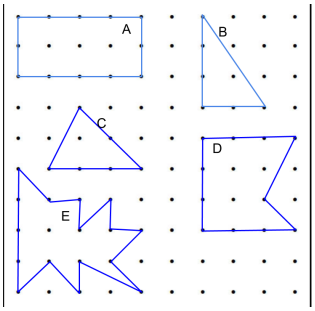
Lattice Polygons[1]

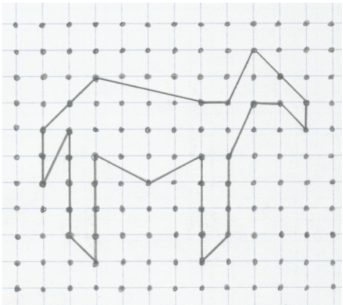
1 Pick's Theorem

1. For each of these shapes, record
   (a) I = the number of lattice points (dots) inside the shape
   (b) B = the number of lattice points on the boundary of the shape
   (c) A = the area of the shape



Shape	I	B	Area
A			
B			
C			
D			
E			
F			

2. Do you notice any patterns between area, I, and B?
3. If a shape has $I = 3$ and $B = 4$, can you predict its area?
4. Find the area of this horse.

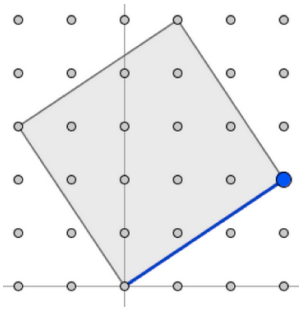


5. How many ways can you make change for a dollar using only dimes, nickels, and pennies? Using dimes, nickels, pennies, and quarters? Hint: chart out the options of dimes and nickels on lattice paper.

[1] *Geometry: A Guide for Teachers, Mathematical Circles Library* by Judith and Paul Sally.

2 Lattice Squares

1. Assume each square of the graph paper has area 1. Draw a lattice square with
   (a) area 1
   (b) area 4
   (c) area 36
2. Is it possible to draw a lattice square with
   (a) area 2?
   (b) area 3?
   (c) area 5?
3. What is the area of this square?



4. What numbers are possible for the areas of lattice squares?

Area	Possible?	Area	Possible?	Area	Possible?
1		11		21	
2		12		22	
3		13		23	
4		14		24	
5		15		25	
6		16		26	
7		17		27	
8		18		28	
9		19		29	
10		20		30	