**Pick's Theorem**

Georg Alexander Pick (1859-1942) was an Austrian mathematician who earned his Ph.D. in 1880 from the University of Vienna. He is credited with having published 67 mathematical papers and worked with such people as Konigsberger, Weyl, Klein, Einsten, and others. He is best known for the following theorem which bears his name:

Given a simple polygon constructed on a grid of equal-distanced points such that all the polygon's vertices are grid points, the area (A) of the simple polygon is given by

A = $i + \frac{b}{2} - 1$ where *b* is the number of grid points on the boundary of the polygon and *i* is the number of grid points in the interior of the polygon.

How does Pick's formula compare with the formula you created?

Perhaps we should name this theorem after you!!!!! (Sorry, Georg Pick found it before you.)

**NOTE:** Georg Pick died in Theresiendstadt concentration camp in 1942.

**Extensions**

True or False?: The area of any parallelogram whose vertices are lattice points is a whole number.

What happens to the area of the figure if we fix the number of interior pegs and increase the boundary pegs by 1? What happens to the area of the figure if we fix the number of boundary pegs and increase the interior pegs by 1? Can we describe this mathematically?

Note: A = a(Number of Boundary Pegs) + b(Number of Interior Pegs) + c

 = a*b* + b*i* + c

Create three arbitrary lattice polygons and fill in A, *b,* and *i*. Solve the system. What do you get?

Try to make an equilateral triangle on the geoboard. How can Pick's Theorem be used to show this is impossible?

**Additional Resources Related to Pick's Theorem:**

Russell, R. Alan. 2004. "Pick's Theorem: What a Lemon!" *Mathematics Teacher* 97 (5): 352-355.

Russell, Alan R. *Rediscovering the Patterns in Pick's Theorem.* NCTM Illuminations. https://illuminations.nctm.org/lesson.aspx?id=2083

Su, Francis E., et al. "Pick's Theorem." *Math Fun Facts*. http://www.math.hmc.edu/funfacts