Finding Pick's formula	Season	3
	Episode	01
	Time frame	1 period

Objectives :
- Experiment on a lattice to find Pick's formula.

Materials :
- *Fact sheet about Pick's formula.*
- *Empty lattice.*
- *Beamer about Pick's formula.*
- *Paper for posters.*

1 – Trying to find the formula 45 mins

Students work in teams of 3 or 4. They are given an empty lattice each and some hints on how to experiment. Other hints may be asked from the teacher if no progress is made.

2 – Formula and examples 10 mins

The formula is given by the teacher, with a few examples of its use.

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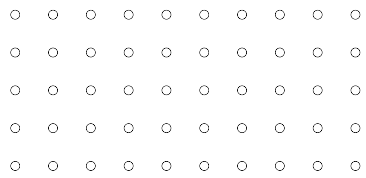
Definition 1

A lattice is a square grid, a discrete surface with a regular gap between any two points. A simple example is the set of the points with whole coordinates on a coordinate graph.

Example :



Consider a lattice. We can draw in this lattice some polygons whose vertices will be some of the lattice's points. *Pick's theorem* provides a simple formula for the area of any such polygon[1].

Definition 2

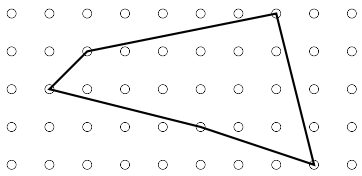
For any polygon P in a lattice, we note B_P the number of points on its border and I_P the number of points strictly inside the polygon. The area of the polygon will be noted $\mathscr{A}_P$.

Theorem 1

For any convex polygon P in a square two-dimensional lattice,

$$\mathscr{A}_P = \frac{1}{2}B_P + I_P - 1.$$

Example :



$$\begin{aligned} B_P &= 5 \\ I_P &= 13 \\ \mathscr{A}_P &= \frac{1}{2}B_P + I_P - 1 \\ \mathscr{A}_P &= \frac{5}{2} + 13 - 1 \\ \mathscr{A}_P &= \frac{29}{2} \end{aligned}$$

1. Inspiration for this chapter comes from *Another Fine Math You've Got Me Into...* by Ian Stewart, a highly recommended book for anyone interested in recreational but serious and thought-provoking mathematics.

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