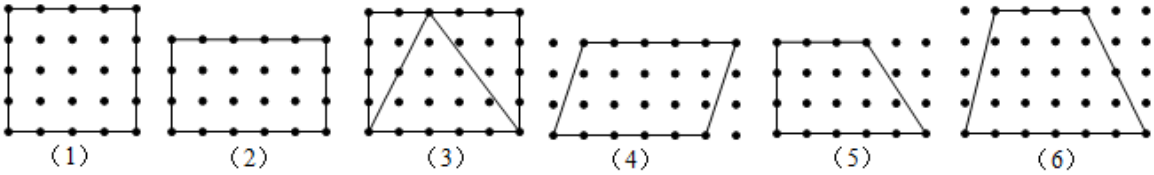
Day 6

1 Observe the figures below.The area of each square in the grids is 1. Fill in the table and find the pattern.



Shape	Number of Points Interior	Number of Points on the Sides	Area
Square			
Rectangle			
Triangle			
Parallelogram			
Right Trapezoid			
Trapezoid			

Answer

Shape	Number of Points Interior	Number of Points on the Sides	Area
Square	9	16	16
Rectangle	8	16	15
Triangle	7	8	10
Parallelogram	10	12	15
Right Trapezoid	7	12	12
Trapezoid	13	12	18

For a lattice polygon,

$A = \frac{B}{2} + I - 1$,

A = Area of the lattice polygon;

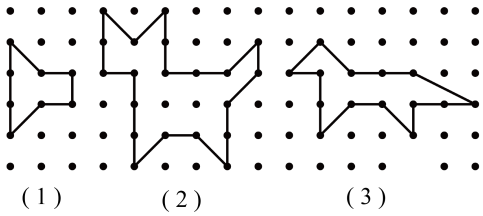
B = Number of Points on the Sides;

I = Number of Points Interior.

That is exactly the application of Pick Theorem.

Solution N/A

2 As shown in the figure below, the area of each grid is 1. What are the areas of these shapes, respectively?



Answer $A_1 = 3$; $A_2 = 11$; $A_3 = 6$

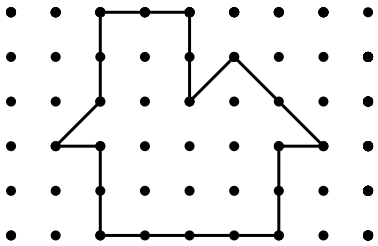
Solution Method 1: Count the unit square with an area of 1 and unit triangle with an area of 0.5, then add them up.

Method 2: The three shapes are all lattice polygons. Find the Numbers of Interior Points and Boundary Points of each shape, and use the value into Pick Theorem.

Shape	Number of Interior Points	Numbers of Boundary Points
(1)	0	8
(2)	2	20
(3)	0	14

$A_1 = 3$; $A_2 = 11$; $A_3 = 6$

3 As shown in the figure below, the area of each grid is 1. What is the area of the shape?

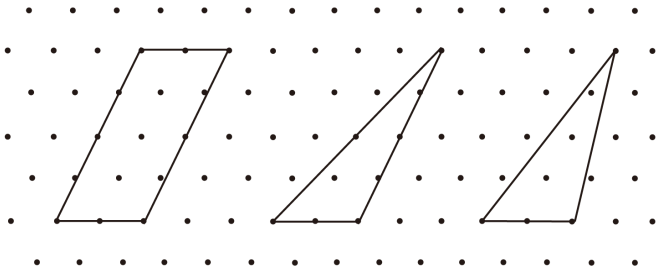


Answer 18

Solution Method 1: DIvide the figure into a 2×2 square, a 4×3 rectangle, two identical small triangle and a big triangle. Then we can get the area is $4 + 12 + 0.5 \times 2 + 1 = 18$.

Method 2: By Pick Theorem, $S = 9 + 20 \div 2 - 1 = 18$.

4 As shown in the figure below, the area of an equilateral triangle made by three neighboring points is 1. Fill in the form.



(1) (2) (3)

Shape	Number of Points Interior	Number of Points on the Sides	Area
(1)			
(2)			
(3)			

Answer

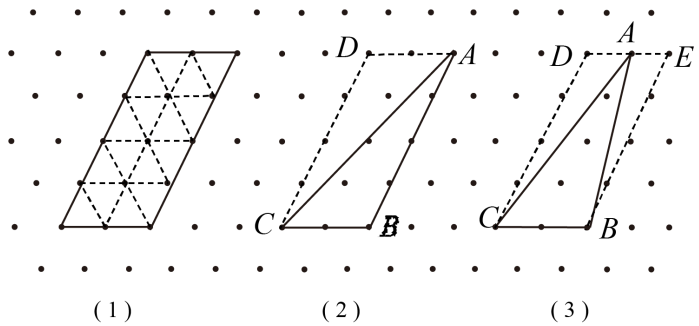
Shape	Number of Points Interior	Number of Points on the Sides	Area
(1)	**3**	**12**	**16**
(2)	**1**	**8**	**8**
(3)	**3**	**4**	**8**

Solution Method 1: Count the equilateral triangles.

(1) The parallelogram consists of 16 equilateral triangles, so the area of the parallelogram is 16.

(2) Area of $\triangle ABC$ = Area of parallelogram $ABCD \div 2 = 16 \div 2 = 8$.

(3) Area of $\triangle ABC$ = Area of parallelogram $ABCD \div 2 = 16 \div 2 = 8$.



(1) (2) (3)

Method 2: Count the number of the interior and the boundary points of the three shapes respectively and input the value into Pick Theorem.

This time the formula is:

for a lattice polygon in the triangular grids,

$A = (\frac{B}{2} + I - 1) \times 2$,

$A =$ Area of the lattice polygon;

$B =$ Number of Points on the Sides;

$I =$ Number of Points Interior.

That is exactly the application of Pick Theorem.

Shape	Number of Interior Points	Number of Boundary Points	Area
(1)	3	12	16
(2)	1	8	8
(3)	3	4	8