# Unit n° 25

Continuation of Unit 24

CoPick

**Polyominoes with isolated holes**

We consider now polyominoes with isolated holes, located in a square grid graph – figs 1 – 9. Isolated means: the perimeter of the holes are not connected with the perimeter of the polyomino (see Fig. 9).

Here are

A – area of the polyomino in grid cell area units

B – number of grid points on the polyomino's perimeter (boundary points)

I – number of grid points inside the polyomino (interior points)

b – number of grid edge elements on the polyomino's perimeter (boundary gee)

i – number of gee inside the polyomino (interior gee)

h – number of isolated holes inside the

polyomino.

With this we have

$$A = i - I - h + 1 \quad . \tag{1}$$

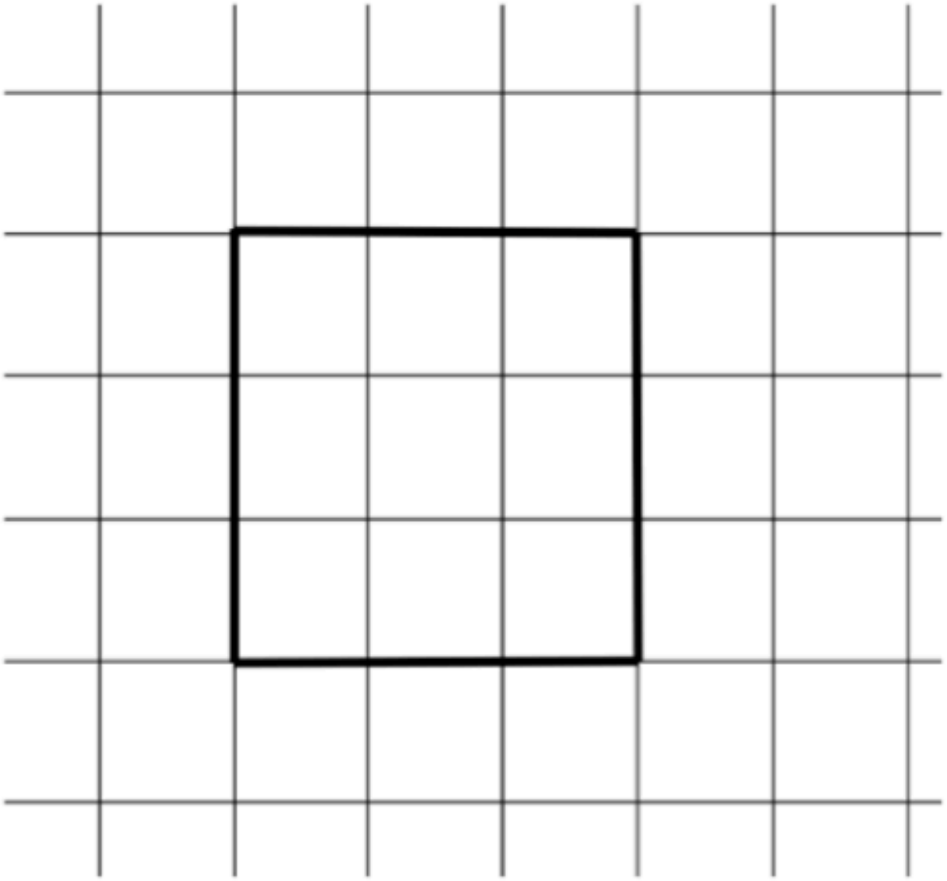



Fig. 1

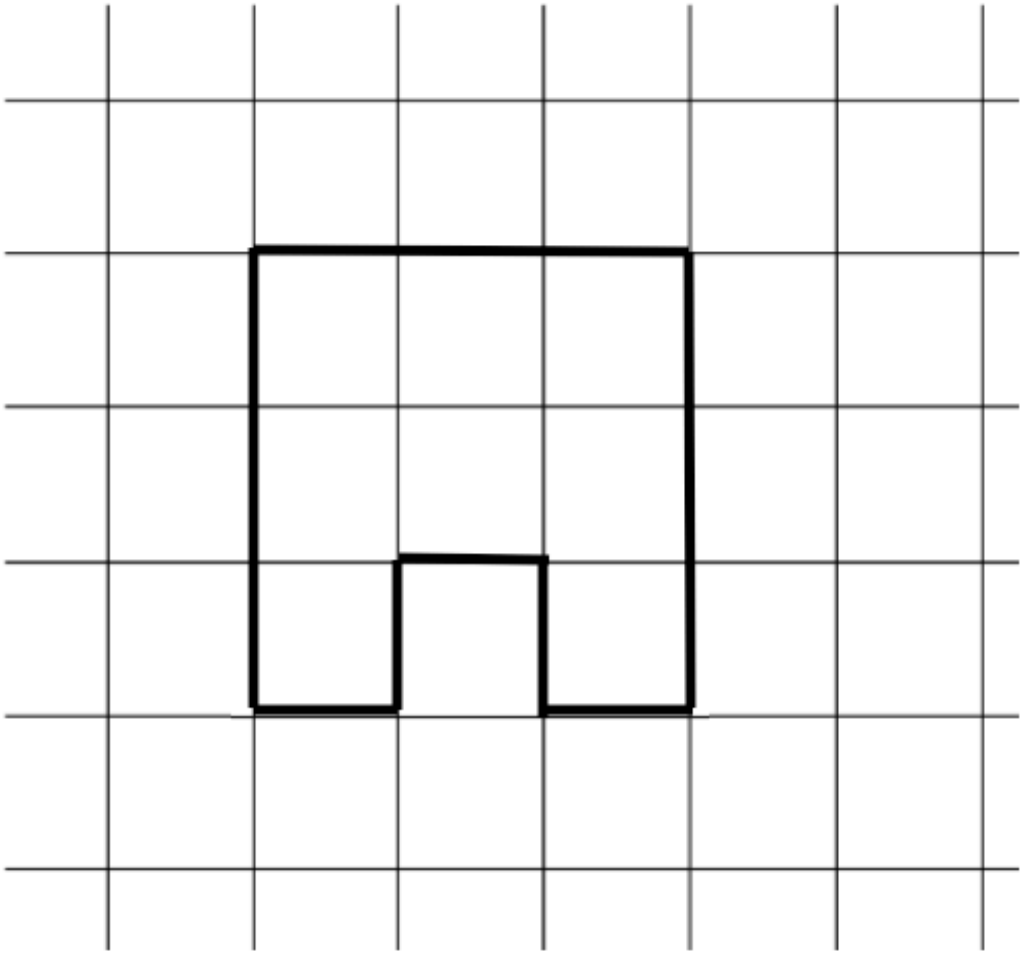



Fig. 2

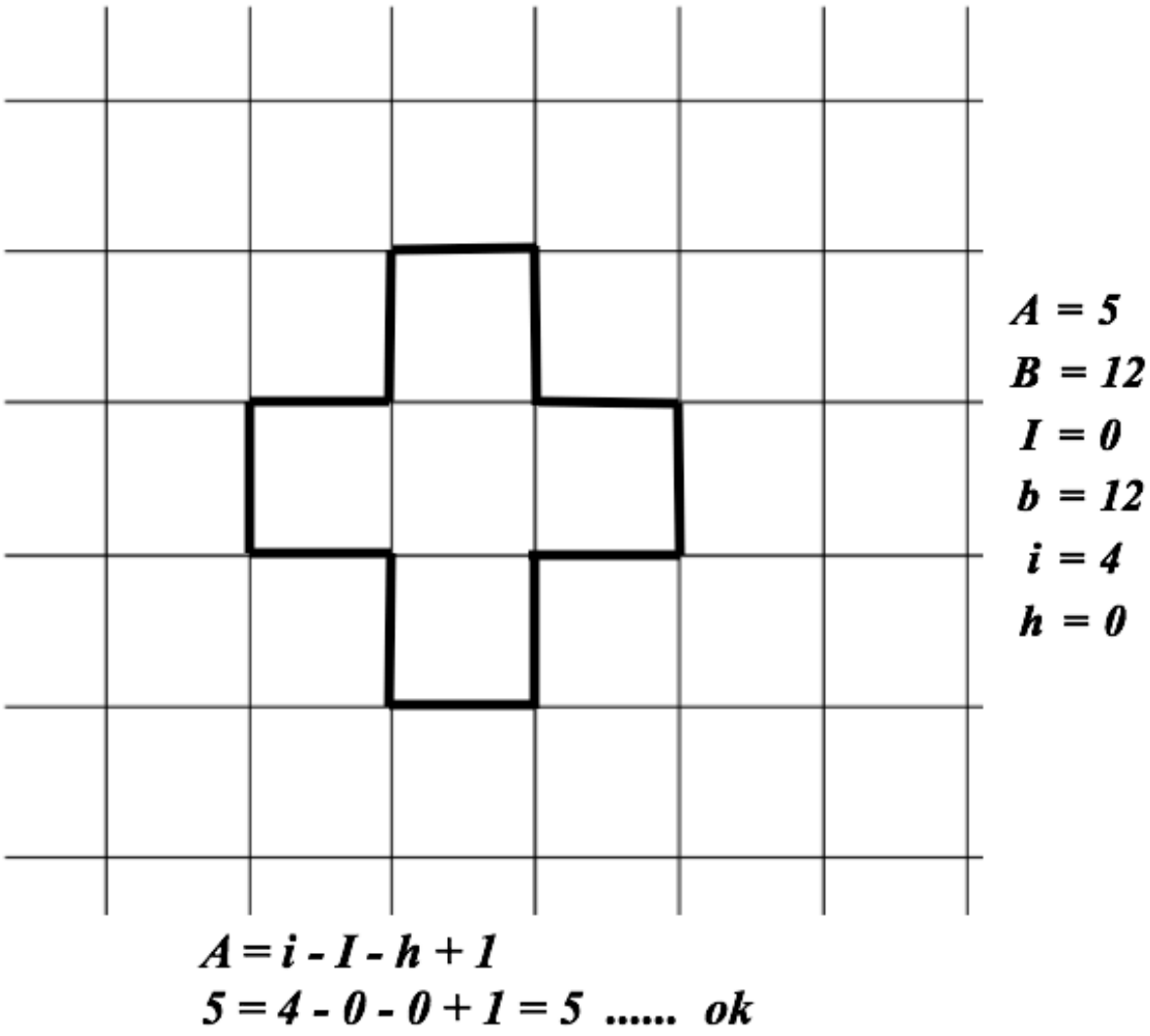
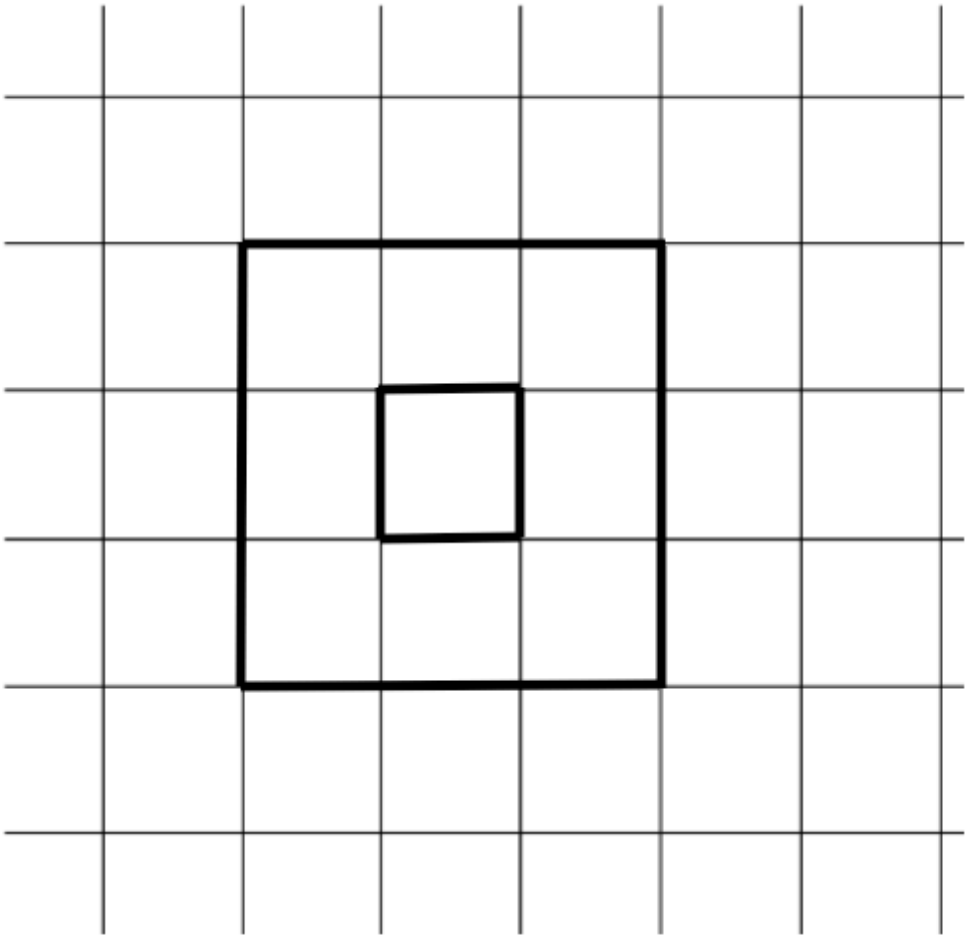



Fig. 3



$A = 8$
$B = 16$
$I = 0$
$b = 16$
$i = 8$
$h = 1$

$$A = i - I - h + 1$$
$$8 = 8 - 0 - 1 + 1 = 8 \quad \ldots\ldots \quad ok$$

Fig. 4

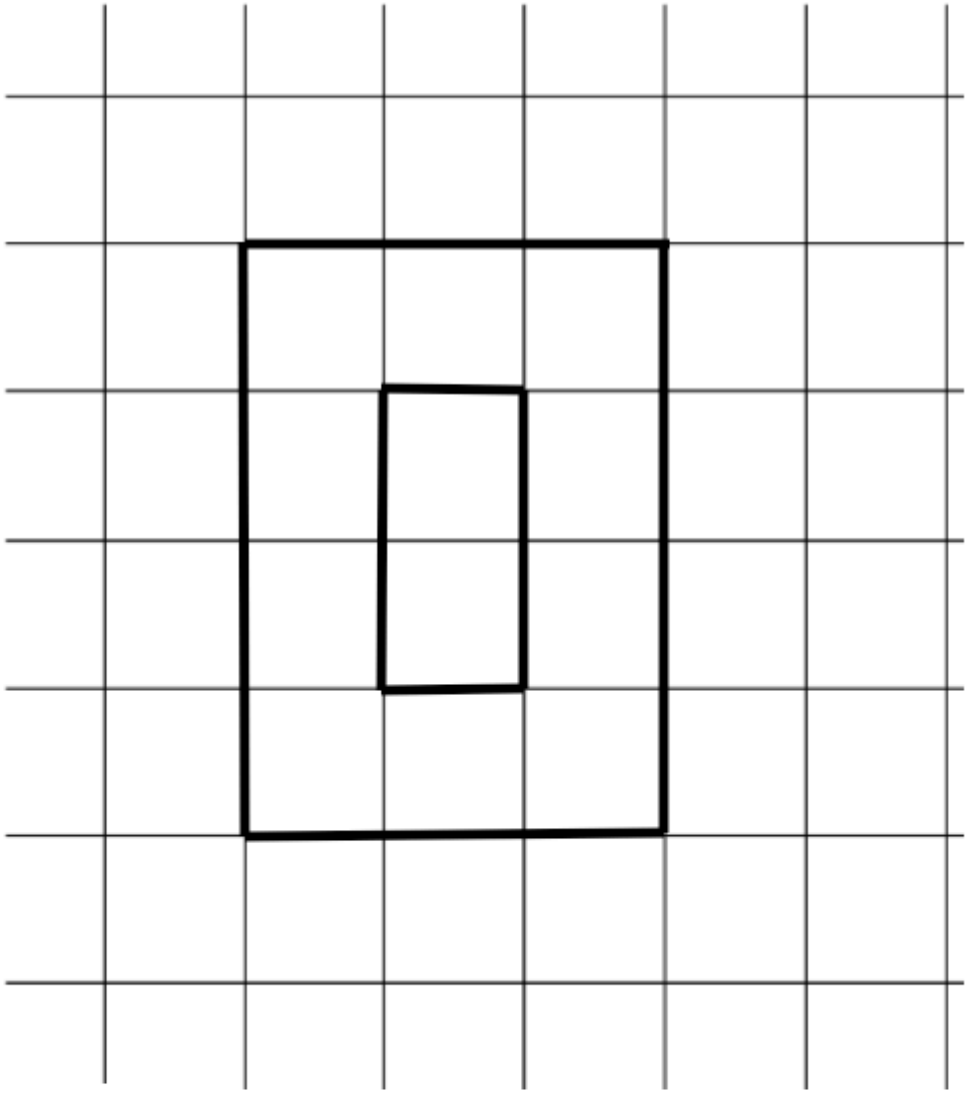
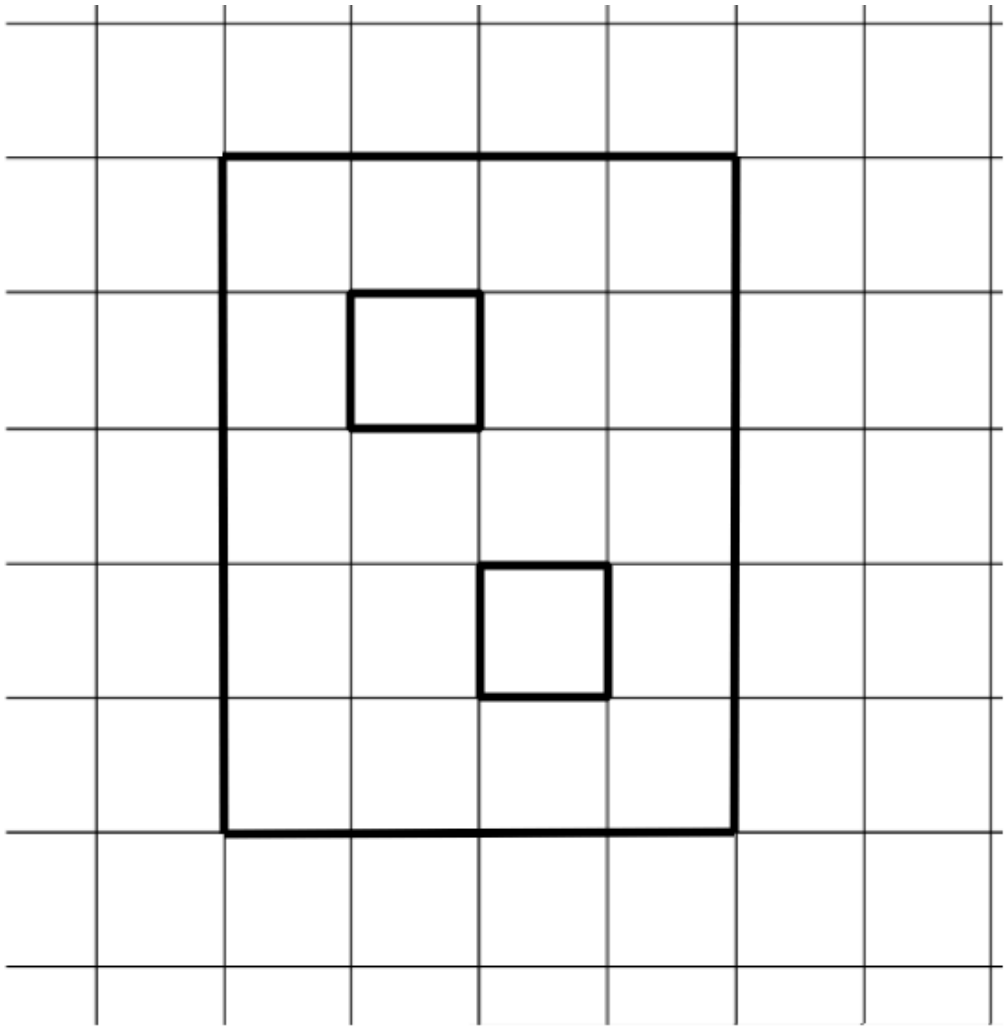


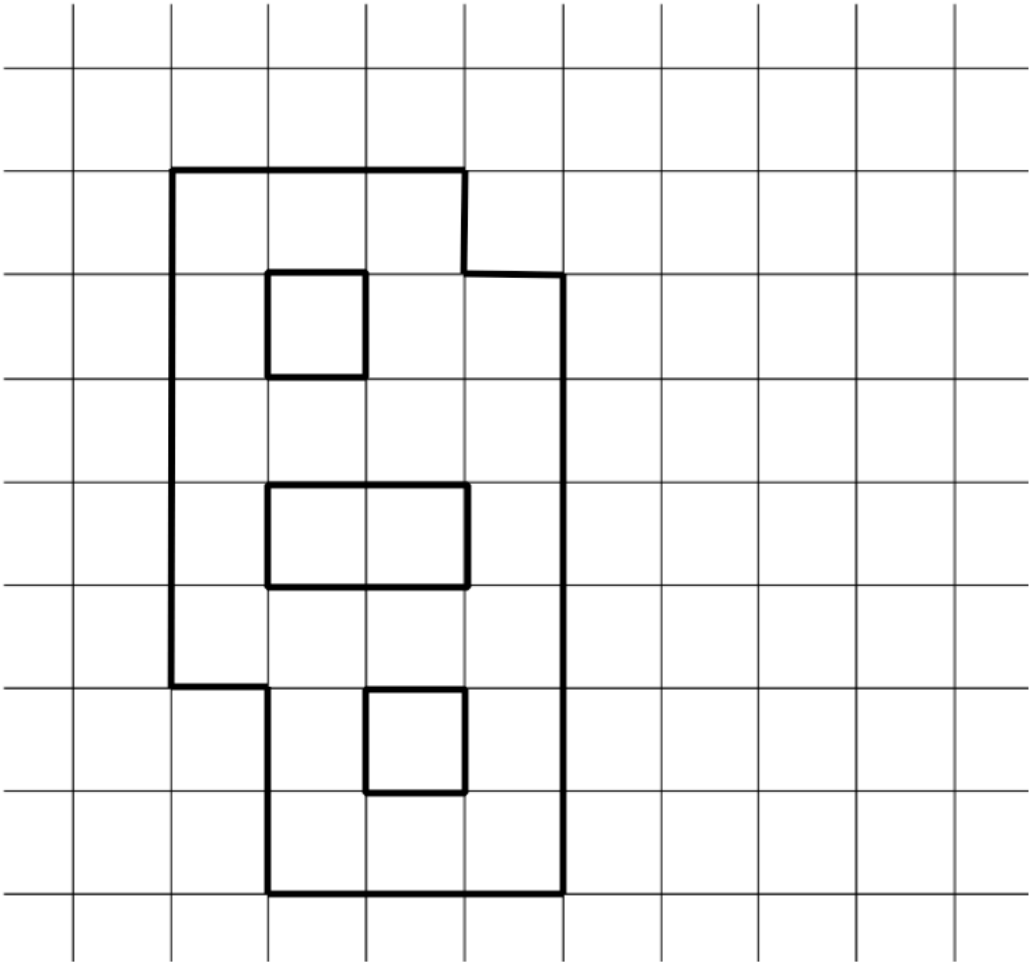

Fig. 5



$A = 18$
$B = 26$
$I = 4$
$b = 26$
$i = 23$
$h = 2$

$$A = i - I - h + 1$$
$$18 = 23 - 4 - 2 + 1 = 18 \quad \ldots\ldots \quad ok$$

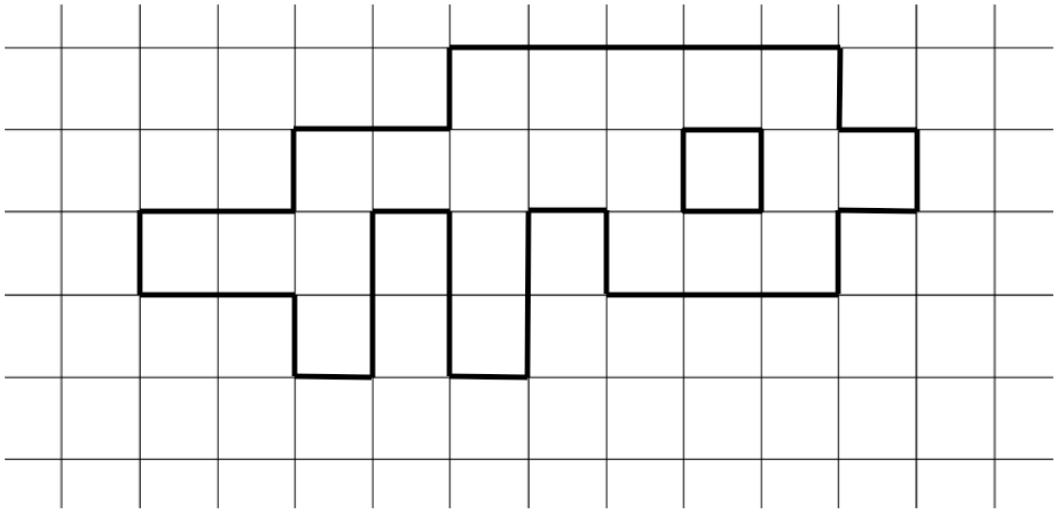
Fig. 6




$A = i - I - h + 1$

$21 = 24 - 1 - 3 + 1 = 21$ ..... ok

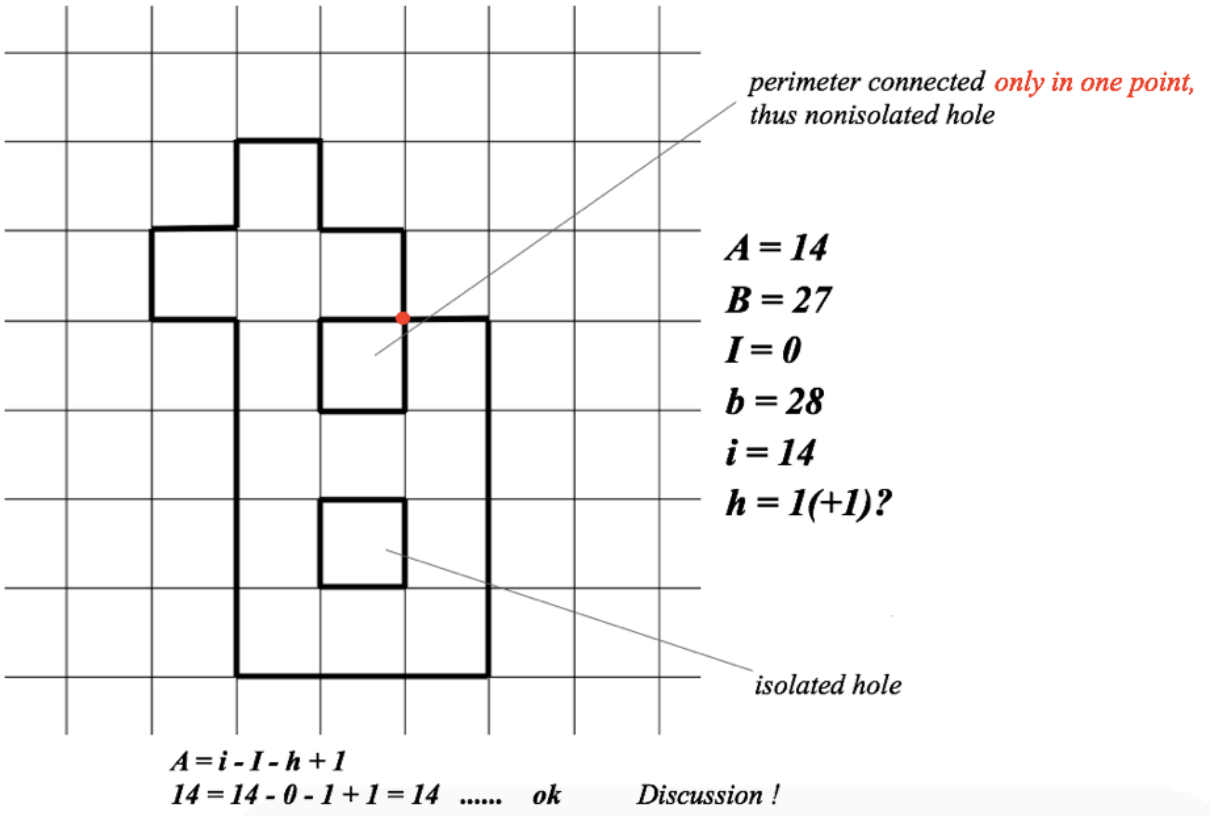
Fig. 7




$A = i - I - h + 1$

$21 = 23 - 2 - 1 + 1 = 21$ ..... ok

Fig. 8




$A = i - I - h + 1$

$14 = 14 - 0 - 1 + 1 = 14$ ..... ok Discussion !

Fig. 9

** Discuss these figs.
** Do there exist counterexamples (see [11])?
** Discuss a connection with [12].
** Extension to 3D.

## Reference:


[1] Weisstein, Eric W. "Polyomino." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/Polyomino.html
[2] https://en.wikipedia.org/wiki/Polyomino
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[5] https://en.wikipedia.org/wiki/Lattice_graph
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[7] Weisstein, Eric W. "Pick's Theorem." From *MathWorld*--A Wolfram Web Resource.
http://mathworld.wolfram.com/PicksTheorem.html
[8] https://en.wikipedia.org/wiki/Pick%27s_theorem
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[11] http://www-math.uni-paderborn.de/~aggathen/vorl/2002ws/mac/Zwoelfte-Vorlesung.pdf
Pick-Gegenbeispiel
[12] http://encyclopedia2.thefreedictionary.com/transfluxor
Transfluxor
A magnetic core having two or more apertures and three or more legs for flux; used as a computer memory element, crossbar switch, channel commutator, or control element.
Component in the computer history, how about a transformation into any future technology?