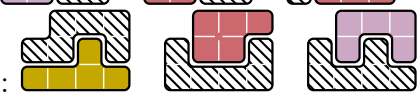
Note : Another, more questionable, way of solving the challenge, is to notice that among the 7 filling possibilities of the bottom right zone, we have 3 groups of 2 solutions that use exactly the same pieces. As it is said that the solution is unique, one can then rule out those $3 \times 2 = 6$ possibilities. Only the possibility with the green cross and the pink C remains.

18 Again a challenge with ambiguities in the smaller areas :

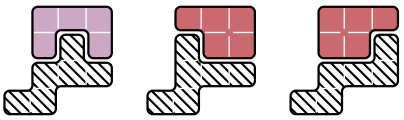
Bottom left :



Bottom right :



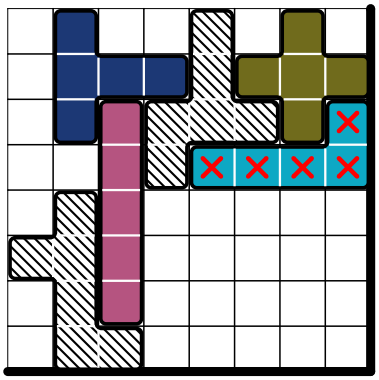
Upper right :



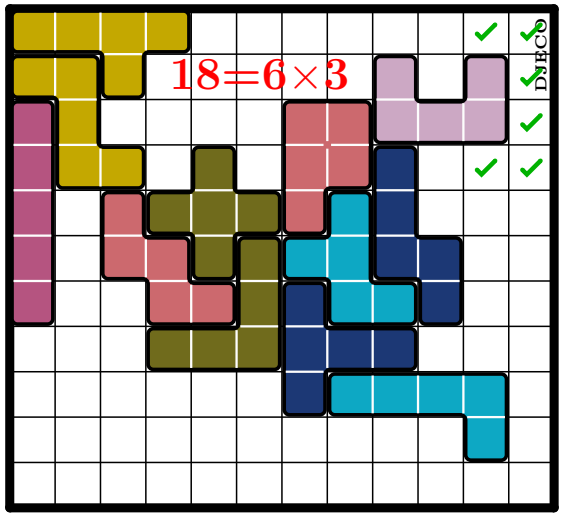
The bigger area contains 34 squares, thus 2 pentominoes and 4 hexominoes, including the long pink bar. This area seems easier to fill up to me, due to its shape which is more constraining.

19 The two areas with size 24 contain hexominoes only and are easy to fill up. But the area of size 25 is way harder to fill. Using uniqueness we can know the blue L pentomino is not as depicted, otherwise we would have a 4×5 rectangle which of course can be filled in 4 ways due to symmetries which would contradict uniqueness.

19



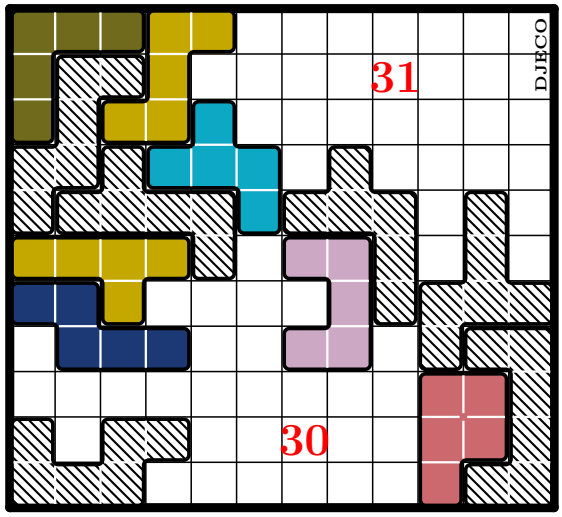
20 This cool position in which all hexominoes are touching the border of the board was found by Tick Wang (although you don't need to know it to solve the puzzle).
We must place all 12 hexominoes in the big area. But we see the upper right corner is quite narrow, so if we start counting the squares (here starting from top) in multiples of 6, it will give us the beginning of the hexomino to place in the narrow part.
Aside you can see green ticks giving the shape of the hexomino found by this method.



20

24 Again a challenge which can be solved more easily by counting the number of squares in each area. We start by placing the correct hexomino in the 6 squares center zone. Then the left area contains 30 squares, hence 6 pentominoes or 5 hexominoes. But since only 4 hexominoes are left, then this area finally contains 6 pentominoes. Lastly, the right area contains 34 squares, hence 2 pentominoes and 4 hexominoes.

25 In this challenge we have 4 areas. The two smaller zones are easy to fill up. When it is done we are now faced with one area of 30 squares and one area of 31 squares, and we have 5 pentominoes and 6 hexominoes left to place. Try as hard as we can, we can not decompose 30 squares to include a number of pentominoes in [1 ;5], thus we can deduce that the area of 30 squares will contain 5 hexominoes! The area of 31 squares will then contain the pentominoes and the remaining hexomino, but we don't yet which one, so the strategy is to start with the 30 squares area!



25

Other challenges that will use this kind of reasoning are : 21, 29, 31, 33, 36, 37, 38, 40, 44...

35 The bottom area has size 30, but it cannot be made of 6 pentominoes because there are not that many still left. So it is 5 hexominoes.

42 The bottom up area has size 30. But since the blue T and the yellow bar are already placed, there's only one possibility to place a piece in the T shaped hole, thus we know the bottom up area contains only hexominoes, and the other area contains only pentominoes.
Also there's only one way to fill the bottom right row with the remaining pentominoes (if the yellow bar or the b&w n were available it would be another story).

50 My advice is to start with the long upper strip. More precisely there are only 3 pieces that can go in the upper right corner with the green cross, but two of them will lead to an impossibility.